City of White House

Wastewater System Master Plan

McGill
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Engineering • Planning • Finance

WASTEWATER SYSTEM MASTER PLAN

CITY OF WHITE HOUSE, TENNESSEE

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SECTION 1 EXECUTIVE SUMMARY

A. Introduction

The City of White House is located along Interstate 65, approximately 22 miles north of Nashville. The City is included in both Robertson and Sumner Counties and covers 11 square miles. It was incorporated in 1971 and has experienced a large increase in population, growing from a population of 2,254 in the 1980 U.S. Census (the City's first official census) to 7,200 in the 2000 U.S. Census. The potential for further growth in the community is great, considering White House's position on Interstate 65 between Nashville and the Kentucky border.

White House owns, operates, and maintains a 1.4-million gallon per day (MGD) wastewater treatment plant to treat raw sewage and industrial wastewaters collected within the sanitary sewer network. Within the sewer network, the City also owns, operates, and maintains approximately 65 miles of small diameter force mains and vacuum collection sewers, approximately 25 miles of large diameter transmission force mains, and 10 lift stations and vacuum pumping stations. The City's collection system is unique, with 1,013 customers served by vacuum collection and 2,586 customers served by low pressure lines. No further growth is allowed in the vacuum systems. Approximately four miles of gravity sewer has been added in recent years.

The operation and maintenance of the collection system is a continual challenge, as much of it is over 20 years old and has received little preventative maintenance until recently. Historically, maintenance has been lacking in that there has been no comprehensive plan to preventatively maintain and replace aging portions of the sewer system. Subsequently, White House has recently begun a tracking and maintenance program with their pressure and vacuum systems. Within the pressure system, the City has started replacing the original Hydromatic low pressure grinder pumps with new E/One low pressure grinder pumps when the existing pumps fail or require excessive maintenance. White House has also begun testing, calibrating, and rebuilding (as needed) the vacuum pumps, sewage pumps, and vacuum valve controllers within the vacuum system. At the same time, the service areas have been growing inside the City Limits and the Urban Growth Boundaries, which are also expanding.

This master planning effort is needed to assist the City of White House in planning and managing the current and proposed residential and commercial growth in the City and within its Urban Growth Boundaries. The single most compelling wastewater system need for White House is to maintain or improve the level of service to the existing wastewater customers, while allowing for the expansion of the system in an orderly manner.

The City of White House retained McGill Associates, P.A. in 2006, to develop a Wastewater System Master Plan that would address improvements within the system and prepare the City for expected future wastewater flows. This report contains McGill Associates' recommendations for needed improvements to both the collection system and the wastewater treatment plant. The recommendations are summarized and prioritized in a Service Plan and Capital Improvements Plan (CIP) that estimates costs for the recommended improvements.

This Wastewater Master Plan encompasses a brief history and general description of the project area; the purpose and need for the proposed actions; and an evaluation of the wastewater treatment and collection system needs for the City of White House. This Master Plan addresses improvements that need to be made within the system and prepares the City for expected future wastewater flows.

B. Planning Objective and Approach

The preparation of the Wastewater System Master Plan has followed an approach that contains the comprehensive planning elements associated with orderly and efficient growth of the wastewater system in support of, and as part of, the planned growth of the City of White House. It is the intent of this plan for the wastewater system to be a component of the growth of the City, but to not be the sole catalyst for that growth. In keeping with this, the plan has comprehensive components for the outgrowth of the City beyond its current limits and for the infill growth within the current City limits. This comprehensive approach coupled with the integrated place of the wastewater system in the overall growth equation for the City also requires a strategic component to the plan.

The growth of the wastewater system to support the growth of the City must be founded on the strength of the existing wastewater system. The strategic component of this plan is the capital improvements that must be made within the existing wastewater system in order to allow capital improvements that will be needed to support the more comprehensive infill and outgrowth of the City. The existing wastewater system has been constructed without any significant planning and subsequently has a very fragmented configuration throughout the City, and is therefore more costly to operate and maintain than should be expected. The existing system has hydraulic capacity problems in certain areas and functional problems in certain areas as a result of the mechanical and hydraulic design of the system being overstressed.

Coupling the strategic and comprehensive planning issues into a master plan has created a broader view of the wastewater system than has previously been undertaken. The plan identifies many capital improvements, both strategic and comprehensive, and prioritizes those improvements. Some of the improvements must be implemented to maintain the operational viability of the wastewater system for the benefit of the existing customers and should be initiated by the City. Other improvements would be initiated by the desire or need to support residential and/or commercial development and would be initiated in a planned manner when such development needs come forward to the City from other parties. When this occurs, this plan will define the manner in which those developments will be served with the City's wastewater system. This philosophical approach to both the strategic and comprehensive plan components is the basis of the capital improvements and the manner in which to implement them as contained in the Wastewater System Master Plan.

C. Wastewater System Evaluation

Previous studies and recent wastewater improvements were reviewed in order to effectively and thoroughly evaluate the existing wastewater collection and treatment system.

1. Previous Studies

Previous studies conducted for the City of White House have been used in developing the wastewater system Master Plan document. Previous data by Quest Engineers, Inc., (2003) and Garver Engineers (1998) has been reviewed and evaluated.

2. Recent Wastewater Improvements

The City of White House has recently undertaken a number of efforts to more closely manage and maintain their wastewater collection, pumping, and treatment systems. This wastewater master planning effort is the latest in a series of improvements to the City's wastewater system. These efforts include the following:

- Wastewater Collection System Mapping

  The City has scanned thousands of existing collection system drawings and maps to a digital format for preservation and to improve archiving, cataloging, and data retrieval. The City has also created a new base wastewater collection system map. This mapping will aid in repair, maintenance, and planning efforts.

- Wastewater Standards and Details Update

  The City has updated its sewer standards and details to help ensure that future extensions and additions to the collection system will be designed and installed properly. The City has also hired additional inspectors to ensure that the standards and details are followed in the construction of sewer system extensions.

- Sewer Ordinance, Rates, Fees, and Charges Evaluation

  The City has recently reviewed and updated its sewer ordinance, rates, fees, and charges in an effort to keep current with expenses, regulations, and practices.

- Low Pressure Sewer Pump Maintenance and Replacement

  The City is replacing more than 200 existing low pressure sewer pumps per year with new E/One pumps in an effort to improve service in difficult to serve areas and to reduce the number of pump failures and repair call-outs.

- Vacuum Valve and Controller Replacement

  The City is replacing more than 100 vacuum valve and controllers per year in an effort to improve operation and provide more reliable service in the vacuum collection systems.

- Vacuum Pump and Sewage Pump Testing and Optimization

  Since September of 2005, the City has tested, repaired, and rebuilt vacuum and sewage pumps in both of the existing vacuum pumping stations to provide the necessary redundancy and to improve the operation of these stations. The City has had thermographic scans performed of the electrical equipment at North Palmers VPS to ensure its reliability and had the electric company replace the existing transformer to provide more consistent voltage at the pumping station. Improvements implemented by the City at the North Palmer's Vacuum Pumping Station and in its collection system have resulted in a reduction of vacuum pump run times by 40% since 2005. These changes have also resulted in a reduction of electrical costs of approximately 25% since 2005.

- Lift Station Odor Control

  The City has replaced the previously utilized odor control system at several lift stations with new Vapex Hydroxyl Ion Fog Odor Control Systems. These odor control systems inject an ozone fog which reacts and neutralizes the odor causing compounds in the lift station wetwells. Odor complaints at the upgraded lift stations have been greatly reduced.

D. Recommended Improvements

The approach recommended for the City's long-term wastewater system strategy is to maintain its functionality through improvements to the collection and conveyance systems and wastewater treatment plant and to plan for future growth to ensure the preservation of the City's infrastructure investment. The following improvements are recommended in order to promulgate that approach.

1. Recommended Improvements to the Wastewater Collection System

The improvements to the existing collection system can be divided into four key areas, as follows, although improvements in any area should also have positive effects on other areas. These improvements include the following:

Vacuum Collection System Improvements

- The removal of customers from the North Palmer's Vacuum Pumping Station collection system in order to reduce the area served.
- The continued replacement of vacuum valves and controllers.

Low Pressure Sewer System Improvements

- The replacement of low pressure sewer pumps in the South Palmer's Chapel Lift Station collection system and the demolition of the South Palmer's Chapel Lift Station.
- The replacement of low pressure sewer pumps in the Sage Road area.
- The continued replacement of low pressure sewer pumps.

Lift Station Improvements

- The replacement of the Tyree Springs and Wilkinson Lift Stations.
- The development of a system wide supervisory control and data acquisition (SCADA) system.

Force Main Improvements

- The extension of the 12-inch Northern Force Main between Calista and Bill Moss Roads.
- The extension of the 8-inch Union Road Force Main between Union Road and the wastewater treatment plant.

The estimated cost of the recommended conveyance system improvements is approximately $4,217,319 over the next 20 years. These costs do not include extensions that will be paid for by future developments connecting to the collection system. These costs are in year 2007 dollars and do not include inflation.

2. Recommended Improvements to the Wastewater Treatment Plant

In addition to the conveyance system improvements, there are several improvements that should be made at the wastewater treatment plant to ensure that the facility can continue to provide an acceptable level of treatment.

The wastewater treatment plant improvements include the design and construction of a new headworks structure to add screening, a new solids dewatering and disposal facility, and improvements to the existing spray irrigation system.

The improvements also recommend the expansion of the treatment facility to keep pace with the growth of the City and the corresponding increase in wastewater flows and the development of a new outfall for the facility.

The estimated cost for improvements at the wastewater treatment plant is approximately $9,140,572 over the next 20 years. These costs are in year 2007 dollars and do not include inflation.

E. Summary of Recommended Capital Improvements Plan (CIP)

This Master Plan evaluates the existing and potential capacity of the existing sewer collection and treatment system and identifies the combination of improvements required to continue its ability to provide reliable wastewater service for the next 20 years. The Master Plan also evaluates the potential for growth in the City of White House and its Urban Growth Boundaries and provides recommendations for extending service to those areas as growth occurs.

The CIP, given in Tables 1.1 and 1.2, was developed to help the City of White House plan for and meet these existing and future needs for its wastewater conveyance system and treatment plant over the next 20 years.

1. Organization and Costs

The recommended improvements, presented in Section 6, are organized in the CIP into two phases according to priority and a projection as to when additional service areas will be connected to the system. The 5-Year Primary Focus includes projects from FY 2007-2012. The Long Term Focus includes projects from FY 2012-2025.

The cost estimates presented in the Service Plan and CIP were compiled from recent regional and City of White House bid tabulations, manufacturer quotations, and other bid tabulation and planning level cost information. The costs reflect 2007 costs and have not been adjusted for inflation.

2. 5-Year Primary Focus (FY 2007-2012)

The projects recommended for implementation over the 5-year Primary Focus period are presented in Table 1.1.

Table 1.1 – 5-Year Primary Focus

Priority	Improvements	Cost
1	Wilkinson Lane Lift Station Replacement	$ 295,000
2	Union Road Force Main Extension - Phase 1	$ 484,950
3	WWTP Headworks Improvement	$ 257,400
4	Copes Crossing Lift Station – City Contribution	$ 418,935
5	North Palmer's Chapel Low Pressure Pump Conversion	$ 357,456
6	Northern Force Main Extension	$ 277,855
7	SCADA System	$ 250,000
8	Vacuum Collection System Rehabilitation	$ 495,000
9	Low Pressure Sewer Pump Replacement	$ 297,000
10	WWTP Discharge Alternatives Study	$ 50,000
11	South Palmer's Chapel Low Pressure Pump Conversion	$ 260,250
12	WWTP Effluent Irrigation Improvements	$ 707,672
	Total Construction Cost	**$ 4,213,350**

3. Long Term Focus (FY 2013-2025)

The projects recommended for implementation over the Long Term Focus period (FY 2013-2025) are presented in Table 1.2.

Table 1.2 – Long Term Focus

Priority	Improvements	Cost
1	WWTP Biosolids Dewatering Improvements	$ 148,500
2	Sage Road Low Pressure Pump Conversion	$ 386,000
3	Union Road Force Main Extension - Phase 2	$ 632,940
4	WWTP Expansion	$ 7,977,000
	Total Construction Cost	**$ 9,144,440**

F. Acknowledgements

McGill Associates would like to thank the City of White House staff for their assistance in the preparation of this report, especially Ms. Angie Carrier, City Administrator; Mr. Bill Crusenberry, Director of Wastewater; Mr. Robert Allen, Chief Wastewater Treatment Plant Operator; Mr. Chris Keith, Field Supervisor; and Mr. Addam McCormick, Planning and Codes Director.

A. Location

The City of White House, Tennessee, is located along the boundary of Robertson and Sumner Counties in middle Tennessee. Robertson County is adjacent to Sumner, Davidson, Cheatham, and Montgomery Counties in Tennessee and Todd, Logan, and Simpson Counties in Kentucky. Sumner County is adjacent to Robertson, Davidson, Mason, Trousdale, and Wilson Counties in Tennessee, and Allen and Simpson Counties in Kentucky.

The climate in White House is temperate and continental, with long, warm summers and brief, cold winters. July is typically the hottest month, with an average high of eighty-eight degrees. The average low temperature in January is around twenty-four degrees. The average annual precipitation is 51 inches.

The City of White House has an estimated current population of approximately 8,530, the estimated current Sumner County population is approximately 145,009, and the estimated population of Robertson County is 60,379. A general area map of White House is provided in Figure 2.1.

Figure 2.1 – Map of White House, Tennessee

White House's position 22 miles north of Nashville makes it a site of significant suburban growth. White House is also located between the Kentucky border and Nashville on Interstate 65, a busy corridor linking Nashville with points north, including Bowling Green and Louisville, Kentucky.

B. Population Trends

For the purposes of this report, a 20-year planning period has been selected for all projections of future sewer needs. Based on available U.S. Census data, the 2005 population of Sumner County was 143,618, and the 2000 population of Robertson County was 54,433. The 2000 population of the City of White House was 7,220, and the 2005 special census estimated the City's population at 8,530. (All population numbers are based on the most current U.S. Census data available.) Table 2.1 contains projected population data for the entire state of Tennessee, Robertson and Sumner Counties, and White House through the year 2025, as forecast by the U.S. Census Bureau and the State of Tennessee.

Table 2.1
Population Projections for Tennessee, Sumner County, Robertson County, and the City of White House

Region	2000	2005	2010	2015[(2)]	2020	2025
Tennessee [1]	5,689,283	6,017,595	6,425,969	6,821,312	7,195,374	7,559,531
Sumner County [1]	130,449	143,618	161,570	177,616	193,675	209,736
Robertson County[2]	54,433	59,380	64,809	70,196	75,388	80,534
White House [2]	7,220	8,530	9,482	10,487	11,495	12,541

Notes:

1. U.S. Census Data
2. Tennessee Advisory Committee on Intergovernmental Relations, Center for Business and Economic Research, *Population Projections for the State of Tennessee*, December, 2003.

Table 2.2 quantifies the projected population increase from Table 2.1 in terms of percentage population increase for the State, Counties, and the City.

Table 2.2
Population Increases for Tennessee, Sumner County, Robertson County, and the City of White House

Region	Population 2005	Population 2025	20-Year Population Increase	20-Year Percentage Population Increase
Tennessee	6,017,595	7,559,531	1,541,936	25.6%
Sumner County	143,618	209,736	66,118	46.0%
Robertson County	59,380	80,534	21,154	35.6%
White House	7,220	12,541	5,321	73.7%

The population and population projections are based on the existing City limits and historical growth in the community and similar communities. Robertson and Sumner counties, like the other counties surrounding Nashville and Davidson County, are predicted to be among the fastest growing counties in the entire State of Tennessee between 2005-2025.

SECTION 3 EXISTING SYSTEM CONDITIONS

A. Sewer System Overview

The City of White House operates and maintains 90 miles of sewer collection lines, 10 major lift and pumping stations, and a 1.4-million gallons per day (MGD) wastewater treatment plant, which discharges into Frey Branch. The City's collection system is unique, with 1,013 customers served by vacuum collection, 2,586 customers served by low pressure lines, and approximately 237 served by gravity. No further growth is allowed in the vacuum collection systems. Approximately 20,000 feet of gravity sewer collection has been added in recent years.

The City's Wastewater Treatment Plant was originally constructed in 1983 and was last renovated in 2003. The most recent improvements at the facility included the construction of a new inlet structure, oxidation ditches, secondary clarifiers, sludge pumping station, ultraviolet disinfection, and effluent pipeline. The facility is designed and permitted to treat an average daily flow of up to 1.4 MGD.

The plant is permitted to discharge up to 1.1 MGD to Frey Branch and to spray irrigate up to 0.3 MGD to agricultural fields adjacent to the treatment plant.

For calendar year 2006, the White House WWTP treated an average flow of 0.56 MGD and a maximum flow of 1.26 MGD. The 2006 average flow was 40% of the plant's design capacity and the maximum flow was 46% of the plant's peak capacity of 2.75 MGD. Table 3.1 presents the average daily wastewater treated; the maximum wastewater treated for a single day in a calendar year; and the peaking factor, which is the ratio of the maximum day divided by the average day.

Table 3.1 - Historical Sewage Treatment in Gallons
White House WWTP

Year	Average Day (MGD)	Maximum Day (MGD)	Peaking Factor
1999	0.48	1.40	2.9
2000	0.67	1.73	2.6
2001	0.58	1.38	2.4
2002	0.59	1.31	2.2
2003	0.65	1.69	2.6
2004	0.67	2.24	3.3
2005	0.49	1.05	2.1
2006	0.56	1.26	2.3
2007	0.47	1.13	2.4
White House Wastewater Treatment Plant Monthly Operating Reports 1999-2007.			

B. <u>Existing Users</u>

Table 3.2 contains a breakdown of the City of White House's existing sewer customers.

Table 3.2 – Existing Sewer Customers

Category	Vacuum Sewer Customers[(1)]	Low Pressure Sewer Customers	Gravity Sewer Customers
Residential	926	2,423	230
Non-Residential	87	163	7
Notes: 1. Some customers served by vacuum collection have low pressure grinder pumps which pump into the vacuum sewer collection system. There are approximately 127 of these customers in the North Palmer's Chapel vacuum collection system and 68 in the Calista Road vacuum collection system.			

C. <u>Annual Operating Budget</u>

The City of White House Comprehensive Annual Financial Report for the sewer system is included in Appendix A. The City's recently adopted sewer user rate structure is shown in Table 3.3. This rate structure is set by the City's Board of Mayor and Alderman and is adjusted periodically as required to meet all expenses, debts, and reserves of the sewer system operation.

Table 3.3 – White House - Current Sewer Rates

Customer	Residential	Non-Residential
Customer Charge for First 1,000 Gallons	$14.00	$28.00
Per Additional 1,000 Gallons	$6.65	$6.65
Capacity Fee	$2,500	Varies

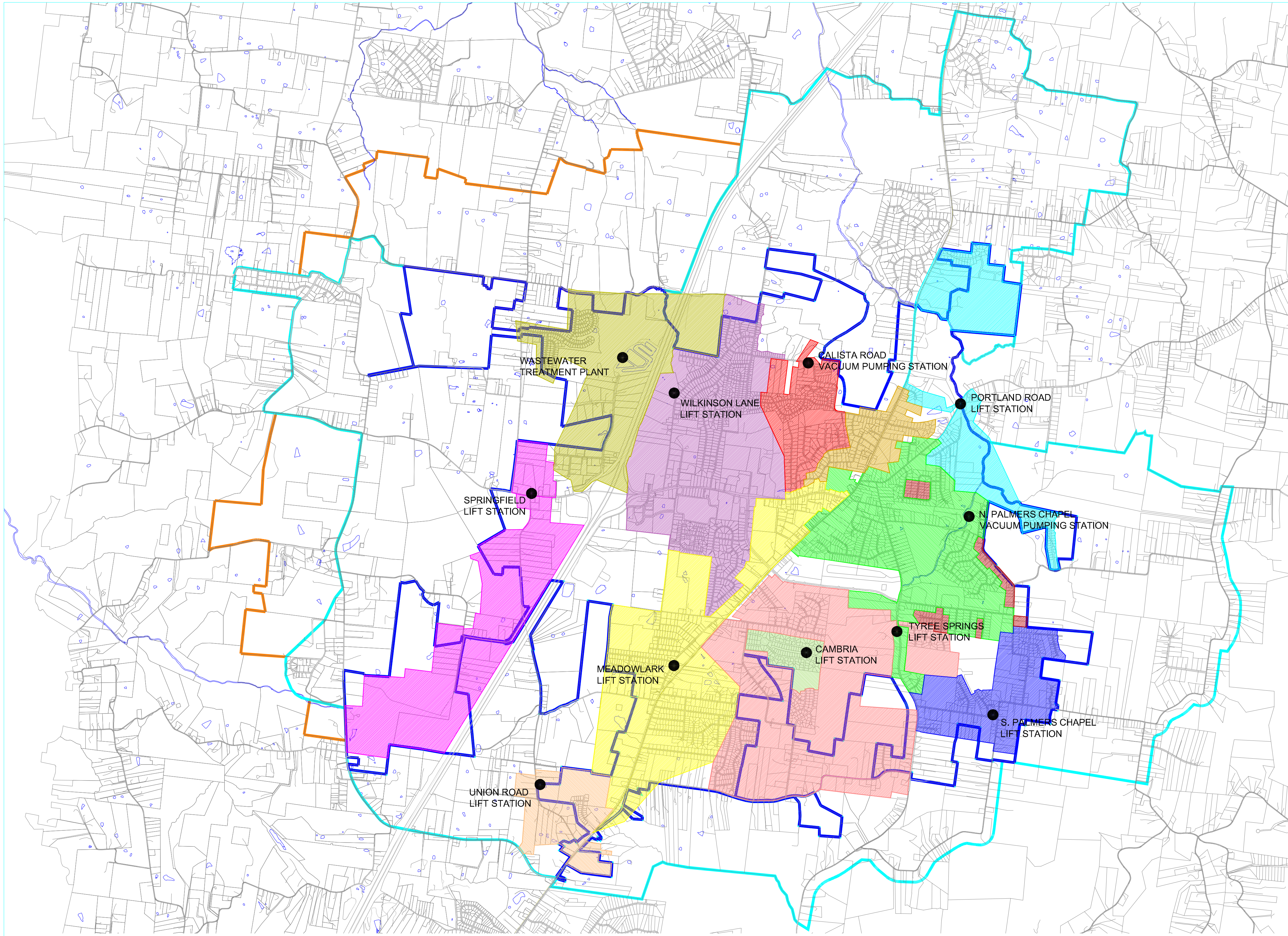
D. <u>Sewer Collection System</u>

1. Lift and Pumping Stations

The City of White House utilizes eight major lift stations and two vacuum pumping stations to pump collected wastewater to the wastewater treatment plant as shown in Table 3.4. These stations were constructed, beginning in 1983, either as part of a large sewer collection project or in response to development within the City limits. The lift and pumping stations and their collection areas are shown in Figure 3.1.

Table 3.4 – Major Pumping and Lift Stations

Pumping or Lift Station	Year Constructed	Design Capacity (GPM)	Manufacturer	Type
North Palmer's Chapel Vacuum Pumping Station	1985	500	AIRVAC	Vacuum
Portland Road Lift Station	1985	100	Smith & Loveless	Wet Pit/ Dry Pit
Calista Road Vacuum Pumping Station	1985	300	AIRVAC	Vacuum
Wilkinson Lane Lift Station	1983	675	Davco	Wet Pit/ Dry Pit
Tyree Springs Lift Station	1992	675	Smith & Loveless	Wet Pit/ Dry Pit
South Palmer's Chapel Lift Station	1994	220	Smith & Loveless	Wet Pit/ Dry Pit
Union Road Lift Station	2004	300	Smith & Loveless	Suction Lift
Cambria Lift Station	2006	160	Gorman Rupp	Suction Lift
Meadowlark Lift Station	1983	400	Davco	Wet Pit/ Dry Pit
Springfield Lift Station	1993	150	Smith & Loveless	Wet Pit/ Dry Pit



WHITE HOUSE, TN.
SEWER SERVICE AREAS

SCALE: 1"= 4000'

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FIGURE 3.1

The City does not currently have any flow measurement instrumentation or pump around connections installed at any of their lift or pumping stations.

2. Force Mains

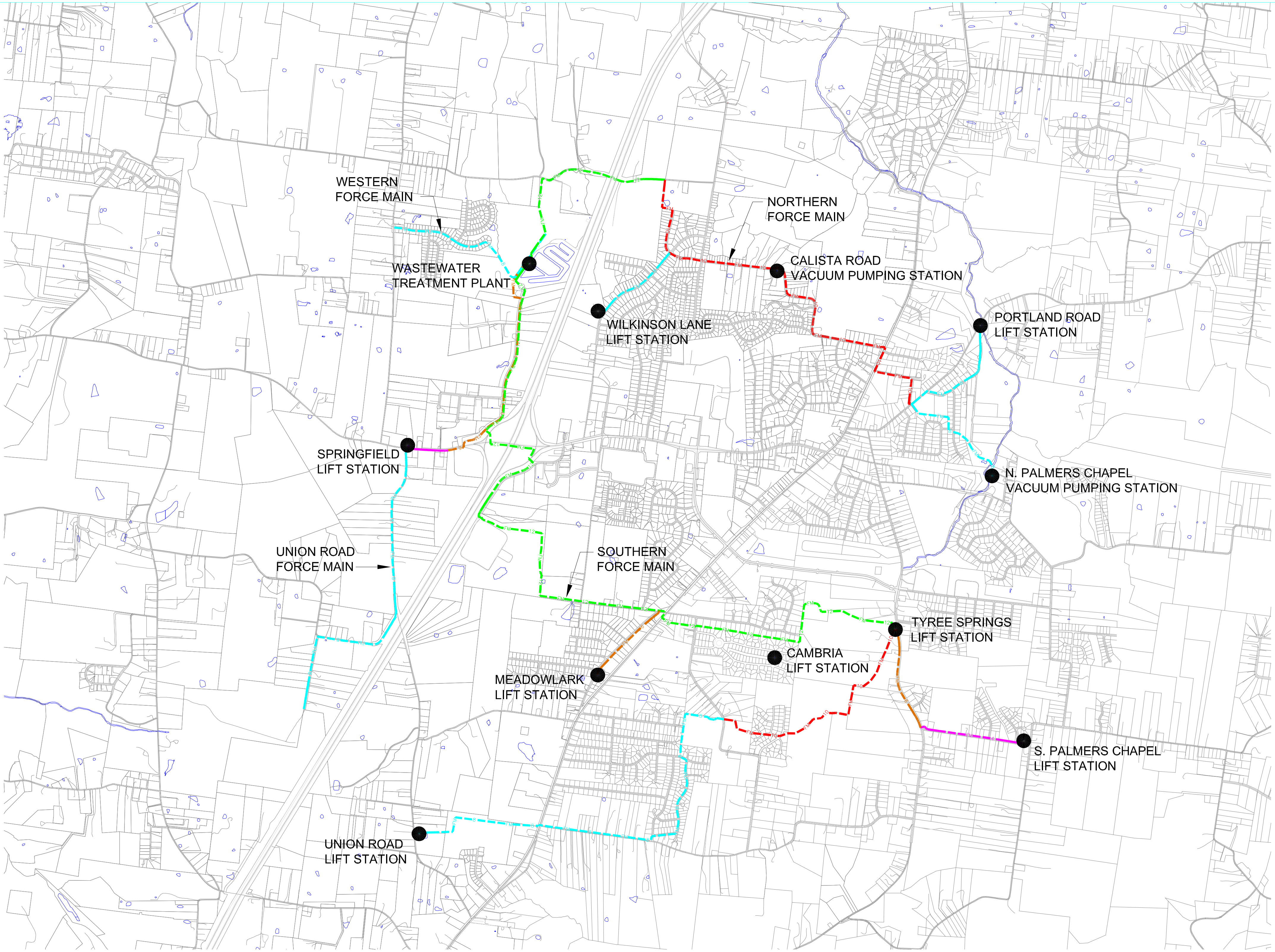
The City's collection system consists of both low pressure and vacuum sewer collection lines. The small diameter low pressure force mains collect flow to lift stations and larger transmission force mains which convey flow to the wastewater treatment plant. The City's pumping and lift stations transmit wastewater to the treatment plant via four large diameter transmission force mains. These force mains are known as the Northern Force Main, Southern Force Main, Union Road Force Main, and the Western Force Main. These force mains, their lengths, design and connected capacities, and percent utilization are listed in Table 3.5. A map showing the major force mains in the City's collection system is included in Figure 3.2.

Table 3.5 – White House – Force Main Capacities

Force Main	Size(s)	Total Length (ft)	Design Capacity (GPM) (1)	Connected Capacity (GPM)	Percent Utilization
Northern Force Main	8-inch	3,520	784	500	64%
	10-inch	12,190	1,225	1,720	**140%**
	12-inch	5,930	1,762	1,720	**98%**
Southern Force Main	12-inch	24,050	1,762	1,235	70%
Union Road Force Main	8-inch	9,185	784	33	4%
Western Force Main	8-inch	5,316	784	132	17%

Notes:
1. Force main design capacity is the calculated as the quantity of wastewater that can be conveyed at a pipeline velocity of 5.0 ft/sec.

The Northern Force Main consists of 3,520 feet of 8-inch, 12,190 feet of 10-inch, and 5,930 feet of 12-inch force main and begins at the North Palmer's Chapel Pumping Station, runs from there via a route overland to Eastside Drive, U.S. Highway 31W, Calista Road, Volunteer Drive, and Bill Moss Road; and finally enters the WWTP property from the north. The Northern Force Main route is shown on Figure 3.2. The Northern Force Main collects flow from North Palmer's Chapel Vacuum Pumping Station, Calista Road Vacuum Pumping Station, Portland Road Lift Station, Wilkinson Lane Lift Station, and several residential low pressure pumping stations.



WHITE HOUSE, TN.
COLLECTION SYSTEM

SCALE: 1"= 3000'

LEGEND

4" FORCE MAIN
6" FORCE MAIN
8" FORCE MAIN
10" FORCE MAIN
12" FORCE MAIN

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FIGURE 3.2

The Southern Force Main consists of 24,050 feet of 12-inch force main and begins at the Tyree Springs Lift Station, runs cross-country to East Sage Road, follows East Sage Road, and then cross-country again to cross under Interstate 65 just south of the State Highway 76 interchange, and then north on Industrial Drive to enter the WWTP from the south. The Southern Force Main route is shown on Figure 3.2. The Southern Force Main collects flow from South Palmer's Chapel Lift Station, Tyree Springs Lift Station, Union Road Lift Station, Meadowlark Lift Station, Cambria Lift Station, and two non-residential low pressure pumping stations.

The Union Road Force Main consists of approximately 9,200 feet of 8-inch force main, and begins at the southern end of North Swift Road and runs along the right-of-way to Union Road. The Union Road Force Main currently terminates at the intersection of Union Road and State Highway 76 into the 4-inch force main from the Springfield Lift Station. This force main was installed in 2006 to serve industrial and residential customers along Union Road and ultimately the Bear Creek Lift Station, which will serve the Bear Creek at Burris Ridge Subdivision.

The Western Force Main consists of 5,316 feet of 8-inch force main, and begins at the intersection of Holly Lane and Pleasant Grove Road and runs eastward to the WWTP. The Western Force Main collects wastewater from the 232 low pressure sewer grinder pumps in the Holly Tree Subdivision.

3. Vacuum Sewer Collection Mains

Most of the vacuum collection system was put into place in 1984 and 1985 with the construction of the North Palmer's Chapel and Calista Road Vacuum Pumping Stations. The City of White House's vacuum collection system was manufactured by AIRVAC, Inc., of Rochester, Indiana. AIRVAC is the largest vacuum sewer system provider in the world, with over 700 installations. The City has approximately 84,000 linear feet (LF) of vacuum collection main in the North Palmer's Chapel Vacuum system and 26,000 LF of collection main in the Calista Road Vacuum system.

The vacuum collection system consists of 3-inch to 10-inch PVC pipe installed in a stair-step manner to convey wastewater to a centrally located vacuum pumping station. Vacuum sewer collection mains, as their name implies, utilize a vacuum pressure to pull wastewater to a collection point, the vacuum pumping station. The wastewater is then pumped from the vacuum pumping station to the wastewater treatment plant by conventional wastewater pumping units located on the North Palmer's Chapel and Calista Road Vacuum Pumping Stations, respectively.

Typically, vacuum collection mains are viewed as "vacuum-assisted gravity sewers." Like gravity sewers, vacuum sewers are installed with a positive slope toward the vacuum station. When vacuum mains slope down against grade they become deep in the ground. Typically, when this depth exceeds 6 to 8 feet, a “lift” is used to return the main to a more acceptable depth below ground. Lifts are 8-inch to 12-inch increases in the elevation of a vacuum pipeline created with 45 degree bends. It is at these lifts that vacuum assists the sewage on its travel toward the vacuum station.

The lifts are part of the stair-step configuration of the vacuum mains, which is a key feature of a vacuum system. The stair-step profile is used to keep an open passageway on the top of the piping network, thereby preventing the pipe from becoming sealed. By doing this, air flows above the liquid, and the vacuum that is created at the vacuum station can be transferred to every valve pit. This ensures that the maximum pressure differential, and hence, maximum energy, can be obtained at each valve pit. The vacuum produced by a vacuum station is generally capable of lifting sewage 15 to 20 feet, depending on the operating vacuum level of the system.

4. *Gravity Sewer Collection*

The City has approximately 20,200 LF of 8-inch gravity sewer. This gravity sewer flows to the Portland Road, Union Road, Kensington Green, Springfield, and Cambria Lift Stations as shown in Table 3.6. The majority of the gravity sewer has been installed in the last five years as part of subdivision developments.

Table 3.6 – Gravity Sewer Collection

Lift Station	Gravity Sewer (LF)
Portland Road Lift Station	4,075
Union Road Lift Station	8,000
Kensington Green Lift Station	990
Springfield Lift Station	3,120
Cambria Lift Station	4,000

5. *Low Pressure Sewer Pumps*

The City has approximately 2,586 customers equipped with low pressure sewer pumps. The vast majority of these customers (2,482) are served a single (simplex) low pressure sewer pump as shown in Table 3.7. Some customers with low pressure sewer pumps are connected to the vacuum sewer system through the use of buffer tanks.

Table 3.7 – Low Pressure Sewer Simplex Customers

Pump Manufacturer	Number	Average Age (years)	Expected Life (years)(1)
Hydromatic	2,069	9	6-8
E/One	412	2	10
Little Giant	1	--	--
1. Expected life taken from pump manufacturer's published literature.			

Approximately 104 customers, primarily industrial and commercial customers, are served by duplex low pressure pumping units. The manufacturers and number of duplex and triplex pumps in the City's collection system are shown in Table 3.8.

Table 3.8 – Low Pressure Duplex and Triplex Customers

Pump Manufacturer	Number of Customers	Number of Pumps	Average Age (years)	Expected Life (years)(1)
Hydromatic – Duplex	79	158	9	6-8(2)
E/One – Duplex	18	36	2	10
E/One – Triplex	4	12	2	10
Barnes - Duplex	3	6	--	--
1. Expected life taken from pump manufacturer's published literature. 2. Expected life for pump operating at design operating point.				

The primary difference between the Hydromatic grinder pumps and the E/One pumps installed in the City's collection system is the maximum discharge pressure the E/One pumps can produce. While both units can pump the range of flows produced in residential service, the E/One pump's semi-positive displacement pumping mechanism can produce heads over 138 feet (60 psi), while the centrifugal pump impeller utilized in the Hydromatic grinder can only produce approximately 53 feet of head (23 psi). This difference means that the E/One pump can be installed in a much wider variety of locations and in much more difficult-to-serve areas than its Hydromatic counterpart. The E/One units also carry a better warranty and have a better service life expectancy.

6. Vacuum Sewer Collection Pods (Valve Pits)

There are approximately 1,013 sewer customers connected to the North Palmer's Chapel and Calista Road Vacuum Pumping Stations. Of these customers, most are connected to the vacuum collection system with a vacuum sewer collection pod, also known as a valve pit. A number of customers pump to a neighbor's valve pit or to a vacuum buffer tank utilizing low pressure sewer pumps. The City's collection system typically has 1.3 houses connected to one valve pit, although up to four homes can be connected to a valve pit if certain conditions are met.

The vacuum valve pit contains a vacuum valve, controller, and inlet sump. The inlet sump collects wastewater by gravity from the customer, where it is stored before it is drawn into the vacuum collection system. Once 10 gallons of sewage accumulates in the sump, the vacuum interface valve automatically opens utilizing the vacuum pressure in the collection main. No electrical power is required at the valve pit. An installed valve pit is shown in Figure 3.3.

Figure 3.3 – Valve Pit Lid and External Breather

A. Sewer Collection System Evaluation

1. Force Mains

The Northern Force Main currently collects pumped flow from lift and pumping stations of approximately 1,600 gpm. In addition to this flow, another 120 gpm in peak flow is connected to the force main from developments using low pressure sewer pumps. This total flow results in velocities in the 10-inch section of force main in excess of 7.0 feet per second, and in excess of 4.9 feet per second in the 12-inch section of force main. The velocity in the 10-inch section of the Northern Force Main is very high for a wastewater force main. The velocity in all sections of the Northern Force Main should be kept to less than 5.0 feet per second in order to keep the sewage pumps operating within their original design parameters.

The Southern Force Main currently collects pumped flow of 1,235 gpm in addition to a small number of customers connected directly using low pressure sewer pumps. This total flow results in velocities in the Southern Force Main of approximately 3.5 feet per second.

The most significant deficiency noted for the force mains is the high velocity in the 10-inch section of the Northern Force Main. The most notable result from this is that the high velocities result in higher head losses in the pipeline, resulting in lower flows from all the centrifugal pumps at the lift stations and pumping stations pumping to this force main. This reduction in flow results in several of these pumps operating below their design capacity thereby reducing the capacity of each lift station or pumping station.

The 10-inch section of the Northern Force Main between Calista Road and Bill Moss Road should be replaced with a new section of 12-inch force main to reduce the friction head losses and reduce the operating heads on the pumps in this section of the collection system. The high friction losses in the Northern Force Main are causing all the pumps in this system to operate at a higher head and therefore a lower flow.

In the case of Portland Road Lift Station, this increase in pumping head has reduced the lift station's pumping capability below the rated capacity of the station of 100 gallons per minute when all the pumping and lift stations are operating simultaneously. Data collected by the City indicates that all the pumping and lift stations connected to the Northern Force Main currently operate simultaneously at least once per day. The extension of a 12-inch force main to replace the 10-inch section between Calista Road and Bill Moss Road will return this portion of the collection system to its original design capacity, but will not allow for any additional flow to be added to each lift station above its design capacity.

Other deficiencies noted in the force main network, include the termination of the 8-inch Union Road Force Main into a 4-inch force main at State Highway 76 and the long distance pumping of the flow from the Union Road Lift Station to the Tyree Springs Lift Station before it is pumped to the wastewater treatment plant.

2. Vacuum Sewer Collection Mains

Although AIRVAC had some involvement in the original layout and design of the vacuum collection system that was constructed in 1986/1987, vacuum collection lines for both the Calista Road and North Palmer's Chapel Vacuum Pumping Station have been extended several times to accommodate new development adjacent to areas served by the vacuum system. These extensions appear to have been undertaken without any review by AIRVAC and, in several cases, where another means of collection (low pressure sewer) was also available. Small changes in the length of collection lines or in the number of units connected to the vacuum collection system can disrupt the conveying capacity and reliable operation of the system.

According to a 2005 AIRVAC evaluation of the Calista Road Vacuum Collection system original design drawings, it appeared that the system was installed with no lifts, that the system flowed continuously downhill to the pumping stations. AIRVAC termed this discovery "highly doubtful." If the system could have been installed without any lifts, a conventional gravity sewer collection system could have been utilized instead of the vacuum system. It is likely that lifts were added in the field during construction with limited consideration about the effect this might have on the overall vacuum system design.

While the North Palmer's Chapel and Calista Road vacuum collection systems operate satisfactorily during normal (dry-weather) conditions, they do not function reliably during wet-weather conditions due to a combination of the vacuum collection system's original design and construction and extensions made to the system since then. Both collection systems have difficulty maintaining sufficient vacuum pressure throughout their system to keep all their vacuum valves in operation during times of significant flow. Both collection systems have been deemed to be at their design capacity by AIRVAC due to their inability to convey wet weather flows. Wet-weather flows are the combination of a system dry-weather wastewater flow from customers plus water infiltration and inflow (I/I) from rain, streams, and groundwater.

Given that there are no records available from construction of the either the North Palmer's Chapel or Calista Road vacuum collection systems that would allow for a further evaluation of the original design of the system, it is not possible to determine if the system was originally designed and constructed to meet AIRVAC's design guidelines. However, AIRVAC has analyzed several portions of the vacuum collection system using information gathered from the existing system and from observations of operation of the system in a variety of flow conditions. Specifically, they have identified a section of the North Palmer's Chapel Vacuum Pumping Station collection system along Oak Valley Subdivision, Dawn Court and Tyree Springs Road, south of Raymond Hirsch Parkway, as extending further from the vacuum station and having friction losses higher than recommended for reliable operation.

This section of vacuum collection system, along with the nearby White House High School and White House Middle School, should be converted to either low pressure or gravity sewer collection and their flows conveyed to either the existing Tyree Springs Lift Station or the proposed Copes Crossing Lift Station. These modifications will lessen the flows to most heavily utilized portion of the North Palmer's vacuum collection system and will improve operation of the vacuum station and other portions of its collection system.

3. Gravity Sewer Collection

Given that the majority of the gravity sewer has been installed in the last five years as part of subdivision developments, several of which have not yet been fully built-out, the gravity sewer portion of White House's collection system has sufficient capacity for current and future development.

4. Low Pressure Sewer Pumps

The City is currently replacing approximately 225 Hydromatic pumps per year. Units are identified for replacement when a unit fails or when repeated service calls make it uneconomical to keep a unit in service. At the current rate of replacement, it will take the City approximately 10 years to replace all the Hydromatic grinder pumps in their collection system. By the end of that time, the remaining Hydromatic pumps will be approaching almost 20 years of service. It is unrealistic to assume that the current rate of pump failure, approximately 225 per year for 8-12 year old pumps, will remain constant as the pumps age further. It is likely that the failure rate will exceed 225 pumps per year as the existing pumps age. It currently costs the City approximately $1,200 to replace a Hydromatic grinder pump and controls with a new E/One After Market Grinder Pump (AMGP) and controls. E/One AMGPs are specifically designed to be installed in existing grinder pump wetwells, and a photo of one is shown in Figure 4.1.

Figure 4.1 – E/One AMGP

In order to keep ahead of the rate of pump failures, it is recommended that the City increase the rate of replacement to proactively replace Hydromatic grinder pumps before failures or other problems occur. The proactive replacement of pumping units should focus on areas within the City's collection system that have a high rate of failures or areas where pump replacement could provide reductions in flow to the City existing lift stations. It is recommended that the City replace at least a years worth of units at one time, approximately 225 units, in order to stay ahead of the rate of failures. In addition, the replacement of the Hydromatic low pressure pumps that currently pump to the South Palmer's Chapel Lift Station with new E/One AMGPs would reduce flow to the currently overburdened Tyree Springs Lift Station and redirect it directly to the Southern Force Main.

Another area of potential pump replacement includes the area bounded by State Highway 76, Sage Road, Raymond Hirsch Parkway, and U.S. Highway 31W. This area is currently served by low pressure grinder pumps that convey flow to the Wilkinson Lane Lift Station and ultimately to the overburdened Northern Force Main. This area is bisected by the Southern Force Main before it crosses under Interstate 65. The replacement of the existing grinder pumps with new E/One AMGPs would allow them to pump directly to the wastewater treatment plant via the Southern Force Main and free up capacity at the Wilkinson Lane Lift Station and in the Northern Force Main. These improvements are estimated to remove an additional 271 homes (48,000 gpd of wastewater) from the Wilkinson Lift Station and the Northern Force Main.

5. Vacuum Sewer Collection Pods (Valve Pits)

Other than recent expansions of the vacuum collection system, all of the vacuum valve pits were installed with the construction of the vacuum collection stations in 1984/1985. This means that most of the valve pits are 20 years old. According to AIRVAC's published maintenance recommendations, valve pit controllers should be rebuilt every 3-5 years of operation, and vacuum valves should be rebuilt every 7-10 years of operation. For the last two years, the City has been replacing between 75 and 100 units per year as problems are identified.

Unfortunately, there is no clear evidence of a valve's failure. The typical procedure for locating faulty valves in a vacuum collection system involves isolating sections of vacuum collection main by closing isolation valves and testing the vacuum integrity of the system. Unfortunately, many isolation valves in the City's vacuum collection system were left off or not installed during its construction. In the years since installation many valves, identified as needing replacement, were simply removed by maintenance personnel and not replaced. The lack of isolation valves requires City personnel to go valve-to-valve to identify failures, a huge expenditure of the City's manpower to both locate and replace the valve. A new valve and controller currently costs the city approximately $975.

A vacuum valve (lower section) and controller (upper section) is shown in Figure 4.2.

Figure 4.2 – Vacuum Valve and Controller

B. Pumping Station and Lift Station Evaluations

1. Capacity

Given that there is not any flow measurement instrumentation installed at the City's lift and pumping stations, the following estimates of the flows at each station were developed. Table 4.1 estimates the current peak lift and pumping station flow based on an average flow per customer for the entire collection system.

Table 4.1 – White House – Estimated Lift and Pumping Station Flows

Pump Station	Connections[1]	Peak Flow (GPM) [2]	Design Capacity (GPM)	Percent Utilization
North Palmer's Chapel Vacuum Pumping Station	654[3]	311	500	62%
Portland Road Lift Station	163	80	100	80%
Calista Road Vacuum Pumping Station	359[4]	167	300	56%
Wilkinson Lane Lift Station	868	372[5]	675	55%
Tyree Springs Lift Station	1,170[6]	486	675	72%
South Palmer's Chapel Lift Station	286	135	220	61%
Union Road Lift Station	159	76	300	25%
Cambria Lift Station	144	72	160	45%
Meadowlark Lift Station	463	211	400	53%
Springfield Lift Station	10	4	150	3%

Notes:
1. Number of connections provided by City of White House; includes allocated sewer commitments.
2. Peak flow is calculated based on average flow for all persons within the City (61 gpd), 2.9 persons per connection, and utilizes a peaking factor ranging from 3.0 to 4.5 based on the contributing population (Harmon's Peaking Factor).
3. North Palmer's Chapel Vacuum Pumping Station connections include 127 customers connected to the vacuum system with low pressure sewer grinder pumps.
4. Calista Road Vacuum Pumping Station connections include 68t customers connected to the vacuum system with low pressure sewer grinder pumps.
5. Wilkinson Lane Lift Station flows are assumed to be higher than this value due to collection area containing a majority of the City's commercial area, including two hotels.
6. Tyree Springs Lift Station connections include South Palmer's and Union Road Lift Station customers (connections).

Table 4.2 utilizes an estimate of 100 gallons per person per day to generate the lift station peak flow values in accordance with the Tennessee Department of Environment and Conservation (TDEC) Design Basis for New Sewage Works Appendix- 2-A.

Table 4.2 – White House – Lift and Pumping Station Capacities – Design Values

Pump Station	Connections(1)	Peak Flow (GPM) (2)	Design Capacity (GPM)	Percent Utilization
North Palmer's Chapel Vacuum Pumping Station	654	512(3)	500	**102%**
Portland Road Lift Station	163	132	100	**132%**
Calista Road Vacuum Pumping Station	359	273	300	**91%**
Wilkinson Lane Lift Station	868	611	675	**91%**
Tyree Springs Lift Station(4)	1,170	799	675	**118%**
South Palmer's Chapel Lift Station	286	219	220	**100%**
Union Road Lift Station	159	128	300	43%
Cambria Lift Station	144	116	160	73%
Meadowlark Lift Station	463	345	400	86%
Springfield Lift Station	10	9	150	6%

Notes:
1. Number of connections provided by City of White House; includes allocated sewer commitments.
2. Peak flow is calculated based on the typical design average flow for all persons within the City (100 gpd), 2.9 persons per connection, and utilizes a peaking factor ranging from 3.0 to 4.5 based on the contributing population (Harmon's Peaking Factor).
3. North Palmer's Vacuum Station observed to lose service at influent flows above 400 gpm. Loss of service attributed by AIRVAC to limitations in the vacuum collection system as constructed.
4. Tyree Springs Lift Station connections include South Palmer's and Union Road Lift Station customers (connections).

The primary difference in these two forms of lift station flow estimation is the assumption made about the average flow to each station made by each customer. In a completely uniform collection system the assumption, the usage of the City's system-wide average of 61 gallons per day per person would accurately estimate the flow for all the lift stations in the collection system. However, no collection system is uniform, and the City's is certainly no exception. The City's collection system not only varies, like most systems, in the nature of the customers collected from station to station in the percentage of business, residential, and industrial wastewaters, it also has the unique variable of type of wastewater collection. Vacuum sewer collection, low pressure sewer, and gravity sewer collection all have unique characteristics related to infiltration/inflow and the ratio of the peak flow to average flow.

Any leaks in a vacuum sewer system will tend to draw in groundwater or surface water at stream crossings, causing the average flow in these systems to be higher. Wet-weather infiltration is also possible in gravity sewer collection systems. Conversely, wet-weather infiltration is not possible in the force mains that make up a large percentage of the remainder of the City's wastewater collection system. However, due to the relatively small amount of gravity sewer line in the City's collection system and its recent installation, wet-weather infiltration is not assumed to be a significant problem in the gravity sewer portion of the collection system.

Table 4.1 likely under estimates the peak flows for the two vacuum pumping stations due to the wet-weather infiltration and inflow that exists in the vacuum collection system. Table 4.2, conversely, likely over estimates the peak flows at the lift stations. It more closely approximates the peak flows at the vacuum pumping stations. The actual average and peak flow at each lift station is likely in between the numbers estimated by the two methods and is impossible to determine precisely without flow monitoring at each lift station.

2. Power Costs

The City of White House has tracked the monthly power costs at each of its lift and pumping stations over the last two years. A summary of the major lift stations, their average monthly electrical costs, and cost per customer is shown in Table 4.3.

Table 4.3 – White House – Lift Station Operating Power Costs

Pump Station	Connections(1)	Design Capacity (GPM)	Average Monthly Power Cost	Monthly Cost per Customer
North Palmer's Chapel Vacuum Pumping Station	654	500	$1,998	**$3.05**
Portland Road Lift Station	163	100	$105	$1.55
Calista Road Vacuum Pumping Station	359	300	$1,096	**$3.05**
Wilkinson Lane Lift Station	868	675	$255	$0.29
Tyree Springs Lift Station	1,170	675	$250	$0.21
South Palmer's Chapel Lift Station	286	220	$96	$0.34
Union Road Lift Station	159	300	$50	$0.31
Cambria Lift Station	144	160	$105	$0.73
Meadowlark Lift Station	463	400	$179	$0.39
Springfield Lift Station	10	150	$40	$4.00

Notes:
1. Number of connections provided by City of White House; includes allocated sewer commitments.
2. Tyree Springs Lift Station connections include South Palmer's and Union Road Lift Station customers.

The most notable result from this analysis is the high cost per customer for both vacuum pumping stations when compared to the cost for the other gravity and low pressure collection lift stations. The high cost per customer for the Springfield Lift Station is an anomaly due to combination of a very low number of customers and a minimum bill of $40 for the station's electrical service.

3. Physical Condition

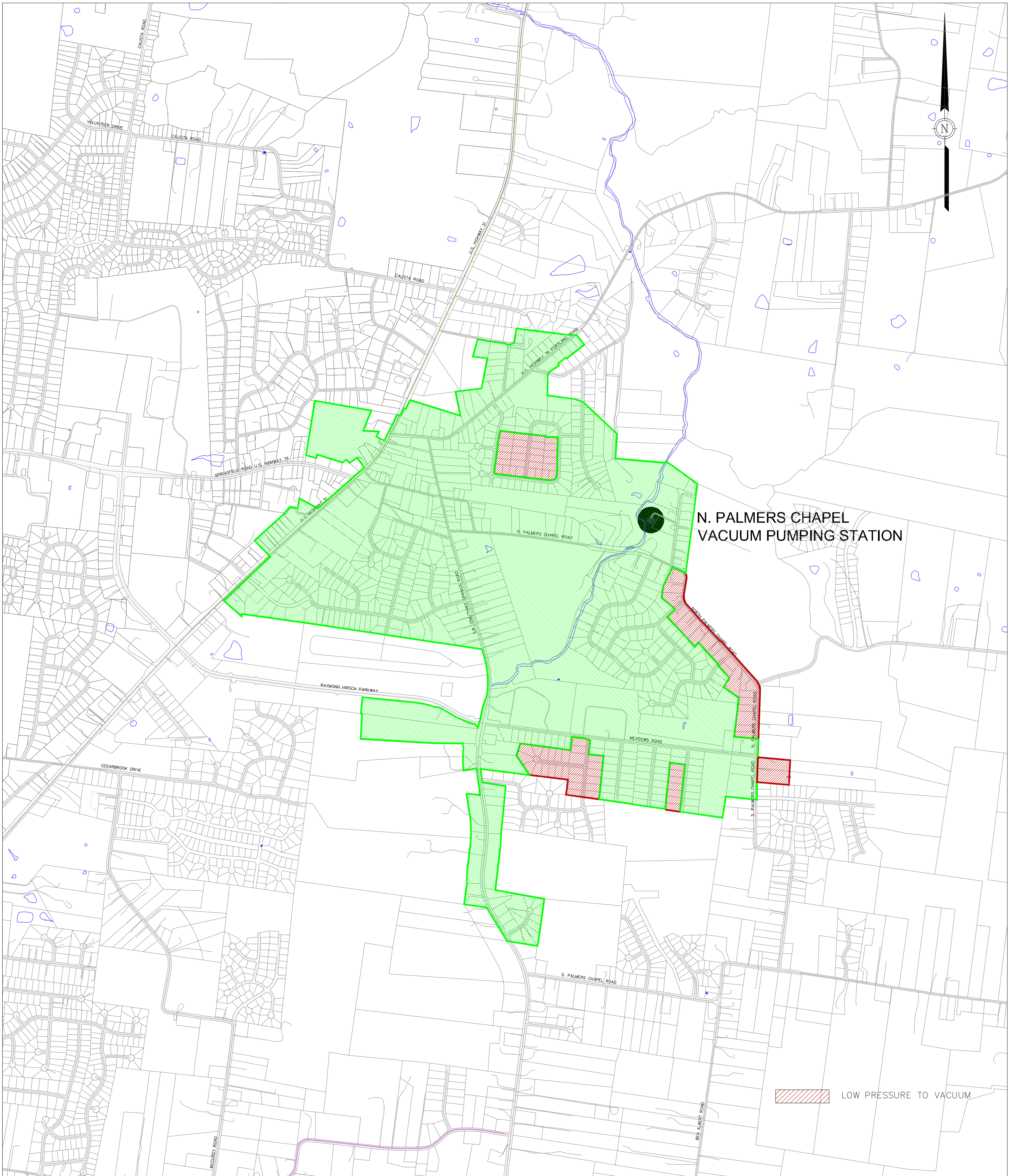
As part of the wastewater master planning effort, an inspection was performed on each of the lift stations and pumping stations in the City's collection system. The inspection reports for each lift station and pumping station are located in Appendix B.

In general, the lift stations and vacuum pumping stations are well-kept and clean. All the sites are enclosed with locked permanent fencing. The lift stations are all equipped with local alarms (red light and audible alarms) to notify operators of an equipment failure or high wastewater level. The red light alarms are visible from each lift station enclosure's fencing. The vacuum pumping stations are equipped with an alarm system that phones utility staff to inform them of equipment failures or high wastewater levels.

4. North Palmer's Chapel Vacuum Pumping Station

The North Palmer's Chapel Vacuum Pumping Station, originally constructed in 1987, is located on the northeast side of the City. The AIRVAC vacuum pumping station provides vacuum sewer service to approximately 654 customers, 527 residential and 68 non-residential, and approximately 737 acres of service area, which includes Tyree Springs Road, White House High School, White House Middle School, and North Palmer's Chapel Road. North Palmer's VPS has approximately 127 customers connected to its vacuum collection system though the use of low pressure sewer pumps. The vacuum pumping station was designed to pump up to 500 gpm of sewage into the 10-inch and 12-inch Northern Force Main. The North Palmer's Chapel Vacuum Pumping Station consists of three vacuum pumps, a 4,400-gallon vacuum collection tank, and two 500-gpm sewage pumps. The vacuum pumping station is also equipped with an emergency diesel engine generator to provide electrical power in the event of an outage. The North Palmer's Chapel Vacuum Pumping Station is shown in Figure 4.3. Due to vacuum line extensions beyond the original collection design and infill development over the last 20 years, the North Palmer's Chapel Vacuum Pumping Station is currently at its design limit. No additional new connections or subdivisions of existing parcels are being allowed to connect to the vacuum collection system. A map of the North Palmer's Chapel Vacuum Pumping Station collection area is shown in Figure 4.4.

Figure 4.3 – North Palmer's Chapel Vacuum Pumping Station



WHITE HOUSE, TN.
N. PALMERS CHAPEL ROAD SERVICE AREA

SCALE: 1"= 2000'

FIGURE 4.4

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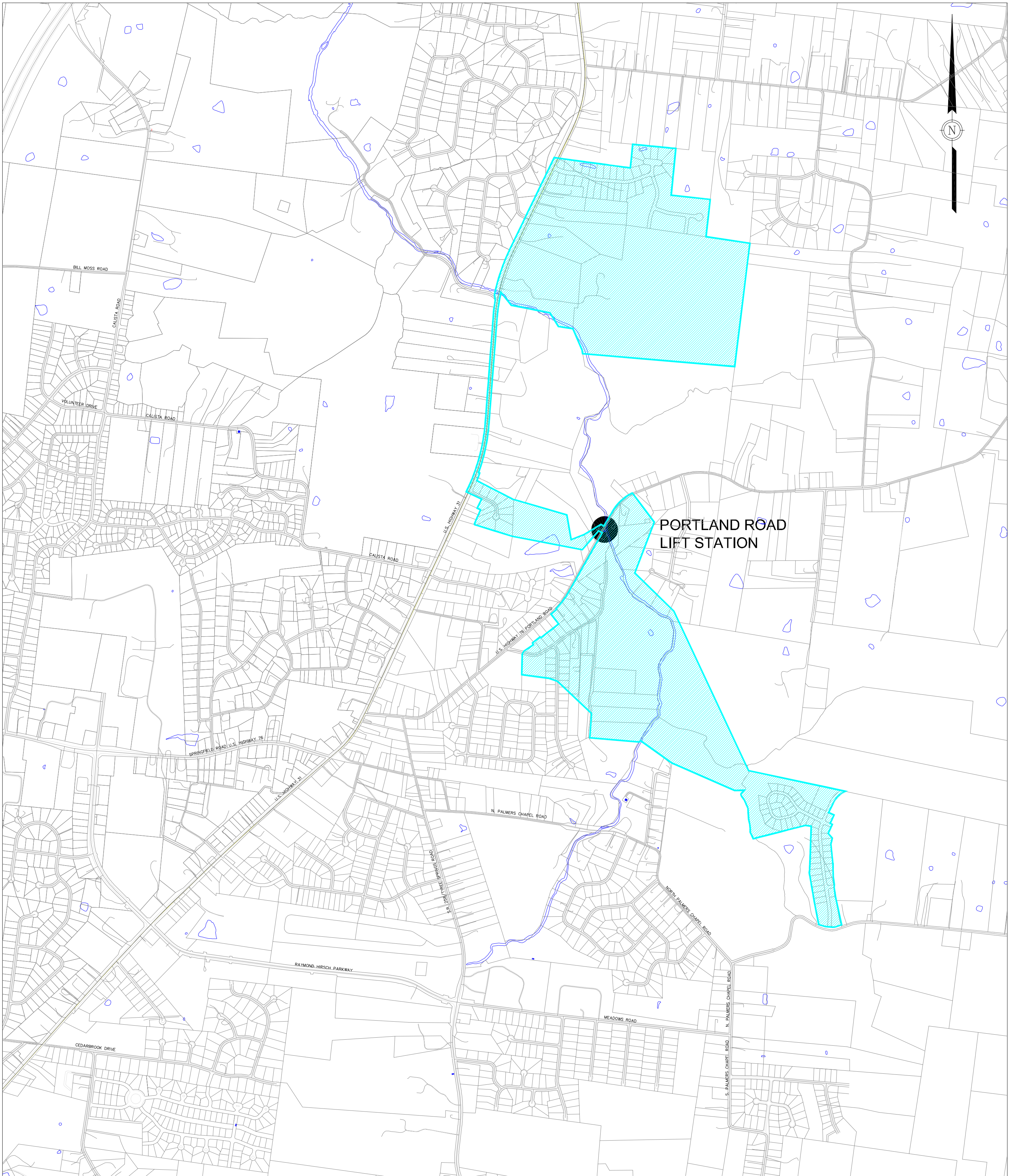
5. Portland Road Lift Station

The Portland Road Lift Station is a wet pit/ dry pit lift station originally constructed in 1987. This lift station is located on the northeast side of the City. The lift station provides sewer service to approximately 163 customers and about 775 acres of service area, which includes Portland Road, U.S. Highway 31, and Sumner Crossing Subdivision. The lift station was designed to pump up to 100 gpm of sewage into the 10-inch and 12-inch Northern Force Main. The Portland Road Lift Station consists of two 100-gpm sewage pumps and is shown in Figure 4.5. A map of the Portland Road Lift Station collection area is shown in Figure 4.6.

Figure 4.5 – Portland Road Lift Station



WHITE HOUSE, TN.
PORTLAND ROAD SERVICE AREA

SCALE: 1"= 2000'

FIGURE 4.6

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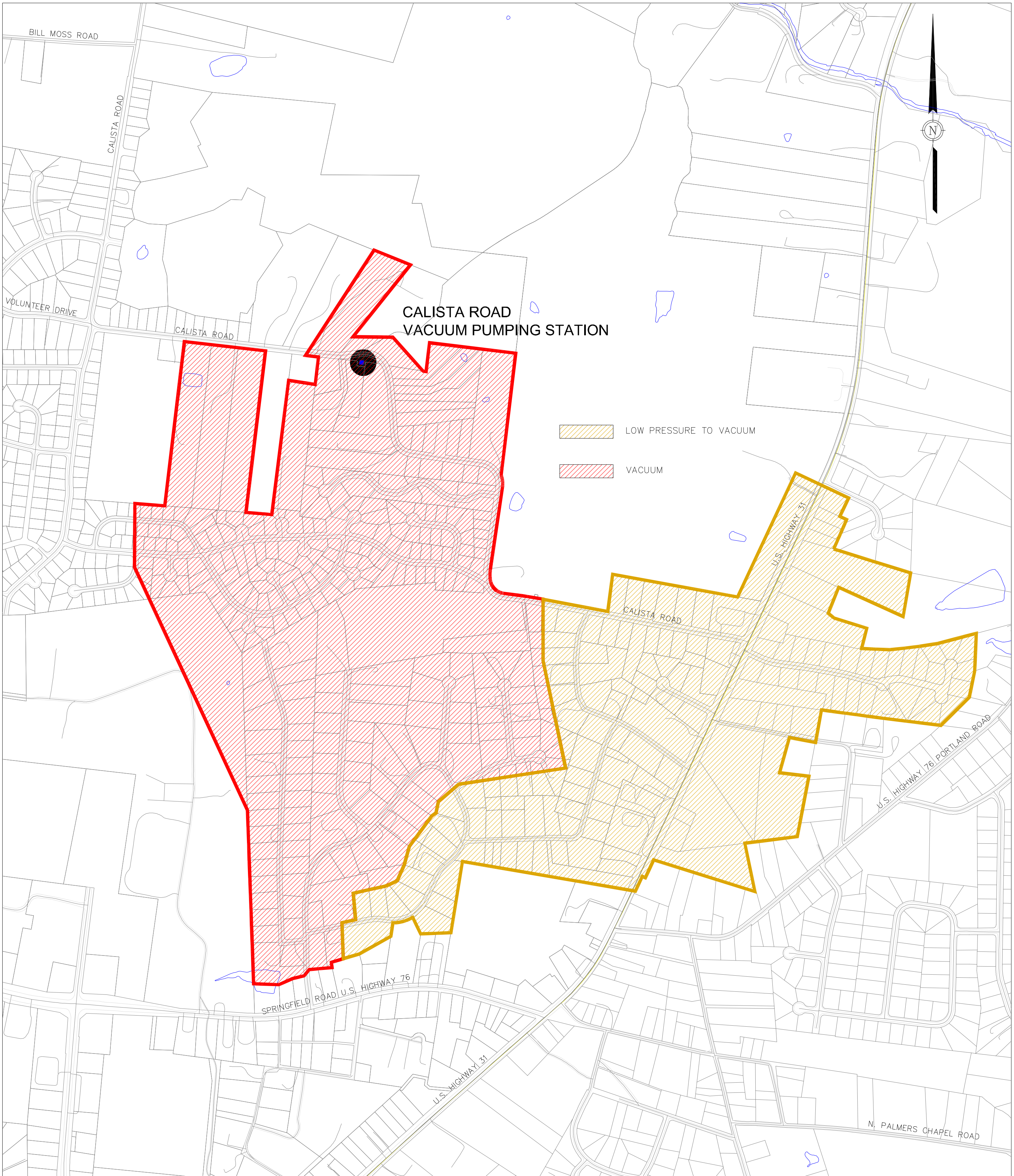
6. Calista Road Vacuum Pumping Station

The Calista Road Vacuum Pumping Station, originally constructed in 1987, is located in the northern area of the City. The AIRVAC vacuum pumping station provides vacuum sewer service to approximately 359 customers, 340 residential and 19 non-residential, and about 203 acres of service area, which includes Calista Road, Apache Trail, and extends to the south to include Hamlet and Skyline Drives. These customers include approximately 68 customers connected to the vacuum collection system through the use of low pressure sewer pumps. The vacuum pumping station was designed to pump up to 300 gpm of sewage into the 10-inch and 12-inch Northern Force Main. The Calista Road Vacuum Pumping Station consists of two vacuum pumps, a 4,400-gallon vacuum collection tank, and two 300-gpm sewage pumps. The vacuum pumping station is also equipped with an emergency diesel engine generator to provide electrical power in the event of an outage. The Calista Road Vacuum Pumping Station is shown in Figure 4.7.

Due to vacuum line extensions beyond the original collection design and infill development over the last 20 years, the Calista Road Vacuum Pumping Station is currently at its design limit. No additional new connections or subdivisions of existing parcels are being allowed to connect to the vacuum collection system. A map of the Calista Road Vacuum Pumping Station is shown in Figure 4.8.

Figure 4.7 – Calista Road Vacuum Pumping Station



WHITE HOUSE, TN.
CALISTA ROAD SERVICE AREA

SCALE: 1"= 1000'

FIGURE 4.8

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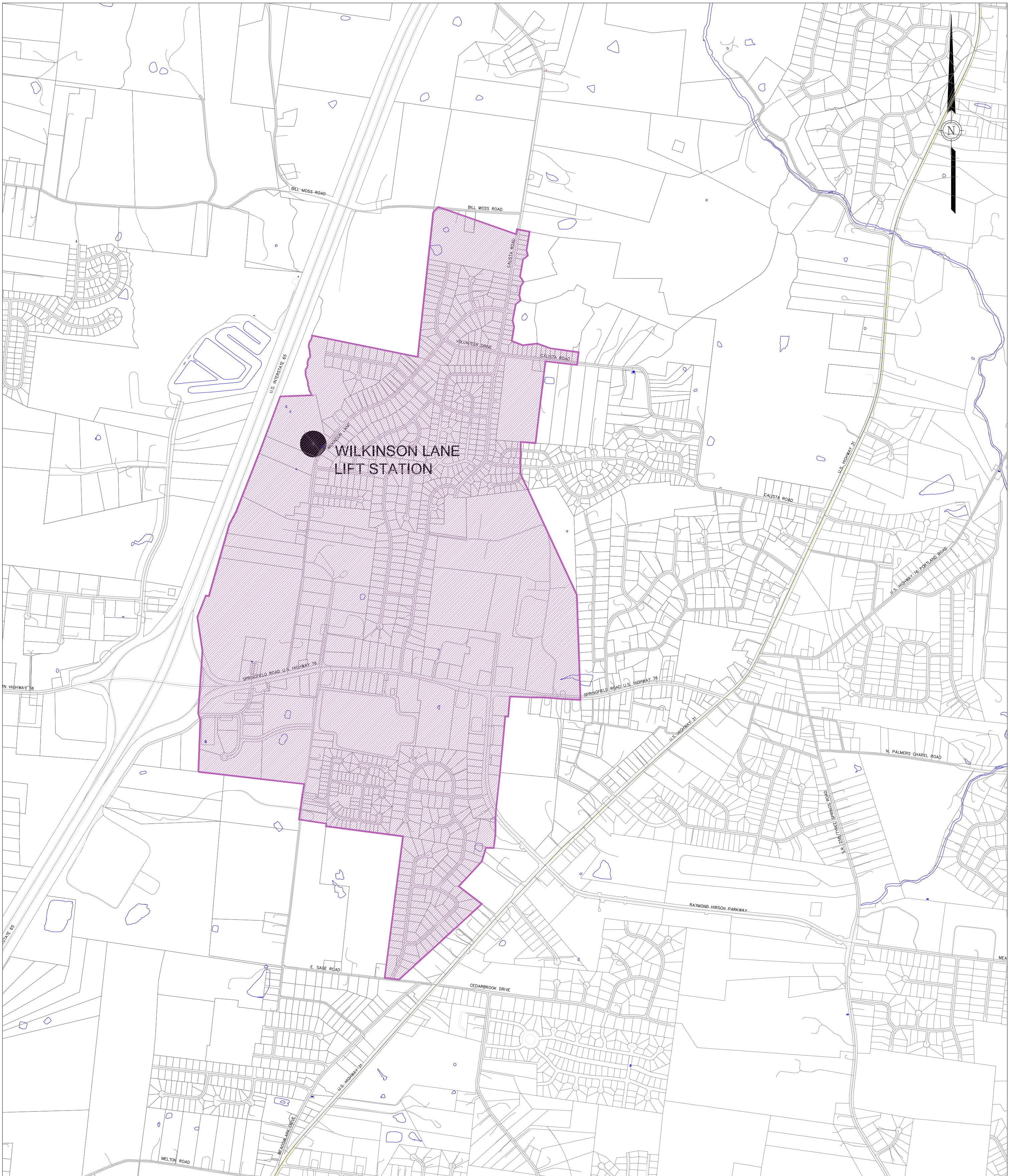
7. Wilkinson Lane Lift Station

The Wilkinson Lane Lift Station is a Davco wet pit/dry pit lift station originally constructed in 1983. The lift station is located on the northwest side of the City. The lift station provides sewer service to approximately 868 customers and approximately 1,032 acres of service area, which includes Wilkinson Lane, portions of State Highway 76, and Volunteer Drive. The lift station was designed to pump up to 675 gpm of sewage into the 10-inch and 12-inch Northern Force Main. The Wilkinson Lane Lift Station consists of two 675 gpm sewage pumps and is shown in Figure 4.9. A map of the Wilkinson Lane Lift Station collection area is shown in Figure 4.10.

This lift station will be replaced by a new 700 gpm submersible sewage lift station in the same location in the fall of 2007.

Figure 4.9 – Wilkinson Lane Lift Station



WHITE HOUSE, TN.
WILKINSON LANE SERVICE AREA

SCALE: 1"= 2000'

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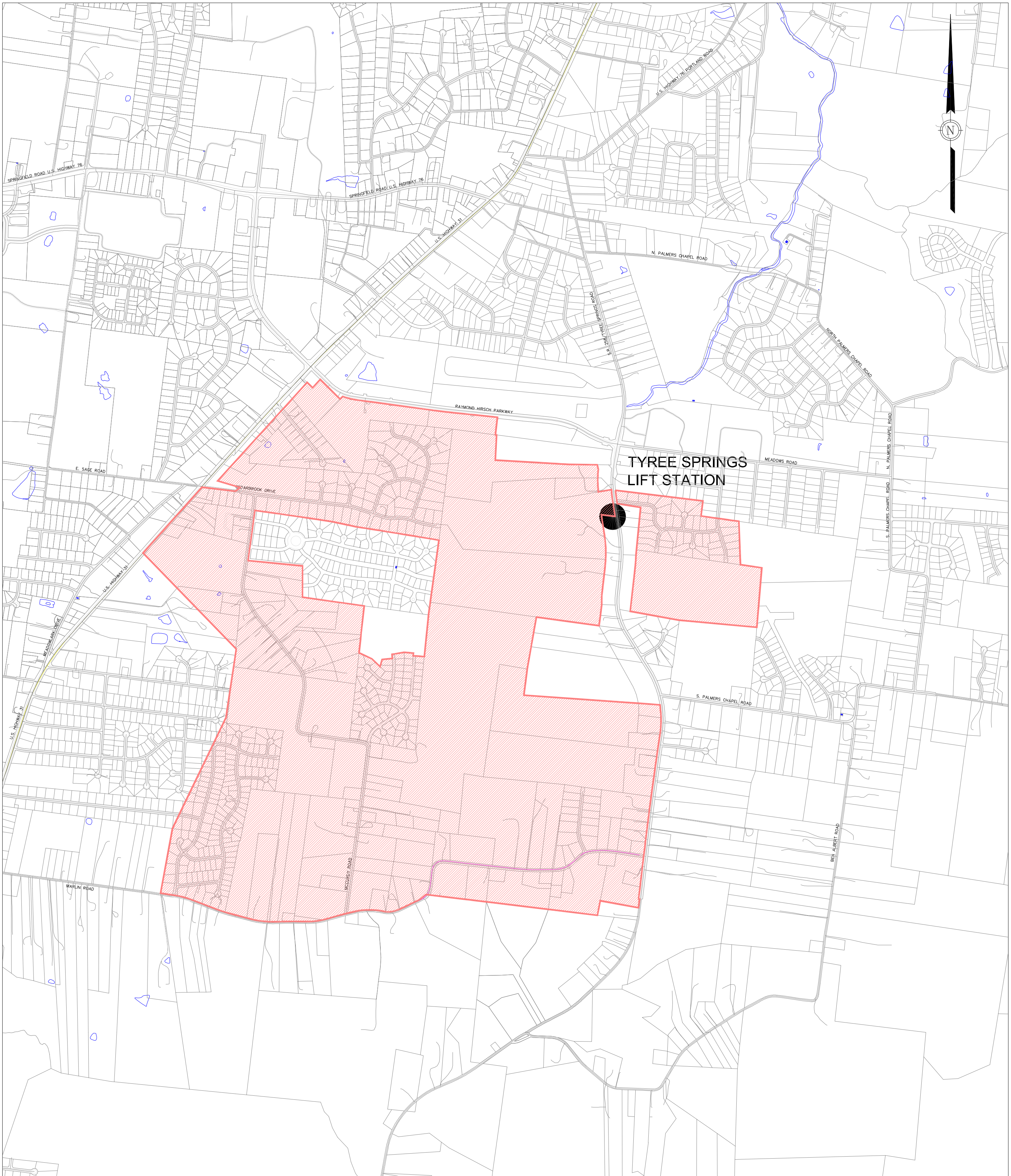
FIGURE 4.10

8. Tyree Springs Lift Station

The Tyree Springs Lift Station is a Smith & Loveless wet pit/dry pit lift station originally constructed in 1993. The lift station is located on the southeast side of the City. The lift station provides sewer service to approximately 1,170 customers and approximately 1,394 acres of service area, which includes Tyree Springs Road, portions of U.S. Highway 31, and McCurdy Road. The lift station was designed to pump up to 675 gpm of sewage into the 12-inch Southern Force Main. The Tyree Springs Lift Station consists of two 675-gpm sewage pumps and is shown in Figure 4.11. A map of the Tyree Springs Lift Station collection area is shown in Figure 4.12, excluding the collection areas for Union Road and South Palmer's Chapel Lift Stations.

South Palmer's and Union Road Lift Stations redundantly pump sewage through Tyree Spring Lift Station. Tyree Springs Lift Station is currently over its design capacity with this arrangement. No new connections or subdivisions of existing parcels are being allowed to connect to this lift station's collection system.

Figure 4.11 – Tyree Springs Lift Station



WHITE HOUSE, TN.
TYREE SPRINGS SERVICE AREA
SCALE: 1"= 2000'

FIGURE 4.12

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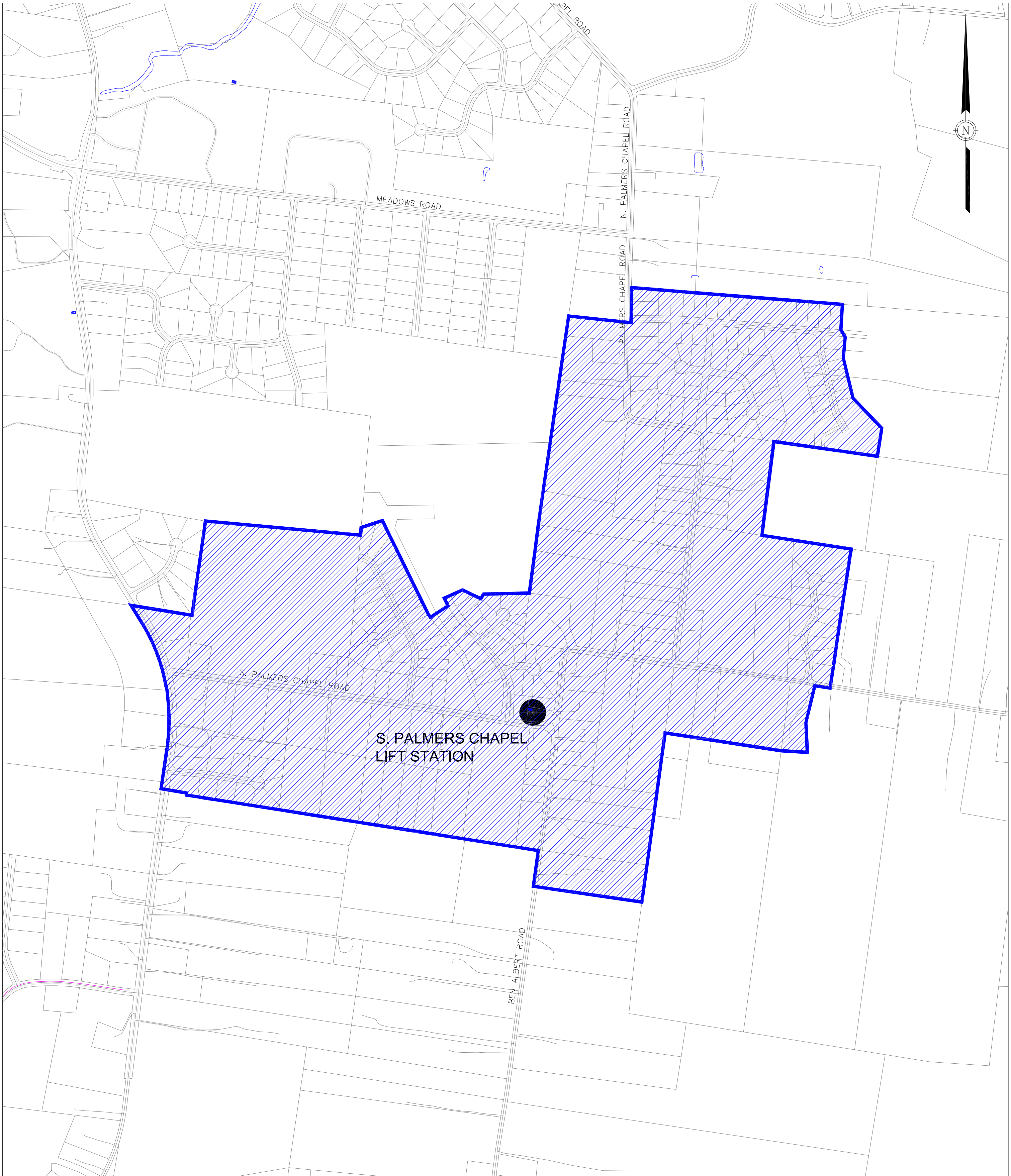
9. South Palmer's Chapel Lift Station

The South Palmer's Chapel Lift Station is a Smith & Loveless wet pit/dry pit lift station that was constructed in 1994. The lift station provides sewer service to approximately 286 customers and approximately 223 acres of service area, which includes South Palmer's Chapel Road, Thoroughbred Way, and Tison Way. The South Palmer's Chapel Lift Station was designed to pump up to 220 gpm of wastewater to Tyree Springs Lift Station, from which the wastewater is re-pumped to the wastewater treatment plant via the 12-inch Southern Force Main. The South Palmer's Chapel Lift Station consists of two 220-gpm sewage pumps and is shown in Figure 4.13. A map of the South Palmer's Chapel Lift Station collection area is shown in Figure 4.14.

South Palmer's Chapel Lift Station has been reported to overflow into the next door neighbor's swimming pool.

Figure 4.13 – South Palmer's Chapel Lift Station



WHITE HOUSE, TN.
S. PALMERS CHAPEL ROAD SERVICE AREA

SCALE: 1"= 1000'

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FIGURE 4.14

10. Union Road Lift Station

The Union Road Lift Station is a Smith & Loveless self-priming suction lift package lift station that was constructed in 2004 to provide sewer service to the Magnolia Village Subdivision. The Union Road Lift Station was designed to pump up to 300 gpm of wastewater to the wastewater treatment plant via the Southern Force Main. However, it appears that at some point the force main for the Union Road Lift Station was modified so it discharged into the Tyree Springs Lift Station wetwell, from which the wastewater is re-pumped to the wastewater treatment plant via the 12-inch Southern Force Main. The lift station provides sewer service to approximately 159 customers and approximately 190 acres of service area, which includes Magnolia Village Subdivision, U.S. Highway 31, Union Road, and White House Middle School. The Union Road Lift Station consists of two 300 gpm sewage pumps and is shown in Figure 4.15. A map of the Union Road Lift Station collection area is shown in Figure 4.16.

Figure 4.15 – Union Road Lift Station

WHITE HOUSE, TN.
UNION ROAD SERVICE AREA
SCALE: 1"= 1000'

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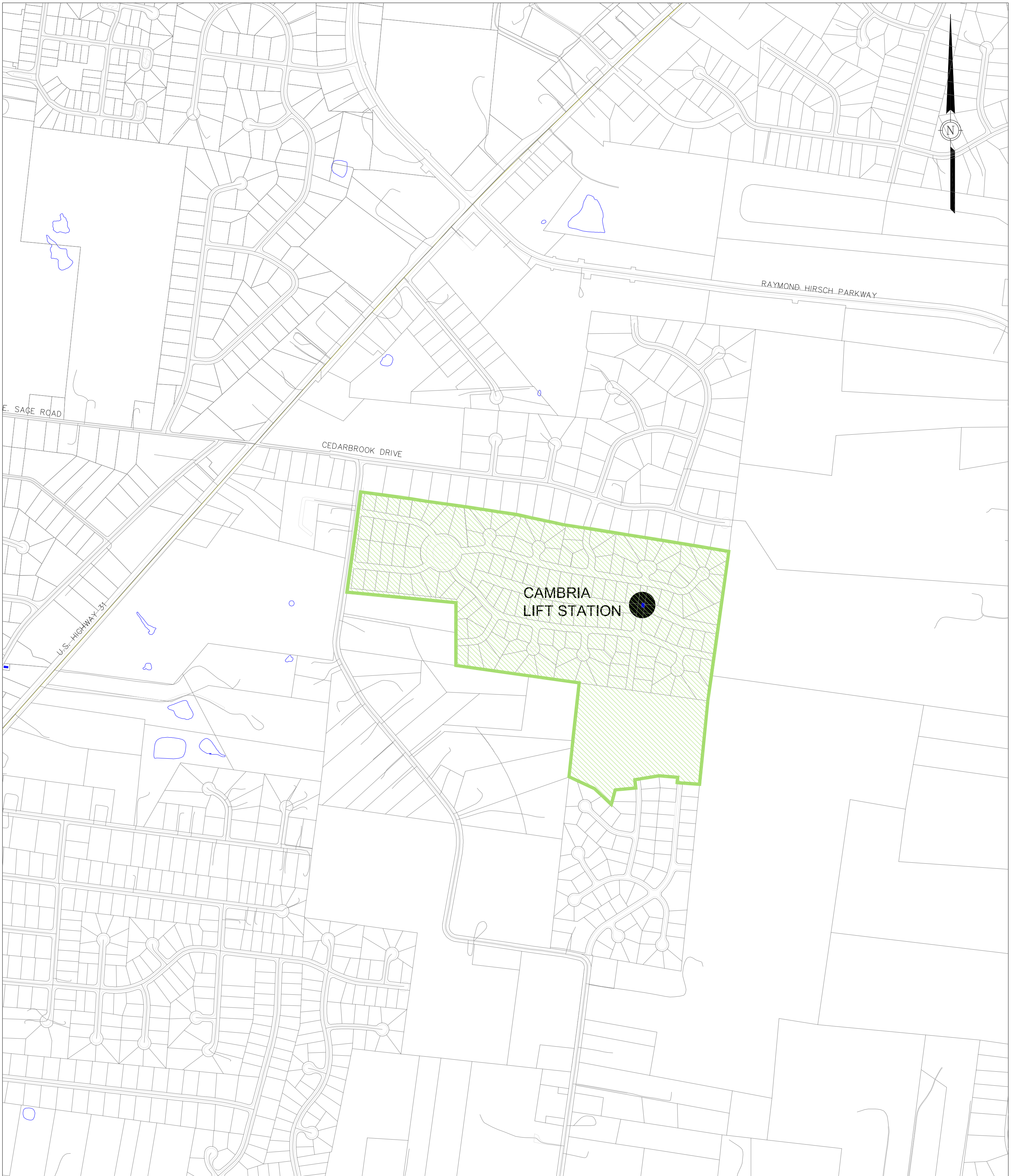
FIGURE 4.16

11. Cambria Lift Station

The Cambria Lift Station is a Gorman-Rupp self-priming suction lift package station that was constructed in 2006. The Cambria Lift Station collection area consists of 8-inch gravity sewer in the Cambria Village Subdivision. The lift station provides sewer service to approximately 144 customers. The lift station was designed to pump up to 160 gpm of sewage into the 12-inch Southern Force Main. The Cambria Lift Station consists of two 160-gpm sewage pumps and is shown in Figure 4.17. A map of the Cambria Lift Station collection area is shown in Figure 4.18.

Figure 4.17 – Cambria Lift Station



WHITE HOUSE, TN.
CAMBRIA SERVICE AREA

SCALE: 1"= 2000'

FIGURE 4.18

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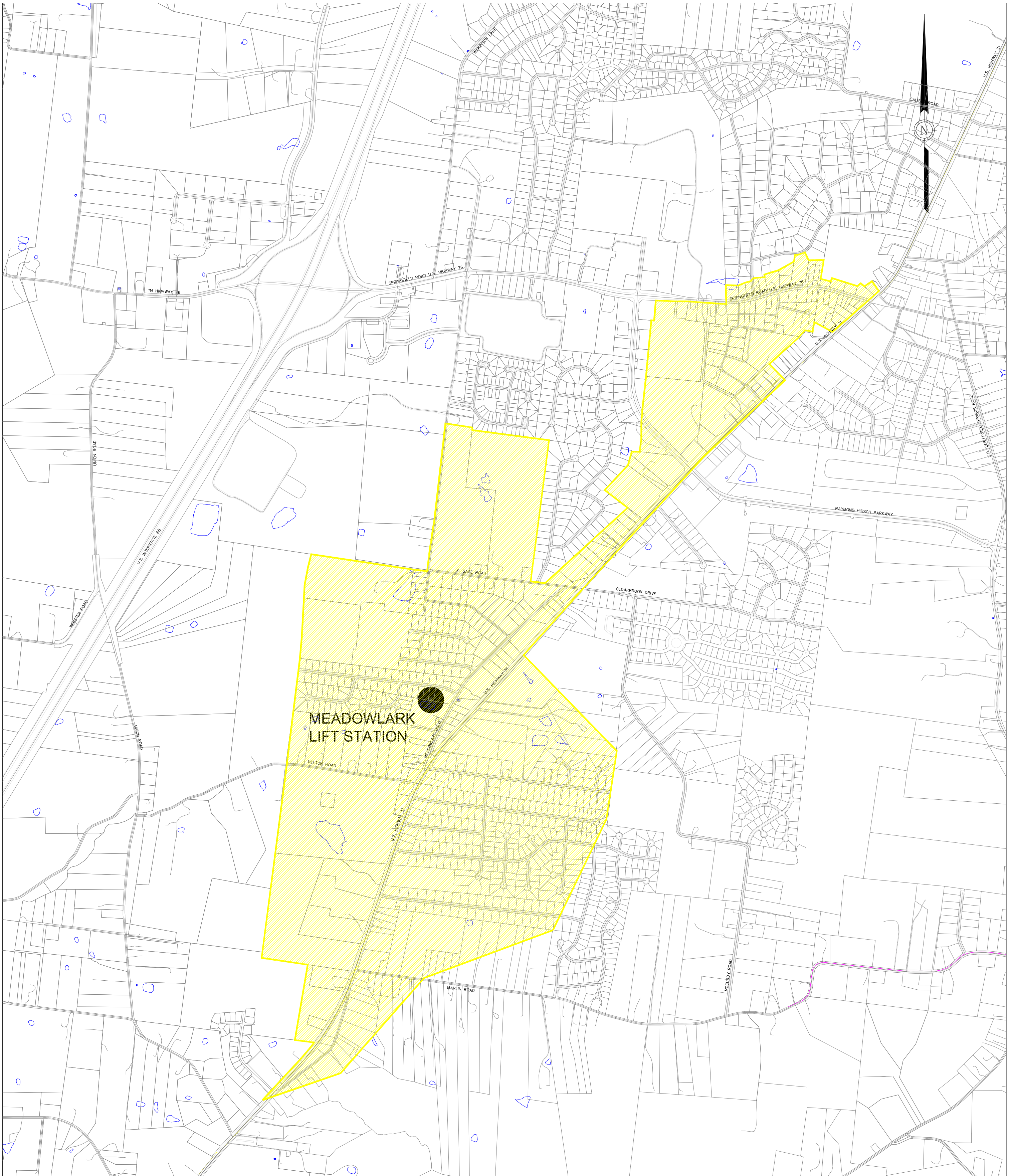
12. Meadowlark Lift Station

The Meadowlark Lift Station is a Davco wet pit/dry pit package lift station originally constructed in 1983. The lift station is located on the southwest side of the City. The lift station provides sewer service to approximately 463 customers and approximately 1,041 acres of service area, which includes White House Elementary, portions of U.S. Highway 31, and Cardinal Drive. The lift station was designed to pump up to 400 gpm of sewage into the 12-inch Southern Force Main. The Meadowlark Lane Lift Station consists of two 400-gpm sewage pumps and is shown in Figure 4.19. A map showing the location of the Meadowlark Lift Station and its collection area is included in Figure 4.20.

Figure 4.19 – Meadowlark Lift Station



WHITE HOUSE, TN.
MEADOWLARK ROAD SERVICE AREA
SCALE: 1"= 2000'

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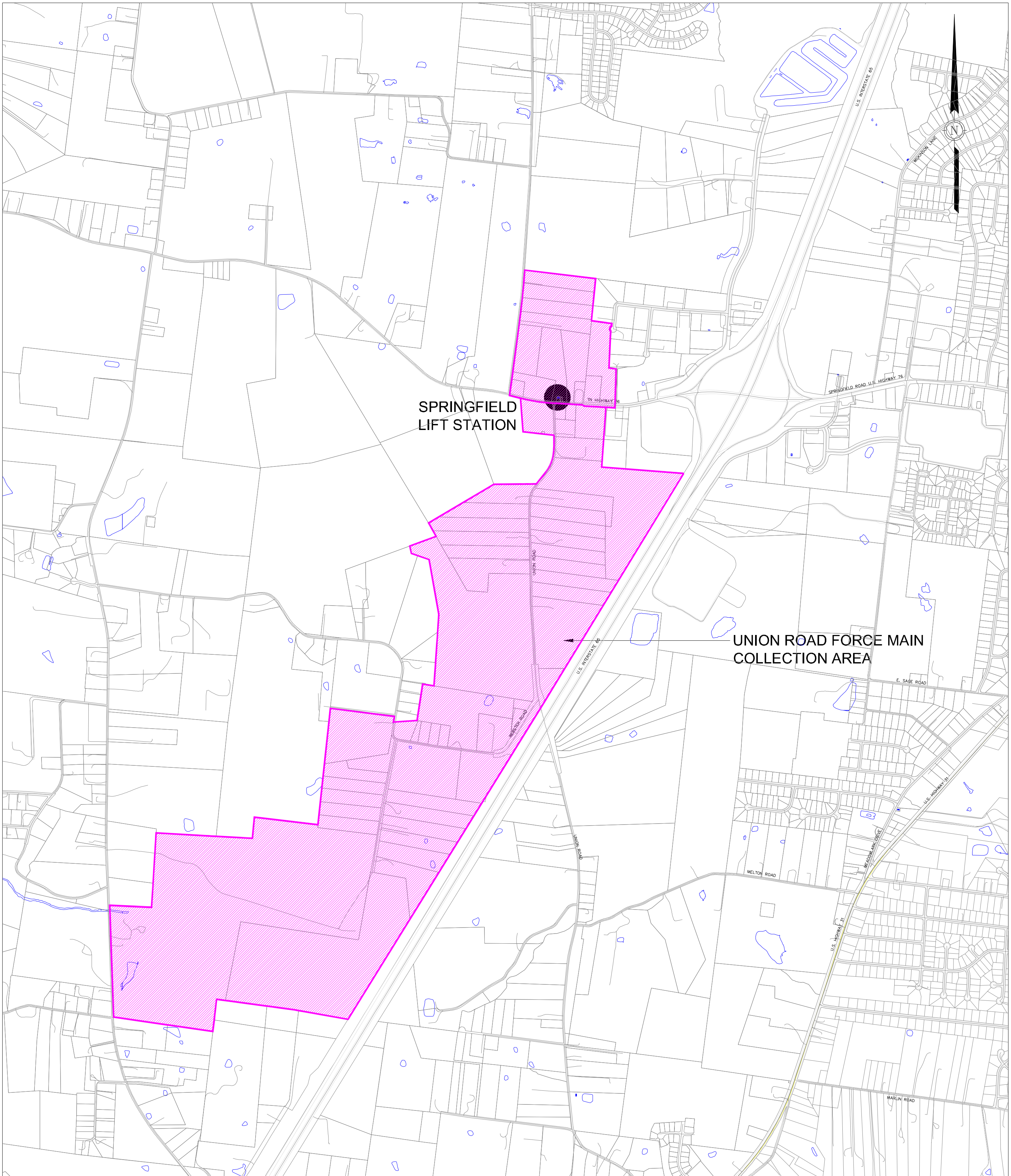
FIGURE 4.20

13. Springfield Lift Station

The Springfield Lift Station is a Smith & Loveless wet pit/dry pit package lift station originally constructed in 1993. The lift station is located on the west side of the City. The lift station provides sewer service to approximately 10 customers and approximately 266 acres of service area, which includes the northern section of Union Road and portions of State Highway 76. The lift station was designed to pump up to 220 gpm of sewage into a 6-inch force main that flows directly into the WWTP. The Springfield Lift Station consists of two 220 gpm sewage pumps and is shown in Figure 4.21. A map showing the location of the Springfield Lift Station and its collection area is included in Figure 4.22.

Figure 4.21 – Springfield Lift Station



WHITE HOUSE, TN.
SPRINGFIELD ROAD SERVICE AREA

SCALE: 1"= 2000'

FIGURE 4.22

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14. Noted Deficiencies

The most significant deficiency noted at all the vacuum pumping stations and lift stations was a lack of a uniform remote telemetry system or supervisory control and data acquisition (SCADA) system. The two vacuum pumping stations are equipped with telephone dialers to notify operators of an alarm situation, but the system does not transmit the type of alarm, nor does it allow for the remote monitoring of the pumping station equipment and operation. None of the lift stations are equipped with remote telemetry. The City's sewer system standards, revised in 2007, require the installation of instrumentation and radio telemetry to transmit both alarm and normal operating conditions to the SCADA system at the WWTP for all new lift stations. The revised sewer standards also require the installation of flow monitoring and pump around connections for all new lift stations. Pump around connections allow for the connection of portable sewage pumps in the event of an extended power failure or equipment failure at the lift station to maintain sewer collection service.

Additional deficiencies noted at the existing lift stations is the lack of area lighting to provide illumination and security at the lift station sites and the lack of flow monitoring instrumentation.

C. Wastewater Treatment Plant

The City's wastewater treatment plant was originally constructed in 1982. The original facility consisted of two aerated lagoons and a walking spray irrigation system. The facility was expanded in 1993 to include a Lemna lagoon treatment system, ultraviolet disinfection, and an outfall pipeline to Frey Branch with a cascade aerator. An aerial view of the treatment plant site is shown in Figure 4.23.

Figure 4.23 – WWTP – Aerial View

The latest expansion of the treatment plant occurred in 2000-2002. The most recent expansion included the addition of a headworks structure to combine and split the influent flow, oxidation ditches, two 50-foot diameter secondary clarifiers, return activated sludge/waste activated sludge (RAS/WAS) pumping station, new ultraviolet disinfection, and a new plant outfall pipeline. The plant is currently permitted to treat an average of up to 1.4 million gallons of wastewater daily. The facility is permitted to discharge up to 1.1 million gallons of treated wastewater to Frey Branch daily; the remaining 300,000 gallons of wastewater is spray irrigated on crop land adjacent to the facility. The Frey Branch discharge location is noted by the red dot at the top right of Figure 4.23. The oxidation ditches are shown in Figure 4.24, and one of the secondary clarifiers and RAS/WAS pumping station are shown in Figure 4.25.

Figure 4.24 – WWTP – Oxidation Ditches

Figure 4.25 – WWTP – Secondary Clarifier and RAS/WAS Pumping Station

The plant is in compliance with its discharge permit (NPDES Permit No. TN0059404) and has no known violations over the last two years. The facility is required to remove 85% of influent chemical biological oxygen demand (CBOD5) and total suspended solids (TSS) on a monthly average basis for all wastewater discharge to Frey Branch. Effluent wastewater discharged to Frey Branch must not contain more than 10 mg/L of CBOD5 and 30 mg/L of TSS on a monthly average. Wastewater effluent to be used for irrigation must not contain more than 45 mg/L of BOD5 and 100 mg/L of TSS on a monthly average.

The wastewater treatment plant does have several operational issues. The operators routinely have to shut down the return activated sludge (RAS) and waste activated sludge (WAS) pumps to remove hair, rags, and other debris that has become wrapped up in their impellers. The reason for this recurring maintenance problem is due to the lack of raw wastewater screening at the head of the treatment plant. When unscreened wastewater enters the oxidation ditches, it is subjected to aeration and the turbulent action of the wastewater in the basins. This action tends to wind hair and other long particles into rope-like strands, which can become entangled in the oxidation ditch disc aerators or they can settle out in the secondary clarifiers and can become entangled in the RAS and WAS pump impellers. In order to prevent the ongoing maintenance problems and to prevent damage to equipment, it is recommended that the City install influent screens at their headworks to remove large solid and inorganic material prior its introduction into the treatment trains.

The facility currently pumps its waste activated sludge to the two aerated lagoons, constructed in 1983. The City partially treats these solids by maintaining aeration in the lagoons, but there is no way to remove solids from the basins for permanent disposal. The WWTP operators were told by the treatment plant designers that the lagoons have sufficient storage for more than 20 years of waste activated sludge storage. However, no studies or calculations have been discovered that support this assertion. The lagoons are shown in Figure 4.26.

Figure 4.26 – WWTP – Aerated Lagoons

The City needs to study and develop a solution for dewatering and disposal of the treatment plant's waste solids. Alternatives considered for solids dewatering and some of each options key criteria are listed in Table 4.4.

Table 4.4 – White House – WWTP Dewatering Alternatives

Dewatering Alternative	Biosolids Class[1,2]	Approximate Construction Cost	Operating Cost/Effort	Other Structures
Dewatering Boxes	B	$ 110,000	Low	Conc. Pad
Belt-Filter Press	B	$ 500,000	High	Building
Clam Shell Press	B	$ 500,000	Medium	Building
Centrifuge	B	$ 500,000	Medium	Building
Biosolids Dryer	A	$ 1,000,000	Very High	Building
Solar Biosolids Dryer	A	$ 600,000	Low	Conc. Pad

Notes:
1. Class A Biosolids can be disposed of in a municipal landfill, by land application, or given away/sold as mulch.
2. Class B Biosolids can be disposed of in a municipal landfill or by land application.

Based on the comparison of viable alternatives shown in Table 4.4, the utilization of dewatering boxes for biosolids dewatering not only has the lowest construction cost, but also has a low operating cost. Biosolids from the dewatering operation could be disposed of either by land application on dedicated cropland or by dumping at a municipal landfill. The land application cropland would need to in addition to the land currently utilized by the City for effluent irrigation.

The WWTP is permitted to dispose of up to 300,000 gallons per day of wastewater by irrigating crop land adjacent to the plant. The irrigation system consists of a pair of walking irrigators. These walkers require frequent service to remain in reliable operation. The limit switches that keep the walker in the fields have also failed, causing them to crash into fences at the edge of the fields. In order to eliminate this ongoing maintenance requirement and to help guarantee that the City can take full advantage of its irrigation capability, it is recommended that the City install a fixed irrigation system in the fields adjacent to the facility.

SECTION 5 FUTURE FLOW PROJECTIONS

A. Population and Flow Projections

As presented in Section 2, the City is expected to experience significant population growth over the next 20 years. As presented in Section 3, the average sewer flows at the City's WWTP have not varied independent of recent population growth in the City. This variation could be caused by a number of factors, including improvements and repairs to the existing collection system to reduce inflow and infiltration. As a result of this lack of variation, historic sewer flow values have not been included in the projection of future flows. The future flows shown in Table 5.1 below are based on the City's average sewer flow per person of 61 gallons per day per person and the population projections by the U.S. Census Bureau and the State of Tennessee.

Table 5.1 - Population and Sewer Flow Projections for White House, Tennessee

	2000	2005	2010	2015	2020	2025
White House Population	7,220	8,530	9,482	10,487	11,495	12,541
Average Sewer Flow (MGD)	0.67	0.49	0.61	0.64	0.70	0.77

At the rate of projected growth, the City's WWTP will have adequate capacity beyond 2025. However, it is assumed that this projection only accounts for population growth within the existing City Limits and does not account for annexation of the City's Urban Growth Boundary.

B. Service Area Growth

The City Limits currently encompass an area of approximately 6,900 acres and the Urban Growth Boundaries (UGB) encompass an additional 8,900 acres. White House's existing City Limits and its Urban Growth Boundaries are shown in Figure 5.1. The City is in the process of expanding its UGB to include two undeveloped areas in Robertson County adjacent to the existing City Limits and Urban Growth Boundaries. These areas are identified as the Proposed Southwestern UGB and Proposed Northwestern UGB in Figure 5.1. A determination of the status of these areas was not complete before the conclusion of this planning effort, but it is assumed that they will be incorporated into the City before the end of this 20 year planning cycle. The area and percent developed for the existing City of White House and its Urban Growth Boundary areas, including the proposed areas, are shown in Table 5.2.

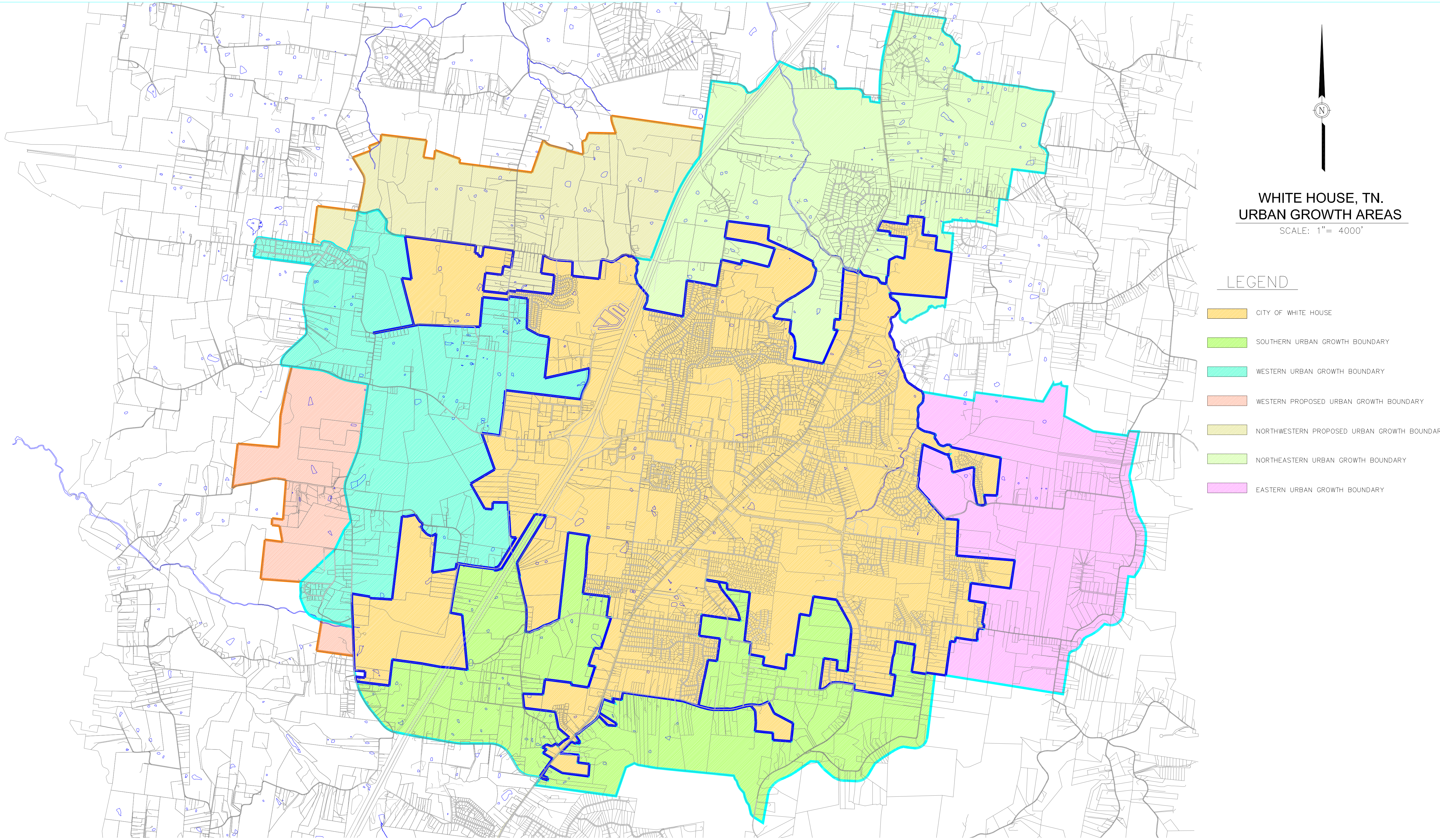

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FIGURE 5.1

Table 5.2 – White House – City Limits and Urban Growth Boundary Areas

Zone	Area (acres)	Percent Developed[1]
White House City Limits	6,878	60%
Northeastern UGB	2,586	11%
Eastern UGB	1,725	7%
Southern UGB	2,459	<1%
Western UGB	2,122	7%
Proposed Western UGB	652	11%
Proposed Northwestern UGB	1,389	<1%
1. Percent developed is estimated for Urban Growth Boundaries area based on number of subdivided and smaller parcels and tracts.		

The City's Urban Growth Boundary areas are assumed to be a part of the City by the end of the 20-year planning cycle. The City of White House, within the current City Limits, is projected to have a population of 12,541 by 2025. Utilizing the total acreage given in Table 5.2, the population density of the City will be approximately 1.8 persons per acre in 2025. If the entire Urban Growth Boundary is developed to this density by 2025, the population of the City would be approximately 32,200.

The City is aware of a number of proposed developments that are in the planning stages, identified in Table 5.3. These developments are located both in the existing City Limits and in the Urban Growth Boundary. It is anticipated that the developments outside the existing City Limits will request annexation prior to initiation of the development and that they will request sewer service.

Table 5.3 – White House – Major Developments in Planning Stages

Development	Zone/Geographical Location	Force Main	Proposed Units	Projected Average Flow at Completion (GPD)
Copes Crossing	City Limits	Southern FM	200	70,000
BrookHaven	City Limits	Southern FM	187	46,750
Calista Farms	City Limits	TBD	204	71,400
Bear Creek	City Limits	Union Road FM	627	206,375
Barton Meadows	City Limits	TBD	125	37,500
Stockbridge	Northwestern UGB	TBD	1,378	375,000
Heritage Estates	Western UGB	Western FM	370	92,500
Total			**3,091**	**899,525**

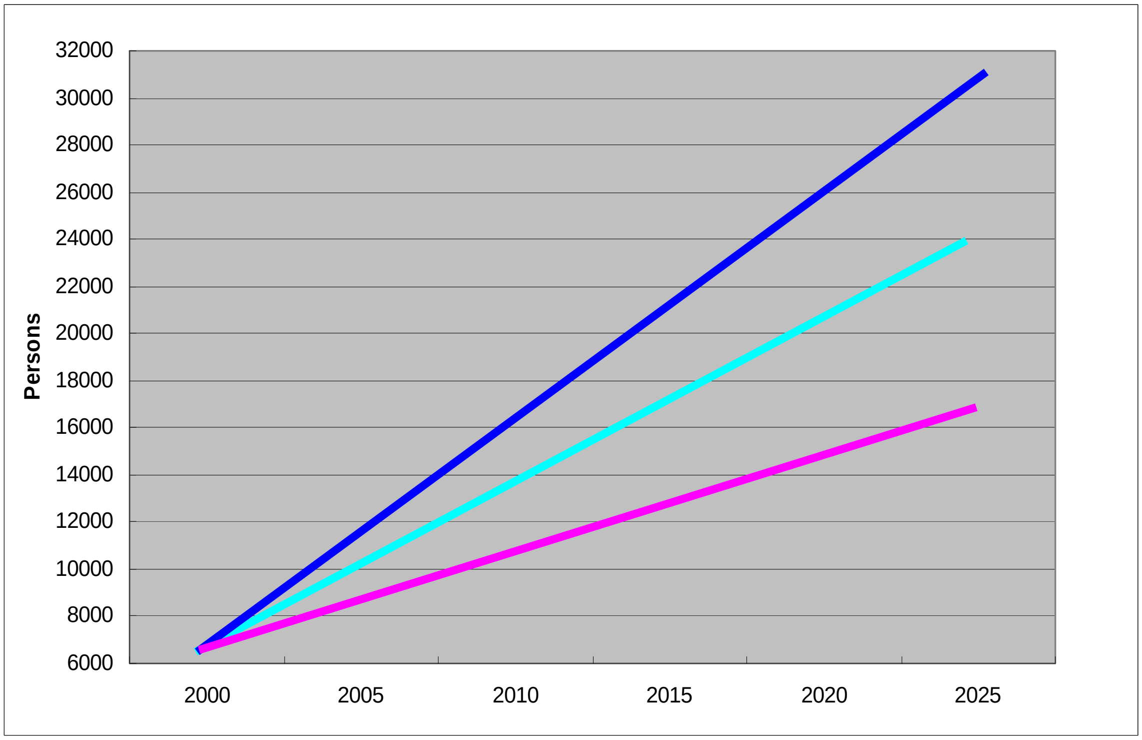
As is evident in Table 5.3 above, there are a considerable number of proposed units in the planning stages. These developments, if fully built out, could effectively double the current population and wastewater flow generated by the City. The primary unknown factor in this evaluation is the pace at which the development will occur and the rate at which new residents will occupy them, but it is realistic to assume that they will be complete before the end of this planning period, in 2025.

These developments, at an estimated 3.0 persons per residence, could add approximately 4,000 people inside the existing City Limits and another 5,250 inside the UGB.

While the existing collection system in the southern and western areas of the City is capable of conveying the wastewater flow projected from the developments listed above, the existing collection system in the northern areas of the City is stretched beyond its capacity and cannot accommodate additional development.

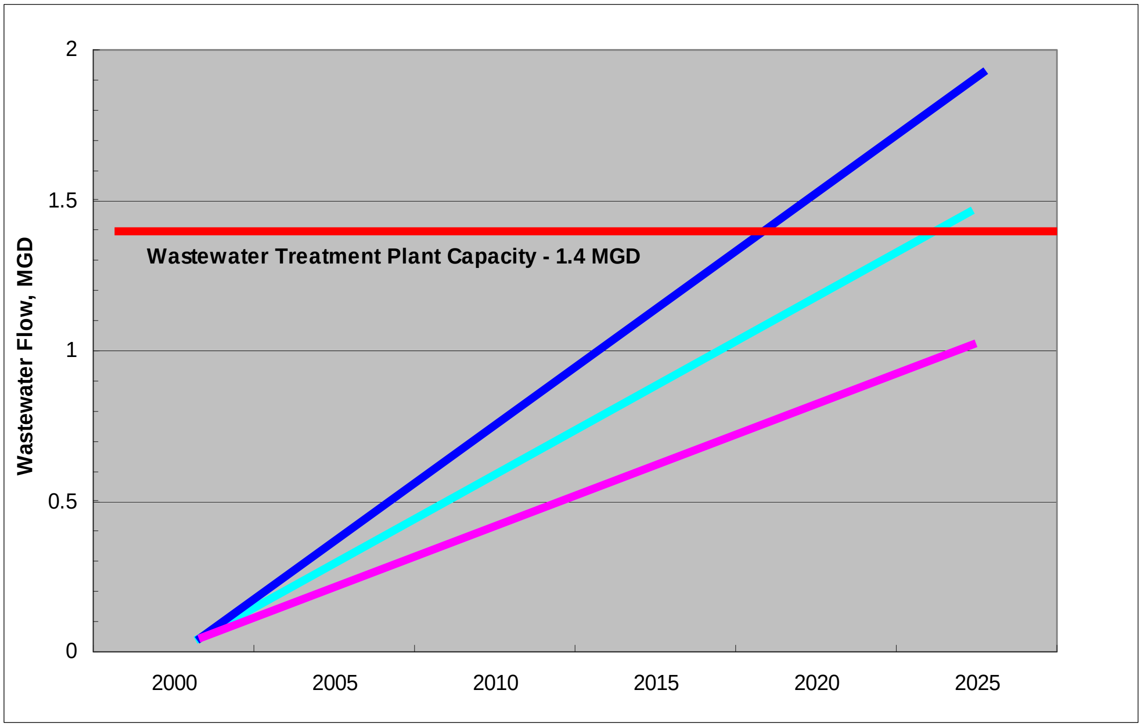
A range of population projections for the City are shown in Figure 5.2, which accounts for some of the uncertainty associated with predicting future development in the City and its UGB.

Figure 5.2 – White House Estimated Population Growth



This wide range of potential populations results in an equally wide range of projected wastewater flows as shown in Figure 5.3.

Figure 5.3 – White House Projected Range of Wastewater Flows



The WWTP will most likely need expansion between 2020 and 2025 according to the median projection from Figure 5.3.

C. <u>System Capacity Needs</u>

1. Collection System Capacity

Based on the locations of proposed developments and the force main capacities presented in Table 3.5, the collection system will need to be expanded to the northern areas of the City. Given that the needed growth of the collection system is being driven by development in this area, the City's development policies dictate that the development process should shoulder the burden of developing adequate sewer collection infrastructure to meet its needs. The proposed developments and other future developments will need to construct adequate infrastructure to meet their own needs, with the City sharing in costs to upsize/upgrade collection system projects to meet the long-term sewer collection needs of areas in the UGB when the upsizing is in the City's best interest.

2. Wastewater Treatment Plant Expansion

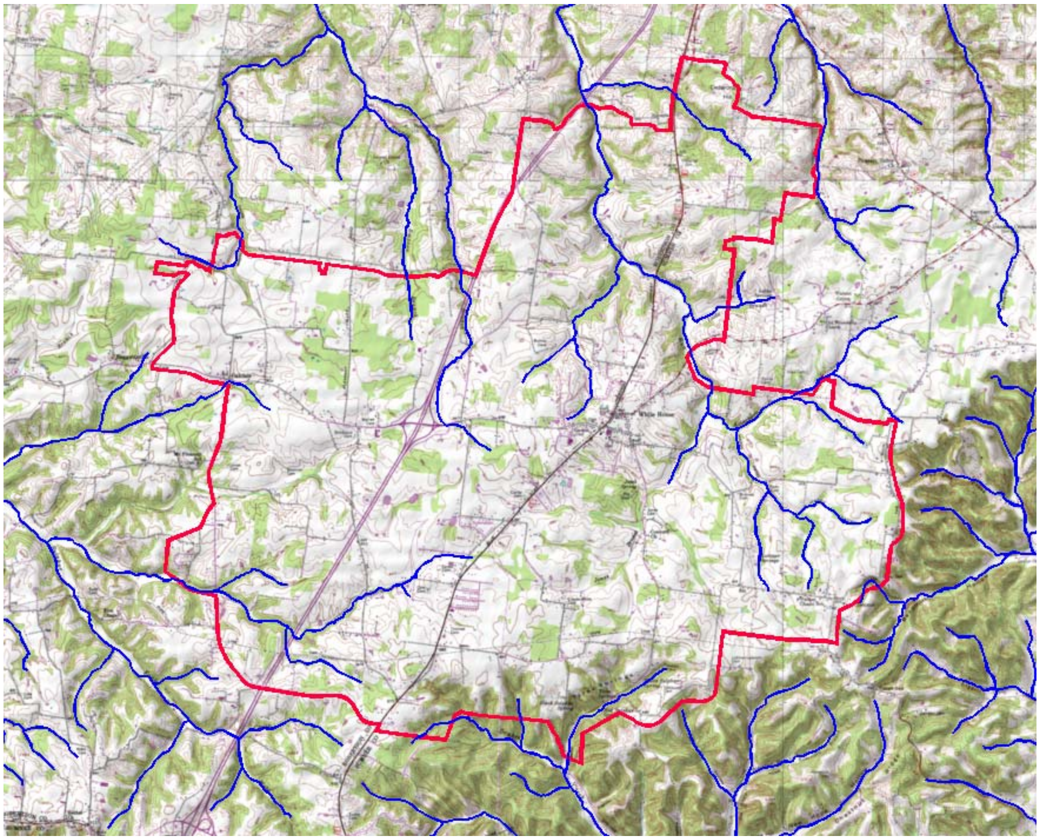
At the median rate of projected growth from Figure 5.2, the City will need to expand its WWTP and modify its discharge location between 2020 and 2025. However, given the large amount of development projected to begin in the next couple of years in the City and its Urban Growth Boundary, it would be prudent to monitor this growth and be prepared to accelerate the schedule for the next wastewater treatment plant expansion should it become necessary. Due to the many uncertainties in projected future growth and wastewater flows, the size of the WWTP expansion or the size of a new treatment facility will need to be determined when the existing facility nears its capacity. However, it is realistic to assume that the City will need to expand its treatment capacity to a minimum of 3.0 million gallons per day, effectively doubling its current capacity, to adequately plan for the next 20 years from the time of its expansion (2040 +/-)

The most important issue when considering a future expansion of the existing WWTP will be the increase in discharge from the facility. The WWTP has adequate space available for expansion at its current site to accommodate growth for the foreseeable future. However, the existing WWTP is limited in one major regard; its point of discharge. The WWTP currently discharges to Frey Branch, a very small tributary of Honey Run and ultimately the Red River.

During preliminary discussions with TDEC, officials have indicated that they will not approve any additional discharge above the existing 1.1 MGD to Frey Branch. This means that the City will have to find another alternative for discharge of treated wastewater when expansion of its wastewater treatment capability becomes necessary. Alternatives for disposal include: locating an alternate discharge location, creating a reuse/reclaim system, building a new wastewater treatment plant near a larger receiving stream, or utilizing some combination of these alternatives.

The hydrology in the City and surrounding Sumner and Robertson Counties is shown in Figure 5.4. Note that the City is located at the high point, with all the streams radiating out from the center. There are no surface water streams flowing through the White House service area. All of the streams shown in the figure begin in the White House service area and flow out.

Figure 5.4 – White House Hydrology



Because the City is on a plateau, there is no dominant drainage basin. The streams in the City are, like Frey Branch, generally unsuited for assimilation of a significant wastewater discharge. The nearest significant receiving bodies of water to the existing WWTP are shown in Figure 5.5 and Table 5.4. The WWTP site is shown as a blue dot.

Figure 5.5 – White House Wastewater Discharge Alternate Locations

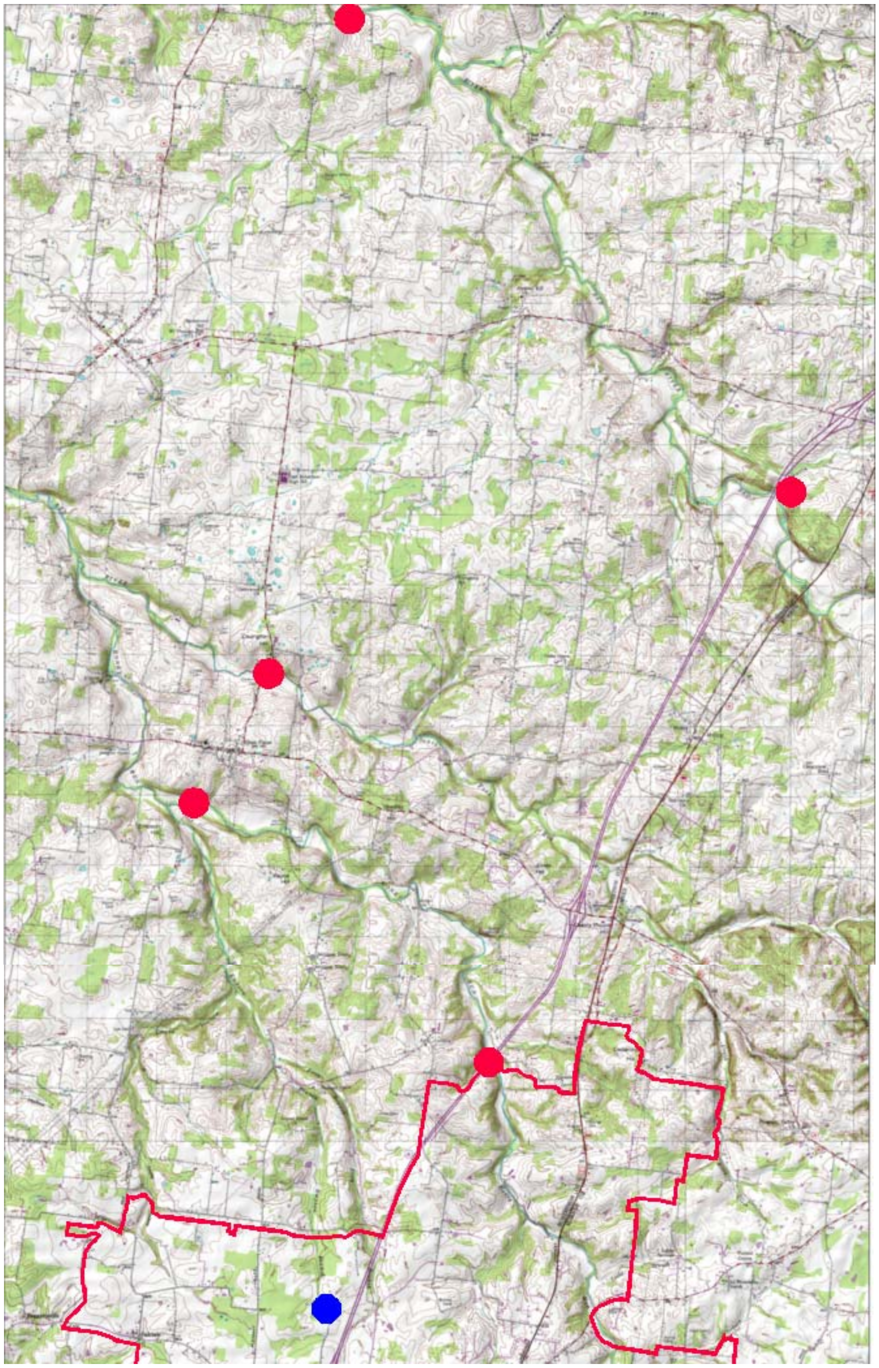


Table 5.4 – White House – Future Treatment Discharge Options

Receiving Stream	Location	Low Flow (1)	Drainage Area	Distance from WWTP
Honey Run Creek	I-65 Crossing	0.10 CFS	15 +/- sq. miles	2.64 miles
Honey Run Creek	South of Cross Plains	0.17 CFS	25.8 +/- sq. miles	4.55 miles
South Fork Red River	North of Cross Plains	0.50 CFS	19.7 +/- sq. miles	5.56 miles
Red River	I-65 Crossing	0.20 CFS	15.1 +/- sq. miles	8.14 miles
Red River	North of Orlinda	2.3 CFS	78.4 +/- sq. miles	11.42 miles
Sulphur Fork Creek	Near Springfield	2.5 CFS	84.6 +/- sq. miles	11.72 miles
Note 1. 7-Day / 10-Year Flow				

There is, however, no guarantee that TDEC would permit discharge to any of these potential receiving bodies of water. Before the next treatment plant expansion becomes necessary, the potential discharge locations will need to be studied further and ultimately permitted with the State. Studying and attempting to permit one of these locations at this time is not recommended due to the amount of time before utilization of the new discharge location would be necessary. The TDEC requirements for permitting a new wastewater discharge location are evolving and will likely change again before the discharge permit would be needed by a new or expanded WWTP. TDEC will also not permit a new discharge location until it is ready for use.

Additionally, given that none of the potential discharge locations are large bodies of water, it is entirely possible that TDEC will only allow partial discharge of the expanded treatment plant flow at any single location, it would be in the City's best interest to investigate alternatives to conventional wastewater discharge to surface water. Alternatives to conventional discharge include reuse/reclaim water systems, spray irrigation, or drip irrigation. In a growing system, like White House's, the implementation of a reuse/reclaim system with a large residential component would be much easier to initiate than in older, more established communities. The City should initiate a preliminary WWTP discharge study to determine the parameters for a new discharge location and evaluate alternatives to a conventional discharge. The study will determine the regulatory, cost, and planning issues associated with a new WWTP discharge location.

A. Existing System Improvements

1. Northern Force Main Extension

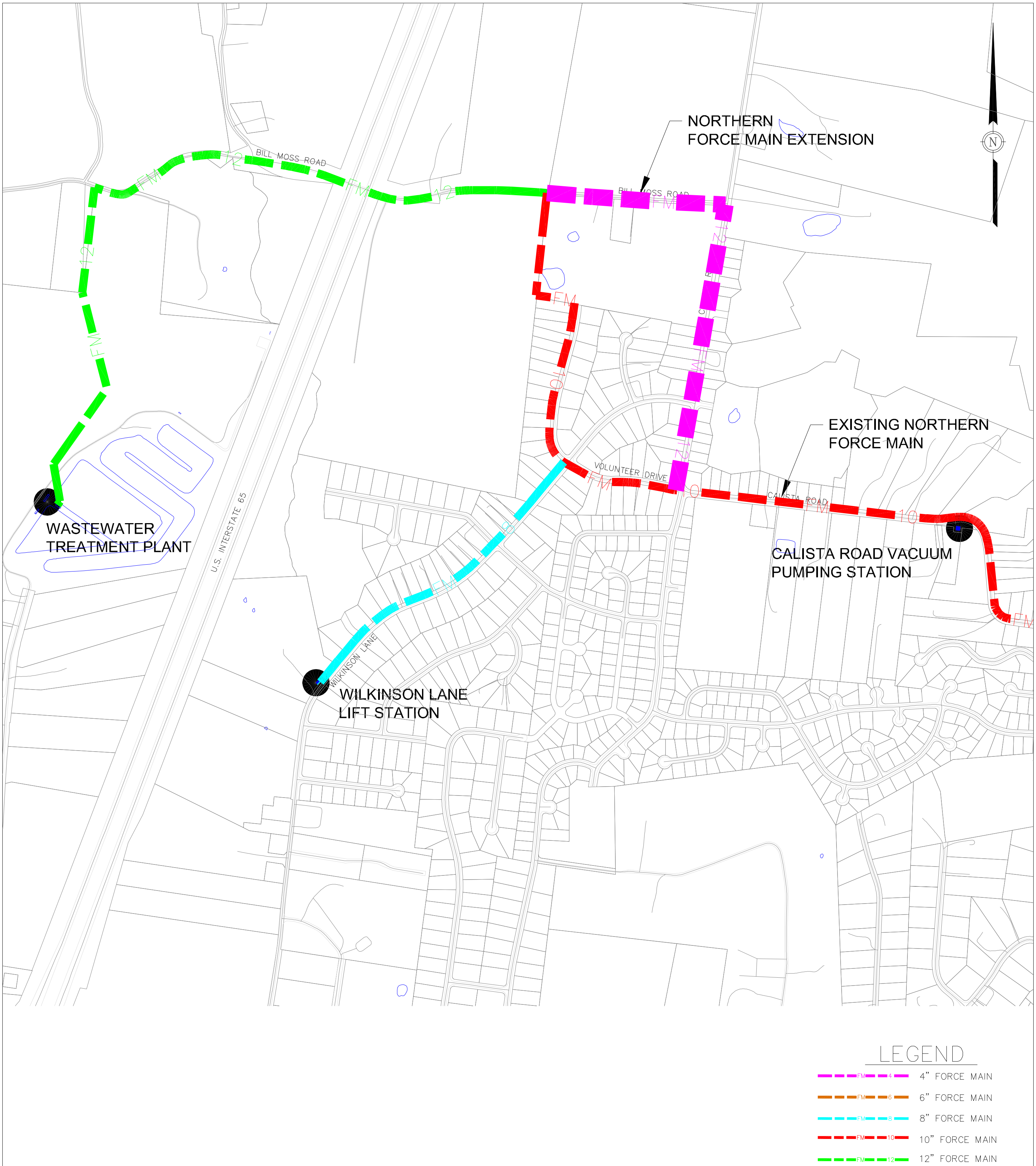
The 10-inch section of the Northern Force Main between Calista Road and Bill Moss Road should be replaced with a new section of approximately 3,500 LF of 12-inch force main to reduce the friction head losses and reduce the operating heads on the pumps in this section of the collection system. The cost for this force main extension is provided in Table 6.1 and a map showing the proposed project is provided in Figure 6.1.

Table 6.1 - Cost Estimate for Northern Force Main Extension

Improvements	Cost	
12-inch PVC Force Main	$	210,000
Asphalt Pavement Repair	$	3,000
Air Release Valve	$	6,000
Stone Backfill	$	8,750
Total Construction Cost	**$**	**227,750**
Contingencies	$	22,775
Design and Professional Services	$	34,163
Total Project Cost	**$**	**284,688**

2. Union Road Force Main Extension – Phase 1

The Union Road Force Main is currently connected to a 4-inch force main at the intersection of State Highway 76 and Union Road. When the Bear Creek Lift Station is connected to the Union Road Force Main, it will be necessary to extend the 8-inch force main to the WWTP to accommodate flows from the new lift station. The estimated construction costs for this extension are provided in Table 6.2, and a map showing its location is provided as Figure 6.2.



WHITE HOUSE, TN.
NORTHERN FORCE MAIN EXTENSION

SCALE: 1"= 1000'

FIGURE 6.1

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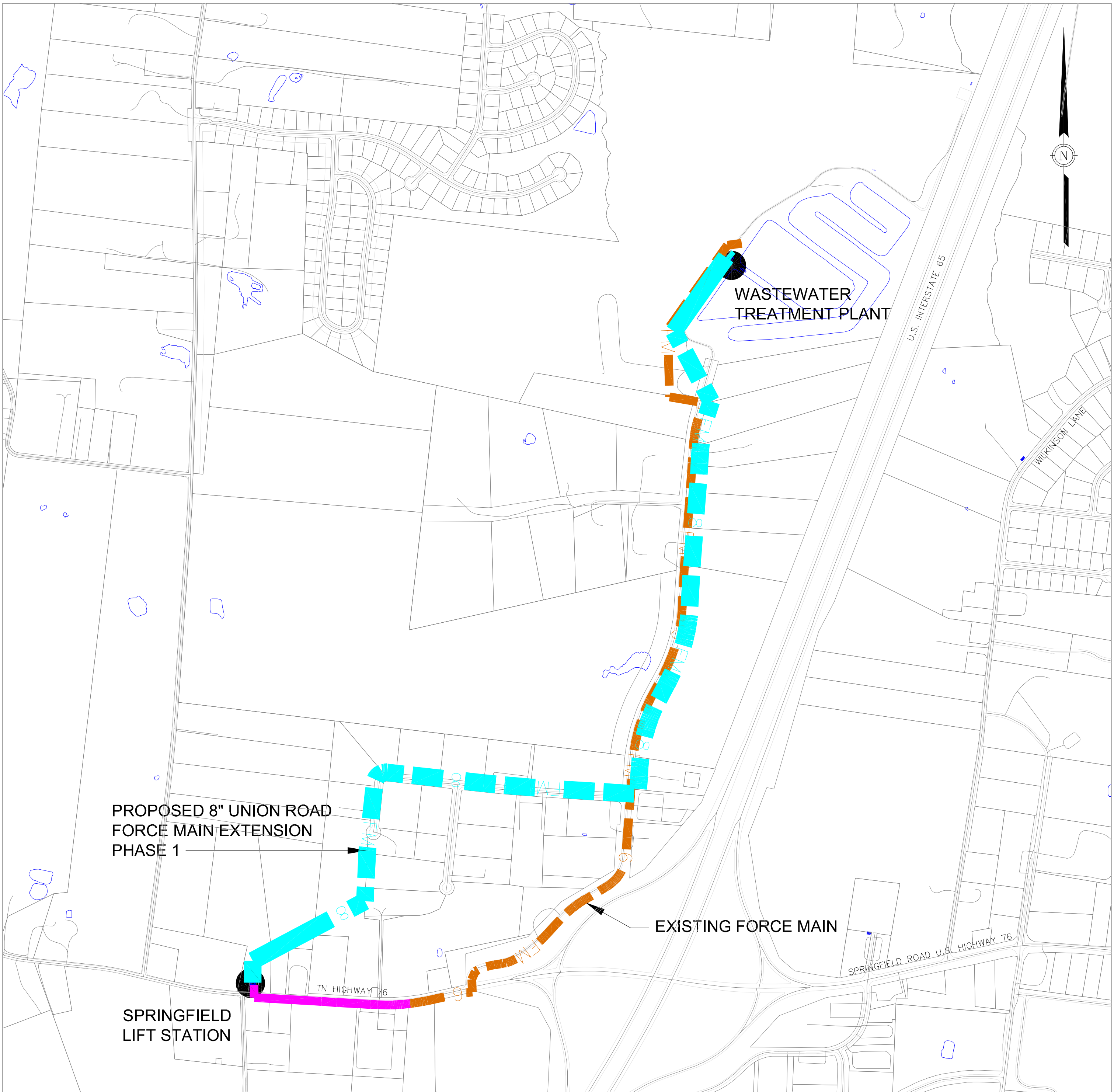

LEGEND

FM 4	4" FORCE MAIN
FM 6	6" FORCE MAIN
FM 8	8" FORCE MAIN
FM 10	10" FORCE MAIN
FM 12	12" FORCE MAIN

WHITE HOUSE, TN.
UNION ROAD FORCE MAIN EXTENSION
PHASE 1

SCALE: 1"= 1000'

FIGURE 6.2

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Table 6.2 - Union Road Force Main Extension - Phase 1

Improvements	Cost
8-inch PVC Force Main	$ 370,000
Asphalt Pavement Repair	$ 3,000
Air Release Valve	$ 6,000
Stone Backfill	$ 18,500
Total Construction Cost	**$ 397,500**
Contingencies	$ 39,750
Design and Professional Services	$ 47,700
Total Project Cost	**$ 484,950**

3. Low Pressure Sewer Pump Replacement

In order to keep ahead of the rate of pump failures, it is recommended that the City replace the oldest Hydromatic grinder pumps in their system before failures or other problems occur. The proactive replacement of pumping units should also focus on areas within the City's collection system that have a high rate of failures. The cost for this replacement of pumps is provided in Table 6.3.

Table 6.3 - Cost Estimate for Low Pressure Sewer Pump Replacement

Improvements	Cost
E/One AMGP Replacement Pumps	$ 270,000
Total Construction Cost	**$ 270,000**
Contingencies	$ 27,000
Total Project Cost	**$ 297,000**

B. Vacuum Collection System Rehabilitation Plan

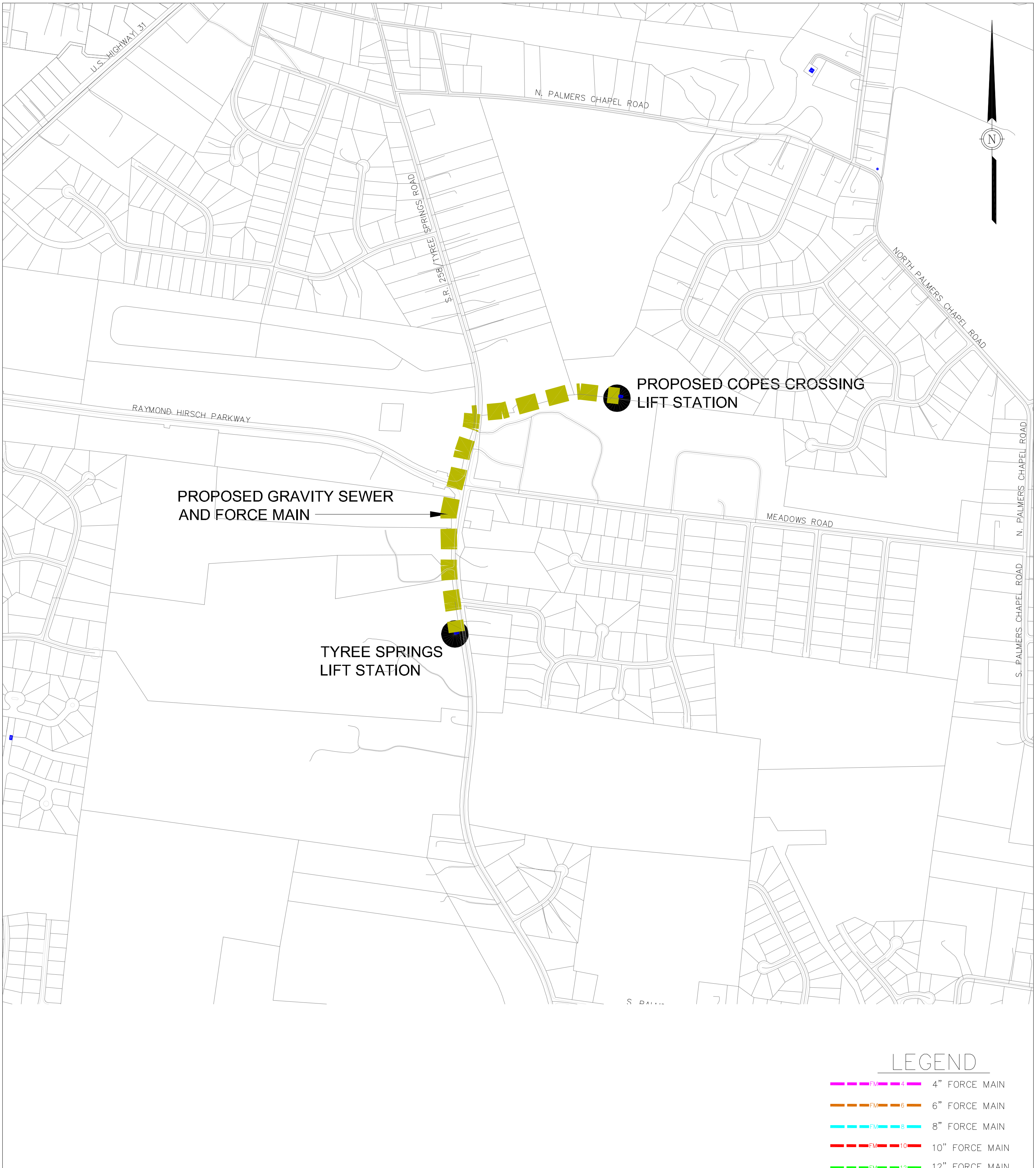
Complete replacement of the City's vacuum collection system with another type of collection system, either low pressure or gravity, is not a feasible alternative. It is estimated that the construction cost of a new gravity sewer collection system to serve the current vacuum sewer customers is approximately $7,250,000. This project would generate no new customers, and would have to be paid for entirely by the existing customer base through rate increases. The electrical savings that might be realized by the replacement of the vacuum collection system are negligible, approximately $30,000 per year, when compared with the overall cost of the project. The most practical way to reduce or limit the areas that will remain connected to the vacuum collection system is to convert the extremities of the existing vacuum collection system service area to low pressure sewer service and pump the flow to a nearby lift station or force main.

1. Copes Crossing Lift Station

One such area that has been identified is near the intersection of Raymond Hirsch Parkway and Tyree Springs Road in the North Palmer's Vacuum Pumping Station collection area. The area is adjacent to the proposed Copes Crossing Lift Station, which is proposed to accommodate flow from the proposed Copes Crossing and BrookHaven subdivision developments and two commercial developments. It is proposed to redirect flow from nearby White House High School, White House Middle School, and Tyree Springs Lift Station via a new gravity sewer to the proposed Copes Crossing Lift Station, as shown on Figure 6.3. The cost for the Copes Crossing Lift Station will be shared between the subdivision developers and the City, per the City's development policies.

Flow from the Union Road Lift Station collection area will be redirected from its existing discharge into the Tyree Springs wetwell by connecting the Union Road Lift Station force main directly to the Southern Force Main; from there, it will be pumped to the wastewater treatment plant. The high school, middle school, and the areas along Tyree Springs Road are all currently served by the North Palmer's Chapel Vacuum Pumping Station.

The removal of the high school and middle school's wastewater flow from the North Palmer's Chapel Vacuum Station collection system will result in a reduction of almost 50 gallons per minute (gpm) and more than 100 gpm in peak flow to this station when the schools are in session. This is an average flow reduction of approximately 10 percent of the capacity of the North Palmer's Chapel Vacuum Pumping Station. This reduction should allow for limited infill growth in the existing North Palmer's Chapel Vacuum Station collection system on previously undeveloped lots. Total costs for the proposed Copes Crossing Lift Station and Sewer Lines project are given in Table 6.4. The costs projected to be the developers' responsibility are shown in Table 6.5.



WHITE HOUSE, TN.

COPES CROSSING GRAVITY SEWER AND FORCE MAIN

SCALE: 1"= 1000'

FIGURE 6.3

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Table 6.4 - Copes Crossing Lift Station and Sewer Lines – Total Project Cost

Improvements	Cost
8-inch PVC Gravity Sewer Line	$ 165,000
Sewer Manholes	$ 27,500
Duplex Lift Station	$ 350,000
8-inch PVC Sewer FM	$ 82,500
Asphalt Pavement Repair	$ 3,000
Bore Under Tyree Springs Road	$ 15,000
Stone Backfill	$ 20,625
Tyree Springs Lift Station Demolition	$ 10,000
Total Construction Cost	**$ 673,625**
Contingencies	$ 67,363
Legal, Administrative, Easements	$ 67,363
Design and Professional Services	$ 80,835
Total Project Cost	**$ 889,185**

Table 6.5 - Copes Crossing Lift Station and Sewer Lines – Developers' Costs

Improvements	Cost
8-inch PVC Gravity Sewer Line	$ 90,000
Sewer Manholes	$ 15,000
Duplex Lift Station	$ 200,000
4-inch PVC Sewer FM	$ 27,000
Asphalt Pavement Repair	$ 3,000
Stone Backfill	$ 11,250
Tyree Springs Lift Station Demolition	$ 10,000
Total Construction Cost	**$ 356,250**
Contingencies	$ 35,625
Legal, Administrative, Easements	$ 35,625
Design and Professional Services	$ 42,750
Total Developer Project Cost	**$ 470,250**

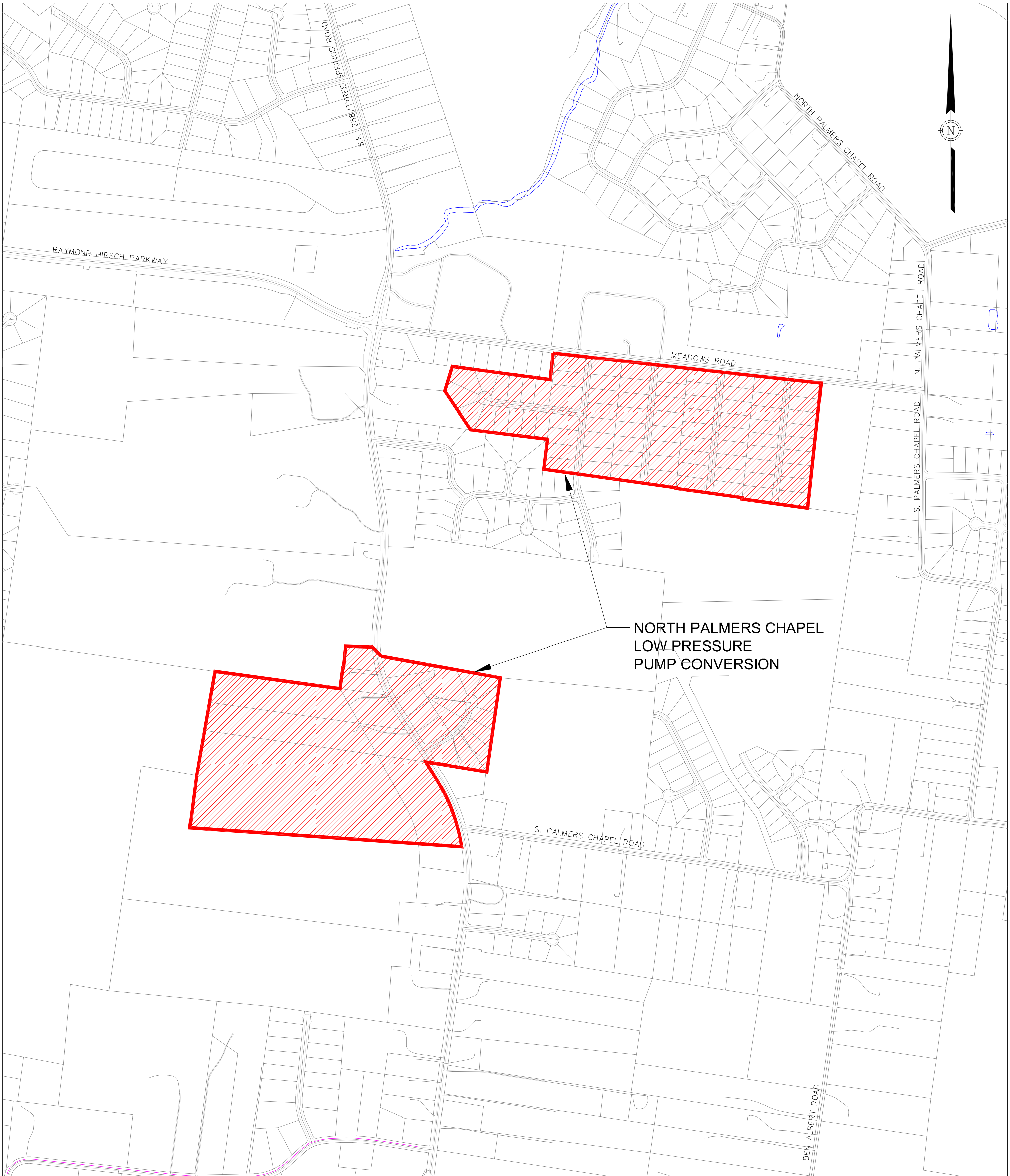
City of White House Project Cost	**$ 418,935**

2. North Palmer's Vacuum Chapel Low Pressure Pump Conversion

In addition to the removal of the high school and middle school from the North Palmer's Chapel Vacuum Station collection area, it will also be possible to switch from vacuum to low pressure sewer collection in several other areas where existing vacuum and low pressure collection systems are in close proximity. Dawn Court, Oak Park Court, Spicer Court, and portions of Tyree Springs Road are currently served by vacuum but lie adjacent to low pressure sewer service, as shown in Figure 6.4. These areas can be converted through the installation of a duplicate collection system. There are also sections of the vacuum collection service areas along Patana and Strassle Drives that are served by low pressure sewer collection systems that pump to vacuum buffer tanks. These areas can be removed from vacuum sewer service through the extension of low pressure force main to the nearest low pressure force main or gravity sewer. These improvements are estimated to remove an additional 102 homes (18,000 gpd of wastewater) from the North Palmer's Chapel Vacuum Pumping Station. Costs for this conversion are provided in Table 6.6.

Table 6.6 – North Palmer's Chapel Low Pressure Pump Conversion

Improvements	**Cost**
E/One Low Pressure Pump Package	$ 203,000
E/One AMGP Replacement Pumps	$ 52,800
4-inch PVC Force Main	$ 15,000
Total Construction Cost	**$ 270,800**
Contingencies	$ 27,080
Legal, Administrative, Easements	$ 27,080
Design and Professional Services	$ 32,496
Total Project Cost	**$ 357,456**



WHITE HOUSE, TN.
NORTH PALMERS CHAPEL
LOW PRESSURE PUMP CONVERSION

SCALE: 1"= 1000'

FIGURE 6.4

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3. Vacuum Collection System Rehabilitation

In order to reduce the time and expense associated with locating and identifying faulty vacuum valves, it is necessary to proactively replace the oldest vacuum valves in the City's collection system and to install the isolation valves necessary to efficiently diagnose and repair vacuum collection system problems in the future. Costs for the rehabilitation of the vacuum collection system are shown in Table 6.7.

Table 6.7 –Vacuum Collection System Rehabilitation

Improvements	Cost
Vacuum Valve Replacement	$ 200,000
Isolation Valve Installation	$ 250,000
Total Construction Cost	**$ 450,000**
Contingencies	$ 45,000
Total Project Cost	**$ 495,000**

C. Lift Station and Vacuum Pumping Station Plan

The primary focus of lift station and pumping station improvements and replacements is on those lift stations operating at their design capacities. Lift and pumping stations at or near their design capacities or near their end of their expected service life include the North Palmer's Chapel and Calista Road Vacuum Pumping Stations and Wilkinson Lane, Portland Road, Tyree Springs, and South Palmer's Chapel Lift Stations.

1. Wilkinson Lane Lift Station Replacement

The Wilkinson Lane Lift Station is at the end of its expected service life and is in need of replacement. The existing lift station will be replaced in the fall of 2007 with a slightly larger submersible lift station to accommodate its current sewer collection area and the additional flows from new development to the south on Wilkinson Lane. The costs for this replacement are shown in Table 6.8 and are being paid for by new development.

Table 6.8 – Wilkinson Lane Lift Station Replacement - Developer's Costs

Improvements	Cost
New Submersible Lift Station – Design, Permitting, and Construction	$ 295,000

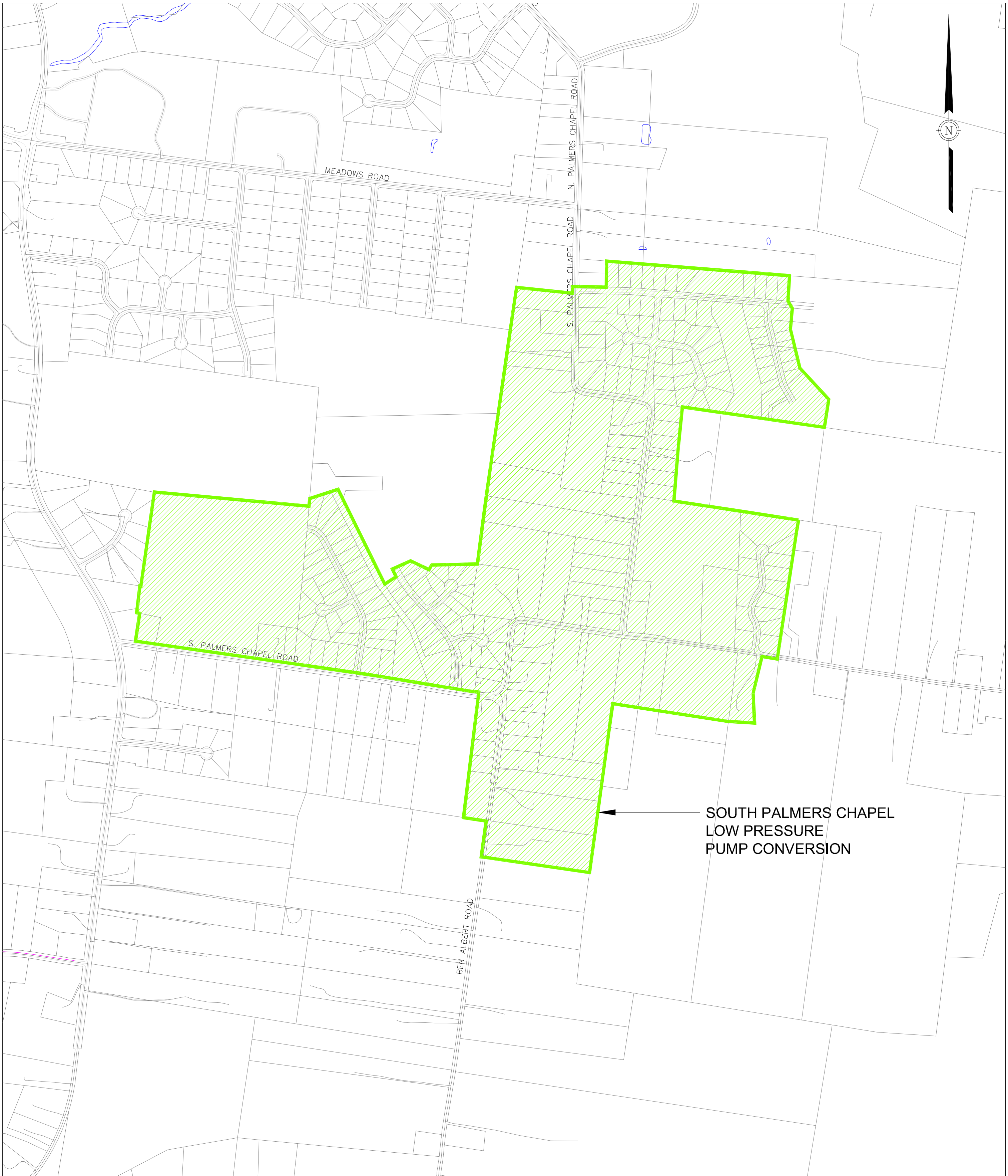
2. *South Palmer's Chapel Low Pressure Pump Conversion*

The South Palmer's Chapel Lift Station is nearing its design capacity and currently pumps wastewater collection from a low pressure collection system to the Tyree Springs Lift Station. The South Palmer's Chapel Lift Station pumps do not have sufficient head to pump to any other lift station or directly to the WWTP. When the Tyree Springs Lift Station is replaced by the new Copes Crossing Lift Station, the force main discharge from the South Palmer's Chapel Lift Station will be relocated to discharge into a new gravity sewer line running north down Tyree Springs Road to the new lift station.

The plan for the removal of the South Palmer's Chapel Lift Station is to replace the low head Hydromatic low pressure pumps at each house in its collection area with new E/One AMGP low pressure grinder pumps. The E/One pumps have sufficient pumping head to pump directly from the residences in the South Palmer's Chapel collection area to the relocated force main discharge point on Tyree Springs Road, as shown in Figure 6.5. The existing low pressure sewage pumps have reached the end of their expected service lives and will be replaced as part of the ongoing maintenance effort to install new E/One pumps. Once all the existing low pressure sewer pumps have been converted, the South Palmer's Chapel Lift Station can be bypassed and removed from service. The cost for the South Palmer's Chapel Low Pressure Pump Conversion is provided in Table 6.9.

Table 6.9 – South Palmer's Chapel Low Pressure Pump Conversion

Improvements	Cost
Low Pressure Sewer Pumps	$ 210,000
Force Main Modification	$ 7,500
Lift Station Demolition	$ 10,000
Total Construction Cost	**$ 227,500**
Contingencies	$ 22,750
Design and Professional Services	$ 10,000
Total Project Cost	**$ 260,250**



WHITE HOUSE, TN.
SOUTH PALMERS CHAPEL
LOW PRESSURE PUMP CONVERSION

SCALE: 1"= 1000'

FIGURE 6.5

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3. SCADA for Lift and Pumping Stations

It is recommended that the City implement installation of a system-wide SCADA system to monitor the operation and alarms and install flowmeters and pump around connections at the pump stations and lift stations as detailed in Table 6.10. These improvements will allow the City to monitor the operation of their lift stations. The monitoring will also allow the City to anticipate potential problems and to proactively repair or replace the impaired equipment to avoid failures, potential spills and permit violations.

Table 6.10 – SCADA System

Improvements	Cost
Telemetry at Lift Stations	$ 160,000
Telemetry at Vacuum Pumping Stations	$ 30,000
Master Telemetry at WWTP	$ 60,000
Total Construction Cost	**$ 250,000**
Contingencies	$ 25,000
Design and Professional Services	$ 30,000
Total Project Cost	**$ 305,000**

D. Wastewater Treatment Plant Improvements

1. Headworks Improvements

In order to prevent the ongoing maintenance problems and to prevent damage to equipment, it is recommended that the City install influent screens at their headworks to remove large solid and inorganic material prior its introduction into the treatment trains. The cost for improving the headworks is shown in Table 6.11.

Table 6.11 – WWTP Headworks Improvements

Improvements	Cost
New Fine Screens	$ 45,000
Screening Conveyor/Compactor	$ 35,000
Flowmeters	$ 15,000
Modifications to Existing Concrete	$ 15,000
Total Construction Cost	**$ 195,000**
Contingencies	$ 39,000
Design and Professional Services	$ 23,400
Total Project Cost	**$ 257,400**

2. Biosolids Dewatering

Based on the comparison of viable alternatives detailed in Section 4, the utilization of dewatering boxes for biosolids dewatering not only has the lowest construction cost, but also has a low operating cost. Biosolids from the dewatering operation could be disposed of either by land application or by dumping at a municipal landfill. The cost for implementing this dewatering alternative is shown in Table 6.12.

Table 6.12 – WWTP Biosolids Dewatering Improvements

Improvements	Cost
Biosolids Dewatering Box	$ 20,000
Biosolids Feed Pump	$ 15,000
Polymer Feed System	$ 5,000
Concrete Pad with Drainage	$ 5,000
Total Construction Cost	**$ 110,000**
Contingencies	$ 22,000
Design and Professional Services	$ 16,500
Total Project Cost	**$ 148,500**

3. Effluent Irrigation System Improvements

The WWTP is permitted to dispose of up to 300,000 gallons per day of wastewater by irrigating crop land adjacent to the plant. In order to eliminate the ongoing maintenance requirement and to help guarantee that the City can take full advantage of its irrigation capability, it is recommended that the City install a fixed irrigation system in the fields adjacent to the facility. The costs for installing a fixed irrigation system are given in Table 6.13.

Table 6.13 – WWTP Effluent Irrigation Improvements

Improvements	Cost
Irrigation Guns - 30 GPM	$ 7,280
Irrigation Guns - 50 GPM	$ 125,775
Irrigation Guns - 100 GPM	$ 54,000
PVC Irrigation Piping 4-inch	$ 54,000
PVC Irrigation Piping 6-inch	$ 93,000
PVC Irrigation Piping 8-inch	$ 96,000
PVC Irrigation Piping 12-inch	$ 129,000
Valves - 6-inch	$ 2,400
Valves - 8-inch	$ 10,000
Valves - 12-inch	$ 3,600
Total Construction Cost	**$ 536,115**
Contingencies	$ 107,223
Design and Professional Services	$ 64,334
Total Project Cost	**$ 707,672**

E. System Capacity Development Plan

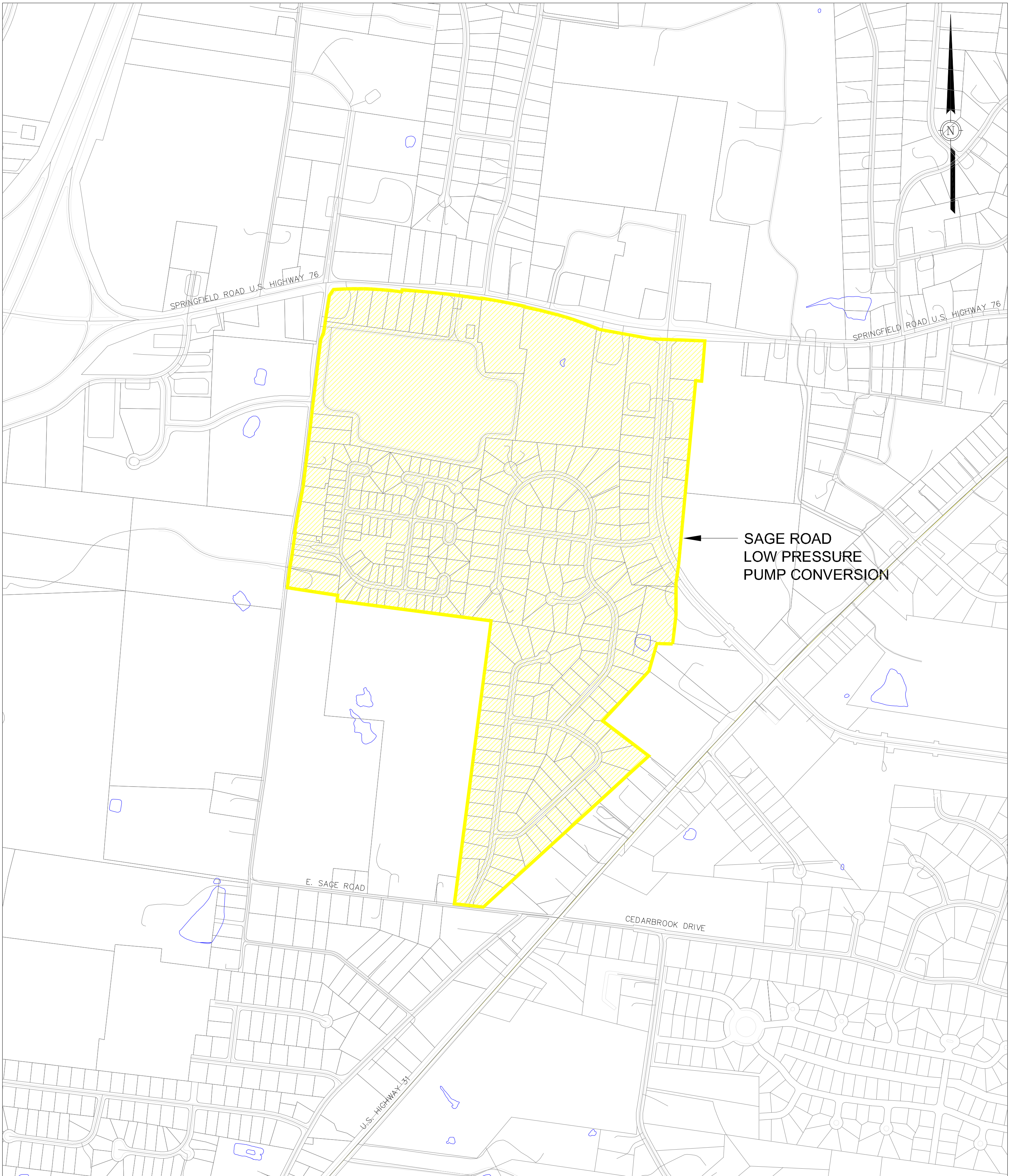
As development occurs on previously un-sewered lots within the existing collection system, it will become necessary to modify the existing collection system to redistribute its unallocated capacity. Some costs of these improvements may be recoverable from the new development, depending on the nature of the development in question. The projects below allow for the shifting of flow from one collection area to another.

1. *Sage Road Low Pressure Pump Conversion*

The replacement of the existing grinder pumps with new E/One AMGPs would allow for the pumping of wastewater directly to the wastewater treatment plant via the Southern Force Main and free up capacity at the Wilkinson Lane Lift Station and in the Northern Force Main. These improvements are estimated to remove an additional 271 homes (48,000 gpd of wastewater) from the Wilkinson Lift Station and the Northern Force Main as shown in Figure 6.6. The shifting of flow from Northern Force Main to the Southern Force Main from the Sage Road area will free up some additional capacity to allow for infill development in the Northern Force Main collection area. The estimated cost for this transition is provided in Table 6.14.

Table 6.14 – Sage Road Low Pressure Pump Conversion

Improvements	Cost
Low Pressure Sewer Pumps	$ 330,000
Force Main Modification and Valves	$ 10,000
Total Construction Cost	**$ 340,000**
Contingencies	$ 34,000
Design and Professional Services	$ 12,000
Total Project Cost	**$ 386,000**



WHITE HOUSE, TN.
SAGE ROAD LOW PRESSURE
PUMP CONVERSION

SCALE: 1"= 1000'

FIGURE 6.6

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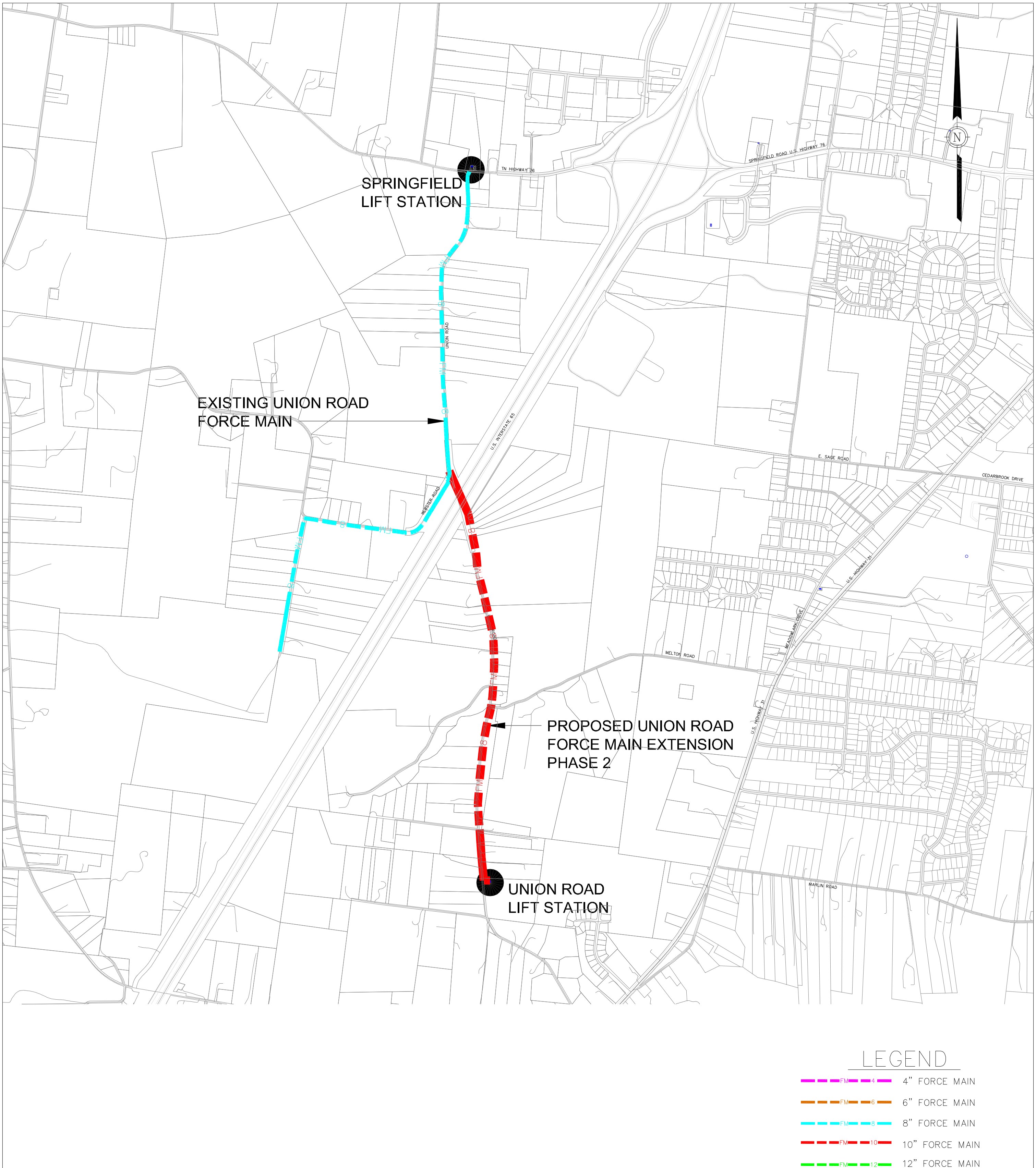
2. Union Road Force Main Extension – Phase 2

The most practical way to reduce flows to the Southern Force Main is to identify areas that can pump to other force mains. The Union Road Lift Station currently pumps to the Tyree Springs Lift Station wetwell. When the Tyree Springs Lift Station is replaced by the Copes Crossing Lift Station, the Union Road Lift Station discharge will be diverted directly into the 12-inch Southern Force Main at the Tyree Springs Lift Station site. However, given the proximity of the Union Road Lift Station to Interstate 65, it is not a practical long term solution to continue pumping wastewater over two miles to the east to the Tyree Springs site, only to have the wastewater come back to the west in the Southern Force Main and ultimately to the WWTP, when a new force main could eliminate this waste of pumping energy and free up capacity in the Southern Force Main. The new force main from the Union Road Lift Station would connect to the Union Road Force Main on the north side of the Interstate as shown in Figure 6.7. The costs estimated for this extension are given in Table 6.15.

Table 6.15 - Union Road Force Main Extension Phase 2

Improvements	Cost
8-inch PVC Force Main	$ 280,000
Asphalt Pavement Repair	$ 12,000
Air Release Valve	$ 6,000
Bore Under I-65	$ 160,000
Stone Backfill	$ 14,000
Lift Station Modifications	$ 7,500
Total Construction Cost	**$ 479,500**
Contingencies	$ 47,950
Legal, Administrative, Easements	$ 47,950
Design and Professional Services	$ 57,540
Total Project Cost	**$ 632,940**



WHITE HOUSE, TN.
UNION ROAD FORCE MAIN EXTENSION
PHASE 2

SCALE: 1"= 2000'

FIGURE 6.7

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3. Wastewater Treatment Plant Expansion

The expansion of the City's wastewater treatment capability is projected to be necessary between 2020 and 2025. This expansion would most likely double the City's capacity to approximately 3.0 MGD. Although construction of a new or second WWTP at an alternate site are possibilities, the investment that the City has already made in the existing facility makes it most cost effective to expand capacity at the existing facility. This expansion could require the addition of additional levels of treatment, such as tertiary filtration or nitrogen or phosphorus removal, depending on state and federal regulatory requirements. These additional levels of treatment could have a significant impact on the cost of the facility as shown in Table 6.16.

Table 6.16 – Wastewater Treatment Plant Expansion

Item	Cost
Mobilization	$ 179,000
Influent Headworks	$ 500,000
Flow Distribution Boxes	$ 40,000
Oxidation Ditches	$ 1,500,000
Final Clarifiers	$ 575,000
RAW/WAS Pumping Station	$ 300,000
Solids Dewatering Facility	$ 250,000
Tertiary Filtration	$ 800,000
UV Disinfection	$ 400,000
Effluent Pumping Station	$ 500,000
Sitework	$ 437,000
Instrumentation	$ 218,000
Electrical	$ 437,000
Total WWTP Construction Cost	**$ 6,136,000**
Contingencies	$ 614,000
Legal, Administrative, Easements, Permitting	$ 307,000
Design and Professional Services	$ 920,000
WWTP Project Cost	**$ 7,977,000**

F. Urban Growth Boundary Service Plan

The City's Urban Growth Boundary areas, shown in Table 6.17, are assumed to be a part of the City's wastewater service area by the end of the 20-year planning cycle for the purposes of the planning effort. In order to properly plan for growth in the City's wastewater collection system, it will be necessary to accommodate growth within each of the City's UBG areas. The cost of sewer infrastructure is expected to be predominantly paid for by property development companies and individuals with the City paying for any upsizing of lines that it deems desirable. The need for upsizing sewer proposed by development in the UGB will be evaluated by the City on a case by case basis.

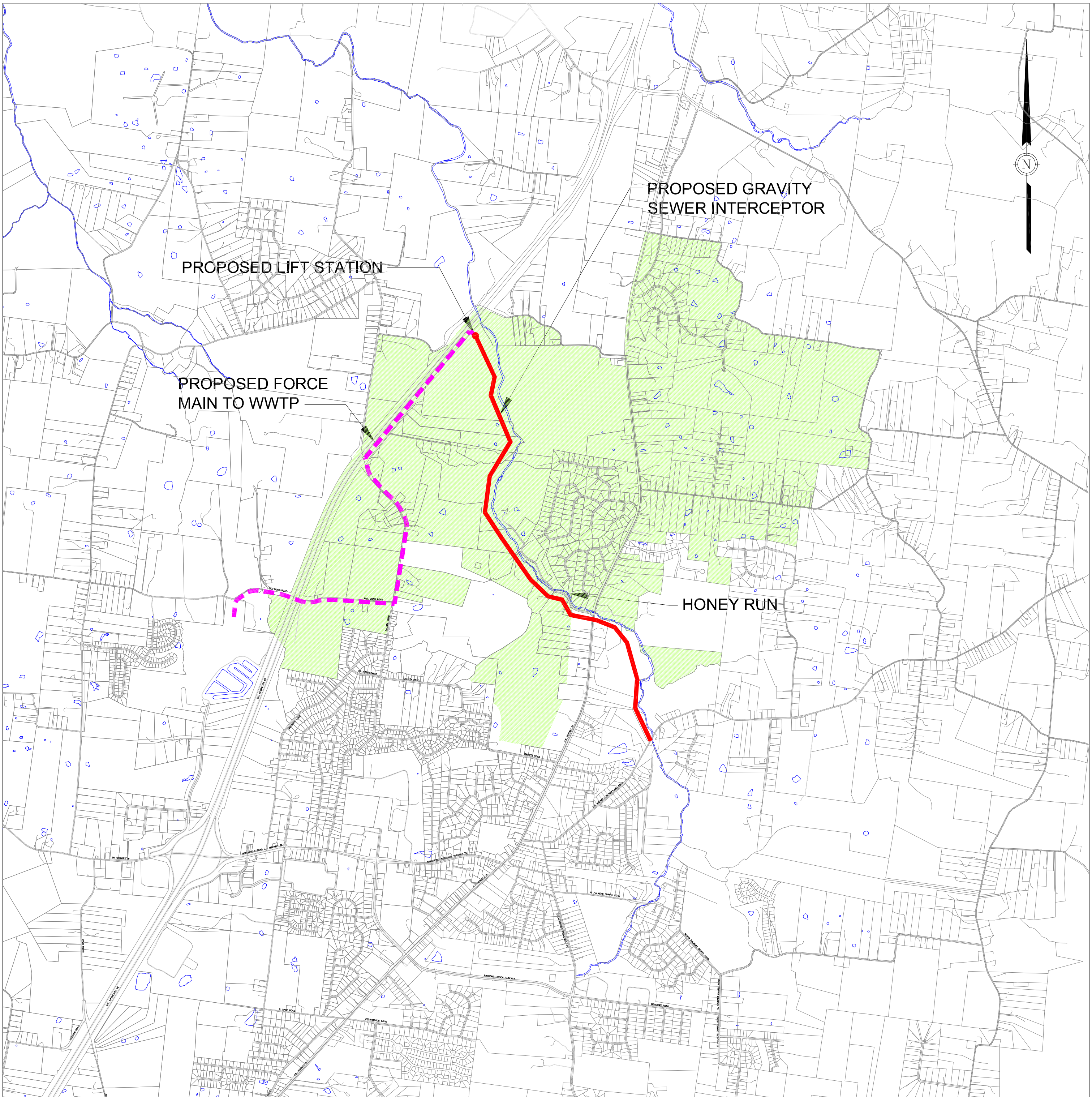
Table 6.17 – White House –Urban Growth Boundary Areas

Zone	Area (acres)	Percent Developed(1)
White House City Limits	6,878	60%
Northeastern UGB	2,586	11%
Eastern UGB	1,725	7%
Southern UGB	2,459	<1%
Western UGB	2,122	7%
Proposed Western UGB	652	11%
Proposed Northwestern UGB	1,389	<1%

1. Percent developed is estimated for Urban Growth Boundaries area based on number of subdivided and smaller parcels and tracts.

1. Northeastern UGB

The Northeastern UGB encompasses approximately 2,586 acres. The topography of this area is dominated by Honey Run, which flows from the southeast to the northwest through the UGB. The City does not have any sewer collection adjacent to this area with sufficient unallocated capacity to accommodate its development. New sewer infrastructure will need to be constructed to serve this area. It is proposed that this area can be served by gravity sewer interceptors that follow the natural drainage of the area, following Honey Run to the northwest as shown in Figure 6.8. The gravity sewer interceptor would flow to a proposed lift station to be constructed where Honey Run flows under Interstate 65.



WHITE HOUSE, TN.
NORTHEASTERN URBAN GROUTH
BOUNDARY SERVICE PLAN

SCALE: 1"= 4000'

FIGURE 6.8

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2. Eastern UGB

The Eastern UGB encompasses approximately 1,725 acres. The topography of this area is rolling, with some smaller tributaries of Honey Run. The smaller tributaries of Honey Run flow from the east to the northwest through the UGB. The City does not have any sewer collection system adjacent to this area with sufficient unallocated capacity to accommodate its development. New sewer infrastructure will need to be constructed to serve this area. It is proposed that this area can be served by gravity sewer lines that follow the natural drainage of the area, following the smaller streams to Honey Run to the northwest as shown in Figure 6.9. These gravity sewer lines are proposed to connect to the Honey Run interceptor sewer installed in the Northeastern UGB.

3. Southern UGB

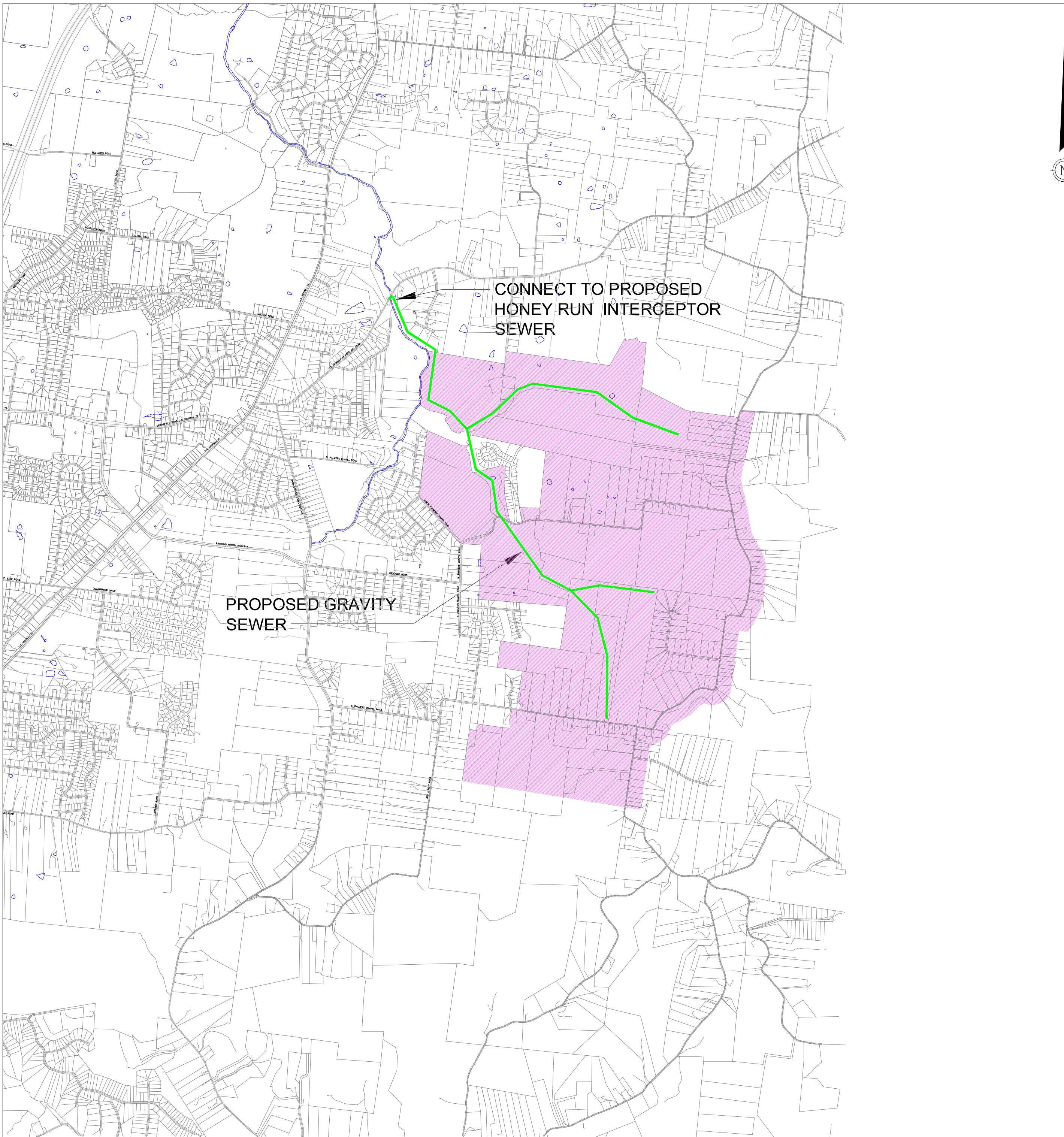
The Southern UGB encompasses approximately 2,459 acres. The topography of this area is rolling, with no predominant drainage pattern. The City has sewer collection facilities adjacent to this area with sufficient unallocated capacity to accommodate some of its development, most notably the Southern and Union Road Force Mains. Once the currently unused capacity in these lines is allocated, new sewer infrastructure will need to be constructed to serve this area. It is proposed that this area can be served by low pressure sewer systems that will pump to the existing collection infrastructure as shown in Figure 6.10.

4. Western and Proposed Western UGB

The Western and Proposed Western UGBs encompass approximately 2,122 and 652 acres, respectively. The topography of this area is rolling, with no predominant drainage pattern. The City has some sewer collection facilities adjacent to this area with sufficient unallocated capacity to accommodate its development, most notably the Union Road and Western Force Mains. Once the currently unused capacity in these lined is allocated, new sewer infrastructure will need to be constructed to serve this area. It is proposed that this area can be served by low pressure sewer systems that will pump to the existing collection infrastructure as shown in Figure 6.11.

5. Proposed Northwestern UGB

The Proposed Northwestern UGB encompasses approximately 1,389 acres. The topography of this area is rolling, with no predominant drainage pattern. The City has no sewer collection adjacent to this area with sufficient unallocated capacity to accommodate its development. New sewer infrastructure will need to be constructed to serve this area. It is proposed that this area can be served by low pressure sewer systems that will pump to the WWTP as shown in Figure 6.12.



WHITE HOUSE, TN.
EASTERN URBAN GROUTH BOUNDARY
SERVICE PLAN

SCALE: 1"= 4000'

FIGURE 6.9

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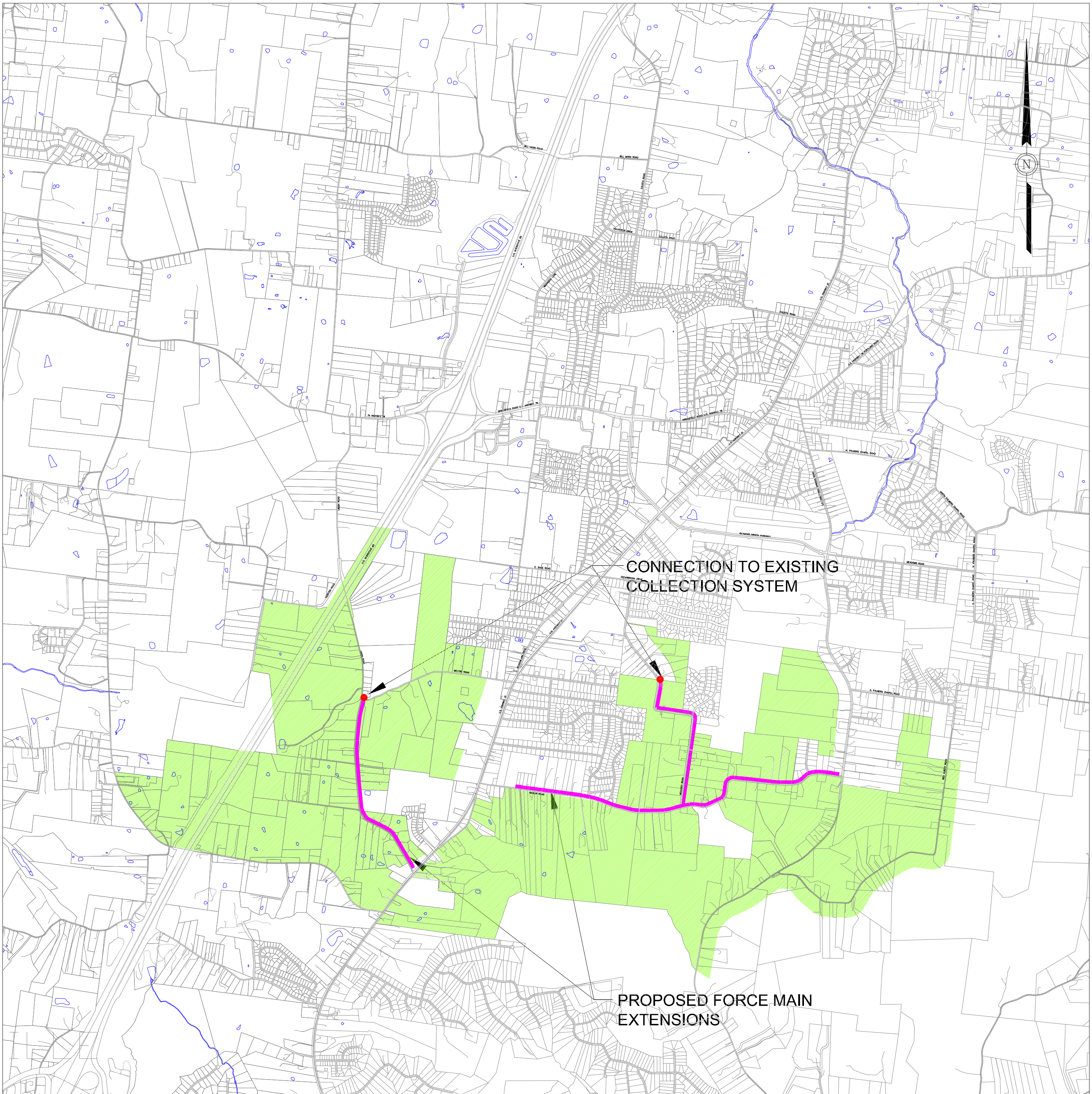

WHITE HOUSE, TN.
SOUTHERN URBAN GROUTH BOUNDARY
SERVICE PLAN

SCALE: 1"= 4000'

FIGURE 6.10

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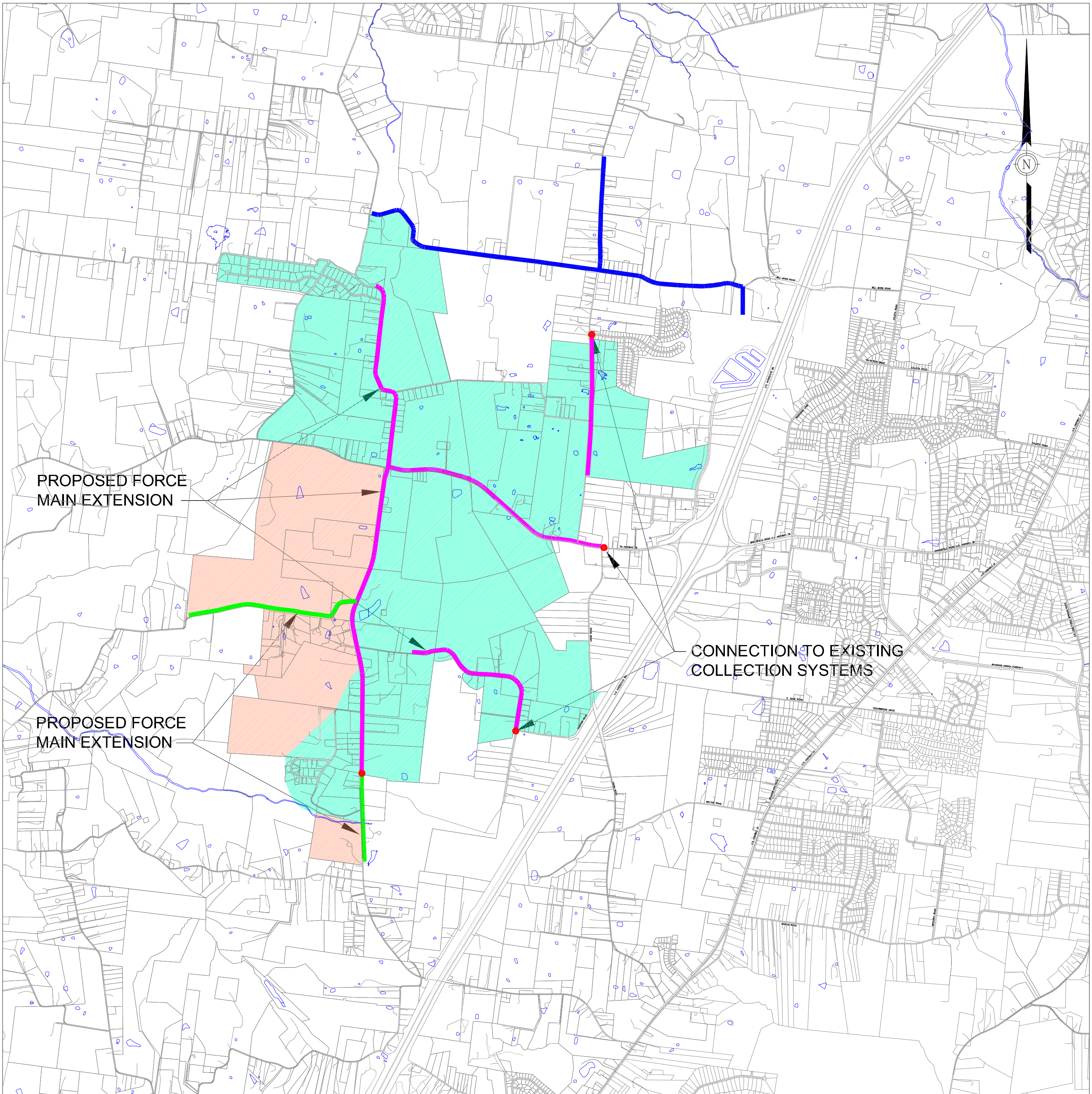

WHITE HOUSE, TN.
WESTERN & WESTERN PROPOSED URBAN
GROUTH BOUNDARY SERVICE PLAN

SCALE: 1"= 4000'

FIGURE 6.11

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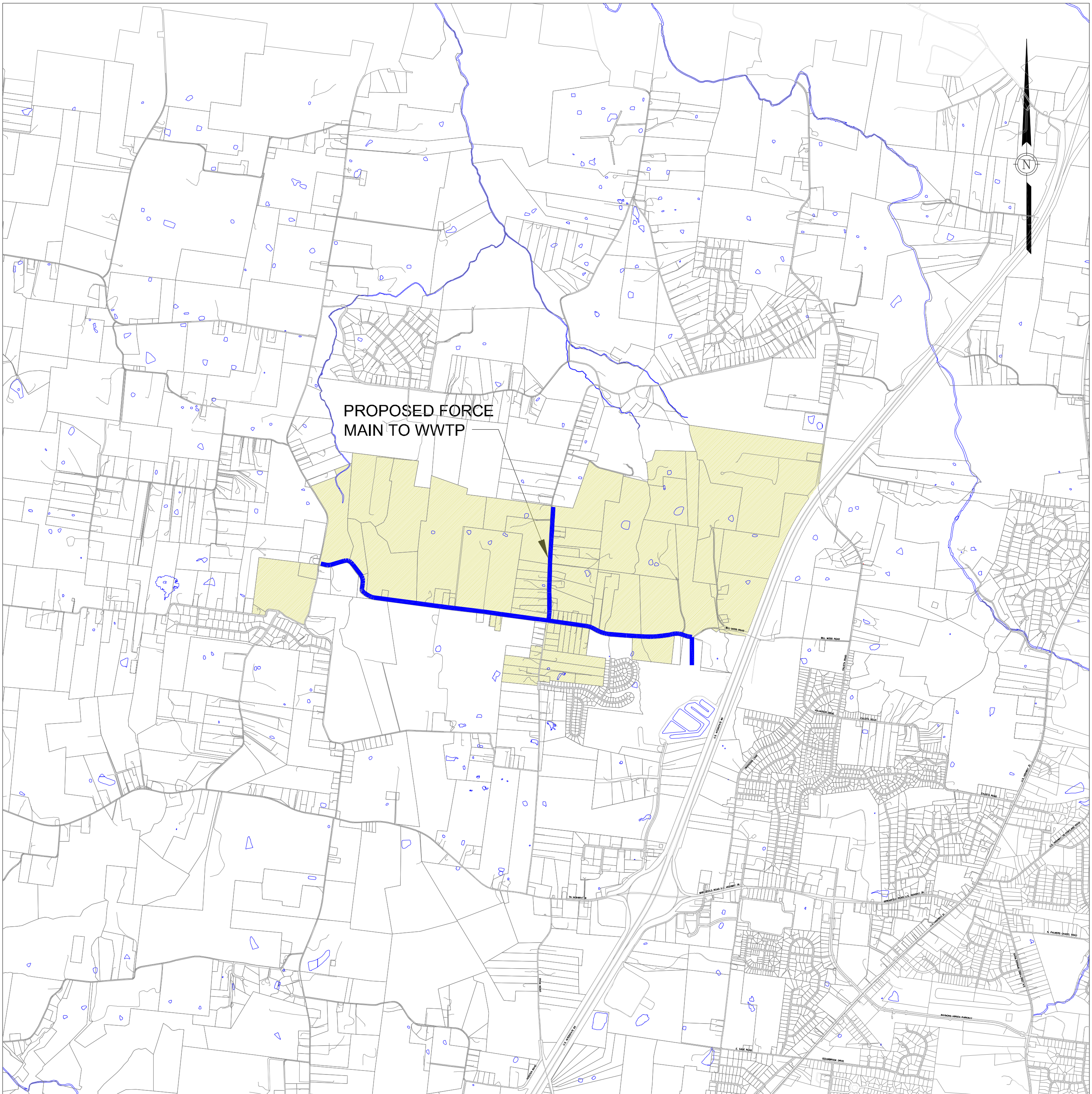

WHITE HOUSE, TN.
NORTHWESTERN PROPOSED URBAN
GROUTH BOUNDARY SERVICE PLAN

SCALE: 1"= 4000'

FIGURE 6.12

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SECTION 7 CAPITAL IMPROVEMENT PROGRAM

A. Objective

This Master Plan has evaluated the existing and potential capacity of the existing sewer collection and treatment system and has identified the combination of improvements required to continue its ability to provide reliable wastewater service for the next 20 years. The Master Plan also evaluated the potential for growth in the City of White House and its UGB and provides recommendations for extending service to those areas as growth occurs.

Included are projects to improve operation of existing collection facilities, accommodate additional infill growth, and reallocate existing sewer capacity, in addition to improvements to and expansion of the wastewater treatment plant.

The Capital Improvement Plan (CIP), given in Tables 7.1 and 7.2, was developed to help the City of White House plans for and meet these existing and future needs for its wastewater conveyance system and treatment plant over the next 20 years.

B. Organization and Costs

The recommended improvements presented in Section 6 are organized into two phases according to priority and a projection as to when additional service areas will be connected to the system. The 5-Year Primary Focus includes projects from FY 2007-2012. The Long Term Focus includes projects from FY 2012-2025.

The cost estimates presented in the Service Plan and CIP were compiled from recent regional and municipal bid tabulations, manufacturer quotations, and other bid tabulation and planning-level cost information. The costs reflect 2007 costs and have not been adjusted for inflation.

C. 5-Year Primary Focus (FY 2007-2012)

The projects recommended for implementation over the 5-year Primary Focus period are presented in Table 7.1.

Table 7.1 – 5-Year Primary Focus

Priority	Improvements	Cost
1	Wilkinson Lane Lift Station Replacement	$ 295,000
2	Union Road Force Main Extension - Phase 1	$ 484,950
3	WWTP Headworks Improvement	$ 257,400
4	Copes Crossing Lift Station – City Contribution	$ 418,935
5	North Palmer's Chapel Low Pressure Pump Conversion	$ 357,456
6	Northern Force Main Extension	$ 277,855
7	SCADA System	$ 250,000
8	Vacuum Collection System Rehabilitation	$ 495,000
9	Low Pressure Sewer Pump Replacement	$ 297,000
10	WWTP Discharge Alternatives Study	$ 50,000
11	South Palmer's Chapel Low Pressure Pump Conversion	$ 260,250
12	WWTP Effluent Irrigation Improvements	$ 707,672
	Total Construction Cost	**$ 4,213,350**

D. Long Term Focus (FY 2013-2025)

The projects recommended for implementation over the Long Term Focus period (FY 2013-2025) are presented in Table 7.2.

Table 7.2 – Long Term Focus

Priority	Improvements	Cost
1	WWTP Biosolids Dewatering Improvements	$ 148,500
2	Sage Road Low Pressure Pump Conversion	$ 386,000
3	Union Road Force Main Extension - Phase 2	$ 632,940
4	WWTP Expansion	$ 7,977,000
	Total Construction Cost	**$ 9,144,440**

APPENDIX A – CITY OF WHITE HOUSE – 2006 COMPREHENSIVE ANNUAL FINANCIAL REPORT

APPENDIX B – LIFT AND PUMPING STATION EVALUATIONS

NORTH PALMERS CHAPEL VACUUM PUMPING STATION

Name of Pump Station: North Palmers Vacuum Pumping Station

Address: Brookview Drive

Service Area: This pump station serves the eastern section of the wastewater service area, bounded to the north by Portland Road, the south by State Route 258 at Dawn Street, the east by North Palmers Chapel Road, and the west by Highway 31. Also included in the service area are the Middle School, High School, Police Station, and the Municipal Offices.

General Description and Age: Vacuum Pumping Station built in 1987

Site:

Access: Approximately 450 linear foot asphalt access from Brookview drive.

Fencing: 6-ft chain link fence with barbed wire top and double leaf gate.

Parking: The parking is adequate both inside and outside the fence, as shown in attached picture.

Lighting: No area lighting. (1)

Water Supply: Hose faucet outside of the building.

General Appearance: The site appeared clean and well maintained.

Inlet Sewer:

Size, Depth, and Material: 4-inch, 8-inch, and 10-inch vacuum sewer inlets into the vacuum storage tank. The vacuum sewer within this collection area has been expanded beyond its design capacity. This causes the vacuum pumps to run excessively and creates extra maintenance for the City. (2)

Dry vs. Wet Flow: The station experiences very high wet weather flows. This is caused from excessive I & I within the collection system. The additional flow during wet weather events causes a drop in available vacuum pressure in some areas of the North Palmers collection system. This vacuum drop causes service interruptions to occur and increases the pump run times. (3)

Condition: Areas of the system are thought to be in poor condition due to the excessive I & I issues encountered on a regular basis.

Pump Station:

Vacuum Storage Tank: 9' diameter vacuum storage tank with 4428 gallons total storage.

Dry Well: Dry well is approximately 12-feet below grade. It contains the vacuum storage tank and the sewerage pumps.

Buildings: Block building with a brick exterior, no insulation, and a flat roof.

Dry Well Ventilation: N/A

Building Ventilation: Louver with ceiling fan.

Odor Control: None

Air & Vacuum Relief: None.

Building Lighting: Overhead fluorescent.

Vacuum Pumps:

Type & Number: 3 Pumps at 490 CFM each

Location: Upper level of building.

Condition & Adequacy: According to previous studies, these pumps need to be rebuilt to better suit their use.

Manufacturer & Model: Busch model RA0030

Ability to Handle Current Dry & Wet Weather Flows: According to previous studies, the vacuum pumps run excessively during wet weather events and need to be rebuilt. (4)

Pumps:

Type & Number: 2 pumps at 75 HP each

Location: Lower level of building, dry pit.

Capacity: 500 GPM at 217 TDH

Manufacturer & Model: Paco model 53-415-1X

Condition & Adequacy: According to previous studies, these pumps are adequate to handle the flow condition.

Electrical:

Power Supply: 3 phase power @ 460 volts

Redundant Power Supply: Cummins Diesel Generator with 375 HP at 1800 RPM.

Pump Control System: Level control vacuum tank.

Alarm & Communications System: Chatterbox by Paco (auto dialer), automatically notifies maintenance personnel of any malfunction.

Condition & Adequacy: Good condition, adequate.

Force Main:

Size & Material: 8-inch PVC force main from lift station to the intersection of Portland Road and Eastside Drive (approximately 3,525 linear feet), were it connects to the 10-inch northern force main.

Route & Length: Sewage travels approximately 21,550 feet of pipe in the northern force main to the WWTP.

Discharge Point: WWTP

Condition & Adequacy: Thought by the City of White House to be in good condition.

Comments:

(1) There is no exterior lighting. The site should have a light added to the outside of the building.

(2) The number of customers within the North Palmers collection system needs to be reduced to its original design capacity in order to reduce excessive maintenance and I & I issues.

(3) The North Palmers vacuum system also needs to be studied, tested, and repaired to reduce excessive I & I problem areas.

(4) The vacuum pumps need to be rebuilt.

PORTLAND ROAD LIFT STATION

Name of Pump Station: Portland Road Lift Station

Address: Portland Road

Service Area: This lift station serves the northeastern portion of the wastewater service area, including Portland Road, Highway 31, and Sumner Crossing Subdivision. It pumps sewage thru the northern force main to the WWTP.

General Description and Age: Wet Pit/Dry Pit constructed in 1987.

Site:

Access: Off street paved access from Portland Road.

Fencing: 6-ft chain link fence with barbed wire top and double leaf gate.

Parking: Pull-off parking is inadequate (1); there is not much room between the gate and the road (as shown in the attached picture).

Lighting: No area lighting. (2)

Water Supply: Hose faucet from waterline.

General Appearance: The site had recently been excavated to repair a leak and had not been graded or cleaned up. (3)

Inlet Sewer:

Size, Depth, and Material: 10-inch force main (from Sumner Crossing Subdivision), 4-inch force main (from Highway 31 area) and 8-inch gravity (from Portland road area). Inlet depth is approximately 30 feet below grade at lift station.

Condition: Thought by the City of White House to be in generally good condition.

Pump Station:

Wet Well: 8-foot diameter wet well with approximately 3752 gallons total storage.

Dry Well: Dry well is clean in appearance and is approximately 30-feet below grade.

Buildings: N/A

Wet Well Ventilation: None.

Dry Well Ventilation: Fan ventilation that turns on with the lighting.

Building Ventilation: N/A

Odor Control: Vapex Hydroxyl Ion Fog Odor Control System.

Air & Vacuum Relief: None.

Building Lighting: N/A

Pumps:

Type & Number: 2 pumps at 50 HP each.

Location: In dry well.

Capacity: 200 GPM at 221 TDH each.

Manufacturer & Model: Smith and Loveless model 4D4A

Condition & Adequacy: Appear to be in good condition.

Electrical:

Power Supply: 3 phase power at 460 volts

Redundant Power Supply: None

Pump Control System: Smith and Loveless package, level control.

Alarm & Communications System: Local audible alarm and flashing red light

Condition & Adequacy: Good condition; adequate.

Force Main:

Size & Material: 8-inch PVC force main from lift station to the intersection of Portland Road and Eastside Drive (approximately 3,330 linear feet), were it connects to the 10-inch northern force main.

Route & Length: Sewage travels approximately 21,350 feet of pipe in the northern force main to the WWTP.

Discharge Point: WWTP

Air & Vacuum Relief Valves: None.

Condition & Adequacy: Thought by the City of White House to be in good condition.

Comments:

(1) Pull-off parking is inadequate. There is not enough room between oncoming traffic and the front gate (as shown in picture below). There is also not enough room to turn the vehicle around and backing into oncoming traffic is extremely dangerous. The fence should be modified to increase the length of the pull off and a turn around areas.

(2) There is no exterior lighting. The site should have a light added to the existing pole inside the fence.

(3) The site needs to be regarded and cleaned from the previous leak repair.

CALISTA ROAD VACUUM PUMPING STATION

Name of Pump Station: Calista Vacuum Pumping Station

Address: Calista Road

Service Area: This pump station serves the northern section of the wastewater service area, bounded to the north and west by Calista Road, the south by Heritage, Skyline, and Hamlet Drives, and to the east by the intersection of Seminole Lane and Apache Trail.

General Description and Age: Vacuum Pumping Station built in 1987

Site:

Access: Off street paved access from Calista Road.

Fencing: 6-ft chain link fence with barbed wire top and double leaf gate.

Parking: The parking is adequate both inside and outside the fence.

Lighting: Motion halogen above door.

Water Supply: None.

General Appearance: The site appeared clean and well maintained.

Inlet Sewer:

Size, Depth, and Material: 8-inch inlet sewer into the vacuum storage tanks.

Dry vs. Wet Flow: The station experiences high wet weather flows. This is caused from excessive I & I within the collection system. The additional flow during wet weather events causes a drop in available vacuum pressure in some areas of the Calista collection system. This vacuum drop causes service interruptions to occur and increases the pump run times. (1)

Condition: Areas of the system are thought to be in poor condition due to the excessive I & I issues encountered on a regular basis.

Pump Station:

Vacuum Storage Tank: 9' diameter vacuum storage tank with 4428 gallons total storage.

Dry Well: Dry well is approximately 12-feet below grade. It contains the vacuum storage tank and the sewerage pumps.

Buildings: Block building with a brick exterior, no insulation, and a flat roof.

Inlet Facilities Ventilation: N/A

Dry Well Ventilation: N/A

Building Ventilation: The louver and ceiling fan inside the building did not work. This created extreme temperatures on the day it was evaluated. (2)

Odor Control: None.

Air & Vacuum Relief: None

Building Lighting: Overhead fluorescent.

Vacuum Pumps:

Type & Number: 2 Pumps at 455 CFM each

Location: Upper level of building.

Condition & Adequacy: According to City of White House personnel, the pumps are adequate except in large wet weather events.

Manufacturer & Model: Busch model RA0030

Ability to Handle Current Dry & Wet Weather Flows: According to City of White House personnel, the vacuum pumps run excessively during wet weather events. (3)

Pumps:

Type & Number: 2 pumps at 75 HP each

Location: Lower level of building, dry pit.

Capacity: 300 GPM at 181 TDH

Manufacturer & Model: Paco model 53-415-1X

Condition & Adequacy:

Electrical:

Power Supply: 3 phase power at 460 volts

Redundant Power Supply: Cummins Diesel Generator with 375 HP at 1800 RPM.

Pump Control System: automatic

Alarm & Communications System: Chatterbox by Paco (auto dialer), automatically notifies maintenance personnel of any malfunction.

Condition & Adequacy: Good condition, adequate.

Force Main:

Size & Material: 8-inch PVC force mian from lift station to Calista Road (approximately 150 linear feet), were it meets with the 10-inch northern force main.

Route & Length: Sewage travels approximately 11,060 feet of pipe in the northern force main to the WWTP.

Discharge Point: WWTP

Condition & Adequacy: Thought by the City of White House to be in good condition.

Comments:

(1) The Calista vacuum system needs to be studied, tested, and repaired to reduce excessive I & I problem areas.

(2) Louver and ceiling fan needs to be replaced in order to properly maintain all of the controls inside the building and for maintenance personnel.

(3) The vacuum pumps need to be rebuilt.

<u>**WILKINSON LANE LIFT STATION**</u>

Name of Pump Station: Wilkinson Lane Lift Station

Address: Wilkinson Lane

Service Area: This lift station serves the northwestern portion of the wastewater service area, bounded to the north and west by Wilkinson Lane, to the south by the intersection of Cherry Lane and Sage Road, and to the east by Hillwood drive. The existing pump station will be replaced in September of 2007 in order to handle additional flow from new developments.

General Description and Age: Wet Pit/Dry Pit built in 1983.

Site:

Access: Paved access off of an existing driveway that connects to Wilkinson Lane.

Fencing: 6-foot wooden fence with double leaf gate,

Parking: Paved parking on private driveway. (1)

Lighting: No area lighting. (2)

Water Supply: Hose faucet.

General Appearance: The site had recently been excavated to repair a leak and has not been cleaned up. The fence is also in disrepair as shown in the attached picture. (3)

Inlet Sewer:

Size, Depth, and Material: 8-inch and 6-inch low pressure force mains currently enter the lift station at approximately 12-feet below grade.

Condition: Thought by the City of White House to be in generally good condition.

Pump Station:

Wet Well:

Dry Well: Dry well is clean in appearance and is approximately 12-feet below grade.

Buildings: N/A

Wet Well Ventilation: None.

Dry Well Ventilation: Fan ventilation that turns on with the lighting.

Building Ventilation: N/A

Odor Control: Vapex Hydroxyl Ion Fog Odor Control System.

Air & Vacuum Relief: None.

Building Lighting: N/A

Pumps:

Type & Number: 2 pumps at 50 HP each

Location: Dry well.

Capacity: 675 GPM at 147 TDH

Manufacturer & Model: Davco

Condition & Adequacy: This lift station is at its current capacity, hence the lift station upgrade and replacement.

Electrical:

Power Supply: 3 phase power at 460 volts

Redundant Power Supply: portable generator at the site, as seen in attached picture.

Pump Control System: level control

Alarm & Communications System: flashing red light

Condition & Adequacy: Good condition; adequate.

Force Main:

Size & Material: 8-inch force main from the lift station to the intersection of Wilkerson Lane and Volunteer drive, were it connects to the 10-inch northern force main.

Route & Length: Sewage travels approximately 10,540 linear feet of pipe in the northern force main to the WWTP.

Discharge Point: WWTP

Air & Vacuum Relief Valves: None.

Condition & Adequacy: Thought by the City of White House to be in good condition.

Comments:

(1) When the lift station is replaced, a separate parking area off of the private driveway will be installed.

(2) There is no exterior lighting. The site should have a light added when the new lift station is constructed.

(3) The site needs to be cleaned up and the fence will be replaced with the new lift station.

TYREE SPRINGS LIFT STATION

Name of Pump Station: Tyree Springs Lift Station

Address: Tyree Springs Road

Service Area: This lift station serves the southern portion of the wastewater service area, bounded to the north by Raymond Hirsh Parkway, to the east by Beechbrook Drive, the south by Marlin Road, and to the west by Highway 31. It receives sewage from the previously mentioned area as well as Union Road and South Palmers lift stations. The sewage leaves the lift station thru the southern force main to the WWTP.

General Description and Age: Wet Pit/Dry Pit built in 1993

Site:

Access: Off Street gravel access from Tyree Springs Road.

Fencing: 6-ft chain link fence with barbed wire top and double leaf gate around the site. There is also a 6-foot wooden fence encompassing the lift station (as shown in the attached picture).

Parking: Pull-off parking is inadequate (1); there is not much room between the gate and the road (as shown in the attached picture).

Lighting: No area lighting. (2)

Water Supply: Hose faucet.

General Appearance: The site appeared clean and well maintained.

Inlet Sewer:

Size, Depth, and Material: 6-inch force main from South Palmers lift station, 10-inch force main from Union Road lift station, and another 6-inch force main that collects from the Tyree Springs service area. Inlet depth is approximately 12-feet below grade.

Condition: Thought by the City of White House to be in generally good condition.

Pump Station:

Wet Well: 9' Diameter wet well with 4520 gallons total storage

Dry Well: Dry well is clean in appearance and is approximately 12-feet below grade.

Buildings: N/A

Wet Well Ventilation: 6-inch DIP vent

Dry Well Ventilation: Fan ventilation that turns on with the lighting.

Building Ventilation: N/A

Odor Control: Ferrous and Ferric Sulfates container outside of wooden fence. This unit was said to be out of service by White House personnel. (3)

Air & Vacuum Relief: None.

Building Lighting: N/A

Pumps:

Type & Number: 2 pumps at 50 HP each

Location: Dry well.

Capacity: 675 GPM at 145 TDH

Manufacturer & Model: Smith and Loveless model 4D4A

Condition & Adequacy: According to City of White House personnel, 2 pump failures have occurred in the month prior to inspection. The first was cause by large grease deposits on the floats and the second the pumps were air locked. (4)

Electrical:

Power Supply: 3 phase power @ 460 volts

Redundant Power Supply: None.

Pump Control System: Smith and Loveless, level control

Alarm & Communications System: Red light on control panel.

Condition & Adequacy: Good condition, adequate.

Force Main:

Size & Material: 12-inch force main from the lift station to the WWTP.

Route & Length: Sewage travels approximately 24,050 linear feet of pipe in the southern force main to the WWTP.

Discharge Point: WWTP

Air & Vacuum Relief Valves: None.

Condition & Adequacy: Thought by the City of White House to be in generally good condition.

Comments:

(1) Pull-off parking is inadequate. There is not enough room between oncoming traffic and the front gate (as shown in picture below). There is also not enough room to turn the vehicle around and backing into oncoming traffic is extremely dangerous. The fence should be modified to increase the length of the pull off and a turn around areas.

(2) There is no exterior lighting. The site should have a light added to the existing pole outside the fence.

(3) The odor control unit needs to be fixed or replaced.

(4) This lift station is overworked and may require replacement in the near future.

SOUTH PALMERS CHAPEL LIFT STATION

Name of Pump Station: South Palmers Lift Station

Address: South Palmers Chapel Road

Service Area: This lift station serves the southeastern portion of the wastewater service area, bound to the north by Thoroughbred Way, the east by Tison and Grayson Lanes, the south by Marlin Road, and the west by SR 258.

General Description and Age: Wet Pit/Dry Pit built in 1994

Site:

Access: Off Street paved access from South Palmers Chapel Road

Fencing: 6-foot wooden fence with double leaf gate.

Parking: The parking is adequate both inside and outside the fence.

Lighting: No area lighting. (1)

Water Supply: Hose faucet.

General Appearance: The site appeared to be clean and well maintained

Inlet Sewer:

Size, Depth, and Material: 6-inch force main enter the lift station approximately 10-feet below grade.

Condition: Thought by the City of White House to be in generally good condition.

Pump Station:

Wet Well: 8' Diameter wet well with 3572 gallons total storage. This wet well has been reported to overflow into the adjoining neighbor's swimming pool (as shown in attached picture). (2)

Dry Well: Dry well is clean in appearance and is approximately 10-feet below grade.

Buildings: N/A

Wet Well Ventilation: None.

Dry Well Ventilation: Fan that turns on with lighting.

Building Ventilation: N/A

Odor Control: Vapex Hydroxyl Ion Fog Odor Control System and carbon filter (3).

Air & Vacuum Relief: None.

Building Lighting: N/A

Pumps:

Type & Number: 2 pumps @ 20 HP each

Location: Dry well

Capacity: 220 GPM @ 52 TDH

Manufacturer & Model: Smith and Loveless model 4C2A

Condition & Adequacy: Appear to be in good condition.

Electrical:

Power Supply: 3 phase power @ 460 volts

Redundant Power Supply: None.

Pump Control System: Smith and Loveless, level control.

Alarm & Communications System: Red light. Audible alarm in place, but not connected to electrical source. (4)

Condition & Adequacy: Good condition, adequate.

Force Main:

Size & Material: 4-inch force main from the lift station to the intersection of South Palmers Chapel Road and SR 258 (approximately 2,810 linear feet), were it turns to 6-inch pipe and goes to Tyree Springs lift station (approximately 2,825 linear feet). (5)

Route & Length: Sewage travels approximately 5,635 linear feet to Tyree Springs lift station and approximately another 24,050 linear feet to the WWTP.

Discharge Point: Tyree Springs lift station

Air & Vacuum Relief Valves: None.

Condition & Adequacy: Thought by the City of White House to be in good condition.

Comments:

(1) There is no exterior lighting. The site should have a light added to the outside of the building.

(2) This problem could be solved by fixing the audible alarm or by incorporating a SCADA System.

(3) Fix or replace carbon filter, as it is currently leaking and eating away at the concrete below. White House personnel has also reported the filter to emit a foul odor.

(4) Rewire the electrical to the audible alarm.

(5) Re-route the piping from the inlet side to the outlet side of Tyree Springs lift station to avoid re-pumping the sewage.

UNION ROAD LIFT STATION

Name of Pump Station: Union Road/Magnolia Village Lift Station

Address: Union Road

Service Area: This lift station serves the southwestern portion of the wastewater service area, including Magnolia Village Subdivision, Highway 31, Union Road, Webb Lane, and the White House Middle School.

General Description and Age: Suction Lift Station built in 2004 (as shown in the attached picture)

Site:

Access: Off street gravel access from Union Road.

Fencing: 6-foot tall wood fence with double leaf gate.

Parking: Gravel parking inside and outside the fence are adequate.

Lighting: No area lighting. (1)

Water Supply: Hose faucet.

General Appearance: The site appeared clean and well maintained.

Inlet Sewer:

Size, Depth, and Material: 8-inch gravity from Magnolia Village Subdivision and 6-inch force main covering Highway 31, Union Road, Webb Lane, and the White House Middle School.

Condition: Thought by the City of White House to be in good shape.

Pump Station:

Wet Well: 6’ diameter

Dry Well: N/A

Buildings: N/A

Wet Well Ventilation: None.

Dry Well Ventilation: N/A

Building Ventilation: N/A

Odor Control: Vapex Hydroxyl Ion Fog Odor Control System.

Air & Vacuum Relief: None.

Building Lighting: N/A

Pumps:

Type & Number: 2 pumps @ 30 HP each

Location: At grade.

Capacity: 300GPM @ 125 TDH

Manufacturer & Model: Smith and Loveless model 4C3B

Condition & Adequacy: Appear to be in good condition

Electrical:

Power Supply: 3 phase @ 460 volts

Redundant Power Supply: None.

Pump Control System: Smith and Loveless package, level control

Alarm & Communications System: red light

Condition & Adequacy: Good condition, adequate.

Force Main:

Size & Material: 8-inch force main from the lift station to McCurdy Road (approximately 12,360 linear feet), were it turns to 10-inch force main and goes to Tyree Springs lift station (approximately 6,700 linear feet). (2)

Route & Length: Sewage travels approximately 19,060 linear feet to Tyree Springs lift station and approximately another 24,050 linear feet to the WWTP.

Discharge Point: Tyree Springs lift station

Air & Vacuum Relief Valves: None.

Condition & Adequacy: Thought by the City of White House to be in good condition.

Comments:

(1) There is no exterior lighting. The site should have a light added to the outside of the building.

(2) Re-route the piping from the inlet side to the outlet side of Tyree Springs lift station to avoid re-pumping the sewage.

CAMBRIA LIFT STATION

Name of Pump Station: Cambria Lift Station

Address: Cambria Village Subdivision

Service Area: This lift station serves Cambria Village Subdivision.

General Description and Age: Suction lift station built in 2006

Site:

Access: Asphalt drive in Cambria Village Subdivision.

Fencing: There is no fencing surrounding this lift station. (1)

Parking: There is no designated parking area near the lift station. (2)

Lighting: No area lighting. (3)

Water Supply: No water supply. (4)

General Appearance: Appeared clean and new aside from the missing amenities (as shown in the attached picture).

Inlet Sewer:

Size, Depth, and Material: 8-inch PVC gravity from Cambria Subdivision.

Condition: New in 2006.

Pump Station:

Wet Well:

Dry Well: N/A

Buildings: N/A

Wet Well Ventilation: 6-inch DIP with cracks and holes into the wet well. Mechanical joint bolt were used in stead of flange bolts on the vent pipe. (5)

Dry Well Ventilation: N/A

Building Ventilation: N/A

Odor Control: None.

Air & Vacuum Relief: None.

Building Lighting: N/A

Pumps:

Type & Number: 2 suction lift pumps ?? HP each

Location: At grade.

Capacity: 160 GPM

Manufacturer & Model: Gorman Rupp model T3A3S-B / WWS

Condition & Adequacy: New

Electrical:

Power Supply: 3 phase power at 460 volts

Redundant Power Supply: None.

Pump Control System: Gorman Rupp EPS 2000

Alarm & Communications System: Red alarm light.

Condition & Adequacy: Good condition, adequate.

Force Main:

Size & Material: 3-inch PVC force main from lift station to the 12-inch southern force main.

Route & Length:

Discharge Point: WWTP

Air & Vacuum Relief Valves: None.

Condition & Adequacy: Thought by the City of White House to be in good condition.

Comments:

(1) Fencing should be added surrounding the lift station in order to protect its operations.

(2) Paved or gravel parking should be added inside and outside of the proposed fence.

(3) Lighting should be added surrounding the lift station.

(4) A hose faucet should be added to the site.

(5) The vent pipe needs to be re-grouted around the slab penetration and the mechanical joint bolts need to be replaced with flanged bolts.

MEADOWLARK LIFT STATION

Name of Pump Station: Highway 31/Meadowlark Lift Station

Address: Meadowlark Road

Service Area: This lift station serves the southwestern portion of the wastewater service area, bound to the north by Highway 76, to the east by the intersection of Sycamore and Highland Drives, to the south by the intersection of Magnolia Boulevard and highway 31, and to the west by the end of Donal Terrace.

General Description and Age: Wet Pit/Dry Pit built in 1983

Site:

Access: Off Street paved access from Meadowlark Road

Fencing: 6-ft chain link fence with barbed wire top and double leaf gate.

Parking: Pull-off parking is inadequate (1); there is not much room between the gate and the road (as shown in the attached picture).

Lighting: No area lighting. (2)

Water Supply: Hose faucet.

General Appearance: The site appeared to be clean and well maintained.

Inlet Sewer:

Size, Depth, and Material: Two 6-inch PVC force mains from the lift station service area.

Condition: Thought by the City of White House to be in generally good condition.

Pump Station:

Wet Well: 8' wet well with 3572 gallons of total storage

Dry Well: Clean in appearance and is approximately 18-feet below grade.

Buildings: N/A

Wet Well Ventilation: 6-inch DIP vent

Dry Well Ventilation: Fan ventilation that turns on with the lighting.

Building Ventilation: N/A

Odor Control: None.

Air & Vacuum Relief: None.

Building Lighting: N/A

Pumps:

Type & Number: 2 pumps at 20 HP each

Location: Dry pit.

Capacity: 225 GPM at 93 TDH

Manufacturer & Model: Davco model 0020FF0A000

Condition & Adequacy: Appear to be in good condition.

Electrical:

Power Supply: 3 phase power @ 460 volts

Redundant Power Supply: None.

Pump Control System: level control

Alarm & Communications System: Red light and audible alarm.

Condition & Adequacy: Good condition, adequate.

Force Main:

Size & Material: 6-inch PVC force main from lift station to the intersection of Meadowlark and East Sage Roads (approximately 2,400 linear feet), were it connects to the 12-inch southern force main.

Route & Length: Sewage travels approximately 18,500 feet of pipe in the southern force main to the WWTP.

Discharge Point: WWTP

Air & Vacuum Relief Valves: None.

Condition & Adequacy: Thought by the City of White House to be in generally good condition.

Comments:

(1) Pull-off parking is inadequate. There is not enough room between oncoming traffic and the front gate (as shown in picture below). The fence should be modified to increase the length of the pull off area.

(2) There is no exterior lighting. The site should have a light added to the existing pole inside the fence.

SPRINGFIELD LIFT STATION

Name of Pump Station: Highway 76/Springfield Lift Station

Address: Highway 76

Service Area: This lift station serves the western portion of the wastewater service area, including Union Road and Highway 76. It pumps sewage thru its own force main to the WWTP.

General Description and Age: Wet Pit/Dry Pit built in 1993

Site:

Access: Off Street paved access from Highway 76.

Fencing: 6-ft chain link fence with barbed wire top and a roller gate.

Parking: Parking is adequate both inside and outside of the fence.

Lighting: No area lighting. (1)

Water Supply: Hose faucet.

General Appearance: The site appeared to be clean and well maintained.

Inlet Sewer:

Size, Depth, and Material: Two 8-inch gravity lines that serve Highway 76 and South Court Drive, 4-inch force main serving Highway 76 and Pleasant grove Road, and an 8-inch force main built to serve Union Road and the future development at Bear Creek. The 8-inch force main currently does not have any flow in it as no taps have been made.

Condition: Thought by the City of White House to be in good condition.

Pump Station:

Wet Well: 8’ concrete wet well with 3572 gallons of total storage

Dry Well: Clean in appearance and is approximately 12-feet below grade.

Buildings: N/A

Wet Well Ventilation: 6-inch DIP vent (as shown in attached picture)

Dry Well Ventilation: Fan ventilation that turns on with the lighting.

Building Ventilation: N/A

Odor Control: None.

Air & Vacuum Relief: None.

Building Lighting: N/A

Pumps:

Type & Number: 2 centrifugal pumps @ 20 HP each

Location: Dry pit.

Capacity: 220 GPM @ 52 TDH

Manufacturer & Model: Smith and Loveless model 4C2A

Condition & Adequacy: Appear to be in good condition.

Electrical:

Power Supply: 3 phase power @ 460 volts

Redundant Power Supply: None.

Pump Control System: Smith and Loveless, level control

Alarm & Communications System: Red light.

Condition & Adequacy: Good condition, adequate.

Force Main:

Size & Material: 4-inch PVC force main from the lift station for approximately 1,150 linear feet, were it turns to a 6-inch force main.

Route & Length: Sewage travels approximately 7,700 feet of pipe to the WWTP.

Discharge Point: WWTP

Air & Vacuum Relief Valves: None.

Condition & Adequacy: Thought by the City of White House to be in good condition.

Comments:

(1) There is no exterior lighting. The site should have a light added to the existing pole outside the fence.