Durham County, NC
Chin Page Road Pump Station

CWSRF Engineering Report and Environmental Information Document

Project Number CS370575-04

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CDM Smith

Section 1
Executive Summary

Durham County (County) owns and operates over 100 miles of sewer collection system that serves over 14,000 residential customers and approximately 1,900 non-residential customers. The system consists of approximately 105 miles of gravity sewer and 11 miles of force main, as well as 13 pump stations. Of this, 61 miles of gravity sewer and 1.3 miles of force main are within the Stirrup Iron Creek Sewer Basin.

The Stirrup Iron Creek Basin (SICB) services residential, commercial, and industrial users and collects wastewater in the Stirrup Iron Creek Pump Station (**Figures 1.1** and **1.2**). The Stirrup Iron Creek Pump Station (SIC PS) is the largest pump station that serves the basin with a permitted capacity 6.5 million-gallons-per-day (MGD). To meet the increasing demand due to growth and development, the SIC PS has been upgraded continuously. According to the County, the SIC PS last underwent a major upgrade in 2018, with the expectation that flows in the basin would increase by 100,000 gallons-per-year (gpy) and the upgrades would allow the basin to provide adequate service for the next 10-15 years. However, the County has been approving 400,000 – 500,000 gpy of new flow in the basin, making the upgrades only adequate for approximately 3 years. Therefore, the pump station will quickly exceed its capacity.

A recently completed preliminary engineering report by AECOM included modeling of the sewers in the basin for the current and projected flows. The study indicated that by restoring service at the ~~existing~~ historical General Electric Pump Station (GE PS) on Chin Page Road within the SICB, future additional flows to the SIC PS could be reduced by effectually splitting the SICB into two separate basins. **Table 1.1** below shows the flows expected at the SIC PS and GE PS with the GE PS back in service.

Table 1.1 Anticipated Flows for the Stirrup Iron Creek Basin[1]

	SIC PS		GE PS	
Loading Scenario	Average Flow (MGD)	Peak Flow (MGD)[2]	Average Flow (MGD)	Peak Flow (MGD)[2]
Existing	0.41	1.11	0.96	2.60
Future	1.17	3.15	1.76	4.74
Buildout	3.08	8.33	3.79	10.22

1. Flows are based on Table 11 included in Appendix A

2. Peak flows were determined by multiplying the average flows by a peaking factor of 2.7

Initial average and future flows expected to flow to the GE PS (estimated based on flows permitted by the County as of 2020) are estimated to be 1.8 mgd and 4.7 mgd, respectively, with a future peak flow of 10.2 mgd projected at buildout as shown in Table 1.1. This is over half of the expected peak buildout flow of 18.55 MGD for the whole basin.

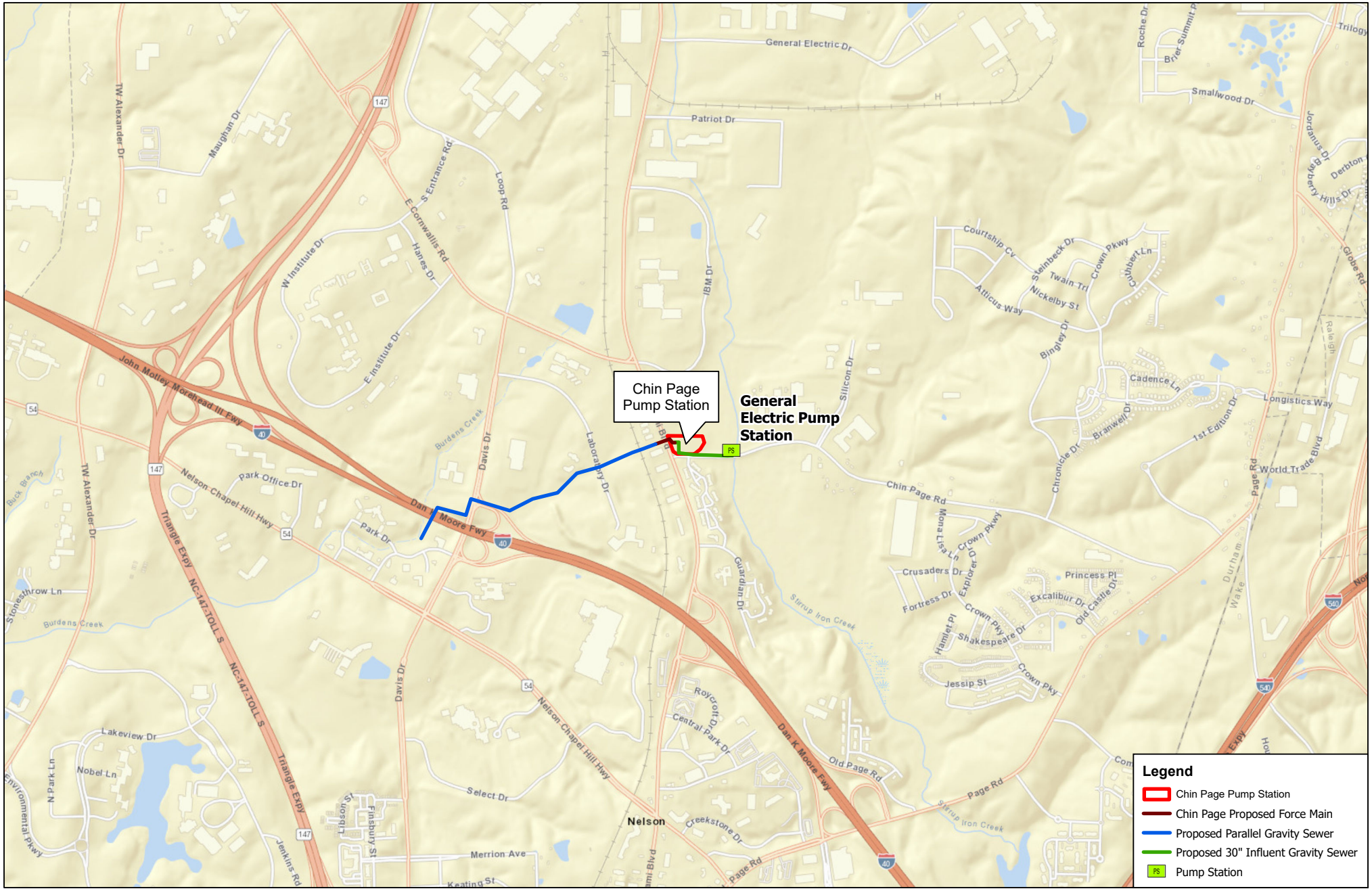
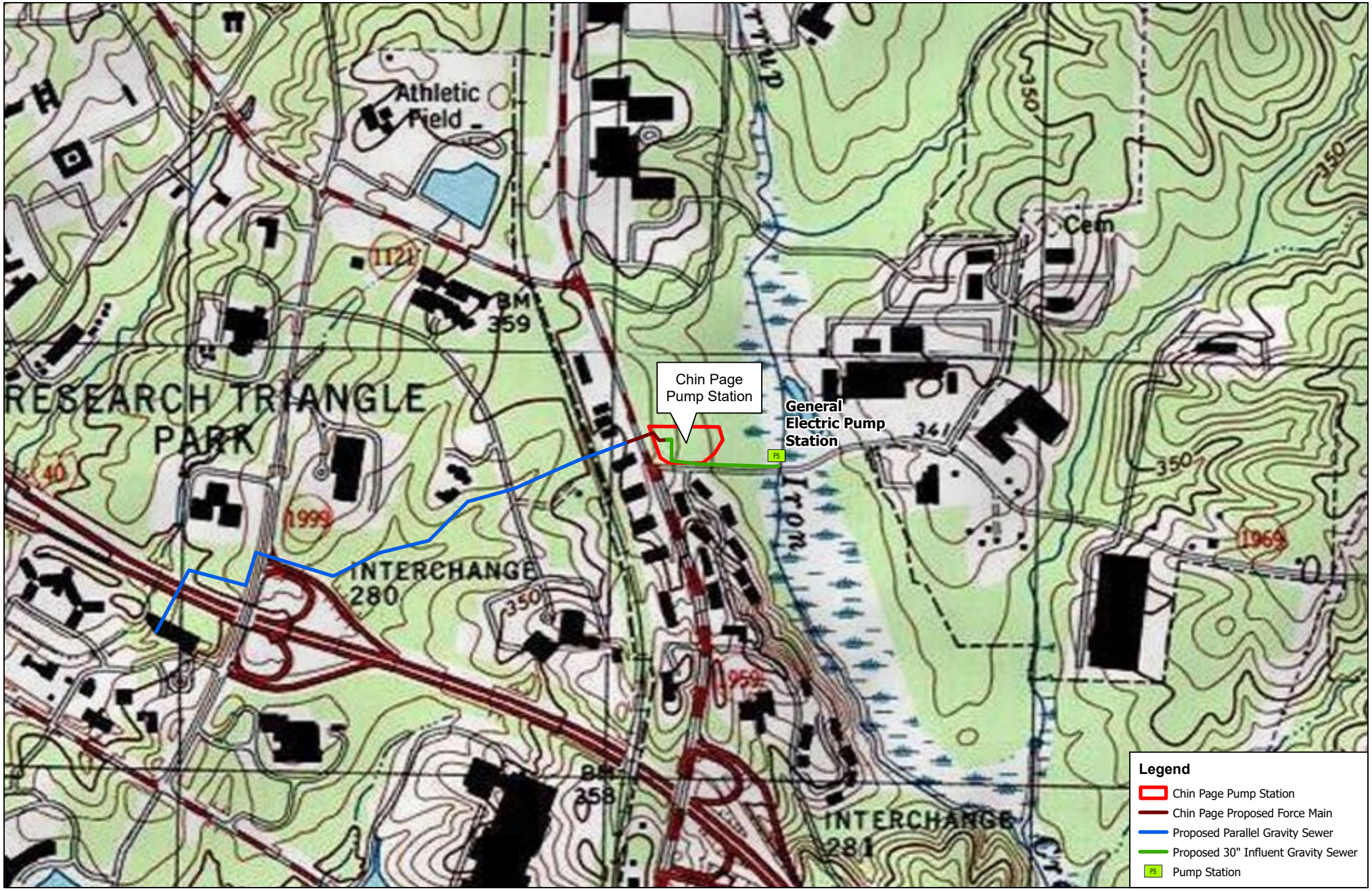


Figure 1
Project Vicinity Map
Durham County - Chin Page Pump Station
Durham, North Carolina



N

0 500 1,000 2,000 3,000 Feet

1 inch equals 1,000 feet

Figure 2
Project Location Map
Durham County - Chin Page Pump Station
Durham, North Carolina

The GE PS is not currently in service, and has not been in service for several decades, although the wetwell still remains in place. Further, because the GE PS is within the 100-year flood plain, the environmental impacts of bringing the station into service in place are undesirable. Previous correspondence with Christyn Fertenbaugh with the North Carolina Division of Water Resources had entertained the possibility of reinstating the pump station in place, although no formal engineering or alternatives analysis had been yet completed at the time. At nearly 50 years old, the pump station is beyond its useful life. Space constraints further prevent a new pump station from being constructed onsite. In addition, the AECOM study (**Appendix A**) determined that expansion of the existing SIC PS to increase the capacity was not a viable alternative given capacity limitations and head constraints imposed by the existing 18-inch diameter force main.

Therefore, the purpose of the proposed project is to:

1. Remove the existing GE PS from within the 100-year flood plain and replace it with a new pump station (Chin Page Road Pump Station) outside of the 500-year flood plain;
2. Address capacity limitations of the wastewater collection system within the SICB; and
3. Minimize the potential for future SSOs.

The proposed project involves intercepting flow near the GE PS, which is currently bypassed with flow going to the SIC PS, and constructing a new pump station outside the 100-year flood plain to address capacity limitations within the sewer collection system due to ongoing growth. Flow previously conveyed to this station will be redirected and conveyed through a new 30-inch gravity sewer installed along an existing easement owned by the County to a new pump station site (referred to as the Chin Page Road Pump Station) located at the intersection of Chin Page Road and South Miami Boulevard. With the proposed pump station in place, sewer flows historically flowing past the GE PS, including sewer flow from the Triangle Development, Ashley Forest, and Stirrup Creek neighborhoods, will longer flow to the SIC PS. Because the new Chin Page Road Pump Station essentially replaces the GE PS, projected flows are equal to the flows projected for the GE PS as shown in Table 1.1.

The primary components for the new Chin Page Road Pump Station are as follows:

- Approximately 1,000 linear feet (LF) of 30-in gravity sewer to divert flow from the out-of-service GE PS to the new Chin Page Road Pump Station;
- A new triplex submersible pump station, with two pumps initially installed and provisions for a third pump to address future flows. Pumps will be equipped with variable frequency drives (VFDs) to minimize fluctuations in flow on the downstream collection system and minimize energy consumption. The wet-well will be equipped with a grinder to mitigate clogging of the pumps due to stringy debris and material present in the wastewater.
- A valve vault
- A meter vault with a magnetic flow meter
- Electrical equipment housed in a pre-engineered building
- Stand-by electrical generator with sound attenuation

- Liquid phase odor control system
- Approximately 500 LF of new, 24-in discharge force main across S Miami Blvd via bore-and-jack or horizontal directional drill (HDD) construction, and
- Approximately 4,000 LF of 30-in gravity sewer, running parallel to an existing gravity sewer, to connect to a new 30-in gravity sewer (by others).
- Demolition or abandonment of the existing GE PS.

The pumps will be controlled using a submersible pressure transducer housed in a stilling well. VFDs will control the pump speed to maintain an operator adjustable wet-well level.

No significant environmental impacts were identified related to the constructing the new Chin Page Road Pump Station. Mitigative measures, such as obtaining the required permits and utilizing sediment and erosion control measures, will be employed to minimize any potential direct environmental impacts to the project area. Secondary and cumulative impacts will also be minimized by adhering to the City of Durham and Durham County Unified Development Ordinances. The majority of the impacts to the environment caused by the construction of the new Chin Page Road Pump Station will be temporary. A small (0.25 ac) portion of the area will be used as the permanent site for the pump station, its electrical control room, its odor control, and access road. Topography changes and forested area loss are anticipated.

Durham County received a letter of intent to fund (LOIF) in March 2022 for a 100 percent Clean Water State Revolving Fund (SRF) loan amount of $19,298,025 at a specified interest rate of 1.16% based on the Opinion of Probable Construction Costs completed as part of the County's SRF application in September 2021. The 20-year loan has a 2% loan fee, or approximately $386,000. Updated costs were developed for the project as part of this 2022 Engineering Report due to changes in market costs, resulting in increased projected capital costs of the project from approximately $15,106,000 to $18,682,000 including contingency.

Costs were updated again in 2024, with a further increase in capital cost to $23,843,500 as market costs continue to evolve. The City intends to seek approval from the grant management unit for an additional 10% increase to their current funding amount of $19,298,025, thereby increasing the loan amount to $21,227,828. The remaining funding required will come from local funds (Enterprise Fund).

~~No other funding source has been requested.~~ The current estimated total present worth of the project is approximately $24.4 million, which includes an estimated capital cost of approximately $23.8 million and an estimated present worth of annual O&M costs (years 1 to 20) of approximately $0.60 million. No replacement costs are anticipated in the first 20 years of the new pump station and pipeline lifetime.

Section 2
Current Situation

Durham County owns and operates over 100 miles of sewer collection system that serves over 14,000 residential customers and approximately 1,900 non-residential customers. The system consists of approximately 105 miles of gravity sewer and 11 miles of force main, as well as 13 pump stations. Of this, 61 miles of gravity sewer and 1.3 miles of force main are within the Stirrup Iron Creek Sewer Basin. **Figure 2.1** shows the wider project area, and **Figure 2.2** shows the proposed project location.

Table 2.1 provides an overview of the Stirrup Iron Creek Basin (SICB). The SICB services residential, commercial, and industrial users and collects wastewater in the Stirrup Iron Creek Pump Station (SIC PS). Two smaller pump stations at Page Park Drive and Page Point also service the basin and ultimately flow to the SIC PS. An out-of-service pump station previously known as both the General Electric Pump Station or the Chin Page Road Pump Station (hereafter referred to as the GE PS) exists on Chin Page Road and also flows to the SIC PS. This pump station is currently bypassed by the gravity sewer lines in the area and flow is conveyed directly to the SIC PS. The SIC PS is the largest pump station that serves the basin with a permitted capacity of 6.5 million-gallons-per-day (MGD).

With the amount of expansion and development occurring within the sewer basin, the SIC PS has been upgraded continuously. The County is in the process of applying for more capacity for this pump station to accommodate the flows experienced in the basin. The pump station is a triplex with 3, 200 HP pumps in service. A fourth 200 HP pump on order for install in 2022 to add further capacity to the pump station. However, the receiving force main downstream of the pump station is limited in its capacity and unable to accept more flow.

According to the County, the SIC PS last underwent a major upgrade in 2018, with the expectation that flows in the basin would increase by 100,000 gallons-per-year (gpy) and the upgrades would allow the basin to provide adequate service for the next 10-15 years. However, the County has been approving 400,000 – 500,000 gpy of new flow in the basin, making the upgrades only feasible for approximately 3 years. Therefore, even with the upgrades to the SIC PS and increases in its capacity, the pump station is still anticipated to be operating at its capacity in the near future and will quickly exceed its capacity.

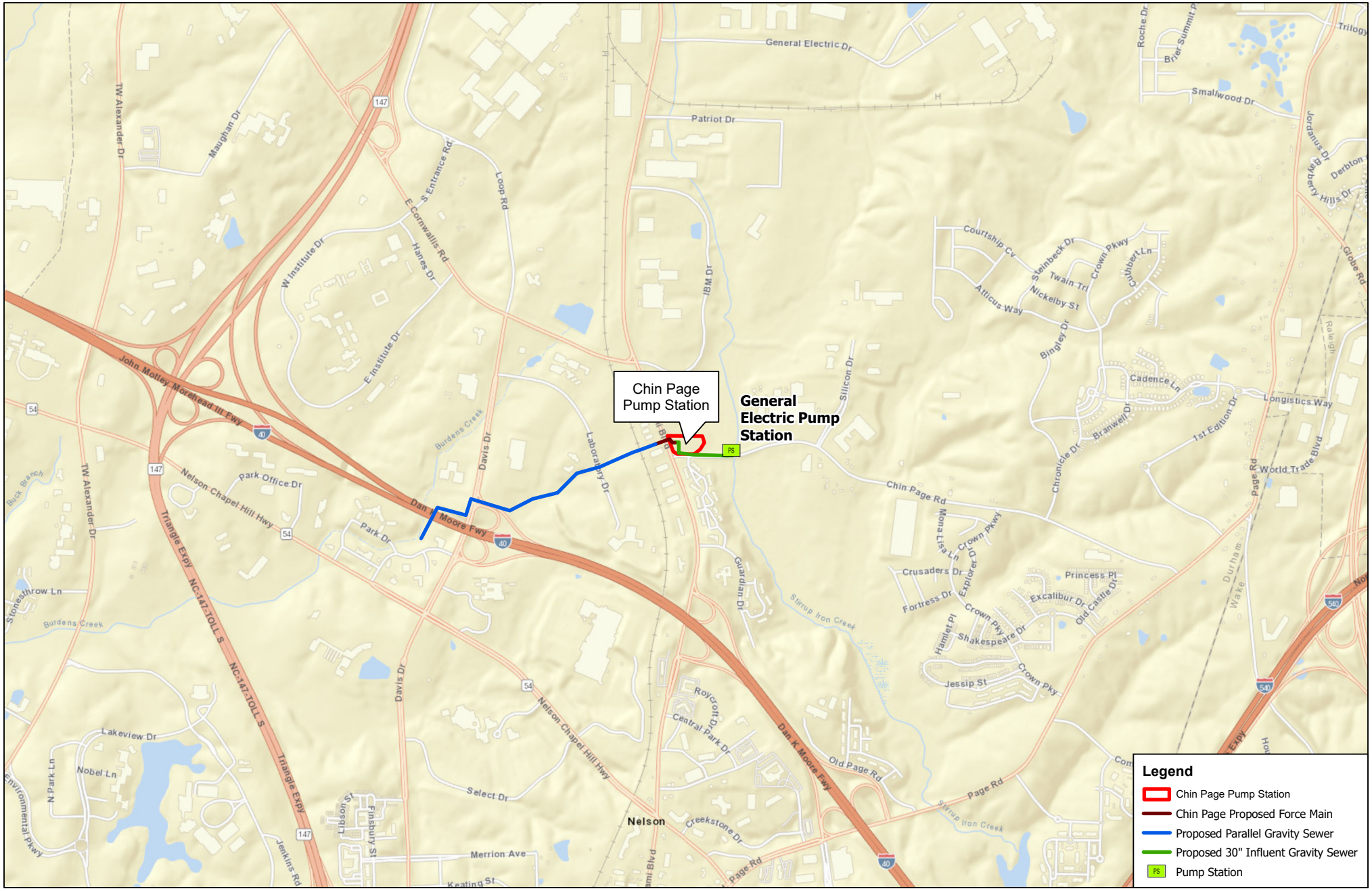


Figure 2.1
Project Vicinity Map
Durham County - Chin Page Pump Station
Durham, North Carolina

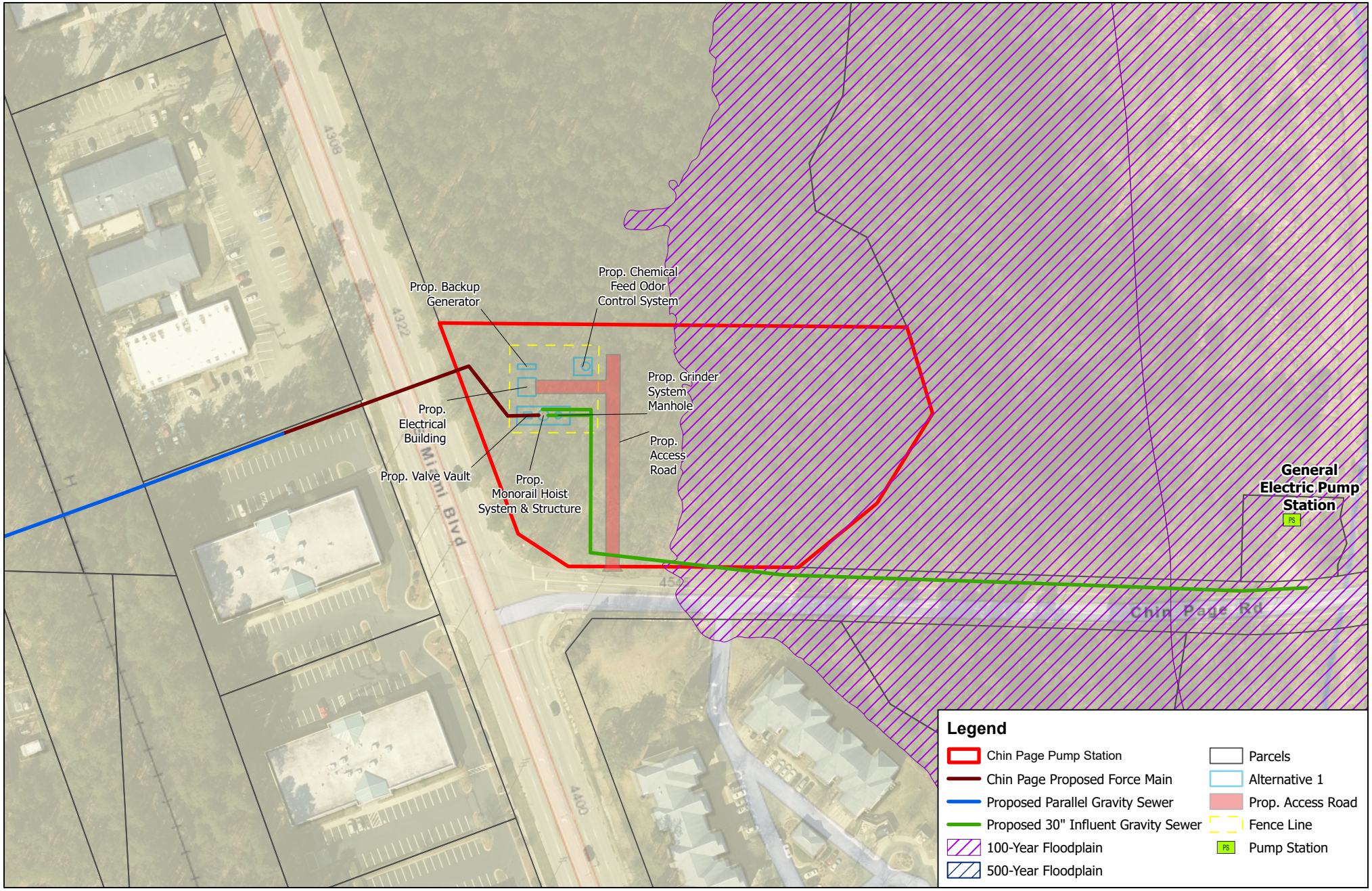


Figure 2.2
Alternative 1
Durham County - Chin Page Pump Station
Durham, North Carolina

Table 2.1 System Overview
Chin Page Road Pump Station
Durham County

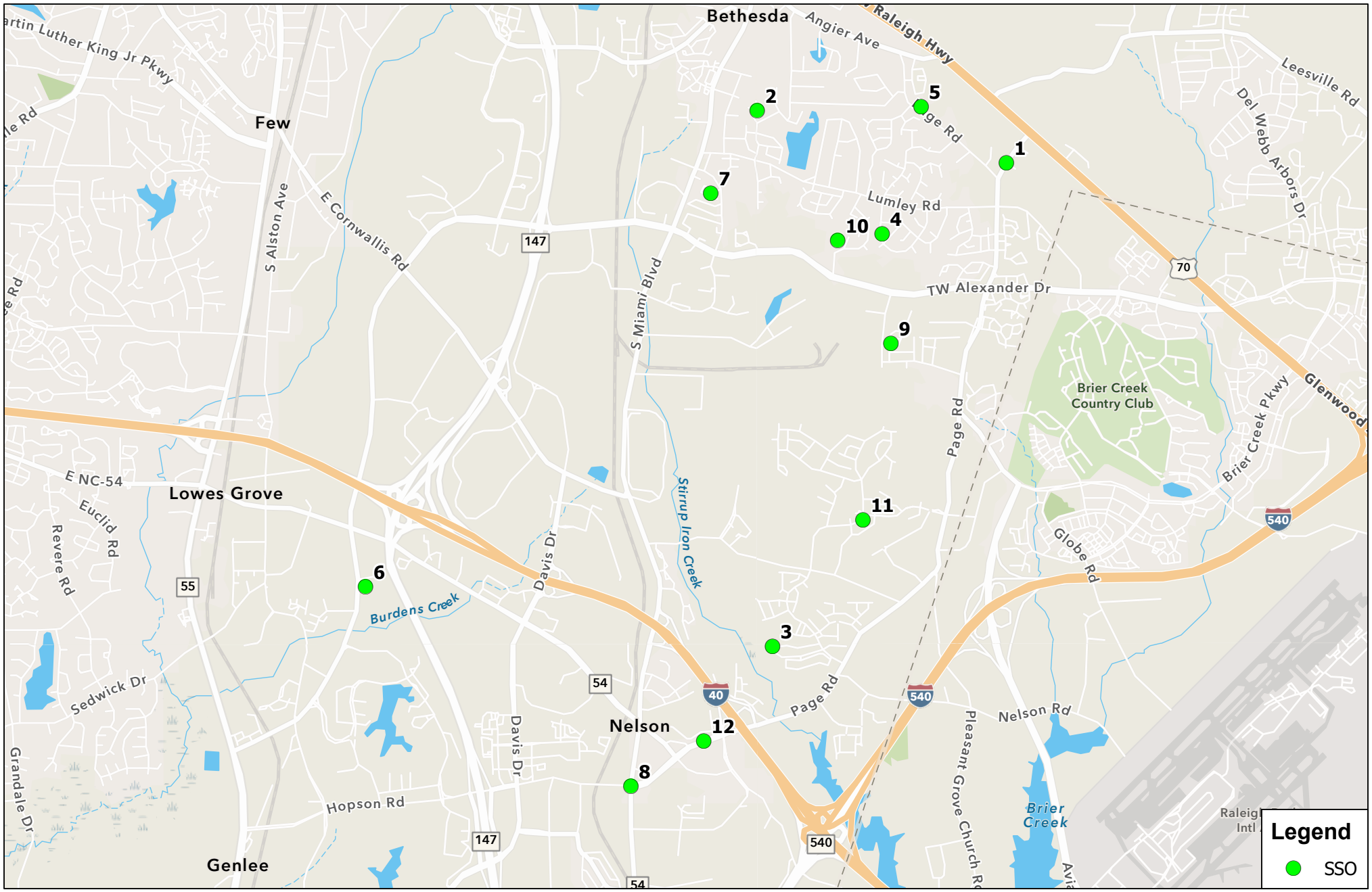
				Appendix reference for figures:	Figure 2.2	
				Appendix reference for supporting information:	Appendix B	
Pump Stations						
Key	Pump Station Name	Capacity (gpm)	Force Main Length (l.f.)	Force Main Diameter(s) (inches)	Force Main Material (if known)	Force Main Age (if known)
	Stirrup Iron Creek	3,500 per pump	9000	18	DIP	unknown
	Page Point Dr	6	3,150	6	PVC	unknown
	Page Park	100	1,600	8	DIP	unknown
	GE Pump Station	NA	NA	NA	NA	NA

Gravity Sewers	
Diameter (inches)	Length
4	(l.f.)
6	31
8	510
10	252,790
12	7,729
15	25,929
16	11,582
18	198
24	13,984
30	4,358
unknown	3,608

2.1 History of Overflows

Table 2.2 below shows the history of Sanitary Sewer Overflows (SSOs) in the SICB since 2017. Copies of the SSO reports can be found in **Appendix C** with locations of the SSOs in the basin shown in **Figure 2.3.**

Table 2.2. SSO Description and Special Orders				
Chin Page Road Pump Station				
Durham County				
Figure number for SSO map:		2.3		
Appendix Number for SSO Reports and Special Orders:		**Appendix C**		
Date	**Location**	**Brief Description of Cause**	**Estimated Amount Spilled (gal).**	**Map Key**
4/17/2020	Litho Way & Page Rd Ext		200	1
3/30/2020	1502 Blue Water Way	grease & debris in line	3,740	2
3/18/2020	5433 Jessip St	grease & debris in line	21,319	3
1/31/2020	3110 Appling Way		100	4
7/31/2019	2007 Page Rd	debris in line	400	5
7/17/2019	105 TW Alexander Dr	VCP failure	418,000	6
6/3/2019	2320 Presidential Dr	grease & roots	300	7
2/6/2019	corner of Miami Blvd & Hopson Rd	ARV leaking		8
10/21/2018	205 Brier Summit Pl	new construction debris	500	9
6/13/2017	Manhole T-11-006, T-11-007	roots & VCP failure	1,101,450	10
5/23/2017	6700 Crown Pkwy	construction debris in line	750	11
3/15/2017	5210 Page Rd	pump station equipment failure	250	12
Does the Applicant have a SOC, pending SOC, Administrative Order or other special order? ☐ Yes, SOC is in place. ☐ Yes, SOC is pending. ☒ No				
If Yes, provide the information discussed in Subchapter 2.1.2 of Part B of the guidance.				
N/A				



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1 inch equals 4,000 feet

Figure 2.3
Stirrup Iron Basin - SSOs
Durham County - Chin Page Pump Station
Durham, North Carolina

2.2 Current Wastewater Flows and Population

According to the United States Census (**Appendix D**), the population for the County as of July 2021 was 324,833. The methodology used to estimate the population in the sewershed service area for the SICB was Method 2 as provided in the Guidance Document. The sewershed covers approximately 8.4 square miles (miles^2) of area, or approximately 3% of the total County area. Durham County is serviced by the Triangle Wastewater Treatment Plant (WWTP).

Table 2.3. Current Population Analysis Method 2 - Large Service Area Chin Page Road Pump Station Durham County	
U.S. Census Place or County:	Durham County
Appendix Reference for U.S. Census Information:	Appendix D
Total American Community Survey (ACS) Population:	324,833
Persons per Square Mile in Local Government Unit (LGU):	1,135.86
LGU Land Area (miles^2):	285.98
WWTP Service Area (miles^2):	285.98
% of LGU in WWTP Service Area:	100.00%
% of WWTP Service Area in Sewershed Service Area:	2.95%
Current Population in Sewershed Service Area:	**9,587**

2.3 Current Wastewater Flow

The flows at the SIC PS, which collects flow from the entire SICB, are typically metered; however, the meter failed in early 2022 and had not yet been replaced at the time of this report. Based on available pump runtimes shown in **Appendix E** and the average pump flow rate of 2,400 gpm, the average daily flow currently pumped from the SIC PS is approximately 2.5 MGD.

The Triangle WWTP is rated for 12 MGD. According to the most recent performance annual report (**Appendix F**), the plant treated 1.5 billion gallons from June 2020 to July 2021, or an average of approximately 4.1 MGD. Approximately 62% of the flow to the Triangle WWTP is from the SICB.

Table 2.4. Current Flow Analysis Chin Page Road Pump Station Durham County	
Current and Obligated Wastewater Treatment Plant Flow	
Average Daily Flow for Most Recent Year (gpd):	4,100,000
Estimated Obligated Average Daily Flow (gpd):	12,000,000
Stirrup Iron Creek Basin System Flow	
Current Flow Determination Methodology:	Pump Runtime
Current Flow Appendix Reference:	Appendix E and Appendix F
Pump Runtime	
Pump Rate Times (gpm):	2,400
Pump Runtime (hrs/day):	18
Current Flow (gpd):	2,534,400

Section 3

Future Situation

3.1 Population Projections

Durham County is experiencing considerable growth within the SICB, resulting from ongoing residential and commercial development. According to the State Data Center (SDC), the projected population for Durham County as a whole is projected to increase by nearly 30% over next 20 years are as shown in **Table 3.1,** with the population within the SICB increasing from approximately 9,600 to 12,300 by year 2039.

Table 3.1. Future Population Analysis				
Chin Page Road Pump Station				
Durham County				
Current Population Methodology			Method 2 - Large Service Area	
Current Local Government Unit (LGU) Population:			324,833	
Current Sewershed Service Area Population:			9,587	
Percentage of LGU Population in County:			100.00%	
SDC Data Appendix Reference:			Appendix G	
County Name:			Durham	
Current Year County Population:			324,833	
Percentage of Service Area in LGU:			2.95%	
	State Data Center			
	Year	County Population	LGU Population	Sewershed Service Area Population
1	2020	324,833	324,833	9,587
2	2021	329,973	329,973	9,738
3	2022	334,486	334,486	9,872
4	2023	339,317	339,317	10,014
5	2024	344,148	344,148	10,157
6	2025	348,979	348,979	10,299
7	2026	353,813	353,813	10,442
8	2027	358,640	358,640	10,584
9	2028	363,472	363,472	10,727
10	2029	368,302	368,302	10,870
11	2030	373,135	373,135	11,012
12	2031	377,965	377,965	11,155
13	2032	382,795	382,795	11,297
14	2033	387,626	387,626	11,440
15	2034	392,458	392,458	11,582
16	2035	397,288	397,288	11,725
17	2036	402,120	402,120	11,868
18	2037	406,952	406,952	12,010
19	2038	411,783	411,783	12,153
20	2039	416,612	416,612	12,295

3.2 Future Flow Projections

Average and peak flows for the SICB were developed as part of a 2020 modeling study for the County that was prepared by AECOM. The 2020 modeling study for the SICB is included in **Appendix A**. The projected flow of 6,780,000 gallons-per-day (gpd) presented in **Table 3.2** represents the anticipated average buildout flow for the SICB inclusive of future development for undeveloped areas and assuming no other changes to the SICB collection system. The peak buildout load is anticipated to be 18.55 million-gallons-per-day (MGD). Loads were determined based on assumed zonings and flows as assumed in the *City of Raleigh Public Utilities Department Handbook* and discussed in Appendix A. At the time the study had been completed, AECOM and the County agreed that the City of Raleigh Handbook would be used for buildout loads as no equivalent reference exists for Durham County.

Table 3.2. Future Peak Flow Analysis Chin Page Road Pump Station Durham County	
Complete the table by filling in the gray boxes. Use the pulldown menus when supplied.	
Appendix Reference:	Appendix A
Current Flow Estimation Method:	Metered
Alternative Population Methodology Used?	No
Alternative Flow Projections Used?	Yes
Current Flow (gpd):	2,534,400
Year 2039 Flow Projection Via Alternative Flow Projection Method for the SICB:	6,870,000
Peaking Factor:	2.7
Year 2039 Peak Flow Projection (gpd):	18,550,000
Provide a justification for the peaking factor utilized in this calculation.	
The peaking factor of 2.7 is based on an analysis of the Stirrup Iron Creek Pump Station completed by AECOM in 2015, as referenced in their 2020 update.	

3.3 Downstream Sewer Analysis for Future Situation

The sewer modeling study and recently completed preliminary engineering report by AECOM did not include modeling of the downstream sewers for the current and projected flows from the existing SIC PS. It is therefore recommended that modeling of downstream sewers be performed at the onset of detailed design.

As noted in Table 2.1 and in a field assessment conducted by Kimley-Horn Associates (included as **Appendix B**), the downstream force main existing for the SIC PS is 18-in. Field testing has indicated that velocities approach 9 feet-per-second (fps) within the force main for the existing triplex pump station with only one pump operating at 3,200 gpm. The County confirmed the findings by noting the existing pumps at the SIC PS are unable to reach full speed due to the

headloss incurred. The receiving force main is unable to accept more flow considering the both the potential for water hammer and the energy consumption resulting from frictional losses at these elevated velocities. The anticipated average buildout flow of 6.78 MGD is also greater than the current permitted capacity of 6.5 MGD for the SIC PS. Further, the anticipated peak load of 18.55 MGD for the SICB (as shown in Table 3.2) far exceeds the pump station capacity.

The sewer modeling study and recently completed preliminary engineering report by AECOM did include modeling of the sewers in the basin for the current and projected flows if the existing GE PS on Chin Page Road is brought back into service and indicated that flows to the SIC PS could be alleviated by effectually splitting the SICB into two separate basins. **Table 3.3** below shows the flows expected at the SIC PS and GE PS with the GE PS brought back into service.

Table 3.3 Anticipated Flows for the SICB[1]

	SIC PS		GE PS	
Loading Scenario	Average Flow (MGD)	Peak Flow (MGD)[2]	Average Flow (MGD)	Peak Flow (MGD)[2]
Existing	0.41	1.11	0.96	2.60
Future	1.17	3.15	1.76	4.74
Buildout	3.08	8.33	3.79	10.22

1. Flows are based on Table 11 included in Appendix A
2. Peak flows were determined by multiplying the average flows by a peaking factor of 2.7

Section 4
Need and Purpose

The existing GE PS is currently just a shell, with no mechanical or electrical elements present at this time. Originally installed in the 1970s (**Appendix H**), the pump station is located within the 100-year flood plain for Stirrup Iron Creek and has been out of service for several years. Currently, the gravity sewer runs through and bypasses the station to ultimately flow to the SIC PS.

As shown in Table 3.3, the initial average and future flows expected to flow to the GE PS (estimated based on flows permitted by the County as of 2020) are estimated to be 1.8 mgd and 4.7 mgd, respectively, with a future peak flow of 10.2 mgd projected at buildout. This is over half of the total expected peak buildout flow of 18.55 MGD for the current SICB as projected in Table 3.2.

Because the GE PS is within the 100-year flood plain, the environmental impacts of bringing the station into service in place is undesirable by the County. Previous correspondence with Christyn Fertenbaugh with the state had entertained the possibility of reinstating the pump station in place, although no formal engineering or alternatives analysis had been yet completed at the time. At nearly 50 years old, the pump station is beyond its useful life. Space constraints further prevent a new pump station from being constructed onsite. In addition, the AECOM study in **Appendix A** determined that expansion of the existing Stirrup Creek pump station to increase the basin flow capacity was not a viable alternative given capacity limitations and head constraints imposed by the existing 18-inch diameter force main.

Therefore, the purpose of the proposed project is to:

- Remove the existing GE PS from within the 100-year flood plain and replace it with a new pump station outside of the 500-year flood plain;
- Address capacity limitations of the wastewater collection system within the SICB; and
- Minimize the potential for future SSOs.

Section 5
Alternatives Analysis

This section presents the evaluations of three alternatives that were evaluated for addressing growth and flow increases within the SICB.

5.1 Alternatives Descriptions

The following alternatives were evaluated for the SICB and are presented in the following order:

- Alternative 1 – constructing a new pump station at the corner of Chin Page Road and Miami Blvd (preferred alternative)
- Alternative 2 – the "no-action" or "do nothing" alternative
- Alternative 3 – Expansion of the Stirrup Iron Creek Pump Station (rejected alternative)

Alternative 1 - New Pump Station at Chin Page Road

Alternative 1 involves relocating the existing GE PS, which resides within a 100-year flood plain, and constructing a new pump station (Chin Page Road Pump Station) at the corner of Chin Page Road and Miami Boulevard. In addition to the flood plain considerations, the existing station is nearly 50 years old based on available deeds for the property, which is well beyond the useful life for this package station. Currently, flows that were once served by this station are being diverted to the SIC PS, which is approaching capacity. Table 3.3 provides the existing, future and buildout flow conditions for the station, based on the sewer modeling study provided in Appendix A.

This alternative will require the installation of 1,000 linear feet (LF) of 30-inch diameter gravity sewer to redirect flow from the existing GE PS to the new Chin Page Road Pump Station. The new station will be a triplex submersible pump station initially sized to address the future peak flow conditions. Two pumps will be installed initially, and provisions will be made in the initial design for adding a third pump to address the buildout conditions presented in Table 3.3 with two pumps operating in parallel. The wet-well will be provided with a grinder for minimizing the potential of clogging of the submersible pumps. The submersible pumps will be equipped with variable frequency drives (VFDs). The pumps will be controlled using a submersible pressure transducer housed in a stilling well. VFDs will control the pump speed to maintain an operator adjustable wet-well level. Adjacent to the station will be a valve vault followed a meter vault which houses a magnetic flow meter.

Electrical equipment will be housed in a pre-engineered building. A liquid phase odor control system will be provided given the proximity to residential and commercial development. A stand-by diesel generator will be provided to address outages and ensure continued operation during severe weather events. The proposed pump station location is shown in **Figure 5.1**.

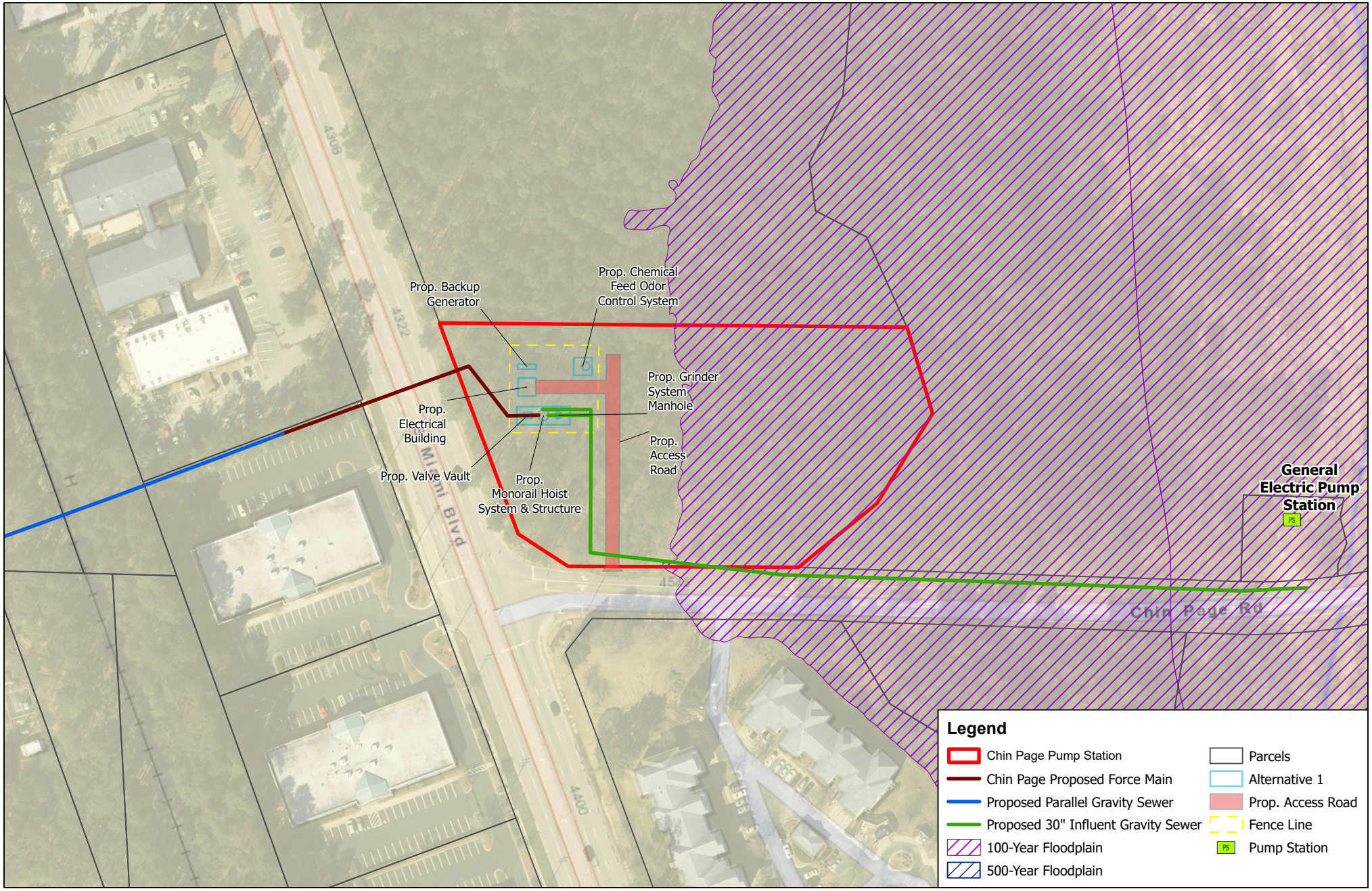


Figure 5.1
Alternative 1
Durham County - Chin Page Pump Station
Durham, North Carolina

Pumped flow from the new station will be conveyed through 500 LF of 24-inch diameter force main across Miami Boulevard. Horizontal direction drilling is the proposed installation method for the force main. The force main will discharge into a new 30-inch diameter gravity sewer which parallels the route of an existing sewer. The project will require approximately 4,000 LF of gravity sewer downstream of the force main. The new 30-inch diameter gravity sewer will be installed underneath I-40 using jack and bore and will discharge into an existing 30-inch diameter sewer located at the southwest corner of I-40 and Davis Drive interchange, as shown in **Figure 5.2**.

Alternative 1 will provide the County with the following benefits:

1. Remove the existing GE PS from within the 100-year flood plain and replace it with a new pump station outside of the 500-year floodplain;
2. Addresses capacity limitations of the wastewater collection system within the SICB
3. Minimizes the potential for future SSOs

As noted in **Table 5.1**, the project scope is not applicable to water use, reuse, recapture, and conservation. However, the project is applicable to energy conservation, as the project includes new pumps to be installed as part of the new pump station. Pumps shall be installed with VFDs to provide soft starts and speed control for more efficient energy use, reduced wet-well size, and reduce surges on pump shutdown.

The capital cost estimate presented for this alternative is based on the Opinion of Probable Construction Costs (OPCC) developed for the County's DWI Clean Water State Revolving Fund (SRF) application, updated for 2022 costs.

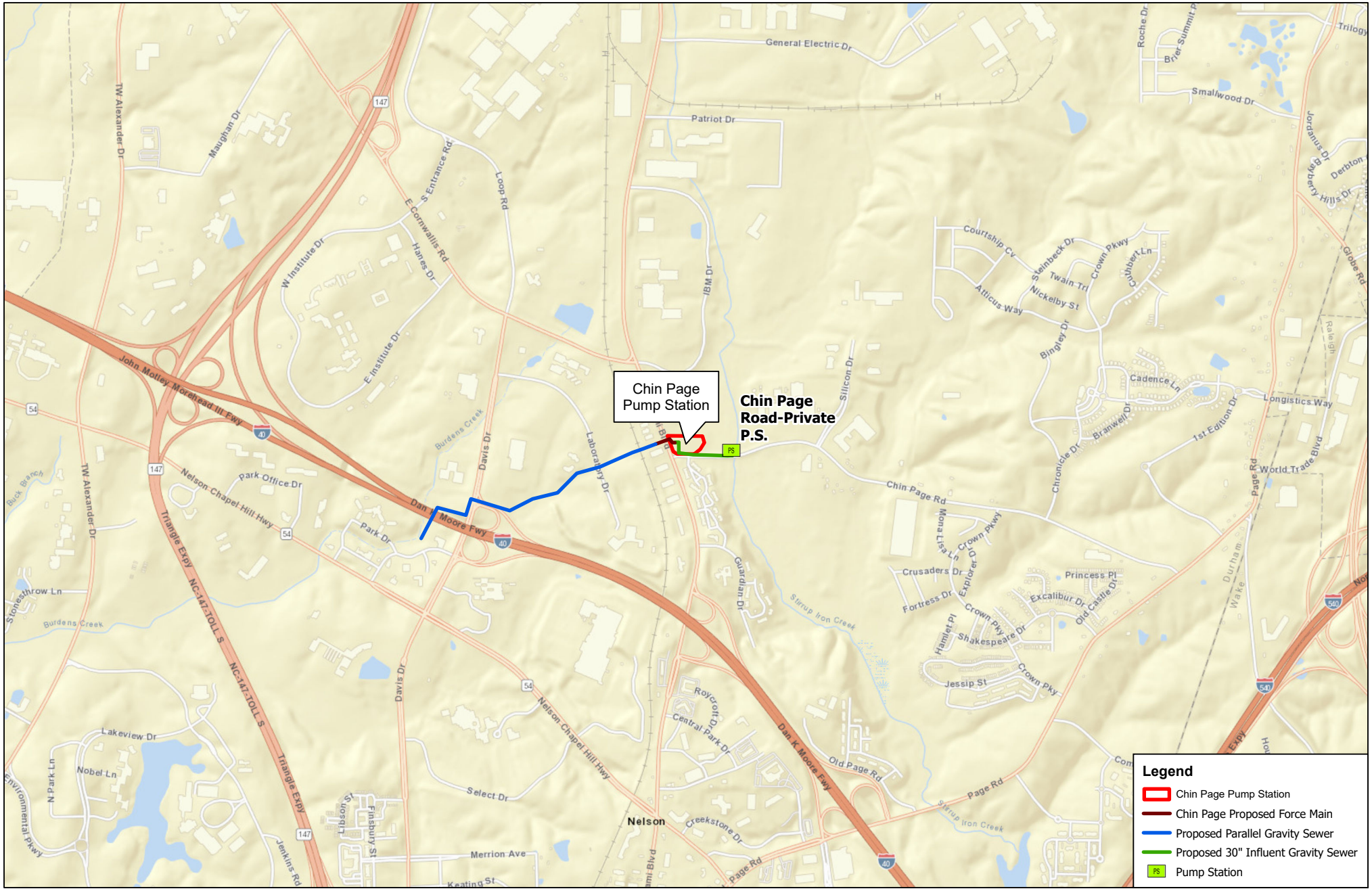


Figure 5.2
Project Vicinity Map
Durham County - Chin Page Pump Station Durham, North Carolina

Table 5.1 Alternatives Description: Alternative 1	
Chin Page Road Pump Station	
Error! Reference source not found.Durham County	
Alternative 1 – New Pump Station at Chin Page Rd	
Supporting Information Appendix Reference:	Appendix A and Appendix I
Description	
Construct new pump station at northeast corner of Chin Page Rd and S Miami Blvd. Divert flows from existing GE PS to the new Chin Page Road pump station via 1,000 LF of new 30-in gravity sewer line. Construct a new, 24-in force main (approximately 500 LF) and 30-in gravity sewer line (approximately 4,000 LF) that follows a parallel route as the existing sewer line and connect to an existing 30-in gravity line south of the I-40/Davis Drive interchange (existing line constructed under a separate project).	
Is Figure Included? ☒ Yes ☐ No	If Yes, Figure #: 5.1
Alternative Feasibility: ☒ Feasible	☐ Infeasible
Capital Cost: $23,843,500	**Present Worth:** $24,443,703
Water Use, Reuse, Recapture, and Conservation	
☒ The project type is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.	
Water Use, Reuse, Recapture, and Conservation Discussion	
N/A	
Energy Conservation	
☒ The scope of the project is applicable to energy conservation. The analysis is briefly discussed below.	
Energy Conservation Discussion	
The project constructs a new wastewater pump station with two (2) new pumps and space for a third. The pumps will be equipped with variable frequency drives (VFDs) to allow for more efficient energy usage by adjusting pump speed as needed and minimizing pump starts.	
Environmental Impact Description	
This alternative moves the pump station from within the 100-yr flood zone to outside of the 500-yr flood zone. In addition, the majority of the new piping will also be installed outside of the 500-yr flood zone. The new pump station site will result in the temporary loss of approximately 2 acres of currently undeveloped, forested area, and permanent loss of approximately 0.25 acres of that area.	
Environmental Impact Analysis	
☐ Greater than Preferred Alternative ☐ Less than Preferred Alternative ☐ Same as Preferred Alternative ☒ Preferred Alternative	
Acceptance/Rejection	
Alternative: ☒ Accepted	☐ Rejected
Rationale for Acceptance/Rejection	
This action is the preferred alternative as it both addresses the needs of the collection system (diverting excess flows from the SIC PS and thereby reducing SSOs within the basin) and minimizes disturbances in the Stirrup Iron Creek floodway and other developed and undeveloped areas of the basin by removing a pump station from within the floodplain.	

Alternative 2 - No-Action Alternative

The No-Action Alternative would consist of continuing to divert flow conveyed to the existing GE PS on Chin Page Road to the SIC PS. As previously discussed in this report, the SIC PS is quickly approaching capacity due to the hydraulic constraints imposed by the existing force main. In an effort to address the current capacity limitations for this station, the County is installing a fourth pump along with a new flow meter at the SIC PS. These improvements will marginally increase the capacity of the existing station by 300,000 to 400,000 gpd, which is well below the projected flow needs for this station when accounting for the additional growth anticipated for the basin. As discussed in previous sections, existing pumps at the SIC PS are currently unable to reach full speed due to the headloss incurred through the force main at the higher velocities.

Modelling results from the 2020 sewer capacity study provided in Appendix A indicate major trunk lines draining to the SIC PS are approaching 100% of their carrying capacity, as noted in Figures III-5 and III-6 in that Appendix. As a result of the sewers reaching their carrying capacity, the County has experienced SSOs during severe wet weather events and other instances as described in previous sections. Sewers specifically noted in the study as at or nearing capacity include:

- The 15-in sewer line behind IBM Drive south of T.W. Alexander that discharges to manhole T-15-014; and
- The 18-in, 24-in, and 30-in gravity sewer lines parallel to Stirrup Iron Creek east of Miami Blvd, from manhole T-15-014 to the SIC PS.

This alternative was therefore deemed “infeasible” as it would not address the wastewater demands within the basin that is served by the SICB and likely result in additional SSOs as flows increase. A summary of the No-Action alternative is shown below in **Table 5.2**.

Table 5.2 Alternatives Description: No Action Alternative Chin Page Road Pump Station Durham County Alternative 2 - No-Action Alternative	
Supporting Information Appendix Reference:	Appendix B, Appendix A
Description	
This alternative assumes no action is taken to address or alleviate expected flow and load increases in the SICB. Flows will continue to be diverted from the GE PS to the SIC PS. At future and buildout peak conditions, major trunk lines feeding into the SIC PS will be significantly or severely full, defined as most or all pipes at or above 100% of their capacity as found by the modelling results presented in Appendix A.	
Is Figure Included? ☒ Yes ☐ No	If Yes, Figure #: Figures III-5 and III-6, Appendix A
Alternative Feasibility: ☐ Feasible	☒ Infeasible
Capital Cost: NA	**Present Worth:** NA
Water Use, Reuse, Recapture, and Conservation	
☒ The project type is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.	
☒ This is the No-Action Alternative.	
Water Use, Reuse, Recapture, and Conservation Discussion	
NA	
Energy Conservation	
☒ The scope of the project is applicable to energy conservation. The analysis is briefly discussed below.	
☒ This is the No-Action Alternative	
Energy Conservation Discussion	
If the No-Action alternative were implemented, the energy use would be less than the Preferred Alternative (Alternative 1) and the Rejected Alternative (Alternative 3). While a new, fourth pump is planned for install at the Stirrup Iron Creek pump station outside of these alternatives, the Preferred Alternative adds pumps to the basin and the Rejected Alternative may require new pumps or allow the pumps to operate at their nameplate capacity. As discussed above and in previous sections, the pumps at the SIC PS are currently unable to operate at full speed as a result headloss constraints in the receiving force main, and will remain unable to operate at full speed under the No-Action Alternative.	
Environmental Impact Description	
Under the no-action alternative, the risk of SSOs in the Stirrup Iron Creek sewer basin would increase as wastewater flows in the sewer basin increase. Several of the manholes are located adjacent to the Stirrup Iron Creek, thereby increasing the likelihood of untreated sewage reaching surface waters.	
Environmental Impact Analysis	
☒ Greater than Preferred Alternative ☐ Less than Preferred Alternative ☐ Same as Preferred Alternative ☐ Preferred Alternative	
Acceptance/Rejection	
Alternative: ☐ Accepted	☒ Rejected
Rationale for Acceptance/Rejection	
This no-action alternative does not address the need for increased capacity in the SICB and increases risk of negative environmental impacts due to SSOs when pipes reach capacity when compared to the preferred alternative of constructing a new pump station and new sewer lines.	

Alternative 3 – Replacement Force Main at Stirrup Iron Creek Pump Station

Because the existing SIC PS is rapidly approaching capacity, Alternative 3 (the rejected alternative) considered installing a new force main at the SIC PS, rather than another portion of the basin. This alternative is shown in **Figure 5.3.**

The SIC PS consists of a large wet-well with three 200 HP pumps providing individual pump capacities of 3,200 gpm. The firm capacity of the station is 4,500 gpm (6.5 MGD). A fourth pump is planned for installation in 2022, with a 200 HP motor and VFD.

The existing 18-in force main that serves the station limits the flow that can be conveyed by the station due to headloss at the higher velocities. In an effort to address immediate wastewater demands from the service area for this station, the County is installing a fourth 200 HP pump. However, this improvement will only provide a marginal capacity increase for the station of approximately 300,000 to 400,000 gpd. While field tests have been conducted at the SIC PS (Appendix B), as noted in Appendix A, modelling of sewers downstream station have not been conducted. Therefore, CDM Smith recommends modelling or further field tests be conducted to confirm the true existing capacity of the receiving force main and gravity sewer.

In order to increase the capacity of the SIC PS, the existing force main will either need to be upsized or a replacement force main installed. Replacing the existing force main in place would require extensive bypass pumping and was therefore deemed impractical when considering the risk and costs.

Upsizing the existing force main to a new, larger, force main along a parallel route would also result in significant logistical disturbances to the surrounding area as the current 18-in DIP force main runs parallel to Page Road, a heavily developed area with existing utility congestion (**Figure 5.3**). According to the County, recent collection system work in the area required hand-digging several feet in order to avoid damage to existing fiber optic cable. As the area is already developed, there will be limited loss of natural areas under this alternative compared to the preferred alternative. This alternative would also require a trenchless crossing of I-40, including the access ramps on the north side of the interstate or additional road crossings to avoid the ramp areas. The force main would also have to cross the North Carolina Railroad in a congested area with buildings on both sides.

The SIC PS is currently located entirely within the flood zone for the Stirrup Iron Creek. Construction of pump station modifications will therefore occur almost entirely within the flood zone. The force main would also cross Stirrup Iron Creek, possibly impacting the southern boundary of the Stirrup Iron Creek Marsh and Sloughs Significant Natural Heritage Area (SNHA), which is located on the north side of Page Road. US Fish and Wildlife Service National Wetland Inventory Mapping indicates likely wetland areas on both sides of Stirrup Iron Creek on both the north and south sides of Page Road.

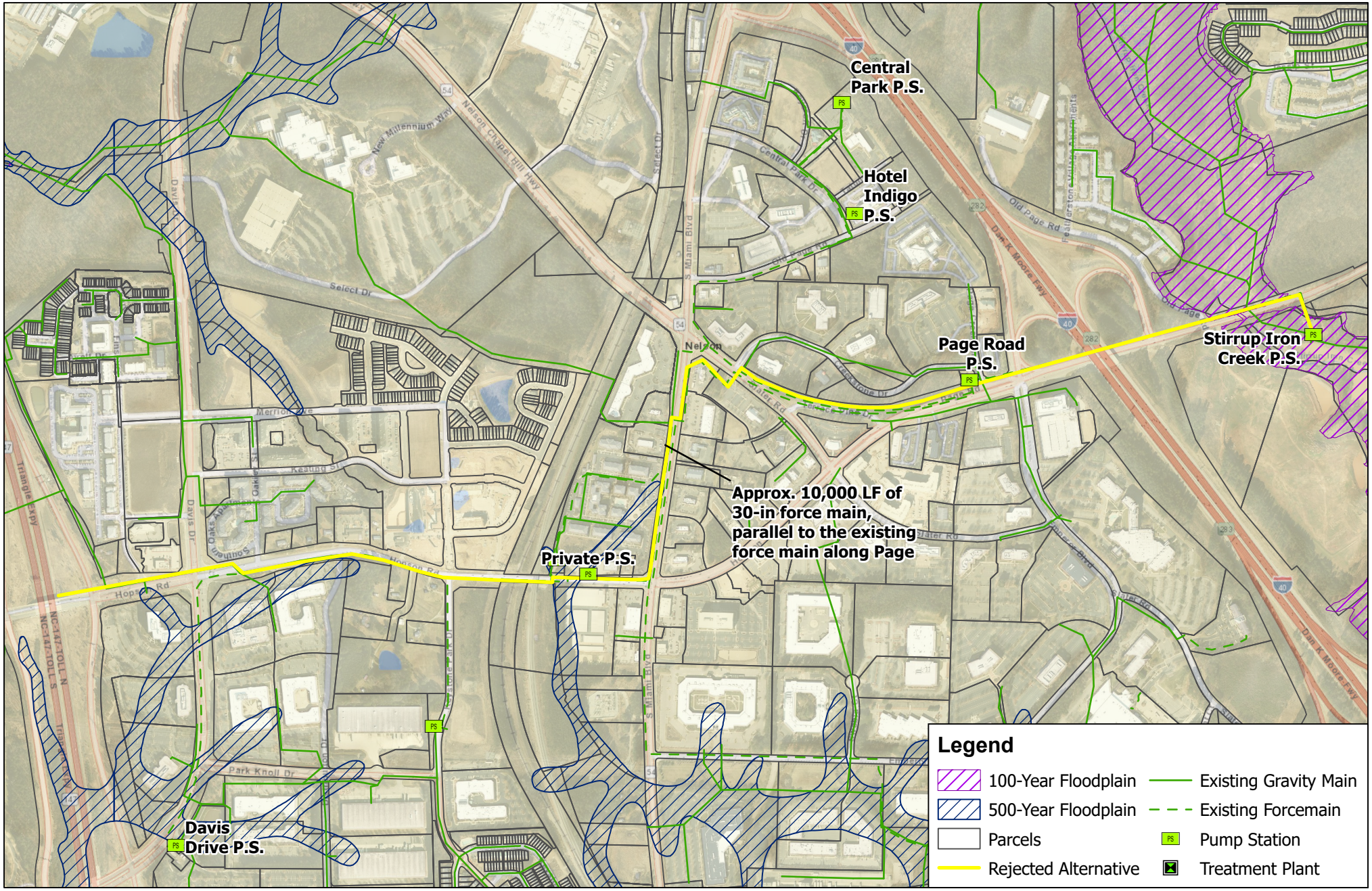


Figure 5.3
Rejected Alternative
Durham County - Chin Page Pump Station
Durham, North Carolina

The rejected alternative includes:

- Approximately 8,200 LF of new, 30-in force main from the existing SIC PS, parallel to the existing force main route, and connecting to the existing gravity sewer at NC-147.

As noted in **Table 5.3**, the project scope is not applicable to water use, reuse, recapture, and conservation. However, the project is applicable to energy conservation, as the new force main will change how the existing pumps operate. Detailed engineering has not been performed on the existing pumps at the SIC PS to determine their ability to perform when the larger force main is installed. Based on the curves presented in **Appendix B**, it is likely that the existing pumps will no longer operate on their best efficiency point curve and will need to be replaced with the force main.

The logistical hurdles of installing a force main along a busy and developed roadway, including altering traffic patterns and relocating utilities, make this alternative extremely impractical when compared to the preferred Alternative 1. Further, although the capital costs and overall present worth for the Rejected Alternative are less than the costs of the Preferred Alternative as currently presented, the costs **do not** include the potential costs for installing new pumps or motors, nor any potential upgrades to the pump station electrical system. These potential needs would add significant capital cost to the presented estimate, and may result in secondary impacts to the County's electrical system if larger motors are ultimately needed. For these reasons, this alternative is rejected.

Table 5.3 Alternatives Description – Alternative 3 **Chin Page Road Pump Station** **Durham County** **Alternative 3 – Replacement Force Main at Stirrup Iron Creek Pump Station**	
Supporting Information Appendix Reference:	NA
Description	
Alternative 3 would consist of a new receiving force main parallel to Page Road to NC-147 and parallel to the existing 18-in force main. The 18-in force main will then be abandoned. This alternative would include minimal structural changes to the existing wetwell. This alternative may require new pumps, although detailed investigation on this has not been performed.	
Is Figure Included? ☒ Yes ☐ No	If Yes, Figure #: 5.2
Alternative Feasibility: ☒ Feasible	☐ Infeasible
Capital Cost: $17,604,840	**Present Worth:** $17,728,917
Water Use, Reuse, Recapture, and Conservation	
☒ The project type is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.	
Water Use, Reuse, Recapture, and Conservation Discussion	
N/A	
Energy Conservation	
☒ The scope of the project is applicable to energy conservation. The analysis is briefly discussed below.	
☒ This alternative provides the same energy conservation as the Preferred Alternative.	
Energy Conservation Discussion	

Table 5.3 Alternatives Description – Alternative 3 Chin Page Road Pump Station Durham County Alternative 3 – Replacement Force Main at Stirrup Iron Creek Pump Station	
The current pumps at the SIC PS do not currently run at full speed. Increasing the size of the receiving force main may either allow the pumps to run at full speed, or require completely new pumps, new motors, and upgrades to the pump station electrical system (not included in cost estimate). A new, fourth pump is planned for install at the Stirrup Iron Creek pump station as a separate project (not part of this alternative).	
Environmental Impact Description	
As the SIC PS and immediate up- and downstream piping exist within the 100-yr flood zone, this alternative would result in more ongoing disturbances within the 100-yr flood zone than the Preferred Alternative (which is nearer to the edge of the floodplain and moves a pump station to outside of the 500-yr flood plain). Further, the existing collection system will continue to need to convey the full current and projected future and build-out flows. The new force main will parallel the route of the existing force main and be constructed in existing easements along Page Rd through an already heavily developed area and require utility relocation and traffic controls. The force main would also have to cross Stirrup Iron Creek, possibly impacting the Stirrup Iron Creek Marsh and Sloughs SNHA and wetlands adjacent to Stirrup Iron Creek.	
Environmental Impact Analysis	
☒ Greater than Preferred Alternative ☐ Less than Preferred Alternative ☐ Same as Preferred Alternative ☐ Preferred Alternative	
Acceptance/Rejection	
Alternative: ☐ Accepted	☒ Rejected
Rationale for Acceptance/Rejection	
This alternative requires equal or more disruption to the 100-yr flood zone surrounding Stirrup Iron Creek compared to the preferred alternative. This alternative requires more instantaneous power usage than the preferred alternative and potentially significant upgrades to the pump station electrical system if new pumps are required. To parallel the existing force main route with a new, larger force main, construction will need to occur throughout a heavily developed area and involve significant disturbance, utility relocation, traffic pattern changes, and other impacts to existing traffic and businesses as shown in Figure 5.2. Therefore, this alternative is rejected.	

5.2 Present Worth Analysis

The present worth analyses for the feasible alternatives (Alternative 1 and Alternative 3) are presented below. No cost analysis was performed for the alternative deemed infeasible (Alternative 2, No-Action). The cost estimates were developed using DWI's "Present Worth Analysis Workbook" (Workbook).

5.2.1 Capital Costs

Preferred Alternative - Alternative 1 - New Pump Station at Chin Page Rd

The capital costs for the Preferred Alternative were estimated for the County's SRF application and updated to 2022 costs. The estimate included a construction contingency cost of 10 percent of the total construction cost. The project administration cost includes engineering costs, such as design, permitting, and land surveying; and administration costs, such as easement and ER/EID

preparation. As shown in **Table 5.4**, the updated capital cost for the Preferred Alternative is approximately $22.9 million.

Rejected Alternative - Alternative 3 – Replacement Force Main at Stirrup Iron Creek Pump Station

The Rejected Alternative capital cost has been developed by entering unit costs and quantities into the "Capital Costs" spreadsheet from the Workbook. As shown in **Table 5.5**, the capital cost estimate for the Rejected Alternative is approximately $13.5 million. This cost includes a 10 percent construction contingency cost and a 20 percent project engineering/administration cost. The cost **does not** include the costs of potentially replacing the existing pumps, motors, or electrical system if the existing pumps are no longer able to operate properly with the new force main in place.

Replacement Costs

Neither the preferred nor the rejected alternative will have replacement costs for the first 20 years of operation, as shown in **Table 5.6** and **Table 5.7**.

Operation and Maintenance Costs

Preferred Alternative - Alternative 1 - New Pump Station at Chin Page Rd

The annual Operations and Maintenance (O&M) costs associated with the Preferred Alternative improvements are the following:

- An average of five hours per week of operations labor for the pump station.
- An average of one hour per week of management labor associated with the pump station.
- Annual maintenance cost for cleaning and replacement parts for the pump station, wet wells, and odor control equal to one percent of capital cost.
- Annual power costs based on 200 hours of pump station operation per year, plus power needed for the channel grinder and the odor control system.

The costs described above were input into the "Yearly O&M Costs 1-10" spreadsheet from the Workbook, which automatically completed the "Yearly O&M Costs 11-20" spreadsheet. These completed spreadsheets are included herein as **Table 5.8 and Table 5.9**.

Rejected Alternative - Alternative 3 – Replacement Force Main at Stirrup Iron Creek Pump Station

The rejected alternative is not anticipated to have any additional annual O&M costs; however, intermittent O&M costs associated with the rejected alternative are:

- Root clearing repeated at 10-year intervals
- Cleaning and closed-circuit television video (CCTV) inspection repeated at 10-year intervals
- Easement clearing repeated at 5-year intervals
- Air release valve inspection and testing

The potential increase in power usage consumed by larger pumps has not been included in the O&M costs for this alternative.

The costs described above were entered into the "Inter O&M Entry" spreadsheet from the Workbook. Formulas included the Workbook automatically completed the "Inter O&M 1-10" and "Inter O&M 11-20" spreadsheets. These completed spreadsheets are included herein as **Tables 5.10 and 5.11**.

Total Present Worth Analysis

The Workbook automatically completes the "Total Present Worth" spreadsheet (**Table 5.12**) based on values input into the "Capital Costs", "Yearly O&M Costs 1-10," and the "Inter O&M Entry" spreadsheets for each alternative (as applicable).

Preferred Alternative - Alternative 1 - New Pump Station at Chin Page Rd

The estimated total present worth of the Preferred Alternative is approximately $23.4 million, which includes an estimated capital cost of approximately $22.8 million (see Table 5.4) and an estimated present worth of annual O&M costs (years 1 to 20) of approximately $0.57 million (see **Table 5-8** and **5-9**).

Rejected Alternative - Alternative 3 – Replacement Force Main at Stirrup Iron Creek Pump Station

The estimated total present worth of the Rejected Alternative is approximately $13.7 million, which includes an estimated capital cost of approximately $13.5 million (see Table 5.5) and an estimated present worth (cost) of intermittent O&M costs (years 1 to 20) of approximately $0.12 million (see Table 5.10 and 5.11). The cost **does not** include the costs of potentially replacing the existing pumps, motors, or electrical system that may be needed when the force main size is increased.

Table 5.4 Capital Costs
Chin Page Road Pump Station
Durham County

	Chin Page Road Pump Station (Preferred)			
Project Administration ($):	$4,192,000			
Component	**Unit Cost[a]**	**Unit**	**Quantity**	**Total Cost**
30-in PVC Gravity Sewer	$2,630	LF	5,000	$13,163,000
24-in DIP Force Main	$1,700	LF	500	$850,000
Pump Station, Lump Sum	$3,851,670	LS	1	$3,852,000
			Total Construction Cost:	**$17,865,000**
			Construction Contingency Cost:	**$1,786,500**
			Project Administration Cost:	**$4,192,000**
			Total Capital Cost:	**$23,843,500**

a. Unit costs are in today's dollars, not future dollars.

Table 5.5. Capital Costs Chin Page Road Pump Station Durham County				
Alternative:	**Replacement Force Main at Stirrup Iron Creek Pump Station (rejected)**			
Project Administration ($):	$2,934,140			
Component	**Unit Cost[a]**	**Unit**	**Quantity**	**Total Cost**
30-in PVC Force Main	$1,620	LF	8,230	$13,337,000
			Total Construction Cost:	**$13,337,000**
			Construction Contingency Cost:	**$1,333,700**
			Project Administration Cost:	**$2,934,140**
			Total Capital Cost:	**$17,604,840**

a. Unit costs are in today's dollars, not future dollars.

Table 5.6 Project Cost Life Cycle Assumptions Chin Page Road Pump Station Durham County Chin Page Road Pump Station (Preferred)			
Component	**Expected Life Cycle**	**Replacement Expected?**	**Rationale for Expected Life Cycle**
30-in PVC Gravity Sewer	20	N	pipeline
24-in DIP Force Main	20	N	pipeline
Pump Station, Lump Sum	20	N	

Table 5.7. Project Cost Life Cycle Assumptions Chin Page Road Pump Station Durham County Replacement Force Main at Stirrup Iron Creek Pump Station (rejected)			
Complete the areas shown in gray.			
Component	**Expected Life Cycle**	**Replacement Expected?**	**Rationale for Expected Life Cycle**
30-in PVC Force Main	20	N	

Table 5.8 Present Value of Operations and Maintenance Costs (Years 1-10)
Chin Page Road Pump Station
Durham County
Chin Page Road Pump Station (Preferred)

Current Inflation Rate Based on Municipal Cost Index: 0.09%

EPA Discount Rate: 4.875%

				Present Value of O&M Costs for Year:									
Component	**Unit Cost**	**Unit**	**Quantity**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pump Station Operations Labor (5 hr/wk)	$25	hrs	260	$6,203	$5,920	$5,650	$5,392	$5,146	$4,911	$4,686	$4,472	$4,268	$4,073
Pump Station Management Labor (1 hr/wk)	$73.00	hrs	52	$3,623	$3,457	$3,299	$3,149	$3,005	$2,868	$2,737	$2,612	$2,493	$2,379
Electrical power	$0.06	kWh	16,965	$920	$878	$838	$799	$763	$728	$695	$663	$633	$604
Pump station maintenance and parts replacement (1% of capital cost/yr)	$38,520	ea.	1	$36,761	$35,083	$33,481	$31,952	$30,493	$29,101	$27,772	$26,504	$25,294	$24,139
Total Present Value of Yearly O&M Expenses (Years 1-10)				**$47,507**	**$45,338**	**$43,268**	**$41,292**	**$39,407**	**$37,607**	**$35,890**	**$34,252**	**$32,688**	**$31,195**

Table 5.9 Present Value of Operations and Maintenance Costs (Years 11-20)
Chin Page Road Pump Station
Durham County
Chin Page Road Pump Station (Preferred)

Current Inflation Rate Based on Municipal Cost Index: 0.09%

EPA Discount Rate: 4.875%

				Present Value of O&M Costs for Year:									
Component	**Unit Cost**	**Unit**	**Quantity**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Pump Station Operations Labor (5 hr/wk)	$25	hrs	1	$15	$14	$14	$13	$12	$12	$11	$11	$10	$10
Pump Station Management Labor (1 hr/wk)	$73	hrs	52	$2,270	$2,167	$2,068	$1,973	$1,883	$1,797	$1,715	$1,637	$1,562	$1,491
Electrical power	$0	kWh	16,965	$576	$550	$525	$501	$478	$456	$435	$415	$397	$378
Pump station maintenance and parts replacement (1% of capital cost/yr)	$38,520	ea.	1	$23,037	$21,985	$20,981	$20,023	$19,109	$18,237	$17,404	$16,609	$15,851	$15,127
Total Present Value of Yearly O&M Expenses (Years 11-20)				**$25,898**	**$24,716**	**$23,587**	**$22,510**	**$21,483**	**$20,502**	**$19,566**	**$18,672**	**$17,820**	**$17,006**
												Total Present Value of Annual O&M Costs (Life of Project)	**$600,203**

Table 5.10. Present Value of Intermittent Operations and Maintenance Costs (Years 1-10)
Chin Page Road Pump Station
Durham County
Replacement Force Main at Stirrup Iron Creek Pump Station (rejected)

Current Inflation Rate Based on Municipal Cost Index: 0.09% EPA Discount Rate: 4.875%

Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year: 1	2	3	4	5	6	7	8	9	10
Root Control (10-year recurrence)	$3	LF	8,230	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15,472
Cleaning and CCTV inspection (10-year recurrence)	$5	LF	8,230	$0	$0	$0	$0	$0	$0	$0	$0	$0	$25,787
Easement Clearing (5-year recurrence)	$3	LF	8,230	$0	$0	$0	$0	$19,545	$0	$0	$0	$0	$15,472
Total Present Value of Intermittent Operations & Maintenance Costs (Years 1-10):				**$0**	**$0**	**$0**	**$0**	**$19,545**	**$0**	**$0**	**$0**	**$0**	**$56,732**

Table 5.11. Present Value of Intermittent Operations and Maintenance Costs (Years 11-20)
Chin Page Road Pump Station
Durham County
Replacement Force Main at Stirrup Iron Creek Pump Station (rejected)

Current Inflation Rate Based on Municipal Cost Index: 0.09% EPA Discount Rate: 4.875%

Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year: 11	12	13	14	15	16	17	18	19	20
Root Control (10-year recurrence)	$3	LF	8,230	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,696
Cleaning and CCTV inspection (10-year recurrence)	$5	LF	8,230	$0	$0	$0	$0	$0	$0	$0	$0	$0	$16,160
Easement Clearing (5-year recurrence)	$3	LF	8,230	$0	$0	$0	$0	$12,248	$0	$0	$0	$0	$9,696
Total Present Value of Intermittent Operations & Maintenance Costs (Years 11-20):				**$0**	**$0**	**$0**	**$0**	**$12,248**	**$0**	**$0**	**$0**	**$0**	**$35,552**
Total Present Value of Intermittent Operations & Maintenance Costs (Life of Project):													**$124,077**

Table 5.12 Total Present Worth for Feasible Alternatives
Chin Page Road Pump Station
Durham County

	Capital Costs	Replacement Costs Present Worth	O&M Costs Present Worth			Total Present Worth
			Annual	Intermittent	Total	
Chin Page Road Pump Station (Preferred)	$23,843,500	$0	$600,203	$0	$600,203	$24,443,703
Replacement Force Main at Stirrup Iron Creek Pump Station (rejected)	$17,604,840	$0	$0	$124,077	$124,077	$17,728,917[1]

1. Does not include potential costs for new pumps, motors, or electrical system upgrades

Section 6

Proposed Project Description

The existing GE PS is located along Chin Page Road, and resides within the 100-year flood plain for the Stirrup Iron Creek. The existing pump station was originally installed in the 1970s and currently has no electrical or mechanical components. Wastewater previously conveyed to this station is currently diverted to around the pump station. The pump station was removed from service prior to 1990.

The proposed project involves intercepting flow near the GE PS, which is currently bypassed with flow going to the SIC PS, and constructing a new pump station outside the 100-year flood plain to address capacity limitations within the sewer collection system due to ongoing growth. Flow previously conveyed through this station will be redirected and conveyed through a new 30-inch gravity sewer installed along an existing easement owned by the County to a new pump station site (referred to as the Chin Page Road Pump Station) located at the intersection of Chin Page Road and South Miami Boulevard, as shown in Figure 2.2.

6.1 Project Components

The primary components for the new Chin Page Road Pump Station are as follows:

- Approximately 1,000 linear feet (LF) of 30-in gravity sewer to divert flow from the existing General Electric Pump Station to the new Chin Page Rd pump station;
- A new triplex submersible pump station with two pumps initially installed and provisions for a third pump to address future flows. Pumps will be equipped with variable frequency drives (VFDs) to minimize fluctuations in flow on the downstream collection system and minimize energy consumption.
- A wet-well grinder to mitigate clogging of the pumps
- A valve vault
- A meter vault with a magnetic flow meter
- Electrical equipment housed in a pre-engineered building
- Stand-by electrical generator with sound attenuation
- Liquid phase odor control system
- Approximately 500 LF of new, 24-in discharge force main across S Miami Blvd via bore-and-jack or horizontal directional drill (HDD) construction; and
- Approximately 4,000 LF of 30-in gravity sewer, running parallel to an existing gravity sewer, to connect to a new 30-in gravity sewer (by others).
- Demolition or abandonment of the existing GE pump station.

Figure 6.2 shows the proposed layout for the project. The proposed project essentially divides the existing SICB into two smaller sewer basins as shown in **Figure 6.3**.

6.1.1 New Gravity and Force Main Piping

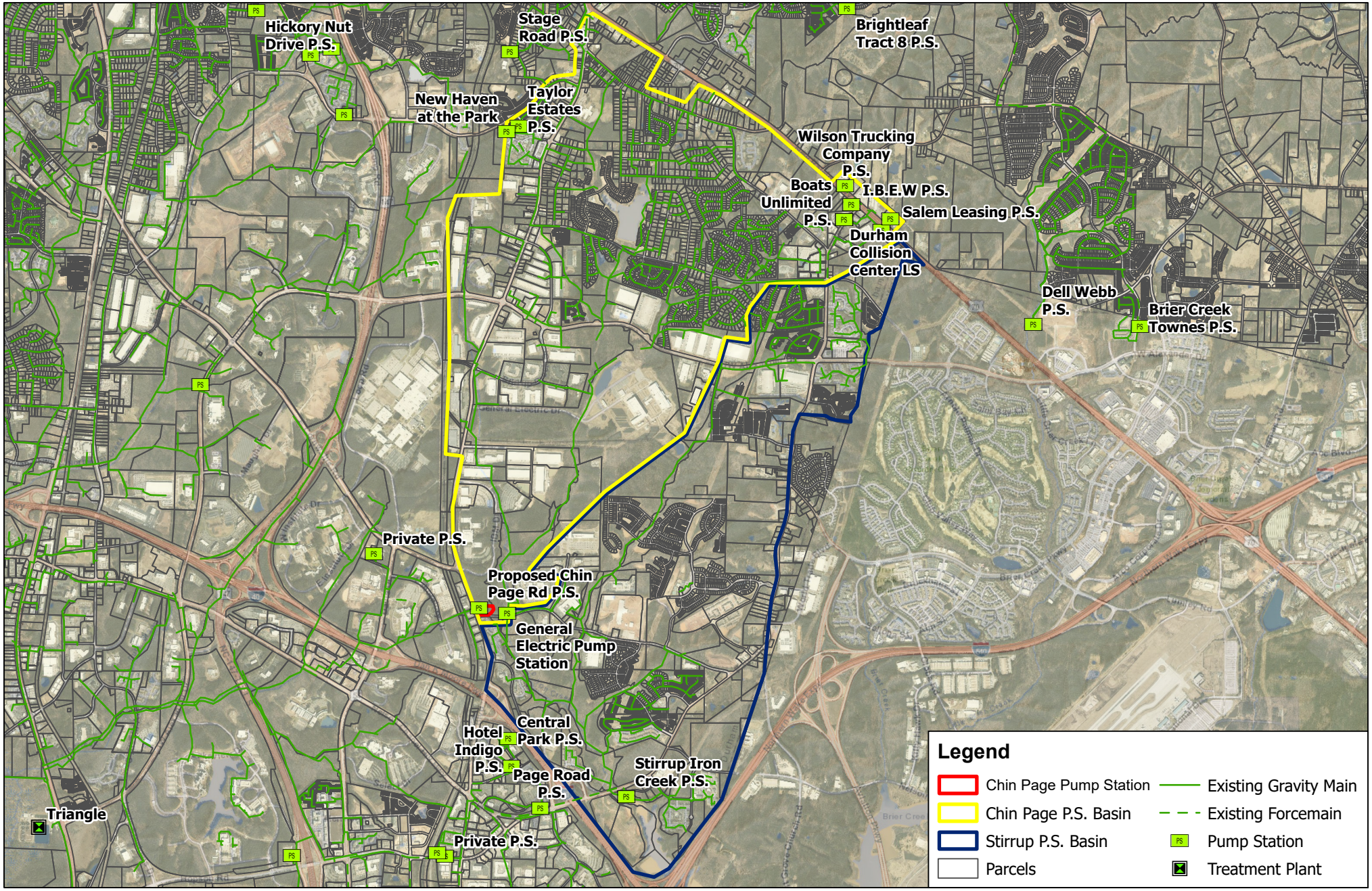
As previously discussed, wastewater from GE PS will be intercepted and conveyed via approximately 1,000 L.F. of new 30-inch PVC gravity sewer west along Chin Page Road to the new pump station at the northeast corner of Chin Page Road and South Miami Boulevard. The new Chin Page Road Pump Station will pump to approximately 500 L.F. of new 24-inch DIP force main west across South Miami Boulevard and flow will continue westward to the southwest corner of the I-40/David Drive interchange. This route parallels existing sewer lines and upsizes them to accommodate the flow from the Chin Page Road Pump Station. The 24-inch force main will discharge to a new, 30-inch PVC gravity line (approximately 4,000 L.F.) which subsequently will connect to an existing 30-inch gravity sewer line that conveys flows southwest to the wastewater treatment plant. **Figure 6.1** shows the proposed project.

6.1.2 Pump Station

The proposed project will consist of the construction of a new submersible pump station outside of the 100-yr and 500-yr flood plains along Stirrup Iron Creek, based on FEMA firm map **Figure 6.4**. The new pump station will be located on a wooded parcel that is being purchased by the County, which is located at the corner of Chin Page Road and South Miami Boulevard, as shown in Figure 6.2.

The pump station will be a triplex pump station (two pumps initially installed) with submersible pumps equipped with VFDs and rated for a firm capacity of 4.7 mgd. Provisions will be incorporated in the wet-well design, piping and electrical equipment for expanding the station to a firm capacity of 10.2 mgd with the addition of a third pump.

The wet-well will include a grinder to address stringy debris and material present in the wastewater, thereby minimizing pump maintenance. The pumps will be equipped with variable frequency drives to minimize large flow functions within the downstream conveyance system. A pre-engineered building will be located at the site for housing electrical equipment. The new station will include an odor control system given the station's close proximity to residential and commercial development. Pumped wastewater will be conveyed through a 24-inch force main installed via jack and bore underneath South Miami Boulevard and discharge into a 30-inch gravity sewer, as shown in Figure 6.1. The proposed 30-inch gravity sewer will terminate at an existing manhole and 30-inch interceptor located at the southwest corner of I-40 and Davis Drive interchange.



N

0 2,000 4,000 8,000 12,000 Feet

1 inch equals 4,000 feet

Figure 6.1
Pump Station Basins
Durham County - Chin Page Pump Station
Durham, North Carolina

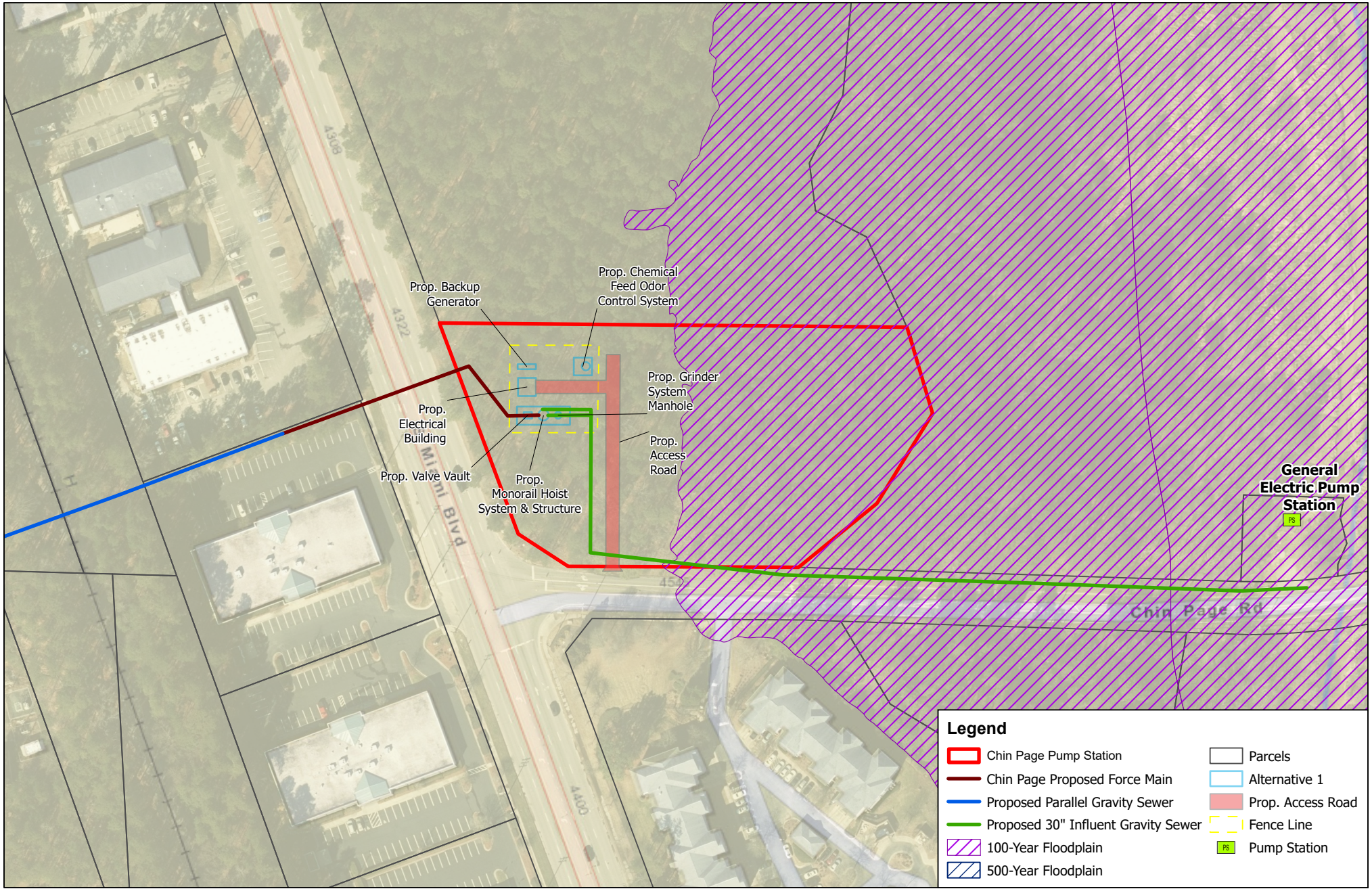


Figure 6.2
Alternative 1
Durham County - Chin Page Pump Station
Durham, North Carolina

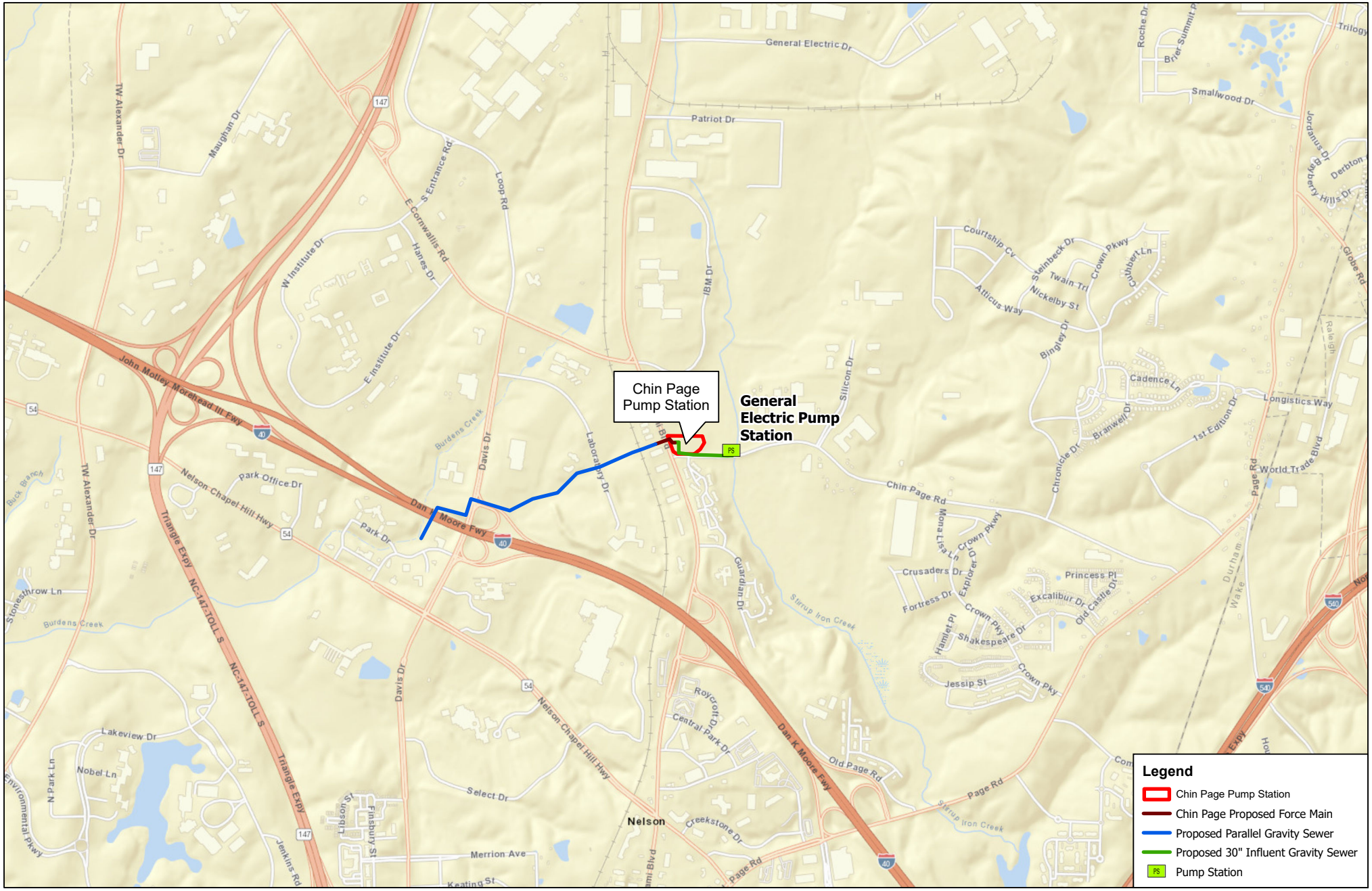


Figure 6.3
Project Vicinity Map
Durham County - Chin Page Pump Station
Durham, North Carolina

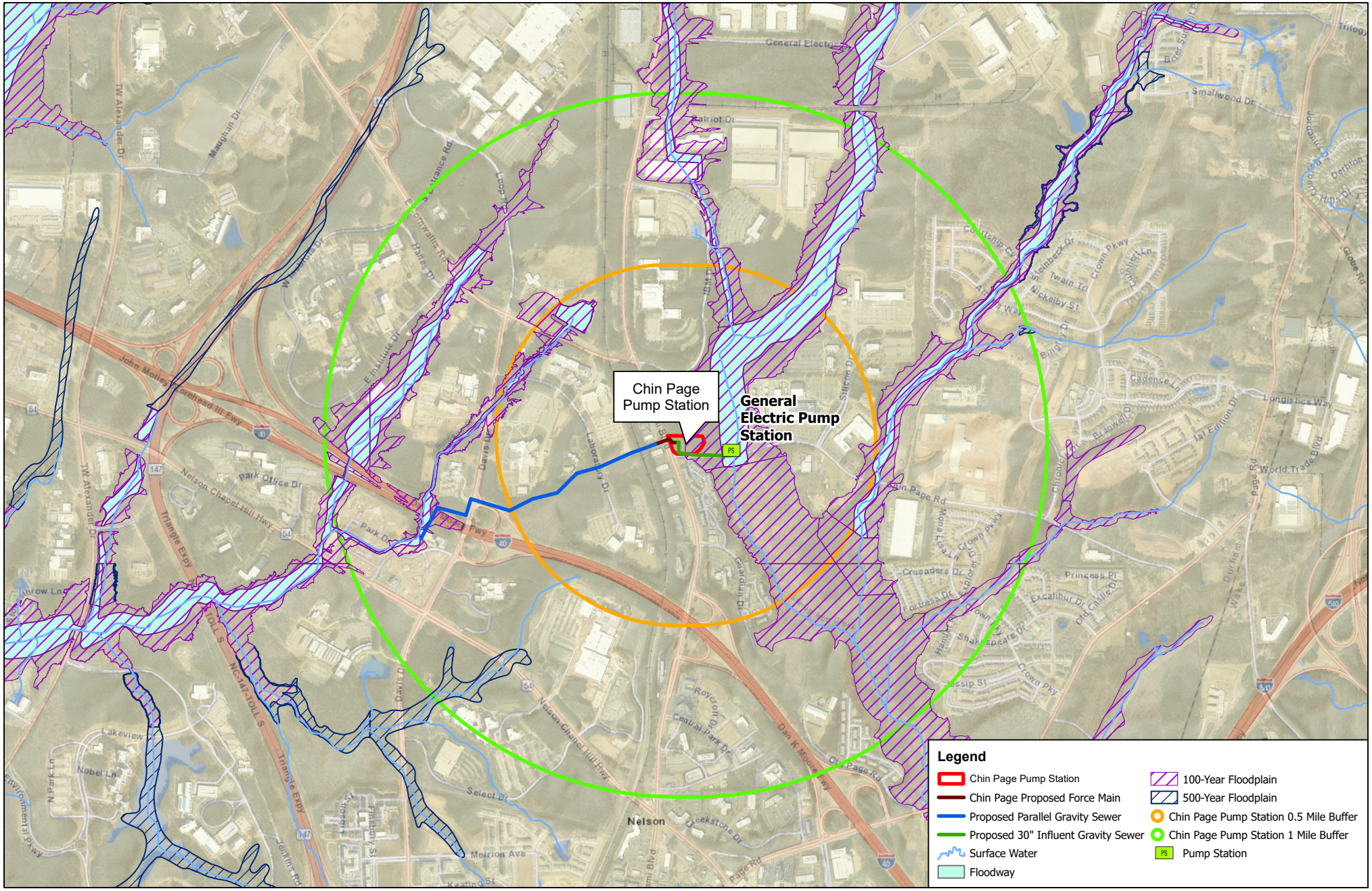


Figure 6.4
Environmental Features Map
Durham County - Chin Page Pump Station
Durham, North Carolina

6.2 Environmental Impacts

This section provides brief discussions of direct environmental impacts associated with the construction and development of the new pump station. Types of impacts discussed in this section include impacts to floodplains and floodways, surface waters, wetlands, and forest resources. More complete discussions of the direct, indirect, and cumulative impacts are provided in Section 7.

6.2.1 Floodplains and floodways

The potential direct impacts to floodplains and floodways considered in this section include temporary disturbance in the floodplain as part of the construction of the new gravity line connecting the GE PS to the new Chin Page Road pump station.

The existing GE PS is within the floodway for the Stirrup Iron Creek. Therefore, the connecting gravity line will also be partially within the floodway and extend through the 100-year flood plain. However, impacts are expected to be temporary because the new gravity line will be buried. The new Chin Page Road pump station location was chosen to be outside of the 500-year flood plain such that none of the new, permanent structures will require filling within the floodway or floodplain. No fill, impervious area, or permanent grading changes will occur within the 100-year floodplain or floodway. After installation of the connecting 30-in gravity line, the floodway and floodplain will be restored with grading and vegetation.

6.2.2 Surface Waters

The potential direct impacts to surface waters considered in this section include impacts from construction near surface waters, soil erosion from construction sites and resulting sedimentation within surface waters.

As further discussed in Section 7, applicable local and state land development regulations require that effective sedimentation and erosion controls are in place during any site development construction activities. Proper installation and maintenance of these control measures effectively prevents adverse impacts to surface waters due to sedimentation and erosion.

Lastly, by reducing the frequency and volume of sanitary sewer overflows within the SICB, the proposed project can be considered to provide a net positive impact on surface water quality within the Stirrup Iron Creek watershed.

6.2.3 Wetlands

Any areas that will be occupied by structures or paving, maintained in a cleared state for maintenance access, or are located within security fences are considered permanent impacts. Limited clearing of additional areas beyond the above-described permanent impact limits will be required to provide sufficient space needed for construction of the proposed facilities and is considered to be a temporary impact.

As indicated in **Figure 6.5**, a portion of the new gravity sewer falls within these wetland limits; therefore, construction of the proposed diversion structure will require clearing within wetland limits. These impacts will be temporary with the exception of the permanently maintained easement for the pipeline, which will be adjacent to Chin Page Road to minimize impacts. Operation of the project will not cause any impacts to wetlands and streams except for temporary disturbance from mowing and maintenance of the easements. The pump station, electrical building, and odor control system will all be constructed outside of jurisdictional wetland limits.

Mitigation for temporary and permanent impacts to wetlands will be provided in accordance with local, state, and federal regulations.

6.2.4 Forest Resources

The potential direct impacts to forest resources considered in this section include the permanent loss of forest cover within the areas that will be converted to new facilities and driveways and additional areas that will be maintained in a cleared state following completion of construction. Additional areas cleared to provide space during construction of these facilities, but beyond the limits required to be maintained in a cleared state for future maintenance access or equipment storage, will be replanted following the completion of construction.

The pump station is proposed to be built on a portion of a currently undeveloped parcel, and would result in the permanent loss of approximately 0.25 acres of land due to construction of the pump station, electrical building, odor control system, and access road.

6.3 Project Costs

As presented in Section 5, the estimated capital cost for the project is approximately $22.9 million, the estimated present worth of annual O&M costs is approximately $0.57 million and the estimated present worth (cost) of capital and O&M costs is approximately $23.4 million.

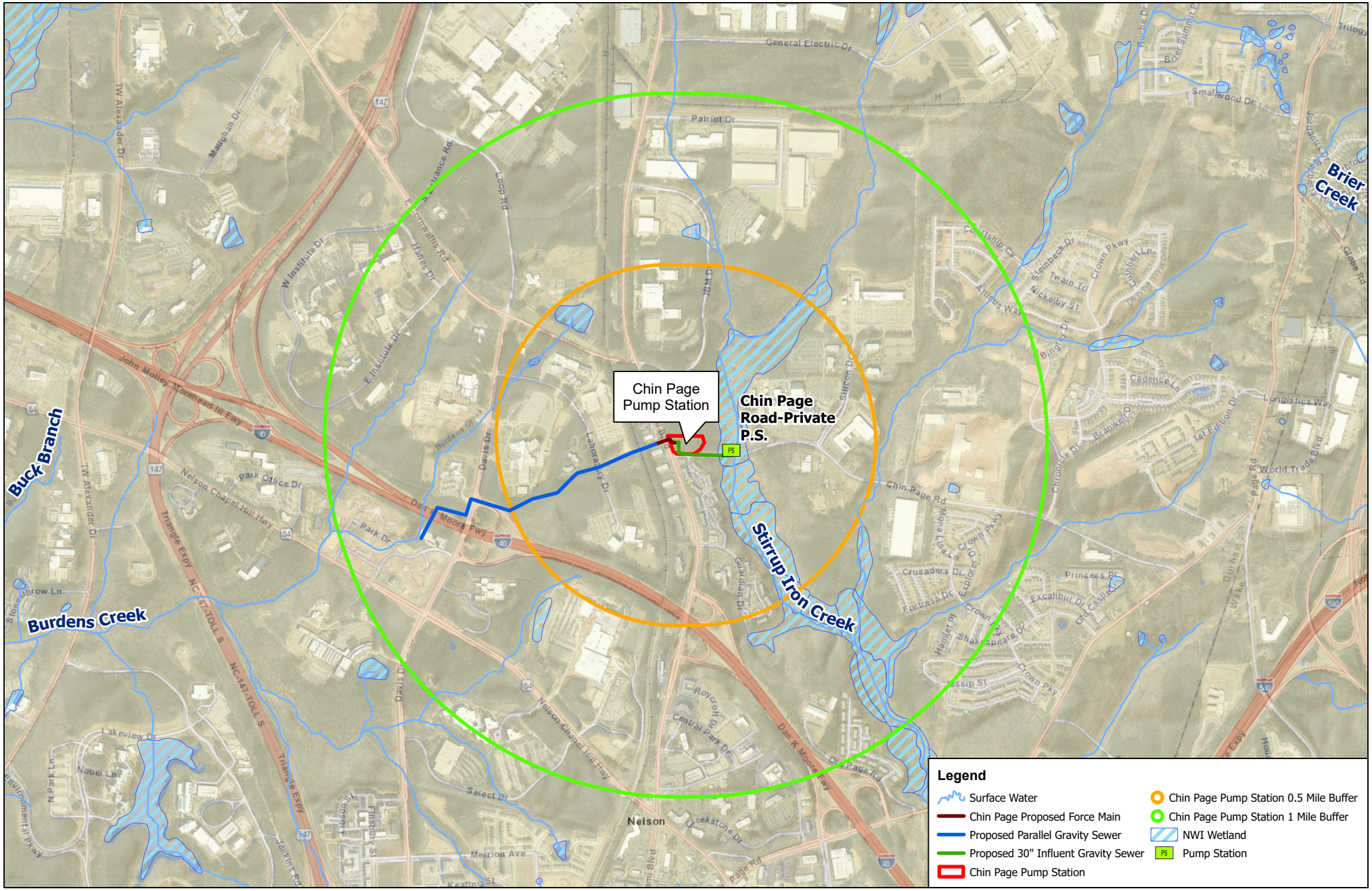


Figure 6.5
Wetlands and Surface Water Map
Durham County - Chin Page Pump Station
Durham, North Carolina

Section 7

Environmental Information Document

Table 7.1 Topography and Floodplains Chin Page Road Pump Station Durham County			
Complete this table in accordance with Section 4.1.			
Floodplain Figure Reference Number (if applicable):			7.1
Floodplain Information Appendix Reference (if applicable):			J
Existing Conditions			
Physiographic Province:	☐ Coastal Plain	☒ Piedmont	☐ Mountains
Minimum Elevation in Project Area (MSL):		*Maximum Elevation in Project Area (MSL):*	
282		362	
Is the project in the 100-year floodplain? (If so, show in Environmental Features Figure.)			☒ Yes ☐ No
Is the project in the 100-year floodway? (If so, show in Environmental Features Figure.)			☒ Yes ☐ No
Discuss other topographical and geological features.			
Elevations in the project area range from approximately 282 feet near the connection to the existing 30-inch sewer to approximately 362 feet at the railroad crossing. According to North Carolina Geologic Survey mapping, the project area is within the Chatham Group of the Triassic Basin, a geologic area consisting of sedimentary rocks with sandstone and mudstone.			
Impacts			
Describe construction impacts of project on topography.			
Construction of the pump station will cause permanent changes to the topography around the infrastructure within the footprint of the pump station site; however, significant re-grading is not anticipated to be required due to the relatively flat site. Construction of the sewer and force main will cause temporary disturbance to the topography along the pipeline corridor; however, permanent changes to topography are not expected since the pipes will be buried.			
Describe impacts of project on the 100-year floodplain and floodway if "Yes" is checked above.			
The existing pump station is located within the floodway. It will be demolished, and a new buried sewer will convey wastewater to the proposed Chin Page Road Pump Station, which will be located entirely outside the floodway and outside the 100-year floodplain. The project will cause only temporary impacts to the floodway and 100-year floodplain, because the pipes will be buried, and existing topography will be re-established. No fill, impervious area, or permanent grading changes will occur within the 100-year floodplain or floodway.			
Describe SCI of the project.			
Secondary and cumulative impacts to topography and floodplains in the service area could be caused by growth that is allowed to occur by the expanded infrastructure. Growth and development could cause temporary and permanent changes to topography as structures and other infrastructure are constructed. Floodplains and other special flood hazard areas could be filled or permanently altered if development occurs in these areas.			

Table 7.1 Topography and Floodplains (continued) Chin Page Road Pump Station Durham County	
Mitigative Measures	
Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*
☒ Yes ☐ Not Applicable	☒ Yes ☐ Not Applicable
Describe the mitigative measures below and supply references to the appropriate appendix in the ER/EID.	
Mitigative Measure Description	*Reference(s)*
Construction impacts will be mitigated by restoring existing topography along the pipelines and by minimizing regrading at the pump station site to the minimum necessary for construction. Sediment and erosion control measures will be used around the work areas to protect adjacent flood hazard areas from sedimentation and runoff. An Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by the North Carolina Department of Environmental Quality (DEQ) prior to construction. A Floodplain Development Permit from Durham County will be obtained for the work in flood hazard areas. SCI impacts will be mitigated by the Unified Development Ordinance of the City of Durham and Durham County (UDO), which will govern growth in the service area. Article 8.4 of the UDO requires a Floodplain Development Permit to be approved by the City-County Floodplain Administrator to ensure compliance with the UDO, protect property, and control development that would increase erosion or flood damage or alter floodplains and stream channels. Development projects will also require a Sedimentation and Erosion Control Plan to be approved by the County per Article 12.10 of the UDO, which will protect downgradient flood hazard areas from construction projects. Topography will be protected by the UDO's Steep Slope Protection Standards (Article 8.8).	NC Erosion and Sediment Control Planning and Design Manual; NPDES Stormwater General Permit NCG010000; City of Durham and Durham County Unified Development Ordinance (Articles 8.4, 8.8, and 12.10)

Table 7.2 Soils Chin Page Road Pump Station Durham County				
Complete this table in accordance with Section 4.2.				
Soils Figure Reference Number:	7.2			
Soils Information Appendix Reference (if applicable):	J			
Existing Conditions				
Describe the types of soil. Provide a soils figure in the EID.				
According to the USDA NRCS Web Soil Survey for Durham County, soils at the Chin Page Road Pump Station site consist of the following soil mapping units: Cartecay and Chewacla soils (0 to 2 percent slopes, frequently flooded); Chewacla and Wehadkee soils (0 to 2 percent slopes, frequently flooded); Gullied land, clayey materials; Roanoke silt loam (0 to 2 percent slopes, occasionally flooded); White Store sandy loam (2 to 6 percent slopes); and White Store sandy loam (6 to 10 percent slopes). The soil types within the project area do not present an impediment to the type of work that is proposed.				
Is soil contamination present?	☒ Yes	☐ No		
Does soil type present any constraints to the project?	☐ Yes	☒ No		
If yes to either of the above, explain: Soil contamination is possible in the project area along the pipeline route. The gravity sewer route crosses through the Syngenta site, which is listed by DEQ as a hazardous waste and brownfields program site.				
Impacts				
Will soil be moved offsite?	☐ Yes	☒ No	*Quantity (yd^3):*	
Will soil be contaminated?	☐ Yes	☒ No		
Describe construction impacts of project.				
Construction of the pump station will cause permanent changes to the soils around the infrastructure within the footprint of the pump station site; however, significant re-grading is not anticipated to be required due to the relatively flat site. Construction of the sewer and force main will cause temporary disturbance to the topography along the pipeline corridor; however, permanent changes to soils are not expected since the pipes will be buried.				
Describe SCI of the project.				
Secondary and cumulative impacts to soils in the service area could be caused by growth that is allowed to occur by the expanded infrastructure. Growth and development could cause temporary and permanent changes to soils as structures and other infrastructure are constructed. Soil types could be permanently altered if development occurs in these areas.				

Table 7.2 Soils (continued) Chin Page Road Pump Station Durham County	
Mitigative Measures	
Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*
☒ Yes ☐ Not Applicable	☒ Yes ☐ Not Applicable
Describe the mitigative measures below and supply references to the appropriate appendix in the ER/EID.	
Mitigative Measure Description	*Reference(s)*
Construction impacts will be mitigated by replacing excavated soils along the pipelines and by minimizing regrading at the pump station site to the minimum necessary for construction. Sediment and erosion control measures will be used around the work areas to protect soils from sedimentation and runoff. An Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by the North Carolina Department of Environmental Quality (DEQ) prior to construction. SCI impacts will be mitigated by the UDO, which will govern growth and development in the service area. Article 8.4 of the UDO requires a Floodplain Development Permit to be approved by the City-County Floodplain Administrator to ensure compliance with the UDO, protect property, and control development that would increase erosion or flood damage or alter floodplains and stream channels. Development projects will also require a Sedimentation and Erosion Control Plan to be approved by the County per Article 12.10 of the UDO, which will protect downgradient flood hazard areas from construction projects. Soils on steep slopes will be protected by the UDO's Steep Slope Protection Standards (Article 8.8).	NC Erosion and Sediment Control Planning and Design Manual; NPDES Stormwater General Permit NCG010000; City of Durham and Durham County UDO (Articles 8.4, 8.8, and 12.10)

Table 7.3 Prime and Unique Farmland Chin Page Road Pump Station Durham County			
Complete this table in accordance with Section 4.3.			
Prime and Unique Farmland Information Appendix Reference (if applicable):			J
Existing Conditions & Impacts			
1) *Does the project area contain prime and unique (P&U) farmlands? If yes, show on soils figure the soil types that are prime and unique farmland. (If "No" skip the rest of the table.)*	☒ Yes ☐ No	If Yes, Quantity (acres):	Approx. 5.4 acres
2) *Will P&U farmland be directly impacted by the project? (If "No" skip questions 3-4.)*	☒ Yes ☐ No	If Yes, Quantity (acres):	Approx. 3 acres
3) *What is the total acreage of P&U farmland in the county?*	Acres Impacted:	Approx. 140,642 acres total in county	
4) *What is the percentage of P&U farmland in the county that will be impacted? (Divide answer to Question 2 by answer to Question 3)*	Percentage Impacted:	0.002%	
Will SCI impact prime and unique farmlands?	☒ Yes ☐ No	If Yes, Quantity (acres):	Quantity unknown
Describe SCI of the project.			
Secondary and cumulative impacts to prime and unique farmland in the service area could result from growth and development in the service area. Areas of farmland could be permanently converted to other uses, including residential and commercial/industrial.			
Mitigative Measures			
Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*		
☒ Yes ☐ Not Applicable	☒ Yes ☐ Not Applicable		

Table 7.3 Prime and Unique Farmland (continued) Chin Page Road Pump Station Durham County	
Describe the mitigative measures below and supply references to the appropriate appendix in the ER/EID.	
Mitigative Measure Description	*Reference(s)*
Construction impacts will be mitigated by minimizing easement widths needed for pipelines, replacing excavated soils after pipeline installation, and minimizing regrading at the pump station site to the minimum necessary for construction. None of the areas within the project footprint are currently used as farmland. Sediment and erosion control measures will be used around the work areas to protect surrounding soils that are prime/unique farmland from sedimentation and runoff. An Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by the North Carolina Department of Environmental Quality (DEQ) prior to construction. SCI impacts will be mitigated by the UDO, which will govern growth and development in the service area, including conversion of prime/unique farmland to other uses. The City and County have classified their jurisdictions into zoning districts and development tiers, including Downtown, Compact Neighborhood, Urban, Suburban, and Rural (Article 4.1) to direct development. Development projects will require a Sedimentation and Erosion Control Plan to be approved by the County per Article 12.10 of the UDO, which will protect downgradient soils and potential farmland from construction projects. Soils on steep slopes will be protected by the UDO's Steep Slope Protection Standards (Article 8.8).	NC Erosion and Sediment Control Planning and Design Manual; NPDES Stormwater General Permit NCG010000; City of Durham and Durham County UDO (Articles 4.1, 8.8, and 12.10)

Table 7.4 Land Use Chin Page Road Pump Station Durham County	
Complete this table in accordance with Section 4.4.	
Land Use Figure Reference Number (if applicable):	7.1
Land Use Information Appendix Reference (if applicable):	J
Existing Conditions	
Discuss the current land use for the project site.	
The pump station will be located on the southern end of a wooded, vacant portion of an 87-acre commercial office property, near the intersection of South Miami Boulevard and Chin Page Road. The pump station site is within the City-County Suburban Development Tier and is within the City of Durham. Along the pipeline corridor, the land use is industrial, commercial, office, and research facilities associated with the Research Triangle Park (RTP) area.	
Discuss the current land use for the project area.	
The project service area is east of RTP and is characterized by similar land uses, including office, commercial, and light industrial on the western side of the service area adjacent to RTP. The northern portion of the service area contains more residential land use.	
Discuss the zoning for the project site.	
The pump station site is zoned industrial light (IL). The pipeline corridor crosses areas zoned IL, office and institutional (OI), and science research park (SRP).	
Discuss the zoning for the project area.	
The southwestern side of the service area is zoned primarily industrial and office/institutional. The northern and eastern sides of the service area contain a mix of planned development residential, residential suburban, residential urban, and residential rural.	
Impacts	
Discuss the direct impacts to land use on the project site.	
The site of the new pump station will be converted from a vacant, wooded area to a small utility use. However, the site is currently part of a large commercial property and will not result in a significant change to the land use of the property. The pipelines will be buried and will not affect land use significantly other than the permanent utility easement for maintenance. No land use changes are anticipated from removing the GE pump station.	

Table 7.4 Land Use (continued)
Chin Page Road Pump Station
Durham County

Describe SCI of the project.

Secondary and cumulative impacts to land use in the service area could result from growth and development in the service area. Because the City and County control and direct growth and development through ordinances, it is likely that the growth and development will occur regardless of the project; however, the proposed project could facilitate this growth and development by providing adequate wastewater collection system capacity.

Mitigative Measures

Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*
☒ Yes ☐ Not Applicable	☒ Yes ☐ Not Applicable

Describe the mitigative measures below and supply references to the appropriate appendix in the EID.

Mitigative Measure Description	*Reference(s)*
Construction impacts will be mitigated by restoring existing topography along the pipelines to minimize changes to land use and by minimizing regrading at the pump station site to the minimum necessary for construction. Sediment and erosion control measures will be used around the work areas to protect adjacent areas from sedimentation and runoff to minimize the impact of construction on adjacent land uses. An Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by the North Carolina Department of Environmental Quality (DEQ) prior to construction. SCI impacts will be mitigated by the UDO, which will govern growth in the service area. Examples of ways the UDO protects existing land uses such as natural resources and controls development by zoning include Article 4.1 (Development Tiers and Zoning); Article 7.2 (Open Space); Article 8.3 (Tree Coverage Standards); Article 8.4 (Floodplain Development); Article 8.5 (Riparian Buffer Protection Standards); Article 8.8 (Steep Slope Protection Standards); Article 8.9 (Wetlands Protection Standards); Article 8.10 (Durham Inventory Site Protection, addressing Important Natural Areas, Plants, and Wildlife); Article 12.8 (Stormwater Management); and Article 12.10 (Sedimentation and Erosion Control).	NC Erosion and Sediment Control Planning and Design Manual; NPDES Stormwater General Permit NCG010000; City of Durham and Durham County UDO (Articles 4.1, 7.2, 8.3, 8.4, 8.5, 8.8, 8.9, 8.10, 12.8, and 12.10)

Table 7.5 Forest Resources Chin Page Road Pump Station Durham County			
Complete this table in accordance with Section 4.5.			
Forest Resources Information Appendix Reference (if applicable):	J		
Existing Conditions			
Discuss the type of forest resources on the project site and in the project area			
The pump station site is wooded with a mix of pine trees and hardwoods such as sweetgum. Forest resources closer to Stirrup Iron Creek and the former pump station include species tolerant of wetter soils such as sycamore, sweetgum, poplar, maple, and water oak, while the area outside the floodplain where the new pump station will be located includes more upland species such as pine, cedar, and white oak.			
Discuss the types of wildlife habitat on the project site and in the project area.			
Wildlife in the project area is typical of cleared sites and easements surrounded by forests and likely includes mammals such as deer, squirrels, opossum, moles, rabbits, chipmunks, beavers, mice, rats, voles, foxes, raccoons, and skunks. The wetland areas adjacent to Stirrup Iron Creek and Burdens Creek are also habitat for amphibians such as salamanders, newts, toads, and frogs and reptiles such as turtles, lizards, skinks, and snakes. The project area and surrounding area also provides habitat for birds.			
Impacts			
Will forest resources be impacted?	☒ Yes ☐ No	If Yes, Quantity (acres):	Approx. 5 acres
Will SCI impact forest resources?	☒ Yes ☐ No	If Yes, Approximate Quantity (acres):	Unknown (depends on development but will follow UDO Article 8.3, Tree Coverage Standards in Appendix)
Describe SCI of the project.			
Secondary and cumulative impacts to forest resources in the service area could result from growth and development in the service area. Forest resources could be permanently cleared and converted to other uses, including residential and commercial/industrial.			
Mitigative Measures			
Mitigative Measures for Construction Impacts?		*Mitigative Measures for SCI?*	
☒ Yes ☐ Not Applicable		☒ Yes ☐ Not Applicable	

Table 7.5 Forest Resources (continued) Chin Page Road Pump Station Durham County	
Describe the mitigative measures below and supply references to the appropriate appendix in the EID.	
Mitigative Measure Description	*Reference(s)*
Construction impacts to forest resources will be mitigated by minimizing regrading at the pump station site to only that which is necessary for construction. Sediment and erosion control measures will be used around the work areas to protect adjacent forested areas from sedimentation and runoff. An Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by the North Carolina Department of Environmental Quality (DEQ) prior to construction. SCI impacts will be mitigated by the UDO, which will govern growth in the service area. Examples of ways the UDO protects existing forest resources and controls development by zoning include Article 4.1 (Development Tiers and Zoning); Article 7.2 (Open Space); Article 8.3 (Tree Coverage Standards); Article 8.4 (Floodplain Development); Article 8.5 (Riparian Buffer Protection Standards); Article 8.8 (Steep Slope Protection Standards); Article 8.9 (Wetlands Protection Standards); Article 8.10 (Durham Inventory Site Protection, addressing Important Natural Areas, Plants, and Wildlife); Article 12.8 (Stormwater Management); and Article 12.10 (Sedimentation and Erosion Control).	NC Erosion and Sediment Control Planning and Design Manual; NPDES Stormwater General Permit NCG010000; City of Durham and Durham County UDO (Articles 4.1, 7.2, 8.3, 8.4, 8.5, 8.8, 8.9, 8.10, 12.8, and 12.10)

Table 7.6 Wetlands and Streams
Chin Page Road Pump Station
Durham County

Complete this table in accordance with Section 4.6 of the guidance.

Wetlands and Streams Figure Reference Number:	7.3
Wetlands and Streams Information Appendix Reference (if applicable):	J

Existing Conditions

Are wetlands present on the project site and in the project area?	*Are streams present on the project site and in the project area?*
☒ Yes ☐ No	☒ Yes ☐ No

If so, discuss the type, quality, function, and relative importance of wetlands and identify any streams.

While delineations have not yet occurred, the US Fish and Wildlife Service's National Wetland Inventory mapping indicates that the area adjacent to Stirrup Iron Creek is a freshwater forested/shrub wetland. The wetland area does not include the proposed pump station site, but it does include the former pump station and piping that will be diverted to the new station. There are two streams in the project area – Stirrup Iron Creek near the pump station on the east side of the project area and Burdens Creek near the end of the pipeline on the west side of the project area. Stream and wetland delineations will occur during design of the project.

Have delineations occurred?	*If so, supply the date.*
☐ Yes ☒ No	

Impacts

Will wetlands be impacted?	☒ Yes ☐ No	If Yes, Quantity (acres):	Approx. 0.1 acre
Will streams be impacted?	☐ Yes ☒ No	If Yes, Quantity (linear feet):	
Will SCI impact wetlands?	☒ Yes ☐ No	If Yes, Approximate Quantity (acres):	Unknown, but will be subject to UDO and federal/state regulations
Will SCI impact streams?	☒ Yes ☐ No	If Yes, Approximate Quantity (linear feet):	Unknown, but will be subject to UDO and federal/state regulations

Describe Direct Impacts of the project (construction and operational impacts). If there will be any stream/wetland crossings, complete Table S.9.a in addition to the description.

The site of the former pump station is within an area designated as a freshwater forested/shrub wetland by the US Fish and Wildlife Service's National Wetland Inventory mapping. The proposed pump station site is outside the wetland area, but the project will require temporary impacts to demolish and remove the former pump station in the wetland and construct the pipeline to direct wastewater flow to the new Chin Page Road Pump Station. These impacts will be temporary with the exception of the permanently maintained easement for the pipeline, which will be adjacent to Chin Page Road to minimize impacts. The easement is expected to be 30-ft wide along the length of the pipe.

No impacts to streams are expected, although the piping and removal of the former pump station may require temporary impacts to the riparian buffer along Stirrup Iron Creek.

Operation of the project will not cause any impacts to wetlands and streams except for temporary disturbance from mowing and maintenance of the easements.

Table 7.6 Wetlands and Streams (continued)
Chin Page Road Pump Station
Durham County

Describe SCI of the project.

Secondary and cumulative impacts to wetlands and streams in the service area could result from growth and development in the service area. These resources could be permanently cleared or converted to other land uses or for infrastructure such as roads and culverts.

Mitigative Measures

Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*
☒ Yes ☐ Not Applicable	☒ Yes ☐ Not Applicable

Describe the mitigative measures below and supply references to the appropriate appendix in the EID.

Mitigative Measure Description	*Reference(s)*
Construction impacts to streams and wetlands will be mitigated by minimizing the footprint of the project to only that which is necessary for construction. The pipeline from the former pump station to the new pump station will be located along Chin Page Road to reduce impacts by co-locating the impact corridor with the road. Sediment and erosion control measures will be used around the work areas to protect adjacent streams and wetlands from sedimentation and runoff. An Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by the North Carolina Department of Environmental Quality (DEQ) prior to construction. Wetlands and streams will be delineated during design of the project and avoided as much as possible, and 404/401 permits will be obtained. SCI impacts will be mitigated by the UDO, which will govern growth in the service area. Examples of ways the UDO protects existing forest resources and controls development by zoning include Article 4.1 (Development Tiers and Zoning); Article 7.2 (Open Space); Article 8.3 (Tree Coverage Standards); Article 8.4 (Floodplain Development); Article 8.5 (Riparian Buffer Protection Standards); Article 8.8 (Steep Slope Protection Standards); Article 8.9 (Wetlands Protection Standards); Article 8.10 (Durham Inventory Site Protection, addressing Important Natural Areas, Plants, and Wildlife); Article 12.8 (Stormwater Management); and Article 12.10 (Sedimentation and Erosion Control).	NC Erosion and Sediment Control Planning and Design Manual; Clean Water Act Section 404/401 permits; NPDES Stormwater General Permit NCG010000; City of Durham and Durham County UDO (Articles 4.1, 7.2, 8.3, 8.4, 8.5, 8.8, 8.9, 8.10, 12.8, and 12.10)

Table 7.7 Stream/Wetland Crossings			
Chin Page Road Pump Station			
Durham County			
Wetland Crossings (add rows as needed; include all crossings even if impact is zero acres.)			
		Stream and Wetlands Crossing Figure Reference Number:	7.3
		Stream and Wetlands Crossing Information Appendix Reference (if applicable):	N/A
# Keyed to Map	Diameter & Type of Sewer	Installation Method	Acres Impacted
1	30” gravity sewer from former pump station to new pump station	Open-cut	Approx. 0.1 ac.
		Total Wetland Impacts (acres):	**Approx. 0.1 ac.**
Stream Crossings (add rows as needed; include all crossings even if impact is zero feet.)			
# Keyed to Map	Diameter & Type of Sewer	Installation Method	Linear Feet Impacted
			0
		Total Stream Impacts (feet):	**0 feet**

Table 7.8 Water Resources
Chin Page Road Pump Station
Durham County

Complete this table in accordance with Section 4.7.

Water Resources Appendix Information Appendix Reference (if applicable):	J

Existing Conditions

River basin(s) for project:	Neuse, Cape Fear

List all stream(s) found within the project site and greater project area.

Name	*Classification*	*Impaired?*	*Reason for Impairment*
Stirrup Iron Creek	C; NSW	☐ Yes ☒ No	
Crabtree Lake (Creek) north of Aviation Parkway	B; NSW	☒ Yes ☐ No	PCB Fish Tissue Advisory
Burdens Creek	WS-V; NSW	☐ Yes ☒ No	
Northeast Creek	WS-IV; NSW	☒ Yes ☐ No	Turbidity, dissolved oxygen, copper, fecal coliform
		☐ Yes ☐ No	

Discuss groundwater quality and quantity.

According to the July 1972 report Public Water Supplies of North Carolina – Part I Northern Piedmont, the southern Durham County area is underlain by sedimentary deposits, including sandstone, siltstone, shale, and conglomerate of Triassic age. Well yields are lower than average for the Piedmont and vary. Groundwater in Durham County is considered adequate for domestic uses, except hardness can be excessive. Durham County supplies water to Rougemont in the northern part of the county, and the source of this supply is two groundwater wells.

Discuss surface water quality.

Stirrup Iron Creek runs along the eastern boundary of the project site and is classified by DWR as C and a Nutrient Sensitive Water (NSW). It flows into Crabtree Lake, which is classified as B and NSW and listed on the 2022 Integrated Report as impaired because of a PCB Fish Tissue Advisory. Burdens Creek is located on the western side of the project area and is classified as WS-V and NSW. It flows into Northeast Creek, which is classified as WS-IV and NSW and is listed on the 2022 Integrated Report as impaired for turbidity, dissolved oxygen, copper, and fecal coliform.

The City of Durham Stormwater Services monitors water quality in Stirrup Iron Creek. The creek was last monitored in 2019 and received a low water quality score due to poor bacteria levels, fair nutrient levels, and poor turbidity levels.

LGU water supply(ies):	In project area, water is supplied by City of Durham (Lake Michie, Little River, Eno River, Jordan Lake)

Table 7.8 Water Resources (continued) Chin Page Road Pump Station Durham County	
Impacts	
Discuss construction impacts related to surface water quality and groundwater quality/quantity.	
This project is not expected to cause significant direct surface water impacts. Water resources around the construction site could be impacted by runoff from the site if sediment and erosion control measures are not used. Because the former pump station will be demolished and a new pump station constructed, the project will result in a small increase in impervious area. However, the net increase is expected to be small. Groundwater that enters the construction area will need to be removed during construction. Sediment will be removed prior to discharging the water from the site.	
Discuss operational impacts related to surface water quality and groundwater quality/quantity.	
Operation of the pump station and pipeline will not significantly affect surface water quality or groundwater quality or quantity of these resources. The County currently holds a Collection System Permit to operate and maintain its wastewater collection system. Wastewater from this project will be conveyed to the County's Triangle WWTP. The proposed project will not require any changes to the WWTP's treatment process or capacity. Operation of the pump station and pipeline will protect the quality of water resources by replacing old, unreliable infrastructure and increasing its ability to prevent SSOs and infiltration.	
Describe SCI of the project.	
Secondary and cumulative impacts to water resources in the service area could result from growth and development in the service area. Because the City and County control and direct growth and development through ordinances, it is likely that the growth and development will occur regardless of the project; however, the proposed project could facilitate this growth and development by providing adequate wastewater collection system capacity. Water resources could be impacted by buffer clearing, filling of streams, or from infrastructure such as roads and culverts.	
Mitigative Measures	
Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*
☒ Yes ☐ Not Applicable	☒ Yes ☐ Not Applicable

Table 7.8 Water Resources (continued) Chin Page Road Pump Station Durham County	
Describe the mitigative measures below and supply references to the appropriate appendix in the EID.	
Mitigative Measure Description	*Reference(s)*
Construction impacts to water resources will be mitigated by using sediment and erosion control measures around the work areas to protect downstream surface water from sedimentation and runoff. An Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by the North Carolina Department of Environmental Quality (DEQ) prior to construction. Wetlands and streams will be delineated during design of the project and avoided as much as possible, and 404/401 permits will be obtained. SCI impacts will be mitigated by the UDO, which will govern growth and development in the service area. Article 8.4 of the UDO requires a Floodplain Development Permit to be approved by the City-County Floodplain Administrator to ensure compliance with the UDO, protect property, and control development that would increase erosion or flood damage or alter floodplains and stream channels. Development projects will also require a Sedimentation and Erosion Control Plan to be approved by the County per Article 12.10 of the UDO, which will protect downstream surface waters from construction projects. Steep slopes will be protected by the UDO's Steep Slope Protection Standards (Article 8.8), further protecting sedimentation in downstream surface waters. Surface water quality will be protected by UDO Article 8.5, Riparian Buffer Protection Standards, and Article 12.8, Stormwater Management. Although this project supports current and future growth in the Stirrup Iron Creek Basin, it does not require changes to the existing WWTP. The existing WWTP is currently undergoing expansion separate from this project.	NC Erosion and Sediment Control Planning and Design Manual; Clean Water Act Section 404/401 permits; NPDES Stormwater General Permit NCG010000; City of Durham and Durham County UDO (Articles 8.4, 8.5, 8.8, 12.8, and 12.10)

Table 7.9 Wild and Scenic Rivers Chin Page Road Pump Station Durham, North Carolina			
Complete this table in accordance with Section 4.8 of the guidance.			
Wild and Scenic Rivers Appendix Information Appendix Reference (if applicable):			N/A
Existing Conditions			
Is the project located within one mile of one of the designated Wild & Scenic Rivers or a river in the Nationwide Rivers Inventory or its tributaries?			☐ Yes ☒ No
If Yes, check the applicable river(s) / stream(s).			
Chattooga River Horsepasture River Lumber River	☐ ☐ ☐	New River Wilson Creek	☐ ☐
If "Yes" was checked above, is the stream reach in the project area designated as Wild & Scenic?			
The project will not result in any impacts to Wild and Scenic Rivers or rivers/tributaries in the Nationwide Rivers Inventory.			
Impacts			
Discuss any construction impacts related to these stream reaches.			
The project will not result in any construction impacts to Wild and Scenic Rivers or rivers/tributaries in the Nationwide Rivers Inventory.			
Discuss any operational impacts related to these stream reaches.			
The project will not result in any operational impacts to Wild and Scenic Rivers or rivers/tributaries in the Nationwide Rivers Inventory.			
Describe the SCI of the project.			
The project will not result in any SCI impacts to Wild and Scenic Rivers or rivers/tributaries in the Nationwide Rivers Inventory.			
Mitigative Measures			
Mitigative Measures for Construction Impacts		*Mitigative Measures for SCI*	
☐ Yes ☒ Not Applicable		☐ Yes ☒ Not Applicable	
Describe the mitigative measures below and supply references to the appropriate appendix in the EID.			
Mitigative Measure Description			*Reference(s)*
N/A			N/A

Table 7.10 Coastal Resources Chin Page Road Pump Station Durham, North Carolina	
Complete this table in accordance with Section 4.9 of the guidance.	
Coastal Resources Appendix Information and Appendix Reference (if applicable)	N/A
CAMA	
Is the project in a CAMA county listed in the guidance? (If no, skip the rest of the table.)	☐ Yes ☒ No
Does the project involve new construction, land conversion, major rehabilitation, and substantial improvement activities?	☐ Yes ☐ No
If "Yes" to both questions, discuss consistency review with Division of Coastal Management and include any relevant documentation in an appendix.	
Coastal Barriers	
Is the project located within a CBRS community? If "Yes," attach a FIRM map indicating whether construction activity occurs in a CBRS and provide documentation of US Fish and Wildlife Service approval in an Appendix. Include the appropriate Appendix reference at the top of this table.	☐ Yes ☐ No

Table 7.11 Shellfish, Fish, and Their Habitats Chin Page Road Pump Station Durham County			
Complete this table in accordance with Section 4.10 of this guidance.			
Shellfish, Fish, and Their Habitats Information Appendix Reference (if applicable):			J
Existing Conditions			
Are T&E species present within the project site, the project area, or downstream from the project?			
☒ Yes ☐ No			
If Yes, list all aquatic T&E species located in the waterbodies within the project site, in the project area, and downstream of the project site. Show approximate location(s) on the Environmental Features Figure.			
Aquatic T&E Species Figure Reference Number (if applicable):			
Common Name	*Scientific Name*	*Status*	*Approximate Location (e.g., 5 mi. NE of Project)*
Carolina madtom	*Noturus furiosus*	Endangered	Critical habitat includes Stirrup Iron Creek
Atlantic pigtoe	*Fusconaia masoni*	Threatened	None known in project area, but project area is within range
Dwarf wedgemussel	*Alasmidonta heterodon*	Endangered	None known in project area, but project area is within range
Neuse River waterdog	*Necturus lewisi*	Threatened	Critical habitat includes Stirrup Iron Creek
Discuss shellfish and fish habitat. (Not just T&E species.)			
There is no fish or shellfish habitat within the project footprint, because no work will occur in streams. However, the streams on the eastern and western sides of the project area that are just downstream of the project (Stirrup Iron Creek and Burdens Creek) do provide habitat to fish and shellfish. The project area is within the known range of the Atlantic pigtoe and dwarf wedgemussel, according to the USFWS Endangered Species Online System (ECOS). The project area is also within the designated critical habitat of the Carolina madtom, according to ECOS. DWR maintains a fish community monitoring site (BF107) on Northeast Creek downstream of the confluence of Burdens Creek (downstream of the pipeline connection point on the western side of the project area). According to DWR's Fish Community Assessment data, the site had a Bioclassification rating of Fair.			

Table 7.11 Shellfish, Fish, and Their Habitats (continued) Chin Page Road Pump Station Durham County	
Impacts	
Discuss any impacts to threatened and endangered species.	
No direct impacts to aquatic threatened and endangered species are anticipated from this project. No work is planned to occur in streams in the project area, including Stirrup Iron Creek and Burdens Creek.	
Discuss construction impacts related to fish, shellfish, and their habitats.	
Construction of the pump station and pipeline will temporarily disturb the land adjacent to streams that are habitat for fish, shellfish, and other aquatic species. Without sediment and erosion control measures, runoff could cause sediment discharge into downstream areas including streams. Although this project supports current and future growth in the Stirrup Iron Creek Basin, it does not require changes to the existing WWTP. The existing WWTP is currently undergoing expansion separate from this project.	
Discuss operational impacts related to fish, shellfish, and their habitats.	
Operation of the pump station and pipeline will not significantly affect adjacent streams that are habitat to fish, shellfish, and other aquatic species. The County currently holds a Collection System Permit to operate and maintain its wastewater collection system. Wastewater from this project will be conveyed to the County's Triangle WWTP. The proposed project will not require any changes to the WWTP's treatment process or capacity. Operation of the pump station and pipeline will protect the quality of water resources by replacing old, unreliable infrastructure and increasing its ability to prevent SSOs and infiltration.	
Describe SCI of the project.	
Secondary and cumulative impacts to streams that are habitat for fish, shellfish, and other aquatic species in the service area could result from growth and development in the service area. Because the City and County control and direct growth and development through ordinances, it is likely that the growth and development will occur regardless of the project; however, the proposed project could facilitate this growth and development by providing adequate wastewater collection system capacity.	
Mitigative Measures	
Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*
☒ Yes ☐ Not Applicable	☒ Yes ☐ Not Applicable

Table 7.11 Shellfish, Fish, and Their Habitats (continued) Chin Page Road Pump Station Durham County	
Describe the mitigative measures below and supply references to the appropriate appendix in the EID.	
Mitigative Measure Description	*Reference(s)*
Construction impacts to streams that are habitat for shellfish, fish, and other aquatic species will be mitigated by using sediment and erosion control measures around the work areas to protect downstream surface water from sedimentation and runoff. An Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by the North Carolina Department of Environmental Quality (DEQ) prior to construction. Wetlands and streams will be delineated during design of the project and avoided as much as possible, and 404/401 permits will be obtained. SCI impacts will be mitigated by the UDO, which will govern growth and development in the service area. Article 8.4 of the UDO requires a Floodplain Development Permit to be approved by the City-County Floodplain Administrator to ensure compliance with the UDO, protect property, and control development that would increase erosion or flood damage or alter floodplains and stream channels. Development projects will also require a Sedimentation and Erosion Control Plan to be approved by the County per Article 12.10 of the UDO, which will protect downstream surface waters from construction projects. Surface water quality will be protected by UDO Article 8.5, Riparian Buffer Protection Standards, and Article 12.8, Stormwater Management.	NC Erosion and Sediment Control Planning and Design Manual; Clean Water Act Section 404/401 permits; NPDES Stormwater General Permit NCG010000; City of Durham and Durham County UDO (Articles 8.4, 8.5, 12.8, and 12.10)

Table 7.12 Wildlife and Natural Vegetation Chin Page Road Pump Station Durham County			
Complete this table in accordance with Section 4.11 of the guidance.			
Wildlife and Natural Vegetation Information Appendix Reference (if applicable)	J		
Existing Conditions			
Are T&E species present within the project site, or project area?			
☒ Yes ☐ No			
If Yes, list all terrestrial T&E species located in the project site or project area. Show approximate location(s) on the Environmental Features Figure.			
Terrestrial T&E Species Figure Reference Number (if applicable):			
Common Name	*Scientific Name*	*Status*	*Approximate Location (e.g., 5 mi. NE of Project)*
~~Neuse River waterdog~~	~~*Necturus lewisi*~~	~~Threatened~~	~~Critical habitat includes Stirrup Iron Creek~~
Monarch butterfly	*Danaus plexippus*	Candidate	None known in project area, but project area is within range
Michaux's sumac	*Rhus michauxii*	Endangered	None known in project area, but project area is within range
Smooth coneflower	*Echinacea laevigata*	Endangered	None known in project area, but project area is within range
Discuss the wildlife and vegetation present in the project site and project area. (Not just T&E species.)			
The pump station will be located on the southern end of a wooded, vacant portion of an 87-acre commercial office property, near the intersection of South Miami Boulevard and Chin Page Road. The site consists of a mix of pine trees and hardwood trees with shrub undergrowth. The former pump station is located in a wetland and floodplain area adjacent to Stirrup Iron Creek. This area includes more water-tolerant species with grassed areas on the pipeline easements and around the pump station. The pipeline corridor will be located in grassed and wooded areas adjacent to industrial, commercial, office, and research facilities. Wildlife in the project area is typical of cleared sites and easements surrounded by forests and likely includes mammals such as deer, squirrels, opossum, moles, rabbits, chipmunks, beavers, mice, rats, voles, foxes, raccoons, and skunks. The wetland areas adjacent to Stirrup Iron Creek and Burdens Creek are also habitat for amphibians such as salamanders, newts, toads, and frogs and reptiles such as turtles, lizards, skinks, and snakes. The project area and surrounding area also provides habitat for birds.			
Impacts			
Discuss any impacts to threatened and endangered species.			
There are no known threatened and endangered species in the project area per GIS data; however, the project area is included in the range for the species listed above. No impacts are expected to the Neuse River waterdog, because the project will not include any work in Stirrup Iron Creek. Habitat for the three other protected species listed above will be assessed during design, and impacts to these species is expected to be able to be avoided.			

Table 7.12 Wildlife and Natural Vegetation (continued)
Chin Page Road Pump Station
Durham County

Discuss construction impacts related to wildlife and natural vegetation.

Construction of the pump station will cause permanent changes to the vegetation within the footprint of the pump station site since this area will be maintained in the future. Construction of the sewer and force main will cause temporary disturbance to the topography along the pipeline corridor; however, permanent changes to vegetation are not expected since the pipes will be buried. Construction of the project will cause temporary displacement of wildlife, but wildlife is expected to return to its use of the site after construction due to the small footprint of the infrastructure and only occasional visits by maintenance personnel.

Describe SCI of the project.

Secondary and cumulative impacts to wildlife and vegetation in the service area could be caused by growth that is allowed to occur by the expanded infrastructure. Growth and development could cause temporary and permanent changes to wildlife and vegetation as structures and other infrastructure are constructed. These resources could be permanently altered if development occurs in these areas.

Mitigative Measures

Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*
☒ Yes ☐ Not Applicable	☒ Yes ☐ Not Applicable

Describe the mitigative measures below and supply references to the appropriate appendix in the EID.

Mitigative Measure Description	*Reference(s)*
Construction impacts to wildlife and vegetation within the project site be mitigated by using sediment and erosion control measures around the work areas to protect downstream areas from sedimentation and runoff. An Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by the North Carolina Department of Environmental Quality (DEQ) prior to construction. Wetlands and streams will be delineated during design of the project and avoided as much as possible, and 404/401 permits will be obtained. SCI impacts to wildlife and vegetation will be mitigated by the UDO, which will govern growth and development in the service area. Development projects will require Sedimentation and Erosion Control Plans to be approved by the County per Article 12.10 of the UDO, which will protect wildlife and vegetation from construction projects. The wildlife and vegetation near surface waters and wetlands will be protected by UDO Article 8.5 (Riparian Buffer Protection Standards), Article 12.8 (Stormwater Management), and Article 8.9 (Wetlands Protection Standards). Article 8.10 of the UDO (Durham Inventory Site Protection) will further protect Important Natural Areas, Plants, and Wildlife in the service area.	NC Erosion and Sediment Control Planning and Design Manual; Clean Water Act Section 404/401 permits; NPDES Stormwater General Permit NCG010000; City of Durham and Durham County UDO (Articles 8.5, 8.8, 8.9, 8.10, 12.8, and 12.10)

Table 7.13 Public Lands and Scenic, Recreational, and State Natural Areas
Chin Page Road Pump Station
Durham County

Complete this table in accordance with Section 4.12 of the guidance.

Public Lands and Scenic, Recreational, and State Natural Area Figure Reference Number (if applicable):	7.4
Public Lands and Scenic, Recreational, and State Natural Area Information Appendix Reference (if applicable):	J

Existing Conditions

Are public lands and scenic, recreational, and state natural areas found adjacent to or in the project area?

☒ Yes ☐ No (then no impact)

If yes, list these areas and show on the Environmental Features Figure

Name	*Type*	*Location (e.g., 5 mi. NE of Project)*
Stirrup Iron Creek Marsh and Sloughs	Significant Natural Heritage Area	Former pump station is located within the SNHA

Impacts

If Yes, discuss construction impacts related to public lands, and scenic, recreational, and state natural areas.

The site of the former pump station is within the Stirrup Iron Creek Marsh and Sloughs, a 218-acre Natural Heritage Program-designated Significant Natural Heritage Area (SNHA) with a steep slope ending in a floodplain with beaver impoundments. The proposed pump station site is outside the SNHA. The project will require temporary impacts to demolish and remove the former pump station and construct the pipeline to direct wastewater flow out of the SNHA to the new Chin Page Road Pump Station. These impacts will be temporary with the exception of the permanently maintained easement for the pipeline, which will be adjacent to Chin Page Road.

If Yes, discuss operational impacts related to public lands, and scenic, recreational, and state natural areas.

Operation of the pump station and pipeline will not significantly affect public lands or scenic, recreational, and state natural areas. The County currently holds a Collection System Permit to operate and maintain its wastewater collection system, and this project will become part of the County's Collection System Permit. Wastewater from this project will be conveyed to the County's Triangle WWTP. The proposed project will not require any changes to the WWTP treatment process or capacity. Operation of the pump station and pipeline will protect the downstream areas such as the Stirrup Iron Creek Marsh and Sloughs by replacing old and unreliable infrastructure and improving its function, reducing SSOs and infiltration.

Describe SCI of the project.

Secondary and cumulative impacts to land use in the service area including impacts to public lands and scenic, recreational, and state natural areas could result from growth and development in the service area. Because the City and County control and direct growth and development through ordinances, it is likely that the growth and development will occur regardless of the project; however, the proposed project could facilitate this growth and development by providing adequate wastewater collection system capacity.

Mitigative Measures

Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*
☒ Yes ☐ Not Applicable	☒ Yes ☐ Not Applicable

Table 7.13 Public Lands and Scenic, Recreational, and State Natural Areas (continued) Chin Page Road Pump Station Durham County	
Describe the mitigative measures below and supply references to the appropriate appendix in the EID.	
Mitigative Measure Description	*Reference(s)*
Construction impacts to the Stirrup Iron Creek Marsh and Sloughs SNHA will be mitigated by using sediment and erosion control measures around the work areas to protect downstream areas including the SNHA from sedimentation and runoff. An Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by the North Carolina Department of Environmental Quality (DEQ) prior to construction. SCI impacts to public lands and scenic, recreational, and state natural areas will be mitigated by the UDO, which will govern growth and development in the service area. Many protected natural areas are located in flood hazard areas and along streams, and Article 8.4 of the UDO requires a Floodplain Development Permit to be approved by the City-County Floodplain Administrator to ensure compliance with the UDO, protect property, and control development that would increase erosion or flood damage or alter floodplains and stream channels. Development projects will also require a Sedimentation and Erosion Control Plan to be approved by the County per Article 12.10 of the UDO, which will protect downstream SNHAs from construction projects. Surface waters and wetlands in SNHAs and other public land areas will be protected by UDO Article 8.5 (Riparian Buffer Protection Standards), Article 12.8 (Stormwater Management), and Article 8.9 (Wetlands Protection Standards). Article 8.10 of the UDO (Durham Inventory Site Protection) will further protect Important Natural Areas, Plants, and Wildlife in the service area.	NC Erosion and Sediment Control Planning and Design Manual; NPDES Stormwater General Permit NCG010000; City of Durham and Durham County UDO (Articles 8.4, 8.5, 8.8, 8.9, 8.10, 12.8, and 12.10)

Table 7.14 Areas of Archaeological or Historical Value Chin Page Road Pump Station Durham County		
Complete this table in accordance with Section 4.13 of this guidance.		
Archaeological or Historical Area Figure Reference Number (if applicable):	7.4	
Archaeological or Historical Area Information Appendix Reference (if applicable):	J	
Existing Conditions		
Are areas of archaeological or historical value in the project site, project vicinity, or project area?		
☒ Yes ☐ No (No Impact)		
If yes, list these and show on the Environmental Features Figure		
Name	*Type*	*Location (e.g., 5 mi. NE of Project)*
American Association of Textile Chemist and Colorists Headquarters Building, Site ID DH3963	HPOWEB site description: 1964 1-story on raised basement flat roof International office building designed by G. Milton Small	Approx. 0.5 mi. NW of pump station site
Impacts		
If Yes, discuss construction impacts related to areas or archaeological or historical value?		
The project area does not contain any known areas of archaeological or historical value per the NC State Historic Preservation Office (SHPO) GIS web mapping program (HPOWEB). There is one known site within 0.5 mile of the pump station site; however, it will not be impacted by construction of the project.		
If Yes, discuss operational impacts related to areas of archaeological or historical value.		
The project area does not contain any known areas of archaeological or historical value per the NC State Historic Preservation Office (SHPO) GIS web mapping program (HPOWEB). There is one known site within 0.5 mile of the pump station site; however, it will not be impacted by operation of the project.		
Describe SCI of the project.		
Secondary and cumulative impacts to land use in the service area could result from growth and development in the service area. Archaeological or historic resources could be impacted by this growth and development.		
Mitigative Measures		
Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*	
☐ Yes ☒ Not Applicable	☒ Yes ☐ Not Applicable	
Describe the mitigative measures below and supply references to the appropriate appendix in the EID.		
Mitigative Measure Description	*Reference(s)*	
Secondary and cumulative impacts from growth and development will be mitigated by Article 3.17 of the UDO, which requires a Certificate of Appropriateness for work in areas designated as historic districts and historic landmarks.	City of Durham and Durham County UDO (Article 3.17)	

Table 7.15 Air Quality Chin Page Road Pump Station Durham County	
Complete the table in accordance with Section 4.14 of the guidance.	
Air Quality Information Appendix Reference (if applicable):	N/A
Existing Conditions	
Discuss the general air quality and identify current sources of emissions from the project and surrounding area. Note whether odors have been a problem.	
According to NC Division of Air Quality data (https://deq.nc.gov/about/divisions/air-quality/air-quality-data/air-quality-attainment-planning), Durham County is part of the Raleigh-Durham-Chapel Hill Ozone Designation area and has been in Attainment/Maintenance status for ozone since 2007. Durham County has been classified as in Attainment status for carbon monoxide since 2015. The County is unclassified and considered in Attainment status for fine particulate matter (PM2.5) and sulfur dioxide. According to USEPA My Environment data, there are eight stationary air pollution permitted facilities (Inflow Data Center, Chemical Industry Institute of Toxicology, Becton Dickinson Technologies, Verizon South, Nortel Northern Telecom, MCI Worldcom, and Cree Inc.) within approximately 1 mile of the proposed pump station site. Two of these sites (Cree Inc. and Nortel Northern Telecom, located approximately 0.5 mile east of the proposed pump station site and approximately 0.75 mile southwest of the proposed pump station site, respectively) are also Toxic Release Inventory (TRI) sites. Interstate 40 is within 0.5 mile of the project site and is a source for non-stationary emissions from motor vehicles. Odors from the collection system at the former pump station have not been reported to be a problem.	
Impacts	
Discuss construction impacts related to air quality.	
Construction of the project may cause temporary, short-term, localized air quality impacts such as increases in suspended particulate matter due to dust emissions from the construction site and exhaust emissions from diesel and gasoline powered equipment. Equipment exhaust emissions typically include nitrogen oxides, hydrocarbons, carbon monoxide, and particulate matter.	
Will open burning occur?	*If Yes, describe what will be burned.*
☐ Yes ☒ No	
Discuss operational impacts related to air quality.	
Some odors from hydrogen sulfide may be detected at the pump station and along the gravity sewer at manholes. However, the project will not result in a significant impact to odors at the site or offsite.	
Describe SCI of the project.	
Secondary and cumulative impacts to air quality in the service area could result from growth and development in the service area. Growth and development could impact air quality in the form of additional emissions from vehicles and emissions from additional industrial facilities.	
Mitigative Measures	
Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*
☒ Yes ☐ Not Applicable	☒ Yes ☐ Not Applicable

Table 7.15 Air Quality (continued) Chin Page Road Pump Station Durham County	
Describe the mitigative measures below and supply references to the appropriate appendix in the EID.	
Mitigative Measure Description	*Reference(s)*
Construction equipment will be required to have air quality/emission reduction devices installed in proper operational condition. Dust on the construction site will be controlled by spraying the area with water if necessary. Temporary gravel construction entrances will also be used to control dust. The construction site will be reseeded as specified in the NC Erosion and Sediment Control Planning and Design Manual. The pump station will include an odor control system to minimize odors at the site during operation of the facility. SCI impacts will be mitigated by DEQ Air Quality regulations and permits required for facilities with emissions (e.g., industrial facilities).	NC Erosion and Sediment Control Planning and Design Manual; Project Specifications; DEQ Air Quality regulations and permits.

Table 7.16 Noise Levels Chin Page Road Pump Station Durham County	
Complete this table in accordance with Section 4.15 of the guidance.	
Noise Level Information Appendix Reference (if applicable):	J
Existing Conditions	
Discuss the current noise levels for the project site and project area.	
Current noise levels at the pump station site are low and consist primarily of vehicular traffic and minimal noise typical of commercial and light industrial uses.	
Does the LGU have noise ordinances in place?	☒ Yes ☐ No
If yes, describe.	
Impacts	
Discuss construction impacts related to noise levels. If noise levels will increase, discuss when they will be heard and at what distance.	
Heavy machinery used to construct the pump station and pipelines will produce temporary loud noise during construction. These noises will be heard during working hours in the daytime.	
Discuss operational impacts related to noise levels.	
Operation of the new pump station and pipelines is not expected to significantly change noise levels in the project area. The new pumps will create noise during operation, but they will be enclosed in a below-grade, enclosed wetwell, so noise is not expected to be significant. The emergency generator will result in noise when in use (only in emergency situations and when exercised for maintenance approximately once per month). Trucks that maintain equipment at the pump station site and along the pipeline easements will infrequently contribute to noise in the project area.	
Describe SCI of the project.	
Secondary and cumulative noise impacts could result from growth and development in the service area, including traffic noise and noise associated with residential, commercial, and industrial uses.	
Mitigative Measures	
Mitigative Measures for Construction Impacts?	*Mitigative Measures for SCI?*
☒ Yes ☐ Not Applicable	☒ Yes ☐ Not Applicable

Table 7.16 Noise Levels (continued) Chin Page Road Pump Station Durham County	
Describe the mitigative measures below and supply references to the appropriate appendix in the EID.	
Mitigative Measure Description	*Reference(s)*
The pumps will be enclosed in a below-grade, enclosed structure to reduce noise. The generator will be enclosed in a sound attenuation structure. Construction of the pump station will be required to adhere to the City of Durham's Noise Ordinance, which is described in Article II, Chapter 26 of the Durham City Code and regulates noise levels and hours when noise can occur. SCI impacts will be mitigated by the UDO, which will govern growth and development in the service area, including the types of development that create various noise levels. The City and County have classified their jurisdictions into zoning districts and development tiers, including Downtown, Compact Neighborhood, Urban, Suburban, and Rural (Article 4.1) to direct development and define allowable uses for the districts, which will result in some control over the locations of noises. Construction and operation of projects related growth and development will be controlled by the City and County's Noise Ordinances (Durham County's Noise Ordinance (Article II, Chapter 26 of the Durham City Code and Chapter 14, Article II of the Durham County Code).	City of Durham and Durham County UDO (Article 4.1); Durham City Code Article II, Chapter 26; Durham County Code Article II, Chapter 14

Table 7.17 Introduction of Toxic Substances Chin Page Road Pump Station Durham County	
Introduction to Toxic Substances Appendix Reference (if applicable):	N/A
Impacts	
Discuss any toxic substances that may be introduced during project construction and operation in accordance with Section 4.16 of the guidance.	
Fuels, lubricants, and other fluids required for operation of heavy machinery may potentially be introduced during construction of the pump station and pipelines. Substances used during operation of the pump station (e.g., diesel fuel for generator, chemicals for odor control system) could inadvertently cause contamination due to spills.	
Mitigative Measures	
Mitigative Measures for Construction Impacts?	
☒ Yes ☐ Not Applicable	
Describe the mitigative measures below and supply references to the appropriate appendix in the EID.	
Mitigative Measure Description	*Reference(s)*
Machinery will be required to be properly maintained and monitored for leaks, and leaks or other problems will be addressed immediately. Chemicals used in the odor control system will be properly stored according to the requirements of the NC Building Code.	Project Specifications; NC Building Code

Table 7.18 Environmental Justice Analysis Chin Page Road Pump Station Durham County									
Complete this table in accordance with Section 4.17 of the guidance.									
Was the U.S. Environmental Protection Agency's Environmental EJ Screen Tool used? If No, then complete the Existing Conditions cells below.						☒ Yes ☐ No			
Environmental Justice Figure Reference Number(s):						See Appendix K			
Environmental Justice Information Appendix Reference (if applicable):						Appendix K			
Existing Conditions									
Provide the following information and key the Block Groups to the map in the EID. Include figures.									
County	**Census Tract**	**Census Block Group**	**Total Population**	**Minority Population**	**Percent Minority Population**	**Significant Minority Population?**	**Low-Income Population**	**Percent Low-Income Population**	**Significant Low Income Population?**
Impacts									
Are there any potentially significant environmental justice populations in the project area?						☒ Yes	☐ No		
If the answer is yes, then below, list the impacts to the minority and/or low-income populations below and whether the impacts are potentially significant. If potentially significant, contact the Environmental Assessment Coordinator.									
Impact						*Potentially Significant?*			
Topography and Floodplains: The floodplain adjacent to Stirrup Iron Creek could be impacted by runoff from the site if sediment and erosion control measures are not used.						☐ Yes	☒ No		
Soils: Soils around the construction site could be impacted by runoff from the site if sediment and erosion control measures are not used.						☐ Yes	☒ No		
Prime and Unique Farmland: The project will be constructed on soils designated as prime and unique farmland; however, none of the area is currently used as farmland.						☐ Yes	☒ No		
Land Use: The site of the new pump station will be converted from a vacant, wooded area to a small utility use. The easements along the buried pipelines will be maintained by mowing.						☐ Yes	☒ No		
Forest Resources: Trees will be cleared at the new pump station site and along the pipeline routes.						☐ Yes	☒ No		

Table 7.18 Environmental Justice Analysis Chin Page Road Pump Station Durham County				
Wetlands and Streams: Streams and wetlands around the construction site could be impacted by runoff from the site if sediment and erosion control measures are not used.	☐	Yes	☒	No
Water Resources: Water resources around the construction site could be impacted by runoff from the site if sediment and erosion control measures are not used. There will be a minimal increase in impervious area due to construction of new pump station.	☐	Yes	☒	No
Shellfish, Fish, and their Habitats: Aquatic species, fish, and shellfish habitat in Stirrup Iron Creek and Burdens Creek could be impacted by runoff from the construction areas if sediment and erosion control measures are not used during construction.	☐	Yes	☒	No
Wildlife and Natural Vegetation: Trees will be cleared at the pump station and along the pipelines for construction. Areas outside the immediate footprint of the infrastructure will be revegetated. Impacts to wildlife are expected to be temporary.	☐	Yes	☒	No
Public Lands and Scenic, Recreational, and State Natural Areas: The Stirrup Iron Creek Marsh and Sloughs Significant Natural Heritage Area will be temporarily impacted to demolish and remove the former pump station and construct the pipeline to divert wastewater to the new pump station.	☐	Yes	☒	No
Air Quality: Heavy machinery used during construction will produce temporary exhaust emissions including nitrogen oxides, hydrocarbons, carbon monoxide, and particulate matter. Airborne particles (dust) will occur temporarily at the site in dry conditions. Odors at the pump station site will be the same as existing conditions but are not reported to be a problem.	☐	Yes	☒	No
Noise Levels: Heavy machinery will produce temporary loud noise during construction. These noises will be heard during working hours in the daytime and will comply with the City and County's noise ordinances. The new pumps and equipment will create noise during operation, but they will be enclosed in buildings or in sound attenuating enclosures, so noise is not expected to be significant. Trucks that deliver and maintain equipment at the pump station site and mowing equipment along the pipeline easements will create occasional noise in the project area; however, this will occur infrequently.	☐	Yes	☒	No
Toxic Substances: Fuels, lubricants, and other fluids required for operation of heavy machinery may potentially be introduced during construction of the proposed project if machinery is not properly maintained and monitored for leaks.	☐	Yes	☒	No

Table 7.19 Mitigative Measures
Chin Page Road Pump Station
Durham County

Complete this table for all resource categories in accordance with Section 4.18 of the guidance. If there was no impact in a particular resource category, then state, "No Impact."

Resource Category	Potential Direct Impact	Mitigative Measure(s) for Direct Impact	Potential SCI	Mitigative Measures for SCI
Topography & Floodplains	Permanent change to a small part of topography within footprint of pump station site; floodplain adjacent to Stirrup Iron Creek could be impacted by runoff from the site.	Restoring existing topography along pipelines; minimizing regrading at the pump station site to the minimum necessary for construction; sediment and erosion control measures will be used around the work areas to protect adjacent flood hazard areas from sedimentation and runoff; an Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by DEQ prior to construction; a Floodplain Development Permit from Durham County will be obtained for the work in flood hazard areas.	Temporary and permanent changes to topography from growth and development in service area; filling or alteration of floodplains and other special flood hazard areas due to development.	City of Durham and Durham County Unified Development Ordinance (Articles 8.4, 8.8, and 12.10)
Soils	Soils around the construction site could be impacted by runoff from the site if sediment and erosion control measures are not used. Soils at Syngenta site may require testing, removal, and replacement if noted in the site's Environmental Management Plan.	Replacement of excavated soils along the pipelines; minimizing regrading at the pump station site to the minimum necessary for construction; sediment and erosion control measures will be used around the work areas to protect soils from sedimentation and runoff; an Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by DEQ prior to construction.	Temporary and permanent changes to soils as structures and other infrastructure associated with growth and development; permanent alteration of soil types due to development.	City of Durham and Durham County UDO (Articles 8.4, 8.8, and 12.10)

Table 7.19 Mitigative Measures (Continued) Chin Page Road Pump Station Durham County				
Resource Category	**Potential Direct Impact**	**Mitigative Measure(s) for Direct Impact**	**Potential SCI**	**Mitigative Measures for SCI**
Prime & Unique Farmland	The project will be constructed on soils designated as prime and unique farmland (although none of the area is currently used as farmland).	Minimizing easement widths needed for pipelines; replacing excavated soils after pipeline installation; minimizing regrading at the pump station site to the minimum necessary for construction; sediment and erosion control measures will be used around the work areas to protect surrounding soils that are prime/unique farmland from sedimentation and runoff; an Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by DEQ prior to construction.	Areas of farmland could be permanently converted to other uses such as residential and commercial/industrial due to growth and development.	City of Durham and Durham County UDO (Articles 4.1, 8.8, and 12.10)
Land Use	The site of the new pump station will be converted from a vacant, wooded area to a small utility use. The easements along the buried pipelines will be maintained by mowing.	Restoring existing topography along the pipelines to minimize changes to land use; minimizing regrading at the pump station site to the minimum necessary for construction; sediment and erosion control measures will be used around the work areas to protect adjacent areas from sedimentation and runoff to minimize the impact of construction on adjacent land uses; an Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by DEQ prior to construction.	Changes in land use because of growth and development in the service area due to adequate wastewater collection system capacity.	City of Durham and Durham County UDO (Articles 4.1, 7.2, 8.3, 8.4, 8.5, 8.8, 8.9, 8.10, 12.8, and 12.10)

Table 7.19 Mitigative Measures (Continued) Chin Page Road Pump Station Durham County				
Resource Category	**Potential Direct Impact**	**Mitigative Measure(s) for Direct Impact**	**Potential SCI**	**Mitigative Measures for SCI**
Forest Resources	Clearing of trees at the new pump station site and along the pipeline routes.	Minimizing regrading at the pump station site to only that which is necessary for construction; sediment and erosion control measures will be used around the work areas to protect adjacent forested areas from sedimentation and runoff; an Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by DEQ prior to construction.	Forest resources could be permanently cleared and converted to other uses, including residential and commercial/industrial, due to growth and development in service area.	City of Durham and Durham County UDO (Articles 4.1, 7.2, 8.3, 8.4, 8.5, 8.8, 8.9, 8.10, 12.8, and 12.10)
Wetlands and Streams	Streams and wetlands around the construction site could be impacted by runoff from the site if sediment and erosion control measures are not used. Mowing and maintenance of easements will cause temporary disturbance to wetlands.	Minimizing the footprint of the project to only that which is necessary for construction; pipeline from the former pump station to the new pump station will be located along Chin Page Road to reduce impacts by co-locating the impact corridor with the road; sediment and erosion control measures will be used around the work areas to protect adjacent streams and wetlands from sedimentation and runoff; an Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by DEQ prior to construction; wetlands and streams will be delineated during design of the project and avoided as much as possible, and 404/401 permits will be obtained.	Growth and development could cause wetlands and streams in the service area to be permanently cleared or converted to other land uses or for infrastructure such as roads and culverts.	Clean Water Act Section 404/401 permits; City of Durham and Durham County UDO (Articles 4.1, 7.2, 8.3, 8.4, 8.5, 8.8, 8.9, 8.10, 12.8, and 12.10)

Table 7.19 Mitigative Measures (Continued) Chin Page Road Pump Station Durham County				
Resource Category	**Potential Direct Impact**	**Mitigative Measure(s) for Direct Impact**	**Potential SCI**	**Mitigative Measures for SCI**
Water Resources	Water resources around the construction site could be impacted by runoff from the site if sediment and erosion control measures are not used; minimal increase in impervious area due to construction of new pump station.	Sediment and erosion control measures will be used around the work areas to protect downstream surface water from sedimentation and runoff; an Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by DEQ prior to construction; wetlands and streams will be delineated during design of the project and avoided as much as possible; 404/401 permits will be obtained.	Growth and development could impact water quality through buffer clearing, filling, and from infrastructure such as roads and culverts.	Clean Water Act Section 404/401 permits; City of Durham and Durham County UDO (Articles 8.4, 8.5, 8.8, 12.8, and 12.10)
Shellfish, Fish, and their Habitats	Fish and shellfish habitat in Stirrup Iron Creek and Burdens Creek could be impacted by runoff from the construction areas if sediment and erosion control measures are not used during construction.	Sediment and erosion control measures will be used around the work areas to protect downstream surface water from sedimentation and runoff; an Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by DEQ prior to construction; wetlands and streams will be delineated during design of the project and avoided as much as possible; 404/401 permits will be obtained.	Growth and development could impact water quality and stream habitat for fish and shellfish through buffer clearing, filling, and from infrastructure such as roads and culverts.	Clean Water Act Section 404/401 permits; City of Durham and Durham County UDO (Articles 8.4, 8.5, 12.8, and 12.10)

Table 7.19 Mitigative Measures (Continued) Chin Page Road Pump Station Durham County				
Resource Category	**Potential Direct Impact**	**Mitigative Measure(s) for Direct Impact**	**Potential SCI**	**Mitigative Measures for SCI**
Wildlife and Natural Vegetation	Clearing of trees at the pump station and along the pipelines for construction; temporary displacement of wildlife during construction.	Sediment and erosion control measures will be used around the work areas to protect downstream areas from sedimentation and runoff; an Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by DEQ prior to construction; wetlands and streams will be delineated during design of the project and avoided as much as possible; 404/401 permits will be obtained.	Growth and development could cause temporary and permanent changes to wildlife and vegetation as structures and other infrastructure are constructed. These resources could be permanently altered if development occurs in these areas.	Clean Water Act Section 404/401 permits; City of Durham and Durham County UDO (Articles 8.5, 8.8, 8.9, 8.10, 12.8, and 12.10)
Public Land and Scenic, Recreational, and State Natural Areas	Temporary impact to Stirrup Iron Creek Marsh and Sloughs SNHA to demolish and remove the former pump station and construct the pipeline to divert wastewater to the new pump station.	Sediment and erosion control measures will be used around the work areas to protect downstream areas including the SNHA from sedimentation and runoff; an Erosion and Sediment Control Plan and Stormwater NPDES Permit will be developed and approved by DEQ prior to construction.	Growth and development could cause SCI impacts to land use in the service area including impacts to public lands and scenic, recreational, and state natural areas.	City of Durham and Durham County UDO (Articles 8.4, 8.5, 8.8, 8.9, 8.10, 12.8, and 12.10)
Areas of Archaeological or Historical Value	No impact	N/A	Archaeological or historic resources could be impacted by growth and development in service area.	City of Durham and Durham County UDO (Article 3.17)

Table 7.19 Mitigative Measures (Continued) Chin Page Road Pump Station Durham County				
Resource Category	**Potential Direct Impact**	**Mitigative Measure(s) for Direct Impact**	**Potential SCI**	**Mitigative Measures for SCI**
Air Quality	Temporary exhaust emissions from machinery during construction; temporary increase in dust in dry conditions during construction; odors from operation of pump station.	Construction equipment will be required to have air quality/emission reduction devices installed in proper operational condition; dust on the construction site will be controlled by spraying the area with water if necessary; temporary gravel construction entrances will also be used to control dust; construction site will be reseeded as specified in the NC Erosion and Sediment Control Planning and Design Manual; pump station will include an odor control system to minimize odors at the site during operation of the facility.	Growth and development in service area could impact air quality in the form of additional emissions from vehicles and emissions from additional industrial facilities.	DEQ Air Quality regulations and permits
Noise Levels	Temporary loud noise from heavy machinery during construction during working hours in the daytime; noise during operation of new pumps and equipment; occasional noise from trucks that deliver and maintain equipment at the pump station site and mowing equipment along the pipeline easements.	Pumps will be enclosed in a below-grade, enclosed structure to reduce noise; generator will be enclosed in a sound attenuation structure; construction of the pump station will be required to adhere to the City of Durham's Noise Ordinance including noise levels and hours when noise can occur.	Growth and development in the service area could cause increased traffic noise and noise associated with residential, commercial, and industrial uses.	City of Durham and Durham County UDO (Article 4.1); Durham City Code Article II, Chapter 26; Durham County Code Article II, Chapter 14

Table 7.19 Mitigative Measures (Continued) Chin Page Road Pump Station Durham County				
Resource Category	**Potential Direct Impact**	**Mitigative Measure(s) for Direct Impact**	**Potential SCI**	**Mitigative Measures for SCI**
Toxic Substances	Fuels, lubricants, and other fluids required for operation of heavy machinery may potentially be introduced during construction of the proposed project if machinery is not properly maintained and monitored for leaks.	Machinery will be required to be properly maintained and monitored for leaks, and leaks or other problems will be addressed immediately. Chemicals used in the odor control system will be properly stored according to the requirements of the NC Building Code.	N/A	N/A

Table 7.19 Mitigative Measures (Continued) Chin Page Road Pump Station Durham County				
Resource Category	**Potential Direct Impact**	**Mitigative Measure(s) for Direct Impact**	**Potential SCI**	**Mitigative Measures for SCI**
Environmental Justice	Primarily temporary direct impacts during construction as described above. Permanent impact from operation of pump station and maintenance of pipeline corridors.	Mitigative measures described above will reduce and mitigate direct impacts. Mitigative measures include minimizing the footprint of the project to only that which is necessary for construction; minimizing regrading at the pump station site to the minimum necessary for construction; restoring existing topography along pipelines; locating pipeline at pump station along Chin Page Road to co-locate impacts; minimizing easement widths needed for pipelines; replacing excavated soils after pipeline installation; delineating wetlands and streams to avoid impacts as much as possible; using sediment and erosion control measures around the work areas; obtaining permits such as Erosion and Sediment Control, Stormwater NPDES, Floodplain Development, and Section 404/401 permits; requiring construction equipment to have air quality/emission reduction devices; controlling dust on construction site; using temporary gravel construction entrances; reseeding disturbed areas after construction; including an odor control system at pump station; enclosing pumps and generator to reduce nose; maintaining construction equipment to minimize leaks; and properly storing chemicals used in the odor control system.	SCI impacts are possible as a result of growth and development in service area.	Mitigative measures described above will reduce and mitigate SCI. Mitigative measures include City of Durham and Durham County UDO, NC Erosion and Sediment Control Planning and Design Manual and NPDES Stormwater General Permit NCG010000, Clean Water Act Section 404/401 permits, Project Specifications, and NC Building Code.

Section 8
Financial Analysis

Tables 8.1 through **8.6** provide details on how the proposed project will be funded by Durham County. Based upon the analysis presented in the tables, it is shown that Durham County would need to increase monthly sewer rates by $0.59 for all users based on the current specified interest rate, assuming a 5,000 gallon usage per customer per month. It is important to note that this analysis does not consider any generated income by Durham County.

As shown in Table 8.1, Durham County has a monthly sewer bill of $63.62 per 5,000 gallons and a monthly water bill of $50.65 per 5,000 gallons, which was a 6.8% increase from 2019 to 2020. The overall bill is 2.25% of the average median household income, which is less than the Guidance Document specification of 4%.

Durham County received a letter of intent to fund (LOIF) in March 2022 for a 100 percent Clean Water State Revolving Fund (CWSRF) loan amount of $19,298,025 at a specified interest rate of 1.16% based on the OPCC completed as part of the County's SRF application in September 2021. The 20-year loan has a 2% loan fee, or approximately $386,000 (Table 8.2). As discussed in Section 5, updated costs were developed for the project due to changes in market costs, resulting in increased projected capital costs of the project from approximately $15,106,000 to $18,682,000 including contingency. The costs were updated again in 2024, with a further increase in capital cost to $23,843,500. The City intends to seek approval from the grant management unit for an additional 10% increase to their current funding amount of $19,298,025, thereby increasing the loan amount to $21,227,828. The remaining funding required will come from local funds (Enterprise Fund).

Both residential and non-residential (commercial and industrial) customers will be affected by loan repayments as shown in Table 8.4. The projected monthly user rate increase is $0.74 for all users and $4.15 for residential users only, assuming a usage rate of 5,000 gallons per month. This would represent a 0.65% increase for all users, or a 3.63% increase for residential users only (Table 8.5). As previously mentioned, the calculated user rate increase does not take into account net income.

Table 8.6 illustrates the potential impact of the project loan on Durham County's customer utility bills. There is no potentially significant impact identified.

Annual rate increases for Durham County have ranged from 2.4% to 6.8% per year since 2016. Therefore, the financial analysis as presented in this Section shows that ongoing plans to raise utility rates within the historical percentage increases will allow Durham County to pay back the CWSRF loan in full in a 20-year period without putting a significant burden on local residents.

Table 8.1. Applicant's/LGUs Financial Condition Chin Page Road Pump Station Alternative 1 - Chin Page Road Pump Station (Preferred Alternative)		
Utility Bill as Percent of Median Household Income		
	Sewer Rate Structure	**Water Rate Structure**
Rate Structure:	Uniform	Uniform
Base Charge:	$28.53	$20.00
Thousands of Gallons in Base Charge:	0	0
Volumetric Charge per 1,000 gallons:	$7.02	$6.13
Monthly Bill for 5,000 gallons:	$63.62	$50.65
Combined Monthly Water and Sewer Bill for 5,000 gallons:	**$114.27**	
Median Household Income:	$60,958	
Monthly Median Household Income for LGU:	$5,080	
Bill as % of Median Household Income:	1.25%	1.00%
Overall Bill as % of Median Household Income:	**2.25%**	
Durham County fee schedule is attached as Appendix L		

Table 8.2. Funding Distribution Chin Page Road Pump Station Durham County Alternative 1 - Chin Page Road Pump Station (Preferred Alternative)					
	Funding Source[a]	**Amount**	**Funding Type**	**Specified Interest Rate from LOIF[c] (if applicable)**	**Repayment Period (if applicable)**
Main Division Funding:	CWSRF	$19,298,025	Loan	1.160%	20
Funding 1:	CWSRF	$1,929,803	Loan	1.160%	20
Funding 2:	Local Funds	$2,191,116	Cash	N/A	N/A
Closing/Administrative Fee(s)[b]:		$424,557	If Other, list:		
Total Funded Amount (minus applicable closing/administrative fee[s]):		**$23,418,944**			
Total Project Cost (with closing/administrative fee[s]):		**$23,843,500**			

a. For SRP grants, grant administrative fee is 1.5% of Total grant award.
b. For SRP and SRF loans, loan administrative fee is 2.0% of Total loan award.
c. LOIF is Letter of Intent to Fund issued by the Division.

Table 8.3. Year 1 Interest and Repayment Chin Page Road Pump Station Durham County Alternative 1 - Chin Page Road Pump Station					
	Funding Source	**Total Funding Amount**	**Year 1 Principal Payment**	**Year 1 Interest Payment**	**Year 1 Total Payment (Principal + Interest)**
Main DWI Funding :	CWSRF	$19,298,025	$964,901	$223,857	$1,188,758
Funding 1:	CWSRF	$1,929,803	$96,490	$22,386	$118,876
Funding 2:	Local Funds	$2,191,116	N/A	N/A	N/A
Total Payment @ Specified Interest Rate(s):					**$1,307,634**

Table 8.4. User Fee Increase Due to Project
Chin Page Road Pump Station
Durham County
Alternative 1 - Chin Page Road Pump Station

Select Customer Type for Financing Project[c]	Average Water Usage Per Month (gallons)	Number of Connections	Total Monthly Water Usage by Customer Type (gallons)	Total Monthly Water Usage for Customer Base (gallons):	840,868,000
☑ Residential	10,500	14,216	149,268,000	# of 5,000 Gallon Units to Finance Project:	168,174
☑ Non-Residential	364,000	1,900	691,600,000	Year 1 O&M Expenses Due to Project:	**$45,057**

	Funding Source	Year 1 Annual Repayment	Year 1 Annual O&M Costs	Total Year 1 Annual Costs @ Specified Interest Rate	Year 1 Monthly Costs @ Specified Interest Rate	Monthly Cost/ 5,000 Gallons Due to Project @ Specified Interest Rate (All Users)	Monthly Cost/5,000 Gallons Due to Project @ Specified Interest Rate (Residential Users Only)
DWI Main Funding Source:	CWSRF	$1,188,758	$45,057	$1,233,815	$102,818	$0.61	$3.44
Funding Source 1:	CWSRF	$118,876		$118,876	$9,906	$0.06	$0.33
Funding Source 2:	Local Funds	N/A		N/A	N/A	N/A	N/A
Funding Source 3:							
Funding Source 4:							
Funding Source 5:							
Total Year 1 Annual Cost @ Specified Interest Rate:				**$1,352,691**			
Total Year 1 Monthly Cost @ Specified Interest Rate:					**$112,724**		
Total Monthly Cost to Treat 5,000 Gallons @ Specified Interest Rate:						**$0.67**	
Total Monthly Cost to Treat 5,000 Gallons @ Specified Interest Rate (Residential Users Only):							**$3.78**

Table 8.5. Impacts to User Rates Chin Page Road Pump Station Durham County Alternative 1 - Chin Page Road Pump Station			
Current Sewer Bill ($/5,000 gallons):			$63.62
Current Water Bill ($/5,000 gallons):			$50.65
Current - Combined Water & Sewer Bill ($/5,000 gallons):			$114.27
	Funding Source	**User Rate Increase Due to Project @ Specified Interest Rate (All Users)**	**User Rate Increase Due to Project @ Specified Rate (Residential Users Only)**
Main IFS Funding Source:	CWSRF	$0.59	$3.32
Funding Source 1:	CWSRF	$0.06	$0.33
Funding Source 2:	Local Funds		
Total User Rate Increase Due to DWI Loan(s) ($/5,000 gal.):		$0.67	$3.78
Total Increase Due to All Loans(s) ($/5,000 gal.):		$0.74	$4.15
New Sewer Bill Due to DWI Loan(s) ($/5,000 gal.):		$64.29	$67.40
New Sewer Bill Due to All Loan(s) ($/5,000 gal.):		$64.29	$67.40
Percent Change in Sewer Bill Due to DWI Loan(s):		1.05%	5.93%
Percent Change in Sewer Bill Due to All Loan(s):		1.05%	5.93%
New Sewer & Water Bills Due to DWI Loan(s) ($/5,000 gal.):		$114.94	$118.05
New Water & Sewer Bills Due to All Loan(s) ($/5,000 gal.):		$114.94	$118.05
Percent Change in Sewer & Water Bills Due to DWI Loan(s):		0.59%	0.59%
Percent Change in Sewer & Water Bills Due to All Loan(s):		0.59%	3.30%

a. Change in User Fee to finance DWI Loan.
b. Change in User Fee to finance ALL funding sources.

Table 8.6. Impact to Bills Due to Project Chin Page Road Pump Station Durham County Alternative 1 - Chin Page Road Pump Station					
Sewer Bill as % Monthly MHI:		1.25%	Water Bill as % Monthly MHI:		1.00%
Current Sewer Bill ($/5,000 gal.):		63.62	Current Water Bill ($/5,000 gal.):		$50.65
Current Sewer & Water Bill ($/5,000 gal.):		114.27	Sewer & Water Bill as % Monthly MHI:		2.25%
Monthly MHI for LGU:		$5,080			
		Sewer Bill Due to DWI Loans	**Sewer Bill Due to All Loans**	**Water & Sewer Bills Due to DWI Loans**	**Water & Sewer Bills Due to All Loans**
Specified Interest Rate (All Users)	New	$64.29	$64.29	$114.94	$114.94
	New %MHI Due to Project	1.27%	1.27%	2.26%	2.26%
	Potentially Significant Impact?	No	No	No	No
Specified Interest Rate (Residential Users Only)	New	$67.40	$67.40	$118.05	$118.05
	New %MHI Due to Project	1.33%	1.33%	2.32%	2.32%
	Potentially Significant Impact?	No	No	No	No

Section 9

Public Participation

A public meeting will be held as part of this project to notify and inform the public on the project. The meeting will occur once the Division of Water Infrastructure has reviewed this ER/EID and the technical approach of the Preferred Alternative has been established.

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