SUPPLEMENTAL CAPACITY ANALYSIS REPORT
REVISED SEWER EVALUATION

HERITAGE AT WEST WINDSOR

TOWNSHIP OF WEST WINDSOR, COUNTY OF MERCER, STATE OF NEW JERSEY

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File No.: **SCE-R11109.011**

AUGUST 2020

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EXECUTIVE SUMMARY

SUBURBAN CONSULTING ENGINEERS, INC. (SCE) has produced the following Supplemental Capacity Analysis Report - Sewer Evaluation (Supplemental Sewer Evaluation) on behalf of American Properties at West Windsor, LLC (AP). This Supplemental Sewer Evaluation has been revised to incorporate pertinent data from SCE's March 2020 Capacity Analysis Report – Sewer Evaluation (March 2020 Capacity Analysis Report), which identified the impacts of the Heritage at West Windsor property development on the existing sewer conveyance system. This Supplemental Sewer Evaluation is meant to supersede the previously prepared Reports. The March 2020 Capacity Analysis Report analyzed the capacity of the West Windsor sanitary sewer collection and conveyance system and the impacts of the proposed flows only from Heritage at West Windsor on the system. The study area included the proposed sewer extension from the Heritage at West Windsor site location to the Southfield Road Pump Station and downstream infrastructure, including gravity mains which are tributary to the Assunpink interceptor, South Post Road Pump Station and the interceptor to Duck Pond Pump Station.

This Supplemental Sewer Evaluation incorporates SCE's previous findings and expands the scope to include projected flows for additional zoning changes and proposed developments within this section of the West Windsor Township sewer conveyance system. Zoning amendments and associated projected flows were provided by the West Windsor Township title "Fair Share Program". It is our understanding there are active developments which are pursuing the necessary approvals and are expected to have contributing flows in the near future. The active projects evaluated as part of this Supplemental Sewer Evaluation are: Heritage at West Windsor, Hilton Realty (Toll Brothers property), Eden Institute and Bear Creek Independent Living Facility. This report presents a Phased approach and recommendations for interim improvements to accommodate the immediate requirements and recommended modifications to the sewer conveyance system as Phase I, and requirements and recommended modifications as Phase II for future projects.

The following is a summary of our findings and recommendations:

Phase I Recommendations

Phase I of the recommended upgrades includes the installation of new pumps at Southfield Pump Station to account for the Phase I development that ties into this pumping station.

Pump Stations

Phase I of recommended updates includes the installation of new pumps at Southfield Pump Station to account for the Heritage at West Windsor, Hilton Realty and Eden Institute developments that connect into this pumping station. The existing capacity of the Southfield Pump Station is 300,000 GPD (208 GPM). The projected peak flow for the active developments and existing flows combined is 640,800 GPD (445 GPM) at 70 feet of total dynamic head (TDH).

A duplex, solids handling submersible centrifugal pump system is currently installed at the Southfield Road Pump Station. The duplex system employs two pumps manufactured by Aurora. Each pump is rated at 10 horsepower (HP) and with a rated flow of 190 GPM at 70 feet of TDH. SCE determined the Pentair Hydromatic Pumps, Model S4PXP with a 15 HP motor and 9.00-inch diameter impeller manufactured by Aurora are capable of meeting these flow and head conditions.

Additionally, SCE recommends installation of variable frequency drives (VFDs) installed with the pumps to reduce cycles per hour and improve lifespan. The pump upgrades will be sufficient to handle projected flow conditions. The final selected pumps and electrical improvements will be performed during design upgrades.

Given the inefficient capabilities of one of the existing triplex pumps at South Post Pump Station, the total projected Phase I peak flow will exceed the existing capacity. A replacement pump rated for 550 GPM is proposed. Minor additional modifications to the existing station would be expected, as the

station's initial design was for a total capacity of 1,500 GPM. This 1,500 GPM capacity exceeds the necessary flow requirements for Phase I improvements.

Southfield Road Pump Station Electrical Upgrades

Based on the anticipated 15 HP pump selection, a 30 kW portable generator is proposed to operate both pumps and miscellaneous electrical loads in the event of an emergency at Southfield Pump Station. No capital improvements are proposed at South Post Pump Station.

Millbrook Drive, Jarrett Court and Bruntsfield Drive Conveyance System

Phase I recommendations also include improvements to the existing gravity mains. Based on the proposed flows, several sections of the eight-inch Millbrook Drive and 12-inch Bruntsfield Drive pipe section are over capacity. Additionally, the ten-inch Jarret Court pipe section is over capacity in its entirety. Given the significantly undersized Jarret Court pipe section, SCE recommends this 1,811 LF section to be updated to a twelve-inch diameter pipe.

In evaluating the measured existing flow in comparison to the expected calculated flow, SCE notes a disparity between these values, indicative of Inflow and Infiltration (I&I) contributing to a significant portion of the existing flows at both the upstream and the downstream location. As such, it is expected that there is significant I&I within the Millbrook Drive, Jarret Court and Bruntsfield Drive pipe sections. If I&I flows were reduced, more capacity to accept flow from new developments would become available. SCE recommends the installation of cured-in-place pipe (CIPP) lining for approximately 3,500 lf of the 8-inch Millbrook Drive gravity main. The following Sections are above capacity: 38, 40, 41, 44, 46, 47, and 49-57. The installation of CIPP lining will reduce the I&I flow within the conveyance system. This includes the installation of a felt tube, fiberglass cloth or a number of other suitable materials into the existing pipe. It is usually done from the upstream access point (manhole). Little to no digging is involved in this trenchless process.

Additionally, with the contributing flows from the Bear Creek property which connect into the existing 10-inch diameter main on Jarrett Court result in sections of the existing 10-inch and 12-inch to be improved or enlarged. SCE recommends CIPP lining of the existing 12-inch diameter pipe on Bruntsfield drive, sections 63-65 which is approximately 845 lf; installation of a new 12-inch diameter pipe to replace sections 58-62 which is approximately 1,800 lf; and replacement of existing sections 68 and 69 with a new 15-inch diameter pipe prior to the Assunpink Interceptor, approximately 420 lf.

No further modifications or improvements are recommended for Phase I at this time.

SCE utilized the Developer's cost calculation described in ordinance 200-85 to calculate the Developer's Cost for each of the respective phase I projects. The following calculation was utilized to determine the total anticipate cost contributions:

$$Developer's\ Cost = \frac{Total\ Enlargement\ or\ Improved\ Cost}{(\frac{Total\ Tributary\ gpd}{Development\ gpd})}$$

Property	Southfield Pump Station, Gravity Main CIPP & Electrical Improvements	South Post Pump Station, Gravity Main CIPP and Gravity Main Replacement	Total Developer's Cost
Heritage at West Windsor	$101,167.00	$107,770.00	$208,937.00
Hilton Realty	$38,133.00	$40,621.00	$78,754.00
Eden Institute	$3,635.00	$3,872.00	$7,507.00
Bear Creek	-	$46,424.00	$46,424.00

Phase II Recommendations

Phase II includes all the projected updates to the Township of West Windsor based on the proposed development projects provided to SCE by the Township. This phase assumes that all the allowable zoning changes come to fruition and that the proposed development projects are constructed. Replacement of the existing Southfield Road Pump Station, upgrades to the existing South Post Pump Station, and replacement of several sections of the gravity sewer conveyance system are recommended. ***It should be noted this alternative only applies to the Phase II projects which are constructed following the completion of Phase I. Phase II has been designed for the maximum buildout based on the potential for new projects as a result of the Fair Share zoning changes implemented in West Windsor. Phase II requirements are subject to change based on actual new developments.***

Pump Stations

The Southfield Road Pump Station projected capacity is calculated to be 628 GPM at 70 feet TDH. SCE determined the Pentair Hydromatic Pumps, Model S4LXP with a 25 HP motor and 9.00-inch diameter impeller, are capable of meeting these flow and head conditions. However, the existing wet well does not have adequate capacity, and therefore it is recommend a pre-fabricated station be installed adjacent to the existing with all of the necessary improvements including increase in wet well size, appropriately sized pumps and all necessary appurtenances.

The capacity of the South Post Pumping Station (after Phase I improvements) is 1,500 GPM; however, 1,000 GPM if only two pumps are running. Given projected peak flows, the pumping station will require a capacity of 1,243 GPM. The existing South Post Road Pump Station is a triplex pump design. Given the projected peak, SCE determined the Pentair Hydromatic Pumps, Model S6LXP with a 40 HP motor and 11.88-inch diameter impeller pumps, are capable of meeting the flow and head conditions.

Additionally, SCE recommends installation of variable frequency drives (VFDs) installed with the pumps to reduce cycles per hour and improve lifespan.

Electrical Upgrades

Given the need for capital improvements to both pumping stations, the increase in horsepower would result in an increase in electrical demands. An evaluation would also be required to identify whether there is adequate secondary electrical power source at both stations in accordance with NJAC 7:14A-23.10 Wastewater Pumping Stations.

Force Mains

Based on the projected peak discharge, and calculated velocities based on these flows, the force main for Southfield requires replacement, while South Post is adequately sized to handle the increasing projected peak flow to account for all projects.

Conveyance System

Upgrades to Phase I includes the installation of CIPP lining to Millbrook Drive and Jarret Court piping. It is expected that reducing the I&I within these pipe sections will reduce the existing flow and allow for more developments to tie into the system without major alterations required to the conveyance system. A flow monitoring study and subsequent engineering design would be required after installation of the CIPP lining in order to adequately identify the updates to the conveyance system that would be required. Based on the calculations provided in Table 2-2b, I&I contributes between 15% to 60% of the existing measured flow from Millbrook Drive through Jarret Court. The below Phase II updates are assuming no alterations to the existing measured flow, as a more detailed flow monitoring study would need to be completed after Phase I is completed in order to accurately predict the impact of future flows without I&I. In being conservative with I&I reduction, calculations were completed assuming a 15% reduction in the flow, and the below recommendations are still applicable.

The following pipe sections are projected to be over capacity with the additional developments to the conveyance system: the eight-inch Southfield Road piping, the eight-inch Millbrook Drive piping and the ten-inch Jarret Court piping.

The Southfield Road pipe sections are either over-, or close to over-capacity with the addition of the full buildout potential. As a result, SCE recommends increasing the pipe diameter to ten-inch inches. Additionally, the Millbrook Drive and Jarret Court piping is significantly over capacity and SCE recommends updating these to ten- and twelve-inch piping, respectively.

Subsequent to Jarret Court, the flow enters a twelve-inch Bruntsfield Interceptor. There is one section in the Bruntsfield Interceptor piping that is marginally over capacity. This pipe section includes an unusually shallow slope; SCE recommends no changes made to this portion of the sewer conveyance system. The following two alternatives are contemplated to address the piping upgrades proposed: Alternative 1 Gravity Piping Upgrades (Millbrook Drive, Jarret Court and Southfield Road gravity pipe sections) and Alternative 2 Piping Upgrades and Force Main Extension (Jarret Court and Southfield Road gravity pipe sections and Southfield Road force main).

1.0 INTRODUCTION

1.1 Background

SUBURBAN CONSULTING ENGINEERS, INC. (SCE) has produced the following Supplemental Capacity Analysis Report - Sewer Evaluation (Supplemental Sewer Evaluation) on behalf of American Properties at West Windsor, LLC (AP). This Supplemental Sewer Evaluation has been revised to incorporate pertinent data from SCE's March 2020 Capacity Analysis Report – Sewer Evaluation (March 2020 Capacity Analysis Report), which identified the impacts of the Heritage at West Windsor property development on the existing sewer conveyance system. This Supplemental Sewer Evaluation is meant to supersede the previously prepared Reports. The March 2020 Capacity Analysis Report analyzed the capacity of the West Windsor sanitary sewer collection and conveyance system and the impacts of the proposed flows only from Heritage at West Windsor on the system. The study area included the proposed sewer extension from the Heritage at West Windsor site location to the Southfield Road Pump and downstream infrastructure, including gravity mains which are tributary to the Assunpink interceptor, South Post Road Pump Station and the interceptor to Duck Pond Pump Station.

This Supplemental Sewer Evaluation incorporates SCE's previous findings and expands the scope to include projected flows for additional zoning changes and proposed developments within this section of the West Windsor Township sewer conveyance system. Zoning amendments and associated projected flows were provided by the West Windsor Township title "Fair Share Program". It is our understanding there are active developments which are pursuing the necessary approvals and are expected to have contributing flows in the near future. The active projects evaluated as part of this Supplemental Sewer Evaluation are: Heritage at West Windsor, Hilton Realty (Toll Brothers property), Eden Institute and Bear Creek Independent Living Facility. This report presents a Phased approach and recommendations for interim improvements to accommodate the immediate requirements and recommended modifications to the sewer conveyance system as Phase I, and requirements and recommended modifications as Phase II for future projects.

SCE's March 2020 Capacity Analysis Report has been provided under separate cover and references articles used to evaluate the existing sewer and conveyance system.

1.2 Objective

The objective of this Supplemental Sewer Evaluation is to further investigate proposed changes within the Township of West Windsor to gauge future projected flows as it relates to the above stated flow network. SCE evaluated and proposed upgrades and recommendations to meet the demands of the increased flow based on zoning changes in the Township of West Windsor.

Recommendations are based on existing conditions, projected future use zoning changes and the following project specific factors:

- Cost-effectiveness;
- Minimal disruption to the community due to potential conflict with existing utilities;
- Increased hydraulic capacity for conveyance of existing and proposed flow from the service area; and,
- Improved system resiliency and reliability.

2.0 SEWER CAPACITY EVALUATION

2.1 Existing and Projected Flows

As detailed in SCE's March 2020 Capacity Analysis Report, a flow monitoring study was performed at two locations, upstream and downstream, along the West Windsor sewer collection system. These locations are shown in **Appendix A** and resulting flows were used to identify existing conditions along the sewer collection system. Additionally, SCE investigated individual tributary residential zones and calculated the associated projected flows in accordance with the Division of Water New Jersey Administrative Code (N.J.A.C) 7:14A-23: Projected Flow Criteria. Conservative measures were assumed for SCE's March 2020 Capacity Analysis Report in regards to tributary flows; however, the tributary flows were expanded upon further in this report. Flows were based on parcel quantity within each area serving as tributary to the sewer collection system. Each property was attributed a flow of 300 gallons per day (GPD) [0.208 GPM]. The various zones are mapped out and included in **Appendix C** to supplement the calculated tributary flows shown in the below **Table 2-1a**.

Table 2-1a: Tributary Flows

Tributary Zone	Parcels	Average Flow GPM	Calculated Peak Flow (GPM)	Entry Point	Pipe Section # Entry Point
1	405	84	211	Assunpink Interceptor	69
2	22	5	11	Assunpink Interceptor	69
3	18	4	9	Bruntsfield Interceptor	63
4	33	7	17	Bruntsfield Interceptor	63
5	7	1	4	Jarret Court	58
6	199	41	103	Jarret Court	58
7	446	93	232	Jarret Court	58
8	95	20	49	Assunpink Interceptor	69
9	128	27	67	Assunpink Interceptor	91
10	103	21	54	Jarret Court/Millbrook Dr.*	37-58
11	255	53	133	Bruntsfield Interceptor	63
12	123	26	64	North Post Gravity	92
13	399	83	207	North Post Gravity	92
14	246	51	128	Duck Pond Interceptor	95
15	126	26	66	Southfield PS	37
16	16	3	8	Southfield Road	36
17	80	17	42	Southfield Road	35
18	164	34	85	Murano Drive	16
19	34	7	18	Southfield PS	37
20	116	24	60	South Post PS	93

Notes: *Zone 10 parcels were broken up and added at appropriate locations along the Jarret Court/Millbrook Drive pipe sections

Pursuant to the 2019 Housing Element and Fair Share Plan (Fair Share Plan), various zoning changes are proposed within the Township of West Windsor in order to address its affordable

housing obligation. SCE received a projected flow chart from the Township of West Windsor, identifying all of the proposed development projects including in the Fair Share Program zoning changes and their corresponding projected flows. A list of the property block and lot along with corresponding projected flows is included in **Appendix B**.

The Township of West Windsor was contacted to identify locations on the above referenced zoning change list that have already been constructed and are currently tied into the sewer collection system. These properties were removed from the calculations of projected flows as they are assumed to be incorporated into the measured flows monitoring. An itemized breakdown of the various properties and projected flows is included in **Appendix B**.

At the direction of West Windsor following the technical sewer meeting, SCE was directed to evaluate the following properties as part of Phase I: Heritage at West Windsor, Hilton Realty, Eden Institute and Bear Creek Senior Independent Living Facility. Calculations for flow for the Heritage at West Windsor property development are further discussed in SCE's March 2020 Capacity Analysis Report. The new development Bear Creek Senior Independent Living facility (Block 33, Lot 1.02), was included for projected flows per communication with the West Windsor Township requesting an allocation of 32,270 GPD for this property. It is our understanding Bear Creek Senior Independent Living Facility has received West Windsor's signature on their Treatment Works Approval (TWA) Permit Application. The new development Hilton Realty (Block 37, Lot 7), was included in the Fair Share Plan, including a projected flow of 28,000 GPD (flow data received from representatives from Toll Brothers, contract purchaser of the property). The new development Eden Institute (Block 37, Lot 1) was included in the Fair Share Plan, including a projected flow of 2,689 GPD. The recommendations to accommodate the flow from these three locations are presented in the Phase I Recommendations below. The remainder of the analysis is for the maximum future buildout based on proposed development projects, as presented in Phase II Recommendations.

Measured peak flows were identified during the flow monitoring study to be 257 gallons per minute (GPM) at Millbrook Drive and 685 GPM at the Assunpink Interceptor. These measured flows were combined with projected peak flows for Heritage at West Windsor, Hilton Realty, Eden Institute and Bear Creek Assisting Living Facility at their appropriate connection points. Heritage at West Windsor and Hilton Realty projected flows were included within the sewer collection system at Old Trenton Road. Bear Creek Independent Living Community projected flow was included at the ten-inch Jarret Court main. These locations are shown in **Appendix A**.

Table 2-1b summarizes the projected flows for all proposed developments.

Table 2-1b Project Flows of Proposed Developments

Proposed Properties	Projected Flow (GPM)	Peak Projected Flow (GPM)	Connection Point
Heritage at West Windsor	52	130	Old Trenton Road
Hilton Realty	19.4	49	Old Trenton Road
Eden Institute	1.86	4.67	Old Trenton Road
Bear Creek Independent Living Facility	22	56	10-inch Jarret Court Main
Fair Share Program Properties*	66.8	167	Upstream of Southfield P.S. (varies)

Notes: *Hilton Realty and Eden Institute were included in the Fair Share Program list; however, this property is in active development and projected flow has been removed.

Supplemental analytical data is included in **Appendix D** to support the above referenced projected flows.

2.2 Conveyance System and Gravity Mains

Capacity of the existing gravity infrastructure was evaluated as it relates to the Heritage at West Windsor property development in the March 2020 Capacity Analysis Report. This Supplemental Sewer Analysis expands on these calculations and accounts for all proposed developments on the same sewer collection conveyance system to evaluate future projected capacity inadequacies for potential and active developments.

The existing West Windsor conveyance system flow capacity was calculated along various pipe sections utilizing the Manning's equation. Flow capacity data for all the proposed development projects is included in **Appendix D**; a summary is shown in the below **Table 2-2a**.

The projected peak flows were calculated along the same pipe sections for Phase I (active developments) and Phase II (Fair Share Program). Projected peak flow is presented as an average for each of the pipe sections based on varying slopes between each manhole. A more comprehensive list of projected flows along the length of all pipe sections is included in **Appendix D**. A discussion of Phase I and Phase II results is included.

Table 2-2a: Conveyance System Capacity Summary

Pipe Section Description	Pipe Capacity (GPM)	Phase I Peak Flow (GPM)*	Phase II Peak Flow (GPM)*
8-Inch Old Trenton Road to Southfield Road	426	228	227
8-Inch Southfield Road	436	343	510
8-Inch Millbrook Drive	486	468	620
10-Inch Jarret Court	654	888	969
12-Inch Bruntsfield Drive	1,059	1,085	1,185
15-Inch Assunpink Interceptor	1,715	926	1,356
15-Inch North Post	2,725	1,034	1,652
16-Inch Duck Pond Interceptor	3,320	984	1,763

Notes: *The table represents average values for each pipe section description. Highlighted yellow cells represent pipe sections with one or more manhole to manhole section with an exceedance over its corresponding pipe capacity. Highlighted cells in orange represent pipe sections with all manhole to manhole sections above corresponding pipe capacities. Appendix D should be used to supplement this table for a more detailed list of the individual pipe sections.

In evaluating the measured existing flow in comparison to the calculated tributary flow, SCE notes a disparity between existing and expected flows. This evaluation was completed at the two locations in which measured flow was completed: upstream and downstream, as shown in Appendix A. below **Table 2-2b** shows the percent differential between the calculated and actual peak flows.

Table 2-2b: Calculated vs. Existing Flows

Parameter	Upstream	Downstream
Calculated Peak Tributary (GPM)	218.4	823
Actual Peak Flow (GPM)	257	685
Delta (GPM)	38.6	-137.86
Percent Differential	15%	-20%

Even assuming conservative calculations regarding calculated tributary flows with a peaking factor of 2.5, the existing peak flows are much higher than expected. This can be attributed to infiltration and inflow (I&I) adding to the flow of the pipes. As shown above, I&I accounts for 20% downstream. If I&I flows were reduced, more capacity to accept flow from new developments would become available.

Phase I

Based on the above capacity summary, there are three locations along the conveyance system that have one or more pipe section exceeding existing capacity. These three locations include: the eight-inch Millbrook Drive piping, the ten-inch Jarret Court piping and the 12-inch Bruntsfield Drive piping. The eight-inch Millbrook Drive pipe section includes segments which exceeds existing capacity and would need to be rehabilitated prior to the occupancy of the active developments coming online. The entirety of the ten-inch Jarret Court piping is in exceedance of proposed capacity. The twelve-inch Bruntsfield Drive pipe section also includes segments which exceed existing capacity.

Phase II

Based on the above capacity summary, there are four locations that have at least one manhole to manhole segment with projected flows above existing capacity. These four locations include: the eight-inch Southfield Road piping, the eight-inch Millbrook Drive piping, the ten-inch Jarret Court piping and the twelve-inch Bruntsfield Drive piping. In referencing Appendix D, Southfield Road, Millbrook Drive, Jarret Court and Bruntsfield Drive piping would need to be updated in entirety.

Recommendations on the necessary improvements to accommodate the proposed flows are outlined in Section 3.0 of this report.

2.3 Pump Stations Capacity Limitations

Given future projected flows and existing measured flows, SCE evaluated the pump station capacities of Southfield Road and South Post Road. A discussion of Phase I and Phase II results is included.

Southfield Road Pump Station

The peak flow for the Southfield Road Pump Station was calculated utilizing the measured peak flow from the flow monitoring study, the peak flows from the proposed developments, and the calculated peak tributary flows. The pump station capacity analysis is shown in **Table 2-3a**.

Table 2-3a: Southfield Road Pump Station Flows and Capacity

Flow Source	Phase I Peak Flow (GPM)	Phase II Peak Flow (GPM)
Existing Measured Peak Flow	257	257
Proposed Development Peak Flow	183	350
Calculated Tributary Flow*	11	11
Total Projected Flow	452	619
Pump Station Specifications	Phase I Peak Flow (GPM)	Phase II Peak Flow (GPM)
Required Pump Capacity	452	619
Current Southfield Road Pump Capacity	208	208

Note: *Tributary flows at Southfield Road P.S. are minimal due to SCE's reliance, at this location, on measured existing flows.

Phase I. In accordance with N.J.A.C. 7:14A-23, pump stations must have least two pumps, each designed to handle peak flows equivalent to 2.5 times the average daily flow. Therefore, the required capacity of each pump at the Southfield Pump Station will be 452 GPM during Phase I. The existing system does not have adequate capacity at this pumping station to accommodate these flows.

Phase II. In accordance with N.J.A.C. 7:14A-23, Southfield P.S. will require a capacity of 619 GPM for each pump.

Recommendations on the necessary improvements to accommodate the proposed flows are outlined in Section 3.0 of this report.

South Post Road Pump Station

The peak flow for the South Post Pump Station was calculated using the measured peak flow from the flow monitoring study, the peak flows from the proposed developments, and the calculated peak tributary flows. The pump station capacity analysis for South Post Road Pump Station is shown in **Table 2-3b**.

Table 2-3b: South Post Road Pump Station Flows and Capacity for All Projects

Flow Source	Phase I Peak Flow (GPM)	Phase II Peak Flow (GPM)
Existing Measured Peak Flow	685	685
Proposed Development Peak Flow	238	405
Calculated Tributary Flow	332	672.5
Total Projected Flow	1,255	1,763
Pump Station Specifications	**Phase I Peak Flow (GPM)**	**Phase II Peak Flow (GPM)**
Required Pump Capacity	1,255	1,763
Current South Post Road Pump Capacity	836*	1,500

*Notes: *Based on ACT's flow monitoring study, the pump station current firm capacity is 836 GPM*

Phase I. The existing South Post Road Pump Station includes a triplex pump with an existing capacity of 1,111 GPM. A document provided by West Windsor Township Department of Public Works titled "Pump Station Pump Flows" indicates that each of the three pumps at South Post Pump Station is rated at 500 GPM, producing a total capacity of 1,500 GPM. Through flow monitoring, conducted by ACT Engineers between August 2019 to present, the capacities of each pump were calculated at 377 GPM, 459 GPM, and 565 GPM. In accordance with N.J.A.C. 7:14A-23.10(b), in the event of the failure of the largest pump, the remaining pumps must have the capacity to handle the peak flows equivalent to 2.5 times the average daily flow. The failure of the pump with a 565 GPM capacity would result in a total pump station capacity of 836 GPM and would not be able to handle the Total Projected Phase I Peak Flow of 1,255 GPM.

Phase II. Given the total pump station capacity of 1,500 GPM, South Post Pump Station is not adequately sized to handle the projected flow of 1,763 GPM for Phase II given the above requirements of N.J.A.C. 7:14A-23.10(b), in which the station capacity would be 1,000 GPM.

Recommendations on the necessary improvements to accommodate the proposed future flows are outlined in Section 3.0 of this report.

2.3.1 Southfield Road Pump Station Wet Well Detention Time

Phase I. Wet well detention time for the Southfield Road Pump Station was calculated by dividing the capacity of the wet well, 752 gallons, by the average projected flow from the active developments. The projected average flow of 160 GPM produces a wet well detention time of 4.68 minutes. This detention time is in accordance with N.J.A.C. 7:14A-23.12 which states the detention time of a wet well shall not exceed ten minutes when the flow is at the average dry weather rate.

Phase II. The projected average flow of 227 GPM produces a wet well detention time of 3.3 minutes. This detention time is in accordance with N.J.A.C. 7:14A-23.12 which states the detention time of a wet well shall not exceed ten minutes when the flow is at the average dry weather rate. While detention time is within recommended time limitations,

the number of pump cycles exceeds design criteria and wet well capacity is recommended to be increased.

2.3.2 South Post Pump Station Wet Well Detention Time

Phase I. The projected average flow is approximately 502 GPM at South Post Pump Station. Wet well detention time for the South Post Road Pump Station cannot be calculated due to a lack of available information; however, the future needs of the pumping station could exceed the capacity of 836 GPM.

Phase II. The projected average flow is approximately 572 GPM for Phase II improvements. Wet well detention time for the South Post Road Pump Station cannot be calculated due to a lack of available information; however, the future needs of the pumping station could exceed the capacity of 836 GPM.

2.4 Force Mains

There are currently three force mains present along this section of the sewer conveyance system. One, six-inch force main, is located after the Southfield Pumping Station. Additionally, there are two parallel, six- and ten-inch force mains, after South Post Pump Station, which flow into the 15-inch North Post Road PVC gravity sewer main.

Phase I. Analyzing the effects of the active new developments on the existing force mains, all three are adequately sized. Therefore, even with increased flows from Phase I, the existing force mains remain in compliance with N.J.A.C. 7:14A specifications and do not exceed the recommended 6 feet per second (fps).

Phase II. Analyzing the effects of the Fair Share Program developments on the existing force mains, the six-inch Southfield pump station is inadequately sized and must be upgraded to an eight-inch forcemain. The existing six-inch and ten-inch South Post parallel forcemains are adequately sized. Therefore, even with increased flows from Phase II, the existing force mains remain in compliance with N.J.A.C. 7:14A specifications and do not exceed the recommended 6 feet per second (fps).

2.5 Electrical Upgrades

An "Electrical Service Evaluation" was completed by Kelter & Gilligo and included as an Appendix in ACT's 2013 Southfield Road Pump Station and Trunkline Capacity Sewer Capacity Assessment Report for West Windsor Township (Southfield Road P.S. Report); this report was received on June 10, 2020.

This report included the following recommended electrical upgrades:

- Replace the existing main disconnect switch with a new service entrance rated weatherproof fused disconnect switch;
- Install emergency generator with automatic transfer switch; and,
- Electrical system overhaul per Single Line Diagram Schematic. This schematic was completed assuming 20 HP requirements.
- An estimate of $176,000 in electrical upgrades was proposed, including approximately $90,000 for the installation of a permanent generator.

Following SCE's review of this report, the recommendation for the installation of a 175 kW generator was deemed excessive for this station. Even with the installation of two (2) 20 HP

pumps, the generator would be significantly oversized and subject to performance issues such as wet stacking. The station is currently equipped with an outdoor receptable which feeds a manual transfer switch for connection with a portable generator providing a means for a second electrical power source and meeting the requirements of NJAC 7:14A-23.10 Wastewater Pumping Stations. The NJAC code does not require this power source to be a permanent standby emergency generator. The use of a portable generator provides additional operational flexibility and can be used at multiple locations. Based on the anticipated 15 HP pump selection for Phase I, a 30 kW portable generator is proposed to operate both pumps and miscellaneous electrical loads in the event of an emergency. Confirmation on the size of the existing portable generator is necessary.

SCE does not anticipate the need for any capital improvements to the existing electrical capacity at South Post Pumping Facility for Phase I. It is expected the replacement of the existing pump, which is no longer operating as designed, with a pump of similar size to the basis of design of the station would not generate electrical loads above current capacities. Additionally, SCE performed a windshield survey of this station and observed an existing emergency standby generator is currently on site. It appears this generator was replaced in late 2017, early 2018 and its operation should be adequate for a station capacity of 1,500 GPM, as long as regular maintenance and exercising is performed.

For Phase II, electrical loads would need to be updated based on the increased horsepower for new pumping requirements. Additionally, an evaluation would be required to identify if there is an adequate secondary electrical power source at both stations in accordance with NJAC 7:14A-23.10 Wastewater Pumping Stations.

3.0 RECOMMENDATIONS

The following includes sequenced recommendations to account for the necessary updates to the sewer system. The hydraulic design criteria for the evaluation of sewer capacity was based on N.J.A.C 7:14A-23.6.

Upgrades to this section of the sewer conveyance system are presented below in the following phases:

- Phase I: Recommendations have been made for the addition of Heritage at West Windsor, Hilton Realty, Eden Institute and Bear Creek developments. These recommendations include required updates to Southfield Pumping Station as well as along the sewer conveyance system.
- Phase II: Recommended future updates to the Southfield and South Post Pumping Stations and associated sewer conveyance system in order to accommodate all the proposed development projects in the Fair Share Program. This phase assumes that all the proposed development projects as listed in Appendix B will come to fruition.

3.1 Phase I Updates

Pump Stations

Phase I of recommended updates includes the installation of new pumps at Southfield Pump Station to account for the Heritage at West Windsor and Hilton Realty developments that tie into this pumping station. The existing capacity of the Southfield Pump Station is 300,000 GPD (208 GPM). The projected peak flow for the active developments and existing flows combined is 452 GPM at 70 feet of total dynamic head (TDH).

A duplex, solids handling submersible centrifugal pump system is currently installed at the Southfield Road Pump Station. The duplex system employs two pumps manufactured by Aurora.

Each pump is rated at 10 horsepower (HP) and with a rated flow of 190 GPM at 70 feet of TDH. SCE determined the Pentair Hydromatic Pumps, Model S4PXP with a 15 HP motor and 9.00-inch diameter impeller manufactured by Aurora are capable of meeting these flow and head conditions as shown in the pump performance datasheet (**Appendix E**).

Additionally, SCE recommends installation of variable frequency drives (VFDs) installed with the pumps to reduce cycles per hour and improve lifespan. VFD multi-speed performance curves can also be found in **Appendix E**. The pump upgrades will be sufficient to handle projected flow conditions. The final selected pumps and electrical improvements will be performed during design upgrades.

Given the inefficient capabilities of one of the existing triplex pumps at South Post Pump Station, the total projected Phase I peak flow will exceed the existing capacity. A replacement pump rated for 550 GPM is proposed. Minor additional modifications to the existing station would be expected, as the station's initial design was for a total capacity of 1,500 GPM.

Southfield Road Pump Station Electrical Upgrades

Based on the anticipated 15 HP pump selection, a 30 kW portable generator is proposed to operate both pumps and miscellaneous electrical loads in the event of an emergency at Southfield Pump Station. No capital improvements are proposed at South Post Pump Station.

Millbrook Drive, Jarrett Court and Bruntsfield Drive Conveyance System

Phase I recommendations also include improvements to the existing gravity mains. Based on the proposed flows, several sections of the eight-inch Millbrook Drive and 12-inch Bruntsfield Drive pipe section are over capacity. Additionally, the ten-inch Jarret Court pipe section is over capacity in its entirety. Given the significantly undersized Jarret Court pipe section, SCE recommends this 1,811 LF section to be updated to a twelve-inch diameter pipe.

In evaluating the measured existing flow in comparison to the expected calculated flow, SCE notes a disparity between these values, indicative of Inflow and Infiltration (I&I) contributing to a significant portion of the existing flows at both the upstream and the downstream location. As such, it is expected that there is significant I&I within the Millbrook Drive, Jarret Court and Bruntsfield Drive pipe sections. If I&I flows were reduced, more capacity to accept flow from new developments would become available. SCE recommends the installation of cured-in-place pipe (CIPP) lining for approximately 3,500 lf of the 8-inch Millbrook Drive gravity main. The following Sections are above capacity: 38, 40, 41, 44, 46, 47, and 49-57. The installation of CIPP lining will reduce the I&I flow within the conveyance system. This includes the installation of a felt tube, fiberglass cloth or a number of other suitable materials into the existing pipe. It is usually done from the upstream access point (manhole). Little to no digging is involved in this trenchless process.

Additionally, with the contributing flows from the Bear Creek property which connect into the existing 10-inch diameter main on Jarrett Court result in sections of the existing 10-inch and 12-inch to be improved or enlarged. SCE recommends CIPP lining of the existing 12-inch diameter pipe on Bruntsfield drive, sections 63-65 which is approximately 845 lf; installation of a new 12-inch diameter pipe to replace sections 58-62 which is approximately 1,800 lf; and replacement of existing sections 68 and 69 with a new 15-inch diameter pipe prior to the Assunpink Interceptor, approximately 420 lf.

No further modifications or improvements are recommended for Phase I at this time.

3.2 Phase II Updates

Phase II includes all the projected updates to the Township of West Windsor based on the proposed development projects provided to SCE by the Township. This phase assumes that all the allowable zoning changes come to fruition and that the proposed development projects are constructed. Replacement of the existing Southfield Road Pump Station, upgrades to the existing South Post Pump Station, and replacement of several sections of the gravity sewer conveyance system are recommended. ***It should be noted this alternative only applies to the Phase II projects which are constructed following the completion of Phase I. Phase II has been designed for the maximum buildout based on the potential for new projects as a result of the Fair Share zoning changes implemented in West Windsor. Phase II requirements are subject to change based on actual new developments.***

Pump Stations

The Southfield Road Pump Station projected capacity is calculated to be 628 GPM at 70 feet TDH. SCE determined the Pentair Hydromatic Pumps, Model S4LXP with a 25 HP motor and 9.00-inch diameter impeller, are capable of meeting these flow and head conditions as shown in the pump performance datasheet (**Appendix E**). However, the existing wet well does not have adequate capacity, and therefore it is recommend a pre-fabricated station be installed adjacent to the existing with all of the necessary improvements including increase in wet well size, appropriately sized pumps and all necessary appurtenances.

The existing South Post Road Pump Station is a triplex pump design. The capacity of the South Post Pumping Station (after Phase I improvements) is 1,500 GPM; however, 1,000 GPM if only two pumps are running. Given projected peak flows, the pumping station will require a capacity of 1,763 GPM. SCE determined the Pentair Hydromatic Pumps, Model S6LXP with a 40 HP motor and 11.88-inch diameter impeller pumps, are capable of meeting the flow and head conditions as shown in the pump performance datasheet (**Appendix E**).

Additionally, SCE recommends installation of variable frequency drives (VFDs) installed with the pumps to reduce cycles per hour and improve lifespan. VFD multi-speed performance curves can also be found in **Appendix E**.

Electrical Upgrades

Given the need for capital improvements to both pumping stations, the increase in horsepower would result in an increase in electrical demands. An evaluation would also be required to identify whether there is adequate secondary electrical power source at both stations in accordance with NJAC 7:14A-23.10 Wastewater Pumping Stations.

Force Mains

Based on the projected peak discharge, and calculated velocities based on these flows, the force main for Southfield requires replacement, while South Post is adequately sized to handle the increasing projected peak flow to account for all projects.

Conveyance System

Upgrades to Phase I includes the installation of CIPP lining to Millbrook Drive and Bruntsfield Drive piping. It is expected that reducing the I&I within these pipe sections will reduce the existing flow and allow for more developments to tie into the system without major alterations required to the conveyance system. A flow monitoring study and subsequent engineering design would be required after installation of the CIPP lining to adequately identify the updates to the

conveyance system that would be required. Based on the calculations provided in Table 2-2b, I&I contributes to approximately 20% of the existing measured flow from Millbrook Drive through Bruntsfield Drive. The below Phase II updates are assuming no alterations to the existing measured flow, as a more detailed flow monitoring study would need to be completed after Phase I is completed in order to accurately predict the impact of future flows without I&I. In being conservative with I&I reduction, calculations were completed assuming a 15% reduction in the flow, and the below recommendations are still applicable.

The following pipe sections are projected to be over capacity with the additional developments to the conveyance system: the eight-inch Southfield Road piping, the eight-inch Millbrook Drive piping and the twelve-inch Bruntsfield Drive piping.

The Southfield Road pipe sections are either over-, or close to over-capacity with the addition of the full buildout potential. As a result, SCE recommends increasing the pipe diameter to a ten-inch. Additionally, the Millbrook Drive and Bruntsfield Drive piping is over capacity and SCE recommends updating these to ten- and fifteen-inch piping, respectively. As previously stated, the Jarret Court piping is recommended to be upgraded to a ten-inch during Phase I and two of the Bruntsfield Drive pipe sections (68 and 69) were also recommended to be upgraded during Phase I. The below alternatives assume that all Phase I recommendations have been completed.

Two alternatives are discussed below to account for required system upgrades.

Alternative 1: Gravity Piping Upgrades. This alternative would require the three pipe sections projected over capacity (the eight-inch Southfield Road piping, the eight-inch Millbrook Drive piping and the twelve-inch Bruntsfield Drive piping) to be upgraded in size as shown in **Table 3.2a**.

Table 3-2a: Gravity Piping Upgrades

Pipe Section Description	Existing Pipe Size (Inner Diameter)	Proposed Pipe Size (Inner Diameter)	Linear Feet of Pipe (LF)
Millbrook Drive (38-57)	8-Inch	10-Inch	4,495
Bruntsfield Drive (63-67)	12-Inch	15-Inch	1,260
Southfield Road (35-37)	8-Inch	10-Inch	915

These upgrades would adequately account for the new capacity requirements. In this scenario a total of approximately 6,670 LF of gravity piping would require updating.

These updates would require disturbance to the community; however, an effort would be made to keep disturbances to a minimum. This alternative is expected to take approximately 40 days to complete. Installation of the new pipe sections would be completed utilizing conventional open cut trench excavation within existing streets with appropriate traffic control and detours. The advantage of traditional open cut construction is allowing the project to progress in a continuous fashion, a lower unit price comparison than other rehabilitation methods, real time modifications or adjustments when obstructions are discovered, and allowing for verifications of the installation and associated workmanship. The traditional open cut method is suitable for nearly all soil conditions except for oozing mud and running sands. Depths of installation can be accomplished up to 16-feet, however, if deeper excavations are required, costs escalate rapidly. Based on as-built drawings of the existing sewer system, excavation deeper than 16-feet is not expected. Given the assumed general lithology of the Site and depth of excavation, this method would be appropriate.

Open cut trenching can be dangerous, and the walls of the trench must be supported or sloped. If the Contractor slopes the trench, a larger work area is required, and more material must be excavated, increasing the project cost. The restoration of the disturbed areas associated with open cut method would add significant costs and add to the project duration. It has also been documented that the cutting of asphalt paving and subsequent repairing of asphalt paving significantly reduces the lifespan of the pavement.

Alternative 2: Piping Upgrades and Force Main Extension.

The Southfield Force Main extends from the Southfield Pumping Station to Millbrook Drive. This Alternative 2 proposes extending the Southfield force main approximately 4,495 LF to the Jarret Court pipe section (updated to a ten-inch in Phase I), thereby redirecting the Millbrook Drive pipe section. Bruntsfield Drive Sections would still be updated per Alternative 1. In this scenario the eight-inch Millbrook Drive pipe section would remain as is. This alternative would comparably result in less disturbance to the community. Open cut trenching would be completed as discussed in Alternative 1; however, the disturbance to the community would only include traffic disturbances during the rehab of the Millbrook Drive pipe section, as the gravity sewer line would remain operational during construction activities. Disturbances to the community would remain the same for the Southfield Road pipe sections. N.J.A.C includes specifications for slope minimums given the pipe diameters. Slopes were calculated for all pipe sections and meet the required minimums. This alternative is recommended and would be completed in the same manner as the pipe sections discussed in Alternative 1.

Alternatives 1 and 2 are shown in **Appendix F**.

Both Alternatives 1 and 2 will include the installation of a new eight-inch PVC pipe to connect the Heritage at West Windsor development into the existing collection system along Old Trenton Road. It is anticipated that a new sewer extension will be constructed in order to connect all proposed development projects with the existing system. This layout is not yet available; however, given the placement of the blocks and lots poised for redevelopment, SCE assumes all future buildout will be directed in one way or another to Southfield Road.

A discussion of cost is included in Section 4.0 of this report. In addition to the replacement of the existing pumps, additional evaluation of the electrical equipment is necessary to ensure the electrical service can adequately handle the proposed pumps, as well as conform to the latest electrical standards and code requirements.

4.0 CONCLUSIONS AND COST ESTIMATE

4.1 Phase I Cost Estimate

The following cost estimate for Phase I is broken up in accordance with Cost Contribution factors. Table 4.1a includes the following cost contributors: Heritage at West Windsor, Hilton Realty and Eden Institute. Table 4.1b includes the above cost contributors with the addition of Bear Creek Living Facility. The following cost contributions were calculated utilizing the Developer's cost calculation described in ordinance 200-85:

$$Developer's\ Cost = \frac{Total\ Enlargement\ or\ Improved\ Cost}{(\frac{Total\ Tributary\ gpd}{Development\ gpd})}$$

For Table 4.1a the Total Tributary gpd for this section is 673,920 gpd (468gpm).

$$\text{Heritage at West Windsor } Cost = \frac{\$364{,}200}{(\frac{673{,}920\ gpd}{187{,}200\ gpd})} = \$101{,}167.00$$

$$\text{Hilton Realty } Cost = \frac{\$364{,}200}{(\frac{673{,}920\ gpd}{70{,}560\ gpd})} = \$38{,}133.00$$

$$\text{Eden Institute } Cost = \frac{\$364{,}200}{(\frac{673{,}920\ gpd}{6{,}724.8\ gpd})} = \$3{,}635.00$$

Table 4.1a: Southfield Pump Station Pump Replacement, Gravity Main CIPP, Electrical Improvements

Description	Bid Quantity	Unit	Unit Price	Total Price
Mobilization	1	LS	$7,000.00	$7,000.00
Furnish and Install Two Pentair 24P 15 HP Pumps (Southfield Road PS)	2	EA	$20,000.00	$40,000.00
Anticipated Electrical Improvements (Southfield Road PS)	1	LS	$86,000.00	$86,000.00
Install 8-inch CIPP (Millbrook Drive)	3,550	LF	$40.00	$142,000.00
			Construction Subtotal	$275,000.00
			20% Contingency	$55,000.00
			Construction Total	$330,000.00
			Permitting	$1,200.00
			Engineering and Design	$33,000.00
			Project Total	**$364,200.00**
Heritage Cost Contribution (Based on Prorated Enlargement Share Calculation)				**$101,167.00**
Hilton Realty Cost Contribution (Based on Prorated Enlargement Share Calculation)				**$38,133.00**
Eden Institute Contribution (Based on Prorated Enlargement Share Calculation)				**$3,635.00**

For table 4.1b the Total Tributary gpd for this section is 1,562,400 gpd (1085 gpm).

Heritage at West Windsor $Cost = \frac{\$899{,}460}{(\frac{1{,}562{,}400\ gpd}{187{,}200\ gpd})}$ = $107,770.00

Hilton Realty $Cost = \frac{\$899{,}460}{(\frac{1{,}562{,}400\ gpd}{70{,}560\ gpd})}$ = $40,621.00

Eden Institute $Cost = \frac{\$899{,}460}{(\frac{1{,}562{,}400\ gpd}{6{,}724.8\ gpd})}$ = $3,872.00

Bear Creek Living Facility $Cost = \frac{\$899{,}460}{(\frac{1{,}562{,}400\ gpd}{80{,}640\ gpd})}$ = $46,424.00

Table 4.1b: South Post Pump Station Improvements, Gravity Main CIPP, Gravity Main Replacement

Description	Bid Quantity	Unit	Unit Price	Total Price
Mobilization	1	LS	$10,000.00	$10,000.00
Traffic control devices	1	LS	$2,500.00	$2,500.00
Uniformed traffic directors	320	MH	$100.00	$32,000.00
Furnish and Install One 20 HP 550 gpm Pump (Southfield Road PS)	1	LS	$15,000.00	$15,000.00
Install 12-inch CIPP (Bruntsfield Drive sections 63-65)	845	LF	$50.00	$42,250.00
Install 15" Diameter Pipe Replacement (Bruntsfield Interceptor sections 68-69)	420	LF	$300.00	$126,000.00
12" Diameter Pipe Replacement (Jarret Court pipe section)	1,811	LF	$250.00	$452,750.00
			Construction Subtotal	$680,500.00
			20% Contingency	$136,100.00
			Construction Total	$816,600.00
			Permitting	$1,200.00
			Engineering and Design	$81,660.00
			Project Total	**$899,460.00**
			Heritage Cost Contribution (Based on Prorated Enlargement Share Calculation)	**$107,770.00**
			Hilton Realty Cost Contribution (Based on Prorated Enlargement Share Calculation)	**$40,621.00**
			Eden Institute Contribution (Based on Prorated Enlargement Share Calculation)	**$3,872.00**
			Bear Creek Living Facility Contribution (Based on Prorated Enlargement Share Calculation)	**$46,424.00**

4.2 Phase II Project Descriptions – Jaret Court Gravity Main Replacement

This section includes project descriptions for the various alternatives proposed, assuming all of the proposed development projects come to fruition. These project descriptions are approximate and are subject to change pending actual anticipated project completions. The below cost estimates are recommendations assuming only the minimum expected I&I reduction of 15%.

Originally, the intention was to provide AP with a schedule for the below Phase II updates. It is expected that the gravity mains will need to be updated prior to the pump station improvements for Phase II. With the addition of Heritage at West Windsor, Eden Institute, Bear Creek Living Facility and Hilton Realty, the gravity mains will be operating close to peak and the below updates will likely be required prior to any additional developments coming online in excess of approximately 25 GPM.

4.2.1 Southfield Pumping Station Replacement

Item No.	Description	Bid Quantities	Unit	Unit Price	Total Price
1	Mobilization & Staging	1	LS	$10,000.00	$10,000.00
2	Clearing Site	1	LS	$9,000.00	$9,000.00
3	Demolition				$37,000.00
3.1	Pump Out Existing Wet Well and Seal Influent Pipe	1	LS	$15,000.00	$15,000.00
3.2	De-Energize and Remove Conductors	1	LS	$12,000.00	$12,000.00
3.3	Dewater, Cap and Fill Existing Force Main with Flowable Fill	1	LS	$10,000.00	$10,000.00
4	Exploratory Test Pits	20	LS	$175.00	$3,500.00
5	Duplex Pump Station				$457,000.00

5.1	Prefabricated Duplex Pumping System Inclusive Of FRP Enclosure With Piping, Check And Gate Valves, Magnetic Flow Meter, Air Release Valve, Alarm Light And Horn, Heater And Ventilator, Control Panel, Electrical Wiring, Two (2) VFD's, Two (2) Submersible Pumps With Level Transducer And Backup Floats, And Related Assembly Accessories.	1	LS	$450,000.00	$450,000.00
5.2	Precast Concrete Wet Well Including Pump Discharge Elbow And 6" Discharge Dip Piping, Couplings, Pump and Trash Rack Access Hatches with Safety Grates and Lifting Davit.	1	LS	$7,000.00	$7,000.00
6	Electrical Work				$18,300.00
6.1	Furnish and Install Main Disconnect Switch to Panel	1	LS	$1,200.00	$1,200.00
6.2	Connect New Conductors to Existing ATS	1	LS	$5,000.00	$5,000.00
6.3	Furnish and Install Pump Power Conductors	1	LS	$8,500.00	$8,500.00
6.4	Furnish and Install Level Sensor Cables	1	LS	$3,600.00	$3,600.00
7	Miscellaneous Site Work				$100,000.00

Construction Subtotal:	$634,800.00
20% Contingency:	$126,960.00
Construction Total:	$761,760.00
Permitting	$7,500.00
Engineering Design & Inspection	$76,176.00
Project Total:	$845,436.00

4.2.2 South Post Pumping Station Upgrades

Item No.	Description	Bid Quantities	Unit	Unit Price	Total Price
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	Selective Demolition	1	LS	$10,000.00	$10,000.00
3	Furnish and Install Three Pumps (2.15 MGD total Capacity)	3	EA	$50,000.00	$150,000.00
4	Anticipated Electrical Improvements	1	LS	$90,000.00	$90,000.00
			Construction Subtotal:		$260,000.00
			20% Contingency:		$52,000.00
			Construction Total:		$312,000.00
			Permitting		$7,500.00
			Engineering Design & Inspection		$31,200.00
			Project Total:		$350,700.00

4.2.3 Conveyance System

Alternative 1: Gravity Piping Upgrades

Item No.	Description	Bid Quantities	Unit	Unit Price	Total Price
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	Traffic Control Devices	1	LS	$2,500.00	$2,500.00
3	Uniformed Traffic Directors	320	MH	$100.00	$32,000.00
4	Bypass Piping and Pumping	1	LS	$25,000.00	$25,000.00
5	8" Forcemain Replacement	5500	LF	$150.00	$825,000.00
6	15" diameter pipe replacement (Bruntsfield Drive)	840	LF	$300.00	$252,000.00
7	10" Diameter Pipe Replacement (Millbrook Dr.)	4,495	LF	$200.00	$899,000.00
8	10” Diameter Pipe Replacement (Southfield Rd)	915	LF	$200.00	$183,000.00
				Construction Subtotal:	$2,228,500.00
				20% Contingency:	$445,700.00
				Construction Total:	$2,674,200.00
				Permitting	$15,000.00
				Engineering Design & Inspection	$267,420.00
				Project Total:	**$2,956,620.00**

Alternative 2: Force Main Extension and Gravity Main Updates

Item No.	Description	Bid Quantities	Unit	Unit Price	Total Price
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	Traffic Control Devices	1	LS	$2,500.00	$2,500.00
3	Uniformed Traffic Directors	200	MH	$100.00	$20,000.00
4	Bypass Piping And Pumping	1	LS	$10,000.00	$10,000.00
5	8" Diameter Force Main Extension	9,500	LF	$150.00	$1,425,000.00
6	15" diameter pipe replacement (Bruntsfield Drive)	840	LF	$300.00	$252,000.00
7	10” Diameter Pipe Replacement (Southfield Rd)	915	LF	$200.00	$183,000.00
				Construction Subtotal:	$1,902,500.00
				20% Contingency:	$380,500.00
				Construction Total:	$2,283,000.00
				Permitting	$15,000.00
				Engineering Design & Inspection	$228,300.00
				Project Total:	**$2,526,300.00**

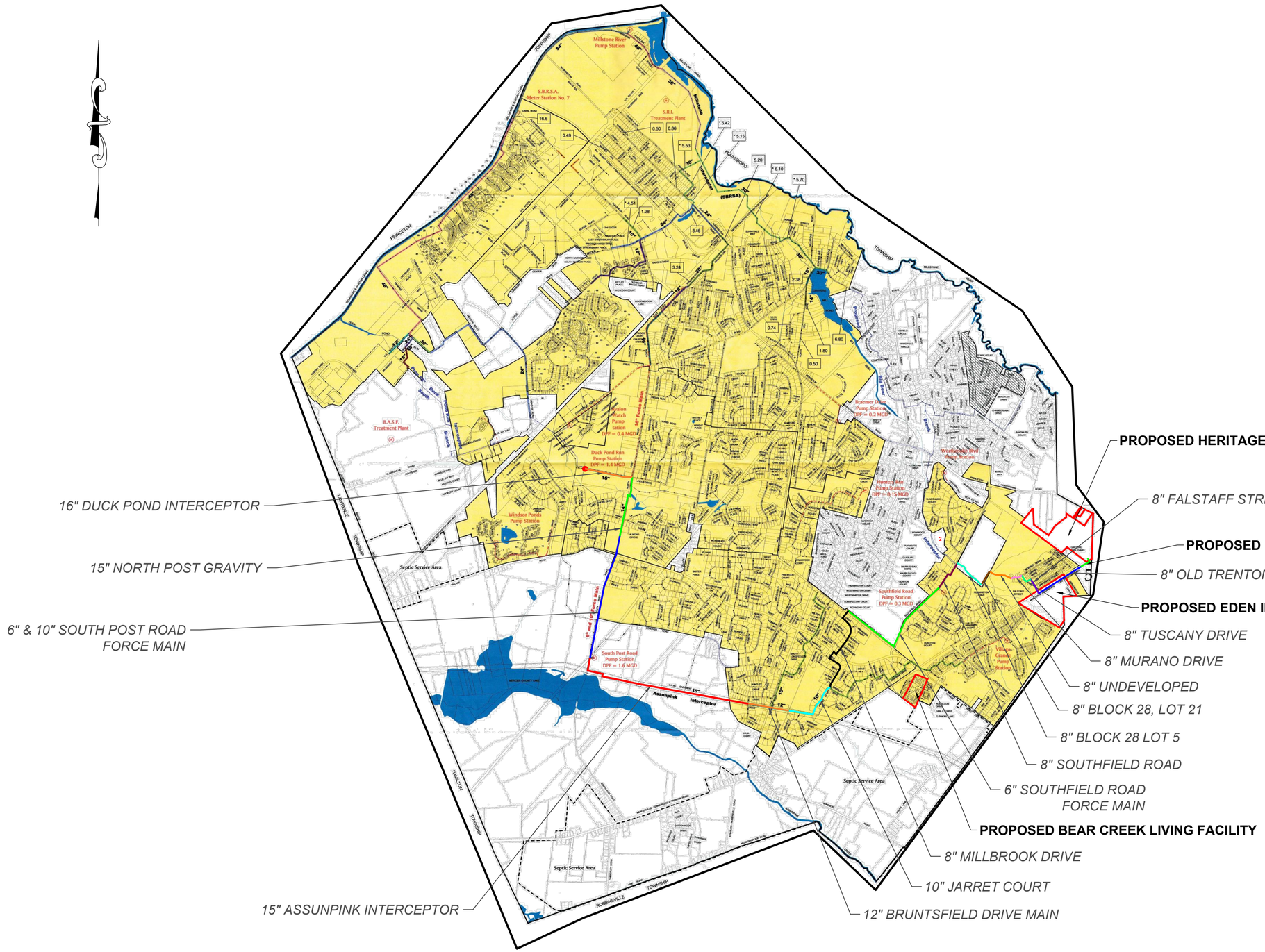
4.3 Conclusions

In accordance with ordinance 200-85 from the Town of West Windsor, AP maintains the position that the Devloper's Cost is based on the Total Tributary gpd over the Development gpd and the necessary upgrades required for the enlargement of infrastructure for Heritage at West Windsor would be completed during Phase I. As such, the below table identifies the prorated enlargement or improvement share of the Phase I properties, which includes improvements to the Southfield Pump Station, CIPP lining of the existing 8-inch Millbrook Drive gravity main, South Post Pump Station improvements, and the Jarret Court and Bruntsfield interceptor improvements as properties outside of the development will also be benefited by the improvements of Phase I. Additionally, the ordinance 200-85 exempts Heritage at West Windsor from future cost contributions for collection and conveyance improvements related to future projects under Phase II. A review of ordinance 200-89 Delaware and Raritan Canal/Duck Pond Run Interceptor Sewer Improvement District Program does not apply to these projects as they are not located within the established sewer improvement district.

Property	Southfield Pump Station, Gravity Main CIPP & Electrical Improvements	South Post Pump Station, Gravity Main CIPP and Gravity Main Replacement	Total Developer's Cost
Heritage at West Windsor	$101,167.00	$107,770.00	$208,937.00
Hilton Realty	$38,133.00	$40,621.00	$78,754.00
Eden Institute	$3,635.00	$3,872.00	$7,507.00
Bear Creek	-	$46,424.00	$46,424.00

Appendix A

SEWER COLLECTION SYSTEM



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DESCRIPTION	NO.	DATE:	BY:	CHK:
REVISIONS				

DRAWN BY:

CHECKED BY:

CHECKED BY:

ANDREW S. HOLT, PE
NJ PROFESSIONAL ENGINEER
LICENSE NO. 24GE03[illegible]

PRELIMINARY

DATE:

SUBURBAN CONSULTING ENGINEERS, INC.
COA NO.: 24GA28037500
23MID00042500
- Civil Engineers - Municipal Engineers -
- Landscape Architects -
- Planners - Environmentalists - Land Surveyors -
96 US Highway 206, Suite 101 Flanders, N.J. 07836 - 973.398.1776
2430 Highway 34, Bldg. A Suite 1R Wall, N.J. 08736 - 732.282.1776
EXCELLENCE ♦ ECONOMY ♦ ENVIRONMENT

HERITAGE AT WEST WINDSOR SEWER SERVICE EVALUATION TOWNSHIP OF WEST WINDSOR COUNTY OF MERCER STATE OF NEW JERSEY

SITE LAYOUT

PROJECT NUMBER: 11109.011

SCALE:

SHEET 1 OF 3

REVISION___

Appendix B

PROPOSED ZONING CHANGES

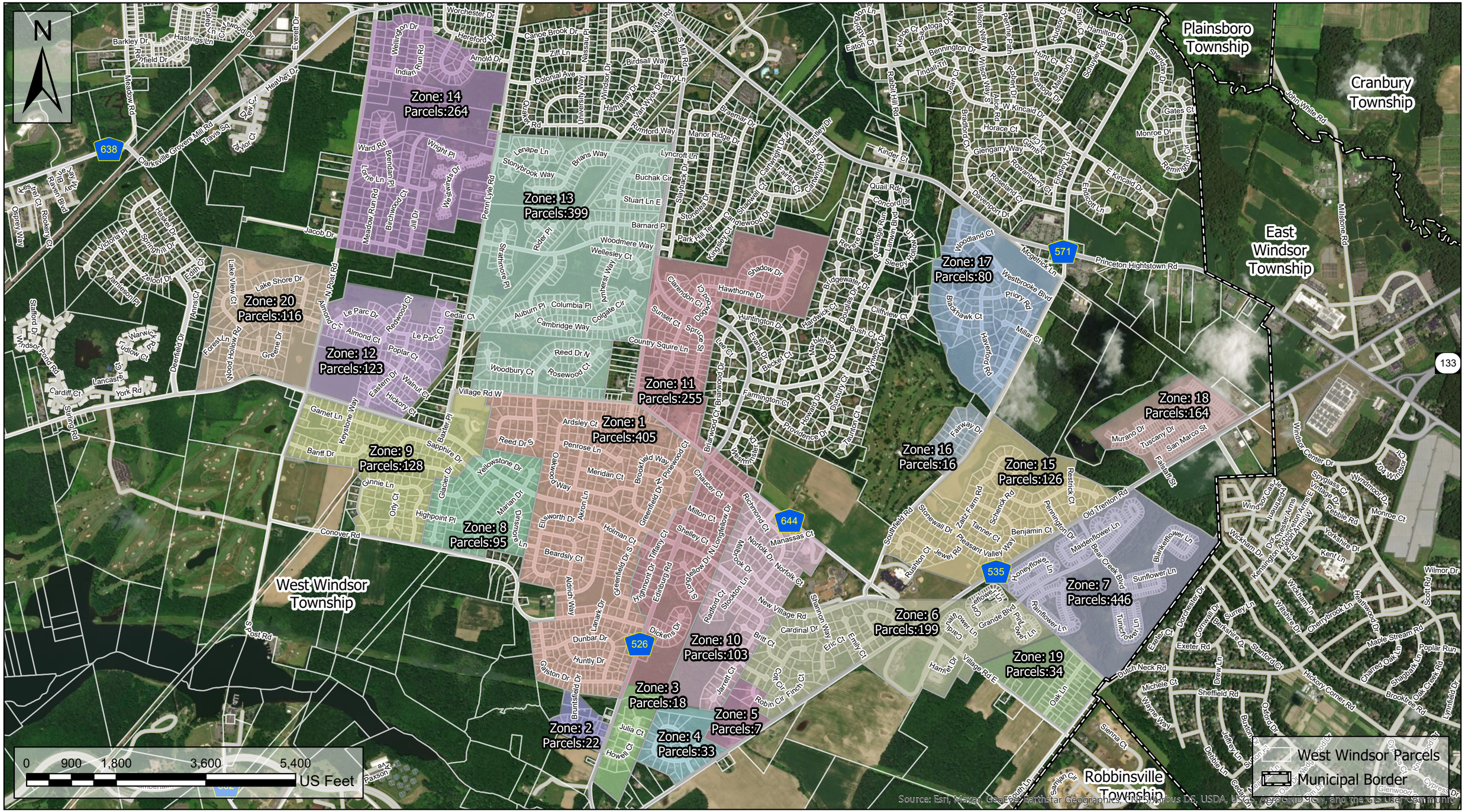
Appendix B
Fair Share Program Estimated Projected Flow

FAIR SHARE PROGRAM							
Block	**Lot**	**Connected to Sewer System**	**Area (Acres)**	**DESCRIPTION**	**Projected Average Flow (GPD)**	**Projected Average Flow (GPM)**	**Projected Peak Flow (GPM)**
21.30	14	Yes	120.23	Cranbury Golf Course	5,000	3.47	8.68
21.27	1	No	21.59	Westbrooke Blvd.	11,286	7.84	19.59
22	3	Yes	1.59	Tri-State Petro	1,385	0.96	2.40
22	3	No	27.99	Tri-State Petro	15,850	11.01	27.52
22	5	No	27.86	Princeton Hightstown Road	36,407	25.28	63.21
28	13	Yes	5.33	Princeton Hightstown Road	2,322	1.61	4.03
28	2	No	11.04	Princeton Hightstown Road	4,809	3.34	8.35
28	12	No	8.62	Princeton Hightstown Road	5,632	3.91	9.78
28	19	Yes	9.8	Princeton Hightstown Road	6,403	4.45	11.12
28	17	Yes	4.98	Princeton Hightstown Road	3,254	2.26	5.65
28	3	No	16.61	Princeton Hightstown Road	10,853	7.54	18.84
28	4	Yes	5.02	Princeton Hightstown Road	3,280	2.28	5.69
28	18	No	1.2	Princeton Hightstown Road	784	0.54	1.36
28	21	No	5	Princeton Hightstown Road			
28	15	No	61.78	Old Trenton Road	41,875	29.08	72.70
28	15	Yes	7.17	Old Trenton Road	4,685	3.25	8.13
37	7	No	45.15	Old Trenton Road (Hilton Realty)	15,210	10.56	26.41
37.01	1	No	3.43	Old Trenton Road	2,689	1.87	4.67
37.01	2	No	10.01	Old Trenton Road	7,849	5.45	13.63
37.01	8	Yes	10.16	Old Trenton Road	11,064	7.68	19.21
47	1	No	1.19	McGetrick Lane	1,296	0.90	2.25
47	2	No	0.9	McGetrick Lane	980	0.68	1.70
47	3	Yes	0.35	McGetrick Lane	381	0.26	0.66
47	4	No	0.44	McGetrick Lane	479	0.33	0.83
47	6	Yes	1.74	McGetrick Lane	1,895	1.32	3.29
				Projected Total Flow of Uncompleted Projects	*155,999*	*108.33*	*270.83*
				15% Reduction due to Constrained Lands	*23,400*	*16.25*	*40.62*
				Total Flow	**132,599**	**92.08**	**230.21**

notes:
1. Green-highlighted locations are not currently connected to the West Windsor Sewer System.
2. A peak factor of 2.5 was used to calculate peak conditions.

Appendix C

TRIBUTARY FLOW MAP



DRAWN BY:	DATE:	CHECKED BY:	DATE:
MRM	8/14/2020		8/14/2020

SUBURBAN CONSULTING ENGINEERS, INC.
COA NO.: 24GA28037500
21MH00004200
- Civil Engineers - Municipal Engineers -
- Landscape Architects -
- Planners - Environmentalists - Land Surveyors -
96 US Highway 206, Suite 101, Flanders, N.J. 07836 - 973.398.1776
2430 Highway 34, Bldg. A Suite 1R, Wall, N.J. 08736 - 732.282.1776
EXCELLENCE ♦ ECONOMY ♦ ENVIRONMENT

Tributary Sewer Flow Path

West Windsor Township
Mercer County, NJ

SCALE:	SHEET	REVISION	PROJECT NO.
1" = 1,800'	____ of ____	_____	SCE-11109

Appendix D

SEWER CAPACITY TABLES

Appendix D
Gravity Sewer Conveyance Capacity- Phase II

PHASE II GRAVITY ANALYSIS

n= 0.01

								Measured Existing Flow		Proposed Development		Tributary	Peaked	
Pipe Section	Description	Upstream Manhole	Downstream Manhole	LF	Size [in]	Slope [ft/ft]	Slope (%)	Measured Average Flow [gpm]	Measured Peak Flow [gpm]	Calculated Average Flow [gpm]	Calculated Peak Flow [gpm]	Calculated Flow [gpm]	Combined Flow [gpm]	Pipe Capacity [gpm]
Proposed	Heritage development				8	0.0035	0.350%	0	0	52	104	0	104	415
1	Old Trenton Road	1	2	260	8	0.0040	0.400%	0	0	73	183	0	183	444
2	Old Trenton Road	2	3	386	8	0.0040	0.400%	0	0	73	183	0	183	444
3	Old Trenton Road	3	4	25	8	0.0072	0.720%	0	0	73	183	0	183	596
4	Old Trenton Road	4	5	314	8	0.0040	0.400%	0	0	73	183	0	183	444
5	Old Trenton Road	5	6	164	8	0.0040	0.400%	0	0	73	183	0	183	444
6	Old Trenton Road	15	7	476	8	0.0040	0.400%	0	0	73	183	0	183	444
7	Old Trenton Road	16	8	460	8	0.0040	0.400%	0	0	73	183	0	183	444
8	Old Trenton Road	17	9	431	8	0.0040	0.400%	0	0	73	183	0	183	444
9	Falstaff Street	18	19	216	8	0.0035	0.350%	0	0	73	183	0	183	415
10	Falstaff Street	19	20	189	8	0.0035	0.350%	0	0	73	183	0	183	415
11	Falstaff Street	20	21	366	8	0.0035	0.350%	0	0	73	183	0	183	415
12	Tuscany Drive	21	22	130	8	0.0035	0.350%	0	0	73	183	0	183	415
13	Tuscany Drive	22	23	98	8	0.0035	0.350%	0	0	73	183	0	183	415
14	Tuscany Drive	23	24	107	8	0.0035	0.350%	0	0	73	183	0	183	415
15	Tuscany Drive	24	25	243	8	0.0035	0.350%	0	0	73	183	0	183	415
16	Murano Drive	25	26	145	8	0.0035	0.350%	0	0	73	183	34	217	415
17	Murano Drive	26	27	113	8	0.0035	0.350%	0	0	73	183	34	217	415
18	Murano Drive	27	28	127	8	0.0035	0.350%	0	0	73	183	34	217	415
19	Murano Drive	28	29	170	8	0.0035	0.350%	0	0	73	183	34	217	415
20	Undeveloped	29	30	326	8	0.0035	0.350%	0	0	73	183	34	217	415
21	Undeveloped	30	31	432	8	0.0035	0.350%	0	0	73	183	34	217	415
22	Undeveloped	31	32	130	8	0.0035	0.350%	0	0	73	183	34	217	415
23	Undeveloped	32	33	247	8	0.0035	0.350%	0	0	73	183	34	217	415
24	Block 28, Lot 21	33	34	64	8	0.0035	0.350%	0	0	73	183	34	217	415
25	Block 28, Lot 21	34	101	390	8	0.0035	0.350%	0	0	73	183	34	217	415
26	Block 28, Lot 5	101	102	256	8	0.0035	0.350%	0	0	73	183	34	217	415
27	Block 28, Lot 5	102	103	212	8	0.0035	0.350%	0	0	73	183	34	217	415
28	Block 28, Lot 5	103	104	70	8	0.0035	0.350%	0	0	73	183	34	217	415
29	Block 28, Lot 5	104	105	82	8	0.0035	0.350%	0	0	73	183	34	217	415
30	Block 28, Lot 5	105	106	162	8	0.0035	0.346%	0	0	73	183	34	217	413
31	Block 28, Lot 5	106	107	330	8	0.0035	0.350%	0	0	73	183	34	217	415
32	Block 28, Lot 5	107	108	108	8	0.0035	0.352%	0	0	73	183	34	217	417
33	Block 28, Lot 5	108	109	204	8	0.0035	0.348%	0	0	73	183	34	217	414
34	Block 28, Lot 5	109	6	132	8	0.0035	0.350%	0	0	73	183	34	217	415
35	Southfield Rd	6	5	260	8	0.00430108	0.430%	0	0	147	367	51	417	461
36	Southfield Rd	5	4	336	8	0.0037	0.370%	0	0	147	367	54	421	427
37	Southfield Rd	4	3	319	8	0.360%	0.360%	0	0	147	367	87	454	421
38	MILLBROOK DRIVE	1	2	278	8	0.0040	0.400%	69	257	147	367	5	628	444
39	MILLBROOK DRIVE	2	5	306	8	0.0050	0.500%	69	257	147	367	5	628	497
40	MILLBROOK DRIVE	5	6	209	8	0.0040	0.397%	69	257	147	367	5	628	443
41	MILLBROOK DRIVE	6	8	240	8	0.0037	0.375%	69	257	147	367	6	630	430
42	MILLBROOK DRIVE	8	9	274	8	0.0084	0.838%	69	257	147	367	6	630	643
43	MILLBROOK DRIVE	9	14	233	8	0.0045	0.447%	69	257	147	367	6	630	469
44	MILLBROOK DRIVE	14	15	242	8	0.0037	0.367%	69	257	147	367	7	631	425
45	MILLBROOK DRIVE	15	21	50	8	0.0044	0.440%	69	257	147	367	7	631	466
46	MILLBROOK DRIVE	21	23	248	8	0.0041	0.411%	69	257	147	367	7	631	450
47	MILLBROOK DRIVE	23	24	320	8	0.0033	0.331%	69	257	147	367	11	635	404
48	MILLBROOK DRIVE	24	27	90	8	0.0228	2.278%	69	257	147	367	11	635	1060
49	MILLBROOK DRIVE	27	34	355	8	0.0040	0.400%	69	257	147	367	11	635	444
50	MILLBROOK DRIVE	34	36	180	8	0.0040	0.400%	69	257	147	367	11	635	444
51	MILLBROOK DRIVE	36	37	225	8	0.0040	0.400%	69	257	147	367	14	638	444
52	MILLBROOK DRIVE	37	40	210	8	0.0040	0.400%	69	257	147	367	14	638	444
53	MILLBROOK DRIVE	40	41	195	8	0.0040	0.400%	69	257	147	367	18	642	444
54	MILLBROOK DRIVE	41	42	160	8	0.0040	0.400%	69	257	147	367	18	642	444
55	MILLBROOK DRIVE	42	43	120	8	0.0040	0.400%	69	257	147	367	18	642	444
56	MILLBROOK DRIVE	43	44	160	8	0.0040	0.400%	69	257	147	367	18	642	444
57	MILLBROOK DRIVE	44	45	400	8	0.0039	0.390%	69	257	147	367	18	642	439
58	JARRET COURT	45	46	400	10	0.0036	0.358%	69	257	169	422	154	833	761
59	JARRET COURT	46	47	397	10	0.0030	0.300%	69	257	169	422	154	833	697
60	JARRET COURT	47	47A	346	10	0.0029	0.292%	69	257	169	422	154	833	688
61	JARRET COURT	47A	47B	398	10	0.0029	0.294%	69	257	169	422	154	833	690
62	JARRET COURT	47B	14-2	271	10	0.0011	0.114%	69	257	169	422	154	833	430
63	BRUNTSFIELD INTERCEPTOR	14-2	14-1	330	12	0.0024	0.240%	69	257	169	422	218	897	1014
64	BRUNTSFIELD INTERCEPTOR	14-1	13-3	395	12	0.0025	0.250%	69	257	169	422	218	897	1035
65	BRUNTSFIELD INTERCEPTOR	13-3	13-2	120	12	0.0024	0.240%	69	257	169	422	218	897	1014
66	BRUNTSFIELD INTERCEPTOR	13-2	13-1	30	12	0.0046	0.460%	69	257	169	422	218	897	1404
67	BRUNTSFIELD INTERCEPTOR	13-1	12-4	385	12	0.0027	0.270%	69	257	169	422	218	897	1076
68	BRUNTSFIELD INTERCEPTOR	12-4	12-3	300	12	0.0018	0.180%	69	257	169	422	218	897	878
69	BRUNTSFIELD INTERCEPTOR	12-3	12-2	120	12	0.0023	0.230%	69	257	169	422	218	897	993
70	ASSUNPINK INTERCEPTOR	12-2	12-1	250	15	0.0030	0.300%	248	685	169	422	109	1216	2056
71	ASSUNPINK INTERCEPTOR	12-1	11-4	300	15	0.0027	0.270%	248	685	169	422	109	1216	1950
72	ASSUNPINK INTERCEPTOR	11-4	11-3	400	15	0.0021	0.210%	248	685	169	422	109	1216	1720
73	ASSUNPINK INTERCEPTOR	11-3	11-2	400	15	0.0021	0.210%	248	685	169	422	109	1216	1720
74	ASSUNPINK INTERCEPTOR	11-2	11-1	400	15	0.0024	0.240%	248	685	169	422	109	1216	1839
75	ASSUNPINK INTERCEPTOR	11-1	10-3	400	15	0.0017	0.170%	248	685	169	422	109	1216	1548
76	ASSUNPINK INTERCEPTOR	10-3	10-2	400	15	0.0022	0.220%	248	685	169	422	109	1216	1761
77	ASSUNPINK INTERCEPTOR	10-2	10-1	300	15	0.0016	0.160%	248	685	169	422	109	1216	1501
78	ASSUNPINK INTERCEPTOR	10-1	9-4	400	15	0.0017	0.170%	248	685	169	422	109	1216	1548
79	ASSUNPINK INTERCEPTOR	9-4	9-3	200	15	0.0018	0.180%	248	685	169	422	109	1216	1593
80	ASSUNPINK INTERCEPTOR	9-3	9-2	400	15	0.0016	0.160%	248	685	169	422	109	1216	1501
81	ASSUNPINK INTERCEPTOR	9-2	9-1	400	15	0.0019	0.190%	248	685	169	422	109	1216	1636
82	ASSUNPINK INTERCEPTOR	9-1	8-3	400	15	0.0023	0.230%	248	685	169	422	109	1216	1800
83	ASSUNPINK INTERCEPTOR	8-3	8-2	400	15	0.0020	0.200%	248	685	169	422	109	1216	1679
84	ASSUNPINK INTERCEPTOR	8-2	8-1	400	15	0.0018	0.180%	248	685	169	422	109	1216	1593
85	ASSUNPINK INTERCEPTOR	8-1	7-6	330	15	0.0018	0.180%	248	685	169	422	109	1216	1593
86	ASSUNPINK INTERCEPTOR	7-6	7-5	300	15	0.0020	0.200%	248	685	169	422	109	1216	1679
87	ASSUNPINK INTERCEPTOR	7-5	7-4	30	15	0.0016	0.160%	248	685	169	422	109	1216	1501
88	ASSUNPINK INTERCEPTOR	7-4	7-3	300	15	0.0029	0.290%	248	685	169	422	109	1216	2021
89	ASSUNPINK INTERCEPTOR	7-3	7-2	500	15	0.0024	0.240%	248	685	169	422	109	1216	1839
90	ASSUNPINK INTERCEPTOR	7-2	7-1	140	15	0.0019	0.190%	248	685	169	422	109	1216	1636
91	ASSUNPINK INTERCEPTOR	7-1	6-4	259	15	0.0029	0.290%	248	685	169	422	136	1243	2021
92	NORTHPOST GRAVITY	3-1	-	400	15	0.0029	0.290%	248	685	169	422	245	1352	2021
93	NORTHPOST GRAVITY	-	-	1146	15	0.0112	1.1161%	248	685	169	422	245	1352	3966
94	NORTHPOST GRAVITY	-	1-1	377	15	0.0034	0.340%	248	685	169	422	245	1352	2187
95	DUCK POND INTERCEPTOR	1-1	654	2000	16	0.0055	0.554%	248	685	169	422	300	1407	3320

Appendix D
Phase I Gravity Sewer Conveyance Capacity

PHASE I GRAVITY ANALYSIS

n= 0.01

								Measured Existing Flow		Proposed Development		Tributary	Peaked	
Pipe Section	Description	Upstream Manhole	Downstream Manhole	LF	Size [in]	Slope [ft/ft]	Slope (%)	Measured Average Flow [gpm]	Measured Peak Flow [gpm]	Calculated Average Flow [gpm]	Calculated Peak Flow [gpm]	Calculated Flow [gpm]	Combined Flow [gpm]	Pipe Capacity [gpm]
Proposed	Heritage development				8	0.0035	0.350%	0	0	52	130	0	130	415
1	Old Trenton Road	1	2	260	8	0.0040	0.400%	0	0	73	183	0	183	444
2	Old Trenton Road	2	3	386	8	0.0040	0.400%	0	0	73	183	0	183	444
3	Old Trenton Road	3	4	25	8	0.0072	0.720%	0	0	73	183	0	183	596
4	Old Trenton Road	4	5	314	8	0.0040	0.400%	0	0	73	183	0	183	444
5	Old Trenton Road	5	6	164	8	0.0040	0.400%	0	0	73	183	0	183	444
6	Old Trenton Road	15	7	476	8	0.0040	0.400%	0	0	73	183	0	183	444
7	Old Trenton Road	16	8	460	8	0.0040	0.400%	0	0	73	183	0	183	444
8	Old Trenton Road	17	9	431	8	0.0040	0.400%	0	0	73	183	0	183	444
9	Falstaff Street	18	19	216	8	0.0035	0.350%	0	0	73	183	0	183	415
10	Falstaff Street	19	20	189	8	0.0035	0.350%	0	0	73	183	0	183	415
11	Falstaff Street	20	21	366	8	0.0035	0.350%	0	0	73	183	0	183	415
12	Tuscany Drive	21	22	130	8	0.0035	0.350%	0	0	73	183	0	183	415
13	Tuscany Drive	22	23	98	8	0.0035	0.350%	0	0	73	183	0	183	415
14	Tuscany Drive	23	24	107	8	0.0035	0.350%	0	0	73	183	0	183	415
15	Tuscany Drive	24	25	243	8	0.0035	0.350%	0	0	73	183	0	183	415
16	Murano Drive	25	26	145	8	0.0035	0.350%	0	0	73	183	34	217	415
17	Murano Drive	26	27	113	8	0.0035	0.350%	0	0	73	183	34	217	415
18	Murano Drive	27	28	127	8	0.0035	0.350%	0	0	73	183	34	217	415
19	Murano Drive	28	29	170	8	0.0035	0.350%	0	0	73	183	34	217	415
20	Undeveloped	29	30	326	8	0.0035	0.350%	0	0	73	183	34	217	415
21	Undeveloped	30	31	432	8	0.0035	0.350%	0	0	73	183	34	217	415
22	Undeveloped	31	32	130	8	0.0035	0.350%	0	0	73	183	34	217	415
23	Undeveloped	32	33	247	8	0.0035	0.350%	0	0	73	183	34	217	415
24	Block 28, Lot 21	33	34	64	8	0.0035	0.350%	0	0	73	183	34	217	415
25	Block 28, Lot 21	34	101	390	8	0.0035	0.350%	0	0	73	183	34	217	415
26	Block 28, Lot 5	101	102	256	8	0.0035	0.350%	0	0	73	183	34	217	415
27	Block 28, Lot 5	102	103	212	8	0.0035	0.350%	0	0	73	183	34	217	415
28	Block 28, Lot 5	103	104	70	8	0.0035	0.350%	0	0	73	183	34	217	415
29	Block 28, Lot 5	104	105	82	8	0.0035	0.350%	0	0	73	183	34	217	415
30	Block 28, Lot 5	105	106	162	8	0.0035	0.346%	0	0	73	183	34	217	413
31	Block 28, Lot 5	106	107	330	8	0.0035	0.350%	0	0	73	183	34	217	415
32	Block 28, Lot 5	107	108	108	8	0.0035	0.352%	0	0	73	183	34	217	417
33	Block 28, Lot 5	108	109	204	8	0.0035	0.348%	0	0	73	183	34	217	414
34	Block 28, Lot 5	109	6	132	8	0.0035	0.350%	0	0	73	183	34	217	415
35	Southfield Rd	6	5	260.4	8	0.0043	0.430%	0	0	73	183	51	234	461
36	Southfield Rd	5	4	335.6	8	0.0037	0.370%	0	0	73	183	54	237	427
37	Southfield Rd	4	3	318.6	8	0.0036	0.360%	0	0	73	183	87	271	421
38	MILLBROOK DRIVE	1	2	277.54	8	0.0040	0.400%	69	257	73	183	5	445	444
39	MILLBROOK DRIVE	2	5	305.92	8	0.0050	0.500%	69	257	73	183	5	445	497
40	MILLBROOK DRIVE	5	6	208.9	8	0.0040	0.397%	69	257	73	183	5	445	443
41	MILLBROOK DRIVE	6	8	240	8	0.0037	0.375%	69	257	73	183	6	447	430
42	MILLBROOK DRIVE	8	9	274.34	8	0.0084	0.838%	69	257	73	183	6	447	643
43	MILLBROOK DRIVE	9	14	232.78	8	0.0045	0.447%	69	257	73	183	6	447	469
44	MILLBROOK DRIVE	14	15	242.42	8	0.0037	0.367%	69	257	73	183	7	448	425
45	MILLBROOK DRIVE	15	21	50	8	0.0044	0.440%	69	257	73	183	7	448	466
46	MILLBROOK DRIVE	21	23	248.4	8	0.0041	0.411%	69	257	73	183	7	448	450
47	MILLBROOK DRIVE	23	24	320	8	0.0033	0.331%	69	257	73	183	11	452	404
48	MILLBROOK DRIVE	24	27	90	8	0.0228	2.278%	69	257	73	183	11	452	1060
49	MILLBROOK DRIVE	27	34	355	8	0.0040	0.400%	69	257	73	183	11	452	444
50	MILLBROOK DRIVE	34	36	180	8	0.0040	0.400%	69	257	73	183	11	452	444
51	MILLBROOK DRIVE	36	37	225	8	0.0040	0.400%	69	257	73	183	14	454	444
52	MILLBROOK DRIVE	37	40	210	8	0.0040	0.400%	69	257	73	183	14	454	444
53	MILLBROOK DRIVE	40	41	195	8	0.0040	0.400%	69	257	73	183	18	459	444
54	MILLBROOK DRIVE	41	42	160	8	0.0040	0.400%	69	257	73	183	18	459	444
55	MILLBROOK DRIVE	42	43	120	8	0.0040	0.400%	69	257	73	183	18	459	444
56	MILLBROOK DRIVE	43	44	160	8	0.0040	0.400%	69	257	73	183	18	459	444
57	MILLBROOK DRIVE	44	45	400	8	0.0039	0.390%	69	257	73	183	18	459	439
58	JARRET COURT	45	46	400	10	0.0036	0.358%	69	257	95	238	154	650	761
59	JARRET COURT	46	47	396.72	10	0.0030	0.300%	69	257	95	238	154	650	697
60	JARRET COURT	47	47A	345.55	10	0.0029	0.292%	69	257	95	238	154	650	688
61	JARRET COURT	47A	47B	398.13	10	0.0029	0.294%	69	257	95	238	154	650	690
62	JARRET COURT	47B	14-2	271.15	10	0.0011	0.114%	69	257	95	238	154	650	430
63	BRUNTSFIELD INTERCEPTOR	14-2	14-1	330	12	0.0024	0.240%	69	257	95	238	218	714	1014
64	BRUNTSFIELD INTERCEPTOR	14-1	13-3	395	12	0.0025	0.250%	69	257	95	238	218	714	1035
65	BRUNTSFIELD INTERCEPTOR	13-3	13-2	120	12	0.0024	0.240%	69	257	95	238	218	714	1014
66	BRUNTSFIELD INTERCEPTOR	13-2	13-1	30	12	0.0046	0.460%	69	257	95	238	218	714	1404
67	BRUNTSFIELD INTERCEPTOR	13-1	12-4	385	12	0.0027	0.270%	69	257	95	238	218	714	1076
68	BRUNTSFIELD INTERCEPTOR	12-4	12-3	300	12	0.0018	0.180%	69	257	95	238	218	714	878
69	BRUNTSFIELD INTERCEPTOR	12-3	12-2	120	12	0.0023	0.230%	69	257	95	238	218	714	993
70	ASSUNPINK INTERCEPTOR	12-2	12-1	250	15	0.0030	0.300%	248	685	95	238	109	1032	2056
71	ASSUNPINK INTERCEPTOR	12-1	11-4	300	15	0.0027	0.270%	248	685	95	238	109	1032	1950
72	ASSUNPINK INTERCEPTOR	11-4	11-3	400	15	0.0021	0.210%	248	685	95	238	109	1032	1720
73	ASSUNPINK INTERCEPTOR	11-3	11-2	400	15	0.0021	0.210%	248	685	95	238	109	1032	1720
74	ASSUNPINK INTERCEPTOR	11-2	11-1	400	15	0.0024	0.240%	248	685	95	238	109	1032	1839
75	ASSUNPINK INTERCEPTOR	11-1	10-3	400	15	0.0017	0.170%	248	685	95	238	109	1032	1548
76	ASSUNPINK INTERCEPTOR	10-3	10-2	400	15	0.0022	0.220%	248	685	95	238	109	1032	1761
77	ASSUNPINK INTERCEPTOR	10-2	10-1	300	15	0.0016	0.160%	248	685	95	238	109	1032	1501
78	ASSUNPINK INTERCEPTOR	10-1	9-4	400	15	0.0017	0.170%	248	685	95	238	109	1032	1548
79	ASSUNPINK INTERCEPTOR	9-4	9-3	200	15	0.0018	0.180%	248	685	95	238	109	1032	1593
80	ASSUNPINK INTERCEPTOR	9-3	9-2	400	15	0.0016	0.160%	248	685	95	238	109	1032	1501
81	ASSUNPINK INTERCEPTOR	9-2	9-1	400	15	0.0019	0.190%	248	685	95	238	109	1032	1636
82	ASSUNPINK INTERCEPTOR	9-1	8-3	400	15	0.0023	0.230%	248	685	95	238	109	1032	1800
83	ASSUNPINK INTERCEPTOR	8-3	8-2	400	15	0.0020	0.200%	248	685	95	238	109	1032	1679
84	ASSUNPINK INTERCEPTOR	8-2	8-1	400	15	0.0018	0.180%	248	685	95	238	109	1032	1593
85	ASSUNPINK INTERCEPTOR	8-1	7-6	330	15	0.0018	0.180%	248	685	95	238	109	1032	1593
86	ASSUNPINK INTERCEPTOR	7-6	7-5	300	15	0.0020	0.200%	248	685	95	238	109	1032	1679
87	ASSUNPINK INTERCEPTOR	7-5	7-4	30	15	0.0016	0.160%	248	685	95	238	109	1032	1501
88	ASSUNPINK INTERCEPTOR	7-4	7-3	300	15	0.0029	0.290%	248	685	95	238	109	1032	2021
89	ASSUNPINK INTERCEPTOR	7-3	7-2	500	15	0.0024	0.240%	248	685	95	238	109	1032	1839
90	ASSUNPINK INTERCEPTOR	7-2	7-1	140	15	0.0019	0.190%	248	685	95	238	109	1032	1636
91	ASSUNPINK INTERCEPTOR	7-1	6-4	259	15	0.0029	0.290%	248	685	95	238	136	1059	2021
92	NORTHPOST GRAVITY	3-1	-	400	15	0.0029	0.290%	248	685	95	238	245	1168	2021
93	NORTHPOST GRAVITY	-	-	1146	15	0.0112	1.1161%	248	685	95	238	245	1168	3966
94	NORTHPOST GRAVITY	-	1-1	377	15	0.0034	0.340%	248	685	95	238	245	1168	2187
95	DUCK POND INTERCEPTOR	1-1	654	2000	16	0.0055	0.554%	248	685	95	238	300	1223	3320

Appendix E

SPECIFICATION SHEETS

PENTAIR

Customer :
Project name :

Pump Performance Datasheet

Encompass 2.0 - 19.5.6 20.0.4

Item number	: Default	Size	: Hydromatic-S6LXP
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: SUB_S_PE_AH_00013_D_4
Quote number	:	Date last saved	: 18 Mar 2020 3:02 PM

Operating Conditions

Flow, rated	: 1,495.0 USgpm
Differential head / pressure, rated (requested)	: 70.00 ft
Differential head / pressure, rated (actual)	: 72.56 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Performance

Speed, rated	: 1750 rpm
Impeller diameter, rated	: 11.13 in
Impeller diameter, maximum	: 11.88 in
Impeller diameter, minimum	: 8.38 in
Efficiency	: 72.66 %
NPSH required / margin required	: - / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 45 / - Metric units
Minimum Continuous Stable Flow	: 276.5 USgpm
Head, maximum, rated diameter	: 136.7 ft
Head rise to shutoff	: 94.61 %
Flow, best eff. point	: 1,566.6 USgpm
Flow ratio, rated / BEP	: 95.43 %
Diameter ratio (rated / max)	: 93.64 %
Head ratio (rated dia / max dia)	: 70.57 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids diameter limit	: 3.25 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

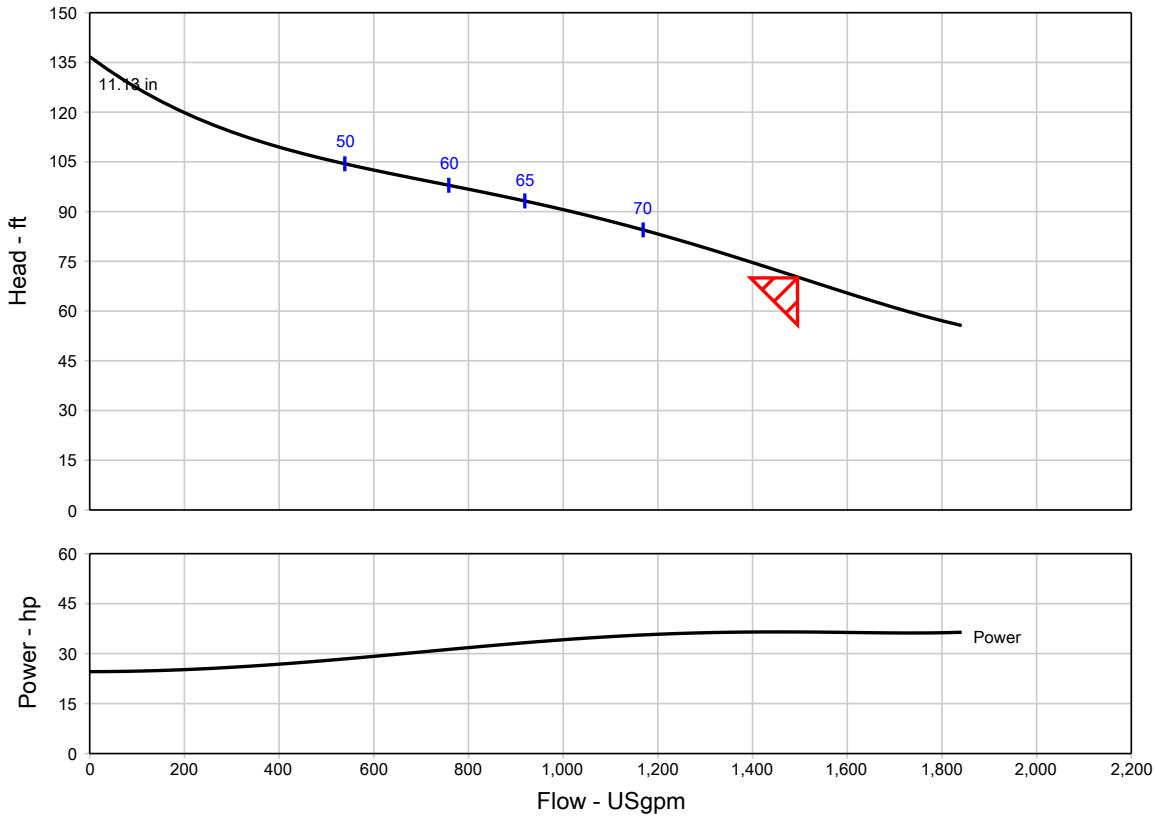
Material selected	: Standard

Pressure Data

Maximum working pressure	: 59.18 psi.g
Maximum allowable working pressure	: N/A
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data (@Max density)

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 26.52 hp
Power, rated	: 36.50 hp
Power, maximum, rated diameter	: 36.51 hp
Minimum recommended motor rating	: 40.00 hp / 29.83 kW

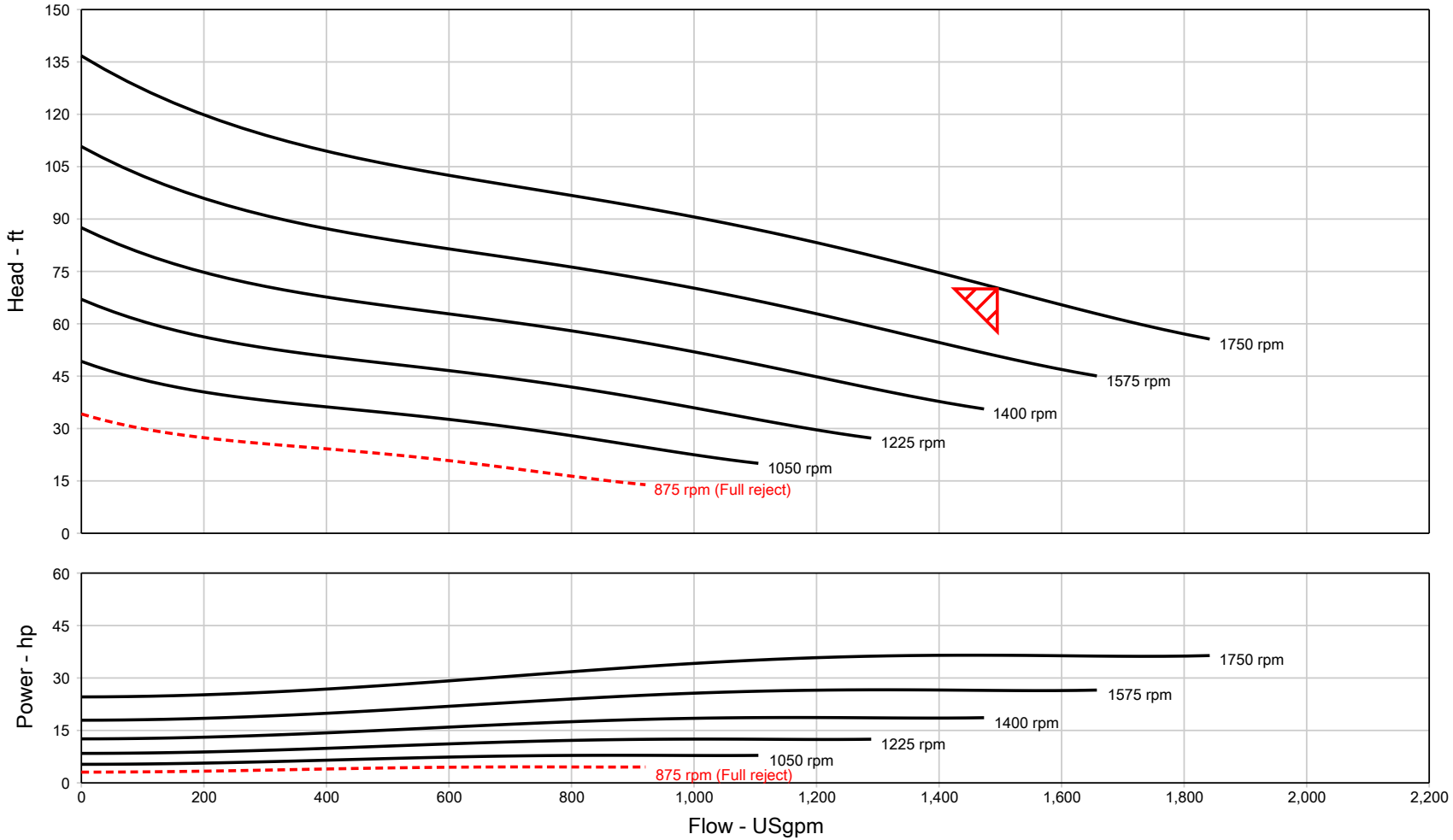


PENTAIR

Customer :
Project name :

Multi-Speed Performance Curve

Encompass 2.0 - 19.5.6 20.0.4



Item number	: Default	Size	: Hydromatic-S6LXP	Flow, rated	: 1,495.0 USgpm
Service	:	Stages	: 1	Differential head / pressure, rated	: 70.00 ft
Quantity	: 1	Efficiency	: 72.66 %	Speed, rated	: 1750 rpm
Quote number	:	Power, rated	: 36.50 hp	Impeller diameter, rated	: 11.13 in
Based on curve number	: SUB_S_PE_AH_00013_D_4	NPSH required	: -	Fluid density, rated / max	: 1.000 / 1.000 SG
		Frequency	: 60 Hz	Viscosity	: 1.00 cP
Date last saved	: 18 Mar 2020 3:02 PM	Nominal speed	: 1750 rpm	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

PENTAIR

Customer :
Project name :

Pump Performance Datasheet

Encompass 2.0 - 19.5.6 20.0.4

Item number	: Default	Size	: Hydromatic-S4LXP
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: SUB_S_PE_AH_00011_D_4
Quote number	:	Date last saved	: 18 Mar 2020 3:01 PM

Operating Conditions

Flow, rated	: 723.0 USgpm
Differential head / pressure, rated (requested)	: 70.00 ft
Differential head / pressure, rated (actual)	: 73.32 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Performance

Speed, rated	: 1750 rpm
Impeller diameter, rated	: 10.00 in
Impeller diameter, maximum	: 11.88 in
Impeller diameter, minimum	: 9.00 in
Efficiency	: 67.34 %
NPSH required / margin required	: - / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 31 / - Metric units
Minimum Continuous Stable Flow	: 231.4 USgpm
Head, maximum, rated diameter	: 100.5 ft
Head rise to shutoff	: 43.55 %
Flow, best eff. point	: 709.8 USgpm
Flow ratio, rated / BEP	: 101.86 %
Diameter ratio (rated / max)	: 84.18 %
Head ratio (rated dia / max dia)	: 49.98 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids diameter limit	: 3.25 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

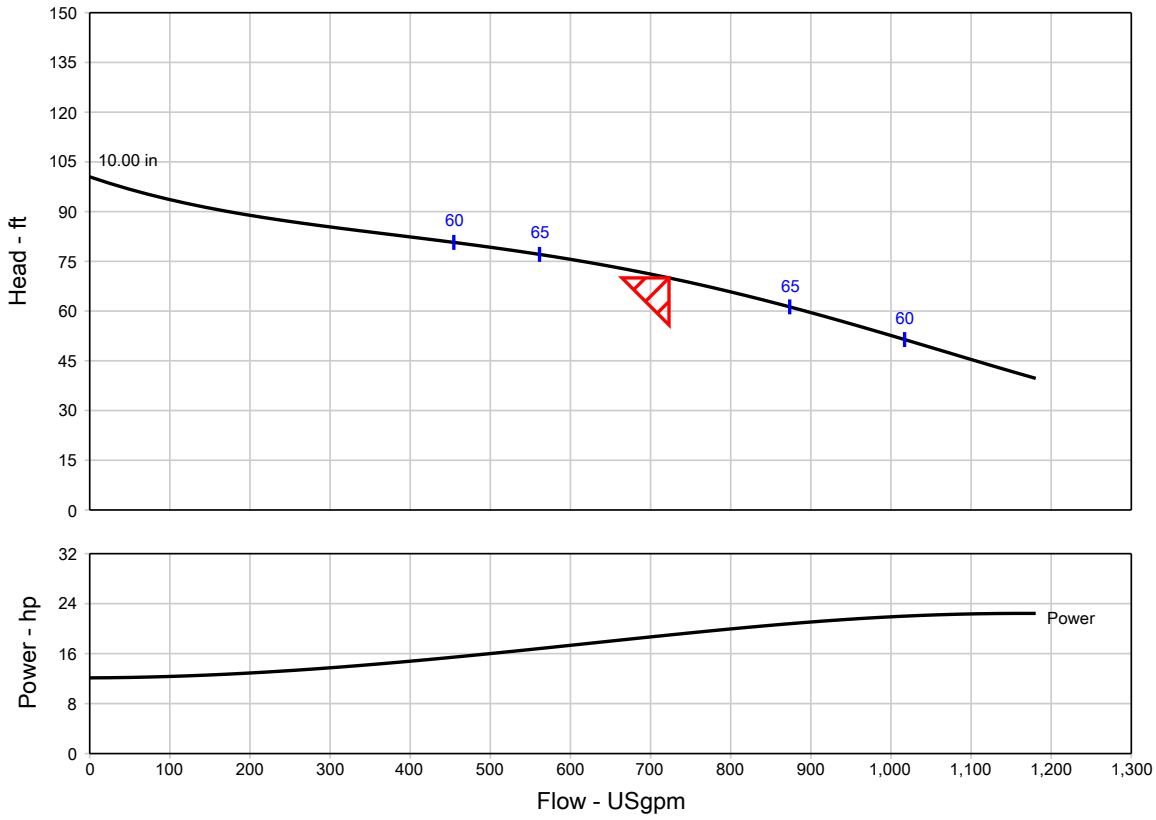
Material selected	: Standard

Pressure Data

Maximum working pressure	: 43.49 psi.g
Maximum allowable working pressure	: N/A
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data (@Max density)

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 12.78 hp
Power, rated	: 18.98 hp
Power, maximum, rated diameter	: 22.44 hp
Minimum recommended motor rating	: 25.00 hp / 18.64 kW

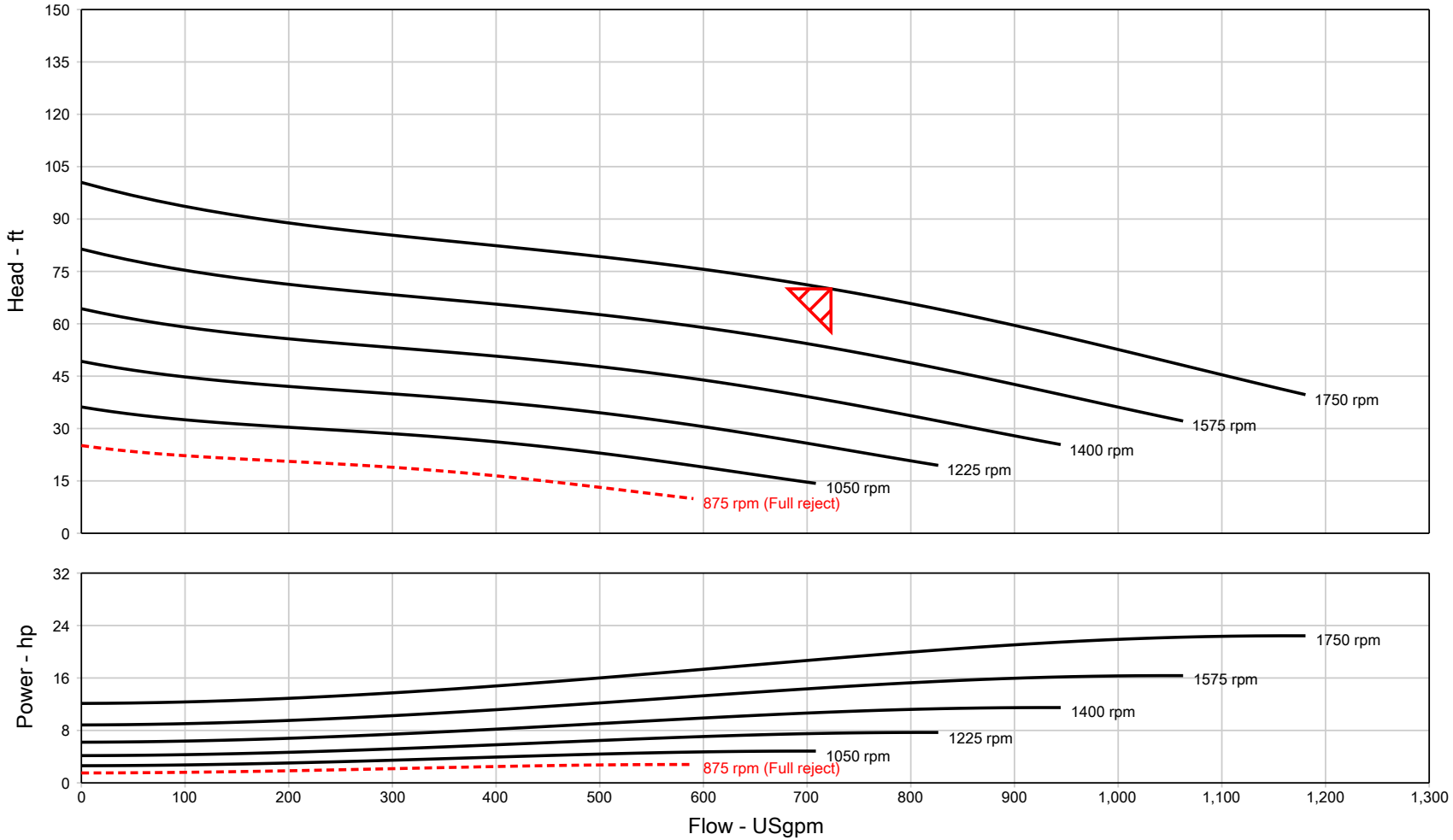


PENTAIR

Customer :
Project name :

Multi-Speed Performance Curve

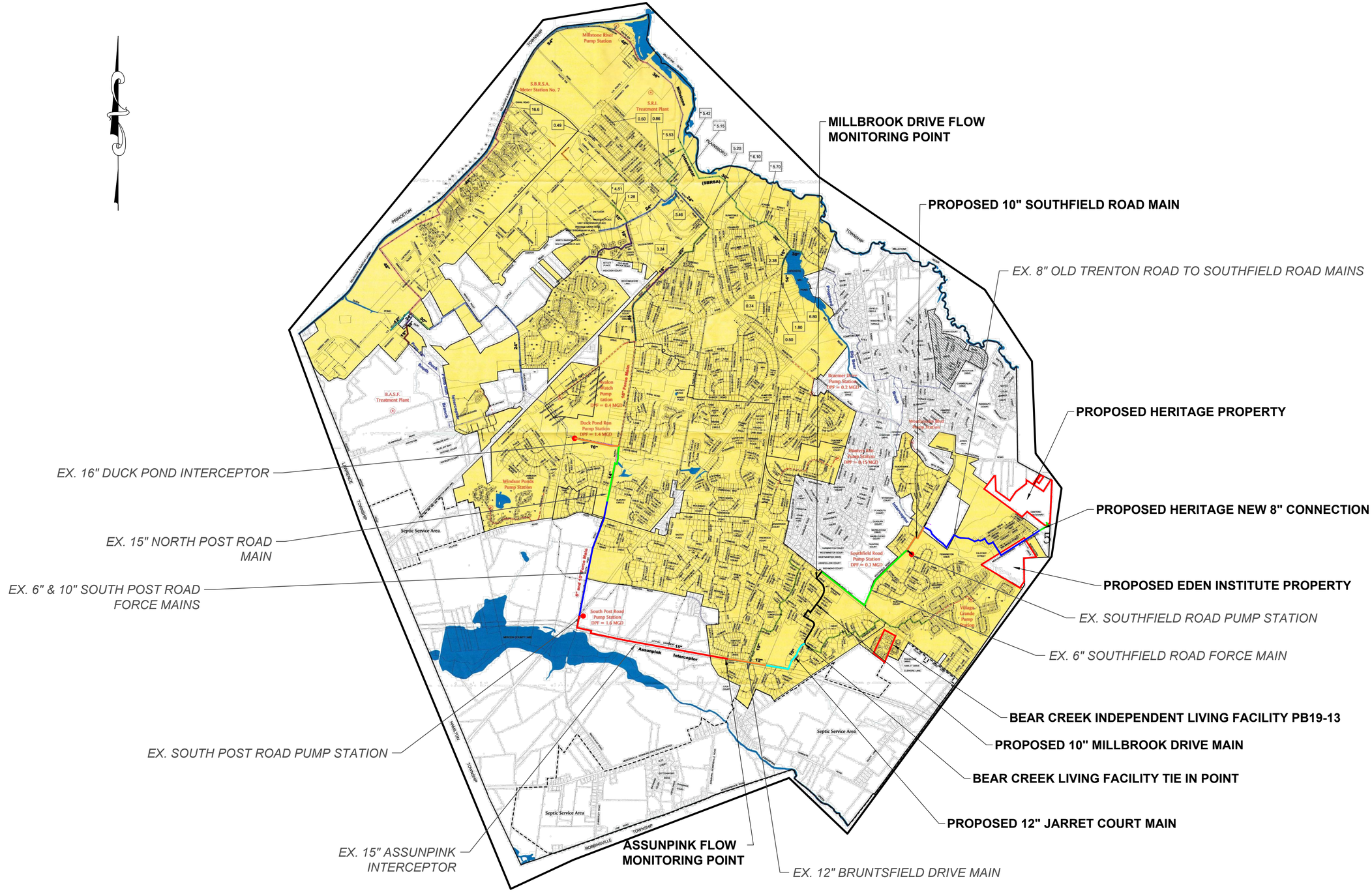
Encompass 2.0 - 19.5.6 20.0.4



Item number	: Default	Size	: Hydromatic-S4LXP	Flow, rated	: 723.0 USgpm
Service	:	Stages	: 1	Differential head / pressure, rated	: 70.00 ft
Quantity	: 1	Efficiency	: 67.34 %	Speed, rated	: 1750 rpm
Quote number	:	Power, rated	: 18.98 hp	Impeller diameter, rated	: 10.00 in
Based on curve number	: SUB_S_PE_AH_00011_D_4	NPSH required	: -	Fluid density, rated / max	: 1.000 / 1.000 SG
		Frequency	: 60 Hz	Viscosity	: 1.00 cP
Date last saved	: 18 Mar 2020 3:01 PM	Nominal speed	: 1750 rpm	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

Appendix F

ALTERNATIVES LAYOUT



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FIRM ID 0004247201
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- Landscape Architects -
- Planners - Environmentalists - Land Surveyors -
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2430 Highway 34, Bldg. A Suite 1R Wall, N.J. 08736 - 732.282.1776
EXCELLENCE ♦ ECONOMY ♦ ENVIRONMENT

HERITAGE AT WEST WINDSOR SEWER SERVICE EVALUATION TOWNSHIP OF WEST WINDSOR COUNTY OF MERCER STATE OF NEW JERSEY

ALTERNATIVE 1

PROJECT NUMBER: 11109.011

SCALE:

SHEET 1 OF 1

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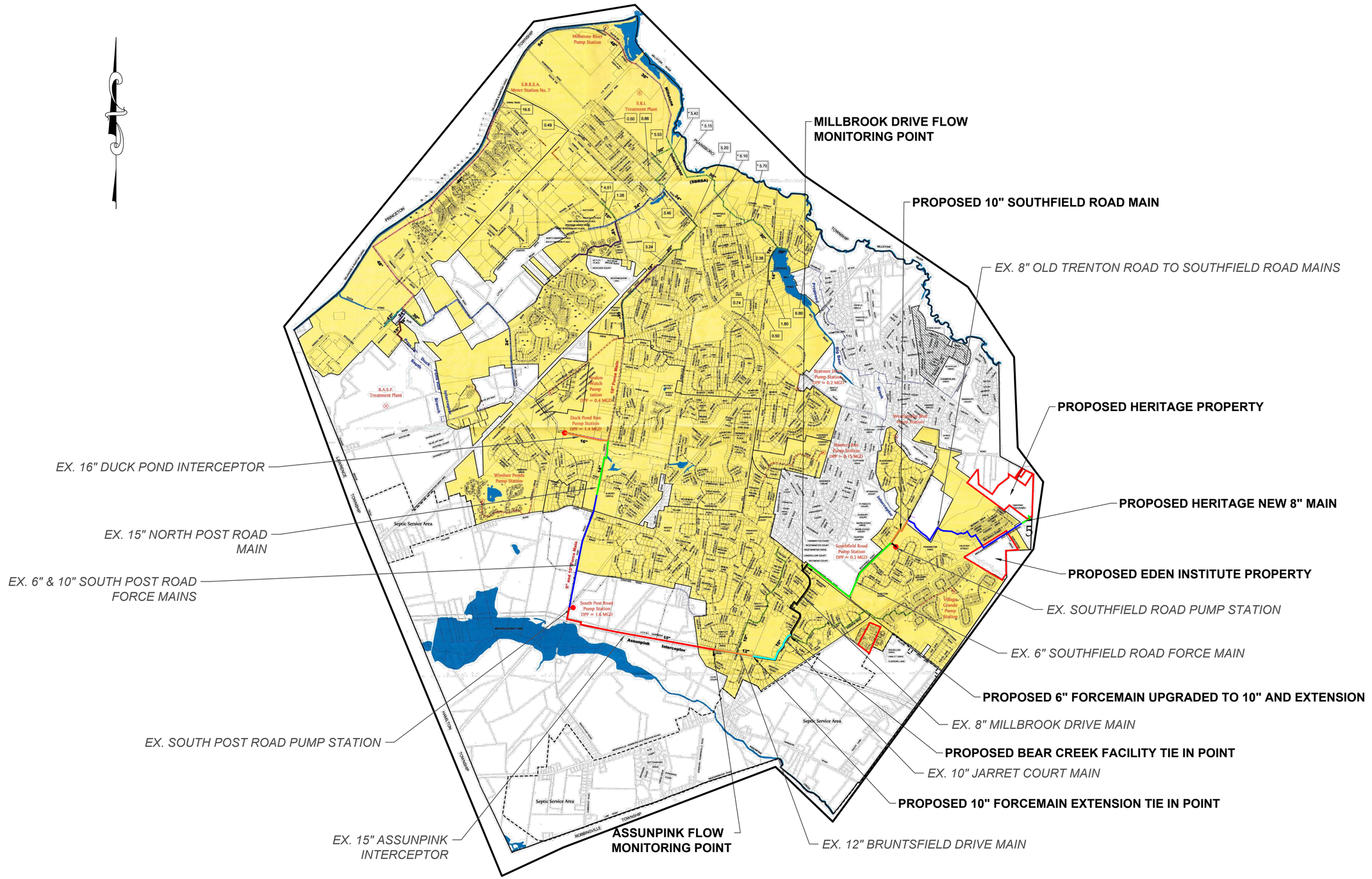

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PROJECT NUMBER: 11109.011

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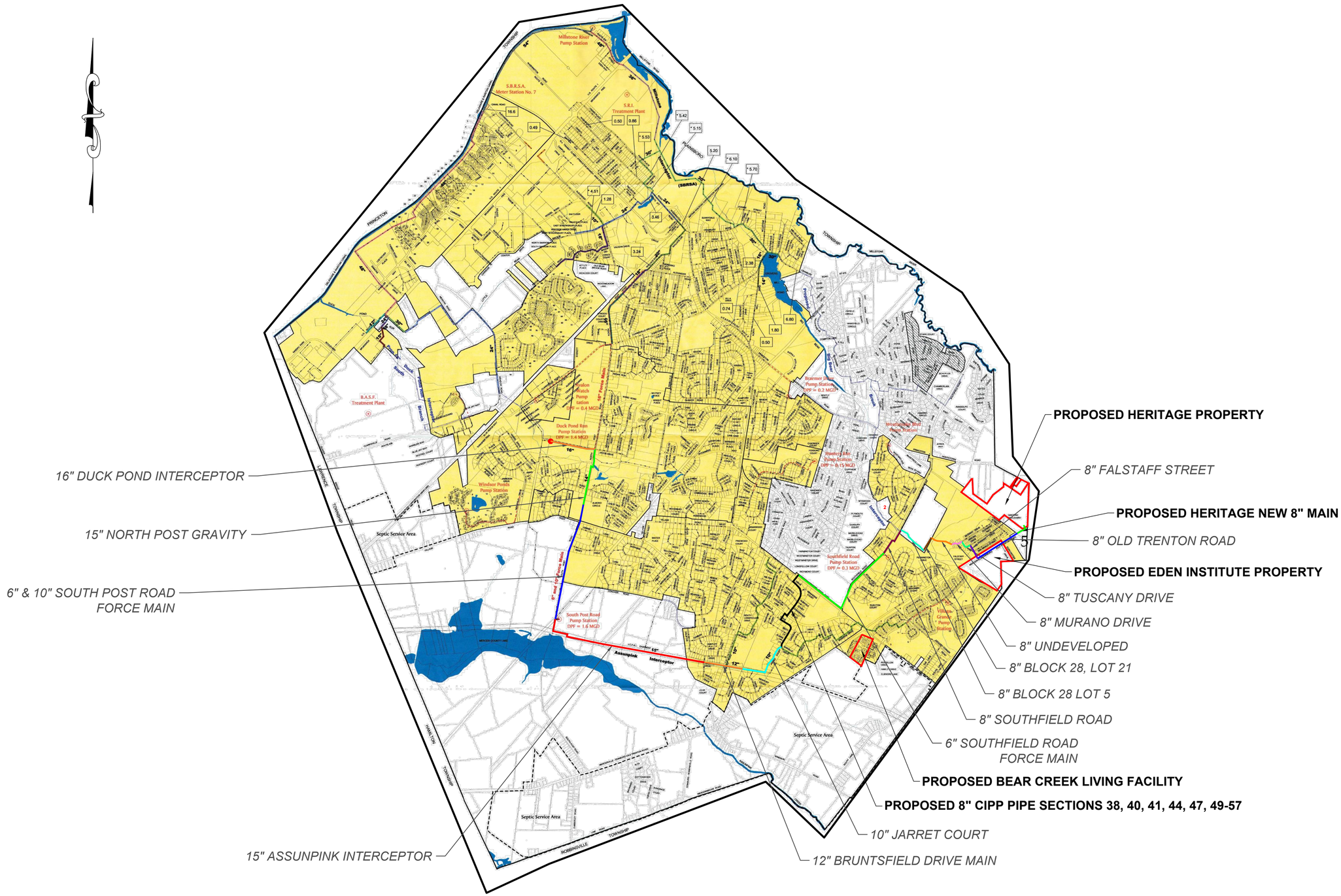

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PHASE I UPDATES

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