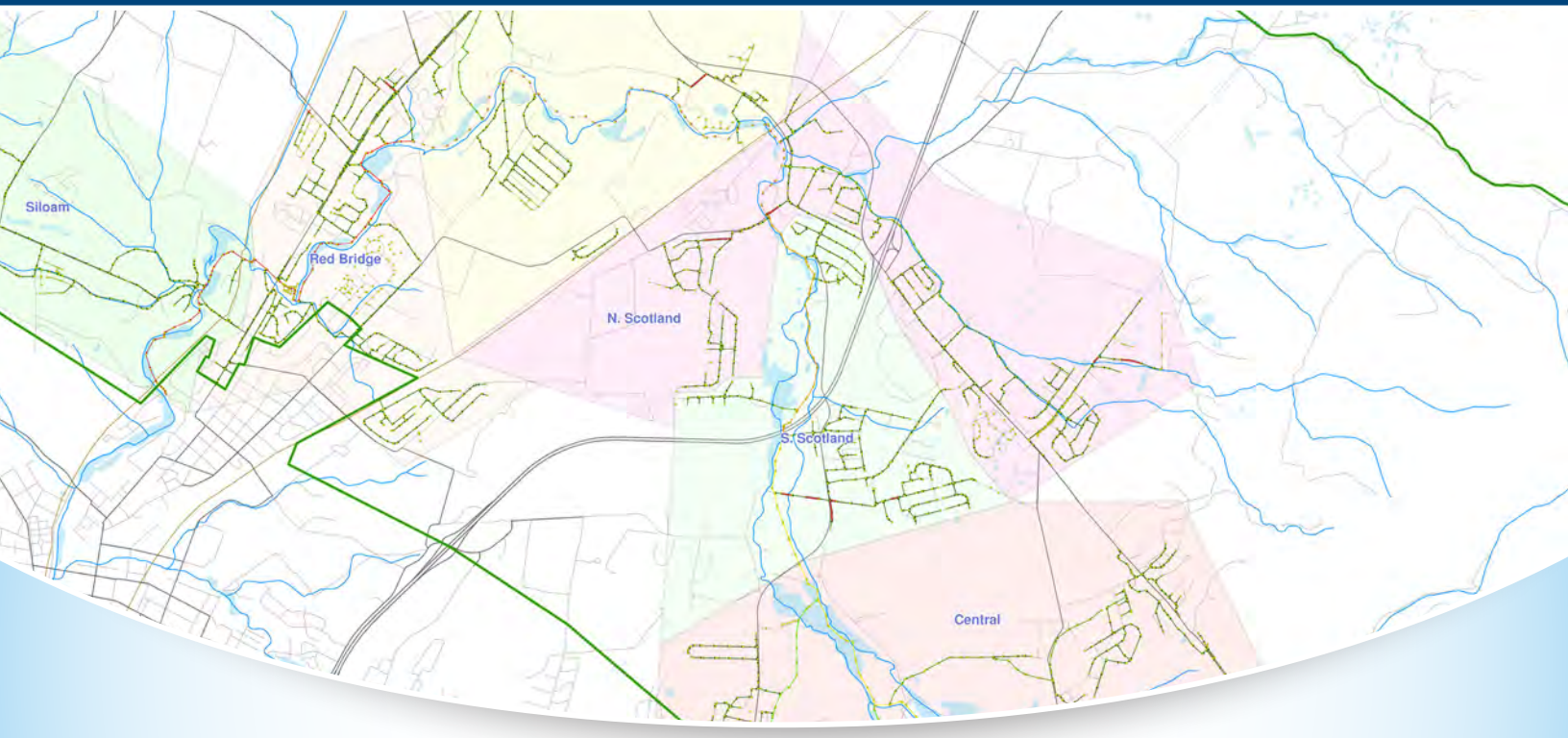
Submitted to:

Greene Township Municipal Authority
Act 537 Plan Update Amendment



Submitted by:

Gannett Fleming

*Excellence Delivered **As Promised***

March 2013

ISO 9001:2008 CERTIFIED

Greene Township Municipal Authority
Franklin County, Pennsylvania

Act 537 Plan Update Amendment

March 2013

Gannett Fleming

Excellence Delivered As Promised

Contents

Tables

Figures

Appendices

1.0 INTRODUCTION

The Greene Township Municipal Authority (GTMA) was incorporated by the Supervisors of Greene Township, Franklin County, Pennsylvania, to provide wastewater collection and conveyance service to most Greene Township residents. The GTMA also provides service to a small portion of neighboring Guilford Township. All of the GTMA Sewer System is tributary to the Chambersburg Borough conveyance system and Wastewater Treatment Plant (WWTP).

The GTMA submitted an Act 537 Plan Update to the Pennsylvania Department of Environmental Protection (PADEP) in December 2008 to serve as the Official Sewage Facilities Plan of Greene Township. PADEP provided comments on the submission in a September 3, 2009 letter addressed to the Greene Township Supervisors, Act 537 Planning APS ID No. 63205 DEP Code No. G2-28907-ACT deficiencies letter (2009 PADEP Letter). The 2009 PADEP Letter contained four (4) review comments, chief among them was the failure of the Plan Update to provide for the resolution of existing sewage facility problems and the failure of the Plan Update to provide for the future disposal needs of Greene Township.

GTMA's February 2009 Wasteload Management Report (Chapter 94 Report) had identified a hydraulic overload within the GTMA sewer system that was not adequately addressed by the December 2008 Plan Update. In response to the hydraulic overload, GTMA prepared a Corrective Action Plan (CAP) in July 2009 to address the overload. The CAP included several broad action items, including preparation of an amendment to the adopted, December 2008 Act 537 Plan Update. In October 2009, the PADEP approved the CAP. The CAP was updated in June 2012.

GTMA reported overflows from its Fayetteville interceptor as a result of wet weather events in early 2010. In April 2010, PADEP established a connection prohibition for facilities tributary to the Fayetteville interceptor. GTMA entered into a Consent Order and Agreement (COA) with PADEP in August 2010. The COA called for GTMA to undertake a comprehensive Inflow and Infiltration Plan to identify sources of extraneous flow and to undertake the necessary improvements to eliminate overflows.

This Act 537 Plan Update Amendment was undertaken to address the comments in the 2009 PADEP Letter and to develop, evaluate, and select an approach to ultimately eliminate sanitary sewer overflows (SSOs) and provide adequate capacity to provide for future disposal needs of Greene Township.

2.0 EXISTING CONDITIONS

The GTMA sewer system consists of approximately 13.7 miles of interceptor that conveys the wastewater from Greene Township residents, some of Guilford Township residents, and the wastewater generated at the Chambersburg Water Treatment Plant to the Chambersburg Borough conveyance system. The GTMA sewer system has approximately 110 miles of collection sewers, 4.8 miles of force main pressure pipes, and eleven (11) lift stations. Table 2-1 provides additional GTMA system and population information.

TABLE 2-1
GREENE TOWNSHIP MUNICIPAL AUTHORITY
EXISTING SYSTEM DATA

Description	Existing Data
2010 Population (1)	16,700
Equivalent Dwelling Units (2)	7,300
Average Dry Weather Flow (3)	2.6 mgd
Sewer Interceptor Length (4)	13.7 miles

Notes:
(1) 2010 Population taken from Census Data reported to Pennsylvania State Data Center.
(2) Equivalent Dwelling Units taken from Greene Township Chapter 94 Report for 2011.
(3) Average Dry Weather Flow (ADWF) taken from 2013 Capacity and Evaluation Report, Table 1, measured in million gallons per day (mgd).
(4) Length of interceptor in GTMA estimated from mapping and modeling data and information.

As part of the 2013 GTMA Sewer System Model Enhancement and Capacity Evaluation (2013 Capacity Evaluation), GTMA's sewer system was studied to determine the hydraulic capacity of the existing interceptor with current flows based on flow metering data collected during 2011 and estimated future flows. The 2013 Capacity Evaluation report is provided in Appendix A. The results of the 2013 Capacity Evaluation provided a means to identify short-term and long-term improvement needs for the GTMA interceptor. The existing interceptor in Fayetteville and portions of Oak Hill are undersized to adequately convey the peak flows monitored during specific storm events during 2011. As a result, SSOs have been reported

in the Fayetteville Basin while the system is experiencing peak flows. In addition, flow monitoring at the Penn Hall meter, located directly upstream of GTMA's connection to the Chambersburg sewer system, have recorded flows at or near 0.0 million gallons per day (mgd) during storm events. Based on the Penn Hall meter calibration and cleaning records, this zero flow reading could be potentially due to Chambersburg sewer system back-ups into the GTMA sewer system that require additional investigation. Additional information on the 2011 flow metering is provided in The 2013 Capacity Evaluation report in Appendix A.

3.0 POPULATION PROJECTIONS AND FUTURE FLOWS

Based on long-term projections available from the Pennsylvania State Data Center, the Franklin County population is projected to increase from 129,313 in 2000, according to the 2000 Census, to 148,596 in 2030. However, the 2010 Franklin County Census counted 149,618 people, which was more than the most recent Pennsylvania State Data Center projections for 2030.

The Franklin County Planning Commission was contacted for available population projections for Greene Township over the next 20 years and to resolve this apparent discrepancy. The Planning Commission indicated it is currently in the process of developing new population projections. Given the lack of available data, 20-year population projections developed by GTMA staff were used for this Plan Update. The GTMA population projections were based on current Greene Township zoning, available undeveloped land, and the historical rate of new growth within Greene Township before the national slow-down in housing development in 2008.

The Flow Projections Section of the 2011 GTMA Chapter 94 Report included both population projections and wastewater flow projections. The Report projects 80 new equivalent dwelling units (EDUs) will be added within Greene Township per year over the next 5 years. In addition to these 400 new EDUs, GTMA staff expects another 1,600 new EDUs to be added to the sewer system in years 6 through 20, resulting in a total increase of 2,000 EDUs for the next 20 years. Based on a planning estimate of 225 gallons per day (gpd) per EDU, the additional 2,000 EDUs that are expected over the next 20 years will contribute an additional average flow of 0.45 mgd. A peaking factor of 2.0 was applied to the average flow for consideration of peak

flow sewer pipe design. The new sewers serving the new EDUs are not expected to contribute as much inflow or infiltration as the existing aging infrastructure, since the new sewers and connections will be made in accordance with GTMA's specifications, will be air tested during construction, and construction will be overseen by GTMA inspectors. The peak flow from the 20-year additional population is expected to be approximately 0.90 mgd. A summary of the projected flows and EDUs is provided in Table 3-1.

TABLE 3-1
GREENE TOWNSHIP MUNICIPAL AUTHORITY
PLANNING PROJECTIONS

Description	Existing	5 Year Growth	Years 5, 20 Growth	Estimated 2030
Population (1)	16,700	960	3,840	21,500
Equivalent Dwelling Units (2)	7,300	400	1,600	9,300
Average Dry Weather Flow (3)	2.6 mgd	0.09 mgd	0.36 mgd	3.05 mgd
Peak Flow (4)	8.5 mgd	0.18 mgd	0.72 mgd	9.4 mgd

Notes:
(1) Existing population counted from 2010 census data from the Pennsylvania State Data Center. Projected population estimated from GTMA projected new EDUs at 2.4 people per EDU.
(2) Existing Equivalent Dwelling Units developed by GTMA staff for Chapter 94 Report and the Act 537 Plan Update Amendment.
(3) Existing ADWF taken from dry weather days in 2011 flow metering data as described in the 2013 Capacity Evaluation Report. Projected ADWF estimated at 225 gpd/EDU. See Section 3 for justification.
(4) Existing peak flow taken from 2011 flow metering data during peak storm events as described in the 2013 Capacity Evaluation Report. Projected peak flows estimated from projected ADWF with a 2.0 peaking factor.

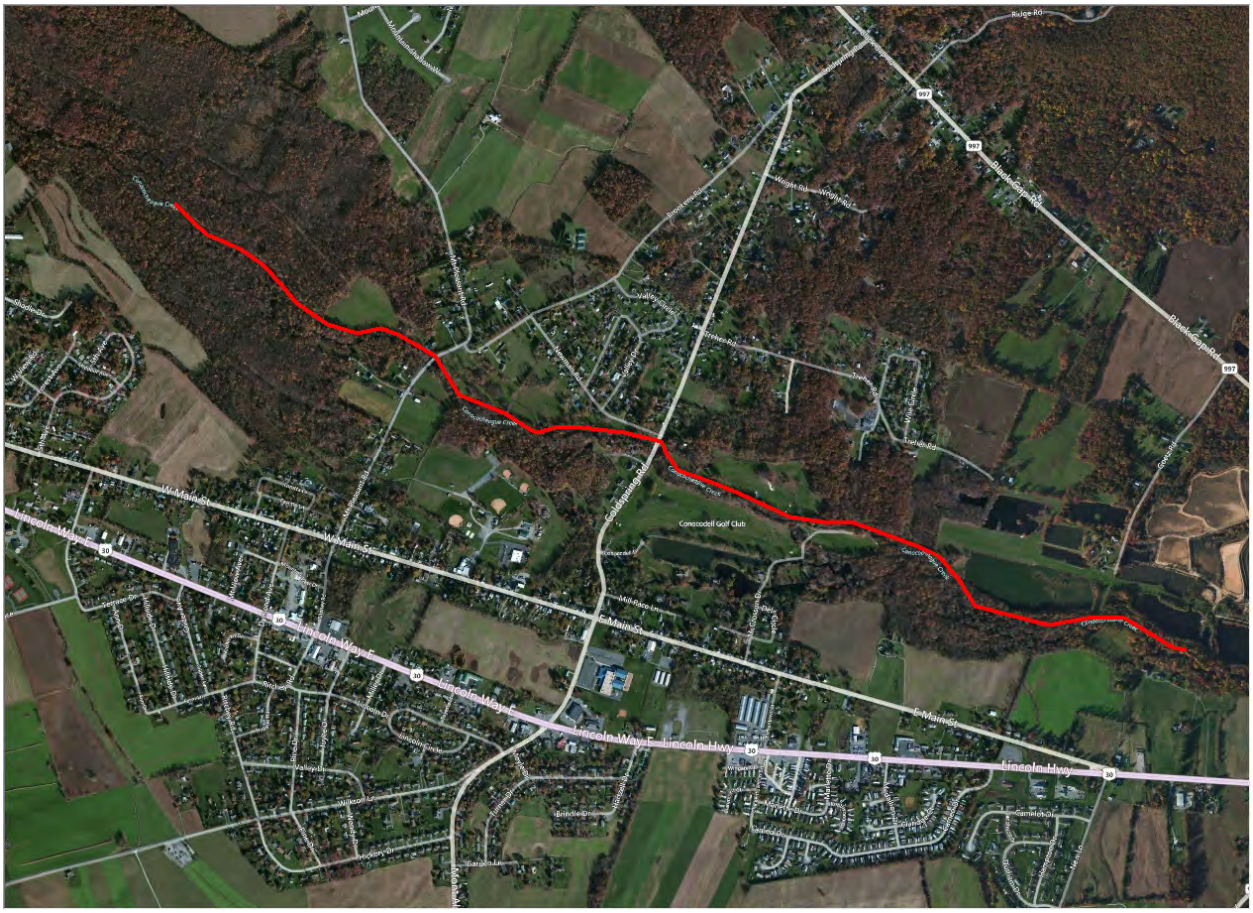
4.0 PHASED IMPROVEMENTS APPROACH

GTMA experienced overflows from its Fayetteville interceptor in early 2010. As a result of the overflows and as a condition of the subsequent CAP, GTMA completed an interceptor capacity evaluation and needs assessment, as explained in the 2013 Capacity Evaluation, in Appendix A. The 2013 Capacity Evaluation report identified short-term and long-term improvement needs for the GTMA interceptor. The 2013 Capacity Evaluation report also identified potential problems within the downstream Chambersburg system, which could cause backups within the GTMA sewer system. These backups rendered the GTMA flow metering ineffective in quantifying the magnitude of peak flows in the lower reaches of the GTMA sewer

system. Due to the extent and cost of capital improvements identified in the Capacity Evaluation report and the unknowns related to Chambersburg backups and GTMA peak flows, a three-phased improvement concept has been identified to meet the current and long-term system needs. The phased concept includes short-term interceptor improvements to address known capacity needs in the Fayetteville Basin and long-term measures to reduce inflow and infiltration (I&I) and address capacity issues in other portions of the system, for which the extent of improvement needs cannot be defined at this time, as described in the 2013 Capacity Evaluation report.

Phase I involves increasing the capacity of the undersized interceptor in the Fayetteville and the Oak Hill Basins. Figure 4-1 shows the tentative route for Phase I improvements. Phase I improvements will help to mediate the peak flow issues in the Fayetteville area of the GTMA sewer system; however, according to modeling analyses, Phase I improvements are not expected to impact the flows Chambersburg is receiving from GTMA, due to the constrained flows in Chambersburg interceptor and the downstream GTMA basins. Phase II will include investigation of the capacity in the Chambersburg interceptor and based on the findings of the investigation, improvements may be necessary upstream or downstream of the Penn Hall meter.

FIGURE 4-1
PHASE I ALTERNATIVE
PROPOSED CONVEYANCE ROUTE
(Red Segment to be Replaced or Paralleled)



Phase II is a program to further identify system deficiencies including: better assessment of peak flows in the system; investigation of downstream capacity in the Chambersburg system available for GTMA flows; and more detailed investigation of sources of I&I and rehabilitation of identified sources to reduce I&I.

Phase III involves undertaking the necessary improvements beyond those completed in Phase I and II, to address the long-term capacity needs in the GTMA interceptor, and addressing the Chambersburg interceptor capacity if necessary.

As part of the 2013 Capacity Evaluation, the Authority's sewer system was studied to determine the hydraulic capacity of the existing interceptor with current and future flows. The existing interceptor in Fayetteville and portions of Oak Hill are undersized to adequately convey the peak flows monitored during specific storm events during 2011. Therefore, two (2) Phase I alternatives were developed to alleviate the peak flow capacity inadequacies. Alternative 1 involves replacing approximately 2.5 miles of the existing interceptor in portions of Fayetteville and Oak Hill with 24-inch diameter sewer. The larger sewer would be placed in the same trench as the existing interceptor. Alternative 2 rehabilitates the existing interceptor with new manholes and runs a parallel sewer along the existing interceptor. The parallel sewer would add approximately 2.5 miles of 12- and 18-inch diameter main adjacent to the existing interceptor in portions of Fayetteville and Oak Hill.

Other Alternatives were considered, but eliminated to address the existing and projected future needs. These other alternatives included flow equalization, pumping excess peak flows to a point lower in the GTMA system, and system rehabilitation to reduce peak flows. The rehabilitation option was eliminated from consideration since the existing Fayetteville interceptor was determined to be undersized to convey future flows even with significant I & I reduction.

Table 4-1 summarizes the two technically feasible Phase I alternatives to increase the capacity of the undersized interceptor in Fayetteville and Oak Hill Basins.

TABLE 4-1
PHASE I ALTERNATIVES FOR EVALUATION (1)

No.	Fayetteville Interceptor Alternative	Required Conveyance Improvement
1	Replace Existing Portions of Interceptor in Fayetteville and Oak Hill Basins	➢ Install approximately 12,750 linear feet of 24- inch interceptor ➢ Replace existing manholes with new manholes
2	Install a parallel sewer along portions of the Fayetteville and Oak Hill interceptors	➢ Install approximately 6,650 feet of 12-inch parallel sewer ➢ Install approximately 5,900 feet of 18-inch parallel sewer ➢ Install approximately 10 feet of connecting sewers to the existing interceptor ➢ Replace the manholes on the existing interceptor with new manholes

Notes:
(1) Estimate of probable cost for each alternative is provided in Chapter 6.2.

5.0 PHASE II – INFLOW AND INFILTRATION PROGRAM

Phase II is a program to identify system deficiencies including, better assessment of peak flows in the system, investigation of downstream capacity in the Chambersburg system available for GTMA flows, and more detailed investigation of sources of I&I and rehabilitation of identified sources to reduce I&I. This phase will be used to assess the results of the Phase I improvements and help quantify peak flows associated with the downstream GTMA sewer basins that could not be determined to date due to potential backflows from the Chambersburg interceptor. Field investigations as part of Phase II will commence during the Phase I construction period.

GTMA will continue to monitor flows with their existing meters, and incorporate a digital rain gage to understand the hydrological contributors. The details of the I&I program associated with Phase II are described below.

5.1 Conveyance Facilities

As discussed throughout the 2013 Capacity Evaluation (Appendix A) and this Plan Update Amendment, the GTMA collection and conveyance system is impacted by wet weather flows resulting in hydraulic overload conditions. GTMA's Inter-municipal Agreement (IMA)

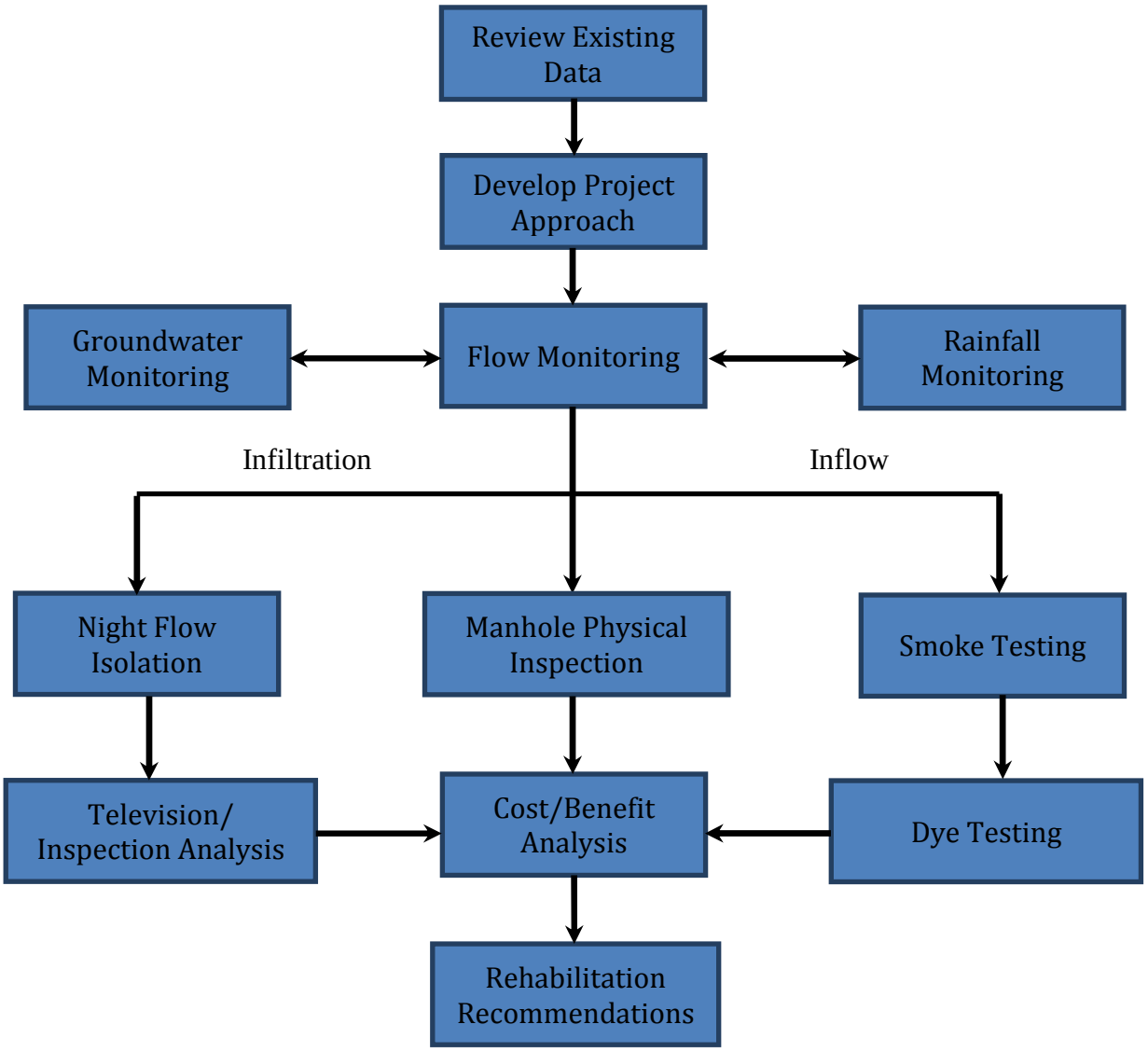
with Chambersburg Borough permits an annual flow of 1.84 mgd. The average annual flow during the period from 2009 to 2010 was 2.3 mgd. The cumulative ADWF for the system was estimated to be 2.6 mgd, based upon the 2011 flow monitoring period. Peak flows during the monitoring period were greater than 8.5 mgd. This indicates portions of the collection systems capture excessive amounts of I&I, further reinforced by the flow metering, model development and analysis, and the capacity evaluation. Recapturing a portion of this capacity through sewer system rehabilitation is typically a cost-effective wastewater conveyance alternative. As detailed herein, a systematic approach for prioritization of rehabilitation of existing sewer sections will be implemented through a comprehensive multi-year Sewer System Evaluation Survey (SSES) program.

5.1.1 Comprehensive Sewer System Evaluation Survey Approach

As part of this Plan Update Amendment, GTMA will implement a multi-year SSES Program. Within the first 5 years following Phase I completion, high priority sewersheds will be addressed. Lower priority sewersheds will be addressed in subsequent years. The main objective is to identify sources of I&I and determine the most cost-effective approach to address reduction of this extraneous flow, which essentially uses system capacity that could otherwise be used for conveyance and treatment of wastewater from new system users. Recapturing a portion of this capacity can be the most cost-effective wastewater conveyance alternative. Rehabilitation of existing sewer sections will be implemented through the SSES program according to the established priority framework provided in the 2013 Capacity Evaluation Report. The rehabilitation will be performed to address National Association of Sewer Service Companies (NASSCO) -coded defects of the highest priority.

The SSES will be completed in accordance with the Environmental Protection Agency (EPA) Handbook "Sewer System Infrastructure Analysis and Rehabilitation Handbook" (EPA/625 6-9/030, 1991). The methods identified in the EPA Handbook prescribed a multi-phased approach, generally involving: (1) analysis, (2) evaluation, and (3) rehabilitation. Figure 5-1 outlines a thorough SSES program.

FIGURE 5-1
SEWER SYSTEM EVALUATION SURVEY
PROGRAM FLOWCHART



5.1.2 Background

The Authority has been performing sewer system investigation and repair since 2002. The program was intensified during the past 5 years, and the GTMA reports it has spent $2.4 million on inspection equipment, flow meters, and sewer system rehabilitation during this time. Based upon the historical analyses and documentation, GTMA staff believes that system issues still exist in the drainage basins east of Interstate 81. Recent flow monitoring and the 2013 Capacity Evaluation support this conclusion.

Other tasks performed by GTMA include:

- Development of comprehensive sewer system mapping, using an electronic Geographic Information System (GIS) database.
- Operation and Maintenance (O&M) activities: cleared/grubbed 4.5 miles of previously neglected easement and performed internal closed-circuit television (CCTV) inspection of 12 miles of interceptor.
- Acquisition of flow meters and implementation of a flow monitoring program (16 selected sites).
- Development of a computer model of the Authority's collection/conveyance system, utilizing Bentley's SewerGEMS software (with the existing GIS data, and recorded flow metering data).
- Completed a hydraulic capacity analysis of the interceptor system utilizing the hydraulic model.
- Initiated planning of hydraulic improvements to the interceptor system.

5.1.3 Findings/Recommendation

In accordance with the CAP, the GTMA has 16 metering locations throughout the system, some installed as early as 2009. Utilizing this broad flow monitoring program, and the Comprehensive I&I Plan mandated by the COA, GTMA has expressed a commitment to thoroughly assess and rehabilitate their collection/conveyance system.

Through flow analyses and hydraulic modeling, the sewersheds were prioritized, as described in the 2013 Capacity Evaluation. The metered basins were compared and prioritized based on peak flows experienced during a November 2011 storm event. For the purpose of calculating ADWF for use in the model, each meter site was evaluated based on the data for days with no precipitation and no precipitation in the previous 2 days. After calculating the ADWF for each meter, a flow balance of all the meters was developed and analyzed. The ADWF and peak flow per EDU in each basin or sub-basin contributing flow to each meter was also reviewed

to further assess the validity of the meter data for use in setting model inflows. ADWF and peak flow per linear computation (linear feet or inch-mile) were also analyzed.

Table 5-1 shows the prioritization for each metered basin. First Priority Basins: include Oak Hill Basin (Manhole 503), Mount Pleasant Road Sub-Basin (Manhole 139), Newman Road Sub-Basin (Manhole 99), and Trayer Howe Sub-Basin (Manhole 248) in Fayetteville, and Black Gap Road Sub-Basin (Manhole 35) in Greene Knolls. The First Priority Basins will be the initial focus of the comprehensive SSES. The Second Priority Basins include: Hidden Valley Sub-Basin (Manhole 200) in Fayetteville, and sub-basin contributing to Manhole 672 in the Central Basin.

TABLE 5-1
BASIN PRIORITIZATION

Red – First Priority Yellow – Second Priority

Primary Basin	Manhole ID	EDUs	Linear Feet (LF)	11/23/11 Metered Peak Flow (mgd)	11/23/11 Metered Peak Sewer Capacity			ADWF (mgd)	Cumulative Average Dry Weather Flow Sewer Capacity		
					(gpd/ LF)	(gpd/ inch-mile	gpd/ EDU		(gpd/ LF)	(gpd/ inch-mile	gpd/ EDU
Greene Knolls	**35**	125	12,793	0.88	69	45,478	7,040	0.31	6	4,008	1325
	378	120	10,028	0.18	18	15,000	1,500				
	561	234	27,552	0.82	16	10,653	1,720				
Fayetteville	**248**	180	19,037	1.1	58	38,136	6,111	0.19	10	6,553	1,050
	225	232	16,506	0.53	32	20,784	2,284	0.10	6	3,804	418
	200	70	13,595	0.54	40	26,216	7,714	0.15	11	7,136	2,100
	138	92	5,581	1.5	269	169,891	16,304	0.08	14	8,948	859
	99	184	20,081	1.30	65	42,727	7,065	0.04	2	1,216	201
	523	1264	36,678	1.79	9	9,441	1,417	0.89	16	7,680	459
Oak Hill	**503**	98	5,051	4.3	497	316,351	25,602	1.18	57	36,565	2,959
Central (1)	**672**	732	69,929	7.0	39	23,276	3,689	1.54	5	3,103	492
S. Scotland (2)	**639**	616	61,363	5.40	-9	-4,635	-877	1.76	4	1,888	357
N. Scotland	**630**	1108	87,940	8.50	10	5,737	870	2.16	5	2,759	361
Greenvillage	**1049A**	1267	104,067	8.50	0.01	2,511	395	2.34	2	904	142
Red Bridge (3)(4)	**1021**	1190	89,575	9.30	9	4,518	755	2.56	2	1,244	185
Siloam (3)(4)	**MC1**	412	49,452	8.69	-12	-5,971	-1,119	2.64	2	784	194

Notes:
(1) Central Basin accepts flow from Guilford Township which ranges from 0.18 to 0.42 mgd.
(2) Missing flow metering data for South Scotland Basin during the November 23, 2011 Storm. Metered Peak Flow reported from May 26, 2011 Storm Event. Flow metering data recorded less than upstream flow meter during peak (5/26/2011) and ADWF. Scaled downstream meter average dry weather flow used.
(3) Red Bridge and Siloam dry weather flow metering data was less than upstream metering data. Adjusted Red Bridge and Siloam data to 20% of Siloam meter reading for ADWF, and scaled Red Bridge.
(4) Table includes length of main in basins that contribute to metering data only. Due to its location, the Penn Hall meter in Siloam includes some main in Red Bridge.

The SSES will initially target televising the sewer mains in the First Priority Basins. Structural and O&M deficiencies will be scrutinized during the field inspections. Concurrent manhole inspections will be performed during the CCTV operations. Defects identified will be categorized using the universally-recognized defect coding system developed by the NASSCO.

Guidelines of the NASSCO Pipeline Assessment and Certification Program (PACP) and the Manholes Assessment and Certification Program (MACP) will be followed. Flow isolation and smoke testing field investigations will also be utilized as warranted. Second Priority Basins will be addressed after completion of the First Priority Basins. Other basins will be reassessed during subsequent years. Table 5-2 summarizes the sizes of the priority basins

TABLE 5-2
PHASED SEWER SYSTEM EVALUATION SURVEY
PRIORITY BASINS

Primary Basin	Manhole ID	EDUs	Linear Feet (LF)
FIRST PRIORITY			
Greene Knolls	35	125	12,793
Fayetteville	248	180	19,037
	138	92	5,581
	99	184	20,081
Oak Hill	503	98	5,051
	TOTAL	679	62,543
SECOND PRIORITY			
Fayetteville	200	70	13,595
Central	672	732	69,929
	TOTAL	802	83,524

Following SSES field investigation tasks for First Priorities, a comprehensive summary that highlights all defects will be developed. A rehabilitation program will be developed to address the defects and deficiencies identified during the First Priority Basins investigation. Depending upon the findings, the recommended rehabilitation program is anticipated to include, but not be limited to:

- External point repairs (excavate and replacement) of sewers
- Removal of sediment, protrusions, roots, and other obstructions
- Internal cured-in-place point repairs of sewers

- Cured-in-place lining of sewers
- Chemical grouting of pipe joints
- Manhole repair (cementitious, epoxy, cured-in-place)
- Removal of extraneous flow contributors (cross-connections, downspouts, area drains, etc.)
- Lateral repairs (cleanout caps, etc.).

The Second Priority Basins will be addressed after completion of the First Priority Basins, in accordance with the estimated duration in Table 5-3. Other basins will be reassessed during subsequent years.

TABLE 5-3
RAIN DERIVIED INFLOW AND INFILTRATION
REDUCTION PROGRAM SCHEDULE AND COSTS

Description	**Duration**	**Estimated Costs**
FIRST PRIORITY BASINS		
➢ Field Investigations	18 Months	$ 150,000
➢ Summary of Findings	1 Month	$ 5,000
➢ Rehabilitation Design and Permitting	8 Months	To Be Determined
➢ Rehabilitation - Bid Phase	3 Months	To Be Determined
➢ Rehabilitation - Construction	12 Months	To Be Determined
SECOND PRIORITY BASINS		
➢ Field Investigations	24 Months	$ 200,000
➢ Summary of Findings	1 Month	$ 7,000
➢ Rehabilitation Design	8 Months	To Be Determined
➢ Rehabilitation - Bid Phase	3 Months	To Be Determined
➢ Rehabilitation - Construction	12 Months	To Be Determined
Reassess Lower Priority Basins	1 Month	To Be Determined

Projected costs can be impacted by inflation and other external factors. The GTMA can also affect the ultimate costs by utilizing staff to perform some field investigation and minor O&M and rehabilitation functions.

Costs for the rehabilitation process is site specific and depends to a large extent on the type of rehabilitation undertaken. In order of increasing costs, rehabilitation could involve grouting of leaking pipe joints; removal of inflow sources; internal lining of sewers, manholes, and laterals; and dig-up and replacement of the sewers. Digging-up and replacing sewers is usually only completed if the physical condition of the existing facility is too degraded to allow for a less-costly trenchless repair technique. Average costs for lining an existing 8-inch diameter sewer main, in 2013 dollars, is about $40 to $50/LF. This cost is much lower than the average cost to dig-up and replace an existing 8-inch diameter main that is about 8-feet deep within an existing right-of-way (about $100 to $120/LF, in 2013 Dollars).

Sewer system rehabilitation is generally less expensive than replacement of existing conveyance facilities with larger capacity facilities. Some of the sewer rehabilitation steps, such as cleaning and televising, should be part of an overall sewer system operation and preventative maintenance program. Sanitary sewers have a limited life and in some cases represent the largest investment in public infrastructure by the municipal owner. All sewers will eventually require rehabilitation or replacement. Proactive sewer system owners implement comprehensive preventative maintenance programs to achieve certain system goals. The Water Environment Federation Manual of Practice, "Wastewater Collection Systems Management" lists the following goals of a typical sewer system preventative maintenance program:

- Prevent public health hazards;
- Protect municipal investment by increasing the useful life and capacities of the systems;
- Use operating funds efficiently;
- Convey wastewater with minimal inflow, infiltration, and exfiltration; and
- Identify and remedy system deficiencies.

5.2 Phase III Planning and Preparation

As part of Phase II, existing unknowns need to be quantified, such as the Chambersburg interceptor capacity, and undefined peak flows in North and South Scotland, Greenvillage, Red Bridge, and Siloam Basins. These unknowns are explained in the 2013 Capacity Evaluation Report. In addition, the improvements made through Phase I and Phase II SSES Program need to be assessed to better understand the new GTMA interceptor and system. In order to continue into Phase III, the system's response to peak flows will need to be re-defined to accommodate the new and rehabilitated sewers. Therefore, it is not feasible to identify the potential Phase III improvements at the current time. The flow metering and investigations will continue through Phase I and Phase II. The flow metering data and the Chambersburg capacity information will contribute to the planning data necessary for Phase III implementation. GTMA will plan Phase III improvements after Phase I and Phase II SSES Program is completed.

6.0 EVALUATION OF ALTERNATIVES

6.1 Consistency Analysis

Wastewater management alternatives developed as part of the Act 537 Plan Update Amendment planning process must be evaluated in terms of their relationship to the goals and objectives of various planning, environmental, and natural resource laws and policies of the Commonwealth of Pennsylvania. Chapter 71.21 (a) (5) of PADEP's regulations requires that the Act 537 Plan address the consistency of each wastewater management alternative with twelve of the Commonwealth's goals and policies. If a recommended alternative is determined to conflict with or is inconsistent with one of the goals and objectives, the conflict and inconsistencies must be resolved before PADEP will approve the alternative.

The following sections discuss the 12 evaluation categories and the consistency analysis. Based on the following analysis, the two (2) Phase I alternatives, Phase II, and III are consistent with all 12 criteria.

6.1.1 Comprehensive Water Quality Management Plan

Sections 4 and 5 of the Clean Streams Law require consideration be given to water quality management and pollution control in a watershed as a whole. Section 208 of the Clean Water Act calls for the development of plans that identify the facilities necessary to meet anticipated municipal and industrial waste treatment needs. Comprehensive Water Quality Management Plans (COWAMP) have been developed under Sections 4 and 5 of the Clean Streams Law and 208 of the Clean Water Act for areas in Pennsylvania.

The COWAMP was completed in the late 1970's and is no longer readily available. In the area of water quality protection, the State Water Plan includes compliance with the COWAMP and the provisions of Chapter 93 and Chapter 16 of the Pennsylvania Code. All applicable protected uses of waters of the Commonwealth are protected by the water quality and toxicity standards in Chapter 93, and Chapter 16, respectively.

The consistency analysis of the phased alternatives required by Chapter 71.21 (a)(5)(i)-(iii) of the Pennsylvania Code will be satisfied through consistency with Chapter 93 and the current State Water Plan. Chapter 6.1.5 evaluates the alternatives with respect to Chapter 93, while Chapter 6.1.6 includes a discussion on the current State Water Plan. The wastewater in the GTMA interceptor is conveyed to the Chambersburg Wastewater Treatment Plant (WWTP) where it is treated to meet applicable water quality and toxicity standards. The Fayetteville Interceptor Improvements (Phase I) and the investigation and rehabilitation of sewers and manholes and additional improvements (Phase II and III) are conveyance alternatives, not water treatment and discharge options. As such, they do not change the current practice of treatment at the Chambersburg WWTP and will not affect the water quality or pollution control in the watershed. Therefore, the phased alternatives are consistent with the current plan for water quality compliance within the watershed.

6.1.2 Municipal Wasteload Management Plans

When sewage collection or treatment facilities are overloaded, either hydraulically or organically, untreated sewage may be discharged into the environment. In order to prevent the environmental and public health hazards associated with these potential discharges,

municipalities that own or operate sewage treatment facilities are required to submit an annual wasteload management report to PADEP that demonstrates the facilities are meeting the municipal wasteload management requirements of Chapter 94. Wastewater generated in Greene Township, in portions of Guilford Township, and from the Chambersburg Water Treatment Plant is conveyed to the Chambersburg WWTP via sewage facilities owned by the GTMA. GTMA annually provides sewer system information to the Borough of Chambersburg for use in preparing the Chambersburg WWTP Wasteload Management Report.

As addressed in Section 3, the Act 537 Plan Amendment includes population projections and wastewater flow projections. These projections were based on information from the 2011 Greene Township Chapter 94 Report. Phase I and Phase II were developed based on the future wastewater needs of Greene Township which are, therefore, consistent with the municipal wasteload management requirements of the Chambersburg Chapter 94. The proposed alternatives were developed to address the current hydraulic overload within the GTMA sewer system and are consistent with the Chapter 94 Report.

6.1.3 Title II of the Clean Water Act

Title II of the Clean Water Act requires the development and implementation of wastewater treatment management plans and practices which provide for the application of the best practical waste treatment technology before discharging into receiving waters. The GTMA facilities are designed to collect and convey wastewater to the Chambersburg WWTP. Therefore, the alternatives do not change the treatment approach and are consistent with the title of the Clean Water Act.

6.1.4 Comprehensive Planning

Both Franklin County and Greene Township have developed Comprehensive Plans to guide future land development. The wastewater management alternatives are consistent with the Greene Township Comprehensive Plan related to growth, land use, and development within the Township, and the adequacy of the sewer facilities. Phase I alternatives provide adequate sewer capacity in Fayetteville and Oak Hill to meet the existing peak flows of the 20-year planned

growth. The Phase II SSES and Phase III activities are expected to free up adequate conveyance capacity to meet the 20-year growth needs of the area.

6.1.5 Chapter 93, 95, and 102 Anti-degradation Requirements

Chapters 93 and 95 under Pennsylvania's Clean Streams Law classifies all surface waters according to uses to be protected and establishes water quality criteria which need to be maintained in the surface waters. These classifications, known as Water Quality Standards, establish the guidelines and procedures for wastewater effluent discharge limits. Chapter 16 of the Pennsylvania Code establishes the guidelines and procedures for development of criteria for toxic substances in order to protect the water uses list in Chapter 93.

Projects proposing a wastewater effluent discharge to special protection waters are required to justify the discharge alternative against all available alternatives. Because the GTMA owns and maintains a sewer conveyance system which does not involve direct discharges from its system after the Act 537 Plan Update Amendment is implemented, the water quality criteria in Chapters 93 and 95 are not applicable and the alternatives are therefore consistent.

Chapter 102 of the Pennsylvania Code requires a soil erosion and sedimentation control plan be prepared and followed for any construction activity impacting greater than one acre. Any sewer system improvements constructed during implementation of the selected alternative will be completed in compliance with necessary erosion and sedimentation control plans.

6.1.6 State Water Plan

The Commonwealth of Pennsylvania enacted the Water Resources Planning Act (Act 220) in 2002, requiring the State Water Plan be updated by March 2008 and every 5 years thereafter. The State Water Plan is available electronically on PADEP's website. The updated Plan replaces the original State Water Plan, completed in 1983.

The State Water Plan includes the State Water Plan Principles, summarizing the planning principles and recommendations, a Water Atlas, providing a plan for proper water and land resources management, and a Digital Water Atlas that allows for mapping of important planning

components. The following recommendations were taken from the State Water Plan Principles section for the Potomac River Basin:

1) Address land use planning and growth: The State Water Plan identified growth management as an important priority of the Potomac region. Strategies to help mediate the migration include implementing sound land use practices, regional planning, and regional regulatory program, and proper management of water resources when making decisions on competing land use decisions as priorities of the Potomac region. This information serves as a basis for making decisions on land use planning, for identifying and analyzing Critical Water Planning Areas, and for making comprehensive preparations in advance of extreme floods and droughts.

2) Develop land use programs that protect water quality and quantity and preserve the ecological integrity of groundwater and surface water, including springs, streams, lakes, and wetlands: A high priority of the Potomac region is to maintain water quality and ecological integrity of groundwater and surface water. Protection of natural soil is necessary in order to achieve the integrity of the water.

A main component of the State Water Plan was to address the planning and growth of the region due to migration of people and businesses. Important land use planning is essential to maintain the proper balance of water resources, natural environment and the emerging population.

The Water Atlas lists information on the major tributaries of the Potomac. Greene Township lies within the Conococheague Watershed. An Act 167 Stormwater Management Plan has been adopted for the Conococheague Creek Watershed. Implementation of the alternatives will not directly change the impervious coverage of the area and are therefore consistent with the pertinent Act 167 Plans.

The Digital Water Atlas provides the ability to select a general area and map, among other planning components, population projections, geology and surface water quality. The

population projections shown on the Digital Water Atlas for Greene Township include a 20-50% increase in population from 2000 to 2030. As described in Section 3, an estimated 2,000 EDUs increase of approximately 27% from existing are projected for the 20-year planning period. The population projections included in this Act 537 Plan Amendment are consistent with the projections prepared as part of the Digital Water Atlas.

A review of the State Water Plan indicated that inconsistencies do not exist between the water quality management goals and objectives of the State Water Plan and this Act 537 Plan Amendment. According to the State Water Plan Atlas and Principals, the updated State Water Plan will help planners determine how to meet current and future water supply and wastewater disposal needs by protecting community growth and development. The alternatives discussed in the Act 537 Plan Amendment are consistent with the State Plan's goal of well-managed water resources.

6.1.7 Prime Agricultural Land Policy

The policy was established to protect prime agricultural land from irreversible conversions to uses that result in the loss of the land as an environmental or essential food source resource. According to the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey of Franklin County the majority of Greene Township is underlain by prime agricultural soils, as shown in Exhibit 1 in Appendix B. However, from the standpoint of this Act 537 Plan Amendment, prime agricultural soils are not a concern since there are no existing agricultural lands in the phased improvement areas. All of the proposed phased improvements will either replace or rehabilitate the existing sewer system in existing sewer rights-of-way (ROW), and will therefore not impact any existing agricultural operations.

The proposed phased alternatives would not remove any existing farmlands from production. Therefore, the alternatives of the Plan are consistent with the Prime Agricultural Land Policy.

6.1.8 County Stormwater Management Plans

The Storm Water Management Act (Pennsylvania Act 167) of 1978 states that inadequate management of stormwater resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of streams and storm sewers, greatly increases the cost of public facilities to carry and control storm water, undermines flood plain management and flood control efforts in downstream communities, reduces groundwater recharge and threatens public health and safety. This act requires each county in Pennsylvania to adopt a stormwater management plan for each watershed. The plan is to be a joint effort between the County Planning Agency and the municipalities located in the particular watershed. The major issues to be addressed in a stormwater management plan include the assessment of projected land development patterns, potential impact of runoff quality, and the present and projected development in flood prone areas. The main objective of a stormwater management plan is to establish regulations for the control of stormwater runoff.

According to the PADEP website, a stormwater management plan, under Act 167, was approved by PADEP for the Conococheague Creek watershed. The Plan was approved on November 10, 2003, and Greene Township adopted a Stormwater Management Ordinance on June 22, 2004. Any earth disturbance activities in Greene Township must comply with the Township's Stormwater Management Ordinance.

The alternatives considered for the Plan Update Amendment will not change the amount of impervious coverage. Construction of the improvements will need to be undertaken in accordance with the Green Township Stormwater Management Ordinance. Therefore, the alternatives are consistent with the Stormwater Management Plan for the Conococheaque Creek Watershed.

6.1.9 Wetlands

Areas identified as wetlands by the National Wetlands Inventory (NWI) are mapped on Exhibit 2, in Appendix B. Wetlands are defined by Pennsylvania Title 25, Chapter 105 as those areas that are inundated or saturated by surface of groundwater at a frequency and duration

sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions; including swamps, marshes, bogs and similar areas. The three (3) essential characteristics possessed by wetlands are: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology, the driving force creating wetlands. Much of the land located along stream corridors in the Planning Area contains NWI wetlands. Sanitary sewers are typically placed along stream corridors to minimize pumping requirements. Therefore, some temporary wetland impacts potentially could occur during implementation of the wastewater management alternatives.

Based on Exhibit 2 the Phase I alternatives will be constructed in or near wetlands. The Phase I alternative may have a potential impact on NWI wetlands within Franklin County along Conococheague Creek. Since the conveyance relies on gravity flow, the existing sewer route will need to be maintained. A formal wetland delineation would be required to document the extent of jurisdictional wetlands occurring within the limits of disturbance. Additional environmental assessments may also be required. These assessments will be completed as part of design of the Phase I chosen alternative.

If wetland encroachment cannot be avoided, PADEP and U.S. Army Corps of Engineers approval will be necessary. Construction through wetlands, if permitted, may require the use of a U.S. Army Corp of Engineer Nationwide Permit 12 and a PADEP General Permit BDWM-GP-5.

6.1.10 Pennsylvania Natural Diversity Inventory

The Pennsylvania Natural Heritage Program, formally known as the Pennsylvania Natural Diversity Inventory (PNDI), maintains a database containing site information on regulated plant and animal species, outstanding geological features, and significant natural communities. A PNDI Project Environmental review, conducted on the PNDI website, acts as a screening tool to determine if any impacts are anticipated to federally listed, proposed, or candidate species if the construction project were to occur in the area and if any further review is required by state or federal agencies.

A PNDI Project Environmental Review was performed for the Phase I alternatives on February 5, 2013. The results from the Project Environmental Review are included in Appendix C.

The Project Environmental Review concluded that further review was required by the Pennsylvania Game Commission (PGC), the Pennsylvania Department of Conservation and Natural Resources (DCNR), and the Pennsylvania Fish and Boat Commission (PFBC), to determine if there may be potential impacts. These inquiries were made on behalf of the Authority in correspondence dated February 14, 2013 and are included in Appendix D.

The DCNR responded in a letter dated February 26, 2013. The letter indicates certain species of special interest may be located in the project area. Therefore, DCNR is requesting a field survey be completed by a qualified botanist and a copy of the survey should be submitted to its office for review. The response letter is included in Appendix E.

The PGC and the PFBC have yet to respond to the inquiries. It is believed according to the PNDI Environmental Review, the Northern Longeared Bat may be in the vicinity of Phase I alternatives. If this is the case, the bat species will only be impacted if trees will need to be removed during construction. Due to the construction site being in the existing sewer ROW that has been maintained by GTMA, minimal impact to the species is expected. However, GTMA will conduct the necessary surveys and modify the construction schedule, as necessary, to minimize impact to the bat species if it is found to be within the area.

6.1.11 Historical and Archeological Resource Protections

Pennsylvania Title 37, Section 507 requires cooperation between public officials and the Pennsylvania Historical and Museum Commission (PHMC). A cultural resource notice request was sent to the PHMC Bureau of Historic Preservation (BHP) on February 12, 2013 for a list of know historical sites and potential impacts on known archeological and historic sites within the planning area by implementation of either of the alternatives. A copy of the letter of request to the PHMC BHP is included in Appendix F.

The PHMC BHP responded with a letter dated February 21, 2013, stating that the proposed construction activities should not have an effect on historical buildings, structures, or archaeological resources located in the project area. A copy of the response letter is located in Appendix G.

6.1.12 Water Quality Standards and Effluent Limitations

The phased alternatives will not have any effects on how Chambersburg treats the sewage at the WWTP. As previously stated, GTMA's system conveys wastewater but does not have a permit for a direct stream discharge. Therefore, inconsistencies do not exist between the phased alternatives introduced in this Plan Update Amendment and the water quality standards and effluent limitations.

6.1.13 Resolution of Inconsistencies

Based on the above analyses, it does not appear that there are any substantial inconsistencies, at the planning stage, between the phased alternatives and the various goals and objectives of the planning, environmental and natural resource laws and policies of the Commonwealth of Pennsylvania. Additional wetlands delineation and vegetation species assessments and other environmental assessments are expected to be required as part of the design of the Phase I interceptor improvements.

6.2 Phase I Alternative Evaluation

A number of factors were considered to determine the best alternative option for Phase I. Table 6-1 includes the major advantages and disadvantages for each alternative. Preliminary planning-level project cost estimates were prepared for each alternative. Alternative 1 will replace the existing interceptor pipe and manholes with new, larger pipe and pre-cast manholes that will located within the same trench as the existing interceptor. No new rights-of-way will be needed to complete the Alternative 1 construction. However, since Alternative 2 involves a parallel sewer, additional rights-of-way along the 2.5 mile route will need to be acquired. GTMA staff expects this ROW acquisition will be both costly and time consuming. Estimated costs for this effort have not been developed as it will involve multiple properties.

TABLE 6-1
PHASE I ALTERNATIVES
ADVANTAGES AND DISADVANTAGES

Phase I Alternative No.	Alternative Description	Advantages	Disadvantages
1	Replace Existing Portions of Interceptor in Fayetteville and Oak Hill Basins	➢ Removes old facilities from the system that may be contributing excessive I/I ➢ Does not require acquisition of any land or rights-of-way ➢ Estimated O&M costs less than Alt. 2	➢ Highest estimated construction cost option (when not considering potential land acquisition costs)
2	Install a parallel sewer along portions of the Fayetteville and Oak Hill interceptors	➢ Provides flexibility in taking portions of existing interceptor out of service for cleaning ➢ Lower construction costs than Alt. 1	➢ Requires acquisition of rights-of-way of land ➢ O&M costs are expected to be greater than Alt. 1 given greater length of sewers

Opinions of probable construction cost were developed on a 2013 basis to determine the lowest cost alternative. As demonstrated in Table 6-2, Alternative 1 has the highest planning level estimated project cost. However, the Authority has estimated that additional land easements for Alternative 2 would be difficult to acquire and this cost is not included. The estimated breakdown of costs is provided in Table H-1 and Table H-2 in Appendix H. The planning level construction cost estimate provided in the 2013 Capacity Evaluation was provided at a higher-level of detail and included a higher contingency value to account for associated unknown project costs.

TABLE 6-2
PHASE I ALTERNATIVES
ESTIMATED PROJECT COST [1]

Phase I Alternative No.	Alternative Description	Estimated Project Cost (2013 dollars)
1	Replace Existing Portions of Interceptor in Fayetteville and Oak Hill Basins	$ 5,700,000
2	Install a parallel sewer along portions of the Fayetteville and Oak Hill interceptors	$ 5,000,000[2]

Notes:
(1) Estimate of probable project cost for each alternative is given in Appendix H.
(2) Estimate does not include land acquisition costs associated with Alternative 2.

Based on the evaluation of the Phase I alternatives, the selected wastewater management approach to meet the existing and projected 20-year peak flows is Alternative 1, replacing the existing interceptor with a larger 24-inch sewer. This alternative does not require additional land or rights-of-way acquisition and eliminates older sewers that may be contributing excessive I&I. An evaluation of potential financing methods, along with an estimate of the user rate impact is included in Section 7.

7.0 FUNDING METHODS

PADEP guidelines for preparation of ACT 537 Plans specify that an analysis of funding methods available to finance the proposed improvements needed within the next 5 years must be undertaken. The PADEP requires that Act 537 Plans quantify the anticipated impacts of the selected capital improvements and funding mechanisms on system user rates. Over the next five years, GTMA will need to finance Phase I, the beginning of Phase II investigations, and its share of the Chambersburg WWTP improvements

The planning-level opinion of probable project cost for Alternative 1, in 2013 dollars, is $5.7 million, including a 25% allowance of costs for Engineering, Legal, Financial and Administrative expenses. The estimated breakdown of project costs is provided in Appendix H. The GTMA is in the process of securing a 2013 series of bonds totaling $27 million. Approximately $20 million of the bond funds will be used to finance GTMA's portion of the

Chambersburg WWTP improvements. The remaining bond balance of approximately $7 million will be used for Phase I improvements. GTMA selected use of sewer revenue bonds as the method of financing given the amount of the funds required, the timing of when capital improvement funds are needed, the current market rate for bonds compared to PENNVEST loans, and the certainty provided by use of bonding versus the extended application process and competition for limited PENNVEST funds.

GTMA's residential sewer rates are currently set at $452/year/EDU. Incorporation of the debt service payments from the 2013 bonds into GTMA's budget is expected to increase residential user rates to approximately $700/year/EDU. The GTMA Sewer User Rates with the 2013 bond are approximately 1.2% of the median household income of the service area, which is slightly below the average user rate for Pennsylvania. The balance of the Phase I and Phase II improvements will be financed by "pay as you go", with GTMA increasing its user rates as needed. The GTMA may consider additional borrowing for Phase II rehabilitation depending on the extent of the rehabilitation needed. GTMA will undertake an analysis of financing options for Phase II rehabilitation, once the costs are better defined after the Phase II investigations are completed.

8.0 CONCLUSIONS

GTMA has invested in a phased approach to manage the current and projected 20-year flows to mediate the sanitary sewer overflows that the system has recently reported in Fayetteville. Phase I improvements will commence after PADEP approval of the Act 537 Amendment. The Phase I alternative of choice is Alternative 1: replace sections of the existing interceptor in Fayetteville and Oak Hill Basins. Concurrently with Phase I, Phase II investigations will begin. After the completion of Phase I, Phase II investigations will continue including flow data monitoring and analyses. Table 8-1 gives an implementation schedule for completion of the improvements and investigations identified in this Act 537 Plan Amendment. The alternatives discussed in the Act 537 Plan Update Amendment are consistent with areas defined in Appendix B of the Pennsylvania Sewage Facilities Act, A Guide for Preparing Act 537 Update Revisions.

TABLE 8-1
IMPLEMENTATION SCHEDULE

Project Component	Start	End
I. Preliminary Items		
1. Adopt Act 537 Plan Update Amendment	4/23/2013	5/7/2013
2. Submit Act 537 Plan Update Amendment to PADEP for Review and Approval	5/12/2013	5/12/2013
3. PADEP Act 537 Plan Update Amendment Approval	5/13/2013	10/13/2013
4. Environmental Assessment for Phase I	5/1/2013	4/1/2014
II. Phase I – Fayetteville Interceptor Improvements	Duration after DEP Approval of GTMA Act 537 Plan Update Amendment	
1. Field Survey and Design	7 Months (after Task I.4. completion)	
2. Permitting	4 Months (after Task II.1. completion)	
3. Bid Phase	4 Months (after Task II.2. completion)	
4. Construction	1 Year (after Task II.3. completion)	
III. Phase II – SSES Program and Additional Investigations	Duration during/after Phase I Completion	
1. First Priority Basins		
a. Field Investigations	1.5 Years (initiated during Task II.3 and completed 1 month after Task II.4. completion)	
b. Finding Summary	1 Month (after Task III.1.a. completion)	
c. Rehabilitation - Design and Permitting	8 Months (after Task III.1.b. completion)	
d. Rehabilitation - Bid Phase	3 Months (after Task III.1.c. completion)	
e. Rehabilitation - Construction	1 Year (after Task III.1.d. completion)	
2. Second Priority Basins		
f. Field Investigations	2 Years (after Task III.1. completion)	
g. Finding Summary	1 Month (after Task III.2.f. completion)	
h. Rehabilitation - Design and Permitting	8 Months (after Task III.2.g. completion)	
i. Rehabilitation - Bid Phase	3 Months (after Task III.2.h. completion)	
j. Rehabilitation - Construction	1 Year (after Task III.2.i. completion)	
3. Evaluation of Metering and Additional Activities Required for Phase III	7.5 Years (concurrently during Task III.1. and Task III.2)	
IV. Phase III -	8 Years (after Task III completion)	

Appendix A

Gannett Fleming

*Excellence Delivered **As Promised***

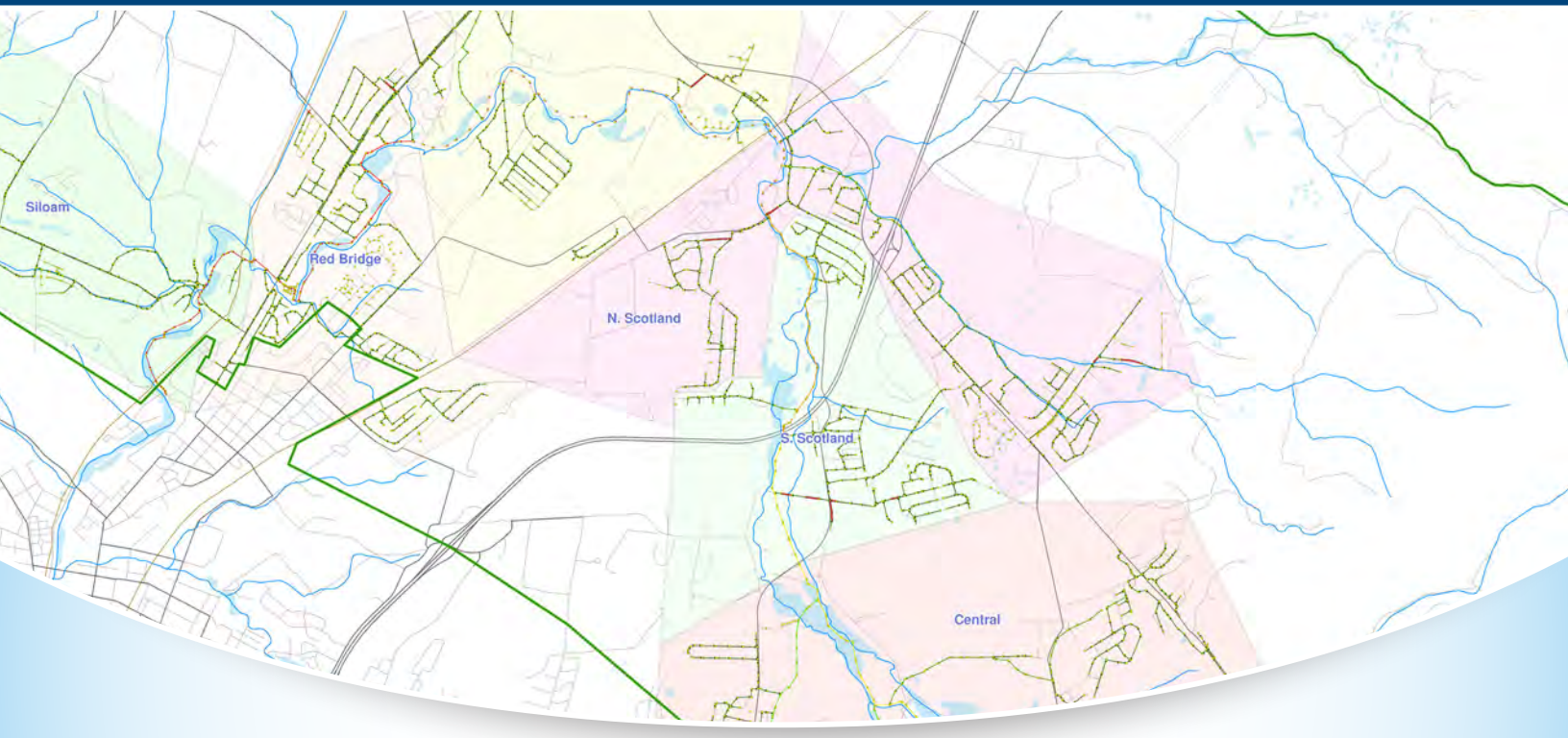
2013 Sewer System Model Enhancement and Capacity Evaluation Report – 2013 Capacity Evaluation

Excellence Delivered ***As Promised***

Submitted to:

GREENE TOWNSHIP MUNICIPAL AUTHORITY 263-5324

Greene Township Municipal Authority
Sewer System Enhancement and Capacity Evaluation Report



Submitted by:

Gannett Fleming

Excellence Delivered ***As Promised***

January 2013

ISO 9001:2008 CERTIFIED

Figures **Title** **Page**

Tables **Title** **Page**

Appendices **Title**

Abbreviation	Definition
ADWF	Average Dry Weather Flow
CAP	Corrective Action Plan
DIP	Ductile Iron Pipe
EDU	Equivalent Dwelling Unit
GF	Gannett Fleming, Inc.
GIS	Geographic Information System
gpd	Gallons per day
GTMA	Greene Township Municipal Authority
I&I	Inflow and infiltration
mgd	Million gallons per day
NDCD	National Climatic Data Center
NOAA	National Oceanic and Atmospheric Administration
PADEP	Pennsylvania Department of Environmental Protection
SSO	Sanitary sewer overflows
WTP	Wastewater Treatment Plant

1.0 BACKGROUND

In accordance with the Greene Township Municipal Authority (GTMA) Corrective Action Plan (CAP) approved by the Pennsylvania Department of Environmental Protection (PADEP) in October 2009 and updated in June 2012, Gannett Fleming (GF) developed a computer model of the GTMA sewer system in April 2012 during Phase I of the Modeling and Analyses Project. Phase I consisted of developing a model of GTMA's sewer system in Bentley's SewerGEMS software using GTMA's existing Geographic Information System (GIS) data and flow metering data recorded in 2011. The model was subsequently used to complete a preliminary hydraulic capacity analysis of GTMA's interceptor system. The results of this Phase I effort are documented in the Sewer System Model Development and Analysis Modeling Report, dated April 2012 (2012 Report). Phase II of the Modeling and Analyses Project enhanced the sewer model to perform more detailed analysis of GTMA's sewer system interceptor capacity. A map of the GTMA sewer system is provided in Exhibit 1.

Phase II Modeling and Analyses includes the following primary components:

1. Model Interceptor Update: The simulation of the GTMA interceptor within the model was updated to address data needs identified during the Phase I effort.
2. Average Dry Weather Flow (ADWF) Update: As part of the Phase I effort, flows in the model were primarily assigned as inflow at the metering locations along the interceptor. As part of Phase II, the system ADWF, which includes sanitary flow as well as base infiltration, was allocated to tributary sewers connecting to the interceptor to better replicate the spatial distribution of flows along the interceptor. Additional flow meter data available during 2012 was also evaluated to further assess the flow assignment in the model.
3. Wet Weather Flow Update: A more refined allocation of wet weather flows, similar to the spatial allocation of the ADWF, was also completed during Phase II. In addition, the flows for the modeled wet weather simulation were categorized to represent the portion of flow contributed from the ADWF versus those flows

attributed to rainfall derived inflow and infiltration (I&I). The updated wet weather simulation was then verified against meter data to confirm a reasonable match between model and field results.

4. Future Year Flows: Based on estimates of potential growth in the system provided by GTMA, a future year flow scenario was established in the model.
5. Interceptor Capacity and Improvement Identification: The updated model was used to identify areas of predicted surcharges and overflows, and to identify recommendations for interceptor improvements in the Fayetteville Basin, as well as potential long-term improvements for the interceptor system beyond Fayetteville, for a selected design storm. The model was also used along with evaluation of the flow meter data to identify sewer basins where rehabilitation may be applicable to address capacity issues.

The CAP includes a requirement for GTMA to submit an amendment to the Greene Township Act 537 Sewage Facilities Plan to address hydraulic overload conditions within the GTMA sewer system. This Phase 2 Modeling Report will serve as a foundation document for GTMA's use in meeting the Act 537 Plan amendment requirement of the CAP. It is expected this Report will be included as an Appendix to the Greene Township Act 537 Plan amendment.

RED BRIDGE BASIN

GREENVILLAGE BASIN

NORTH SCOTLAND BASIN

SILOAM BASIN

PENN HALL METER

CENTRAL BASIN

SOUTH SCOTLAND BASIN

MH 99 NEWMAN ROAD SUB-BASIN

FAYETTEVILLE BASIN

MH 35 BLACK GAP ROAD SUB-BASIN

OAK HILL BASIN

MH 138 MT. PLEASANT ROAD SUB-BASIN

MH 200 HIDDEN VALLEY SUB-BASIN

MH 248 TRAYER HOWE SUB-BASIN

MH 225 RITE SPOT SUB-BASIN

MH 378 METER

GREENE KNOLLS BASIN

Legend

- BASIN BOUNDARY
- PUMP STATION (PS)
- METER (M)
- INTERCEPTOR

SEWER SIZE
- Missing Diameter
- <= 8-inch
- 10-inch
- 12-inch
- 15-inch or 16-inch
- 18-inch
- 21-inch
- 24-inch
- 27-inch
- 30-inch

GREENE TOWNSHIP MUNICIPAL AUTHORITY

2012 EXISTING SYSTEM

N W E S

EXHIBIT 1
JANUARY 2013

5,000 2,500 0 5,000 Feet

1 Inch = 5,000 Feet

GREENE TOWNSHIP MUNICIPAL AUTHORITY

Gannett Fleming

2.0 MODEL INTERCEPTOR UPDATE

The 2012 Report identified several data needs to refine the simulation of the GTMA Interceptor. Specific needs were identified during the development of the model in Phase I. During Phase II, the needs most critical to the model simulation of the interceptor were resolved through use of record drawings provided by GTMA and/or additional information provided by GTMA based on field observation. Specific updates to the model interceptor made during Phase II included the following:

- Update of several interceptor diameters
- Identification and simulation of drop manholes along the interceptor
- Identification and simulation of bolted manholes along the interceptor
- Revision of the sewer profile in Oak Hill near manhole 515
- Refinement of the Siloam siphons simulations.

3.0 AVERAGE DRY WEATHER FLOWS

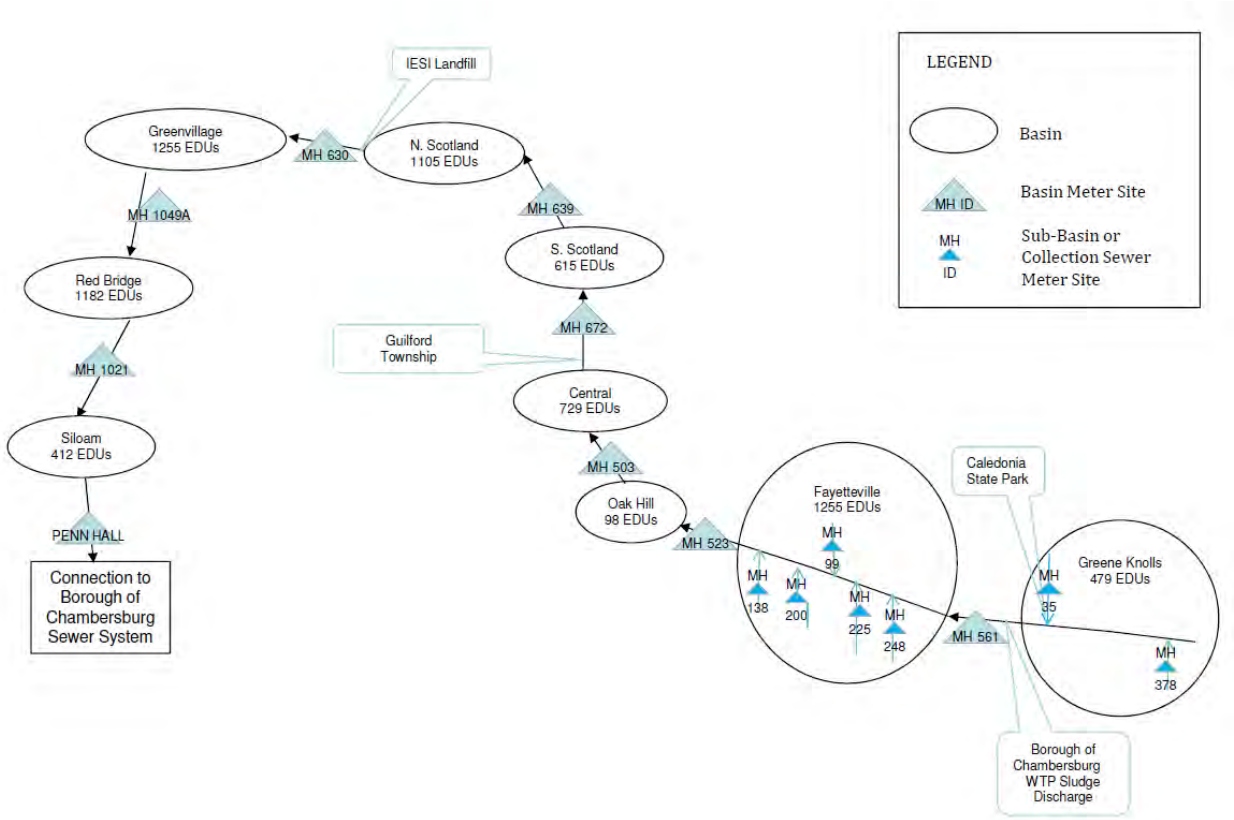
3.1 Flow Metering Data

As part of GTMA's CAP, flow metering of basins within the GTMA sanitary sewer system began in the summer of 2009. Meters are located along the interceptor at nine (9) sites corresponding to the downstream reach of each of its primary sewer basins. Additionally, GTMA also has metering sites located in the collection sewers measuring depth and velocity for five (5) sub-basins that are tributary to the interceptor in the Fayetteville Basin and for two (2) sub-basins tributary to the interceptor in Greene Knolls Basin (at Manhole 378 and the Black Gap Road Sub-Basin at Manhole 35). The Fayetteville sub-basin data included flow recordings from:

- Trayer Howe Sub-Basin at Manhole 248
- Rite Spot Sub-Basin at Manhole 225
- Newman Road Sub-Basin at Manhole 99
- Hidden Valley Sub-Basin at Manhole 200, and
- Mount Pleasant Sub-Basin at Manhole 138.

The data from the nine (9) sites along the interceptor and from the Black Gap Road Sub-Basin site were used during the Phase I analyses. The additional sub-basin meters were not considered in the Phase I analyses but were considered during the Phase II analyses. A schematic identifying basin and sub-basin flow metering sites used for the Phase II analyses is provided in Figure 1.

FIGURE 1: System Schematic of Metering Locations



3.2 Average Dry Weather Flow Assignment

Details of the methodology for establishing the ADWF by basin are provided in the 2012 Report. In summary, available meter data from the metering sites was used to establish an average flow per basin for dry weather days. A dry weather day was defined as day with no precipitation and no precipitation in the previous 2 days. The metering data includes different recording increments for the metering sites. The increments range between every 15-minutes to hourly recorded data. The ADWF per basin was calculated in available increments over a 24-hour period. These average flows were then used to establish an average dry weather diurnal flow pattern for each basin. The cumulative ADWF for the system was estimated to be 2.6 mgd.

Updated Equivalent Dwelling Unit (EDU) counts were provided by GTMA and verified by GF through collecting data associated with available mapped customers for each incoming collection sewer to the interceptor. The EDU counts were utilized along with the sub-basin metering data to improve the spatial distribution of dry weather flows in the model. Based on review of available data, an estimated average sanitary flow of 125 gallons per day (gpd) per EDU was applied to the estimated number of EDU's per sub-basin to establish the allocation of average daily sanitary flows through the interceptor system. The calculated diurnal patterns were then applied to the sanitary flows based on the metering data. The base infiltration for each metered basin and sub-basin was then calculated as the difference between the ADWF and the average sanitary flow. The estimated base infiltration for non-metered sub-basins was based on the base infiltration for the basin and distributed based on the percentage of EDUs for the sub-basin relative to that in the basin. Table 1 provides a summary of the model ADWF assignment by basin and Appendix A contains a table summarizing modeled sub-basin ADWF.

TABLE 1: Model ADWF Summary

Meter ID	Basin	EDUs	Base Sanitary Flow (mgd)	Base Infiltration (mgd)	Basin ADWF (mgd)	Cumulative ADWF (mgd)
MH 561	Greene Knolls	479	0.07	0.24	0.31	0.31
MH 523	Fayetteville	1264	0.16	0.42	0.58	0.89
MH 503	Oak Hill	98	0.01	0.28	0.29	1.18
MH 672	Central	732	0.09	0.27	0.36	1.54
MH 639	South Scotland	616	0.08	0.14	0.22	1.76
MH 630	North Scotland	1108	0.14	0.27	0.41	2.17
MH 1049A	Greenvillage	1267	0.16	0.01	0.17	2.34
MH 1021	Red Bridge	1190	0.14	0.07	0.23	2.57
PENN HALL	Siloam	412	0.05	0.01	0.06	2.63
TOTAL		7166	0.90	1.71	2.63	

4.0 WET WEATHER FLOWS

4.1 Rainfall Data

GTMA currently owns and maintains one (1) manual recording rain gauge, which is generally read every 1 to 10 days. Rain data with a minimum sampling frequency of 1-hour, or preferably 15-minutes, is required to establish a correspondence between rainfall intensity and rainfall derived I&I, which is necessary in developing a predictive sewer system hydrologic model. The National Oceanic and Atmospheric Administration (NOAA) provides publicly available weather data through the National Climatic Data Center (NCDC) database. The Fayetteville Station is the closest NOAA observational station that recorded at a frequency of one-hour or less during 2011. The station maintained 15-minute precipitation data during 2011 and is located greater than ten (10) miles from the GTMA system. Given the often significant spatial variation in storm events, the distance of this rain station makes it of limited use in assessing rainfall response in the GTMA system. Based on the lack of rainfall data within a reasonable proximity to the GTMA system that samples at a frequency of 1 hour or less, it was determined that a reasonably well-calibrated predictive hydrologic model of the system could not be developed at this time.

4.2 System Design Event Selection

2011 was an unusually wet weather year in South-Central Pennsylvania with several rainfall events of historical significance, including Tropical Storm Lee. Therefore, due to the wet antecedent conditions and rainfall events of historical significance, it was determined appropriate to utilize GTMA recorded flow meter data from 2011 to establish a "system design event" that was simulated in the model to assess system response.

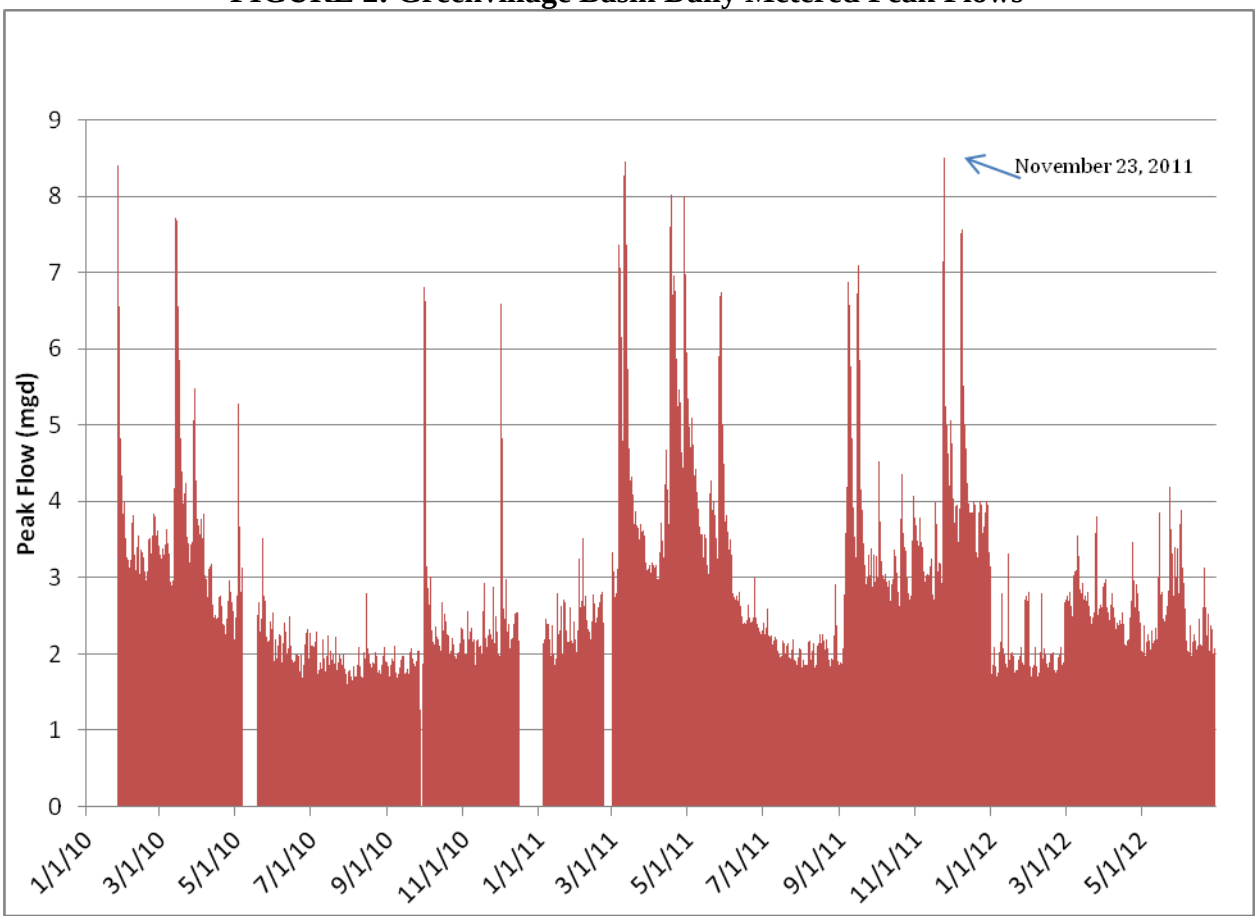
Rainfall data from the GTMA rainfall gauge as well as precipitation data from the NOAA Fayetteville Station were used to identify the approximate dates of the peak rainfall events experienced in the GTMA system in 2011. From this data and a review of GTMA flow metering data, eight (8) significant 2011 storm events were identified. Table B1 in Appendix B provides the metered peak flows recorded at the GTMA metering sites during these eight (8) storm events.

A sewer system's I&I response to a given rainfall event may not be directly correlated to the significance of the rainfall event. Prior experience in model analyses and assessments of metering data indicates that antecedent conditions, including ground saturation, stream flow levels, and the time of year, amongst other variables, have a significant impact on the I&I response to a given rainfall event. For example, a lesser rainfall event may produce a more significant I&I response, depending upon the antecedent conditions. Thus, it is important to consider the sewer system response, and not simply the significance of the rainfall event in identifying a system design event rather than simply selecting a design storm.

A graphical representation of metered peak flows at GTMA's Greenvillage Basin metering site (Manhole 1049A) between January 2010 and June 2012 is provided in Figure 2. The largest recorded peak flow for the period occurred on November 23, 2011, corresponding to a rainfall event that began on November 22, 2011 (November 22 Storm). At a minimum, the system response to the November 22 Storm can be considered to have a return frequency of at least two (2) years as the sampling provided a record of 2.5 years. However, given the fact that 2011 was a wet year with several storm events with a high return frequency (likely in excess of ten (10) years), it can be assumed that the November 22 Storm produced a system response with a return frequency well in excess of two (2) years.

Based on review of available data, the November 22 Storm was selected as the system design event. Typical industry standard calls for selection of design storms with return frequencies of two (2) to five (5) years. It is believed that selection of the November 22 Storm as the system design event will result in a very conservative assessment of system peak flow response. This conservative approach is considered appropriate for use in identifying improvements for the Fayetteville interceptor, which has previously been deemed beyond capacity. The use of the November 22 Storm also provides a means to measure the capacity throughout the interceptor system under a worst-case peak flow event. However, use of the November 22 Storm may be overly conservative in predicting the long-term need for system upgrade in other portions of the system.

FIGURE 2: Greenvillage Basin Daily Metered Peak Flows



4.3 Model Simulation of Design Event

The model was set up to simulate the November 22 Storm. The available metering data was utilized to determine the flows for the event by basin and sub-basin for the sub-basins that were metered. It was assumed that the sanitary flows and base infiltration flows during the November 22 Storm were consistent with the ADWF to estimate the rainfall derived I&I component of the recorded flows for the November 22 Storm. This rainfall derived I&I component can then be applied to any dry weather flow condition, including assessment of future sanitary flows to assess the system under the design event. The rainfall derived I&I component of the November 22 Storm was allocated to sub-basins at the incoming collection sewers based on the approximate area of the sub-basin and the length of sewer in a given sub-basin relative to

the total for that basin. The design event was simulated in the model for 96 hours to account for attenuation and system response.

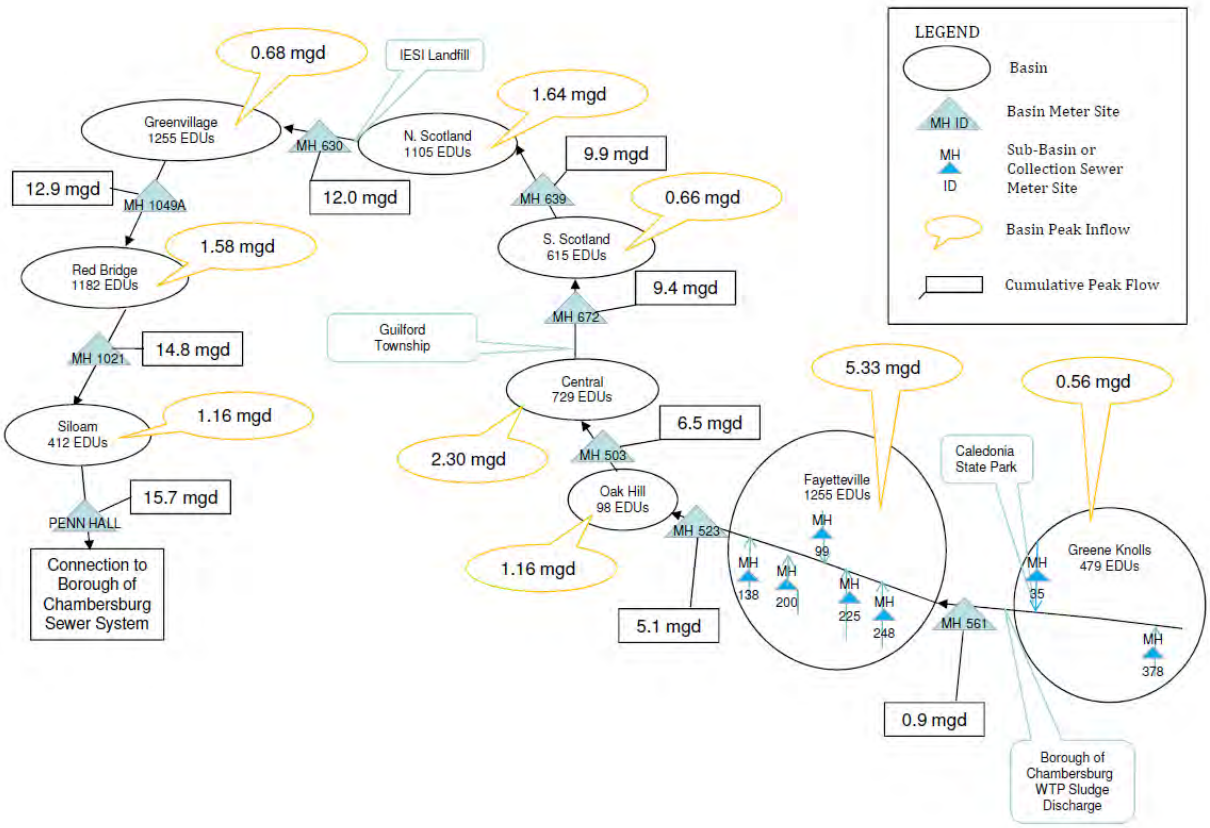
Evaluation of the flow meter data for the November 22 Storm shows decreases in flow proceeding downstream along the interceptor at Manholes 523, 561, and Penn Hall Meter. Further, the sub-basin meters in Fayetteville recorded more flow than the Fayetteville Basin meter located on the interceptor at Manhole 523. Sanitary sewer overflows (SSOs) were reported during this storm event, which would account for the flow loss in the Fayetteville Basin.

Manhole 1049A flow data indicates marginal increase in flow of 0.01 mgd for the Greenvillage Basin compared with the upstream North Scotland Basin. The South Scotland meter at Manhole 630 did not record flow data during the design storm. The flow data at the Oak Hill Basin metering site Manhole 503, indicates intervals during the peak of the storm where the flow decreased and leveled out close to zero mgd. The Penn Hall Meter, Red Bridge, and North Scotland meters also indicate flow decreases during the peak of the November 22 Storm. The observations suggest a backflow condition from the Chambersburg system during the November 22 Storm. This backflow condition appears to constrain the flow that can enter the GTMA interceptor.

The results of the meter data evaluation were used to approximate the potential flow that would have entered the GTMA interceptor during the November 22 Storm if the system was not constrained by capacity of the existing interceptor or by the downstream capacity in Chambersburg. The unconstrained inflows to the Fayetteville Basin were established through use of the sub-basin meters in Fayetteville. The unconstrained inflows to the basins for which metering data suggested no flow increase were estimated through evaluation of peak flows from the eight (8) other storm events identified during 2011. The largest peak inflow read at each of these metering sites for the other storm events was used to estimate the unconstrained peak flow for a given basin during the design event. For the purpose of assessing the potential unconstrained flow in the GTMA system, the discharge of flow from the GTMA interceptor to Chambersburg was simulated as a free outfall (potential backflow condition from the

Chambersburg system was not simulated). Figure 3 provides a schematic of the peak inflows added to each basin in the model for the November 22 Storm.

FIGURE 3: Design Storm Modeled Peak Inflows



5.0 INTERCEPTOR CAPACITY ANALYSIS AND SYSTEM NEEDS ASSESSMENT

The sewer model was utilized to assess the capacity of the existing GTMA interceptor relative to the November 22 Storm. The model simulation of the approximated flows for the November 22 Storm predicts the occurrence of overflows and backflow that is believed to have occurred during the event. Model results predict that surcharging occurred along the majority of the interceptor during the November 22 Storm. The model predicted overflows in the Fayetteville Basin at or near sites that have had reported SSOs. Other basins where the modeled peak flow predicted overflows include: Oak Hill, Central, North Scotland, Greenvillage, Red Bridge, and Siloam. Profiles of the interceptor showing the model-predicted water level, which reflect the surcharging, during the November 22 Storm are provided in Appendix C.

The model simulation of the November 22 Storm predicts the peak flow at the Penn Hall meter location to be approximately 8.8 mgd as opposed to the metered peak flow of approximately 8.7 mgd. If the GTMA interceptor, as well as the Chambersburg interceptor, were able to convey all inflows into the system during the November 22 Storm, the cumulative system peak flow ("unconstrained peak flow") at the Penn Hall meter is estimated to be approximately 15.1 mgd. Given the unknowns in the volume of overflow and extent of backwater and system constraint impacts, the actual unconstrained peak flow for the November 22 Storm cannot be accurately predicted. It is believed that the method used to establish the unconstrained peak flows as part of the current evaluation is a conservative approach for evaluating potential Fayetteville interceptor improvements.

A comparison of the full pipe flow capacity of the interceptor with the estimated unconstrained peak flow experienced during the November 22 Storm was made to provide a means to identify specific areas that may require improvement in order to adequately convey existing peak flows. The full pipe flow capacity is the amount a specific section of the interceptor can convey without becoming surcharged. The comparison is provided in Table 2.

TABLE 2: Interceptor Capacity Assessment

Basin	Metering Site	Cumulative Full Pipe Flow Capacity (mgd)	Cumulative ADWF (mgd)	Full Pipe Flow Capacity to ADWF Ratio	Unconstrained Peak Flow for Nov 22 Storm (mgd)	Full Pipe Flow Capacity to Unconstrained Peak Flow Ratio
Greene Knolls	35	1.0	0.31	3:1	0.9	1:1
	378					
	561					
Fayetteville	248	2.1	0.89	2:1	6.5	less than 1:1
	225					
	200					
	138					
	99					
	523					
Oak Hill	503	2.8	1.18	2:1	7.3	less than 1:1
Central	672	4.6	1.54	3:1	9.7	less than 1:1
South Scotland	639	6.0	1.76	3:1	10.2	less than 1:1
North Scotland	630	7.6	2.17	4:1	12.1	less than 1:1
Greenvillage	1049A	7.6	2.34	3:1	12.5	less than 1:1
Red Bridge	1021	13.0	2.57	5:1	14.1	less than 1:1
Siloam	MC1 (Penn Hall)	13.0	2.63	5:1	15.1	less than 1:1

The results presented in Table 2 further indicate that the interceptor capacity is not sufficient to convey the peak flows of the November 22 Storm without surcharging. Further review of Table 2 indicates that the interceptor in the Fayetteville and Oak Hill Basins can convey only two (2) times the ADWF. This, coupled with the model-predicted surcharging and overflows during the November 22 Storm, indicate that the interceptor is undersized in this area. Table 2 further shows that the interceptor in the Greene Knolls, Central, South Scotland, and Greenvillage Basins can convey only three (3) times the ADWF, in the North Scotland Basin the interceptor can convey four (4) times the ADWF, and in the Red Bridge and Siloam Basins the interceptor can convey five (5) times the ADWF. This suggests that a significant portion of the interceptor may be undersized even if aggressive measures are undertaken to control I&I in the

system. A summary of the capacity analyses and needs assessment for each basin, which includes potential impact of I&I reduction, is presented below.

5.1 Greene Knolls Basin

The Greene Knolls Basin is comprised of approximately 50,400 linear feet of sewer ranging in size from 4- to 10-inch pipe, including the 5,200 feet of 10-inch interceptor. There are 479 total EDUs in the Greene Knolls Basin, with 125 EDUs in Black Gap Road Sub-Basin and 120 EDUs in the sub-basin metered by MH 378. The Greene Knolls Basin conveys flow from the Caledonia State Park and from the Borough of Chambersburg Water Treatment Plant (WTP) Sludge Discharge. The Chambersburg WTP sludge discharge averaged approximately 10,000 gpd during 2010 and 2011 and discharges approximately 600 gpm for 5 minutes during a typical tank cleaning. The Black Gap Road Sub-Basin has an area-velocity meter that recorded peak flows up to 0.88 mgd during the November 22 Storm. This peak flow was calculated to be 45,200 gpd per inch-mile of tributary sewer and 7,000 gpd per EDU. Given the length of main in the sub-basin and the number of EDUs, the Black Gap Road Sub-Basin experiences significant I&I compared to a typical sanitary sewer system. Flow metering at Manhole 378 in the Greene Knolls Basin recorded a peak of 0.18 mgd during the November 22 Storm, which is calculated to be 15,000 gpd per inch-mile and approximately 1,500 gpd per EDU. According to the 2011 metering data and compared with the other basins/sub-basins, the rest of Greene Knolls Basin and the Manhole 378 sub-basin are considered lower priority areas for I&I investigation.

5.2 Fayetteville Basin

The Fayetteville Basin is comprised of approximately 111,500 linear feet of sewer ranging in size from 4- to 15-inch pipe. The interceptor ranges in size from 12 to 15 inches and is approximately 12,340 linear feet in length. There are 1,264 EDUs in the Fayetteville Basin. The sewer model simulation results indicate a full pipe flow capacity in the Fayetteville interceptor of 2.1 mgd. The existing cumulative ADWF conveyed is approximately 0.90 mgd, which provides a ratio of only 2:1 full pipe capacity to ADWF. Considering a typical design

sanitary flow peaking factor of 4:1, the sewer can be considered undersized for existing flows. The metered peak flow during the November 22 Storm was 1.8 mgd. The peak recorded flow at the Fayetteville Basin meter is less than the cumulative peak flows upstream in the Greene Knolls basin and in the metered Fayetteville sub-basins, which is evidence of SSOs in the basin during this event

5.2.1 Trayer Howe - Route 30 Sub-Basin

The Trayer Howe Sub-Basin flows into a portion of the Fayetteville's 12-inch interceptor. There are 180 EDUs in the sub-basin and approximately 19,000 linear feet of sewer. A metered peak flow for the sub-basin of 1.1 mgd was recorded during the November 22 Storm. The metered peak flow corresponds to 38,100 gpd per inch-mile and approximately 6,100 gpd per EDU. Given the peak flows, length of main and EDUs in the sub-basin compared with the rest of the sewer system, significant I&I is experienced in Trayer Howe.

5.2.2 Rite Spot Sub-Basin

There are approximately 16,500 feet of gravity main, a lift station and approximately 800 feet of force main in the Rite Sport Sub-Basin. 232 EDUs are accounted for in the sub-basin. The peak flow during the November 22 Storm was recorded to be 0.53 mgd and is approximately 20,800 gpd per inch-mile and 2,300 gpd per EDU. (These calculations include assumptions for approximately 4,300 feet of sewers with unknown diameters. For these sewers, an 8-inch diameter was assumed.) The 2011 peak flow calculations, when compared with the other basins, indicate Rite Spot Sub-Basin as a lower priority area for I&I rehabilitation or repair.

5.2.3 Hidden Valley Road Sub-Basin

The Hidden Valley Road Sub-Basin includes 70 EDUs that contribute flow to the approximate 13,600 feet of 8-inch sewer. During the November 22 Storm, a peak flow of 0.54 mgd was metered, which is approximately 26,200 gpd per inch-mile and 7,700 gpd per EDU. This sub-basin has a higher peak flow per EDU compared with the other basins, but has an average peak flow per length of sewer. This combination could be contributed to the location

of the sewers, the soil-type, and density of the basin. When compared with calculations of the other sub-basins and basins, Hidden Valley would be ranked as medium priority for additional I&I investigation and rehabilitation.

5.2.4 Newman Road Sub-Basin

The Newman Road Sub-Basin is comprised of 184 EDUs that contribute flow to the approximately 20,100 feet of 8-inch sewer. The recorded peak flow of 1.3 mgd during the November 22 Storm equates to approximately 42,700 gpd per inch-mile and 7,100 gpd per EDU. When compared with the other basins, Newman Road Sub-Basin is ranked as a higher priority for repairs to the sewers to reduce the I&I.

5.2.5 Mount Pleasant Road Sub-Basin

There are 92 EDUs that contribute flow to the approximate 5,600 feet of 8- and 10-inch sewers in the Mount Pleasant Road Sub-Basin. The meter recorded 1.5 mgd for a peak flow during the November 22 Storm. The peak flow is calculated to be approximately 169,900 gpd per inch-mile and 16,300 gpd per EDU. These calculations place the Mount Pleasant Road Sub-Basin as one of the highest ranking candidates for I&I investigation and repair.

5.3 Oak Hill Basin

The Oak Hill Basin includes 98 EDUs contributing flow to approximately 5,100 feet of 8- and 10-inch sewers as well as the 6,200 feet of 15- and 18-inch interceptor. The metered peak flow during the November 22 Storm was 4.3 mgd, of which approximately 2.5 mgd is attributed to the Oak Hill Basin flows. The calculations of approximately 316,400 gpd per inch-mile and 25,600 gpd per EDU would prioritize and rank this basin as one of the highest basins identified for I&I repair. However, as established during the capacity analysis, this basin is also undersized relative to the system ADWF. Therefore, an interceptor upgrade is needed along with I&I investigation extending into the sub-basin tributary sewers and subsequent rehabilitation and repair to reduce I&I.

5.4 Central Basin

The Central Basin is comprised of approximately 75,800 linear feet of sewer ranging in size from 8- to 18-inch, including approximately 5,800 feet of 18-inch interceptor. There are 732 EDUs in the Central Basin. The basin also receives flow from Guilford Township ranging between 0.18 and 0.42 mgd. Metered peak flows of 7.0 mgd occurred during the November 22 Storm. The Basin peak flow of approximately 2.7 mgd calculates to approximately 23,300 gpd per inch-mile and 3,700 gpd per EDU. The metering data also showed surcharging during the November 22 Storm and indication of potential backflow. The Central Basin is considered a medium priority area for I&I investigation and should be considered for additional investigation to better asses peak flows.

5.5 South and North Scotland Basin

There are 616 EDUs that contribute flow to the approximate 61,400 feet of 4- to 21-inch of sewers in the South Scotland Basin, including 10,700 feet of 18- and 21-inch interceptor. The flow meter did not record any data for six of the eight storm events during 2011, including the November 22 Storm. A peak flow of 5.4 mgd was recorded during the May 26, 2011 storm event. However, the upstream Central Basin recorded a peak flow of 5.9 mgd during the same storm at approximately the same time. Given this discrepancy and the lack of data from other storm events, the metering data was not used to assess the peak flow per inch-mile or per EDU for the South Scotland Basin. Therefore, the South and North Scotland Basins were considered from a combined perspective to assess the approximate flow per inch-mile and flow per EDU.

The North Scotland Basin includes 1,108 EDUs that contribute flow to approximately 93,100 feet of 4- to 24-inch gravity sewers, including approximately 3,200 feet of 21- and 24-inch interceptor. A metered peak flow of 8.5 mgd occurred during the November 22 Storm. The estimated combined South and North Scotland Basin peak flow of 1.5 mgd is approximately 5,700 gpd per inch-mile and 900 gpd per EDU. Both the South and North Scotland Basins should be targeted for additional study and investigation to better assess flows and needs.

5.6 Greenvillage Basin

The Greenvillage Basin has 1,267 EDUs that convey flow to the approximate 104,000 linear feet of gravity sewer ranging in size from 4 to 24-inches, including 13,500 feet of 24-inch interceptor. The basin also includes 4 lift stations, and approximately 7,100 feet of force main. The 2011 peak flow of 8.5 mgd was recorded during the November 22 Storm, which is approximately equal to the peak flow measured upstream at the North Scotland Basin. The meter data for the Greenvillage Basin suggests potential periods of backflow. Additional study and investigation should be conducted to better assess peak flows and determine if backflow conditions limit the flow that would otherwise be conveyed to the interceptor within this Basin.

5.7 Red Bridge Basin

There are 1,190 EDUs that contribute flow to the approximate 105,100 feet of 6- to 30-inch gravity sewers in the Red Bridge Basin, including approximately 9,000 feet of 24- and 30-inch interceptor. The Basin also includes a lift station and approximately 1,300 feet of force main. The peak flow recorded during 2011 was 9.3 mgd during the November 22 Storm. The recorded Basin peak flow corresponds to 4,500 gpd per inch-mile and 760 gpd per EDU. The Red Bridge meter at Manhole 1021A is upstream of two (2) of Red Bridge sub-basins. Therefore, the calculations for the flows per inch-mile and EDU only include the approximate 180 inch-mile of main and the 1,058 EDUs that contribute to the meter. Based on these values, the Basin is not currently considered a high priority area to conduct I&I repair. The metering data did indicate potential backflow through the basin meter. Therefore, this basin should also be targeted for additional study and investigation to better determine the peak flows in the Basin.

5.8 Siloam Basin

The Siloam Basin has approximately 41,000 linear feet of 4- to 30-inch gravity sewers, including approximately 6,600 feet of 30-inch interceptor. The Basin also includes a lift station and approximately 6,100 feet of force main. There are 1,197 EDUs that contribute flow to the

Siloam Basin. The 2011 peak flow of 8.7 mgd occurred during the November 22 Storm. Immediately before the peak flow, the meter was submerged for multiple hours with a flow reading of 0.0 mgd. The metering data suggest a potential backflow condition through the meter, potentially originating in the Chambersburg sewer system. Therefore, this basin should also be targeted for additional study and investigation to determine the peak flows. Such investigation would include a determination of the capacity of the Chambersburg interceptor.

5.9 Projected Flow Analysis

A future year sanitary flow scenario was assigned to the model using planning information provided by GTMA. An estimated growth within the GTMA sewer system of 2,000 new households with an average sanitary flow of 225 gpd per household was added to the existing system flows and modeled for the projected future year condition. It was assumed that half of this growth will occur north of Interstate 81, and half south of the Interstate. A peaking factor of 2:1 was applied to the average sanitary flow associated with this growth to account for diurnal fluctuations and some I&I. The future sanitary and peak flows were analyzed for the existing system design event. Model results indicate that the needs to accommodate future flows are similar to those identified to accommodate the existing flows due to the significant peaks currently experienced in the system during the November 22 Storm.

6.0 IMPROVEMENTS

6.1 Improvement Concept

The results of the interceptor capacity evaluation and needs assessment provided a means to identify short- and long-term improvement needs for the GTMA interceptor. In addition, the evaluation and needs assessment provided a means to identify areas of the GTMA system which should be targeted for I&I reduction or additional investigation. As discussed in Section 5, the capacity evaluation indicates that the majority of the interceptor may be undersized to convey current peak flows. However, as also noted in Section 5, there is some uncertainty with regard to the extent of peak flows experienced by the system due to current SSOs and backflow conditions. Additional investigation is also required to better assess the ability of the Chambersburg interceptor to accept peak flows from the GTMA system. Due to the extent and cost of capital improvements that may be needed, the uncertainty with regard to the magnitude of peak flows, and the actual capacity of the Chambersburg interceptor to accept peak flows from the GTMA system; a three-phased improvement concept to meet current and long-term system needs has been identified. The concept includes short-term interceptor improvements to address known capacity needs in the Fayetteville Basin and long-term measures to reduce I&I and address capacity issues in other portions of the system, for which the extent of improvement needs cannot be completely defined at this time.

- Phase I involves increasing the capacity of the undersized interceptor in the Fayetteville and Oak Hill Basins. The objective of the Phase I improvements is to address the immediate concern of SSOs in the Fayetteville Basin.

- Phase II involves additional investigations to better determine peak flows in the system, investigation of downstream capacity in the Chambersburg system, available for GTMA flows, and more detailed investigation of sources of I&I and rehabilitation of identified source basins to reduce I&I.

- Phase III involves undertaking the necessary improvements to address long-term capacity issues beyond those completed in Phase I and Phase II in the GTMA interceptor.

6.2 Phase I: Fayetteville Interceptor Improvements

Phase I of the improvement concept involves improvements to the interceptor in the Fayetteville and Oak Hill Basins to address the current capacity deficiencies and reported SSOs in Fayetteville area. Two (2) alternatives were analyzed to address these issues, and are described below with planning level opinions of probable construction cost. For the purpose of the current study, the main improvements were assumed to follow the alignment of the existing interceptor. The planning level opinions of probable construction are based on 2012 unit pricing from other GF sewer installation projects and include a 25% contingency allowance to account for project unknowns. There is always uncertainty during the planning stage as to the precise content of all items that will need to be undertaken or encountered as part of a construction project. These uncertainties represent risks to the magnitude of the actual project cost and are accounted for in the planning-level estimate as contingency. The level of contingency will decrease as the project moves from planning stage, to preliminary design, to final design, bidding, and construction.

- Alternative No. 1: Install approximately 12,750 linear feet of 24-inch interceptor in the Fayetteville and the Oak Hill Basins from Fayetteville's Manhole 554 to Oak Hill's Manhole 513 (44 manholes). Exhibit 2 provides a map locating the Interceptor Improvement. The improvement will replace existing manholes and interceptor with new manholes and interceptor. The new interceptor will maintain the existing connections to the collection sewers in approximately the same location. Based on feedback from GTMA, Ductile Iron Pipe (DIP) was assumed for the new pipe material. The planning level opinion of probable construction cost of Alternative No. 1 is estimated to be approximately $5.6 million in 2013 dollars. Bypass pumping was included in the cost estimate. The improvement will mitigate the surcharging

and overflows in the area of the improvement. Profiles of the new main showing model-predicted water levels for the November 22 Storm are provided in Appendix D.

- Alternative No. 2: Install a parallel sewer along portions of the Fayetteville and Oak Hill interceptors. The improvement will include approximately 6,650 feet of 12-inch and 5,900 feet of 18-inch main between Fayetteville Manhole 553 to Oak Hill Manhole 513. A map showing the proposed improvement is provided in Exhibit 3. The existing interceptor will remain connected to the system and the new interceptor will serve as a relief line. Based on feedback from GTMA, it is assumed that the existing interceptor manholes will need to be rehabilitated as part of Alternative No. 2. Therefore, rehabilitation of the manholes on the existing Fayetteville and Oak Hill interceptor (approximately 44 manholes) are included in this alternative's planning level opinion of probable cost. Approximately 43 new manholes will be added along the parallel interceptor. For a cost comparison to Alternative No. 1, it was assumed the relief line will have 10 connections to the existing interceptor. Alternative No. 2 does not require by-pass pumping as the existing main will remain in service during construction of the parallel line. At this stage of analyses, the evaluation of Alternative No. 2 assumes the parallel main can be installed in existing right-of-way. The planning-level opinion of probable construction cost of Alternative No. 2 is approximately $4.7 million in 2013 dollars.

Based on the cost comparison of the above alternatives, Alternative No. 2 is estimated to be the more economical alternative. However, additional more detailed evaluation is required to better assess details of each alternative and refine the opinion of probable construction costs. Overall project costs of the alternatives include construction cost plus other costs GTMA would expend to complete the improvement project and represent the anticipated total cost for which financing will be needed. For planning-level purposes, project costs are considered to equal the estimated construction cost plus a 25% allowance to cover other project related costs such as

engineering design, permitting, environmental assessments, legal costs, bidding costs, financing costs and inspection costs during construction. Using this 25% allowance, results in a planning-level opinion of total project costs in excess of approximately $5.9 million and $6.9 million for the two alternatives.

RED BRIDGE BASIN

GREENVILLAGE BASIN

NORTH SCOTLAND BASIN

SILOAM BASIN

PENN HALL METER

CENTRAL BASIN

Fayetteville Interceptor Improvement
ALTERNATIVE NO. 1
Approximately 12,800 feet of 24-inch Sewer from MH 554 to MH 513

MH 99 NEWMAN ROAD SUB-BASIN

SOUTH SCOTLAND BASIN

FAYETTEVILLE BASIN

MH 35 BLACK GAP ROAD SUB-BASIN

OAK HILL BASIN

MH 138 MT. PLEASANT ROAD SUB-BASIN

MH 200 HIDDEN VALLEY SUB-BASIN

MH 248 TRAYER HOWE SUB-BASIN

MH 225 RITE SPOT SUB-BASIN

MH 378 METER

GREENE KNOLLS BASIN

Legend

BASIN BOUNDARY

PUMP STATION

METER

IMPROVEMENT

INTERCEPTOR

SEWER SIZE

- Missing Diameter
- <= 8-inch
- 10-inch
- 12-inch
- 15-inch or 16-inch
- 18-inch
- 21-inch
- 24-inch
- 27-inch
- 30-inch

GREENE TOWNSHIP MUNICIPAL AUTHORITY
PHASE I - INTERCEPTOR IMPROVEMENT
ALTERNATIVE NO. 1

N W E S

EXHIBIT 2
JANUARY 2013

5,000 2,500 0 5,000 Feet

1 Inch = 5,000 Feet

GREENE TOWNSHIP MUNICIPAL AUTHORITY

Gannett Fleming

RED BRIDGE BASIN

GREENVILLAGE BASIN

NORTH SCOTLAND BASIN

SILOAM BASIN

PENN HALL METER

CENTRAL BASIN

Fayetteville Interceptor Improvement ALTERNATIVE NO. 2 Approximately 6,650 feet of 12-inch Sewer from MH 553 to MH 533

MH 99 NEWMAN ROAD SUB-BASIN

SOUTH SCOTLAND BASIN

FAYETTEVILLE BASIN

MH 35 BLACK GAP ROAD SUB-BASIN

OAK HILL BASIN

MH 138 MT. PLEASANT ROAD SUB-BASIN

MH 200 HIDDEN VALLEY SUB-BASIN

Fayetteville Interceptor Improvement ALTERNATIVE NO. 2 Approximately 5,900 feet of 18-inch Sewer from MH 533 to MH 513

MH 225 RITE SPOT SUB-BASIN

MH 248 TRAYER HOWE SUB-BASIN

MH 378 METER

GREENE KNOLLS BASIN

Legend

BASIN BOUNDARY

PUMP STATION

METER

12- INCH IMPROVEMENT

18- INCH IMPROVEMENT

INTERCEPTOR

SEWER SIZE

- Missing Diameter
- <= 8-inch
- 10-inch
- 12-inch
- 15-inch or 16-inch
- 18-inch
- 21-inch
- 24-inch
- 27-inch
- 30-inch

GREENE TOWNSHIP MUNICIPAL AUTHORITY

FAYETTEVILLE INTERCEPTOR IMPROVEMENT ALTERNATIVE NO. 2

N W E S

EXHIBIT 3
JANUARY 2013

5,000 2,500 0 5,000 Feet

1 Inch = 5,000 Feet

GREENE TOWNSHIP MUNICIPAL AUTHORITY

Gannett Fleming

6.3 Phase II: Inflow and Infiltration Reduction

Phase II includes activities to be undertaken by GTMA to reduce I&I in prioritized basins as well as further metering and field investigations to assess system peak flows. As described in Section 5, the metered basins were compared and prioritized based on peak flow and basin size. I&I reduction could be an important component to reduce the extent of additional interceptor improvements needed for Phase III and to reduce the downstream capacity requirements within the Chambersburg system for GTMA'S flows. Table 3 provides a summary of the highest priority basins/sub-basins for I&I investigation and reduction activities based on the November 2011 flow meterings.

TABLE 3: High Priority Ranking Basins/Sub-Basins for I&I Investigation/Reduction

Rank	Basin	Meter Site	Estimated Peak I&I		Peak I&I with 20% Reduction		Peak I&I with 50% Reduction	
			(gpd/inch-mile)	(gpd/ EDU)	(gpd/inch-mile)	(gpd/ EDU)	(gpd/inch-mile)	(gpd/ EDU)
1	Oak Hill Basin	MH 503	316,400	25,600	253,100	20,500	158,200	12,800
2	Fayetteville - Mount Pleasant Road	MH 138	169,900	16,300	135,900	13,000	85,000	8,200
3	Greene Knolls - Black Gap Road	MH 35	45,200	7,300	36,200	5,900	22,600	3,700
4	Fayetteville - Newman Road	MH 99	42,700	7,100	34,200	5,700	21,400	3,600
5	Fayetteville - Trayer Howe	MH 248	38,100	6,100	30,500	4,900	19,100	3,100

Table 3 provides the estimated peak I&I flow and a potential 20 or 50 percent flow reduction in I&I. Based on experience, a 20% reduction in I&I can be considered a reasonable goal that can be achieved through a comprehensive sewer system rehabilitation program. An I&I reduction of up to 50% may be possible but is considered difficult to achieve. Based on the results of the analyses completed for the modeling to date, the Oak Hill Basin and Mount Pleasant Road Sub-Basin in Fayetteville are the highest ranked basins/sub-basins for additional I&I investigation.

Table 4 provides the ranking of medium priority basins/sub-basins for potential I&I investigation and reduction. These basins and/or sub-basins should be targeted after the high priority basins listed in Table 3 have been addressed.

TABLE 4: Medium Priority Ranking Basins/Sub-Basins for I&I Investigation/Reduction

Rank	Basin	Meter Site	Estimated Peak I&I		Peak I&I with 20% Reduction		Peak I&I with 50% Reduction	
			(gpd/ inch-mile)	(gpd/ EDU)	(gpd/ inch-mile)	(gpd/ EDU)	(gpd/ inch-mile)	(gpd/ EDU)
1	Fayetteville - Hidden Valley	MH 200	26,200	7,700	21,000	6,200	13,100	3,900
2	Central Basin	MH 672	23,300	3,700	18,600	3,000	11,700	1,900

Sewer basins that should be further inspected and investigated to better assess peak flows include North Scotland, South Scotland, Greenvillage, Red Bridge, and Siloam. The metering data for this list of basins show signs of inconsistency and/or backflow that make it difficult to establish peak flows and assess the need for facility upgrades in these basins.

6.4 Phase III: System Improvements

Phase III improvements would be initiated after Phase I is completed and the milestones of Phase II are achieved. Model results indicate significant surcharging and the occurrence of SSOs during simulation of the November 22 Storm within the GTMA inceptor, even if the Phase I improvements are implemented. The Phase III improvements would include system improvements needed to address the capacity issues not resolved in Phase I or II.

The model was used to determine the extent of improvements beyond the Phase I improvements needed to convey the estimated peak flows of the November 22 Storm, if no I&I reduction is achieved. For the purpose of this study, these improvements were assumed to consist of replacement of the existing interceptor. A summary of the upgrades, beyond the identified Phase I improvement, required to avoid surcharging during the November 22 Storm are provided below:

- Oak Hill Basin: Replace the existing 15- and 18-inch interceptor downstream of the Phase I improvements (Manhole 513) with approximately 3,200 feet of 24-inch main.
- Central Basin: Replace the existing 18-inch sewer with approximately 6,200 feet of 26-inch sewer.
- South Scotland: Replace the existing 18- and 21-inch interceptor with approximately 8,600 linear feet of 26-inch and approximately 2,100 linear feet of 30-inch sewer.
- North Scotland: Replace the existing 21- and 24-inch sewer with approximately 2,700 feet of 30-inch sewer.
- Greenvillage: Replace the existing 24-inch sewer with approximately 13,500 feet of 30-inch sewer.
- Red Bridge: Replace the existing 24-, 27-, and 30-inch sewer with approximately 2,300 feet of 30-inch sewer and 6,600 feet of 36-inch sewer.
- Siloam: Replace the existing 30-inch sewer with approximately 7,000 feet of 36-inch sewer.

The improvements noted above are consistent with the model simulation of the November 22 Storm that indicates upgrades are required to the majority of the interceptor. Given the extent of these improvements and the associated capital cost, it not considered feasible or prudent to implement them in the short-term. The additional analysis and I&I investigations and rehabilitation to be performed in Phase II are intended to better refine the design peak flows for the remainder of the Interceptor. As previously noted, the November 22 Storm produced a system response well in excess of a two-year event and its use is thus considered conservative for a design storm. Furthermore, I&I reduction that is achieved in Phase II may reduce the extent of improvements required in Phase III. Additional metering and modeling analyses, to be completed in conjunction with Phase II, will better assess the long-term improvements needs of the interceptor. Thus, the implementation of Phase II and Phase III are seen as a long-term plan to identify the most cost-effective, and sustainable solution to meet the current and long-term needs in the GTMA system.

Appendix A
Model ADWF Sub-Basin Assignment

Model Sub-Basin ADWF Summary

Basin	Sub-Basin/MH ID	EDUs	Base Infiltration (mgd)	Base Sanitary Flow (mgd)	Sub-Basin ADWF (mgd)
Greene Knolls	Black Gap Road	125	0.08	0.02	0.1
Greene Knolls	378	120	0.04	0.02	0.05
Greene Knolls	344	60	0.03	0.01	0.04
Greene Knolls	561B	160	0.09	0.02	0.11
Greene Knolls	562	6	0.00	0.00	0.00
Greene Knolls	412	8	0.00	0.00	0.01
Fayetteville	Trayer Howe	180	0.16	0.023	0.18
Fayetteville	Rite Spot	232	0.06	0.029	0.09
Fayetteville	108	133	0.00	0.017	0.02
Fayetteville	Newman Rd	184	0.01	0.023	0.03
Fayetteville	Hidden Valley	70	0.13	0.009	0.14
Fayetteville	202	211	0.00	0.026	0.03
Fayetteville	118	162	0.00	0.020	0.02
Fayetteville	Mt. Pleasant Rd	92	0.06	0.012	0.07
Oak Hill	274	98	0.28	0.01	0.29
Central	4000	402	0.15	0.05	0.20
Central	582	56	0.02	0.01	0.03
Central	1565A	274	0.10	0.03	0.13
S. Scotland	709	362	0.08	0.05	0.13
S. Scotland	663.01	69	0.02	0.01	0.02
S. Scotland	657A	51	0.01	0.01	0.02
S. Scotland	812	134	0.03	0.02	0.05
N. Scotland	826	397	0.10	0.05	0.15
N. Scotland	822	50	0.01	0.01	0.02
N. Scotland	796B	629	0.15	0.08	0.23
N. Scotland	836	32	0.01	0.00	0.01
Greenvillage	625	70	0.001	0.01	0.009
Greenvillage	859	94	0.001	0.01	0.013
Greenvillage	SYC20	68	0.001	0.01	0.009
Greenvillage	1192	203	0.002	0.03	0.027
Greenvillage	1180	832	0.008	0.10	0.112

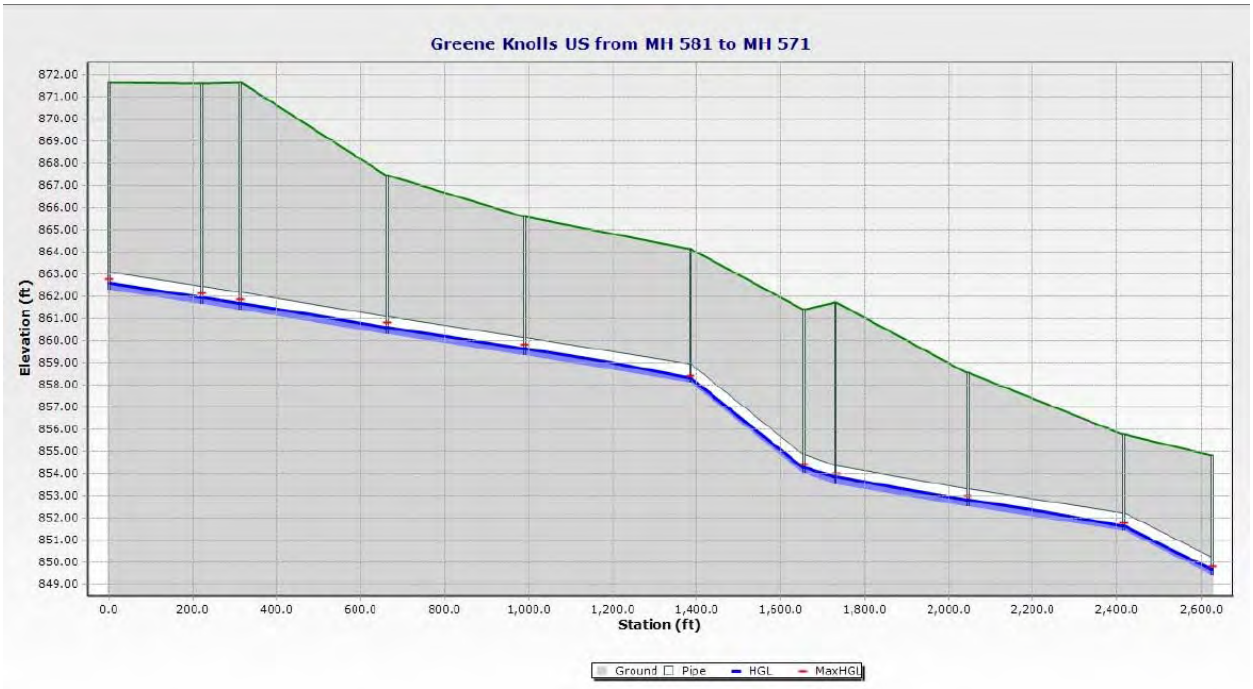
Basin	Sub-Basin/MH ID	EDUs	Base Infiltration (mgd)	Base Sanitary Flow (mgd)	Sub-Basin ADWF (mgd)
Red Bridge	1248	350	0.02	0.04	0.07
Red Bridge	1047.1	12	0.001	0.00	0.003
Red Bridge	1267B	40	0.003	0.01	0.008
Red Bridge	1043A	5	0.0005	0.00	0.001
Red Bridge	1294A	17	0.001	0.00	0.004
Red Bridge	1288A	290	0.02	0.04	0.06
Red Bridge	1309	262	0.01	0.03	0.05
Red Bridge	RIF1	60	0.006	0.01	0.01
Red Bridge	1315	22	0.002	0.00	0.005
Red Bridge	1318	13	0.0003	0.00	0.002
Red Bridge	1331	119	0.0026	0.01	0.02
Siloam	1017.1	29	0.0006	0.00	0.004
Siloam	1410	365	0.0081	0.05	0.05
Siloam	1352	18	0.0004	0.00	0.003

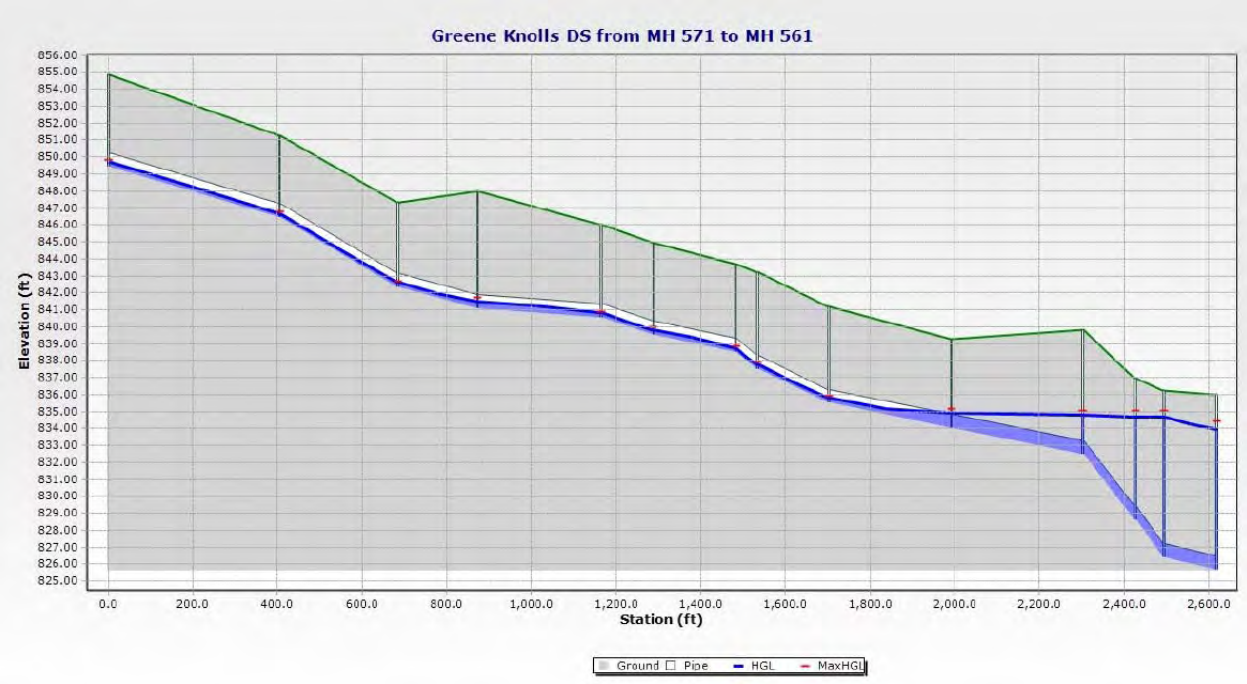
Appendix B
2011 Metered Peak Flows for Identified Storm Events

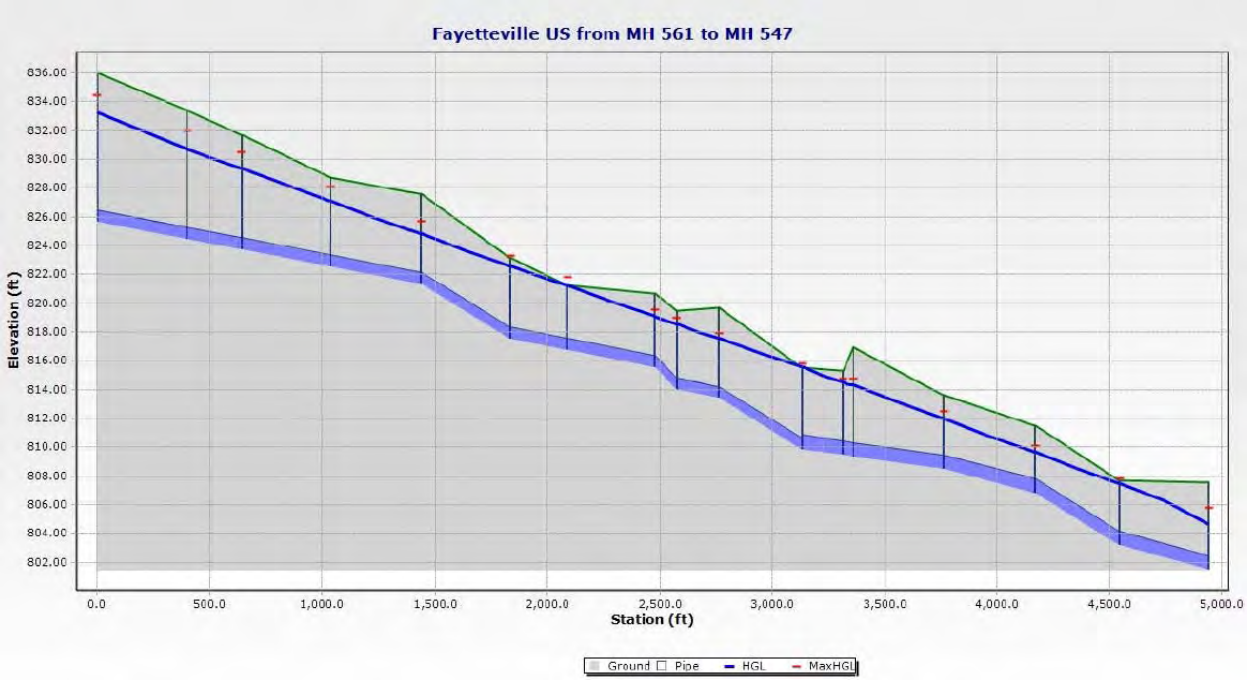
TABLE B1: Metered Peak Flow from Identified 2011 Storm Events

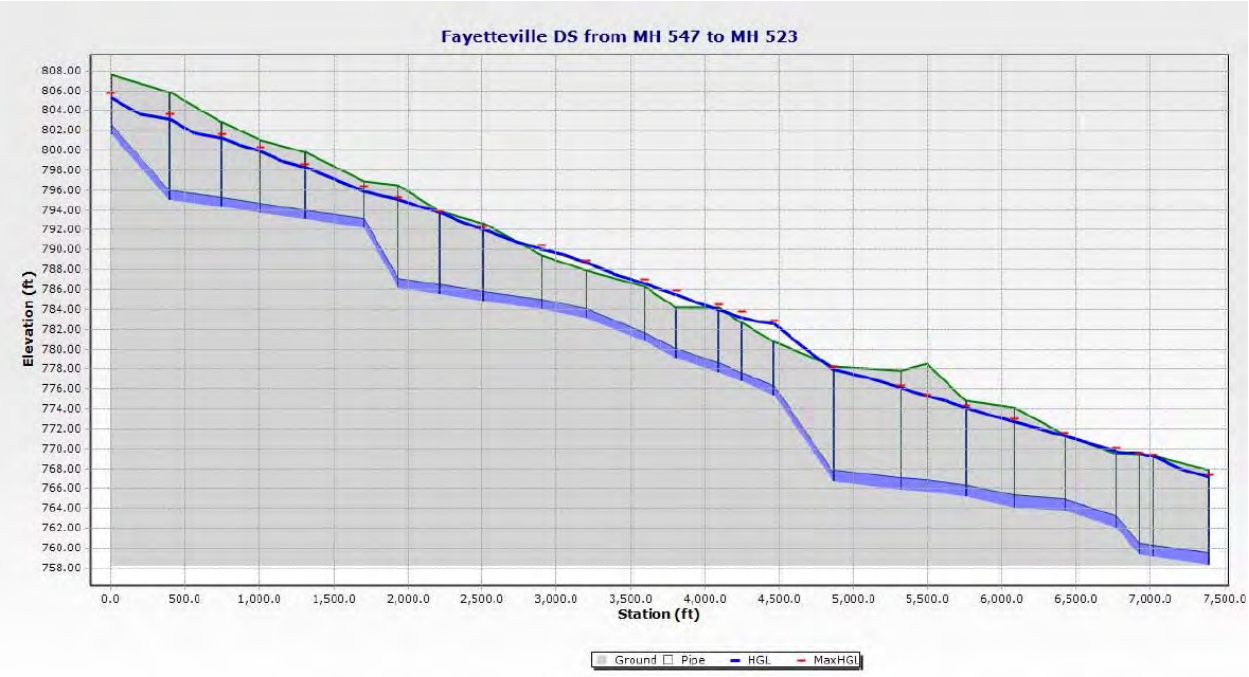
Basin	Meter Site	Recorded Peak Flow (mgd)							
		10-Feb-2011	5-Mar-2011	16-Apr-2011	28-Apr-2011	26-May-2011	20-Jun-2011	22-Nov-2011	29-Nov-2011
Black Gap Road	MH 35	0.11	0.36	0.26	0.50	NO DATA	0.18	0.88	0.64
Collection Sewer - Greene Knolls	MH 378	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	0.10	0.18	0.25
Greene Knolls	MH 561	NO DATA	0.86	0.60	0.69	0.57	0.42	0.82	0.56
Trayer Howe - Fayetteville	MH 248	0.45	1.07	0.77	1.10	0.71	0.21	1.08	0.76
Rite Spot - Fayetteville	MH 225	0.31	0.40	0.47	0.56	0.26	0.20	0.53	0.36
Newman Road - Fayetteville	MH 99	0.03	1.05	1.28	1.25	1.03	0.03	1.25	0.28
Hidden Valley - Fayetteville	MH 200	NO DATA	0.72	NO DATA	NO DATA	NO DATA	0.14	0.54	0.36
Mt. Pleasant Rd - Fayetteville	MH 138	NO DATA	NO DATA	1.62	1.57	0.36	0.18	1.45	0.62
Fayetteville	MH 523	NO DATA	NO DATA	NO DATA	NO DATA	1.83	1.05	1.79	1.86
Oak Hill	MH 503	0.78	3.25	3.50	3.47	3.21	1.62	4.31	2.10
Central	MH 672	NO DATA	NO DATA	NO DATA	NO DATA	5.94	1.74	6.97	3.70
South Scotland	MH 639	NO DATA	NO DATA	NO DATA	NO DATA	5.40	1.21	NO DATA	NO DATA
North Scotland	MH 630	2.63	8.48	8.10	7.61	7.16	2.73	8.49	5.71
Greenvillage	MH 1049A	2.79	7.36	8.02	8.00	6.74	2.99	8.50	5.07
Red Bridge	MH 1021	6.36	9.16	7.42	8.66	4.88	2.32	9.34	4.41
Siloam	MC1	1.96	6.32	7.57	7.85	6.12	2.82	8.69	4.36

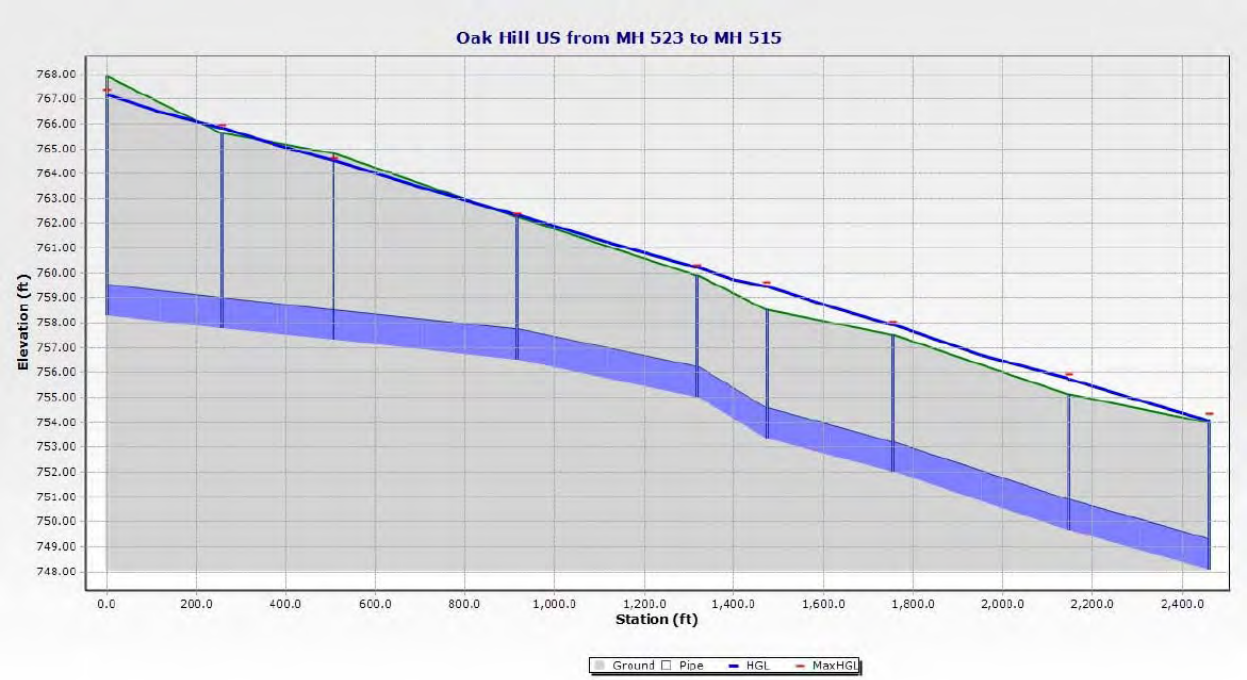
Appendix C
Modeled Sewer Profiles During November 22 Storm

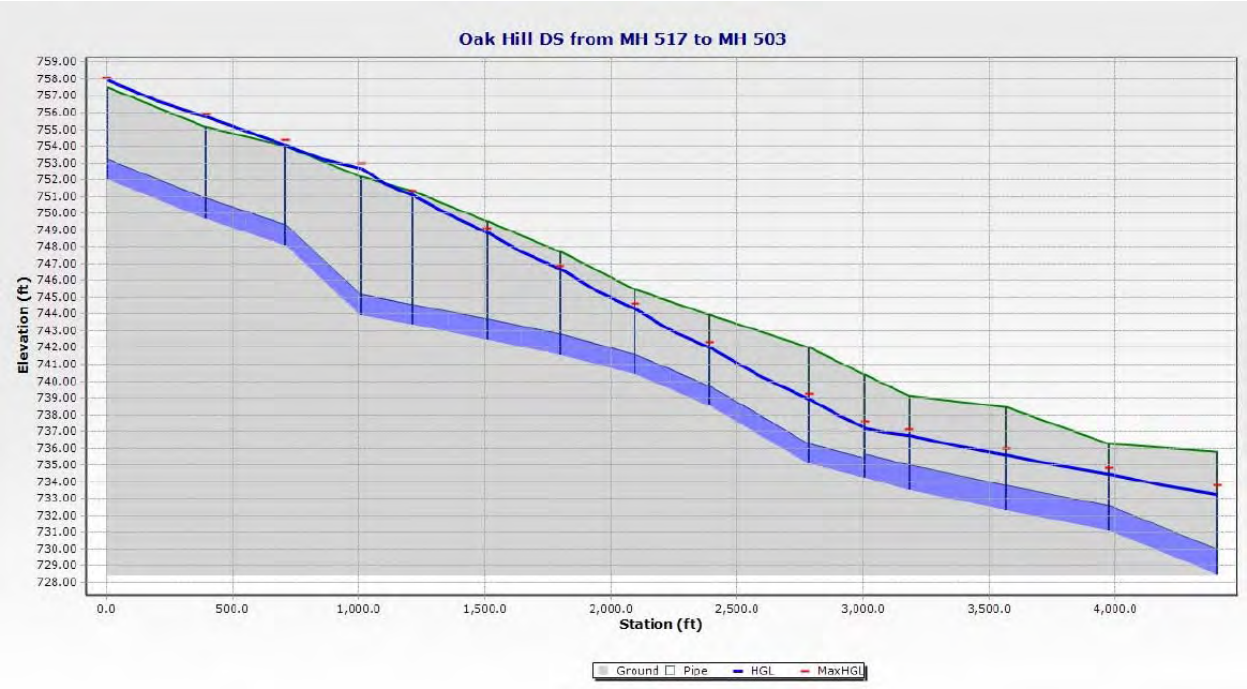

Greene Knolls US from MH 581 to MH 571
Elevation (ft)
872.00
871.00
870.00
869.00
868.00
867.00
866.00
865.00
864.00
863.00
862.00
861.00
860.00
859.00
858.00
857.00
856.00
855.00
854.00
853.00
852.00
851.00
850.00
849.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

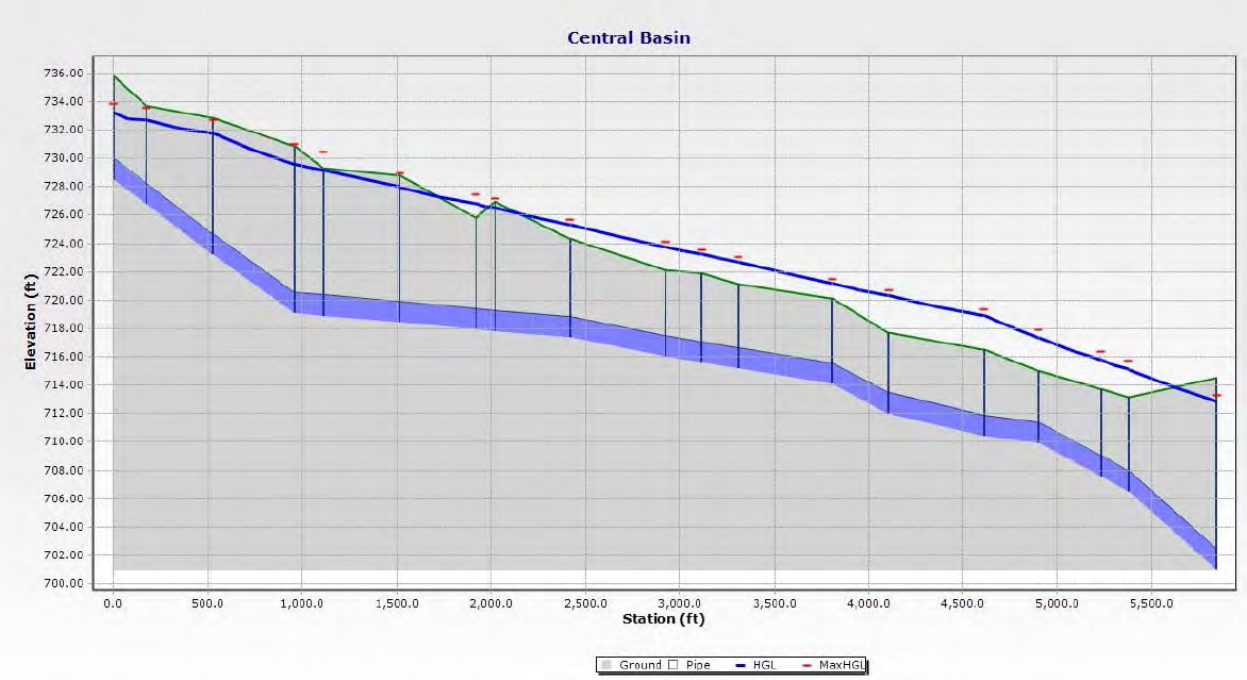

Greene Knolls DS from MH 571 to MH 561
Elevation (ft)
856.00
855.00
854.00
853.00
852.00
851.00
850.00
849.00
848.00
847.00
846.00
845.00
844.00
843.00
842.00
841.00
840.00
839.00
838.00
837.00
836.00
835.00
834.00
833.00
832.00
831.00
830.00
829.00
828.00
827.00
826.00
825.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

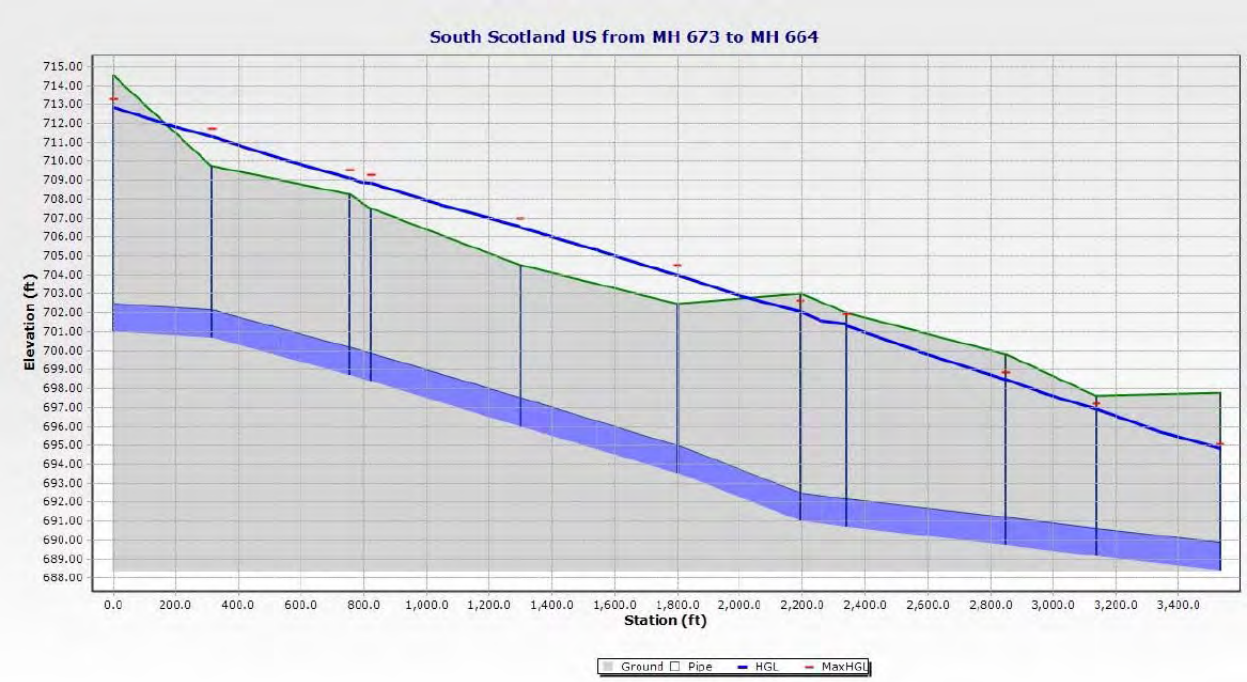

Fayetteville US from MH 561 to MH 547
Elevation (ft)
836.00
834.00
832.00
830.00
828.00
826.00
824.00
822.00
820.00
818.00
816.00
814.00
812.00
810.00
808.00
806.00
804.00
802.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

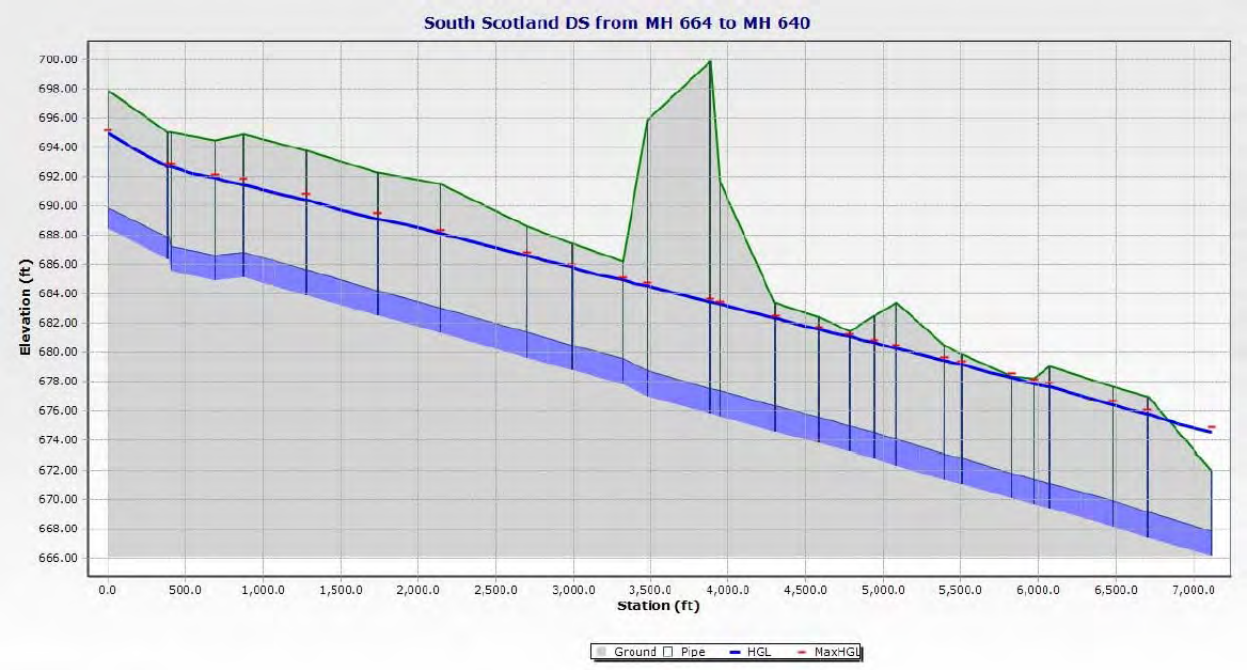

Fayetteville DS from MH 547 to MH 523
Elevation (ft)
808.00
806.00
804.00
802.00
800.00
798.00
796.00
794.00
792.00
790.00
788.00
786.00
784.00
782.00
780.00
778.00
776.00
774.00
772.00
770.00
768.00
766.00
764.00
762.00
760.00
758.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
6,000.0
6,500.0
7,000.0
7,500.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

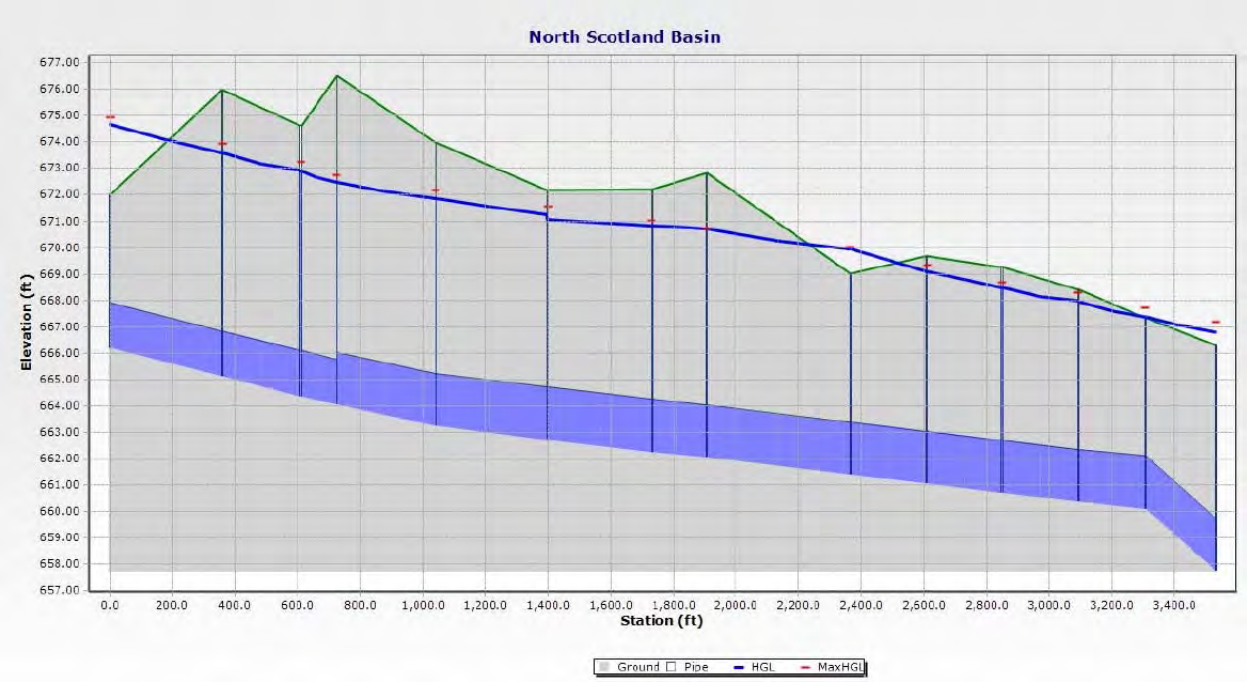

Oak Hill US from MH 523 to MH 515
Elevation (ft)
768.00
767.00
766.00
765.00
764.00
763.00
762.00
761.00
760.00
759.00
758.00
757.00
756.00
755.00
754.00
753.00
752.00
751.00
750.00
749.00
748.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

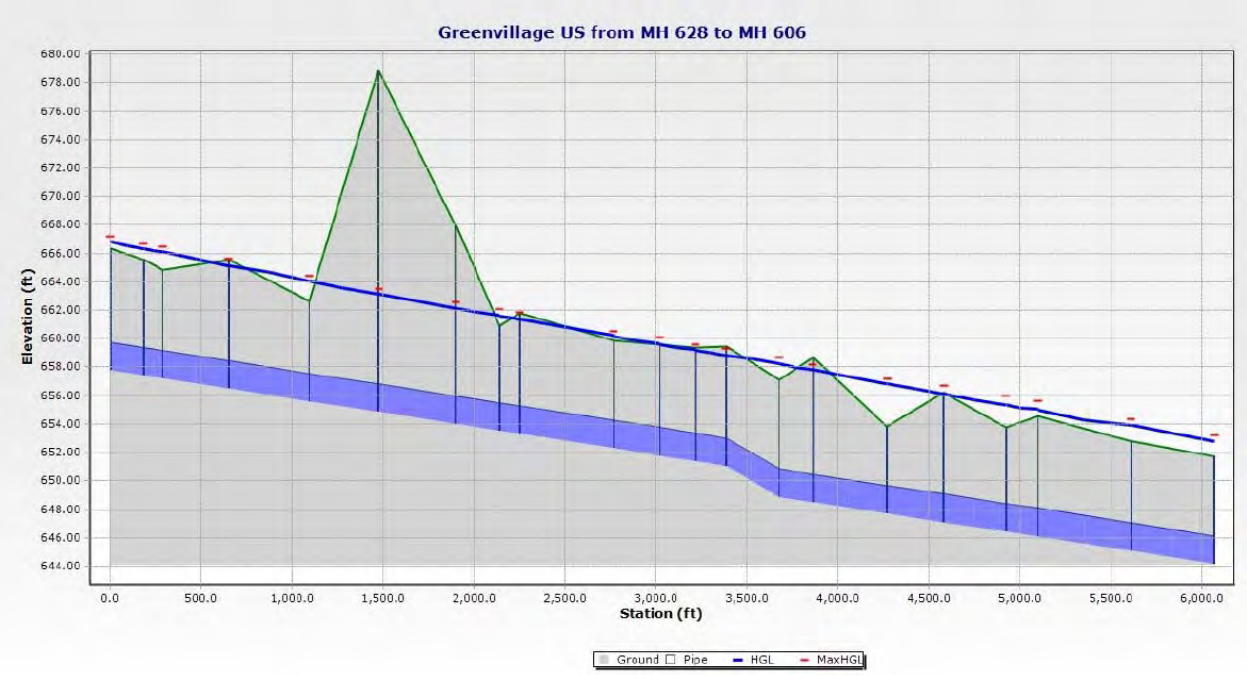

Oak Hill DS from MH 517 to MH 503
Elevation (ft)
759.00
758.00
757.00
756.00
755.00
754.00
753.00
752.00
751.00
750.00
749.00
748.00
747.00
746.00
745.00
744.00
743.00
742.00
741.00
740.00
739.00
738.00
737.00
736.00
735.00
734.00
733.00
732.00
731.00
730.00
729.00
728.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

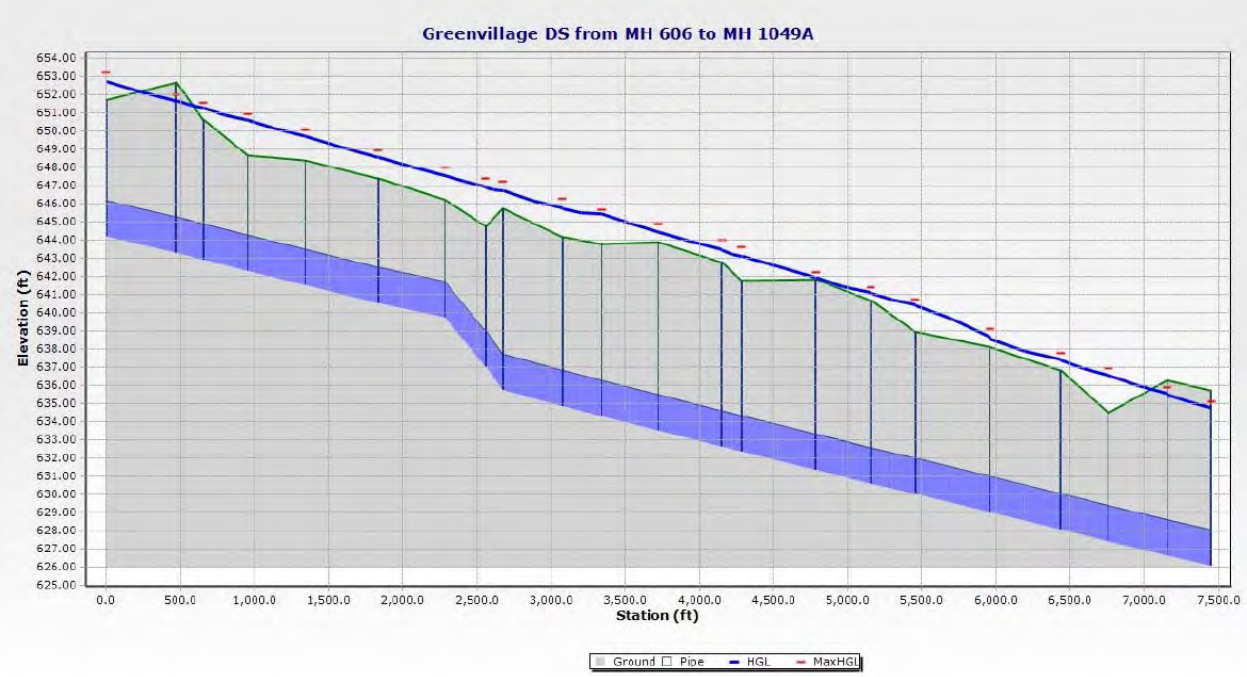

Central Basin
Elevation (ft)
736.00
734.00
732.00
730.00
728.00
726.00
724.00
722.00
720.00
718.00
716.00
714.00
712.00
710.00
708.00
706.00
704.00
702.00
700.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

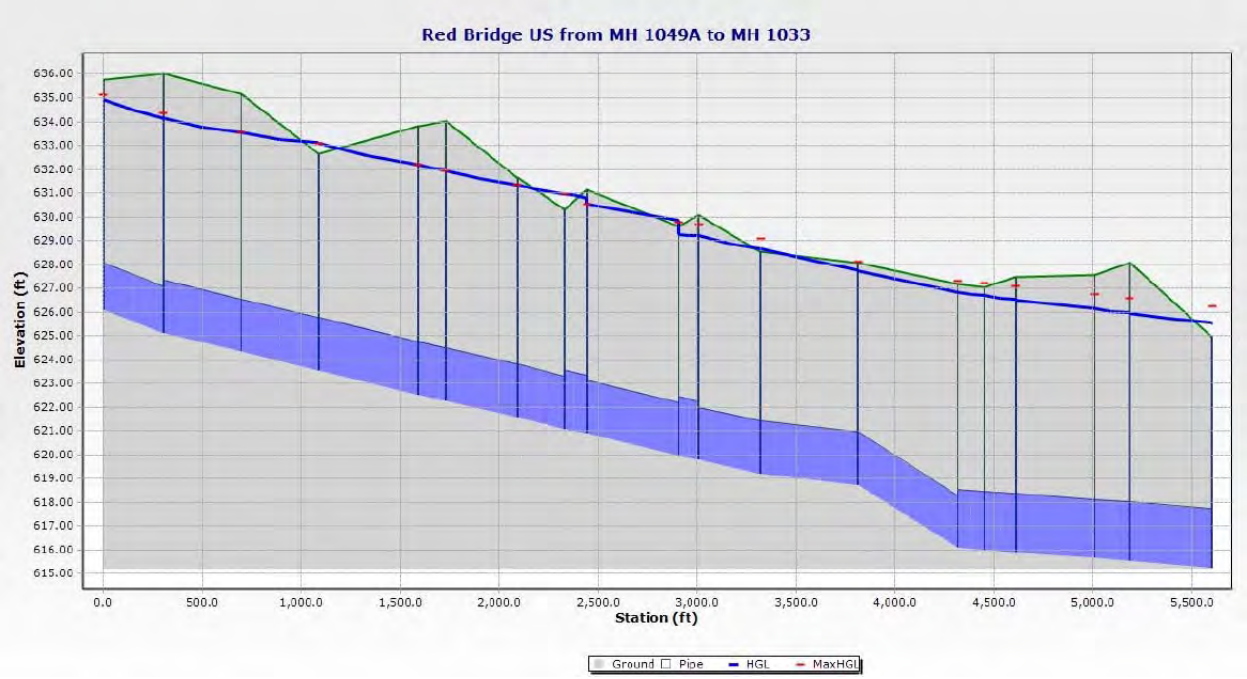

South Scotland US from MH 673 to MH 664
Elevation (ft)
715.00
714.00
713.00
712.00
711.00
710.00
709.00
708.00
707.00
706.00
705.00
704.00
703.00
702.00
701.00
700.00
699.00
698.00
697.00
696.00
695.00
694.00
693.00
692.00
691.00
690.00
689.00
688.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
2,800.0
3,000.0
3,200.0
3,400.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

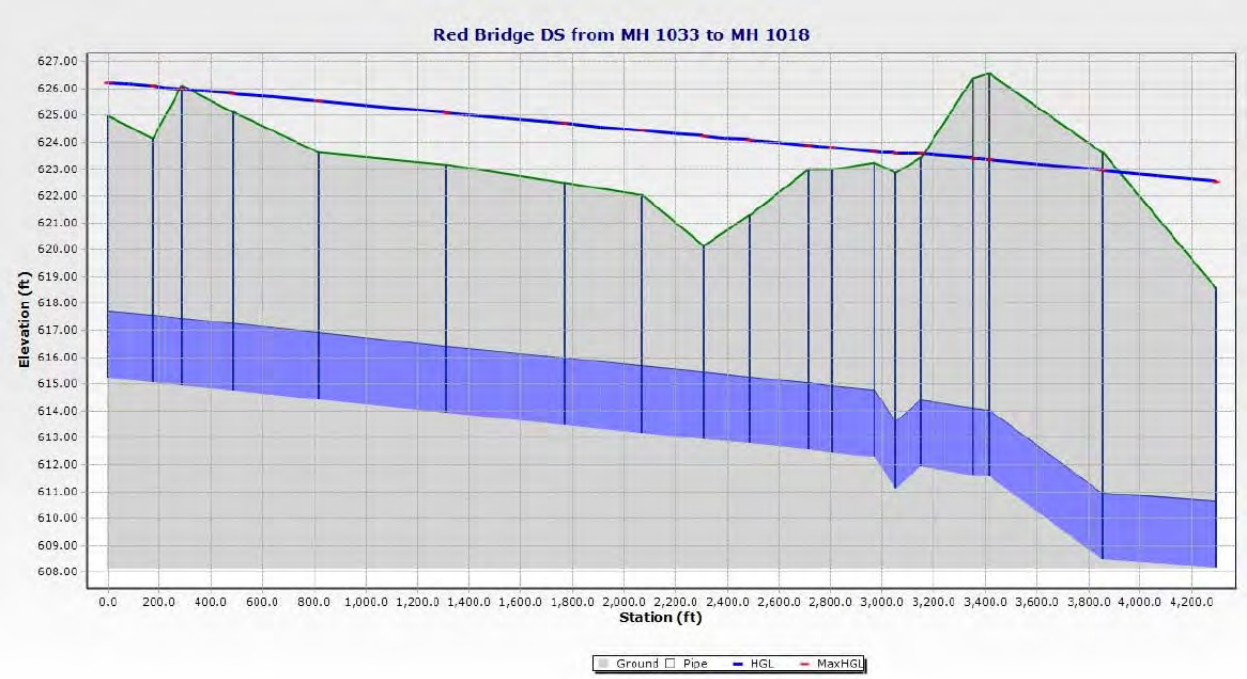

South Scotland DS from MH 664 to MH 640
Elevation (ft)
700.00
698.00
696.00
694.00
692.00
690.00
688.00
686.00
684.00
682.00
680.00
678.00
676.00
674.00
672.00
670.00
668.00
666.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
6,000.0
6,500.0
7,000.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

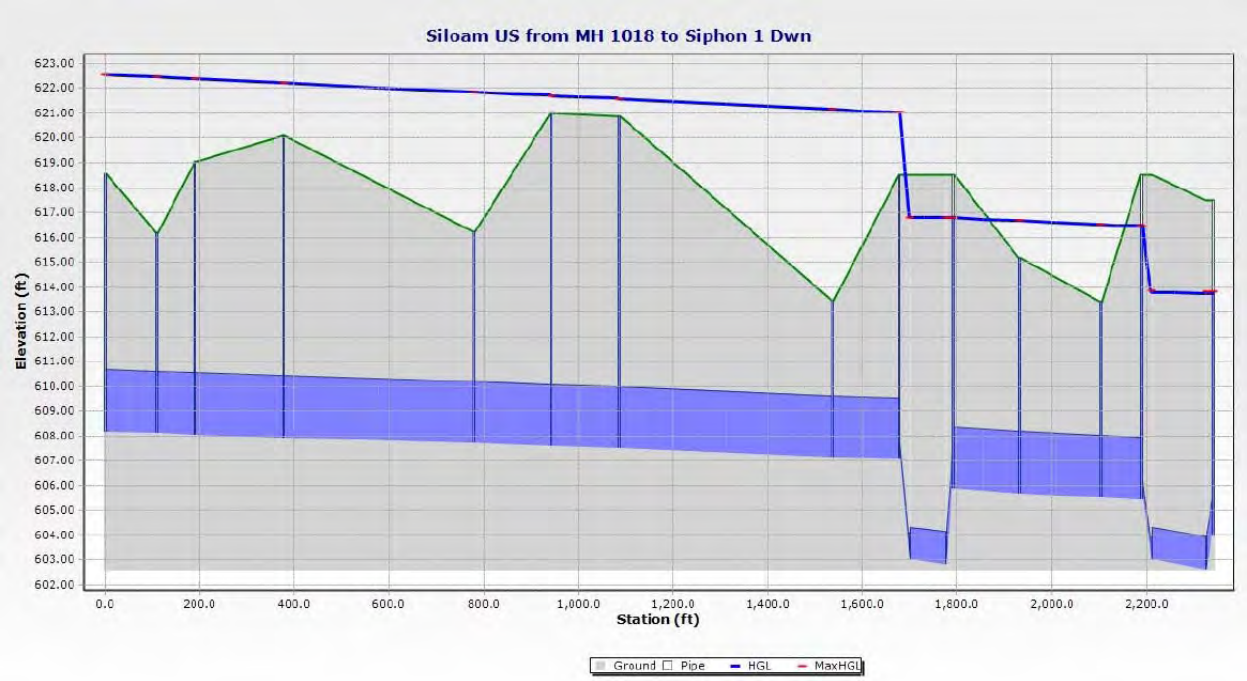

North Scotland Basin
Elevation (ft)
677.00
676.00
675.00
674.00
673.00
672.00
671.00
670.00
669.00
668.00
667.00
666.00
665.00
664.00
663.00
662.00
661.00
660.00
659.00
658.00
657.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
2,800.0
3,000.0
3,200.0
3,400.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

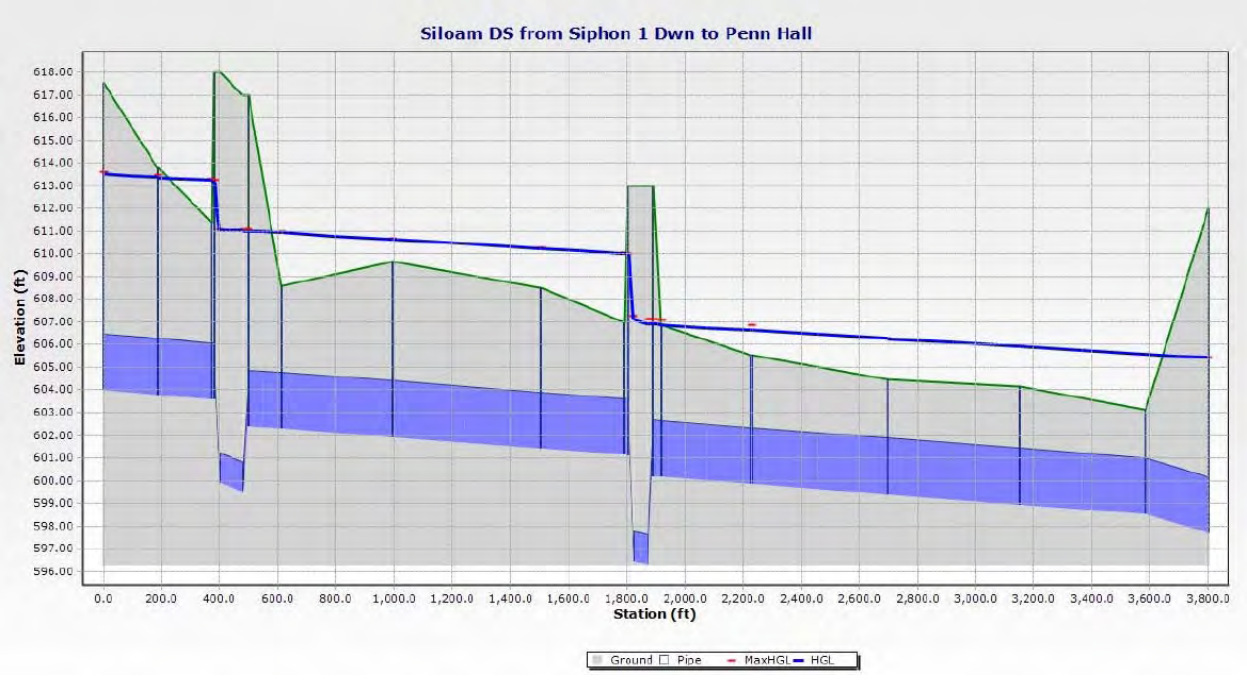

Greenvillage US from MH 628 to MH 606
Elevation (ft)
680.00
678.00
676.00
674.00
672.00
670.00
668.00
666.00
664.00
662.00
660.00
658.00
656.00
654.00
652.00
650.00
648.00
646.00
644.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
6,000.0
Station (ft)
Ground
Pipe
HGL
MaxHGL


Greenvillage DS from MH 606 to MH 1049A
Elevation (ft)
654.00
653.00
652.00
651.00
650.00
649.00
648.00
647.00
646.00
645.00
644.00
643.00
642.00
641.00
640.00
639.00
638.00
637.00
636.00
635.00
634.00
633.00
632.00
631.00
630.00
629.00
628.00
627.00
626.00
625.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
6,000.0
6,500.0
7,000.0
7,500.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

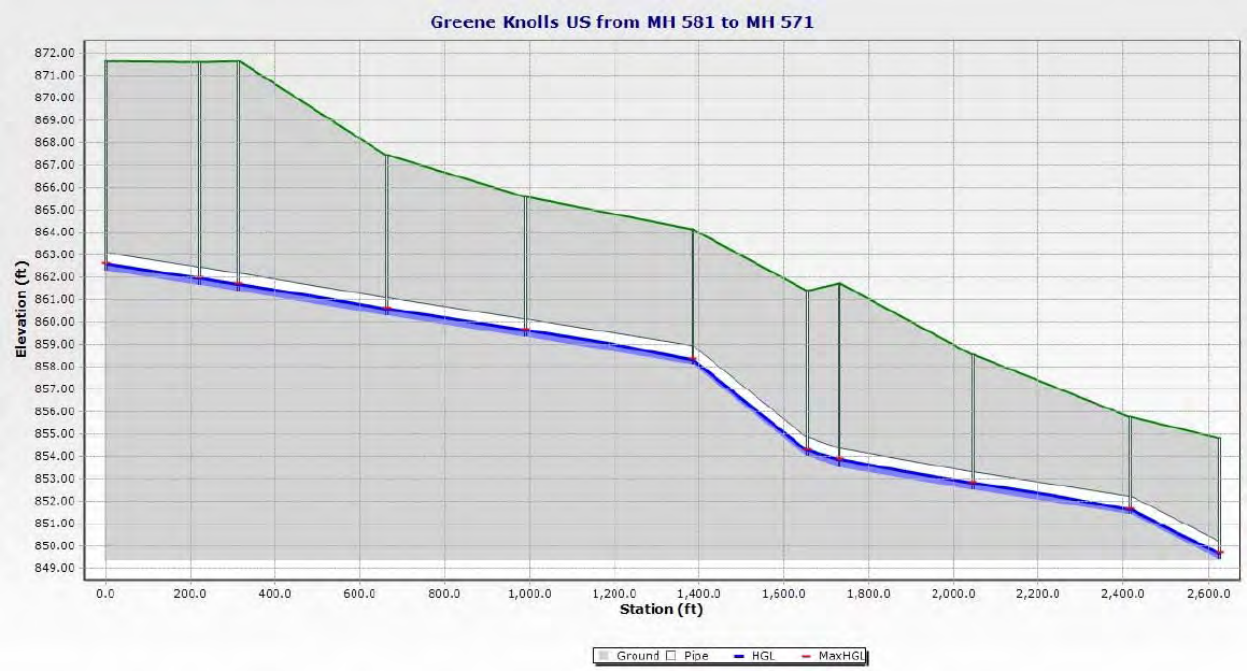

Red Bridge US from MH 1049A to MH 1033
Elevation (ft)
636.00
635.00
634.00
633.00
632.00
631.00
630.00
629.00
628.00
627.00
626.00
625.00
624.00
623.00
622.00
621.00
620.00
619.00
618.00
617.00
616.00
615.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

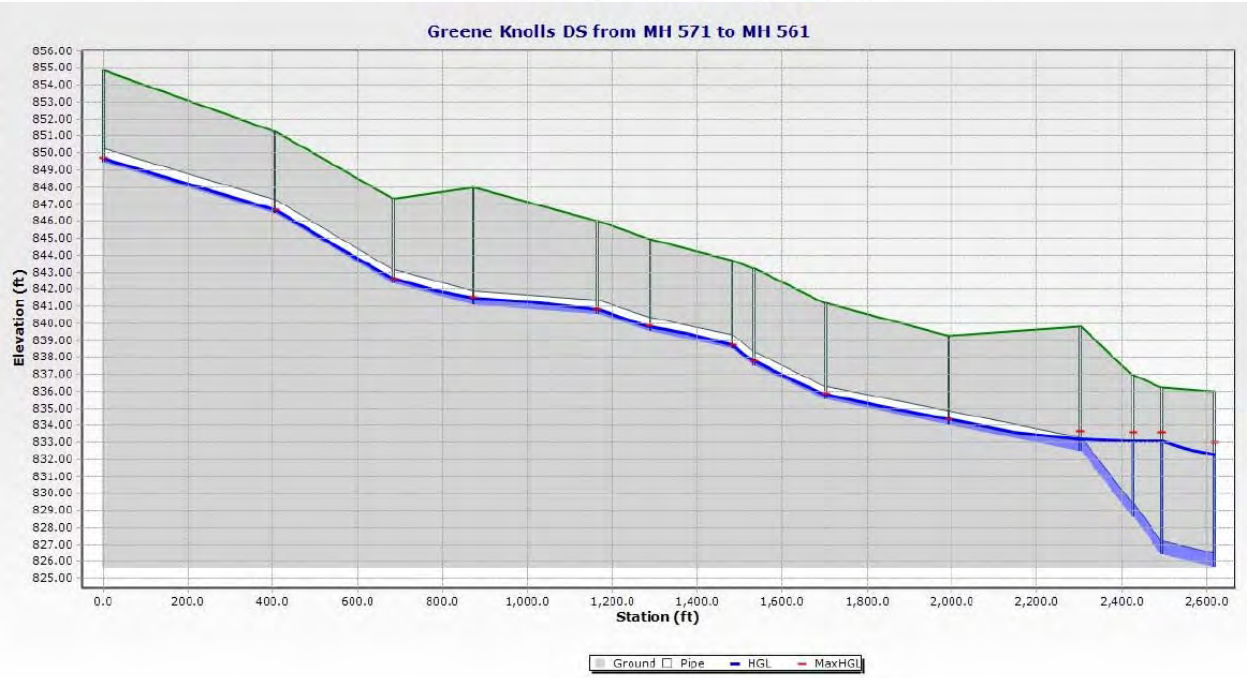

Red Bridge DS from MH 1033 to MH 1018
Elevation (ft)
627.00
626.00
625.00
624.00
623.00
622.00
621.00
620.00
619.00
618.00
617.00
616.00
615.00
614.00
613.00
612.00
611.00
610.00
609.00
608.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
2,800.0
3,000.0
3,200.0
3,400.0
3,600.0
3,800.0
4,000.0
4,200.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

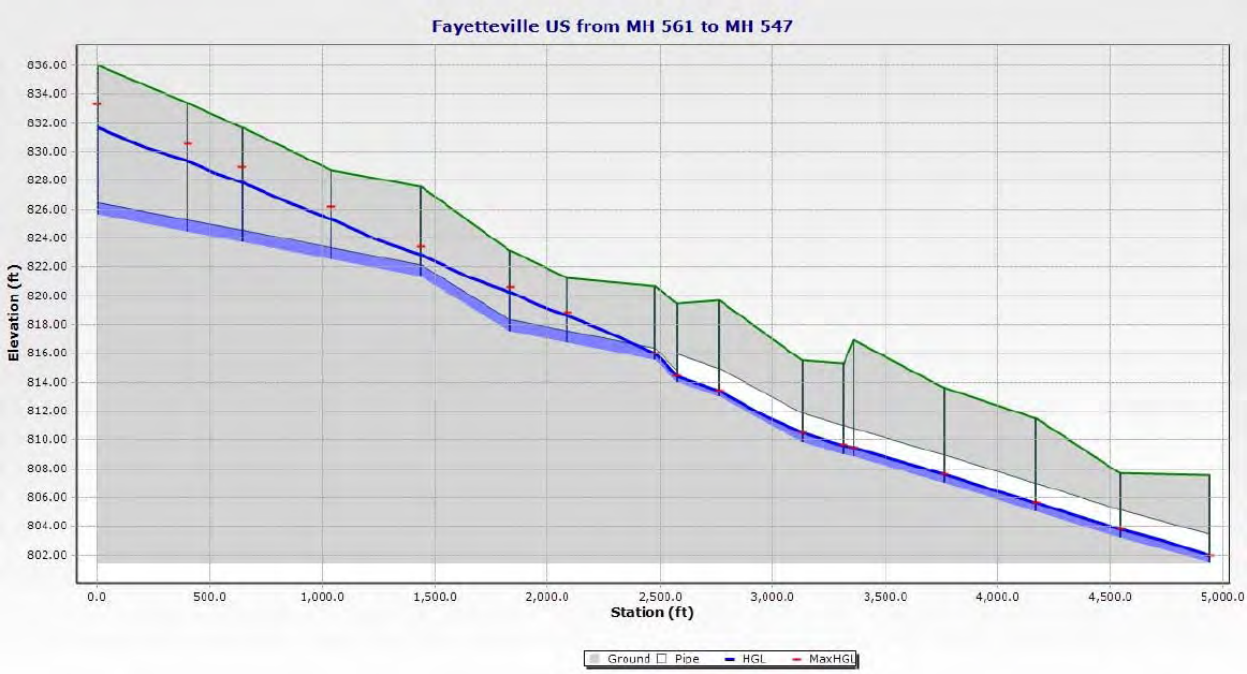

Siloam US from MH 1018 to Siphon 1 Dwn
Elevation (ft)
623.00
622.00
621.00
620.00
619.00
618.00
617.00
616.00
615.00
614.00
613.00
612.00
611.00
610.00
609.00
608.00
607.00
606.00
605.00
604.00
603.00
602.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

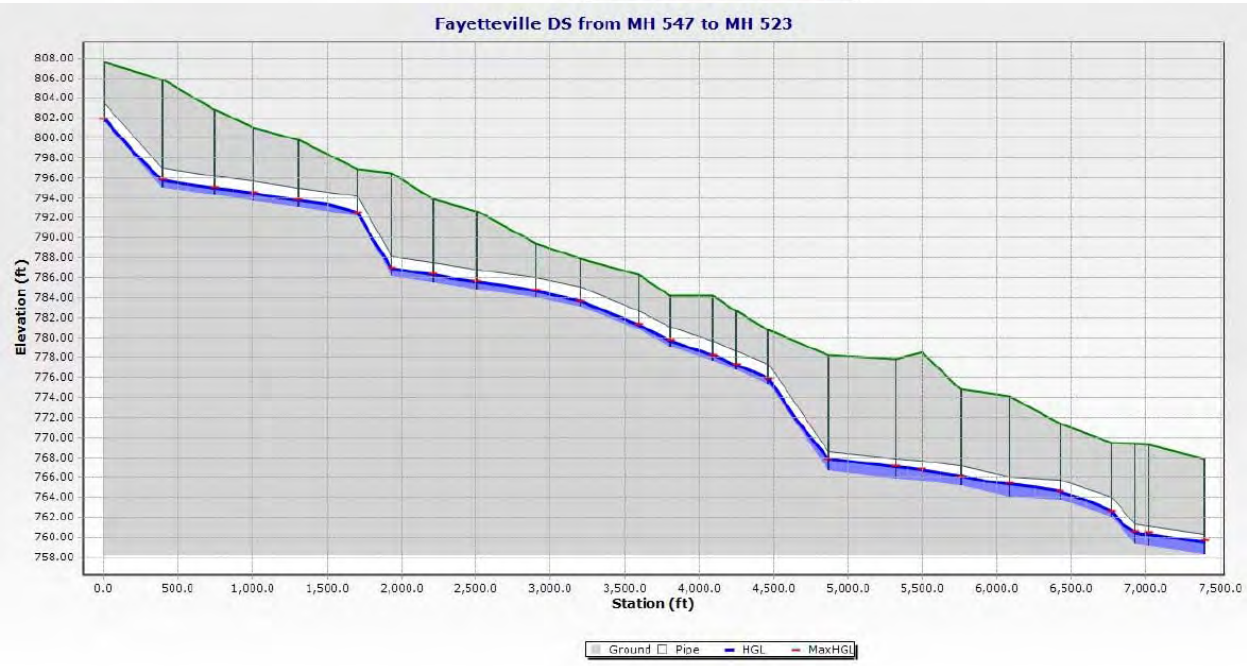

Siloam DS from Siphon 1 Dwn to Penn Hall
Elevation (ft)
618.00
617.00
616.00
615.00
614.00
613.00
612.00
611.00
610.00
609.00
608.00
607.00
606.00
605.00
604.00
603.00
602.00
601.00
600.00
599.00
598.00
597.00
596.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
2,800.0
3,000.0
3,200.0
3,400.0
3,600.0
3,800.0
Station (ft)
Ground
Pipe
MaxHGL
HGL

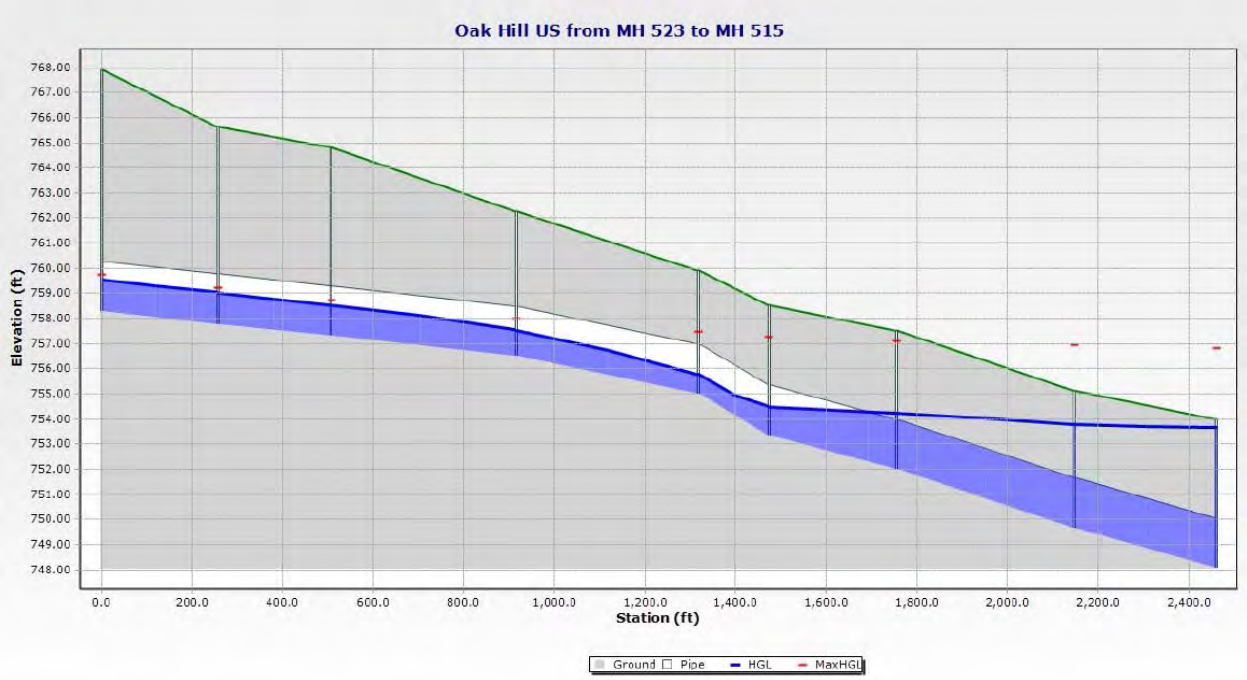
Appendix D
Modeled Sewer Profiles for November 22 Storm After Completion of Phase I Improvements

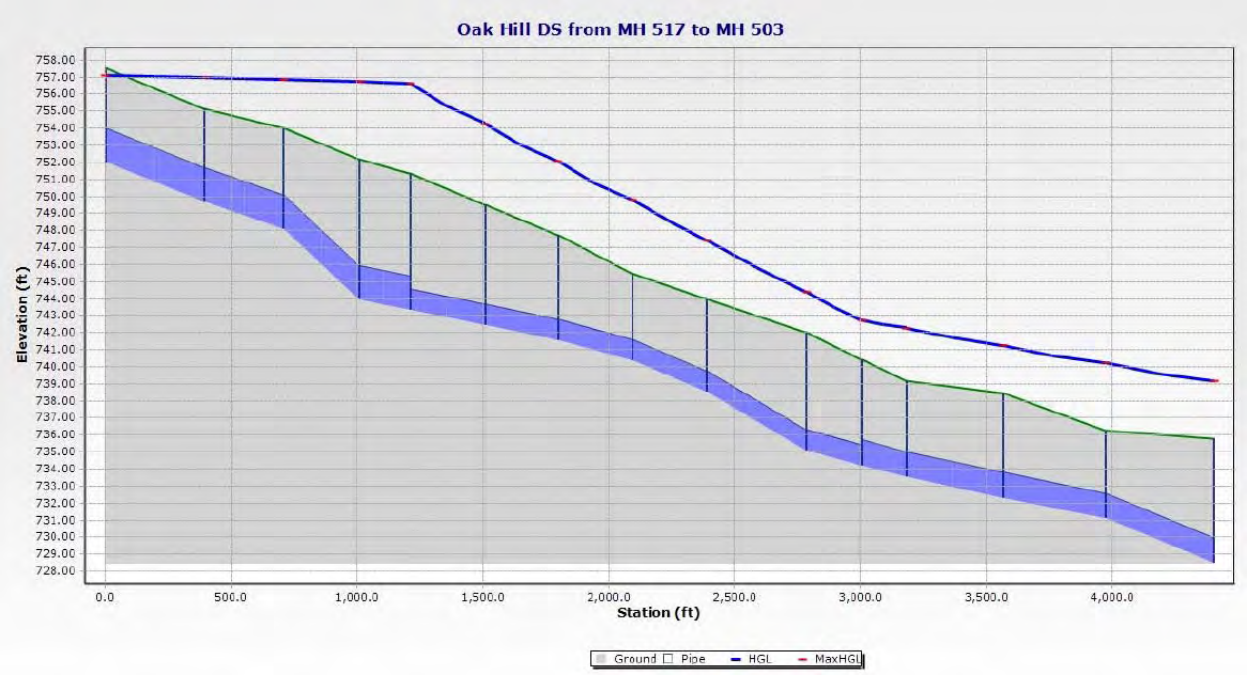

Greene Knolls US from MH 581 to MH 571
Elevation (ft)
872.00
871.00
870.00
869.00
868.00
867.00
866.00
865.00
864.00
863.00
862.00
861.00
860.00
859.00
858.00
857.00
856.00
855.00
854.00
853.00
852.00
851.00
850.00
849.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

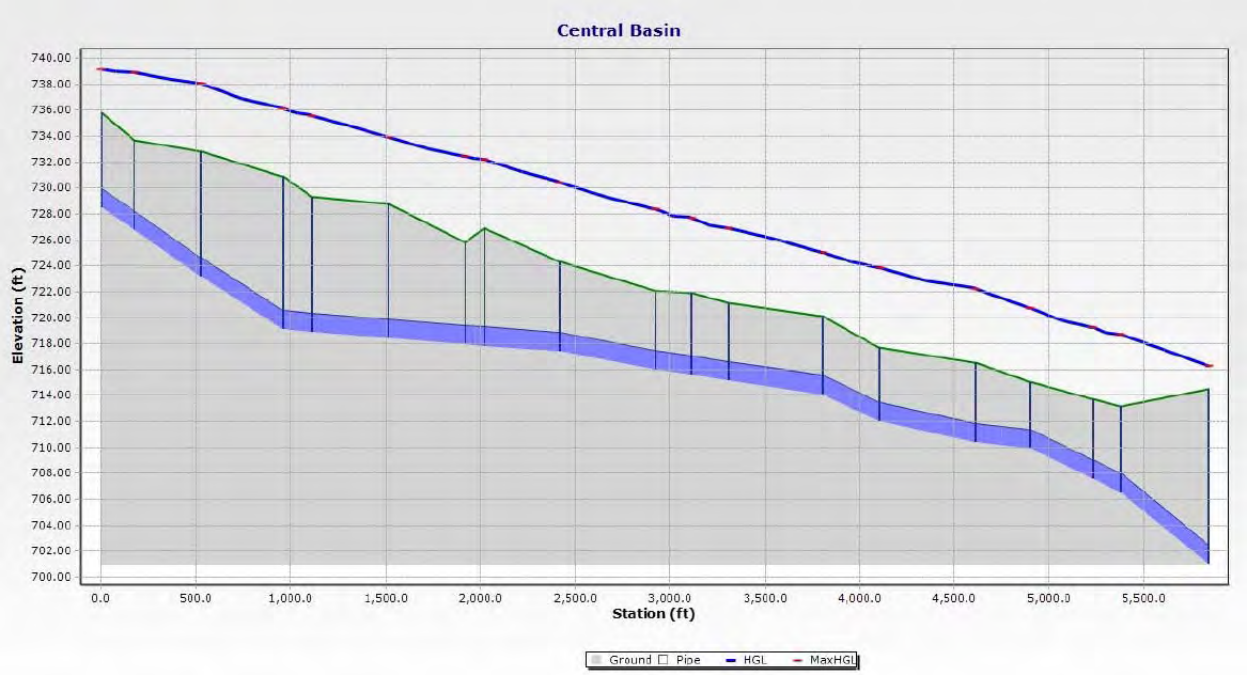

Greene Knolls DS from MH 571 to MH 561
Elevation (ft)
856.00
855.00
854.00
853.00
852.00
851.00
850.00
849.00
848.00
847.00
846.00
845.00
844.00
843.00
842.00
841.00
840.00
839.00
838.00
837.00
836.00
835.00
834.00
833.00
832.00
831.00
830.00
829.00
828.00
827.00
826.00
825.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

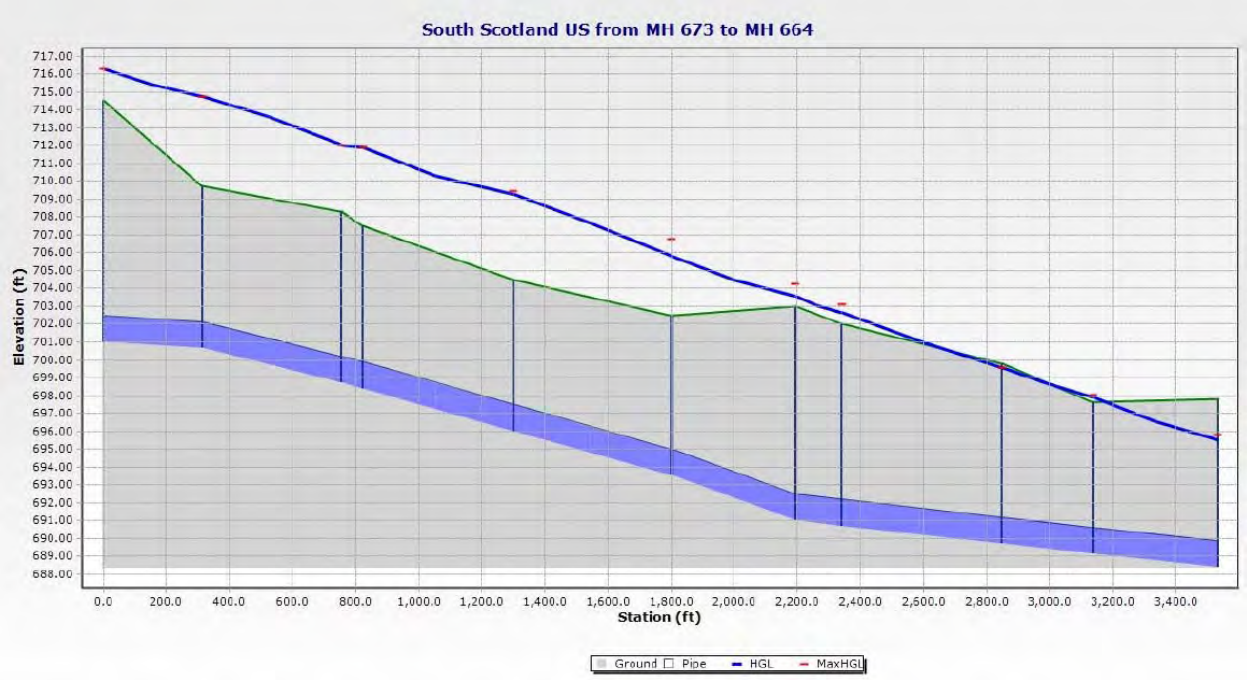

Fayetteville US from MH 561 to MH 547
Elevation (ft)
836.00
834.00
832.00
830.00
828.00
826.00
824.00
822.00
820.00
818.00
816.00
814.00
812.00
810.00
808.00
806.00
804.00
802.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

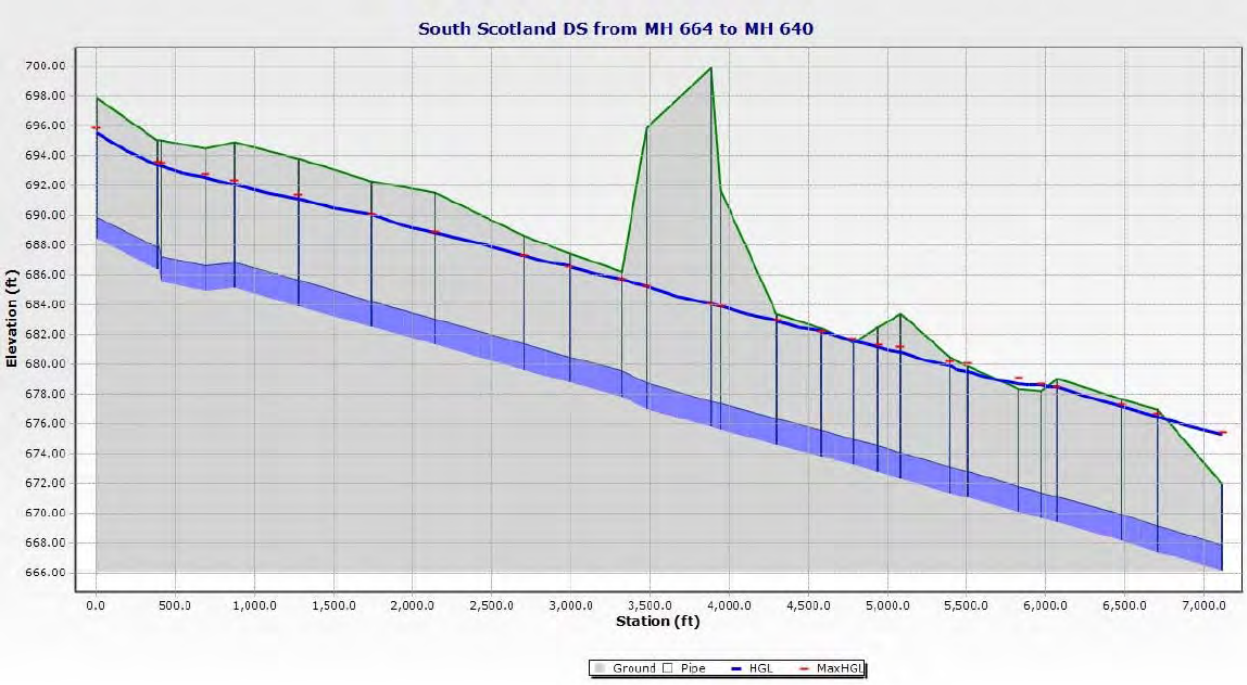

Fayetteville DS from MH 547 to MH 523
Elevation (ft)
808.00
806.00
804.00
802.00
800.00
798.00
796.00
794.00
792.00
790.00
788.00
786.00
784.00
782.00
780.00
778.00
776.00
774.00
772.00
770.00
768.00
766.00
764.00
762.00
760.00
758.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
6,000.0
6,500.0
7,000.0
7,500.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

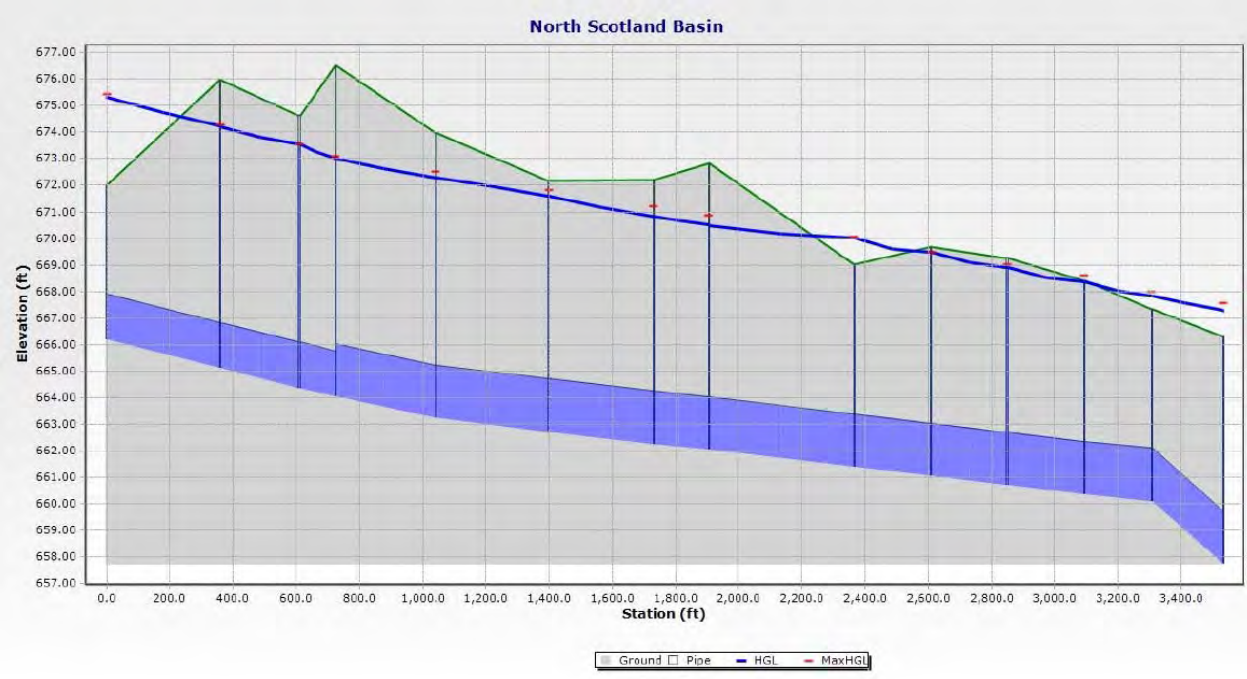

Oak Hill US from MH 523 to MH 515
Elevation (ft)
768.00
767.00
766.00
765.00
764.00
763.00
762.00
761.00
760.00
759.00
758.00
757.00
756.00
755.00
754.00
753.00
752.00
751.00
750.00
749.00
748.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

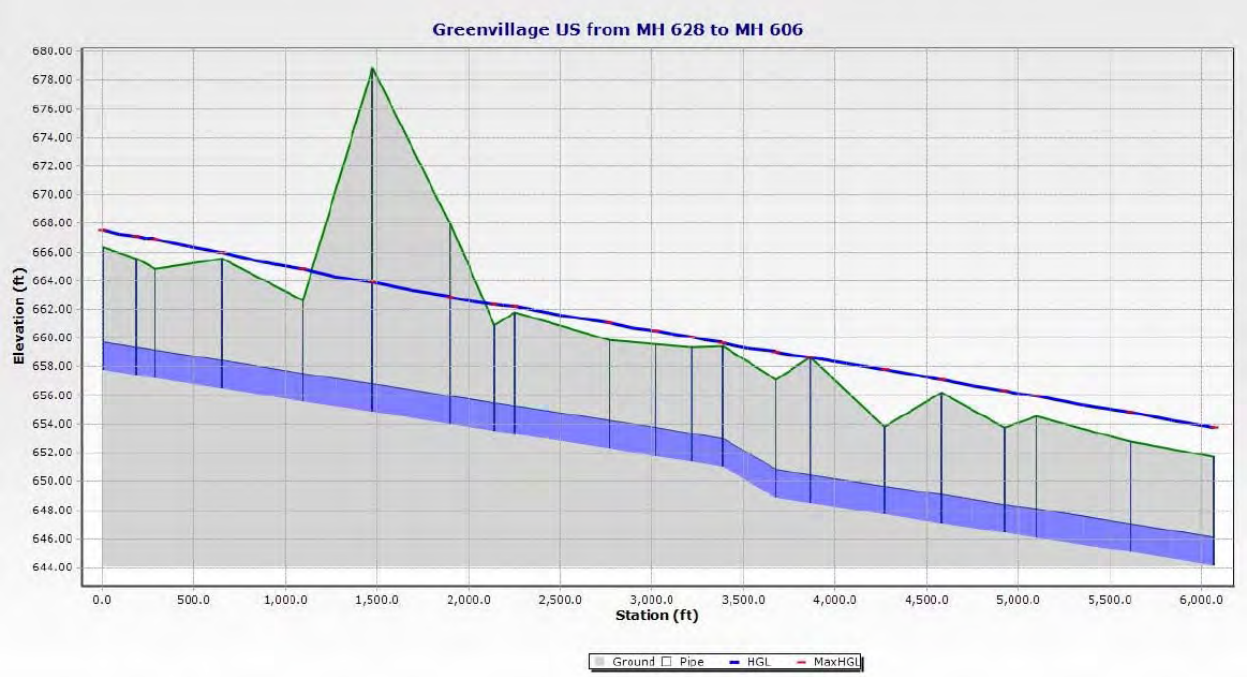

Oak Hill DS from MH 517 to MH 503
Elevation (ft)
758.00
757.00
756.00
755.00
754.00
753.00
752.00
751.00
750.00
749.00
748.00
747.00
746.00
745.00
744.00
743.00
742.00
741.00
740.00
739.00
738.00
737.00
736.00
735.00
734.00
733.00
732.00
731.00
730.00
729.00
728.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

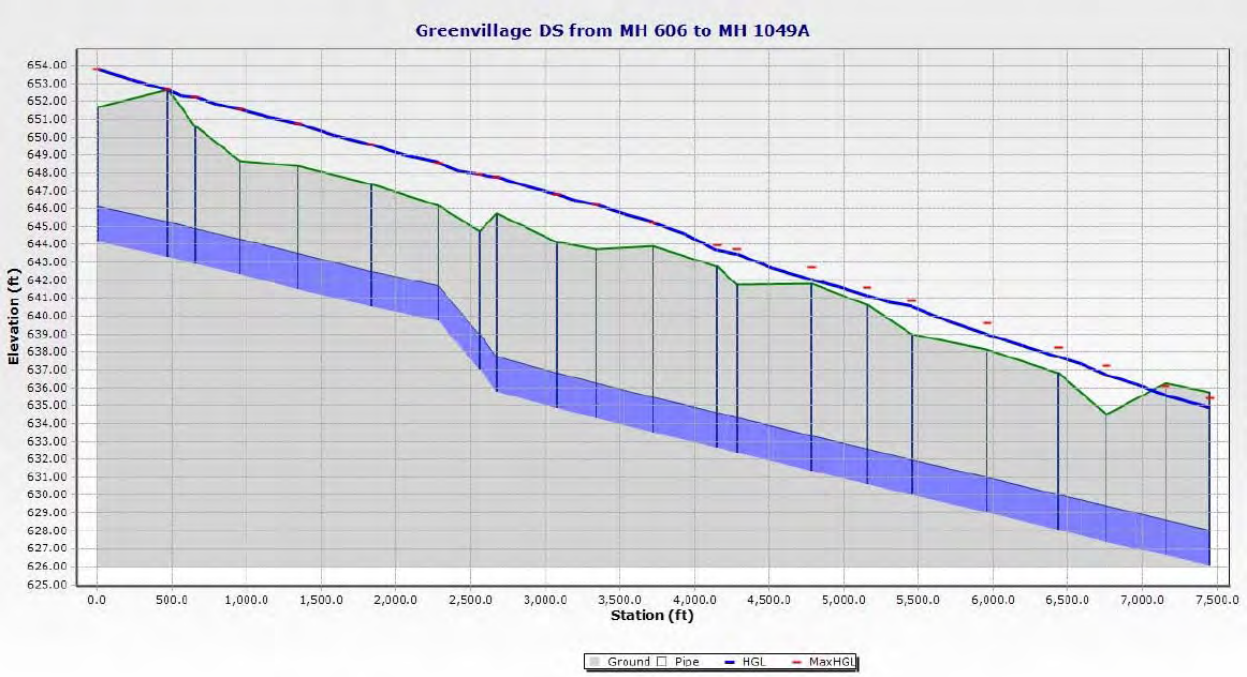

Central Basin
Elevation (ft)
740.00
738.00
736.00
734.00
732.00
730.00
728.00
726.00
724.00
722.00
720.00
718.00
716.00
714.00
712.00
710.00
708.00
706.00
704.00
702.00
700.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

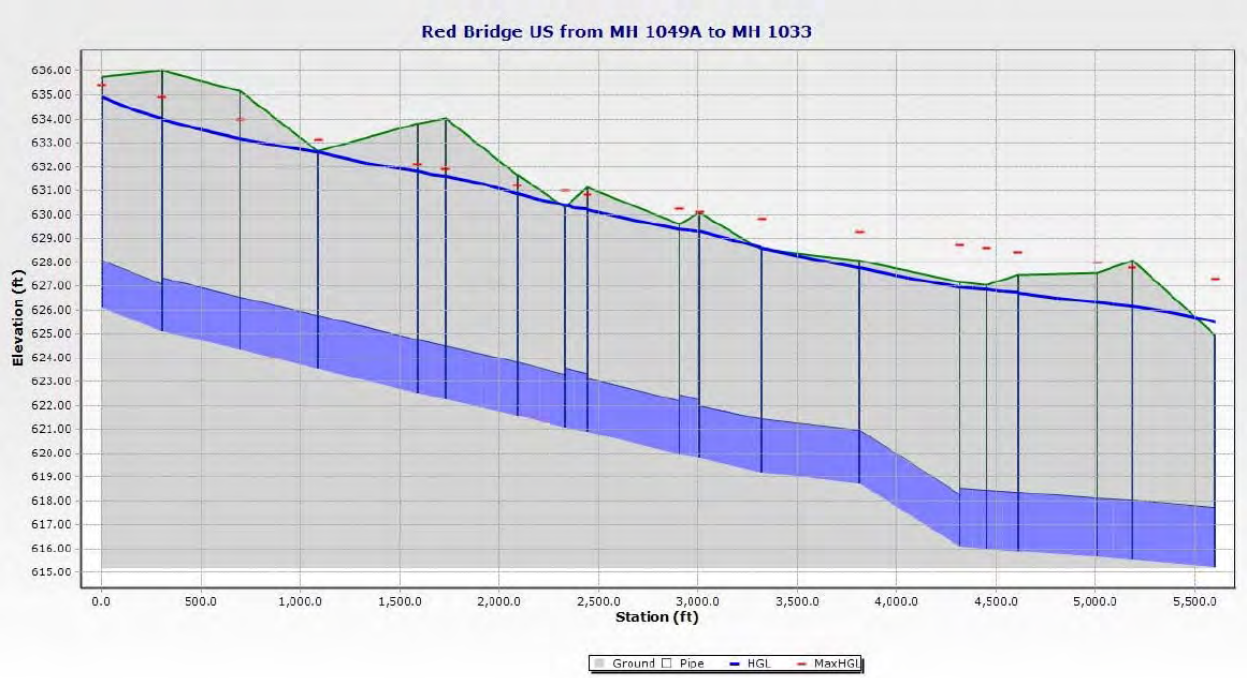

South Scotland US from MH 673 to MH 664
Elevation (ft)
717.00
716.00
715.00
714.00
713.00
712.00
711.00
710.00
709.00
708.00
707.00
706.00
705.00
704.00
703.00
702.00
701.00
700.00
699.00
698.00
697.00
696.00
695.00
694.00
693.00
692.00
691.00
690.00
689.00
688.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
2,800.0
3,000.0
3,200.0
3,400.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

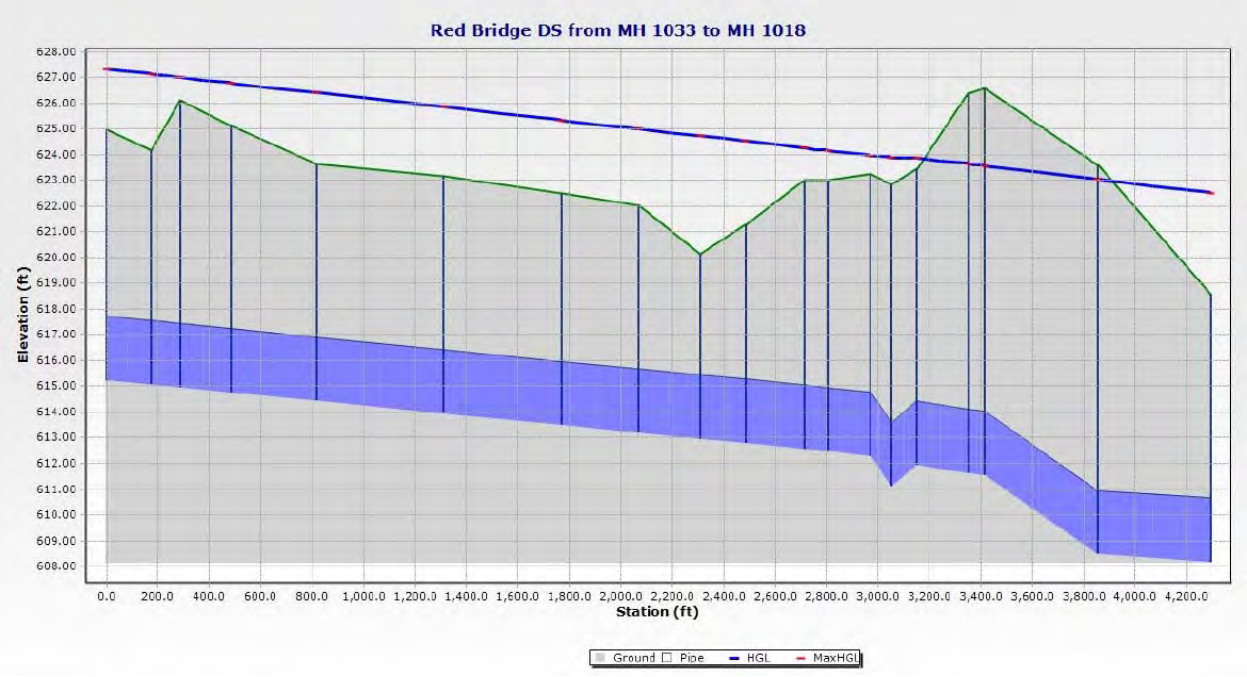

South Scotland DS from MH 664 to MH 640
Elevation (ft)
700.00
698.00
696.00
694.00
692.00
690.00
688.00
686.00
684.00
682.00
680.00
678.00
676.00
674.00
672.00
670.00
668.00
666.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
6,000.0
6,500.0
7,000.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

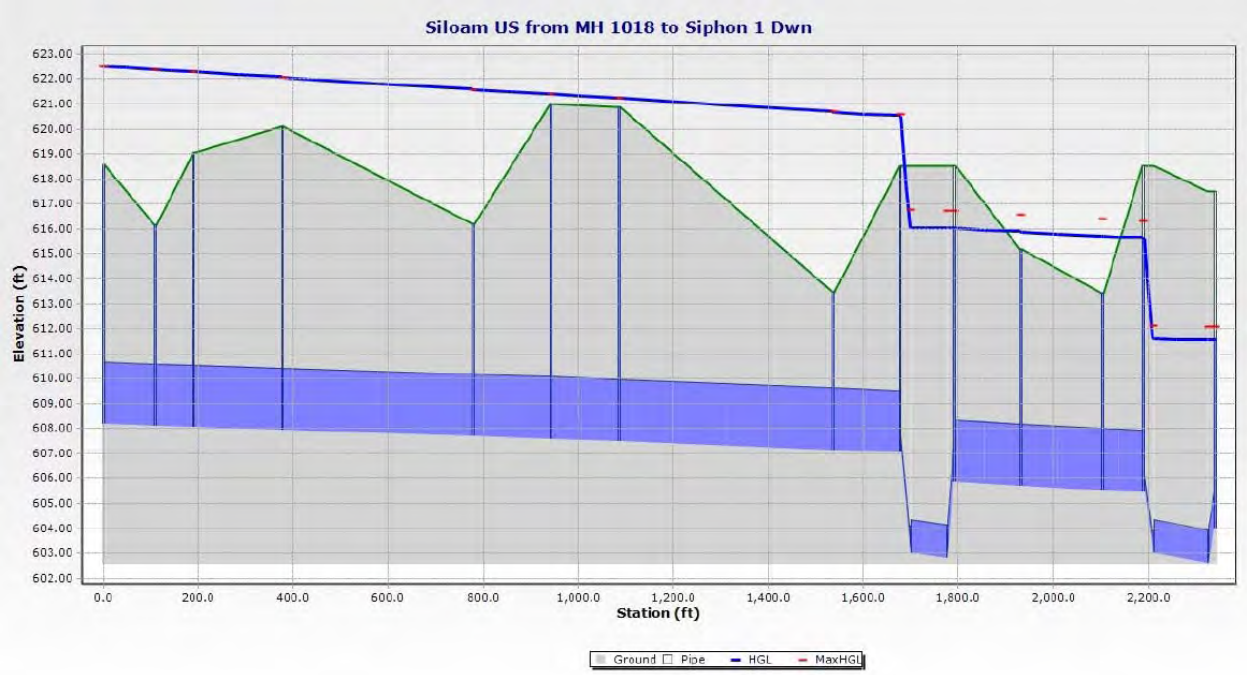

North Scotland Basin
Elevation (ft)
677.00
676.00
675.00
674.00
673.00
672.00
671.00
670.00
669.00
668.00
667.00
666.00
665.00
664.00
663.00
662.00
661.00
660.00
659.00
658.00
657.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
2,800.0
3,000.0
3,200.0
3,400.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

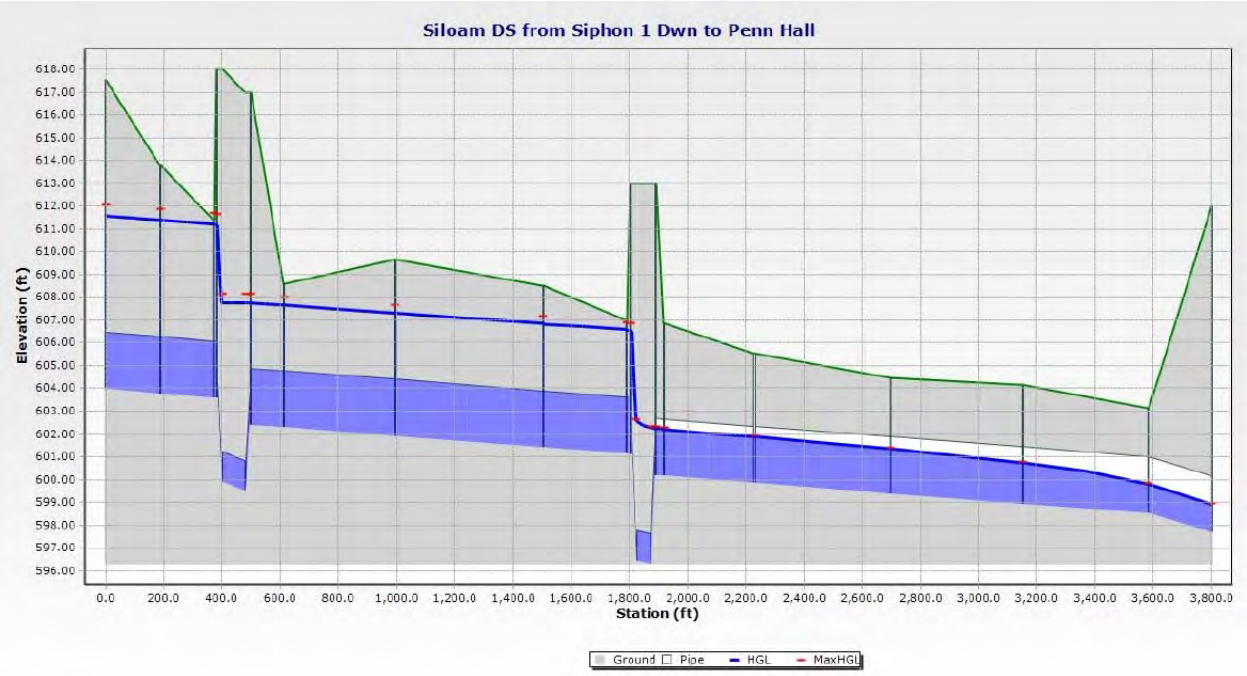

Greenvillage US from MH 628 to MH 606
Elevation (ft)
680.00
678.00
676.00
674.00
672.00
670.00
668.00
666.00
664.00
662.00
660.00
658.00
656.00
654.00
652.00
650.00
648.00
646.00
644.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
6,000.0
Station (ft)
Ground
Pipe
HGL
MaxHGL


Greenvillage DS from MH 606 to MH 1049A
Elevation (ft)
654.00
653.00
652.00
651.00
650.00
649.00
648.00
647.00
646.00
645.00
644.00
643.00
642.00
641.00
640.00
639.00
638.00
637.00
636.00
635.00
634.00
633.00
632.00
631.00
630.00
629.00
628.00
627.00
626.00
625.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
6,000.0
6,500.0
7,000.0
7,500.0
Station (ft)
Ground
Pipe
HGL
MaxHGL


Red Bridge US from MH 1049A to MH 1033
Elevation (ft)
636.00
635.00
634.00
633.00
632.00
631.00
630.00
629.00
628.00
627.00
626.00
625.00
624.00
623.00
622.00
621.00
620.00
619.00
618.00
617.00
616.00
615.00
0.0
500.0
1,000.0
1,500.0
2,000.0
2,500.0
3,000.0
3,500.0
4,000.0
4,500.0
5,000.0
5,500.0
Station (ft)
Ground
Pipe
HGL
MaxHGL


Red Bridge DS from MH 1033 to MH 1018
Elevation (ft)
628.00
627.00
626.00
625.00
624.00
623.00
622.00
621.00
620.00
619.00
618.00
617.00
616.00
615.00
614.00
613.00
612.00
611.00
610.00
609.00
608.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
2,800.0
3,000.0
3,200.0
3,400.0
3,600.0
3,800.0
4,000.0
4,200.0
Station (ft)
Ground
Pipe
HGL
MaxHGL


Siloam US from MH 1018 to Siphon 1 Dwn
Elevation (ft)
623.00
622.00
621.00
620.00
619.00
618.00
617.00
616.00
615.00
614.00
613.00
612.00
611.00
610.00
609.00
608.00
607.00
606.00
605.00
604.00
603.00
602.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
Station (ft)
Ground
Pipe
HGL
MaxHGL


Siloam DS from Siphon 1 Dwn to Penn Hall
Elevation (ft)
618.00
617.00
616.00
615.00
614.00
613.00
612.00
611.00
610.00
609.00
608.00
607.00
606.00
605.00
604.00
603.00
602.00
601.00
600.00
599.00
598.00
597.00
596.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
2,800.0
3,000.0
3,200.0
3,400.0
3,600.0
3,800.0
Station (ft)
Ground
Pipe
HGL
MaxHGL

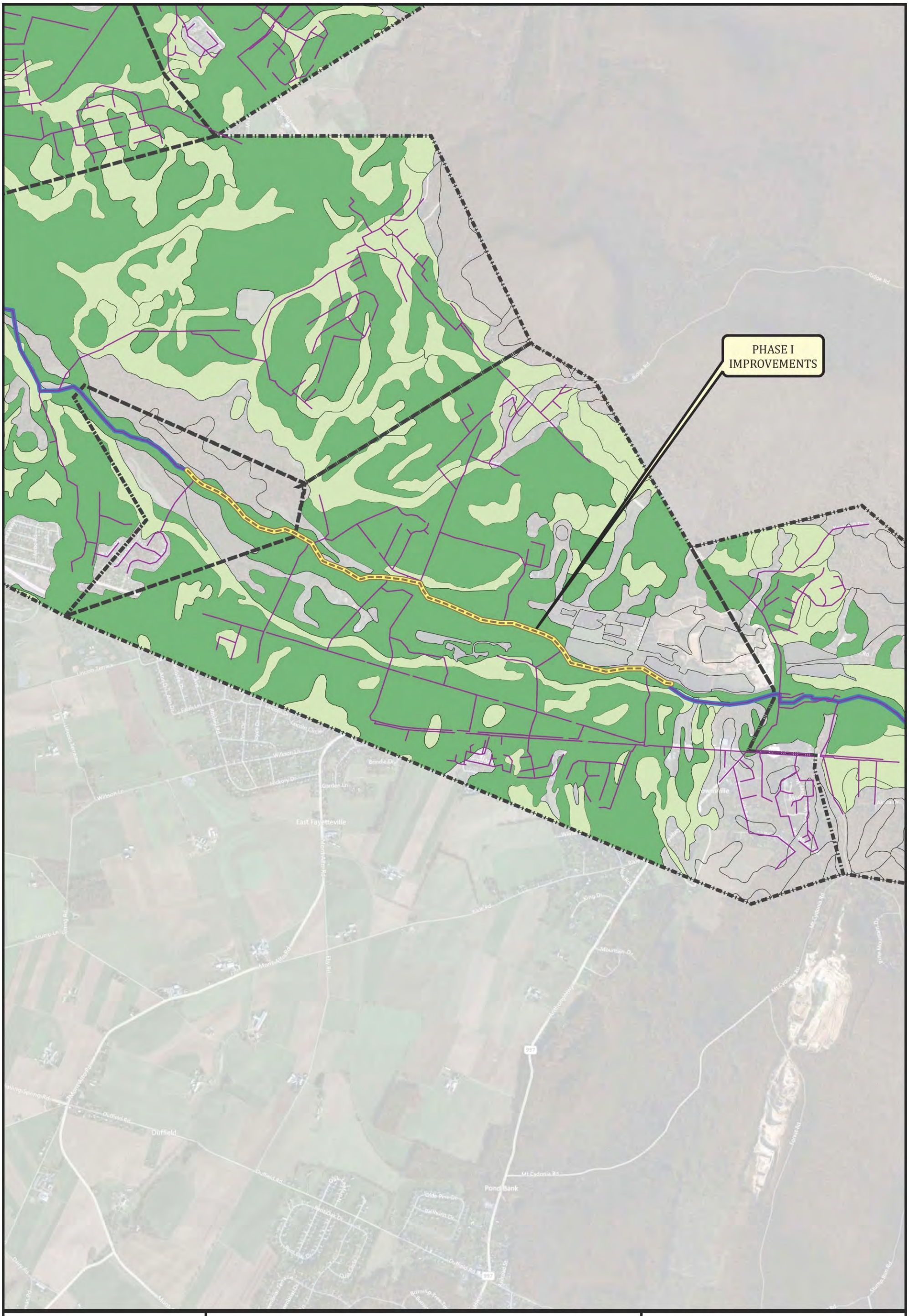
*Excellence Delivered **As Promised***

Appendix B

Exhibits

Gannett Fleming

*Excellence Delivered **As Promised***



Legend

- BASIN BOUNDARY
- PRIME FARMLAND
- FARMLAND OF STATE IMPORTANCE
- IMPROVEMENT
- INTERCEPTOR
- SEWER

PRIME AGRICULTURAL LANDS

PHASE I - INTERCEPTOR IMPROVEMENT

N W E S

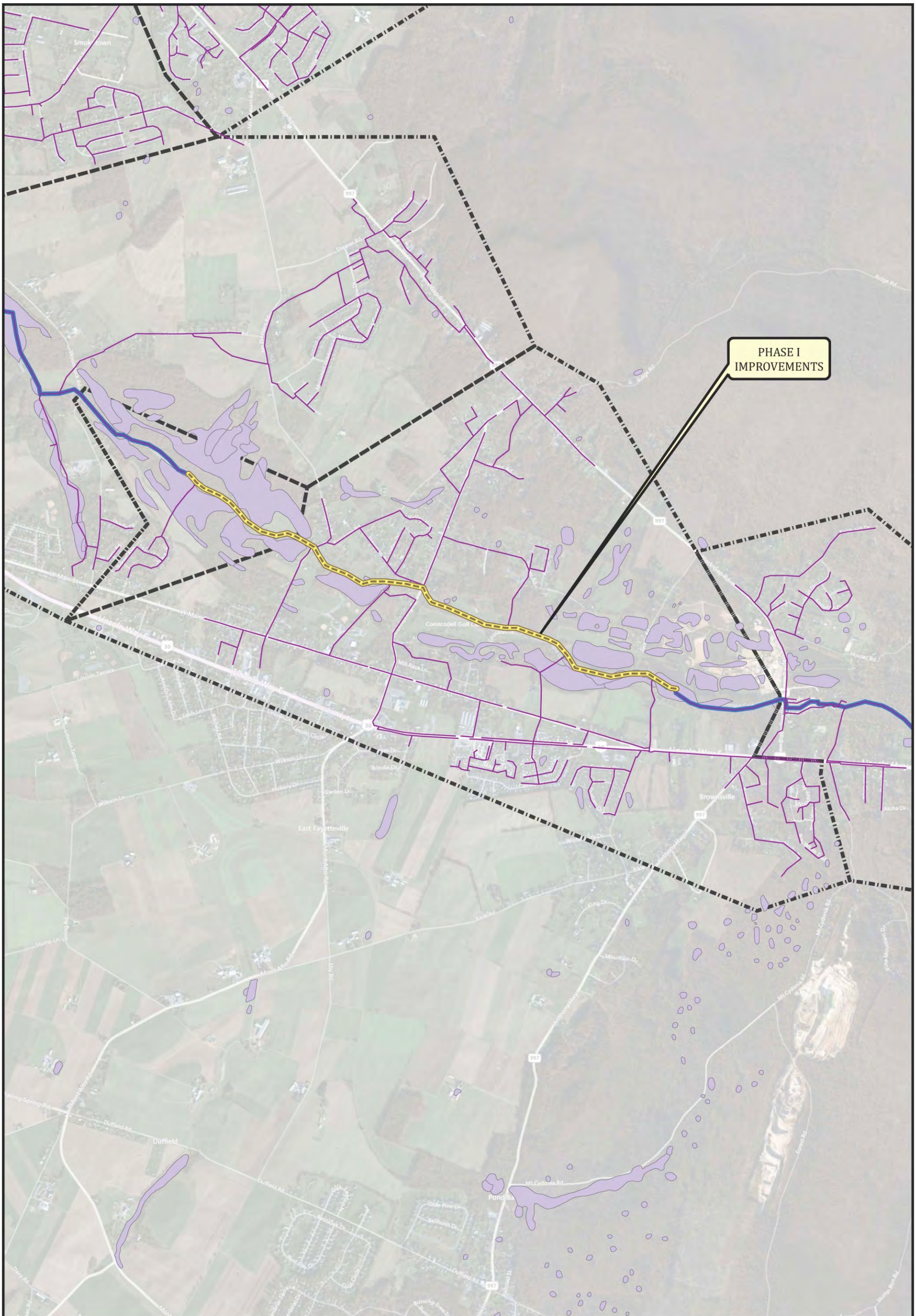
EXHIBIT 1
MARCH 2013

2,000 1,000 0 2,000 Feet

1 Inch = 2,000 Feet

GREENE TOWNSHIP MUNICIPAL AUTHORITY

Gannett Fleming



Legend

- BASIN BOUNDARY
- WETLAND
- IMPROVEMENT
- INTERCEPTOR
- SEWER

WETLANDS

PHASE I - INTERCEPTOR IMPROVEMENT

N
W E
S

EXHIBIT 2
MARCH 2013

2,000 1,000 0 2,000
Feet

1 Inch = 2,000 Feet

GREENE TOWNSHIP MUNICIPAL AUTHORITY

Gannett Fleming

Appendix C

Gannett Fleming

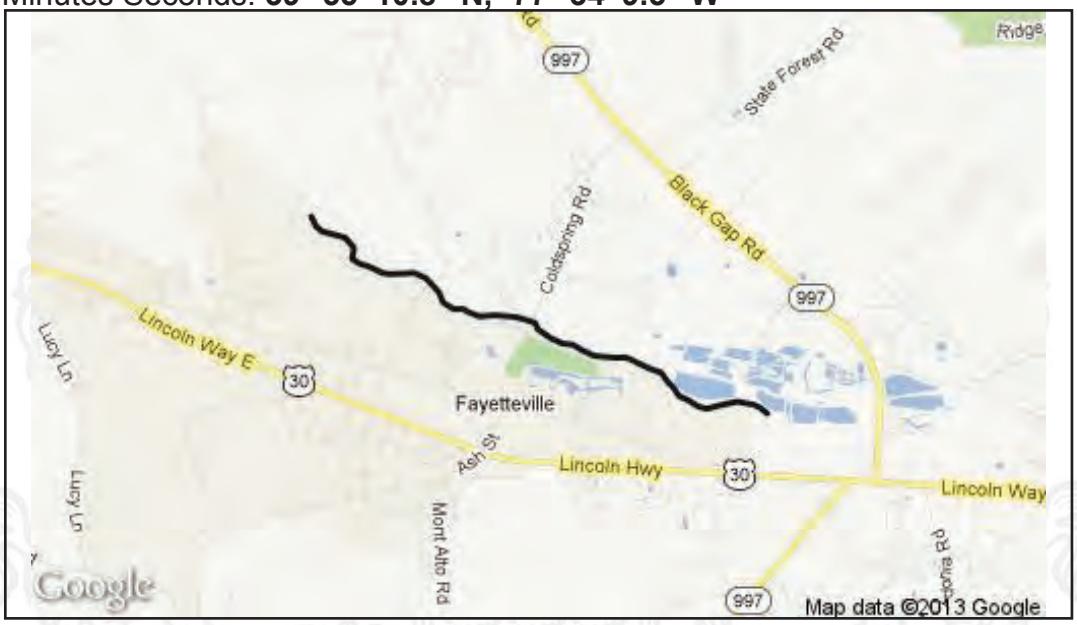
*Excellence Delivered **As Promised***

Pennsylvania Natural Diversity Index
Project Environmental Review

*Excellence Delivered **As Promised***

1. PROJECT INFORMATION

Project Name: **Greene Township Municipal Authority - Interceptor Improvements**
Date of review: **2/5/2013 8:23:57 AM**
Project Category: **Waste Transfer, Treatment, and Disposal,Liquid waste/Effluent,Sewage module/Act 537 plan**
Project Length: **12741.4** feet
County: **Franklin** Township/Municipality: **Greene**
Quadrangle Name: **SCOTLAND** ~ ZIP Code: **17222**
Decimal Degrees: **39.919676 N, -77.569313 W**
Degrees Minutes Seconds: **39° 55' 10.8" N, -77° 34' 9.5" W**



2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Department of Conservation and Natural Resources	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Fish and Boat Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

RESPONSE TO QUESTION(S) ASKED

Q1: Accurately describe what is known about wetland presence in the project area or on the land parcel. "Project" includes all features of the project (including buildings, roads, utility lines, outfall and intake structures, wells, stormwater retention/detention basins, parking lots, driveways, lawns, etc.), as well as all associated impacts (e.g., temporary staging areas, work areas, temporary road crossings, areas subject to grading or clearing, etc.). Include all areas that will be permanently or temporarily affected -- either directly or indirectly -- by any type of disturbance (e.g., land clearing, grading, tree removal, flooding, etc.). Land parcel = the lot(s) on which some type of project(s) or activity(s) are proposed to occur .
Your answer is: **2. The project area (or land parcel) has not been investigated by someone qualified to identify and delineate wetlands, or it is currently unknown if the project or project activities will affect wetlands.**

Q2: Aquatic habitat (stream, river, lake, pond, etc.) is located on or adjacent to the subject property and project activities (including discharge) may occur within 300 feet of these habitats
Your answer is: **3. Unknown**

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

PGC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Myotis septentrionalis
Common Name: Northern Myotis
Current Status: Special Concern Species*
Proposed Status: Special Concern Species*

PA Department of Conservation and Natural Resources

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send

project information to this agency for review (see WHAT TO SEND).

DCNR Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below. After desktop review, if a botanical survey is required by DCNR, we recommend the DCNR Botanical Survey Protocols, available here: http://www.gis.dcnr.state.pa.us/hgis-er/PNDI_DCNR.aspx.)
Scientific Name: Carex prairea
Common Name: Prairie Sedge
Current Status: Threatened
Proposed Status: Threatened

Scientific Name: Juncus arcticus var. littoralis
Common Name: Baltic Rush
Current Status: Threatened
Proposed Status: Threatened

Scientific Name: Lathyrus palustris
Common Name: Vetchling
Current Status: Special Concern Species*
Proposed Status: Endangered

Scientific Name: Salix myricoides
Common Name: Broad-leaved Willow
Current Status: Special Concern Species*
Proposed Status: Endangered

PA Fish and Boat Commission

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

PFBC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Sensitive Species**
Common Name:
Current Status: Endangered
Proposed Status: Endangered

Scientific Name: Sensitive Species**
Common Name:
Current Status: Threatened
Proposed Status: Special Concern Species*

Scientific Name: Sensitive Species**
Common Name:
Current Status: Endangered
Proposed Status: Special Concern Species*

U.S. Fish and Wildlife Service

RESPONSE: No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.* is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictinal agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, send the following information to the agency(s) seeking this information (see AGENCY CONTACT INFORMATION).

Check-list of *Minimum* Materials to be submitted:

____**SIGNED** copy of this Project Environmental Review Receipt
____Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
____Project location information (name of USGS Quadrangle, Township/Municipality, and County)
____USGS 7.5-minute Quadrangle with project boundary clearly indicated, and quad name on the map

The inclusion of the following information may expedite the review process.
____A basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and

endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at http://www.naturalheritage.state.pa.us.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA. 17105-8552
Fax:(717) 772-0271

U.S. Fish and Wildlife Service
Endangered Species Section
315 South Allen Street, Suite 322, State College, PA. 16801-4851
NO Faxes Please.

PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane, Bellefonte, PA. 16823-7437
NO Faxes Please

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797
Fax:(717) 787-6957

7. PROJECT CONTACT INFORMATION

Name: HEATHER RIPLEY
Company/Business Name: GANNETT FLEMING
Address: PO BOX 67100
City, State, Zip: HARRISBURG, PA, 17106-7100
Phone:(717) 763-7211 Fax:(717) 763-1808
Email: hripley@gfnet.com

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

Heather M Ripley — applicant/project proponent signature
2/12/13 — date

Appendix D

Gannett Fleming

*Excellence Delivered **As Promised***

Pennsylvania Natural Diversity Index Inquiries

Gannett Fleming

*Excellence Delivered **As Promised***

Pennsylvania Department of Conservation and Natural Resources

Gannett Fleming

*Excellence Delivered **As Promised***

Gannett Fleming

Excellence Delivered As Promised

February 14, 2013

CERTIFIED MAIL: 7010 3090 0001 8677 7642
RETURN RECEIPT REQUESTED

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street
P.O. Box 8552
Harrisburg, PA 17105-8552

RE: Project Environmental Review Receipt
Potential Impact of Proposed Activity
Greene Township Municipal Authority, Franklin County

Ladies and Gentlemen:

Gannett Fleming is currently assisting Greene Township Municipal Authority (Authority) with planning under the Pennsylvania Sewage Facilities Act (Act 537). The planning has progressed to the point where alternatives have been developed specifically for conveyance of wastewater generated in Greene Township. A Pennsylvania Natural Diversity Inventory (PNDI) Project Environmental Review was performed. The PNDI review determined that additional review is necessary by the Pennsylvania Department of Conservation and Natural Resources to resolve potential impacts from implementation of the alternatives. A signed copy of the Project Environmental Review is enclosed.

Wastewater generated in Greene Township, in portions of Guilford Township, and from the Chambersburg Water Treatment Plant is conveyed to the Chambersburg Wastewater Treatment Plant (WWTP) via sewage facilities owned by the Authority. The wastewater is conveyed by approximately 14 miles of Authority interceptor sewer from Greene Township to the Chambersburg Sewer System. As part of the Act 537 planning process, the Authority considered a number of wastewater management alternatives to adequately provide for its present and projected needs. The most cost effective wastewater management approach at this time for the Authority is to increase the capacity of the Authority's existing interceptor in the Fayetteville area of Greene Township.

There are two (2) alternatives that are being considered; (1) is to replace the existing interceptor sewer with a new larger sewer in the same location as the existing interceptor, and (2) is to rehabilitate the existing interceptor with new manholes and run a parallel sewer along the existing interceptor. Either alternative will be constructed within the Authority's existing sewer right-of-way.

P.O. Box 67100 • Harrisburg, PA 17106-7100 | 207 Senate Avenue • Camp Hill, PA 17011-2316
t: 717.763.7211 • f: 717.763.8150
www.gannettfleming.com

The first alternative will require the Authority to replace approximately 2.5 miles of existing sewer along Conococheague Creek, beginning north of New Lane and U.S. Route 30, and ending west of Mount Pleasant Road (State Route 1001) and north of 5th Avenue. The work will be conducted within the Authority's existing sewer right-of-way. The second alternative will add a sewer parallel to the existing sewer along the same route as Alternative 1 within the Authority's sewer right-of-way. The Greene Township's existing interceptor sewer is between 5 and 13 feet deep along the bank of the creek. The Authority's replacement or parallel interceptor will be placed at approximately the same depth in the same trench as the existing interceptor sewer, but offset to one side to provide future access to the line. This construction method should minimize the amount of new disturbance as most of the excavation will be in areas previously disturbed by Greene Township during the installation of its existing interceptor sewer.

Please find the enclosed documents demonstrating the extent of the project:

1. PNDI Project Environmental Review – Greene Township Municipal Authority – Interceptor Improvements (#20130205389416).
2. Project narrative including an estimate of earth disturbance.
3. 7.5' U.S.G.S. Map with defined boundary of the proposed activity.

This submission is intended to notify the Department of the potential impact and request the appropriate action by the Department to help resolve the potential impact. While a commitment has not been made to undertake the project shown in the mapping and explained in the project narrative, this information will be incorporated in planning assessments under the Pennsylvania Sewage Facility Act and in specific alternative proposals.

Please do not hesitate to call me at (717) 763-7212, Ext. 2393 if you have any questions regarding the Act 537 Plan. We look forward to your prompt response to this letter so that we can properly address any anticipated impacts in the sewage facilities planning.

Very truly yours,

GANNETT FLEMING, INC.
Environmental Resources Division

Heather M Ripley

HEATHER M. RIPLEY, E.I.T.
Planning Specialist
Water Practice

Enclosures

cc: W. Dwayne DelGrande, P.E. Authority Engineer

1. PROJECT INFORMATION

Project Name: **Greene Township Municipal Authority - Interceptor Improvements**
Date of review: **2/5/2013 8:23:57 AM**
Project Category: **Waste Transfer, Treatment, and Disposal,Liquid waste/Effluent,Sewage module/Act 537 plan**
Project Length: **12741.4** feet
County: **Franklin** Township/Municipality: **Greene**
Quadrangle Name: **SCOTLAND** ~ ZIP Code: **17222**
Decimal Degrees: **39.919676 N, -77.569313 W**
Degrees Minutes Seconds: **39° 55' 10.8" N, -77° 34' 9.5" W**

2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Department of Conservation and Natural Resources	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Fish and Boat Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

RESPONSE TO QUESTION(S) ASKED

Q1: Accurately describe what is known about wetland presence in the project area or on the land parcel. "Project" includes all features of the project (including buildings, roads, utility lines, outfall and intake structures, wells, stormwater retention/detention basins, parking lots, driveways, lawns, etc.), as well as all associated impacts (e.g., temporary staging areas, work areas, temporary road crossings, areas subject to grading or clearing, etc.). Include all areas that will be permanently or temporarily affected -- either directly or indirectly -- by any type of disturbance (e.g., land clearing, grading, tree removal, flooding, etc.). Land parcel = the lot(s) on which some type of project(s) or activity(s) are proposed to occur .
Your answer is: **2. The project area (or land parcel) has not been investigated by someone qualified to identify and delineate wetlands, or it is currently unknown if the project or project activities will affect wetlands.**

Q2: Aquatic habitat (stream, river, lake, pond, etc.) is located on or adjacent to the subject property and project activities (including discharge) may occur within 300 feet of these habitats
Your answer is: **3. Unknown**

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

PGC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Myotis septentrionalis
Common Name: Northern Myotis
Current Status: Special Concern Species*
Proposed Status: Special Concern Species*

PA Department of Conservation and Natural Resources

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send

project information to this agency for review (see WHAT TO SEND).

DCNR Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below. After desktop review, if a botanical survey is required by DCNR, we recommend the DCNR Botanical Survey Protocols, available here: http://www.gis.dcnr.state.pa.us/hgis-er/PNDI_DCNR.aspx.)
Scientific Name: Carex prairea
Common Name: Prairie Sedge
Current Status: Threatened
Proposed Status: Threatened

Scientific Name: Juncus arcticus var. littoralis
Common Name: Baltic Rush
Current Status: Threatened
Proposed Status: Threatened

Scientific Name: Lathyrus palustris
Common Name: Vetchling
Current Status: Special Concern Species*
Proposed Status: Endangered

Scientific Name: Salix myricoides
Common Name: Broad-leaved Willow
Current Status: Special Concern Species*
Proposed Status: Endangered

PA Fish and Boat Commission

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

PFBC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Sensitive Species**
Common Name:
Current Status: Endangered
Proposed Status: Endangered

Scientific Name: Sensitive Species**
Common Name:
Current Status: Threatened
Proposed Status: Special Concern Species*

Scientific Name: Sensitive Species**
Common Name:
Current Status: Endangered
Proposed Status: Special Concern Species*

U.S. Fish and Wildlife Service

RESPONSE: No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.* is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictinal agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, send the following information to the agency(s) seeking this information (see AGENCY CONTACT INFORMATION).

Check-list of *Minimum* Materials to be submitted:

✓ **SIGNED** copy of this Project Environmental Review Receipt
✓ Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
✓ Project location information (name of USGS Quadrangle, Township/Municipality, and County)
✓ USGS 7.5-minute Quadrangle with project boundary clearly indicated, and quad name on the map

The inclusion of the following information may expedite the review process.
____A basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and

endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at http://www.naturalheritage.state.pa.us.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA. 17105-8552
Fax:(717) 772-0271

U.S. Fish and Wildlife Service
Endangered Species Section
315 South Allen Street, Suite 322, State College, PA. 16801-4851
NO Faxes Please.

PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane, Bellefonte, PA. 16823-7437
NO Faxes Please

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797
Fax:(717) 787-6957

7. PROJECT CONTACT INFORMATION

Name: HEATHER RIPLEY
Company/Business Name: GANNETT FLEMING
Address: PO BOX 67100
City, State, Zip: HARRISBURG, PA, 17106-7100
Phone:(717) 763-7211 Fax:(717) 763-1808
Email: hripley@gfnet.com

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

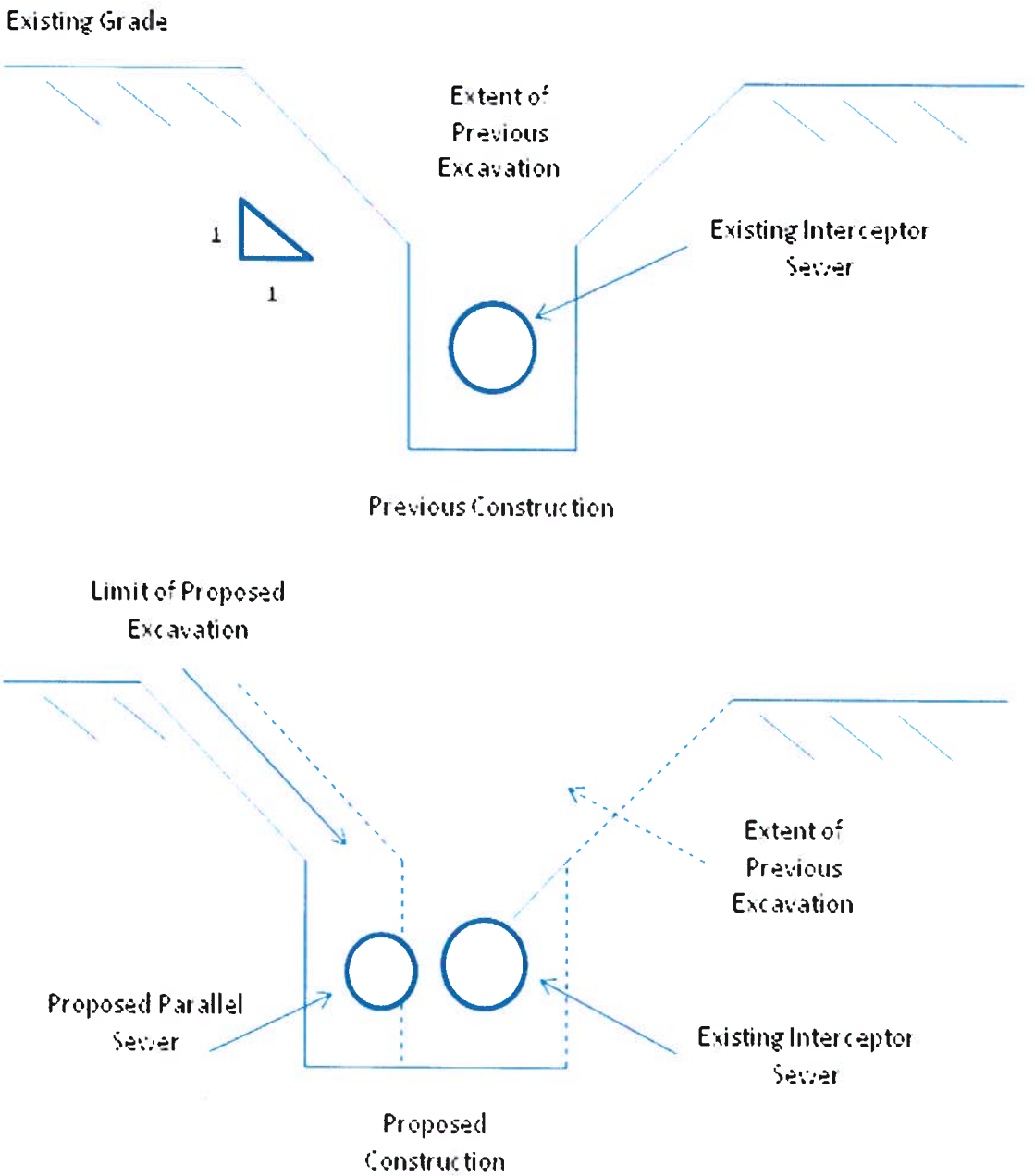
Heather M Ripley — applicant/project proponent signature
2/14/13 — date

PROJECT NARRATIVE

The proposed project will occur in Greene Township, located in Franklin County, Pennsylvania. Greene Township sewage, wastewater from the Chambersburg Water Treatment Plant and a portion of sewage from Guilford Township is conveyed to the Chambersburg Wastewater Treatment Plant (WWTP) by approximately 14 miles of existing interceptor sewers. As part of the Act 537 Planning process, Green Township Municipal Authority (Authority) considered a number of wastewater management alternatives to adequately provide for the existing and projected needs of Greene Township and the surrounding contributors. The most cost effective wastewater management alternative for the Authority was to increase capacity of an existing interceptor sewer in the Fayetteville and Oak Hill areas of Greene Township.

Two (2) alternatives are being considered for the proposed project. The first alternative will replace the existing interceptor sewer with a larger capacity sewer. This alternative will replace approximately 2.5 miles of existing sewer along Conococheague Creek, beginning north of New Lane and U.S. Route 30 and ending west of Mount Pleasant Road (State Route 1001) and north of 5th Avenue. The construction will be completed within the Authority's existing sewer right-of-way. The second alternative will add a parallel sewer to the existing interceptor to handle peak wet weather events. Approximately 2.5 miles of new sewer will be added along the same path as the first alternative. The construction associated with this alternative will be completed within the Authority's existing sewer right-of-way. The added sewer capacity will convey sewage generated in Fayetteville, Greene Knolls Basin including Caledonia State Park, Borough of Chambersburg WTP and Oak Hill. Figure 1 depicts the proposed construction technique for the parallel sewer.

FIGURE 1: ALTERNATIVE 2 PROPOSED CONSTRUCTION TECHNIQUE



An estimate of the amount of land disturbance for the proposed interceptor sewers is included in Table 1. This estimate is based on the length of sewer with six-foot trenching. The proposed project does not include any modifications to existing buildings or disturbance of soils not previously disturbed by sanitary sewer construction.

TABLE 1: Estimated Amount of Earth Disturbance

Sewer Alternative	Description	Length of Sewer	Estimated Amount of Earth Disturbance (1)
1	Replace Existing Interceptor	12,800	5.9 acres
2	Parallel Sewer	12,560	5.8 acres

Notes:

(1) The majority of earth disturbance for Alternative 1 was previously disturbed during construction of the existing sewer. Alternative 2 will make use of the existing trench for the Greene Township Interceptor Sewer, as shown in Figure 1.


USGS
U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY
The National Map
US Topo
SCOTLAND QUADRANGLE
PENNSYLVANIA
7.5-MINUTE SERIES
Proposed
Interceptor Sewer
SCALE 1:24 000
ROAD CLASSIFICATION
SCOTLAND, PA
2010

Pennsylvania Department of Fish and Boat Commission

Gannett Fleming

*Excellence Delivered **As Promised***

Gannett Fleming

Excellence Delivered As Promised

February 14, 2013

CERTIFIED MAIL: 7010 3090 0001 8677 7635
RETURN RECEIPT REQUESTED

PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane
Bellefonte, PA 16823

RE: Project Environmental Review Receipt
Potential Impact of Proposed Activity
Greene Township Municipal Authority, Franklin County

Ladies and Gentlemen:

Gannett Fleming is currently assisting Greene Township Municipal Authority (Authority) with planning under the Pennsylvania Sewage Facilities Act (Act 537). The planning has progressed to the point where alternatives have been developed specifically for conveyance of wastewater generated in Greene Township. A Pennsylvania Natural Diversity Inventory (PNDI) Project Environmental Review was performed. The PNDI review determined that additional review is necessary by the Pennsylvania Fish and Boat Commission to resolve potential impacts from implementation of the alternatives. A signed copy of the Project Environmental Review is enclosed.

Wastewater generated in Greene Township, in portions of Guilford Township, and from the Chambersburg Water Treatment Plant is conveyed to the Chambersburg Wastewater Treatment Plant (WWTP) via sewage facilities owned by the Authority. The wastewater is conveyed by approximately 14 miles of Authority interceptor sewer from Greene Township to the Chambersburg Sewer System. As part of the Act 537 planning process, the Authority considered a number of wastewater management alternatives to adequately provide for its present and projected needs. The most cost effective wastewater management approach at this time for the Authority is to increase the capacity of the Authority's existing interceptor in the Fayetteville area of Greene Township.

There are two (2) alternatives that are being considered; (1) is to replace the existing interceptor sewer with a new larger sewer in the same location as the existing interceptor, and (2) is to rehabilitate the existing interceptor with new manholes and run a parallel sewer along the existing interceptor. Either alternative will be constructed within the Authority's existing sewer right-of-way.

Gannett Fleming, Inc.

P.O. Box 67100 • Harrisburg, PA 17106-7100 | 207 Senate Avenue • Camp Hill, PA 17011-2316
t: 717.763.7211 • f: 717.763.8150
www.gannettfleming.com

The first alternative will require the Authority to replace approximately 2.5 miles of existing sewer along Conococheague Creek, beginning north of New Lane and U.S. Route 30, and ending west of Mount Pleasant Road (State Route 1001) and north of 5th Avenue. The work will be conducted within the Authority's existing sewer right-of-way. The second alternative will add a sewer parallel to the existing sewer along the same route as Alternative 1 within the Authority's sewer right-of-way. The Greene Township's existing interceptor sewer is between 5 and 13 feet deep along the bank of the creek. The Authority's replacement or parallel interceptor will be placed at approximately the same depth in the same trench as the existing interceptor sewer, but offset to one side to provide future access to the line. This construction method should minimize the amount of new disturbance as most of the excavation will be in areas previously disturbed by Greene Township during the installation of its existing interceptor sewer.

Please find the enclosed documents demonstrating the extent of the project:

1. PNDI Project Environmental Review - Greene Township Municipal Authority Interceptor Improvements (#20130205389416).
2. Project narrative including an estimate of earth disturbance.
3. 7.5' U.S.G.S. Map with defined boundary of the proposed activity.

This submission is intended to notify the Commission of the potential impact and request the appropriate action by the Commission to help resolve the potential impact. While a commitment has not been made to undertake the project shown in the mapping and explained in the project narrative, this information will be incorporated in planning assessments under the Pennsylvania Sewage Facility Act and in specific alternative proposals.

Please do not hesitate to call me at (717) 763-7212, Ext. 2393 if you have any questions regarding the Act 537 Plan. We look forward to your prompt response to this letter so that we can properly address any anticipated impacts in the sewage facilities planning.

Very truly yours,

GANNETT FLEMING, INC.
Environmental Resources Division

Heather M Ripley

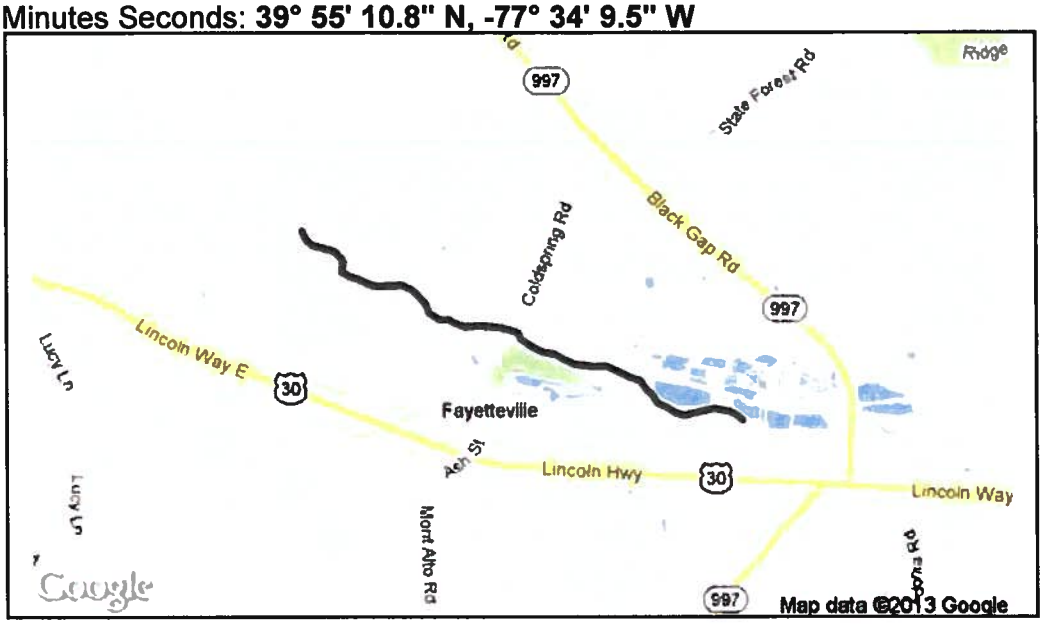
HEATHER M. RIPLEY, E.I.T.
Planning Specialist
Water Practice

Enclosures

cc: W. Dwayne DelGrande, P.E. Authority Engineer

1. PROJECT INFORMATION

Project Name: **Greene Township Municipal Authority - Interceptor Improvements**
Date of review: **2/5/2013 8:23:57 AM**
Project Category: **Waste Transfer, Treatment, and Disposal,Liquid waste/Effluent,Sewage module/Act 537 plan**
Project Length: **12741.4** feet
County: **Franklin** Township/Municipality: **Greene**
Quadrangle Name: **SCOTLAND** ~ ZIP Code: **17222**
Decimal Degrees: **39.919676 N, -77.569313 W**
Degrees Minutes Seconds: **39° 55' 10.8" N, -77° 34' 9.5" W**



2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Department of Conservation and Natural Resources	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Fish and Boat Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

RESPONSE TO QUESTION(S) ASKED

Q1: Accurately describe what is known about wetland presence in the project area or on the land parcel. "Project" includes all features of the project (including buildings, roads, utility lines, outfall and intake structures, wells, stormwater retention/detention basins, parking lots, driveways, lawns, etc.), as well as all associated impacts (e.g., temporary staging areas, work areas, temporary road crossings, areas subject to grading or clearing, etc.). Include all areas that will be permanently or temporarily affected -- either directly or indirectly -- by any type of disturbance (e.g., land clearing, grading, tree removal, flooding, etc.). Land parcel = the lot(s) on which some type of project(s) or activity(s) are proposed to occur .
Your answer is: **2. The project area (or land parcel) has not been investigated by someone qualified to identify and delineate wetlands, or it is currently unknown if the project or project activities will affect wetlands.**

Q2: Aquatic habitat (stream, river, lake, pond, etc.) is located on or adjacent to the subject property and project activities (including discharge) may occur within 300 feet of these habitats
Your answer is: **3. Unknown**

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

PGC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Myotis septentrionalis
Common Name: Northern Myotis
Current Status: Special Concern Species*
Proposed Status: Special Concern Species*

PA Department of Conservation and Natural Resources

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send

project information to this agency for review (see WHAT TO SEND).

DCNR Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below. After desktop review, if a botanical survey is required by DCNR, we recommend the DCNR Botanical Survey Protocols, available here: http://www.gis.dcnr.state.pa.us/hgis-er/PNDI_DCNR.aspx.)
Scientific Name: Carex prairea
Common Name: Prairie Sedge
Current Status: Threatened
Proposed Status: Threatened

Scientific Name: Juncus arcticus var. littoralis
Common Name: Baltic Rush
Current Status: Threatened
Proposed Status: Threatened

Scientific Name: Lathyrus palustris
Common Name: Vetchling
Current Status: Special Concern Species*
Proposed Status: Endangered

Scientific Name: Salix myricoides
Common Name: Broad-leaved Willow
Current Status: Special Concern Species*
Proposed Status: Endangered

PA Fish and Boat Commission

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

PFBC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Sensitive Species**
Common Name:
Current Status: Endangered
Proposed Status: Endangered

Scientific Name: Sensitive Species**
Common Name:
Current Status: Threatened
Proposed Status: Special Concern Species*

Scientific Name: Sensitive Species**
Common Name:
Current Status: Endangered
Proposed Status: Special Concern Species*

U.S. Fish and Wildlife Service

RESPONSE: No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.* is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictinal agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, send the following information to the agency(s) seeking this information (see AGENCY CONTACT INFORMATION).

Check-list of *Minimum* Materials to be submitted:

____**SIGNED** copy of this Project Environmental Review Receipt
____Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
____Project location information (name of USGS Quadrangle, Township/Municipality, and County)
____USGS 7.5-minute Quadrangle with project boundary clearly indicated, and quad name on the map

The inclusion of the following information may expedite the review process.
____A basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and

endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at http://www.naturalheritage.state.pa.us.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA. 17105-8552
Fax:(717) 772-0271

U.S. Fish and Wildlife Service
Endangered Species Section
315 South Allen Street, Suite 322, State College, PA. 16801-4851
NO Faxes Please.

PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane, Bellefonte, PA. 16823-7437
NO Faxes Please

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797
Fax:(717) 787-6957

7. PROJECT CONTACT INFORMATION

Name: HEATHER RIPLEY
Company/Business Name: GANNETT FLEMING
Address: PO BOX 67100
City, State, Zip: HARRISBURG, PA, 17106-7100
Phone:(717) 763-7211 Fax:(717) 763-1808
Email: hripley@gfnet.com

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

Heather M Ripley
applicant/project proponent signature

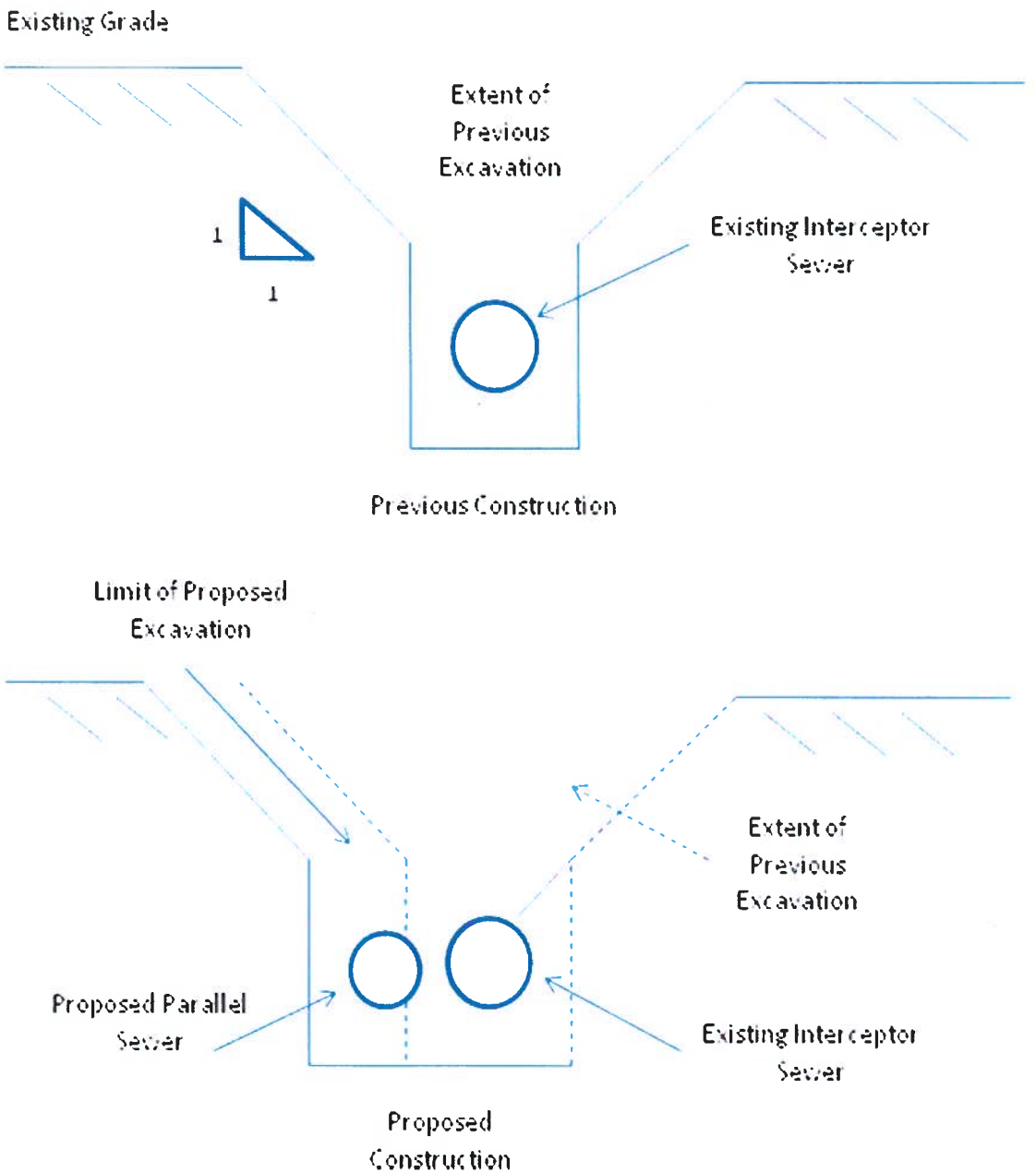
2/12/13
date

PROJECT NARRATIVE

The proposed project will occur in Greene Township, located in Franklin County, Pennsylvania. Greene Township sewage, wastewater from the Chambersburg Water Treatment Plant and a portion of sewage from Guilford Township is conveyed to the Chambersburg Wastewater Treatment Plant (WWTP) by approximately 14 miles of existing interceptor sewers. As part of the Act 537 Planning process, Green Township Municipal Authority (Authority) considered a number of wastewater management alternatives to adequately provide for the existing and projected needs of Greene Township and the surrounding contributors. The most cost effective wastewater management alternative for the Authority was to increase capacity of an existing interceptor sewer in the Fayetteville and Oak Hill areas of Greene Township.

Two (2) alternatives are being considered for the proposed project. The first alternative will replace the existing interceptor sewer with a larger capacity sewer. This alternative will replace approximately 2.5 miles of existing sewer along Conococheague Creek, beginning north of New Lane and U.S. Route 30 and ending west of Mount Pleasant Road (State Route 1001) and north of 5th Avenue. The construction will be completed within the Authority's existing sewer right-of-way. The second alternative will add a parallel sewer to the existing interceptor to handle peak wet weather events. Approximately 2.5 miles of new sewer will be added along the same path as the first alternative. The construction associated with this alternative will be completed within the Authority's existing sewer right-of-way. The added sewer capacity will convey sewage generated in Fayetteville, Greene Knolls Basin including Caledonia State Park, Borough of Chambersburg WTP and Oak Hill. Figure 1 depicts the proposed construction technique for the parallel sewer.

FIGURE 1: ALTERNATIVE 2 PROPOSED CONSTRUCTION TECHNIQUE



An estimate of the amount of land disturbance for the proposed interceptor sewers is included in Table 1. This estimate is based on the length of sewer with six-foot trenching. The proposed project does not include any modifications to existing buildings or disturbance of soils not previously disturbed by sanitary sewer construction.

TABLE 1: Estimated Amount of Earth Disturbance

Sewer Alternative	Description	Length of Sewer	Estimated Amount of Earth Disturbance (1)
1	Replace Existing Interceptor	12,800	5.9 acres
2	Parallel Sewer	12,560	5.8 acres

Notes:

(1) The majority of earth disturbance for Alternative 1 was previously disturbed during construction of the existing sewer. Alternative 2 will make use of the existing trench for the Greene Township Interceptor Sewer, as shown in Figure 1.

USGS

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

US Topo

SCOTLAND QUADRANGLE
PENNSYLVANIA
7.5-MINUTE SERIES

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

ROAD CLASSIFICATION

SCOTLAND, PA
2010

Pennsylvania Game Commission

Gannett Fleming

*Excellence Delivered **As Promised***

Gannett Fleming

Excellence Delivered As Promised

February 14, 2013

CERTIFIED MAIL: 7010 3090 0001 8677 7659
RETURN RECEIPT REQUESTED

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue
Harrisburg, PA 17110-9797

RE: Project Environmental Review Receipt
Potential Impact of Proposed Activity
Greene Township Municipal Authority, Franklin County

Ladies and Gentlemen:

Gannett Fleming is currently assisting Greene Township Municipal Authority (Authority) with planning under the Pennsylvania Sewage Facilities Act (Act 537). The planning has progressed to the point where alternatives have been developed specifically for conveyance of wastewater generated in Greene Township. A Pennsylvania Natural Diversity Inventory (PNDI) Project Environmental Review was performed. The PNDI review determined that additional review is necessary by the Pennsylvania Game Commission to resolve potential impacts from implementation of the alternatives. A signed copy of the Project Environmental Review is enclosed.

Wastewater generated in Greene Township, in portions of Guilford Township, and from the Chambersburg Water Treatment Plant is conveyed to the Chambersburg Wastewater Treatment Plant (WWTP) via sewage facilities owned by the Authority. The wastewater is conveyed by approximately 14 miles of Authority interceptor sewer from Greene Township to the Chambersburg Sewer System. As part of the Act 537 planning process, the Authority considered a number of wastewater management alternatives to adequately provide for its present and projected needs. The most cost effective wastewater management approach at this time for the Authority is to increase the capacity of the Authority's existing interceptor in the Fayetteville area of Greene Township.

There are two (2) alternatives that are being considered; (1) is to replace the existing interceptor sewer with a new larger sewer in the same location as the existing interceptor, and (2) is to rehabilitate the existing interceptor with new manholes and run a parallel sewer along the existing interceptor. Either alternative will be constructed within the Authority's existing sewer right-of-way.

The first alternative will require the Authority to replace approximately 2.5 miles of existing sewer along Conococheague Creek, beginning north of New Lane and U.S. Route 30, and ending west of Mount Pleasant Road (State Route 1001) and north of 5th Avenue. The work will be conducted within the Authority's existing sewer right-of-way. The second alternative will add a sewer parallel to the existing sewer along the same route as Alternative 1 within the Authority's sewer right-of-way. The Greene Township's existing interceptor sewer is between 5 and 13 feet deep along the bank of the creek. The Authority's replacement or parallel interceptor will be placed at approximately the same depth in the same trench as the existing interceptor sewer, but offset to one side to provide future access to the line. This construction method should minimize the amount of new disturbance as most of the excavation will be in areas previously disturbed by Greene Township during the installation of its existing interceptor sewer.

Please find the enclosed documents demonstrating the extent of the project:

1. PNDI Project Environmental Review – Greene Township Municipal Authority – Interceptor Improvements (#20130205389416).
2. Project narrative including an estimate of earth disturbance.
3. 7.5' U.S.G.S. Map with defined boundary of the proposed activity.

This submission is intended to notify the Commission of the potential impact and request the appropriate action by the Commission to help resolve the potential impact. While a commitment has not been made to undertake the project shown in the mapping and explained in the project narrative, this information will be incorporated in planning assessments under the Pennsylvania Sewage Facility Act and in specific alternative proposals.

Please do not hesitate to call me at (717) 763-7212, Ext. 2393 if you have any questions regarding the Act 537 Plan. We look forward to your prompt response to this letter so that we can properly address any anticipated impacts in the sewage facilities planning.

Very truly yours,

GANNETT FLEMING, INC.
Environmental Resources Division

Heather M Ripley

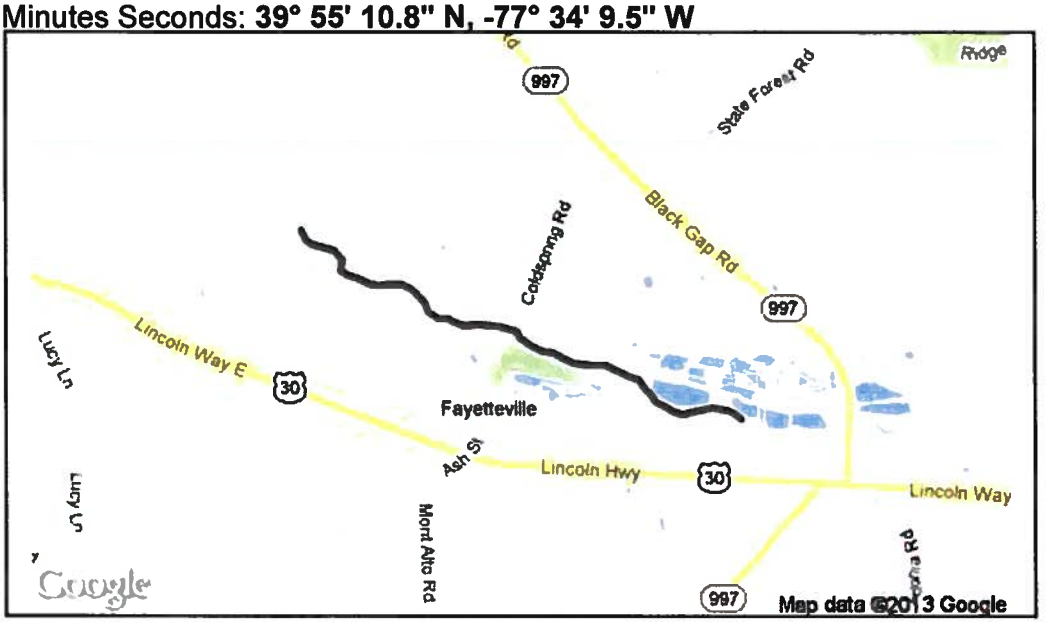
HEATHER M. RIPLEY, E.I.T.
Planning Specialist
Water Practice

Enclosures

cc: W. Dwayne DelGrande, P.E. Authority Engineer

1. PROJECT INFORMATION

Project Name: **Greene Township Municipal Authority - Interceptor Improvements**
Date of review: **2/5/2013 8:23:57 AM**
Project Category: **Waste Transfer, Treatment, and Disposal,Liquid waste/Effluent,Sewage module/Act 537 plan**
Project Length: **12741.4** feet
County: **Franklin** Township/Municipality: **Greene**
Quadrangle Name: **SCOTLAND** ~ ZIP Code: **17222**
Decimal Degrees: **39.919676 N, -77.569313 W**
Degrees Minutes Seconds: **39° 55' 10.8" N, -77° 34' 9.5" W**



2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Department of Conservation and Natural Resources	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Fish and Boat Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

RESPONSE TO QUESTION(S) ASKED

Q1: Accurately describe what is known about wetland presence in the project area or on the land parcel. "Project" includes all features of the project (including buildings, roads, utility lines, outfall and intake structures, wells, stormwater retention/detention basins, parking lots, driveways, lawns, etc.), as well as all associated impacts (e.g., temporary staging areas, work areas, temporary road crossings, areas subject to grading or clearing, etc.). Include all areas that will be permanently or temporarily affected -- either directly or indirectly -- by any type of disturbance (e.g., land clearing, grading, tree removal, flooding, etc.). Land parcel = the lot(s) on which some type of project(s) or activity(s) are proposed to occur .
Your answer is: **2. The project area (or land parcel) has not been investigated by someone qualified to identify and delineate wetlands, or it is currently unknown if the project or project activities will affect wetlands.**

Q2: Aquatic habitat (stream, river, lake, pond, etc.) is located on or adjacent to the subject property and project activities (including discharge) may occur within 300 feet of these habitats
Your answer is: **3. Unknown**

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

PGC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Myotis septentrionalis
Common Name: Northern Myotis
Current Status: Special Concern Species*
Proposed Status: Special Concern Species*

PA Department of Conservation and Natural Resources

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send

project information to this agency for review (see WHAT TO SEND).

DCNR Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below. After desktop review, if a botanical survey is required by DCNR, we recommend the DCNR Botanical Survey Protocols, available here: http://www.gis.dcnr.state.pa.us/hgis-er/PNDI_DCNR.aspx.)
Scientific Name: Carex prairea
Common Name: Prairie Sedge
Current Status: Threatened
Proposed Status: Threatened

Scientific Name: Juncus arcticus var. littoralis
Common Name: Baltic Rush
Current Status: Threatened
Proposed Status: Threatened

Scientific Name: Lathyrus palustris
Common Name: Vetchling
Current Status: Special Concern Species*
Proposed Status: Endangered

Scientific Name: Salix myricoides
Common Name: Broad-leaved Willow
Current Status: Special Concern Species*
Proposed Status: Endangered

PA Fish and Boat Commission

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

PFBC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Sensitive Species**
Common Name:
Current Status: Endangered
Proposed Status: Endangered

Scientific Name: Sensitive Species**
Common Name:
Current Status: Threatened
Proposed Status: Special Concern Species*

Scientific Name: Sensitive Species**
Common Name:
Current Status: Endangered
Proposed Status: Special Concern Species*

U.S. Fish and Wildlife Service

RESPONSE: No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.* is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictinal agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If **project information was requested by one or more of the agencies above,** send the following information to the agency(s) seeking this information (see AGENCY CONTACT INFORMATION).

Check-list of *Minimum* Materials to be submitted:

__✓__ **SIGNED** copy of this Project Environmental Review Receipt
__✓__ Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
__✓__ Project location information (name of USGS Quadrangle, Township/Municipality, and County)
__✓__ USGS 7.5-minute Quadrangle with project boundary clearly indicated, and quad name on the map

The inclusion of the following information may expedite the review process.
____ A basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
____ Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____ Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and

endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at http://www.naturalheritage.state.pa.us.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA. 17105-8552
Fax:(717) 772-0271

U.S. Fish and Wildlife Service
Endangered Species Section
315 South Allen Street, Suite 322, State College, PA. 16801-4851
NO Faxes Please.

PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane, Bellefonte, PA. 16823-7437
NO Faxes Please

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797
Fax:(717) 787-6957

7. PROJECT CONTACT INFORMATION

Name: HEATHER RIPLEY
Company/Business Name: GANNETT FLEMING
Address: PO BOX 67100
City, State, Zip: HARRISBURG, PA, 17106-7100
Phone:(717) 763-7211 Fax:(717) 763-1808
Email: hripley@gfnet.com

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

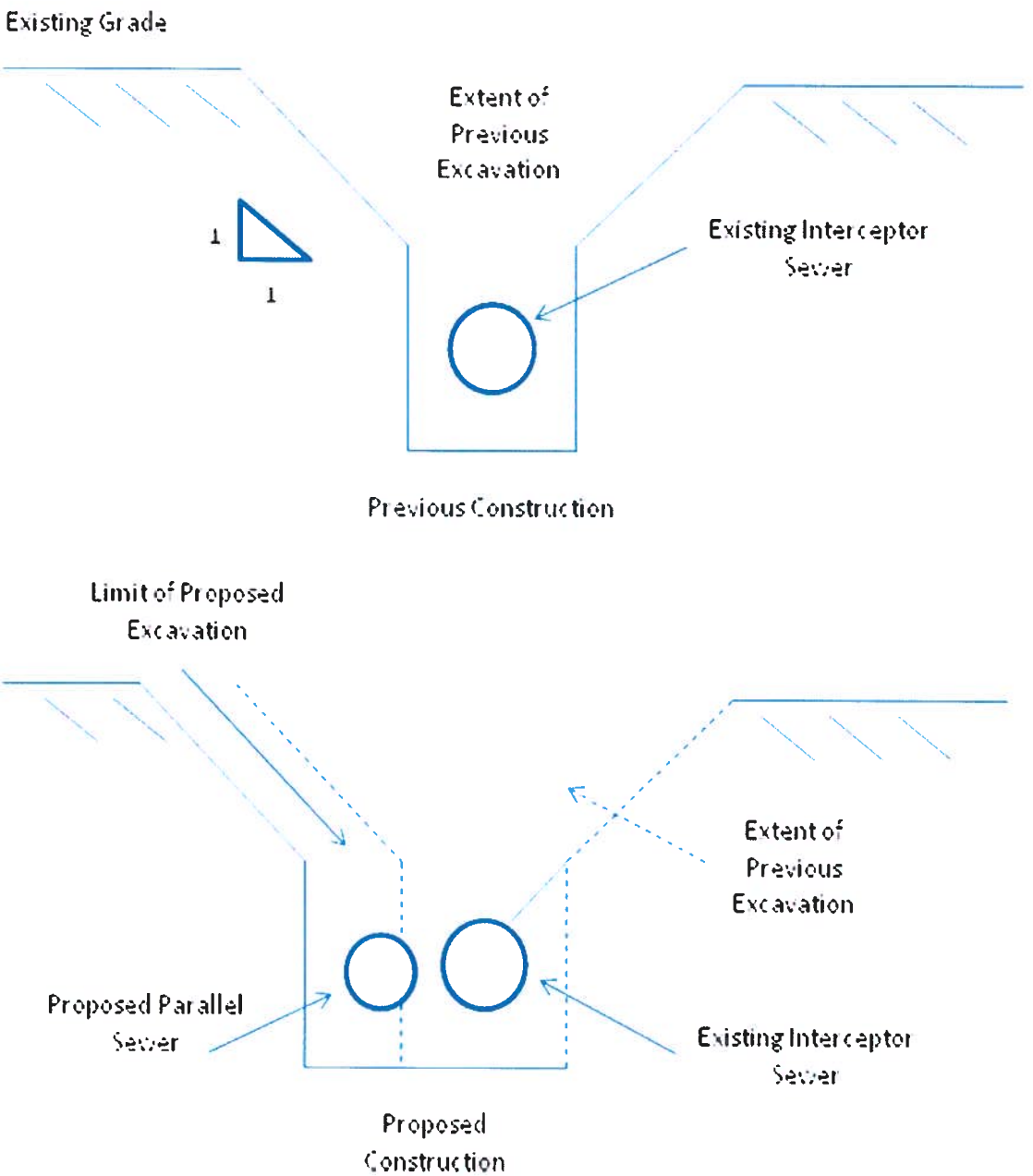
Heather M Ripley 2/14/13
applicant/project proponent signature date

PROJECT NARRATIVE

The proposed project will occur in Greene Township, located in Franklin County, Pennsylvania. Greene Township sewage, wastewater from the Chambersburg Water Treatment Plant and a portion of sewage from Guilford Township is conveyed to the Chambersburg Wastewater Treatment Plant (WWTP) by approximately 14 miles of existing interceptor sewers. As part of the Act 537 Planning process, Green Township Municipal Authority (Authority) considered a number of wastewater management alternatives to adequately provide for the existing and projected needs of Greene Township and the surrounding contributors. The most cost effective wastewater management alternative for the Authority was to increase capacity of an existing interceptor sewer in the Fayetteville and Oak Hill areas of Greene Township.

Two (2) alternatives are being considered for the proposed project. The first alternative will replace the existing interceptor sewer with a larger capacity sewer. This alternative will replace approximately 2.5 miles of existing sewer along Conococheague Creek, beginning north of New Lane and U.S. Route 30 and ending west of Mount Pleasant Road (State Route 1001) and north of 5th Avenue. The construction will be completed within the Authority's existing sewer right-of-way. The second alternative will add a parallel sewer to the existing interceptor to handle peak wet weather events. Approximately 2.5 miles of new sewer will be added along the same path as the first alternative. The construction associated with this alternative will be completed within the Authority's existing sewer right-of-way. The added sewer capacity will convey sewage generated in Fayetteville, Greene Knolls Basin including Caledonia State Park, Borough of Chambersburg WTP and Oak Hill. Figure 1 depicts the proposed construction technique for the parallel sewer.

FIGURE 1: ALTERNATIVE 2 PROPOSED CONSTRUCTION TECHNIQUE



An estimate of the amount of land disturbance for the proposed interceptor sewers is included in Table 1. This estimate is based on the length of sewer with six-foot trenching. The proposed project does not include any modifications to existing buildings or disturbance of soils not previously disturbed by sanitary sewer construction.

TABLE 1: Estimated Amount of Earth Disturbance

Sewer Alternative	Description	Length of Sewer	Estimated Amount of Earth Disturbance (1)
1	Replace Existing Interceptor	12,800	5.9 acres
2	Parallel Sewer	12,560	5.8 acres

Notes:

(1) The majority of earth disturbance for Alternative 1 was previously disturbed during construction of the existing sewer. Alternative 2 will make use of the existing trench for the Greene Township Interceptor Sewer, as shown in Figure 1.


U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY
SCOTLAND QUADRANGLE
PENNSYLVANIA
7.5-MINUTE SERIES
Proposed Interceptor Sewer
SCALE 1:24 000
CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
ROAD CLASSIFICATION
SCOTLAND, PA
2010

Appendix E

Gannett Fleming

*Excellence Delivered **As Promised***

Pennsylvania Natural Diversity Index
Responses

Excellence Delivered ***As Promised***

pennsylvania
DEPARTMENT OF CONSERVATION
AND NATURAL RESOURCES

BUREAU OF FORESTRY

February 26, 2013 **PNDI Number: 20130205389416**

Heather Ripley
Gannett Fleming, Inc.
P.O. Box 67100
Harrisburg, PA 17106
Email: hripley@gfnet.com (hard copy will not follow)

Re: Greene Township Municipal Authority – Interceptor Improvements
Greene Township, Franklin County, PA

Dear Ms. Ripley,

Thank you for the submission of the Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review Receipt Number 20130205389416 for review. PA Department of Conservation and Natural Resources screened this project for potential impacts to species and resources under DCNR's responsibility, which includes plants, terrestrial invertebrates, natural communities, and geologic features only.

Potential Impact Anticipated

PNDI records indicate species or resources under DCNR's jurisdiction are located in the project vicinity. Based on a detailed PNDI review, DCNR determined potential impacts to the following threatened or endangered species or species of special concern.

Scientific Name	Common Name	PA Current Status	PA Proposed Status
Carex prairea	Prairie Sedge	Threatened	Threatened
Juncus arcticus var. *littoralis*	Baltic Rush	Threatened	Threatened
Lathyrus palustris	Marsh Vetchling	Undetermined	Endangered
Salix myricoides	Broad-leaved Willow	Not Listed	Endangered

Survey Request
DCNR requests a survey for the following species:

- ***Carex prairea* (Prairie Sedge):** prefers wet calcareous marshes and fens; fruits June – July
- ***Juncus arcticus var. littoralis* (Baltic Rush):** prefers calcareous swamps and shores; flowers/fruits late May – September
- ***Lathyrus palustris* (Marsh Vetchling):** prefers shores, moist meadows, sand plains, swamps, and thickets; flowers June – August
- ***Salix myricoides* (Broad-leaved Willow):** prefers stream banks and swamps; flowers in May

✓ A survey for the above species should be conducted by a qualified botanist *at the appropriate time of year and then submitted to our office for review*. **Your botanist should carefully review the new DCNR Botanical Survey Protocols available at http://www.gis.dcnr.state.pa.us/hgis-er/Login.aspx. These protocols are recommended to ensure that the all necessary information is collected and that survey reports are prepared properly. It is the expectation of DCNR that these protocols will be followed when conducting surveys for species under our jurisdiction.**

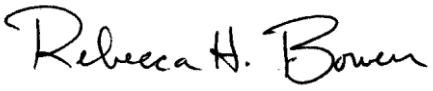
✓ Your botanist should *fill out the field survey form while performing their survey*: http://www.gis.dcnr.state.pa.us/hgis-er/hgis/Internet%20Field%20Survey%20Form_2007.pdf. Contact our office prior to the survey for detailed information about the species, or for a list of qualified surveyors.

- ✓ Any target and non-target state-listed species found during the site visit should be reported to our office. Mitigation measures and monitoring may be requested if species or communities of special concern are found on or adjacent to site.
- ✓ If the land type(s) does not exist on site, a survey may not be necessary; please submit a habitat assessment report which describes the current land cover, habitat types, and species found on site.

This response represents the most up-to-date review of the PNDI data files and is valid for two (2) years only. If project plans change or more information on listed or proposed species becomes available, our determination may be reconsidered. For PNDI project updates, please see the PNHP website at www.naturalheritage.state.pa.us for guidance. As a reminder, this finding applies to potential impacts under DCNR's jurisdiction only. Visit the PNHP website for directions on contacting the Commonwealth's other resource agencies for environmental review. Should you have any questions or concerns, please don't hesitate to contact me by phone (717-705-2822) or via email (c-jryndock@pa.gov).

Sincerely,

Jason Ryndock, Ecological Information Specialist
Bureau of Forestry, Ecological Services Section
Pennsylvania Natural Heritage Program



Rebecca H. Bowen, Section Chief
Bureau of Forestry, Ecological Services Section
Pennsylvania Natural Heritage Program

Appendix F

Gannett Fleming

*Excellence Delivered **As Promised***

Pennsylvania Historical Museum Commission
Cultural Response Inquiry

Gannett Fleming

*Excellence Delivered **As Promised***

Gannett Fleming

Excellence Delivered As Promised

February 12, 2013

CERTIFIED MAIL: 7010 3090 0001 8677 7628
RETURN RECEIPT REQUESTED

Pennsylvania Historical and Museum Commission
Bureau of Historic Preservation
Commonwealth Keystone Building
400 North Street, Second Floor
Harrisburg, PA 17120-0093

RE: Notification of Potential Effect of Proposed Action
On Archaeological and Historical Resources
Greene Township Municipal Authority, Franklin County

Ladies and Gentlemen:

Gannett Fleming is currently assisting Greene Township Municipal Authority (Authority) with planning under the Pennsylvania Sewage Facilities Act (Act 537). The planning has progressed to the point where alternatives have been developed specifically for conveyance of wastewater generated in Greene Township. The Act 537 planning regulations require the Authority to determine if the alternatives will have an impact on archaeological or historical resources.

Wastewater generated in Greene Township, in portions of Guilford Township, and from the Chambersburg Water Treatment Plant is conveyed to the Chambersburg Wastewater Treatment Plant (WWTP) via sewage facilities owned by the Authority. The wastewater is conveyed by approximately 14 miles of Authority interceptor sewer from Greene Township to the Chambersburg Sewer System. As part of the Act 537 planning process, the Authority considered a number of wastewater management alternatives to adequately provide for its present and projected needs. The most cost effective wastewater management approach at this time for the Authority is to increase the capacity of the Authority's existing interceptor in the Fayetteville area of Greene Township.

There are two (2) alternatives that are being considered; (1) is to replace the existing interceptor sewer with a new larger sewer in the same location as the existing interceptor, and (2) is to rehabilitate the existing interceptor with new manholes and run a parallel sewer along the existing interceptor. Either alternative will be constructed within the Authority's existing sewer right-of-way.

The first alternative will require the Authority to replace approximately 2.5 miles of existing sewer along Conococheague Creek, beginning north of New Lane and U.S. Route 30, and ending west of Mount Pleasant Road (State Route 1001) and north of 5th Avenue. The work will be conducted within the Authority's existing sewer right-of-way. The second alternative will add a sewer parallel to the existing sewer along the same route as Alternative 1 within the

Gannett Fleming, Inc.

P.O. Box 67100 • Harrisburg, PA 17106-7100 | 207 Senate Avenue • Camp Hill, PA 17011-2316
t: 717.763.7211 • f: 717.763.8150
www.gannettfleming.com

Authority's sewer right-of-way. The Greene Township's existing interceptor sewer is between 5 and 13 feet deep along the bank of the creek. The Authority's replacement or parallel interceptor will be placed at approximately the same depth in the same trench as the existing interceptor sewer, but offset to one side to provide future access to the line. This construction method should minimize the amount of new disturbance as most of the excavation will be in areas previously disturbed by Greene Township during the installation of its existing interceptor sewer.

Please find the enclosed documents demonstrating the extent of the project:

1. Completed Cultural Resource Notice.
2. Project narrative including an estimate of earth disturbance.
3. 7.5' U.S.G.S. Map with defined boundary of the proposed activity.

This submission is intended to notify the Commission of the potential effect of a proposed action on an archaeological or historical resource in accordance with the Pennsylvania Historic Preservation Act, 37 PA, CSA, Section 501-502. We understand the Commission will advise the Authority within 15 days of the receipt of this notice if the proposed projects will not affect a known archaeological or historical resource or, if a significant known archaeological or historical resource, as determine by the Commission using Secretary of Interior criteria for determining resource significant, required protection or if a "high probability archaeological area" could be affected by the proposed sewage facilities. While a commitment has not been made to undertake either of the two alternatives both in the same location as shown on the map and explained in the project narrative, this information will be incorporated in the planning assessments under the Pennsylvania Sewage Facility Act and in specific alternative proposals.

Please do not hesitate to call me at (717) 763-7212, Ext. 2393 if you have any questions regarding the Act 537 Plan. We look forward to your prompt response to this letter so that we can properly address any anticipated impacts in the sewage facilities planning.

Very truly yours,

GANNETT FLEMING, INC.
Environmental Resources Division

Heather M Ripley

HEATHER M. RIPLEY, E.I.T.
Planning Specialist
Water Practice

Enclosures

cc: W. Dwayne DelGrande, P.E. Authority Engineer

0120-PM-PY0003 Rev. 5/2006
NOTICE

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

CULTURAL RESOURCE NOTICE

DEP USE ONLY
Date Received

Read the instructions before completing this form.

SECTION A. APPLICANT IDENTIFIER

Applicant Name: Greene Township Municipal Authority

Street Address: 4182 Sunset Pike

City: Chambersburg State: PA Zip: 17202

Telephone Number: 717-263-5324

Project Title: Interceptor Improvements

SECTION B. LOCATION OF PROJECT

Municipality: Greene Township County Name: Franklin DEP County Code: 28

SECTION C. PERMITS OR APPROVALS

Name of Specific DEP Permit or Approval Requested:

Anticipated federal permits:

- ☐ Surface Mining
- ☒ Army Corps of Engineers
- ☐ 401 Water Quality Certification
- ☐ 404 Water Quality Permit
- ☐ Federal Energy Regulatory Commission
- ☒ Other: Act 537 Plan Approval, WQM Part II Permit, NPDES Permit

SECTION D. GOVERNMENT FUNDING SOURCES

- ☐ State: (Name)
- ☒ Local: (Name) Existing Authority Funds
- ☐ Federal: (Name)
- ☐ Other: (Name)

SECTION E. RESPONSIBLE DEP REGIONAL, CENTRAL, DISTRICT MINING or OIL & GAS MGMT OFFICE

DEP Regional Office Responsible for Review of Permit Application

- ☐ Central Office (Harrisburg)
- ☐ Southeast Regional Office (Norristown)
- ☐ Northeast Regional Office (Wilkes-Barre)
- ☒ Southcentral Regional Office (Harrisburg)
- ☐ Northcentral Regional Office (Williamsport)
- ☐ Southwest Regional Office (Pittsburgh)
- ☐ Northwest Regional Office (Meadville)
- ☐ District Mining Office:
- ☐ Oil & Gas Office:

SECTION F. RESPONSIBLE COUNTY CONSERVATION DISTRICT, if applicable.

County Conservation District	Telephone Number, if known
Franklin County Conservation District	717-264-5499

SECTION G. CONSULTANT

Consultant, if applicable: Gannett Fleming, Inc.

Street Address: P.O. Box 67100

City: Harrisburg State: PA Zip: 17106-7100

Telephone Number: 717-763-7212 ext. 2393

SECTION H. PROJECT BOUNDARIES AND DESCRIPTION

REQUIRED

Indicate the total acres in the property under review. Of this acreage, indicate the total acres of earth disturbance for the proposed activity.

Attach a 7.5' U.S.G.S. Map indicating the defined boundary of the proposed activity.

Attach photographs of any building over 50 years old. Indicate what is to be done to all buildings in the project area. N/A

Attach a narrative description of the proposed activity.

Attach the return receipt of delivery of this notice to the Pennsylvania Historical and Museum Commission.

REQUESTED

Attach photographs of any building over 40 years old.

Attach site map, if available.

SECTION I. SIGNATURE BLOCK

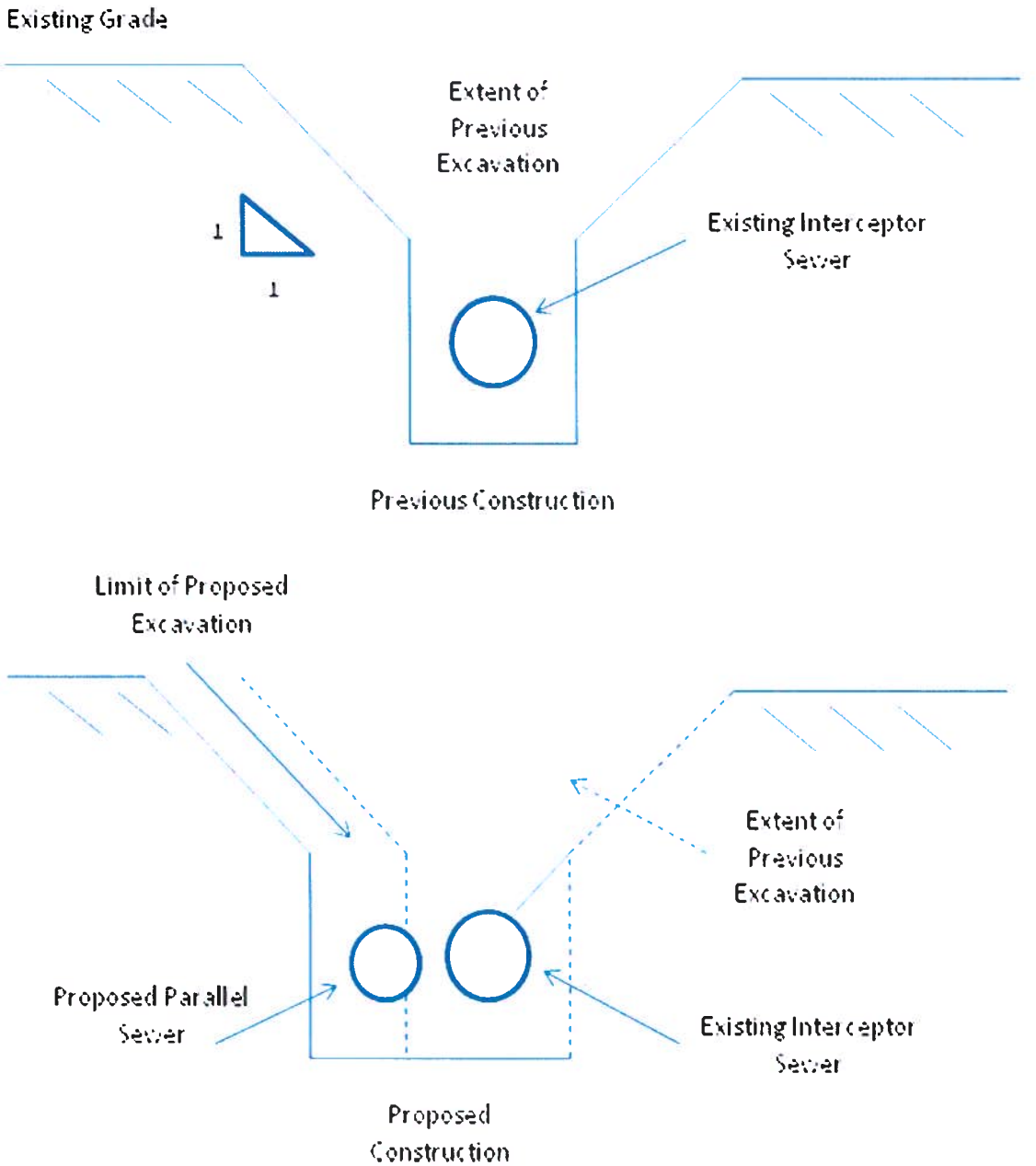
Applicant's Signature	Date of Submission of Notice to PHMC
Heather M Ripley	2/12/2013

PROJECT NARRATIVE

The proposed project will occur in Greene Township, located in Franklin County, Pennsylvania. Greene Township sewage, wastewater from the Chambersburg Water Treatment Plant and a portion of sewage from Guilford Township is conveyed to the Chambersburg Wastewater Treatment Plant (WWTP) by approximately 14 miles of existing interceptor sewers. As part of the Act 537 Planning process, Green Township Municipal Authority (Authority) considered a number of wastewater management alternatives to adequately provide for the existing and projected needs of Greene Township and the surrounding contributors. The most cost effective wastewater management alternative for the Authority was to increase capacity of an existing interceptor sewer in the Fayetteville and Oak Hill areas of Greene Township.

Two (2) alternatives are being considered for the proposed project. The first alternative will replace the existing interceptor sewer with a larger capacity sewer. This alternative will replace approximately 2.5 miles of existing sewer along Conococheague Creek, beginning north of New Lane and U.S. Route 30 and ending west of Mount Pleasant Road (State Route 1001) and north of 5th Avenue. The construction will be completed within the Authority's existing sewer right-of-way. The second alternative will add a parallel sewer to the existing interceptor to handle peak wet weather events. Approximately 2.5 miles of new sewer will be added along the same path as the first alternative. The construction associated with this alternative will be completed within the Authority's existing sewer right-of-way. The added sewer capacity will convey sewage generated in Fayetteville, Greene Knolls Basin including Caledonia State Park, Borough of Chambersburg WTP and Oak Hill. Figure 1 depicts the proposed construction technique for the parallel sewer.

FIGURE 1: ALTERNATIVE 2 PROPOSED CONSTRUCTION TECHNIQUE



An estimate of the amount of land disturbance for the proposed interceptor sewers is included in Table 1. This estimate is based on the length of sewer with six-foot trenching. The proposed project does not include any modifications to existing buildings. Photographs of buildings over 50-years old are therefore not applicable.

TABLE 1: Estimated Amount of Earth Disturbance

Sewer Alternative	Description	Length of Sewer	Estimated Amount of Earth Disturbance (1)
1	Replace Existing Interceptor	12,800	5.9 acres
2	Parallel Sewer	12,560	5.8 acres

Notes:

(1) The majority of earth disturbance for Alternative 1 was previously disturbed during construction of the existing sewer. Alternative 2 will make use of the existing trench for the Greene Township Interceptor Sewer, as shown in Figure 1.

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

USGS

The National Map
US Topo

SCOTLAND QUADRANGLE
PENNSYLVANIA
7.5-MINUTE SERIES

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 18S
10 000-foot tick: Pennsylvania Coordinate System of 1983
(south zone)

Imagery ..... NAIP, September 2008 - October 2008
Roads ..... ESRI, 2009
Names ..... ESRI, 2009
Hydrography ..... National Hydrography Dataset, 2009
Contours ..... National Elevation Dataset, 2009

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

ROAD CLASSIFICATION

SCOTLAND, PA
2010

Appendix G

Excellence Delivered ***As Promised***

Pennsylvania Historical Museum Commission Response

Gannett Fleming

*Excellence Delivered **As Promised***

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

February 21, 2013

Heather M. Ripley, E.I.T.
Gannett Fleming, Inc.
P.O. Box 67100
Harrisburg, PA 17106-7100

TO EXPEDITE REVIEW USE BHP REFERENCE NUMBER

Re: File No. ER 2013-0907-055-A
COE Act 537 Plan Approval, WQM Part II Permit, NPDES Permit: Greene Township Municipal Authority Interceptor Improvements
Greene Twp., Franklin Co.

Dear Ms. Ripley:

Thank you for submitting information concerning the above referenced project. The Bureau for Historic Preservation (the State Historic Preservation Office) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

Archaeology

Alternative No. 1

There is a high probability that archaeological resources are located in this project area. In our opinion, the activity described in your proposal should have no effect on such resources. Should the scope of the project be amended to include additional ground disturbing activity this office should be contacted immediately and a Phase I Archaeological Survey may be necessary to locate all potentially significant archaeological resources.

Alternative No. 2

Based on an evaluation by our staff, there is a high probability that significant archaeological sites are located in this project area and could be adversely affected by project activities. Although there are no recorded archaeological sites within the project boundaries, the soil type, topographic setting, slope direction, and distance to water of the project area are similar to the settings of known archaeological sites in the vicinity. A Phase I archaeological survey of the project area is required to locate potentially significant archaeological resources. Guidelines and instructions for conducting Phase I surveys are available on our web site or from our office upon request.

Historic Structures

There may be historic buildings, structures, districts, and/or objects eligible for the National Register of Historic Places located in the project area. However, in our opinion, the activity described in your proposal should have no effect on such resources. Should the scope and/or nature of the project activities change, the Bureau for Historic Preservation should be contacted immediately.

If you need further information in this matter please consult Doug McLearen at (717) 772-0925.

Sincerely,

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

cc: Greene Township Municipal Authority, 4182 Sunset Pike, Chambersburg, PA 17202
COE, Baltimore District
DEP, Southcentral Regional Office

DCM/tmw

Appendix H

Gannett Fleming

*Excellence Delivered **As Promised***

Planning Level Opinion of Probable Costs

Gannett Fleming

*Excellence Delivered **As Promised***

TABLE H-1

PLANNING LEVEL ESTIMATED PROJECT COSTS

ALTERNATIVE NO. 1[1]

Item Description	Estimated Quantities	Unit	Cost/Unit	Cost
Mobilization and Demobilation	1	LS	$ 50,000	$ 50,000
24-inch DIP Sewer	12,374	LF	$ 200	$ 2,474,800
Reconnect 8-inch Existing Sewer [2]	6	Each	$ 2,000	$ 12,000
Reconnect 10-inch Existing Sewer	2	Each	$ 2,200	$ 4,400
Reconnect 12-inch Existing Sewer	1	Each	$ 2,400	$ 2,400
Reconnect 15-inch Existing Sewer	1	Each	$ 2,600	$ 2,600
Connect 24-inch New Sewer	42	Each	$ 3,200	$ 134,400
4 foot Manhole (new)	44	Each	$ 4,000	$ 176,000
Manhole Frame and Cover	44	Each	$ 450	$ 19,800
Abandon Manhole (existing)	44	Each	$ 3,000	$ 132,000
Grading and Seeding	1	LS	$ 5,400	$ 5,400
By-pass Pumping	6	Month	$ 45,000	$ 270,000
Stream Crossing	526	LF	$ 680	$ 357,680
Concrete Encasement	526	LF	$ 350	$ 184,100
Contingency			20%	$ 770,000
		Estimated Construction Cost		$ 4,600,000
Engineering, Legal, Financial, and Administration			25%	$ 1,100,000
		ESTIMATED PROJECT COST		$ 5,700,000

Notes:

(1) Unit costs include excavation, bedding, and initial backfill materials.

(2) Assume forcemain connection is 8-inches in diameter.

TABLE H-2

PLANNING LEVEL ESTIMATED PROJECT COSTS

ALTERNATIVE NO. 2[(1)(2)]

Item Description	Estimated Quantities	Unit	Cost/Unit	Cost
Mobilization and Demobilation	1	LS	$ 50,000	$ 50,000
12-inch DIP Sewer	6,697	LF	$ 120	$ 803,640
12-inch pipe lay (0-12 feet deep)	6,697	LF	$ 60	$ 401,820
Reconnect 10-inch Existing Sewer	1	Each	$ 2,200	$ 2,200
Reconnect 12-inch Existing Sewer	9	Each	$ 2,400	$ 21,600
18-inch DIP Sewer	5,949	LF	$ 170	$ 1,011,330
18-inch pipe lay (0-12 feet deep)	5,949	LF	$ 40	$ 237,960
4 foot Manhole (new)	43	Each	$ 4,000	$ 172,000
Manhole Frame and Cover	43	Set	$ 450	$ 19,350
Rehabilitate Manhole (existing)	330	Vertical LF	$ 230	$ 75,900
Grading and Seeding	1	LS	$ 5,400	$ 5,400
Stream Crossing	526	LF	$ 680	$ 357,680
Concrete Encasement	526	LF	$ 350	$ 184,100
Contingency			20%	$ 670,000
			Estimated Construction Cost	$ 4,000,000
Engineering, Legal, Financial, and Administration			25%	$ 1,000,000
			ESTIMATED PROJECT COST	$ 5,000,000

Notes:

(1) Unit costs include excavation, bedding, and initial backfill materials.

(2) Land acquisition and ROWs not included in costs.