
EXHIBIT P2

LOWER MAKEFIELD TOWNSHIP
ACT 537 PLAN DOCUMENTS (SPECIAL STUDY 2018)

**LOWER MAKEFIELD TOWNSHIP ACT 537 SEWAGE
FACILITIES PLAN SPECIAL STUDY**

FOR

NESHAMINY INTERCEPTOR

LOCATED IN

**LOWER MAKEFIELD TOWNSHIP,
BUCKS COUNTY, PENNSYLVANIA**

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EXECUTIVE SUMMARY

LOWER MAKEFIELD TOWNSHIP, BUCKS COUNTY

2018 ACT 537 PLAN SPECIAL STUDY

EXECUTIVE SUMMARY

The Lower Makefield Township 2018 Act 537 Plan Special Study for the Neshaminy Interceptor addresses the long term sewage facilities planning for the portion of Lower Makefield Township where the public sanitary sewer needs are met by conveying the wastewater to the Bucks County Water and Sewer Authority (BCWSA) owned Neshaminy Interceptor. In 2015, a Settlement Agreement between BCWSA and the Pennsylvania Department of Environmental Protection (PA DEP) required the establishment of a Corrective Action Plan and Connection Management Plan for the Neshaminy Interceptor. Each tributary Municipality is operating under this program to reduce infiltration and inflow (I&I), implement a Connection Management Plan (CMP) with BCWSA, implement a Corrective Action Plan (CAP), and perform Act 537 Plan Updates.

The focus of this Special Study is to provide long term sewage facilities planning for the Neshaminy Interceptor Public Sanitary Sewer Service Area. The Special Study will evaluate the ability of the existing sanitary sewer infrastructure to meet the projected sanitary sewer needs of the service area.

One of the key components of the Special Study is implementation of a Corrective Action Plan (CAP) to identify and remove inflow and infiltration (I/I) from the existing sanitary sewer system in this service area.

The CAP is a long term program where the entire Neshaminy Interceptor Service Area was divided into smaller study areas and each study area is evaluated through the use of multiple flow meters to identify the location of the potential sources of I/I. The sources of I/I are then identified through either video inspection or physical field inspections. Once the sources of I/I are identified, Lower Makefield Township will perform the necessary repairs to remove the I/I. A complete copy of the CAP is attached to this Special Study.

Lower Makefield Township has executed the Supplemental Agreement with BCWSA that was required by the PA DEP at their public meeting on February 7, 2018.

Lower Makefield Township took this opportunity to review its existing and proposed public sanitary sewer service areas, existing and future needs, resolve zoning inconsistencies, and provide guidance to future wastewater disposal policies and procedures. Through these analyses, Lower Makefield Township has identified alternatives that will best serve its needs now and into the future.

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In this Act 537 Plan Special Study, the Township was divided into four Study Areas to facilitate the analysis of potential improved wastewater alternatives for each. The Study Areas were chosen based upon existing sewer service areas and the need for reduced sewage flows entering the Neshaminy Interceptor. The four Study Areas are identified as follows:

- Core Creek Interceptor Study Area:
- Middletown Township Study Area
- Falls Township Contract Study Area
- Falls Township Service Study Area

The following is a summary of each of the four study areas

Core Creek Interceptor Study Area:

The Core Creek Interceptor Study Area is located in the western portion of the Township, west of Interstate 95 (I-95) and north of Cornerstone Drive. The area comprises primarily residential homes, along with some commercial properties. This area of the Township has the greatest potential for future growth based upon the availability of open space and the existing Zoning Ordinance and Subdivision and Land Development Ordinance. This area is currently serviced by the existing public sanitary sewer collection and conveyance system. This study area contains three pump stations (Chanticleer Pump Station, Farmview Pump Station and the Brookstone Pump Station).

The existing annual average flows from the Core Creek Interceptor in 2017 were 613,017 gpd. The projected flows from currently identified developments that are contained in the most recent Connection Management Plan are 48,500 gpd and the long term (20 year) projected additional flows for this service area are 119,250 gpd. The total projected flows for the twenty year planning horizon for this study area are 780,767 gpd (613,017 gpd + 48,500 gpd + 119,250 gpd).

The selected alternatives for this study area are as follows:

The existing gravity sanitary sewer collection and conveyance system has sufficient capacity to meet the projected and existing flows for this service area as identified in Chapter IV. The entire gravity sanitary sewer system in this sanitary sewer service area will be evaluated in more detail as part of the Corrective Action Plan (CAP) to identify and reduce any sources of inflow and infiltration.

Lower Makefield Township has selected to implement the best long term method of repairing the gravity sanitary sewer system through the use of liners where possible. Lower Makefield Township currently has \$50,000.00 per year budgeted for the repair of the gravity collection system in its annual sanitary sewer operating budget. There may also be larger capital projects that are identified as a

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result of the implementation of the CAP. Lower Makefield Township has incorporated some of those costs into the large bond issuance that they performed in 2016.

The Chanticleer Pump Station needs to be upgraded in order to provide the required pumping capacity to meet both the existing and proposed flows to the pump station. This will allow Lower Makefield Township to approve the connection of the fourteen projected edus.

This will be accomplished through the replacement of the existing two inch force main with a three inch force main. It is noted that the three inch force main will be installed in the same trench as the existing two inch force main. The pumps will also be replaced with new pumps that utilize three phase power to improve the reliability of the pumps and minimize any issues with clogging that occurred with the use of single phase electrically power grinder pumps.

The estimated cost to replace the force main which is located in a non-paved open space area is approximately \$36,000.00 (900 linear feet x \$40.00/linear foot). The estimated cost to replace the pumps, controls and convert the single phase electric power to three phase is estimated at \$65,000.00. The entire cost of this upgrade will be approximately \$100,000.00.

Lower Makefield Township is currently in discussions with the developer of one of the proposed projects on these requirements. Lower Makefield Township also has the funds available in its existing operating and reserve accounts to implement this alternative.

The Brookstone Pump Station needs to be upgraded in order to provide the required pumping capacity to meet the existing flows to the pump station. Upon a detailed inspection of the pump station in July 2018, it was discovered the pump station was no longer secured in place and moving when the pumps engaged. The pump station will be upgrade from a dry well station to a submersible pump station. The existing dry well will be abandoned in place and a new wet well will installed for the submersible pumps.

The cost of the site work is estimated to be \$38,500.00. The construction of a new wet well and forcemain is estimated at \$91,200.00. The demolition of the dry well in place will be approximately \$8,000.00 and a new valve box is estimate at \$51,000.00. The entire cost for the upgrade will be approximately \$232,101.00. Lower Makefield Township has the funds available in its existing operating and reserve accounts to implement this alternative.

The evaluation of the Farmview Pump Station concluded that no changes are required at this time to this pump station and that it has adequate available capacity to service the long term planning needs of its service area.

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Under the current requirements of PA DEP's agreement with BCWSA, Lower Makefield Township will continue to implement the CAP. Future wastewater needs within the public sanitary sewer service area will be implemented in accordance with the CMP. No new service connections will be issued until EDUs are released by BCW&SA.

Middletown Township Study Area:

The Middletown Township Study Area is located in the southwestern portion of the Township along the north and south sides of Big Oak Road. The area is comprised of primarily residential homes with some commercial properties. This area of the Township has some potential for future growth based upon the existing Zoning Ordinance and Subdivision and Land Development Ordinance. This area is currently serviced by the existing public sanitary sewer collection and conveyance system. This study area contains one existing pump station known as the Yardley Oaks Pump Station.

The existing annual average flows from the Middletown Township Service Area in 2017 were 166,607 gpd. The projected flows from currently identified developments that are contained in the most recent Connection Management Plan are 43,500 gpd and the long term (20 year) projected additional flows for this service area are 5,000 gpd. The total projected flows for the twenty year planning horizon for this study area are 215,107 gpd (166,607gpd + 43,500 gpd +5,000 gpd).

The selected alternatives for this study area are as follows:

The existing gravity sanitary sewer collection and conveyance system has sufficient capacity to meet the projected and existing flows for this service area as identified in Chapter IV. The entire gravity sanitary sewer system in this sanitary sewer service area will be evaluated in more detail as part of the CAP to identify and reduce any sources of inflow and infiltration. The implementation and costs associated with the CAP are the same as described above for the Core Creek Interceptor Service Area.

The Yardley Oaks Pump Station has a capacity of 48,420 gpd and the average flow rate at the pump station in 2017 was 39,117 gpd. Based on the 20 year projections for the area that flows into the Yardley Oaks Pump Station, 12,000 gpd is anticipated. The actual flows to this pump station will be monitored and if the need for an upgrade to this pump station is determined to be required, a separate planning effort will be performed at that time.

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Falls Township Contract Study Area:

The Falls Township (Contract Area) is located in the southern-most portion of the Township and is divided into two sections. The western section comprises an area west of Derbyshire Road and bound to the north and west by the Middletown, Yardley Borough, and Morrisville Borough Service Areas. The eastern portion of the Service Area is situated between Pine Grove Road, Ferry Road, and Wood Street. Watersheds in the Service Area include Martins Creek and Rock Run. The area is comprised of primarily residential homes with some limited woodland areas. There is no pump station located in this service area.

The existing annual average flows from the Falls Township Contract Service Area in 2017 were 304,790 gpd. This area is almost entirely built out and fully serviced by the existing public sanitary sewer system. There are no projected flows from currently identified developments that are contained in the most recent Connection Management Plan. There are six projected edus for the long term (20 year) projected additional flows for this service area. The total projected flows for the twenty year planning horizon for this study area are 306,290 gpd (304,790 gpd + 1,500 gpd).

There is a permitted pump station at the Derbyshire meter pit that is used to bypass flows when the existing flows cannot be conveyed by gravity. The pump run time hour meters are now being recorded and will be presented in future Chapter 94 Reports. The operation staff will now be checking this pump station site as part of their regular inspections and will note the approximate start time and end time of all pumping events as well as recording the pump run times.

The selected alternatives for this study area are as follows:

The existing gravity sanitary sewer collection and conveyance system has sufficient capacity to meet the projected and existing flows for this service area as identified in Chapter IV. The entire gravity sanitary sewer system in this sanitary sewer service area will be evaluated in more detail as part of the CAP to identify and reduce any sources of inflow and infiltration. The implementation and costs associated with the CAP are the same as described above for the Core Creek Interceptor Service Area.

Falls Township (Service Area):

The Falls Township Service Area is located between the two Falls Township Contract Areas in the southern portion of the Township. The Falls Township Service Area is comprised of primarily residential homes with some recreational and community service properties, including the Charles Boehm, Pennwood, and

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William Penn Middle Schools. There is no pump station located in this service area.

Lower Makefield Township and the Township of Falls Authority (TOFA) have an existing agreement, whereby sewage flows generated in this portion of Lower Makefield Township are conveyed to TOFA who owns and maintains the public sewer system in Falls Township. The wastewater generated in the Falls Township area is conveyed through TOFA where it will flow to the Neshaminy Interceptor for ultimate treatment and disposal at the City of Philadelphia Northeast Water Pollution Control Plant.

The Falls Township Service Area is almost entirely built out and fully serviced by the existing public sanitary sewer system. This service area is not being metered and TOFA utilizes water usage to bill Lower Makefield Township. There are no projected flows from currently identified developments that are contained in the most recent Connection Management Plan. There are four projected edus for the long term (20 year) projected additional flows for this service area. The total projected flows for the twenty year planning horizon for this study area are 1,000 gpd.

The Act 537 Plan Special Study also incorporates the alternative analysis and the selected alternatives of the BCWSA Neshaminy Interceptor Evaluation dated March 2015 (last revised January 2016). This evaluation and selected alternatives are summarized within this Executive Summary.

BCWSA provides sanitary sewer conveyance service to numerous municipalities along the Neshaminy Creek between Newtown Township and Bensalem Township. Treatment capacity is provided by BCWSA through an agreement with the City of Philadelphia Water Department. A Settlement Agreement between BCWSA and the PA DEP included the establishment of a Corrective Action Plan (NICAP) and Connection Management Plan (NICMP) for the Neshaminy Interceptor and which included the requirement for tributary municipalities to complete updates to their Municipal Act 537 Plans, prepare a Sewer System Needs Analysis for their communities and complete a comprehensive inflow and infiltration (I/I) evaluation for their sanitary sewer systems.

BCWSA performed an evaluation of the interceptor characterizing the current flow conditions in the Neshaminy Interceptor and projected conditions as a result of the municipal forecasted needs. The evaluation also considered the effects of reduction of infiltration and inflow from municipal sewer systems completed in conformance with the NICAP/NICMP and Supplemental Agreements which include flow limits for all tributary municipalities to the Neshaminy Interceptor. The detailed BCWSA Neshaminy Interceptor Technical Evaluation is provided in Appendix D.

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The alternative to improve the wastewater facilities evaluated by BCWSA were the following types of improvements to the Neshaminy Interceptor:

- Lining of the 30 inch, 33 inch, 36 inch, 42 inch and portions of 48 inch of the interceptor
- Upgrading the size of the 30 inch, 33 inch, 36 inch, 42 inch and portions of 48 inch of the interceptor
- Installing a relief parallel sanitary sewer along the 54" portion of the Interceptor

The alternative selected by BCWSA is the lining of the 30 inch, 33 inch, 36 inch, 42 inch and portions the 48 inch Interceptor plus construction of a relief sewer along the 54" portion of the Interceptor at an estimated cost of \$18,173,000. Since this upgrade is based on significant I/I reductions by the municipalities, the modeled conditions utilized by BCWSA could take time to achieve and would need to be maintained in order to accommodate future flows. Connection limitations to Municipal customers who do not achieve the necessary I/I reductions would be instated.

BCWSA Neshaminy Interceptor Improvements-Easements: The construction of the 54 inch Interceptor relief sewer will be within the existing easement that has been acquired by BCWSA. The installation of CIPP lining will also be completed within existing right-of-ways and existing Interceptor easements.

BCWSA Neshaminy Interceptor Improvements - PNDI and BHP: It is anticipated the 54 inch Interceptor relief sewer will be installed by directional drilling within the easement and no excavation is anticipated for installation of liners. If excavation outside the easement area is anticipated during preparation of bid documents, BCWSA will identify the locations and submittal the information to PNDI and BHP for their determinations.

The BCWSA Implementation Schedule is outlines below:

BCWSA 54 Inch Interceptor Relief Sewer (**)	Elapsed Time (From DEP Plan Approval)
Design, Easements and Permits	8 months
Bid, Award and Construction Completion 30 inch, 33 inch, 36 inch, 42 inch and 48 inch Interceptor Lining (**)	18 months
Design, Easements and Permits	12 months
Bid, Award, and Construction Completion	24 months

***Interceptor Manhole Inspections will be conducted during Interceptor Improvements. Manhole Defects identified during inspections will be scheduled for repair within 12 months of discovery.*

Lower Makefield Township will pay its proportionate share of the BCWSA liner project which has been funded through a bond issuance by the BCWSA by paying the increased

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sewer rental charges to BCWSA in accordance with its existing agreement with BCWSA. Lower Makefield Township Board of Supervisors executed the BCWSA Supplemental Agreement at their public meeting on February 7, 2018.

Lower Makefield Township has the necessary funds in its existing operating and reserve funds to finance the implementation of the CAP and the upgrades to the two pump stations. It is noted that some of the monies for the capital projects may come from the 2016 Bond proceeds.

The Implementation Schedule for the selected alternatives is as follows:

Milestone	Estimated Timeframe for Completion
Lower Makefield Pump Station Upgrades	
Part II Permit Application for the existing Chanticleer and Brookstone Pump Station Upgrades	6 Months
PADEP Review and Approval of Part II Permit for Chanticleer and Brookstone Pump Station Upgrades	9 Months
Bidding for Chanticleer and Brookstone Pump Stations Upgrades	12 Months
Construction of Chanticleer and Brookstone Pump Station Upgrades	18 Months
Corrective Action Plan - Implementation of I/I Abatement	
CAP Year One; Meter Sub Basin A-1	Month 1 – Month 12
CAP Year Two, Make Repairs in Sub Basin A-1; Meter Sub Basin A-2	Year 2
CAP Year Three, Make Repairs in Sub Basin A-2; Meter Sub Basin B-1 and B-2	Year 3
CAP Year Four, Make Repairs in Sub Basin B-1 and B-2; Meter Sub Basin C	Year 4
CAP Year Five, Make Repairs in Sub Basin C; Meter Sub Basin D	Year 5
CAP Year Six, Make Repairs in Sub Basin D; Meter Sub Basin E	Year 6
CAP Year Seven, Make Repairs in Sub Basin E; Meter Sub Basin F	Year 7
CAP Year Eight, Make Repairs in Sub Basin F	Year 8
CAP Year Nine and Beyond LMT will continue the same flow metering and monitoring program following same pattern and address any I/I identified in the following budget year. It is noted	Year Nine and Beyond

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Milestone	Estimated Timeframe for Completion
that the order of flow monitoring may change based upon field observations and flows recorded at the permanent flow meter locations.	
BCWSA 54 Inch Interceptor Relief Sewer	
Design, Easements and Permits	8 months
Bid, Award and Construction Completion 30 inch, 33 inch, 36 inch, 42 inch and 48 inch Interceptor Lining	18 months
Design, Easements and Permits	12 months
Bid, Award, and Construction Completion	24 months

A detailed implementation schedule for the Corrective Action Plan is attached in Appendix B.

CHAPTER I
PREVIOUS SEWAGE FACILITIES PLANNING

CHAPTER I

PREVIOUS SEWAGE FACILITIES PLANNING

A. Earliest Sewage Facilities Planning

Bucks County Master Plan (1960)

The earliest Act 537 related planning for Lower Makefield Township dates back to 1960, when Bucks County released its Master Plan for Water Supply and Sewerage Facilities (1960 County Plan).

The 1960 County Plan anticipated the construction of the existing Falls Township Wastewater Treatment Plant (WWTP) to serve areas of Lower Makefield Township and adjacent to Fairless Hills. The Falls Township WWTP would be phased out to the proposed Lower Neshaminy WWTP by the year 2010. The proposed Lower Neshaminy WWTP would then serve areas of Lower Makefield Township, as well as other areas within the Neshaminy Creek watershed tributary to the plant, and areas formerly discharging to the Falls Township WWTP. The 1960 County Plan also proposed the existing Morrisville WWTP to serve portions of Lower Makefield after 2010. The portions of Lower Makefield Township to be served by this plant would be in watersheds discharging toward the Delaware River.

Bucks County Sewerage Facilities Plan (1970)

Lower Makefield Township's first sewage facilities plan was prepared and approved in September 1969, which became part of the 1970 Bucks County Act 537 Plan. This served as an update to the 1960 County Master Plan. The recommendation to phase-out the Falls Township WWTP was not proposed in the 1970 County Plan. Instead, the 1970 County Plan proposed that the Falls Township WWTP would serve additional areas in Lower Makefield Township. Flows in excess of the plant's capacity would be diverted to the Bristol Township Sewage Treatment Plant by a proposed extension to the then existing Neshaminy Interceptor. The 1970 County Plan also proposed the construction of the Lower Neshaminy WWTP by 1980 to serve flows in excess of the Bristol Township WWTP's capacity. In addition, flows in excess of the Lower Neshaminy WWTP's capacity would be served by an expansion of the Plant or conveyance to the Northeast Philadelphia WWTP.

Between 1960 and 1970, the Morrisville WWTP was expanded and began accepting wastewater from portions of Lower Makefield Township and Yardley Borough. The 1970 County Plan proposed that the Morrisville WWTP begin serving additional areas in Lower Makefield Township, as well as part of Upper Makefield Township by 1980. After 1980, the Morrisville WWTP would serve the remaining portions of Lower Makefield Township within the watersheds discharging towards the Delaware River.

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Lower Makefield Township Sewage Facilities Plan (1975)

From 1970 to 1975, significant sewer expansion occurred as a result of increased development in Lower Makefield Township. Consistent with the 1970 County Plan, the Core Creek Branch of the Neshaminy Interceptor was completed, and the Morrisville WWTP was expanded and upgraded. Contrary to the 1970 County Plan, the Lower Neshaminy WWTP was not constructed, and flows were instead directed to the City of Philadelphia Northeast WWTP via the Neshaminy Interceptor.

As a result of the increased development, Lower Makefield Township completed a Sewage Facilities Plan in 1975 to update their 1969 Plan and the 1970 County Plan. The 1975 Township Plan was adopted by Lower Makefield Township on July 21, 1975, and remains as the Township's Official Sewage Facilities Plan. The 1975 Township Plan recommended the following:

- Construction of a new parallel interceptor from the Dyers Creek Basin along Taylorsville Road to Yardley Borough;
- Discharge of flows from portions of Dyers Creek, Buck Creek, and Brock Creek drainage basins to the Morrisville WWTP;
- Discharge of future flows from the Core Creek Basin to the Core Creek Interceptor;
- Discharge of future flows from the Mill Creek Basin to Middletown Township;
- Discharge of future flows from the Silver Lake and Black Rock Basins to Morrisville Borough;
- Discharge of future flows from the Rock Run Basin to Falls Township.

The 1975 Township Plan also had provisions to accept and convey future flow from Upper Makefield and Newtown Townships.

Bucks County Sewerage Facilities Plan Update (1977)

The 1970 County Plan was updated in 1977 to evaluate changes in wastewater facilities planning and expressed the need to reevaluate the proposed expansion of sewer service into Upper Makefield Township for treatment at the Morrisville WWTP. The remainder of the 1977 plan was consistent with the 1970 plan.

B. Lower Makefield Township Act 537 Plan Revision (1990)

As a result of increased development in the Township at rates higher than anticipated, the Morrisville WWTP was near its hydraulic capacity. As a result, the Heacock Road Pumping Station was constructed to temporarily pump wastewater from the Lower portion of the Brock Creek basin to the Bucks County Water and Sewer Authority Core Creek Interceptor. Once the Morrisville WWTP expansions were completed, these flows would be diverted back to the Morrisville WWTP.

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In 1990 Lower Makefield Township adopted an Act 537 Plan Revision eliminating the temporary Heacock Road Pumping Station, as the Morrisville WWTP expansion was nearly complete. Flows from the Heacock Road Pumping Station would then be sent to the Morrisville WWTP which was re-rated from 7.1 MGD to 8.7 MGD.

C. Lower Makefield Township Act 537 Plan Revision (1999)

Lower Makefield Township adopted an Act 537 Plan Update in 1999, which was prepared to identify where on-lot sewage disposal systems (OLDS) were malfunctioning and in need of improved facilities. The plan also evaluated existing sanitary sewer facilities and the need for improvements and repairs. Based on the evaluation of existing facilities and future flow projections, the plan proposed increasing the pumping capacity of the Black Rock Road pumping station, potentially increasing the capacity allocated to Lower Makefield Township in their agreement with Yardley Borough, and providing public sewage facilities to two on-lot system areas (Edgewood Village Historic District and River Road/Robinson Place). Other problem areas based on 10-year projections included the Hillside and Spring Lanes area, Delaware Rim Drive and Sunnyside Lane area, West Afton Avenue area, and the Yardley-Newtown Road area near Cultipacker Road.

D. Yardley Borough Act 537 Plan Revision (2018)

A portion of Lower Makefield Township wastewater flows through Yardley Borough for conveyance to the Morrisville Wastewater Treatment Plant for treatment and disposal and identified in pink on the General Plan of Sanitary Sewer (Map No. 1). The two connection points from Lower Makefield Township to the Yardley Borough system are through Buck Creek Interceptor at Manhole No. F-200 and Brock Creek Interceptor at Manhole No. F-101. This is the only service area of Lower Makefield Township that flows through Yardley Borough.

Per the Yardley Borough Act 537 Plan, anticipated development projects for both Yardley Borough and Lower Makefield Township project that approximately 550 additional EDUs will be connected to the YBSA system by 2020, and a total of 822 EDUs will be connected within the next 20 years. At this time, certain conveyance sewers are operating at or near maximum capacity during peak flow events. In order to accommodate the planned connections, capacity in these sewers is proposed to be increased. Therefore Yardley Borough prepared an Act 537 Plan to resolve the issue through the construction of bypass relief sewers. Yardley Borough updated their Act 537 Plan and submitted it to PADEP in September 2016.

Bypass relief sewers will be constructed parallel to existing conveyance sewers at Buck Creek Interceptor and Longshore Sewer. Existing conveyance sewers at the Brock Creek Interceptor will be reconstructed in place with larger diameter sewers. The additional capacity gained from this alternative is expected to be adequate for the 20 year planning period. All the proposed upgrades and construction will occur in Yardley Borough, Bucks County, PA.

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Lower Makefield Township has reviewed the Yardley Borough Act 537 Plan Update and passed a resolution of adoption on February 7, 2018 supporting the implementation of the Act 537 Plan update.

E. Official Sewage Facilities Plan Revisions (Planning Modules)

The table below comprises available records regarding PADEP approved Sewage Facilities Planning Modules in Lower Makefield Township. This table documents historic Lower Makefield Township efforts to properly administer proposals for various types of land development with respect to sewage facilities planning. They are as follows:

Developer/Subdivision Name	PA DEP Code No.	EDUs Planned	Status of Project
Regency at Yardley -Singles	1-09929-267-X	191	Under Construction
Regency at Yardley -Carriages (Townhomes)	1-09929-267-X	186	Under Construction
Matrix Lower Makefield Residential (aka Matrix Condos)	1-09929-267-X	62	Approved
Matrix – Office	1-09929-267-X	6	Complete
Brookshire Section I	1-09929-247-3IJ	21	Complete
Brookshire Section II	1-09929-247-3IJ	8	Complete
Trolio Tract	1-09929-262-E	5	Complete
Minehart Subdivision	1-09929-255-3IJ	7	Under Construction
Fiorelli Grove	1-09929-268-E	3	Approved
Capstone Terrace	1-09929-272-3J	192	Proposed
Reserve at Yardley (aka Freeman’s Farm)	1-09929-278-E	15	Under Construction
Grace Point Church (aka 1 st Baptist Church)	1-09929-282-3J	1	Approved
Pennwood Middle School Renovations	1-09929-295-X	1	Approved

The use of a Connection Management Plan was initiated in 2005 and did not get implemented until years after. The planning approvals listed above are from when the CMP was actively being used and only for the area serviced by the Neshaminy Interceptor.

F. Summary of Previous Act 537 Planning Documents

The previous Act 537 Plans addressed the need for public sewerage facilities to on-lot system areas where high rates of malfunction were reported. In addition, the previous plans identified public sewer service area expansions as a result of development within the Township. However, the previous plans did not adequately address the hydraulic

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capacities of the Neshaminy Interceptor. The Core Creek Interceptor, Middletown Township, and Falls Township (Contract and Service Areas) Sewer Service Areas convey flows to the Neshaminy Interceptor, as shown in previous Act 537 Plans. These documents did not identify the potential hydraulic overload of the Neshaminy Interceptor. Additionally, the Lower Makefield Township sewer system is old with high rates of infiltration and inflow, which is the primary reason for the submission of this Special Study. Land development within Lower Makefield Township has also continued, requiring additional sewer capacity to service those new developments. This 537 Special Study addresses the sewage disposal needs of these three sewer service areas.

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EE, Inc.

CHAPTER II
PHYSICAL AND DEMOGRAPHIC ANALYSIS

CHAPTER II

PHYSICAL AND DEMOGRAPHIC ANALYSIS

A. Designation of Study Area

Lower Makefield Township is situated in the southeast region of Bucks County. It is south of Upper Makefield Township, east of Newtown Township, and north of Middletown Township, Falls Township and Morrisville Borough. Lower Makefield Township is bordered to the east by the Delaware River and Yardley Borough.

The Township is divided into six (6) Sewer Service Areas which comprise of the following: Core Creek Interceptor, Middletown Township, Yardley Borough, Morrisville Borough, Falls Township (Contract Area) and Falls Township (Service Area). The four service areas that contribute flow to the Neshaminy Interceptor are Core Creek Interceptor, Middletown Township, Falls Township (Contract Area), and Falls Township (Service Area). Map No. 1 entitled General Plan of Sanitary Sewers with Service Area identifies the locations of all the Service Areas within the Township.

The Core Creek Interceptor Service Area, the Middletown Township Service Area, the Falls Township Contract Area, and the Falls Township Service Area flow to the Neshaminy Interceptor, which ultimately conveys wastewater to the City of Philadelphia Northeast Water Pollution Control Plant for treatment and disposal under NPDES Permit No. PA0026689. Wastewater in the Yardley Borough and Morrisville Borough service areas is conveyed to the Morrisville WWTP for treatment and disposal under NPDES Permit No. PA0026701.

This Act 537 Special Study is being prepared to address the portion of Lower Makefield Township, where the wastewater is conveyed to the BCWSA Neshaminy Interceptor. It is noted that while the Falls Township (Service Area) conveys wastewater to the Neshaminy Interceptor, the Township of Falls Authority (TOFA) owns and maintains the sewer lines in this part of Lower Makefield Township. The service areas for this Special Study include the Core Creek Interceptor, Middletown Township, Falls Township Contract Area, and Falls Township Service Area. These four areas are further outlined in detail below:

1. Core Creek Interceptor Service Area

The Core Creek Interceptor Service Area is located in the western portion of the Township, west of Interstate 95 (I-95) and north of Cornerstone Drive within the Core Creek Watershed. A small portion of the northeastern area is located within the Dyers Creek Watershed, and a few lots adjacent to I-95 are in the Buck Creek Watershed. This Study Area is identified on Map No. 1 in yellow.

This Service Area comprises primarily residential homes, along with some commercial properties. Based on the Township's current Zoning Map dated September 10, 2015, the northern portion of the area is zoned primarily as R-1

(Revised August 17, 2018)

(Residential Low Density) with two small areas zoned as R-2 (Residential Medium Density). The southern portion of the area is zoned as O/R (Office Research) and R-4 (Residential Multiple Family High Density). Map No. 2 entitled Township Zoning Map identifies the zoning designations for the Township.

Topography is gentle to moderate and slopes generally towards the center of the service area, where Core Creek flows from north to south. The wastewater within the northern portion of the area is conveyed by the Core Creek Interceptor entering into BCWSA system at the Lindenhurst Meter where it will then flow to the Neshaminy Interceptor. The southern portion of this service area enters into the BCWSA system through Meter 2001, Village Road Meter, and Meter 2003 which all flow to the Neshaminy Interceptor.

The Neshaminy Interceptor conveys the wastewater through the Totem Road Pump Station with ultimate treatment and disposal at the City of Philadelphia Northeast Pollution Control Plant under NPDES Permit No. PA0026689.

2. Middletown Township Service Area

The Middletown Township Service Area is located in the Northeastern portion of the Township along the north and south sides of Big Oak Road within the Brock Creek and Queen Anne Creek Watersheds. This Service Area is identified on Map No. 1 in turquoise.

The area is comprised of primarily residential homes with some commercial properties. Based on the Township's current zoning map (September 10, 2015), the area is zoned as C-1 (Commercial Neighborhood Shopping), C-2 (Commercial Highway Services), C-3 (General Business/Industrial), R-1 (Residential Low Density), and R-3 (Residential Single Family High Density). Map No. 2 entitled Township Zoning Map identifies the zoning designations for the Township.

Topography is gentle to moderate and is varied, with a general slope towards area streams. The wastewater within this area enters into BCWSA's system at the Meter 2005 where it will then flow to the Neshaminy Interceptor.

The Neshaminy Interceptor conveys the wastewater through the Totem Road Pump Station with ultimate treatment and disposal at the City of Philadelphia Northeast Pollution Control Plant under NPDES Permit No. PA0026689.

3. Falls Township (Contract Area)

The Falls Township (Contract Area) is located in the southern-most portion of the Township and is divided into two sections. The western section comprises an area west of Derbyshire Road and bound to the north and west by the Middletown, Yardley Borough, and Morrisville Borough Service Areas. The eastern portion of the Service Area is situated between Pine Grove Road, Ferry Road, and Wood Street.

(Revised August 17, 2018)

Watersheds in the Service Area include Martins Creek and Rock Run. This Service Area is identified on Map No. 1 in purple.

The area is comprised of primarily residential homes with some limited woodland areas. Based on the Township's current zoning map (September 10, 2015), the Falls Township Contract Area is zoned as R-2 (Residential Medium Density), R-3M (Residential Single Family High Density Modified), and C-2 (Commercial Highway Services).

Topography is gentle to moderate with a general slope towards the south. All wastewater within the Service Area is conveyed to Falls Township, which is ultimately conveyed to the Neshaminy Interceptor for treatment and disposal at the City of Philadelphia Northeast Pollution Control Plant under NPDES Permit No. PA0026689.

4. Falls Township (Service Area)

The Falls Township (Service Area) is located between the two Falls Township Contract Areas in the southern portion of the Township. This Service Area is identified on Map No. 1 in orange.

The Service Area is comprised of primarily residential homes with some recreational and community service properties, including the Charles Boehm, Pennwood, and William Penn Middle Schools. Based on the Township's current zoning map (September 10, 2015), the Falls Township Area is zoned as R-2 (Residential Medium Density), R-3(Residential Single Family High Density), R-3M (Residential Single Family High Density Modified), and C-2 (Commercial Highway Services). Map No. 2 entitled Township Zoning Map identifies the zoning designations for the Township.

Topography is gentle to moderate with a general slope towards the south. All wastewater within the Service Area is conveyed to Falls Township, which is ultimately conveyed to the Neshaminy Interceptor for treatment and disposal at the City of Philadelphia Northeast Pollution Control Plant under NPDES Permit No. PA0026689.

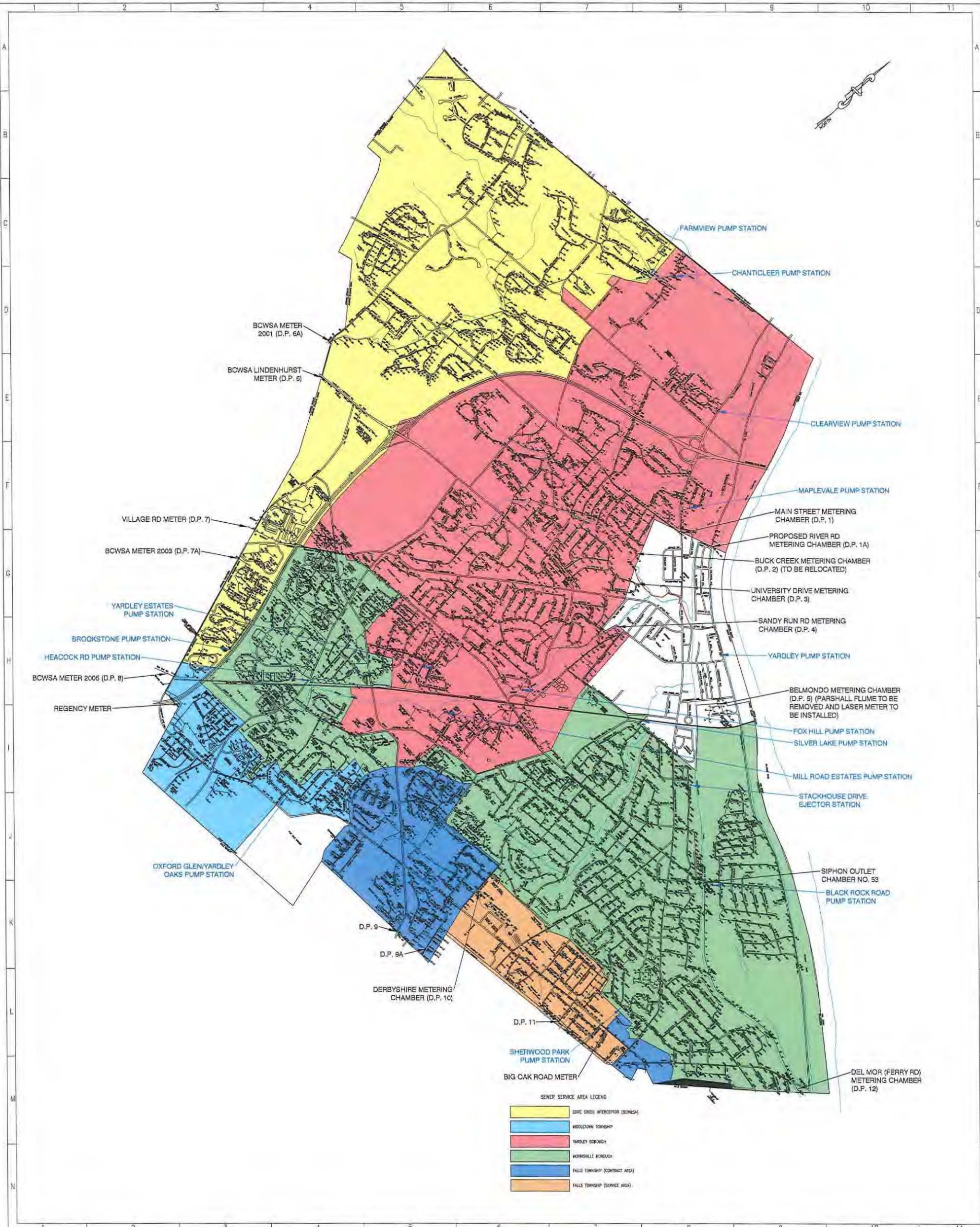
MAP NO. 1

GENERAL PLAN OF SANITARY SEWERS WITH SERVICES AREA

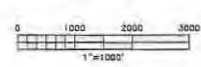
(Revised August 17, 2018)

II-4

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Number	Description	Date	Drawn By	Project Engr.	Checked By	Scale	Job No.	Date	Drawing No.
1	REVISION TO MORRISVILLE BOROUGH SERVICE AREA	8/31/18							

GENERAL PLAN OF SANITARY SEWERS
WITH SEWER SERVICE AREAS
FOR
LOWER MAKEFIELD TOWNSHIP

Ebert Engineering, Inc.
Water and Wastewater Engineering
10 Elm St.
4802 S. Upper Merion Pike, Suite 202
28380 Peach, PA 19274

Phone: (610) 584-0701
Fax: (610) 584-0704
E-mail: info@ebertengineering.com

Drawn By: [] Project Engr.: []
Checked By: [] Scale: [] Job No.: [] Date: []
FEE: [] FEE: [] FEE: [] FEE: [] FEE: [] FEE: []

1 OF 1

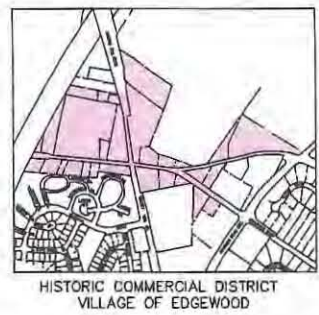
MAP NO. 2
ZONING MAP

(Revised August 17, 2018)
II-5

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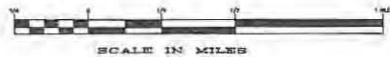
LOWER MAKEFIELD TOWNSHIP
Bucks County, Pennsylvania
ZONING MAP

- DISTRICT BOUNDARY
- R-RP RESIDENTIAL-RESOURCE PROTECTION
 - R-1 RESIDENTIAL LOW DENSITY
 - R-2 RESIDENTIAL MEDIUM DENSITY
 - R-3 RESIDENTIAL SINGLE FAMILY HIGH DENSITY
 - R-3M SINGLE FAMILY HIGH DENSITY MODIFIED
 - R-4 RESIDENTIAL MULTIPLE FAMILY HIGH DENSITY
 - C-1 COMMERCIAL NEIGHBORHOOD SHOPPING
 - C-2 COMMERCIAL HIGHWAY SERVICES
 - C-3 GENERAL BUSINESS/INDUSTRIAL
 - H/C HISTORIC - COMMERCIAL
 - O/R OFFICE RESEARCH
 - TELECOMMUNICATION FACILITY OVERLAY DISTRICT
 - SPECIAL OFF-PREMISES ADVERTISING SIGN (SOPAS) OVERLAY DISTRICT
 - TRADITIONAL NEIGHBORHOOD DEVELOPMENT (TND) OVERLAY DISTRICT
- LEGEND



HISTORIC-COMMERCIAL DISTRICT AND
TRADITIONAL NEIGHBORHOOD
DEVELOPMENT OVERLAY DISTRICT
SEE INSETS

PER COURT
STIPULATION
9/25/85



ISSUED: SEPTEMBER 10, 2015

THE ZONE DISTRICTS SHOWN HEREON ARE CURRENT AS OF
SEPTEMBER 10, 2015

Approximate Area of
Special Study

JOB NO.:
1277000

TITLE :

TOWNSHIP ZONING MAP

DRAWN BY:
TMW

CHECKED BY:
MWE

SCALE:
AS NOTED

PLAN STATUS:
FINAL

Boucher & James, Inc.

CONSULTING ENGINEERS
DOYLESTOWN STROUDSBURG

CORPORATE HEADQUARTERS: 1456 FERRY RD, BUILDING 500, DOYLESTOWN, PA. 18901
VOICE: (215) 345-9400 FAX: (215) 345-9401



www.bjengineers.com

SHEET

1 OF 1

PROJECT NAME :

LOWER MAKEFIELD TOWNSHIP ZONING MAP

DATE:

SEPTEMBER 10, 2015

P:\2012\1277000\DVDs from Township\Township Display Maps\Updated Township Maps\R-Zoning Map 2015-09-10.dwg | Tabname :11in x 17in | Sep 11, 2015 - 9:08am | TWallace

B. Hydrologic Features

Due to the limited scope of this current planning effort, a full-scale discussion of the Township-wide hydrologic features is not warranted. However, incorporated herein for reference are maps containing a broad identification of floodplains, wetlands, watershed boundaries, creeks and streams as shown on Map No. 3 entitled Water Features Map.

Within the Study Areas, the following watersheds are identified:

- Core Creek
- Dyers Creek
- Buck Creek
- Brock Creek
- Queen Anne Creek
- Martins Creek
- Rock Run

Core Creek and Queen Anne Creek flow towards the south, which discharge to the Neshaminy Creek beyond the limits of the Township and ultimately to the Delaware River.

Dyers Creek, Buck Creek, and Brock Creek flow towards the east, which discharge to the Delaware River east of the Township.

Martins Creek and Rock Run flow towards the south, which discharge to Mill Creek and Van Sciver Lake beyond the limits of the Township and ultimately to the Delaware River.

MAP NO. 3
WATER FEATURES MAP

(Revised August 17, 2018)
II-7

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LEGEND

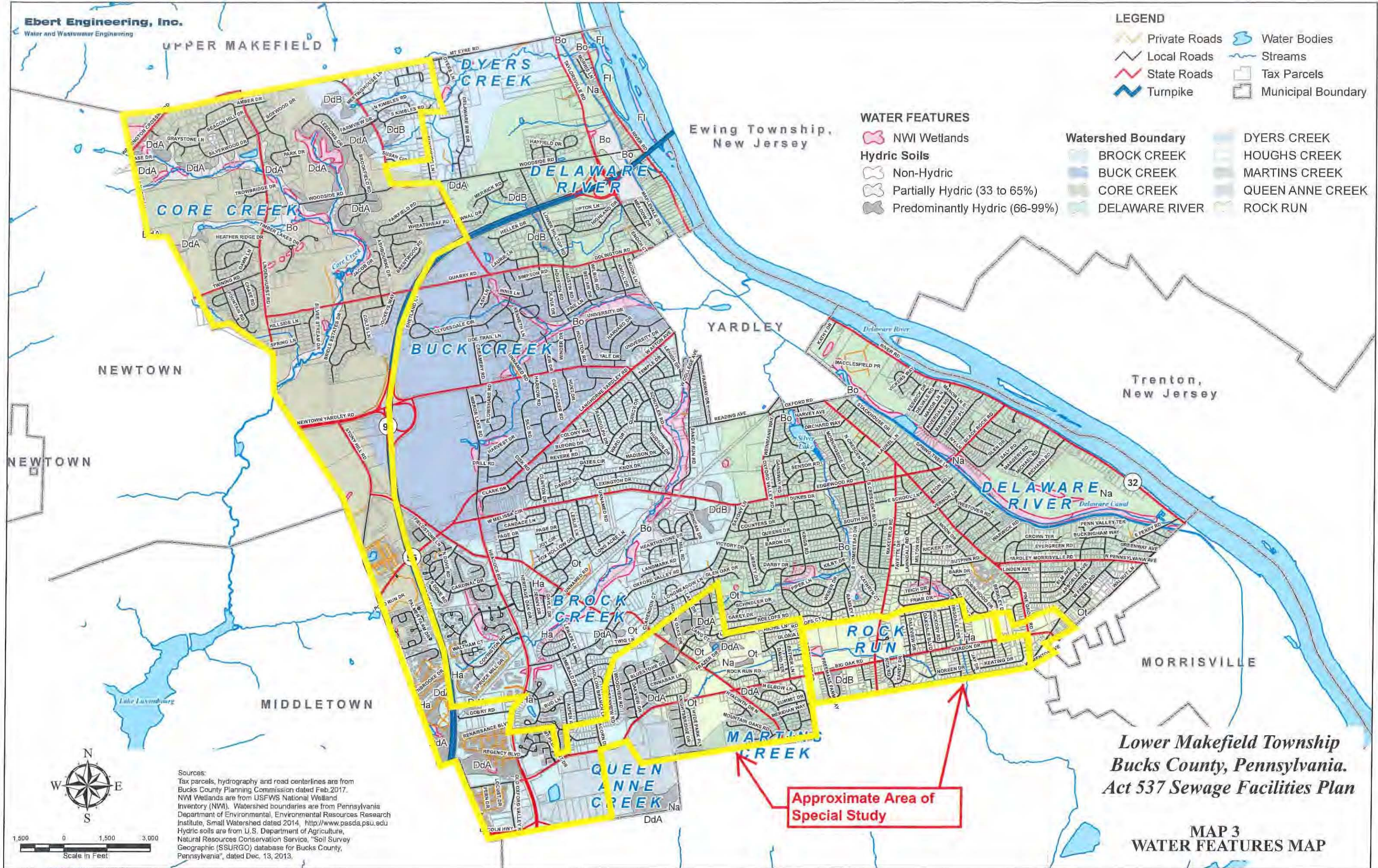
Private Roads	Water Bodies
Local Roads	Streams
State Roads	Tax Parcels
Turnpike	Municipal Boundary

WATER FEATURES

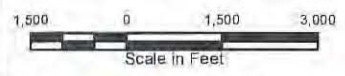
- NWI Wetlands
- Hydric Soils**
- Non-Hydric
- Partially Hydric (33 to 65%)
- Predominantly Hydric (66-99%)

Watershed Boundary

- BROCK CREEK
- BUCK CREEK
- CORE CREEK
- DELAWARE RIVER
- DYERS CREEK
- HOUGHS CREEK
- MARTINS CREEK
- QUEEN ANNE CREEK
- ROCK RUN



Sources:
Tax parcels, hydrography and road centerlines are from Bucks County Planning Commission dated Feb. 2017.
NWI Wetlands are from USFWS National Wetland Inventory (NWI). Watershed boundaries are from Pennsylvania Department of Environmental, Environmental Resources Research Institute, Small Watershed dated 2014, <http://www.pasda.psu.edu>
Hydric soils are from U.S. Department of Agriculture, Natural Resources Conservation Service, "Soil Survey Geographic (SSURGO) database for Bucks County, Pennsylvania", dated Dec. 13, 2013.



Approximate Area of Special Study

*Lower Makefield Township
Bucks County, Pennsylvania.
Act 537 Sewage Facilities Plan*

**MAP 3
WATER FEATURES MAP**

C. Soils

In order to present the most current information relative to soils, Map No. 4, entitled Soils Map has been prepared to show the soils mapped within the Township. The official USDA-NRCS on-line database was queried to determine soil types and descriptions for soils located within the Study Areas. The following soil types were located within the Study Areas:

Abbottstown

The Abbottstown series consists of deep and very deep, somewhat poorly drained soils. They formed in residuum from acid red shale, siltstone and sandstone. They are on concave upland slopes of 0 to 15 percent. Saturated hydraulic conductivity is moderately low to moderately high above the fragipan and moderately low in and below the fragipan.

Bedington

The Bedington series consists of very deep well drained soils. They formed in residuum from dark brown, gray and olive acid, sedimentary, siltstone and shale, with some sandstone interbeds. They are on nearly level to steep convex uplands and on the sideslopes of hills and ridges. Permeability is moderate.

Brownsburg

The Brownsburg series consists of deep, well drained soils on hills. They are formed in a thin mantle of loess and in the underlying material weathered from red shale and siltstone residuum. Permeability is moderate. Slope ranges from 0 to 15 percent.

Brownsburg-Knauers

This series is a complex of Brownsburg-Knauers soil series. The Brownsburg series consists of deep, well drained soils on hills. They are formed in a thin mantle of loess and in the underlying material weathered from red shale and siltstone residuum. Permeability is moderate. Slope ranges from 0 to 15 percent.

The Knauers series consists of very deep, poorly drained soils formed in recent alluvial deposits derived from sandstones and shales. They are on the backwater areas of floodplains with slightly depressed slopes of 0 to 3 percent. Saturated hydraulic conductivity is moderately high and high in the A and B horizons, and high to very high in the C horizon.

Buckingham

The Buckingham series consists of very deep, somewhat poorly drained soils on head slopes, in drainage ways and U-shaped valleys on hills. They are formed in colluvium derived from weathered gray and red shale, siltstone and sandstone materials. Saturated hydraulic conductivity is very high to high above the fragipan, and moderately low to moderately high in the fragipan. Slope ranges from 0 to 8 percent.

Chalfont

The Chalfont series consists of deep and very deep, somewhat poorly drained soils formed in a loess mantle and the underlying residuum of shale and sandstone. Slopes range from 0 to 25 percent.

Chester

The Chester series consists of very deep well drained soils on uplands. Saturated hydraulic conductivity is moderately high to high. They formed in materials weathered from micaceous schist. Slopes range from 0 to 65 percent.

Doylestown

The Doylestown series consists of deep, poorly drained soils. These soils formed in silty materials, presumably eolian deposits, over soil materials weathered from a variety of parent materials, but principally red shale. They are on concave upland slopes of 0 to 5 percent. Permeability is slow.

Duncannon

The Duncannon series consists of deep, well drained soils that formed in silty to very fine sandy loam material, presumed to be eolian, overlying a variety of residuum materials, stream deposits and glacial deposits. The soils are on nearly level to moderately steep uplands and terraces. Permeability is moderate. Slope ranges from 0 to 35 percent.

Fountainville

The Fountainville series consists of deep, moderately well drained soils on hills. They are formed in a thin mantle of loess and in the underlying material weathered from red and brown shale and siltstone residuum. Permeability is moderate above the fragipan, and slow to moderately slow in the fragipan. Slope ranges from 0 to 15 percent.

Glenville

The Glenville series consists of very deep moderately well drained or somewhat poorly drained soils. They formed primarily in colluvium or residuum affected by soil creep that is weathered from phyllite, micaceous schist, granitic gneiss and other acid crystalline rocks. Slopes range from 0 to 15 percent. Saturated hydraulic conductivity is moderately low to moderately high.

Hatboro

The Hatboro series consists of very deep and poorly drained soils formed in alluvium derived from metamorphic and crystalline rock. They are on flood plains. Slopes range from 0 to 3 percent. Saturated hydraulic conductivity is moderately high to high.

Klinesville

The Klinesville series consists of shallow, somewhat excessively drained soils formed in residuum derived from red shale, siltstone, slate, and fine-grained sandstone. They

(Revised August 17, 2018)

are on dissected uplands. Slopes range from 3 to 80 percent. Saturated hydraulic conductivity is high.

Lansdale

The Lansdale series consists of deep and very deep, well drained soils on uplands. They formed in residuum weathered from sandstone and/or conglomerate. Slopes are 0 to 25 percent. Saturated hydraulic conductivity is moderately high to high.

Lawrenceville

The Lawrenceville series consists of deep and very deep, moderately well drained soils formed in silty transported materials. Slopes range from 0 to 15 percent. Permeability is moderately slow.

Manor

The Manor series consists of very deep, well drained soils on plateaus. They formed from residuum weathered from micaceous schist. Slopes are 0 to 65 percent. Saturated Hydraulic Conductivity is moderately high to very high.

Matapeake

The Matapeake series consists of very deep, well drained soils. Permeability is moderate to moderately slow. They formed from silty eolian sediments underlain by coarser fluvial or marine sediments. Slopes range from 0 to 30 percent.

Mattapex

The Mattapex series consists of very deep, moderately well drained soils on uplands and lowlands. Saturated hydraulic conductivity is moderately high or high in the subsoil and high or very high in the substratum. They formed from silty eolian deposits over fluvio-marine sediments. Slopes range from 0 to 30 percent.

Penn

The Penn series consists of moderately deep, well drained soils formed in residuum weathered from noncalcareous reddish shale, siltstone, and fine-grained sandstone normally of Triassic age. Slopes range from 0 to 60 percent. Saturated hydraulic conductivity is moderately high to high.

Penn-Lansdale

The Penn-Lansdale complex is a well drained residuum weathered from shale and siltstone. Mean annual precipitation is 36 to 50 inches.

Readington

The Readington series consists of deep and very deep, moderately well drained soils formed in medium textured residuum weathered from noncalcareous shale, siltstone, and fine-grained sandstone. Slopes range from 0 to 15 slopes. Saturated hydraulic conductivity is moderately slow.

(Revised August 17, 2018)

Reaville

The Reaville series consists of moderately deep, moderately well and somewhat poorly drained soils formed in residuum weathered from red Triassic, interbedded shale, siltstone, and fine-grained sandstone. Slopes range from 0 to 15 percent. Saturated hydraulic conductivity is moderately low.

Steinsburg

Soils of the Steinsburg series are moderately deep and well drained with moderately rapid permeability. They formed in residuum mostly from weakly cemented acid sandstone, arkosic sandstone and conglomerate. They are on upland slopes of 0 to 70 percent.

Udorthents

This unit consists of well drained to excessively drained soils along mainly the southern edge of Block Island adjacent to Block Island Sound in the Mohegan Bluff area. Wind, waves, and rain have eroded these soils and undercut areas on bluffs. Areas are long and narrow and mostly range from 10 to 200 acres. This unit consists of about 50 percent Udorthents, 20 percent steep, severely eroded areas without vegetation, 15 percent Beaches, and 15 percent other soils.

Weikert-Culleoka

The Culleoka series consists of moderately deep, well drained, soils formed in colluvium or residuum from siltstone or interbedded shale, limestone, siltstone, and fine grained sandstone. Slope ranges from 2 to 70 percent.

Map No. 4A through 4D illustrate the feasibility of on-lot sewage disposal system types based on soil characteristics, such as slopes and depth to seasonal wetness, in the context of current PADEP requirements. OLDS are in general, somewhat limited to extremely limited throughout the Study Areas.

According to this information, soils in the Study Areas are designated as "well drained, moderately well drained, and somewhat poorly drained". The Natural Resource Conservation Service (NRCS) defines the drainage classifications as the following:

Well Drained

Water is removed from the soil readily but not rapidly. Internal free water occurrence commonly is deep or very deep; annual duration is not specified. Water is available to plants throughout most of the growing season in humid regions. Wetness does not inhibit growth of roots for significant periods during most growing seasons. The soils are mainly free of the deep to redoximorphic features that are related to wetness.

Moderately Well Drained

Water is removed from the soil somewhat slowly during some periods of the year. Internal free water occurrence commonly is moderately deep and transitory through

(Revised August 17, 2018)

permanent. The soils are wet for only a short time within the rooting depth during the growing season, but long enough that most mesophytic crops are affected. They commonly have a moderately low or lower saturated hydraulic conductivity in a layer within the upper 1 m, periodically receive high rainfall, or both.

Somewhat Poorly Drained

Water is removed slowly so that the soil is wet at a shallow depth for significant periods during the growing season. The occurrence of internal free water commonly is shallow to moderately deep and transitory to permanent. Wetness markedly restricts the growth of mesophytic crops, unless artificial drainage is provided. The soils commonly have one or more of the following characteristics: low or very low saturated hydraulic conductivity, a high water table, additional water from seepage, or nearly continuous rainfall.

Above all, these designations should be recognized as general guidelines based on typical soil and landscape composition, and should not be interpreted as areas where on-lot sewage disposal systems are not permitted. Site-specific soil testing performed by the Sewage Enforcement Officer (SEO) may result in the approval of on-lot disposal within these soil types, particularly in consideration of the on-going development of new alternate technologies by PADEP for more restrictive soils.

MAP NO. 4

SOILS MAP

(Revised August 17, 2018)

II-13

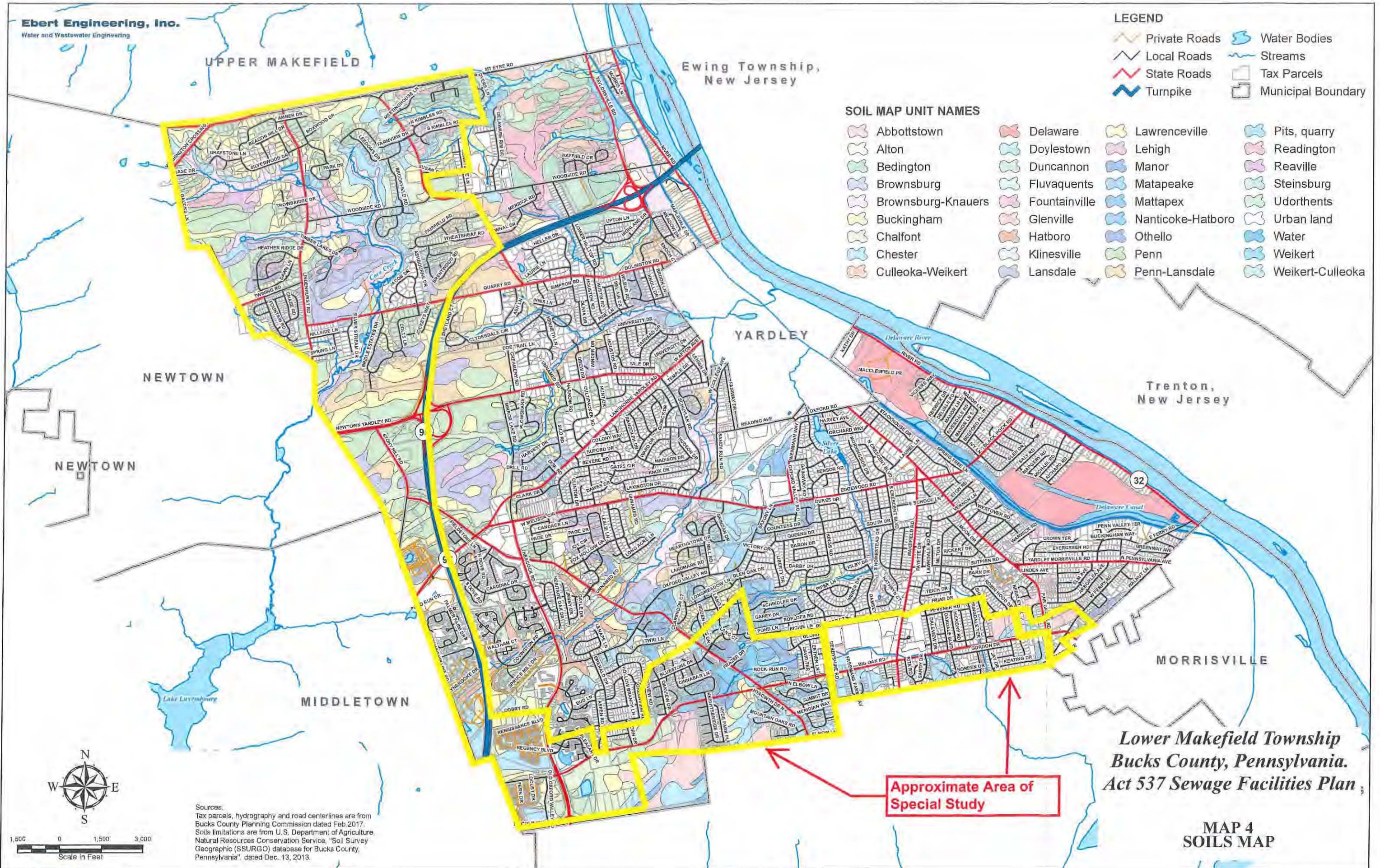
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LEGEND

- Private Roads
- Local Roads
- State Roads
- Turnpike
- Water Bodies
- Streams
- Tax Parcels
- Municipal Boundary

SOIL MAP UNIT NAMES

- | | | | |
|--------------------|---------------|-------------------|------------------|
| Abbottstown | Delaware | Lawrenceville | Pits, quarry |
| Alton | Doylestown | Lehigh | Readington |
| Bedington | Duncannon | Manor | Reaville |
| Brownsburg | Fluvaquents | Matapeake | Steinsburg |
| Brownsburg-Knauers | Fountainville | Mattapex | Udorthents |
| Buckingham | Glenville | Nanticoke-Hatboro | Urban land |
| Chalfont | Hatboro | Othello | Water |
| Chester | Klimesville | Penn | Weikert |
| Culleoka-Weikert | Lansdale | Penn-Lansdale | Weikert-Culleoka |



Sources:
Tax parcels, hydrography and road centerlines are from Bucks County Planning Commission dated Feb. 2017.
Soils limitations are from U.S. Department of Agriculture, Natural Resources Conservation Service, "Soil Survey Geographic (SSURGO) database for Bucks County, Pennsylvania", dated Dec. 13, 2013.

*Lower Makefield Township
Bucks County, Pennsylvania.
Act 537 Sewage Facilities Plan*

**Approximate Area of
Special Study**

**MAP 4
SOILS MAP**

MAP NO. 4A, 4B, 4C, AND 4D
SOIL LIMITATIONS FOR ON-LOT SEWAGE DISPOSAL SYSTEMS

(Revised August 17, 2018)
II-14





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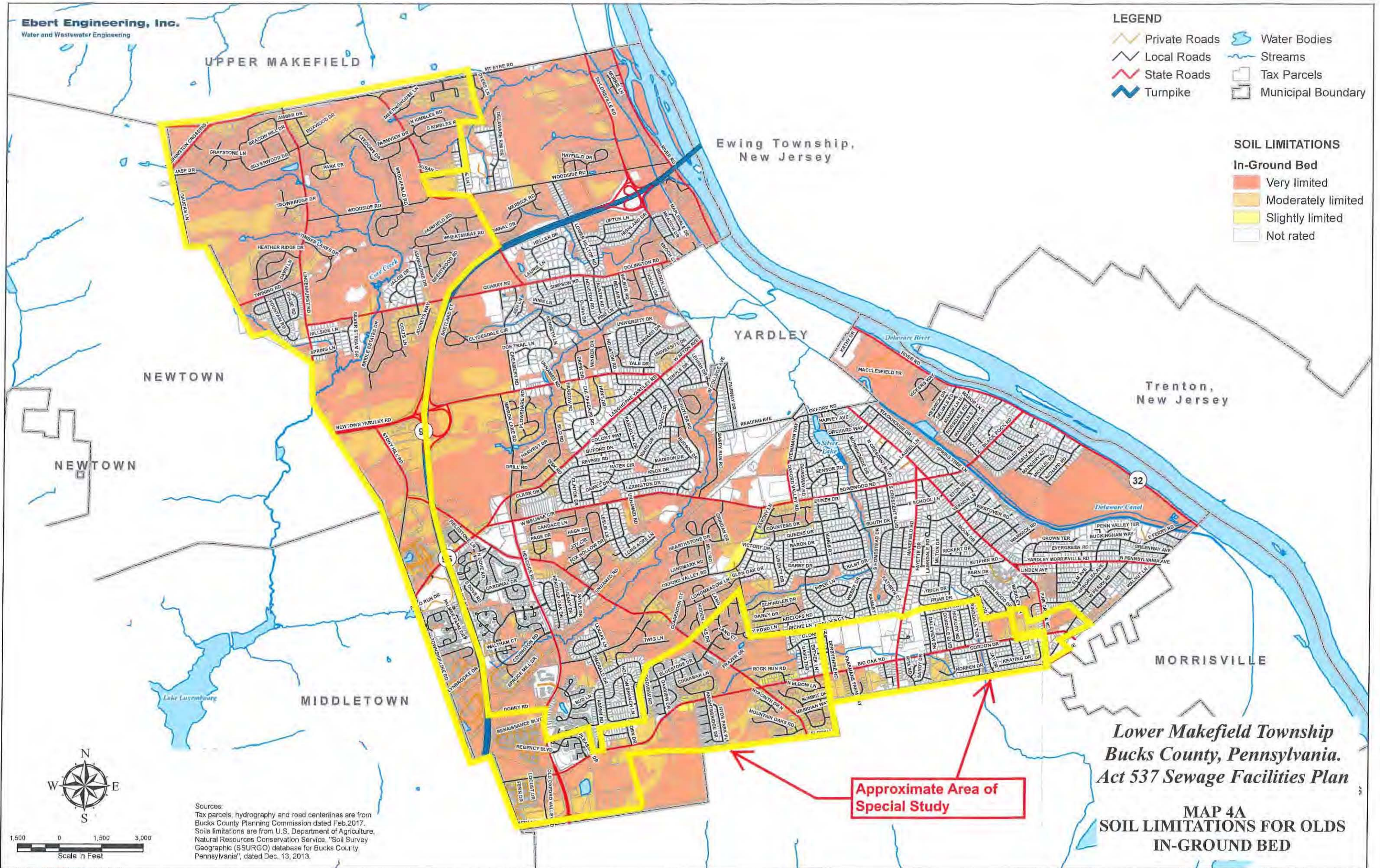
LEGEND

-  Private Roads
-  Local Roads
-  State Roads
-  Turnpike
-  Water Bodies
-  Streams
-  Tax Parcels
-  Municipal Boundary

SOIL LIMITATIONS

In-Ground Bed

-  Very limited
-  Moderately limited
-  Slightly limited
-  Not rated



Sources:
Tax parcels, hydrography and road centerlines are from Bucks County Planning Commission dated Feb. 2017.
Soils limitations are from U.S. Department of Agriculture, Natural Resources Conservation Service, "Soil Survey Geographic (SSURGO) database for Bucks County, Pennsylvania", dated Dec. 13, 2013.

Approximate Area of Special Study

*Lower Makefield Township
Bucks County, Pennsylvania.
Act 537 Sewage Facilities Plan*

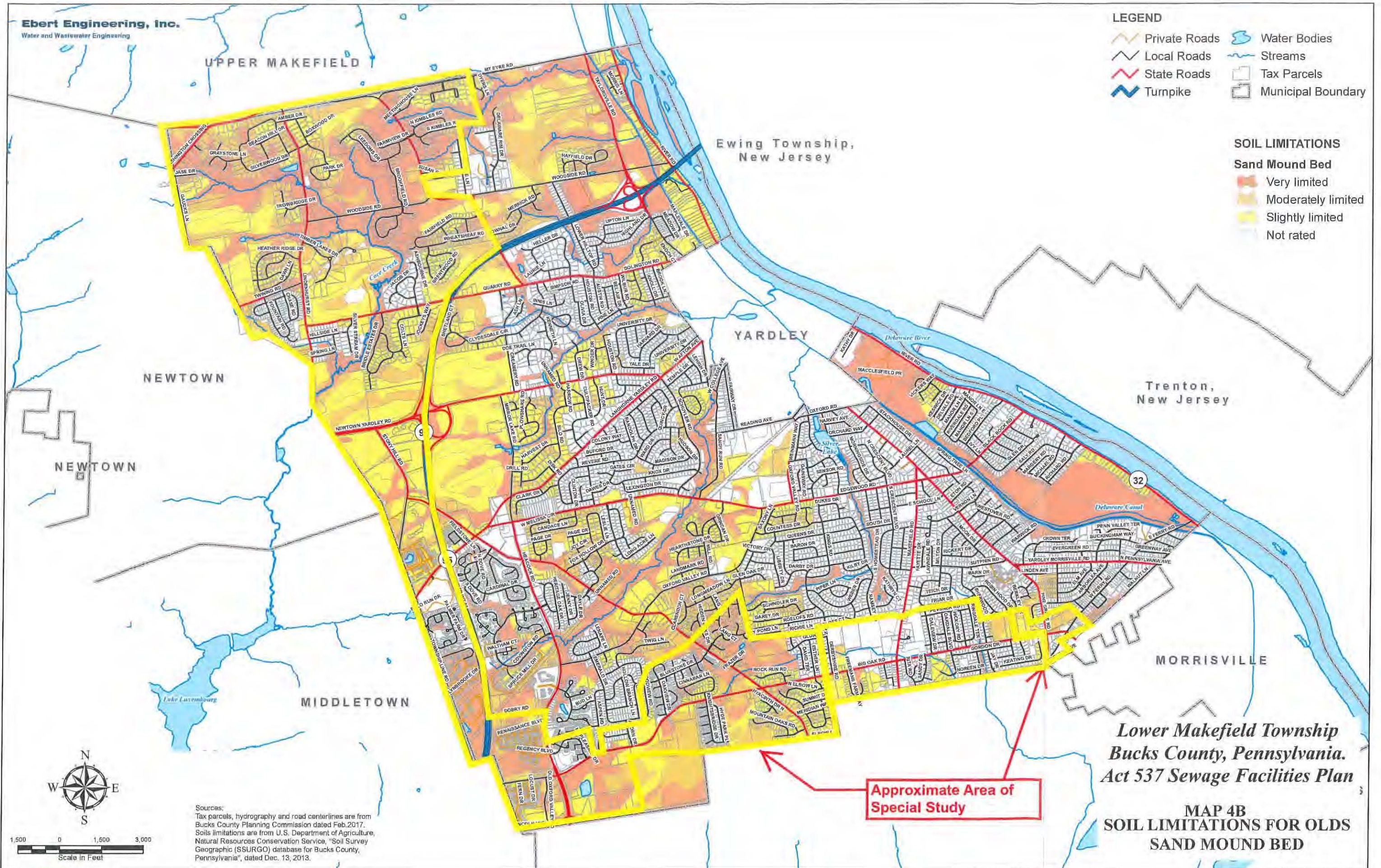
**MAP 4A
SOIL LIMITATIONS FOR OLDS
IN-GROUND BED**

LEGEND

-  Private Roads
-  Local Roads
-  State Roads
-  Turnpike
-  Water Bodies
-  Streams
-  Tax Parcels
-  Municipal Boundary

SOIL LIMITATIONS

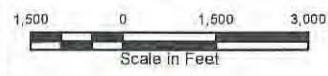
- Sand Mound Bed**
-  Very limited
 -  Moderately limited
 -  Slightly limited
 -  Not rated



*Lower Makefield Township
Bucks County, Pennsylvania.
Act 537 Sewage Facilities Plan*

**MAP 4B
SOIL LIMITATIONS FOR OLDS
SAND MOUND BED**

**Approximate Area of
Special Study**







Sources:
Tax parcels, hydrography and road centerlines are from Bucks County Planning Commission dated Feb. 2017. Soils limitations are from U.S. Department of Agriculture, Natural Resources Conservation Service, "Soil Survey Geographic (SSURGO) database for Bucks County, Pennsylvania", dated Dec. 13, 2013.

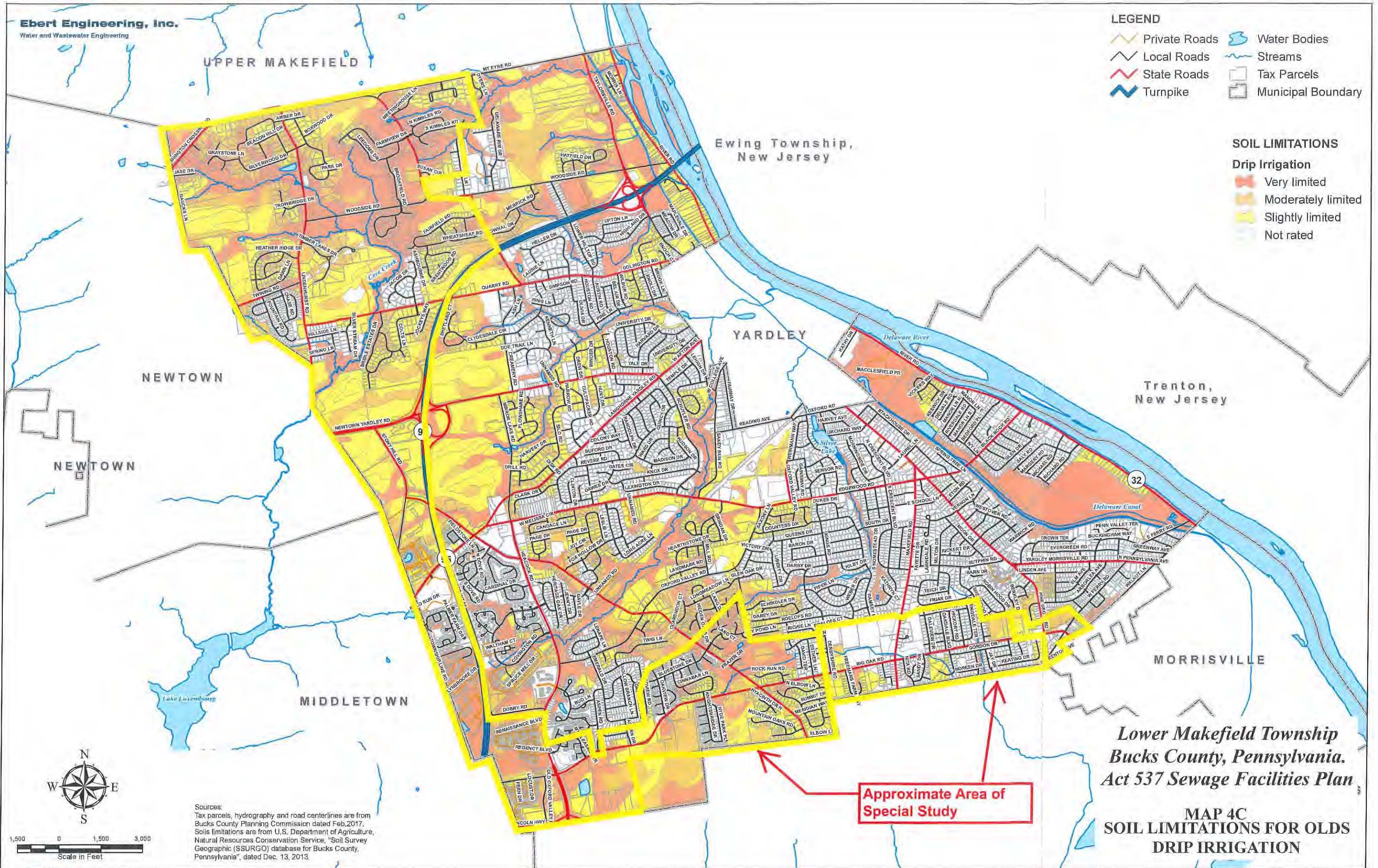
LEGEND

-  Private Roads
-  Local Roads
-  State Roads
-  Turnpike
-  Water Bodies
-  Streams
-  Tax Parcels
-  Municipal Boundary

SOIL LIMITATIONS

Drip Irrigation

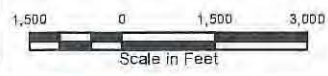
-  Very limited
-  Moderately limited
-  Slightly limited
-  Not rated



*Lower Makefield Township
Bucks County, Pennsylvania.
Act 537 Sewage Facilities Plan*

**MAP 4C
SOIL LIMITATIONS FOR OLDS
DRIP IRRIGATION**

Sources:
Tax parcels, hydrography and road centerlines are from Bucks County Planning Commission dated Feb. 2017.
Soils limitations are from U.S. Department of Agriculture, Natural Resources Conservation Service, "Soil Survey Geographic (SSURGO) database for Bucks County, Pennsylvania", dated Dec. 13, 2013.

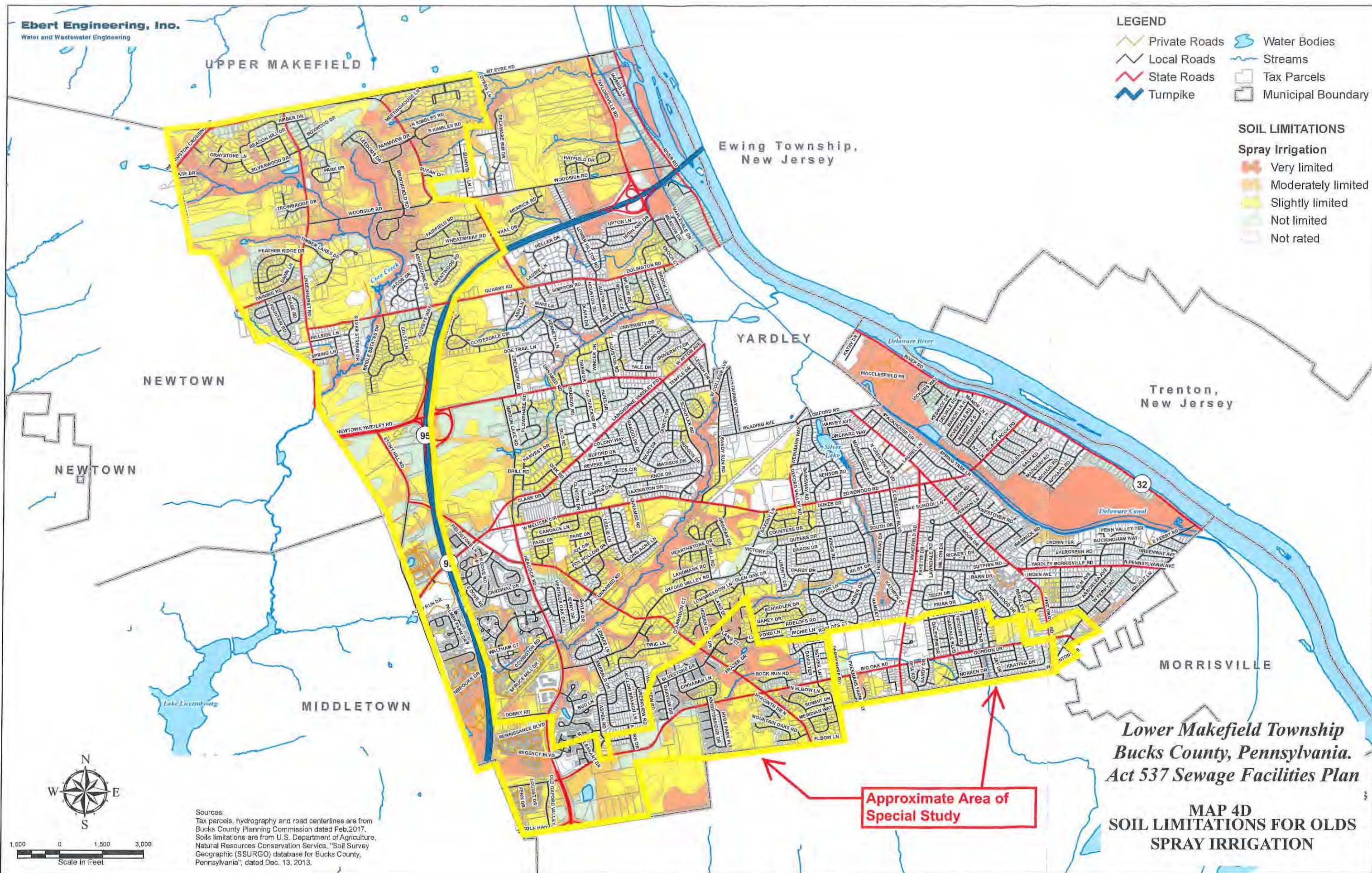


LEGEND

- Private Roads
- Local Roads
- State Roads
- Turnpike
- Water Bodies
- Streams
- Tax Parcels
- Municipal Boundary

SOIL LIMITATIONS

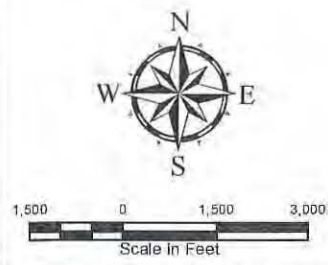
- Spray Irrigation
- Very limited
 - Moderately limited
 - Slightly limited
 - Not limited
 - Not rated



*Lower Makefield Township
Bucks County, Pennsylvania.
Act 537 Sewage Facilities Plan*

MAP 4D
SOIL LIMITATIONS FOR OLDS
SPRAY IRRIGATION

Sources:
Tax parcels, hydrography and road centerlines are from Bucks County Planning Commission dated Feb. 2017.
Soils limitations are from U. S. Department of Agriculture, Natural Resources Conservation Service, "Soil Survey Geographic (SSURGO) database for Bucks County, Pennsylvania", dated Dec. 13, 2013.



Prime Farmland

Prime Farmland is of major importance in meeting the Nation's short and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

The Table below lists the map units in the Service Areas that are considered important farmlands. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance as defined by the Natural Resources Conservation Service (NRCS). In cooperation with other interested Federal, State, and local government organizations, NRCS has inventoried land that can be used for the production of the Nation's food supply. Prime farmland is also illustrated on Map No. 5, entitled Prime Farmland Map. Farmland classifications were obtained from the NRCS online soil survey database.

Agricultural Land Classification		
Map Symbol	Map Unit Name	Farmland Classification
AbA, AbB, AbC	Abbotstown silt loam, 0 to 15% slope	Farmland of Statewide Importance
BeA and BeB	Bedington channery silt loam, 0 to 8% slope	Prime Farmland
BeC	Bedington channery silt loam, 8 to 15% slope	Farmland of Statewide Importance
BsB	Brownsburg silt loam, 3 to 8% slope	Prime Farmland
BwB	Buckingham silt loam, 3 to 8% slope	Farmland of Statewide Importance
CbA and CbB	Chalfont silt loam, 0 to 8% slope	Farmland of Statewide Importance

(Revised August 17, 2018)

Agricultural Land Classification		
Map Symbol	Map Unit Name	Farmland Classification
CdB	Chester silt loam, 3 to 8% slope	Prime Farmland
DuA and DuB	Duncannon silt loam, 0 to 8% slope	Prime Farmland
FoA and FoB	Fountainville silt loam, 0 to 8% slope	Prime Farmland
GrB	Glenville silt loam, 3 to 8% slope	Prime Farmland
KlB	Klinesville very channery silt loam, 3 to 8% slope	Farmland of Statewide Importance
LgA and LgB	Lansdale loam, 0 to 8% slope	Prime Farmland
LgC	Lansdale loam, 8 to 15% slope	Farmland of Statewide Importance
LkA	Lawrenceville silt loam, 0 to 3% slope	Prime Farmland
LkB	Lawrenceville silt loam, 3 to 8% slope	Farmland of Statewide Importance
McB	Matapeake silt loam, 3 to 8% slope	Prime Farmland
MdA	Mattapex silt loam, 0 to 2% slope	Prime Farmland
PeA and PeB	Penn channery silt loam, 0 to 8% slope	Prime Farmland
PeC	Penn channery silt loam, 8 to 15% slope	Farmland of Statewide Importance
PnB	Penn-Lansdale complex, 3 to 8% slope	Prime Farmland
PnC	Penn-Lansdale complex, 8 to 15% slope	Farmland of Statewide Importance
ReA	Readington silt loam, 0 to 3% slope	Prime Farmland
ReB and ReC	Readington silt loam, 3 to 15% slope	Farmland of Statewide Importance
RlB and RlC	Reaville channery silt loam, 3 to 15% slope	Farmland of Statewide Importance
StB and StC	Steinsburg gravelly loam, 3 to 15% slope	Farmland of Statewide Importance

(Revised August 17, 2018)

Lower Makefield Township's 2003 Comprehensive Plan recognizes the requirements of the Pennsylvania Municipalities Planning Code to facilitate comprehensive plans that "address the protection of natural resources including wetlands, woodlands, steep slopes, prime agricultural land, and steep slopes."

To that end, Lower Makefield Township has established an Agricultural Preservation Plan within which property owners may voluntarily enter if minimum criteria have been met, namely property size and the inclusion of prime soils. The Farmland Preservation Corporation, established by Lower Makefield Township as part of their agricultural land preservation efforts, owns about 311 acres of farmland in the Township. In addition, the Township has endorsed the formation of an Agricultural Security District that includes about 794 acres of land on 19 properties. Additionally, the Township Zoning Ordinance standards seek to protect farmland by requiring protection of farmland as part of cluster development in the R-1 district. The R-1 district also permits accessory uses that support farming activities. Properties currently preserved under agricultural conservation easements or security areas are shown on Map 5A, entitled Agricultural Conservation Map. Within the Service Areas, all of the preserved farmlands are located within the Core Creek Interceptor Service Area.

MAP NO. 5
PRIME FARMLAND MAP

(Revised August 17, 2018)
II-18

EE, Inc.

UPPER MAKEFIELD

LEGEND

- | | | | |
|---|--|--|--|
|  Private Roads |  Water Bodies | Farmland Classification | |
|  Local Roads |  Streams | |  Prime Farmland |
|  State Roads |  Tax Parcels | |  Farmland of Statewide Importance |
|  Turnpike |  Municipal Boundary |  Not Prime Farmland | |

Ewing Township,
New Jersey

YARDLEY

Trenton,
New Jersey

NEWTOWN

NEWTOWN

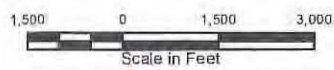
MORRISVILLE

MIDDLETOWN

*Lower Makefield Township
Bucks County, Pennsylvania.
Act 537 Sewage Facilities Plan*

MAP 5
PRIME FARMLANDS

Approximate Area of
Special Study



Sources:
Tax parcels, hydrography, and road centerlines are from Bucks County Planning Commission dated Feb. 2017.
Farmland Classification from U.S. Department of Agriculture, Natural Resources Conservation Service, "Soil Survey Geographic (SSURGO) database for Bucks County, Pennsylvania", dated Dec. 13, 2013.








MAP NO. 5A
AGRICULTURAL PRESERVATION MAP

(Revised August 17, 2018)
II-19

EE, Inc.

UPPER MAKEFIELD

LEGEND

-  Private Roads
-  Local Roads
-  State Roads
-  Turnpike
-  Water Bodies
-  Streams
-  Tax Parcels
-  Municipal Boundary
-  Ag Conservation Easements
-  Agricultural Security Area

Ewing Township,
New Jersey

YARDLEY

Trenton,
New Jersey

NEWTOWN

NEWTOWN

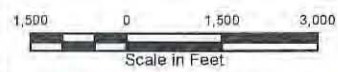
MORRISVILLE

MIDDLETOWN

*Lower Makefield Township
Bucks County, Pennsylvania.
Act 537 Sewage Facilities Plan*

MAP 5A
AGRICULTURAL
CONSERVATION MAP

**Approximate Area of
Special Study**



Sources:
Tax parcels, hydrography, and road centerlines are from Bucks County Planning Commission dated Feb. 2017.
Ag Security Areas are from Bucks County Agricultural Land Preservation Program, Bucks County Planning Commission dated Feb. 10, 2017.

D. Geology

Similar to the discussion in Section B above, the limited scope of this planning effort does not warrant a detailed discussion of the entire regional geology. Map 6, entitled Geology Map, identifies the underlying geology throughout the Township. Throughout the majority of the Core Creek Service Area, the geology is mapped as the Stockton Formation. A small portion of the Service Area in the northern section of the Township is mapped as the Lockatong Formation. In the Middletown and Falls Township Service Areas, geology is mapped as the Bryn Mawr Formation, Chickies Formation, Mafic Gneiss, and the Pennsauken and Bridgeton Formations. A brief description of the geologic formations is provided below. No geologic formations or conditions of concern, such as limestone, are located in Lower Makefield Township based upon this mapping.

Stockton Formation (Trs)

Light-gray to buff, coarse-grained, arkosic sandstone; includes reddish-brown to grayish-purple sandstone, siltstone, and mudstone.

Lockatong Formation (Trl)

Dark-gray to black, thick-bedded argillite containing a few zones of thin-bedded black shale; locally has thin layers of impure limestone and calcareous shale.

Bryn Mawr Formation (Tbm)

High-level terrace deposits; reddish-brown gravelly sand and some silt.

Chickies Formation (Cch)

The Chickies Formation is light-gray to white hard, massive quartzite and quartz schist with thin, interbedded dark slate at its top and conglomerate at its base.

Mafic Gneiss Formation (mgh)

Dark, medium grained; includes rocks of probable sedimentary origin.

Pennsauken and Bridgeton Formations (Tpb)

Dark-reddish-brown, cross-stratified, feldspathic quartz sand and some thin beds of fine gravel and rare layers of clay or silt.

MAP NO. 6
GEOLOGY MAP

(Revised August 17, 2018)
II-21

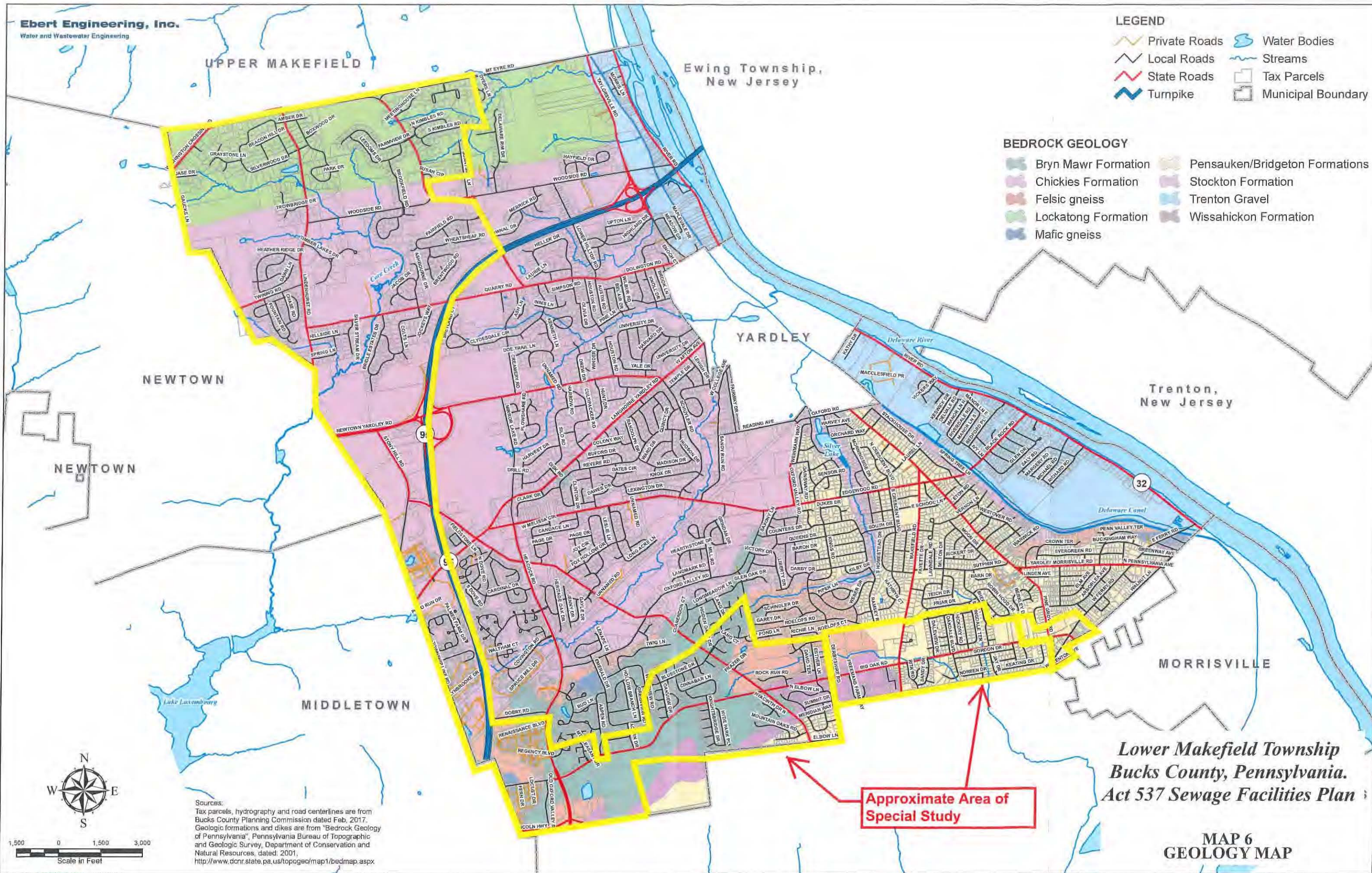
EE, Inc.

LEGEND

- Private Roads
- Local Roads
- State Roads
- Turnpike
- Water Bodies
- Streams
- Tax Parcels
- Municipal Boundary

BEDROCK GEOLOGY

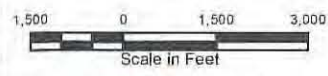
- Bryn Mawr Formation
- Chickies Formation
- Felsic gneiss
- Lockatong Formation
- Mafic gneiss
- Pensauken/Bridgeton Formations
- Stockton Formation
- Trenton Gravel
- Wissahickon Formation



*Lower Makefield Township
Bucks County, Pennsylvania.
Act 537 Sewage Facilities Plan*

**MAP 6
GEOLOGY MAP**

Sources:
Tax parcels, hydrography and road centerlines are from Bucks County Planning Commission dated Feb, 2017.
Geologic formations and dikes are from "Bedrock Geology of Pennsylvania", Pennsylvania Bureau of Topographic and Geologic Survey, Department of Conservation and Natural Resources, dated, 2001.
<http://www.dcnr.state.pa.us/topogeo/map1/bedmap.aspx>



E. Topography

General topography for the Township is presented on Map 7, entitled General Topography. Topography within the Service Areas is gentle to moderately sloping. Based on this information, there are no major concerns that would preclude the implementation of any of the evaluated alternatives. However, this information will affect the specific implementation of each alternative, such as the necessity of grinder pumps and pump stations to reach the collection system. These factors will be evaluated in greater detail sufficient to support Water Quality Management (WQM) Part II permitting as necessary.

F. Potable Water Supplies

The Service Areas are supplied with potable water through a public water supply system from Pennsylvania American Water Company (Public Water System ID 1090074), known as the Yardley system. The Yardley system obtains raw water from the Delaware River and four groundwater wells. The Yardley treatment facility is capable of producing six million gallons of water per day (6 MGD). The combined output of the wells can yield 2 MGD. Pennsylvania American Water's College Avenue pumping station receives water from three wells and the Highland Drive pumping station receives water from one well. The system serves a population of approximately 31,600 customers, located in Falls Township, Lower Makefield Township, and Yardley Borough. The system also has interconnections with Morrisville Municipal Authority and Newtown Artesian Water Company for emergency supplies.

While the Township is served by a public water supply, some limited individual water supply wells remain throughout the Township. These wells are primarily located on properties developed prior to the public water supply system and on larger lots.

MAP NO. 7
GENERAL TOPOGRAPHY MAP

(Revised August 17, 2018)
II-23

EE, Inc.

UPPER MAKEFIELD

LEGEND

- Private Roads
- Local Roads
- State Roads
- Turnpike
- Water Bodies
- Streams
- Tax Parcels
- Municipal Boundary
- Steep Slopes 15% - 25%
- Steep Slopes > 25%
- Topography (5-ft.)

Ewing Township,
New Jersey

YARDLEY

Trenton,
New Jersey

NEWTOWN

NEWTOWN

MORRISVILLE

MIDDLETOWN

*Lower Makefield Township
Bucks County, Pennsylvania.
Act 537 Sewage Facilities Plan*

MAP 7
GENERAL TOPOGRAPHY

Approximate Area of
Special Study

Sources:
Tax parcels, hydrography, and road centerlines are from Bucks County Planning Commission dated Feb. 2017.
Steep slopes are from Natural Lands Trust with input data from PA DEP, dated May 2006, <http://www.pasda.psu.edu>.
Topographic contours are from Delaware Valley Regional Planning Commission DVRPC's 2005 Topographic Contours dated Dec. 2006, <http://www.pasda.psu.edu>.



1,500 0 1,500 3,000
Scale in Feet

CHAPTER III
EXISTING SEWAGE FACILITIES

CHAPTER III

EXISTING SEWAGE FACILITIES

To visually illustrate the facilities discussed in this Chapter, Map 1 entitled “General Plan of Sanitary Sewers with Sewer Service Areas” has been prepared and is included this Act 537 Plan Special Study as an Exhibit. The map provides information on Lower Makefield Township’s existing collection and conveyance system, existing sewer service areas, and existing locations of the sewage pumping stations and meters.

Lower Makefield Township does not own or operate a wastewater treatment plant within the Township limits. All wastewater generated within the Township is conveyed either to the City of Philadelphia Northeast Water Pollution Control Plant by means of BCWSA Neshaminy Interceptor or is conveyed to Morrisville Borough Wastewater Treatment Plant.

The public sanitary system within Lower Makefield Township is divided into six service areas, which are as follows:

- Core Creek Interceptor
- Middletown Township
- Yardley Borough
- Morrisville Borough
- Falls Township (contract area)
- Falls Township (service area)

The Core Creek Interceptor Service Area, the Middletown Township Service Area, the Falls Township Contract Area, and the Falls Township Service Area flow to the Neshaminy Interceptor, which ultimately conveys wastewater to the City of Philadelphia Northeast Water Pollution Control Plant for treatment and disposal under NPDES Permit No. PA0026689. Wastewater in the Yardley Borough and Morrisville Borough service areas is conveyed to the Morrisville WWTP for treatment and disposal under NPDES Permit No. PA0026701.

This Act 537 Special Study addresses only the portion of Lower Makefield Township, where the wastewater is conveyed to the BCWSA owned and operated Neshaminy Interceptor. It is noted that while the Falls Township Service Area conveys wastewater to the Neshaminy Interceptor, the Township of Falls Authority (TOFA) owns and maintains the sewer lines in this part of Lower Makefield Township. The service areas for this Special Study include the Core Creek Interceptor, Middletown Township, Falls Township Contract Area, and Falls Township Service Area. See Map No. 1.

The focus of this Special Study is to provide long term sewage facilities planning for the Neshaminy Interceptor Public Sanitary Sewer Service Area. The Special Study will evaluate the ability of the existing sanitary sewer infrastructure to meet the projected sanitary sewer needs of the service areas.

One of the Key components of the Special Study is implementation of a Corrective Action Plan (CAP) to identify and remove inflow and infiltration (I/I) from the existing sanitary sewer system in this service area. The Pennsylvania Department of Environmental Protection (PADEP) has reviewed Lower Makefield Township's CAP for the Neshaminy Interceptor and DEP's formal approval of the CAP will be effective when this Act 537 Special Study is approved.

The CAP is a long term program where the entire Neshaminy Interceptor Service Area was divided into smaller study areas and each study area is evaluated through the use of multiple flow meters to identify the location of the potential sources of I/I. The sources of I/I are then identified through either video inspection or physical field inspections. Once the sources of I/I are identified, Lower Makefield Township will perform the necessary repairs to remove the I/I. A complete copy of the CAP is attached to this Special Study.

Lower Makefield Township has a total of fourteen (14) traditional pumping stations, one of which is an ejector station. There is also a fifteenth pump station known as Derbyshire located in the Falls Township Service Area. This pump station only is activated when the flows exceed the capacity of the existing gravity sanitary sewer. The flows through this location are normally conveyed by gravity. The table below outlines all the meters and pump stations located within the Township's boundaries:

Major Service Areas	Sub-Service Areas Within Major Service Area	Meters	Pump Stations
Neshaminy	Core Creek Interceptor	BCWSA Lindenhurst	Farmview
		BCWSA 2001	Brook Stone
		BCWSA Village Road	Chanticleer
		BCWSA 2003	
	Middletown Township	BCWSA 2005	Oxford Glen/Yardley Oaks
	Falls Township Service Area	Big Oak Road Derbyshire	No Pump Stations within this service area
	Falls Township Contract Area (Sub-Service Area)	No Meters within this service area	Derbyshire*
Morrisville Borough	Yardley Borough Area	Main Street	Clearview
		Buck Creek	Maplevale
		Sandy Run Road	Yardley Estates
		Belmondo	Fox Hill
			Mill Road Estates
	Morrisville Area	Del Mor/ Ferry Road	Black Rock Road
			Sherwood Park
			Silver Lake
			Heacock Road
			Stackhouse Drive Ejector Station

*High flow bypass only operation.

(Revised September 19, 2018)

The public sanitary system within the Study Area includes four traditional pump stations, plus the Derbyshire pump station, and flows are metered at seven locations near the Municipal boundary. Information regarding the collection and conveyance systems located within the Study Areas was obtained from the 2017 Chapter 94 Report, prepared by Ebert Engineering, Inc. and is presented below. Collection and conveyance systems are currently maintained by the Lower Makefield Township Municipal Authority (LMTMA).

A. Core Creek Interceptor Service Area

The Core Creek Interceptor Service Area is located in the western portion of the Township, west of Interstate 95 (I-95) and north of Cornerstone Drive within the Core Creek Watershed. The area comprises primarily residential homes, along with some commercial properties. The basin area comprises approximately 2,555 acres with approximately 158,899 linear feet of pipe and 890 manholes. Three pumping stations and four meters are located within the service area as indicated in the table above.

The size of collection sewers range from 8 inches to 14 inches and are constructed of vitrified clay (VC), cast iron pipe (CIP) and polyvinyl chloride (PVC). The northern portion of the Core Creek Service area conveys wastewater to the Core Creek Interceptor. The Core Creek Interceptor is constructed of VC, PVC, and CIP. Flows from the Core Creek Interceptor are metered at Lindenhurst Road (BCWSA Lindenhurst Meter D.P. 6) and (BCWSA Meter 2001 DP6A) shown on Map No. 1.

Wastewater in the southern portion of the Service Area is conveyed through lines which exit the Township in two locations including:

- Village Road: Village Road Meter (D.P. 7)
- Township Line Road: BCWSA Meter 2003 (D.P. 7A)

The wastewater within the northern portion of the service area is conveyed by the Core Creek Interceptor entering into BCWSA system at the Lindenhurst Meters (Meter DP6 and DP6A) where it will then flow to the Neshaminy Interceptor. The southern portion of this service area enters into the BCWSA system through Village Road Meter and Meter 2003 which all flow to the Neshaminy Interceptor which is owned by the Bucks County Water and Sewer Authority (BCWSA).

The Neshaminy Interceptor ranges in size from 12-inch to 84-inch diameter and extends a total distance of 14 miles, where the Interceptor terminates at the Totem Road Pump Station in Bensalem Township. The Totem Road Pump Station lifts sewage from the Neshaminy Interceptor and pumps it through parallel 36-inch and 42-inch diameter force mains extending 27,000 linear feet. The force mains are combined into a single 42-inch force main at Grant Avenue in Philadelphia, where flows are conveyed a distance of 21,000 feet to the City of Philadelphia's Delaware interceptor at Rhawn Street, which then conveys the flows

to the City of Philadelphia Northeast Pollution Control Plant for treatment and disposal under NPDES Permit No. PA0026689.

City of Philadelphia Northeast Pollution Control Plant

- NPDES Permit No. PA0026689
- Water Quality Permit No. 5100401
- Location: 3895 Richmond Street, Philadelphia County
- Capacity: 24 mgd (for the Neshaminy Interceptor)
- Receiving Stream: Delaware River

There are three existing pump stations within the Core Creek Interceptor Service Area which are as follows:

1. Farmview Pumping Station

This submersible pumping station is located east of the cul-de-sac of South Kimbles Road and services the surrounding residential developments. The Chanticleer Pump Station pumps the wastewater from its service area to the Farmview Pump Station. The pumping station is equipped with two submersible pumps, which pump an average of 166.3 gpm (239,472 gpd) each. The pump station conveys the wastewater through a four (4) inch forcemain to the discharge location. Emergency power is provided by an existing emergency generator.

The existing single pump pumping capacity of the Farmview Pump Station was confirmed by draw down testing that was performed in 2017. There is no known Water Quality Management Permit for this pump station. Therefore the annual average flow rate for the pump station is calculated below:

$$\begin{aligned} \text{Peak Pump Capacity} &= 166.3 \text{ gpm} \\ &= 166.3 \text{ gpm} \times 1,440 \text{ min/day} \\ &= 239,472 \text{ gpd} \end{aligned}$$

$$\text{PADEP Peak Factor} = 3.9$$

$$\begin{aligned} \text{Annual Average (AA) Flow} &= 239,472 \text{ gpd} / 3.9 \\ &= 61,403 \text{ gpd} \end{aligned}$$

$$\text{Existing Flows (AA)} = 39,091 \text{ gpd}$$

$$\begin{aligned} \text{Projected Flows (AA)} &= 5,750 \text{ gpd}^* \\ * & - 23 \text{ edu(s) from Chanticleer Service Area} \end{aligned}$$

$$\text{Total Flows} = 44,841 \text{ gpd}$$

(Revised September 19, 2018)

$$\begin{aligned} \text{Available Capacity (AA)} &= 61,403 \text{ gpd} - 44,841 \text{ gpd} \\ &= 16,562 \text{ gpd} \end{aligned}$$

2. Brookstone Pump Station

This wet well dry well pumping station is located just south of Lynbrook Drive and services the Brookstone residential development. The collected wastewater is pumped to the BCWSA Meter 2003, where it enters and flows to the Neshaminy Interceptor. The pumping station is equipped with two pumps. The pump station conveys the wastewater through a six inch forcemain to the discharge location. An on-site permanent generator provides emergency power to the pump station.

Upon a detailed inspection of the pump station in July 2018, it was discovered the pump station was no longer secured in place and moving when the groundwater table is elevated. The pump station will be upgraded from a dry well station to a submersible pump station. The existing dry well will be abandoned in place and a new wet well will be installed for the submersible pumps and a new valve and meter vault installed.

The following are the calculations of the required pumping capacity that either the new impellers or pumps must meet or exceed:

$$\begin{aligned} \text{Existing Annual Average (AA) Flow} &= 70,557 \text{ gpd} \\ \text{Projected Future Flows} &= 0 \text{ gpd} \\ \text{Total AA Flows} &= 70,557 \text{ gpd} \\ \text{PADEP Peak Factor} &= 3.9 \\ \text{Required Pumping Capacity} &= 70,557 \text{ gpd} \times 3.9 \text{ (peak factor)} \\ &= 275,172 \text{ gpd} \\ &= 275,172 \text{ gpd} / 1,440 \text{ min/day} \\ &= 191 \text{ gpm} \\ &= \text{Use } \mathbf{200 \text{ gpm (min) pumping capacity}} \end{aligned}$$

The pumping capacity of each of the two pumps will be 200 gpm through the upgrade of the pump station to be a submersible station.

The existing annual average flow rate exceeds the annual average flow capacity of the pump station. The 2018 Chapter 94 Report will report this pump station as an existing hydraulic overload in 2017. The existing hydraulic overload condition can be removed once Lower Makefield Township upgrades the pump station. The PADEP will be notified once this occurs in 2018.

3. Chanticleer Pumping Station

This pumping station is located just southeast of Dyers Lane and services the two small residential developments along Dyers Lane and Delaware Rim Drive. Although the pump station is situated within the Yardley Borough sewer service area, water is pumped from this pumping station to the Farmview Pump Station which conveys the wastewater to the Core Creek Interceptor Service Area. The pumping station is equipped with two submersible pumps. The pump station conveys the wastewater through a two inch forcemain to the discharge location. A portable on-site generator provides emergency power to the pump station. It is noted that the portable generator is permanently stored at the pump station.

The existing flows to the Chanticleer Pump Station in 2017 were 18,540 gpd. There are fourteen proposed edu(s) to be connected to this pump station in the next five years. This includes five edu(s) from the proposed Dogwood Drive Subdivision and nine existing residential dwellings that can be serviced by the proposed sanitary sewer extension. While there are other existing residential dwellings in the area who have selected to remain on the existing on-lot systems, a total of twenty three (23) edu(s) were reserved on the Connection Management Plan should one of those systems malfunction. There have been no documented malfunctions of on-lot systems in this area. With the addition of these existing homes, the total projected flows to this pump station are 24,290 gpd (18,540 gpd existing plus 5,750 gpd proposed 23 edus x 250 gpd/edu).

The existing single pump pumping capacity of the Chanticleer Pump Station was confirmed by a drawdown test performed in 2017. The pumping capacity of the pump station with the largest pump out of service is 49.3 gpm (70,992 gpd). The PADEP requires a peak factor of 4.2 for pump stations servicing flows less than 30,000 gpd. The existing pump station can therefore service an average daily flow of 16,903 gpd and is currently hydraulically overloaded.

The pump station has to be upgraded to meet both the existing and projected flows. The following are the calculations of the required pumping capacity:

Existing Annual Average (AA) Flow	=	18,540 gpd
Projected Future AA Flows	=	5,750 gpd
Total AA Flows	=	24,290 gpd
PADEP Peak Factor	=	4.2
Required Pumping Capacity	=	24,290 gpd x 4.2 (peak factor)
	=	102,018 gpd
	=	102,018 gpd / 1,440 min/day
	=	70.84 gpm
	=	Use 75 gpm (min) pumping capacity

The Chanticleer Pump Station has an existing two inch forcemain that is near the recommended maximum velocity with the existing 49 gpm pumps (5.11 ft/sec),

(Revised September 19, 2018)

and the recommended pumping rate of 75 gpm would produce a velocity of 7.66 ft/sec. This would exceed the recommended velocity in a forcemain (2 to 6 ft/sec). It is recommended to replace the existing nine hundred feet of two inch forcemain with a three inch forcemain. The proposed three inch force main will be installed in the same trench as the existing two inch force main. This will allow for a velocity of 3.33 ft/sec in the forcemain at a pumping rate of 75 gpm.

The estimated cost to replace the forcemain which is located in a non-paved open space area is approximately \$36,000.00 (900 linear feet x \$40.00/linear foot). The proposed three inch forcemain will be installed within the same trench as the existing two inch forcemain. It may also be necessary to replace the existing pumps as part of the upgrade of the pump station. Lower Makefield Township is currently working with a developer, who will perform this upgrade.

B. Middletown Township Service Area

The Middletown Township Service Area is located in the Southwestern portion of the Township. The area is comprised of primarily residential homes with some commercial properties. The basin area comprises approximately 497 acres with approximately 51,818 linear feet of pipe and 297 manholes. One pumping station and one meter is located within the area. The size of collection sewers ranges from 8-inches to 14-inches and are constructed of vitrified clay (VC) and polyvinyl chloride (PVC).

All wastewater within the Service Area is conveyed to the Neshaminy Interceptor through BCWSA Meter 2005. As indicated above, the Neshaminy Interceptor ranges in size from 12-inch to 84-inch diameter and extends a total distance of 14 miles, where the Interceptor terminates at the Totem Road Pump Station in Bensalem Township. The Totem Road Pump Station lifts sewage from the Neshaminy Interceptor and pumps it through parallel 36-inch and 42-inch diameter force mains extending 27,000 linear feet. The force mains are combined into a single 42-inch force main at Grant Avenue in Philadelphia, where flows are conveyed a distance of 21,000 feet to the City of Philadelphia's Delaware interceptor at Rhawn Street, which then conveys the flows to the City of Philadelphia Northeast Pollution Control Plant for treatment and discharged under NPDES Permit No. PA0026689.

There is one existing pump station within the Middletown Township Service Area, and details are provided below:

1. Oxford Glen/Yardley Oaks Pumping Station

This wet well dry well pumping station is located at the intersection of Acorn Drive and Woodview Drive and services the surrounding residential developments. The pumping station is equipped with two pumps, which pump an average of 134.5 gpm (193,680 gpd) each, as confirmed by a drawdown test performed in 2017. An on-site generator provides emergency power.

The annual average flow capacity of the existing pump station based upon the drawdown test has been calculated below:

Peak Pumping Capacity	=	134.5 gpm
	=	134.5 gpm x 1,440 min/day
	=	193,680 gpd
PADEP Peak Factor	=	4.0
Annual Average (AA) Flow	=	193,680 gpd / 4.0 (peak factor)
	=	48,420 gpd
Existing Flows	=	39,117 gpd
Projected Flows	=	12,000 gpd
Total Flows	=	51,117 gpd
Required Pumping Capacity	=	51,117 gpd x 3.9 (peak factor)
	=	199,357 gpd
	=	199,357 gpd / 1,440 min/day
	=	138.4 gpm
	=	Use 140 gpm (min) pumping capacity

The average flow rate for the pump station in 2017 was 39,117 gpd. The annual average flow rate does not exceed the annual average flow capacity of the pump station, and there are no reported overload conditions at this pump station. With the 20-year flow projection, the pump station pumps will need to be upgraded to adequately service the 20-year planning projections. The Township will continue to monitor this pump station through the Chapter 94 Reports. If it is determine an upgrade will be necessary, a planning effort will be performed at that time and PA DEP will be notified.

C. Falls Township Contract Area

The Falls Township Contract Service Area is located in the Southern portion of the Township. The area is comprised of primarily residential homes with some commercial properties. The area comprises approximately 628 acres with approximately 62,774 linear feet of pipe and 283 manholes. There are no pumping stations within the service area. Flows are conveyed through two meters, Derbyshire and Big Oak Road. The size of collection sewers ranges from 8-inches to 10-inches and are constructed of vitrified clay (VC) and polyvinyl chloride (PVC).

All wastewater within the Study Area is conveyed to Falls Township and then to the Neshaminy Interceptor. As indicated above, the Neshaminy Interceptor ranges in size from 12-inch to 84-inch diameter and extends a total distance of 14 miles, where the Interceptor terminates at the Totem Road Pump Station in Bensalem Township. The Totem Road Pump Station lifts sewage from the Neshaminy Interceptor and pumps it through parallel 36-inch

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and 42-inch diameter force mains extending 27,000 linear feet. The force mains are combined into a single 42-inch force main at Grant Avenue in Philadelphia, where flows are conveyed a distance of 21,000 feet to the City of Philadelphia's Delaware interceptor at Rhawn Street, which then conveys the flows to the City of Philadelphia Northeast Pollution Control Plant for treatment and discharged under NPDES Permit No. PA0026689.

There is a PA DEP permitted bypass pump installed in a manhole adjacent to the Derbyshire meter location. This pump station is known as the Derbyshire Pump Station. It is only used in times of high flows when the downstream gravity sanitary sewer main can no longer convey the flows. The Township operation staff is recording the pump run hours. The Township staff will provide additional monitoring of the bypass pump station during all wet weather events so that the approximate start time and stop time can be documented. The dates and hours of the pump operation will be documented in future Chapter 94 Reports. The flows normally flow by gravity through this location.

D. Falls Township (Service Area)

The Falls Township Service Area is located between the two Falls Township Contract Areas in the southern portion of the Township. The Falls Township Service Area is comprised of primarily residential homes with some recreational and community service properties, including the Charles Boehm, Pennwood, and William Penn Middle Schools. There are no pump stations located within this service area.

Lower Makefield Township and the Township of Falls Authority (TOFA) have an existing agreement, whereby sewage flows generated in this portion of Lower Makefield Township are conveyed to TOFA and conveyed through their Municipal sanitary sewer system to the Neshaminy Interceptor for ultimate treatment and disposal at the City of Philadelphia Northeast Water Pollution Control Plant under NPDES Permit No. PA0026689.

The size of collection sewers ranges from 8-inches to 10-inches and are constructed of vitrified clay (VC) and polyvinyl chloride (PVC). There are no pumping stations within the Falls Township Service Area.

E. Problems with Existing Sewage Facilities

Lower Makefield Township is one of twelve (12) Municipalities which contribute wastewater flow to the Neshaminy Interceptor which is owned and operated by Bucks County Water and Sewer Authority. The other Municipalities include Bensalem Township, Hulmeville Borough, Langhorne Borough, Langhorne Manor Borough, Newtown Township/Borough, Middletown Township, Lower Southampton Township, Falls Township, Pennel Borough, Bristol Township, and Northampton Township.

In 2015, a Settlement Agreement between BCWSA and the PA DEP required the establishment of a Corrective Action Plan and Connection Management Plan for the

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Neshaminy Interceptor. Each tributary Municipality is operating under this program to reduce infiltration and inflow (I/I), implement a Connection Management Plan (CMP) with BCWSA, implement a Corrective Action Plan (CAP), and perform Act 537 Plan Updates. More specifically, Lower Makefield Township was required to perform the following related to the Neshaminy Interceptor:

- Sign a Supplemental Agreement with BCWSA that implements the PA DEP and BCWSA's settlement agreement conditions. Lower Makefield Township executed this Supplemental Transportation Agreement with BCWSA on February 7, 2018.
- Prepare a Corrective Action Plan (CAP) outlining an I/I Abatement Plan to reduce the existing peak flows and I/I in the system.
- Submit and update a Connection Management Plan to BCWSA. The PA DEP accepted the latest version by letter dated January 31, 2018.
- Adopt a revision to the Lower Makefield Township Act 537 Plan for the service areas that contribute flows to the Neshaminy Interceptor.

A copy of the Corrective Action Plan is attached in Appendix B.

Connection Management Plan

Lower Makefield Township prepared an updated CMP and Lower Makefield Township requested and submitted the information to BCWSA and PADEP. As part of the CMP request, miscellaneous EDUs have been established for connection of failing OLDS or minor subdivisions. For residential development, 60 EDUs have been allocated. For non-residential development, 70 EDUs have been allocated. Under the stipulations within the CMP, these miscellaneous EDUs can be utilized to service future sewage needs or for development projects with 10 edus or less. Table No. 1 below summarizes the proposed sewer connections from 2014 through 2021, which have been incorporated into the CMP.

The current CMP was accepted by PA DEP in a letter dated January 31, 2018. To date, BCWSA has only released connections for 2014 and 2015. Proposed connections for 2016 and 2017 have not been released. Until BCWSA releases the proposed connections on the CMP, no additional connections can be made.

Table No. 1. Summary of Existing and Proposed Sewage Flows per Connection Management Plan (1/31/2018)

Development Name	PLANNING STATUS		CONNECTION STATUS			NICMP APPROVED EDU'S										
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (next 4 years)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017	2018	2019	2020	2021
Lower Makefield Township																
Regency at Yardley - Singles (North)	1-09929-267-X	Under Construction	191	157	34	34	250	8,500	30	30	35	35	0	0	0	0
Regency at Yardley - Carriages (Townhomes) (South)	1-09929-267-X	Under Construction	186	22	164	75	250	18,750	0	0	30	45	0	0	0	0
Matrix Lower Makefield Residential (aka Matrix - Condo's)	1-09929-267-X	Approved	62	0	62	62	250	15,500	0	0	62	0	0	0	0	0
Matrix -Office	1-09929-267-X	Completed	6	2	0	0	250	0	0	3	1	0	0	0	0	0
Brookshire Section I	1-09929-247-3I	Completed	21	21	0	0	250	0	1	0	0	0				
Brookshire Section II	1-09929-247-3II	Completed	8	8	0	0	250	0	5	3	0	0	0	0	0	0
Troilo Tract	1-09929-262-E	Completed	5	5	0	0	250	0	1	0	0	0	0	0	0	0
Minehart Subdivision	1-09929-255-3II	Under Construction	7	5	2	2	250	500	0	4	2	0	0	0	0	0
Fiorelli Grove	1-09929-268-E	Approved	3	0	3	3	250	750	0	3	0	0	0	0	0	0
Aria Hospital [a]	-	Proposed /HOLD	223	0	223	148	250	37,000	0	0	74	74	0	0	0	0
Capstone Terrace	1-09929-272-3J	Proposed /HOLD	192	0	192	0	250	0	0	0	0	0	0	0	0	0
Reserve at Yardley (Freeman's Farm)	1-09929-278-E	Under Construction	15	14	1	1	250	250	0	0	5	10	0	0	0	0
Moon Nursery	1-09929-293-3J	Approved/ Under Construction	15	7	8	15	250	3,750	0	15	0	0	0	0	0	0
Sunny shine Ln/Dogwood	1-09929-273-3J	Proposed	14	0	14	23	250	5,750	0	0	14	9	0	0	0	0

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Dr (Harmony Lane Sub.)																
PLANNING STATUS		CONNECTION STATUS			NICMP APPROVED EDU'S											
Development Name	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (next 4 years)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017	2018	2019	2020	2021
Grey Nun Retirement Community	-	ON HOLD	114	0	114	0	250	0	0	0	0	0	0	0	0	0
Grace Point Church (aka 1st Baptist Church)	1-09929-282-3J	Approved	1	0	1	1	250	250	0	1	0	0	0	0	0	0
Pennwood Middle School Renovations [b]	1-09929-295X	Approved	1	0	1	1	250	250	0	0	1	0	0	0	0	0
Miscellaneous Residential Development [c] [1]	-	-	60	0	60	60	250	12,750	0	0	60	0	0	0	0	0
Miscellaneous Non-Residential Development [c]	-	-	70	0	69	69	250	17,250	0	0	69	0	0	0	0	0
Shady Brook Farm - Restrooms [d]	-	Proposed	From Miscellaneous Non-Residential	0	1	1	250	250	0	0	1	0	0	0	0	0
TOTAL						495		121,500	37	59	354	173	0	0	0	0

[a] This project was reduced from 375,000 SF hospital with two 40,000 SF buildings to only a 180,000 SF health care village, but an updated EDU projection or connection rate was not provided. Therefore, the Projection Schedule has not been updated from the previous version of this table.

[b] Added per Township Engineer's letter dated 3/15/16.

[c] - June 5, 2017, Letter from Carroll Engineering approving 60 miscellaneous residential edus and 70 miscellaneous non-residential edus to only be utilized for small project, 10 edus or less.

[d] Added per Township Engineer's letter dated 1/2/18 - one miscellaneous non-residential EDU from the Year 2016 column is to be used for this project. This will reduce the miscellaneous non-residential edu allocation from 70 to 69.

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Corrective Action Plan

Lower Makefield Township has prepared a CAP which was reviewed by David Burke, Watershed Manager from PADEP in 2017. DEP's formal approval of the CAP will be effective when this Act 537 Special Study is approved. The CAP includes an I/I abatement plan with a CMP in an effort to further monitor the connections within the Service Areas.

The goal of the CAP is to reduce peak flows to the Neshaminy Interceptor and reduce the amount of I/I in the collection system to prevent the need to expand downstream sanitary sewer facilities. A copy of the CAP is attached in Appendix B.

Lower Makefield Township will begin their I/I removal efforts in the northern portion of the Township. This area was selected based on the known problem area in the Core Creek Interceptor Manholes NC-83 to NC-93.

As described earlier in this Chapter, Lower Makefield Township will need to upgrade both the Brookstone Pump Station and the Chanticleer Pump Station. The Brookstone Pump Station will have the pumping capacity restored to approximately 200 gpm through either a replacement of the impellers in the existing pumps or the installation of two new pumps. The Chanticleer Pump Station will be upgraded to increase its pumping capacity from 49 gpm to approximately 75 gpm through the replacement of the existing two inch forcemain with a three inch forcemain and potentially replacing the two existing pumps.

F. Lower Makefield Township Sewage Disposal Needs

For the purposes of this Special Study plan, only the Core Creek Interceptor, Middletown Township, Falls Township (Contract Area), and Falls Township (Service Area) Sewer Service Areas were evaluated. Lower Makefield Township is in the process of updating their overall Act 537 Plan, which will address all of the Township sewage disposal needs.

Each of the Service Areas is located within the planned public sanitary sewer service area. As discussed above and presented on Table 1, the projected future sewage needs are 495 EDUs within the next four years.

Lower Makefield Township has prepared a CAP which contains an I/I abatement plan outlining the action plan for removal of the I/I within the system. The work will be documented and submitted to BCWSA and PADEP for review. As PADEP reviews and accepts the documented work, edus will be released to Lower Makefield Township to utilize for proposed development or needs throughout the Township.

G. Existing Private / Onlot Sewage Facilities

Limited properties within the Township remain on individual on-lot sewage disposal systems (OLDS). Many of the remaining OLDS are utilized by residences and were constructed prior to current PA DEP design regulations. System types include seepage

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pits, seepage trenches, and seepage beds. There are no known cesspools or retaining tanks in the Township. Any existing and subsequent improvements to existing OLDS systems will continue under the authority of the Bucks County Department of Health on-lot sewage permitting program.

The infrastructure for public sanitary sewer is in place and can be utilized to service remaining OLDS, should they malfunction in the future. As the entire Township is identified as a public sewer service area and no on-lot sewer service areas are identified, the goal of the Township is to have the entire Township connected to public sewer.

There are no individual small flow treatment facilities within the Study Areas of this Act 537 Plan Special Study. Within the boundaries of the Township as a whole, there is one permitted sewage facility. The Delaware Canal State Park has a Part II Water Quality Management Permit (Permit No. 0999418) that was issued in 1999 for the construction and operations to handle 800 gpd system to serve Virginia Forrest Picnic Area located in Solebury Township, Bucks County. Given the current public sanitary sewer infrastructure, new small flow treatment facilities are discouraged and are not consistent with the Township's Act 537 Plan to provide public sanitary sewer to all areas of the Township.

H. Septage Generation

There are no sewage treatment plants within the Lower Makefield Township. Therefore, no septage is generated within the Township requiring transport or disposal.

CHAPTER IV
FUTURE GROWTH AND LAND DEVELOPMENT

CHAPTER IV

FUTURE GROWTH AND LAND DEVELOPMENT

This Chapter is dedicated to an analysis of all existing and planned development in Lower Makefield Township. Such an analysis is critical to understanding both near and long-term future needs of the Township. As with other Chapters in this Special Study Plan, the discussion will generally follow PADEP's *Plan Content and Environmental Assessment Checklist*.

A. Lower Makefield Township Existing Land Use

The 2003 Lower Makefield Township Comprehensive Plan served as an update to the 1992 Comprehensive Plan. Lower Makefield Township has taken positive steps to manage growth and guide its future for more than 60 years. In 1939, when its first zoning ordinance was adopted, Lower Makefield was one of the first communities in Pennsylvania to enact zoning rules. In 1954, the Township adopted its first comprehensive plan.

The history of Lower Makefield Township includes a rural landscape dominated by agriculture. The Township experienced rapid population growth in the 1700s, which resulted in about tenfold growth between 1693 and 1810. Today, the Township has developed primarily as a suburban residential community.

Lower Makefield Township, like much of eastern and lower Bucks County, has large areas of prime agricultural soils and soils of statewide importance. The Township has embraced the concept of preserving land for future farming and other open space uses through its Farmland Preservation Corporation, which owns about 311 acres of farmland. In addition, the Township has endorsed the formation of an agricultural security district that includes about 486 acres of land on 10 properties. Prime Farmland is depicted on Map 5 entitled Prime Farmland Map and attached within this chapter.

The primary existing land use within the Study Areas is single family residential lots. Other existing uses include multi-family and commercial/office uses. Existing land uses are depicted on Map 8 entitled "Existing Land Use" and attached within this chapter.

The Township's master plan envisions the continuation of the quality of life in Lower Makefield. Elements of this quality of life include protecting community aesthetics, preserving aspects of the natural and historic environment, accommodating expected growth without adversely affecting residents, and creating and supporting necessary community services that enhance life.

As indicated in the Township's 2003 Master Comprehensive Plan, it is the Township's policy that all new major development be connected to the existing public sanitary sewer system.

MAP NO. 8
EXISTING LAND USE

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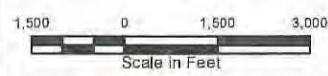
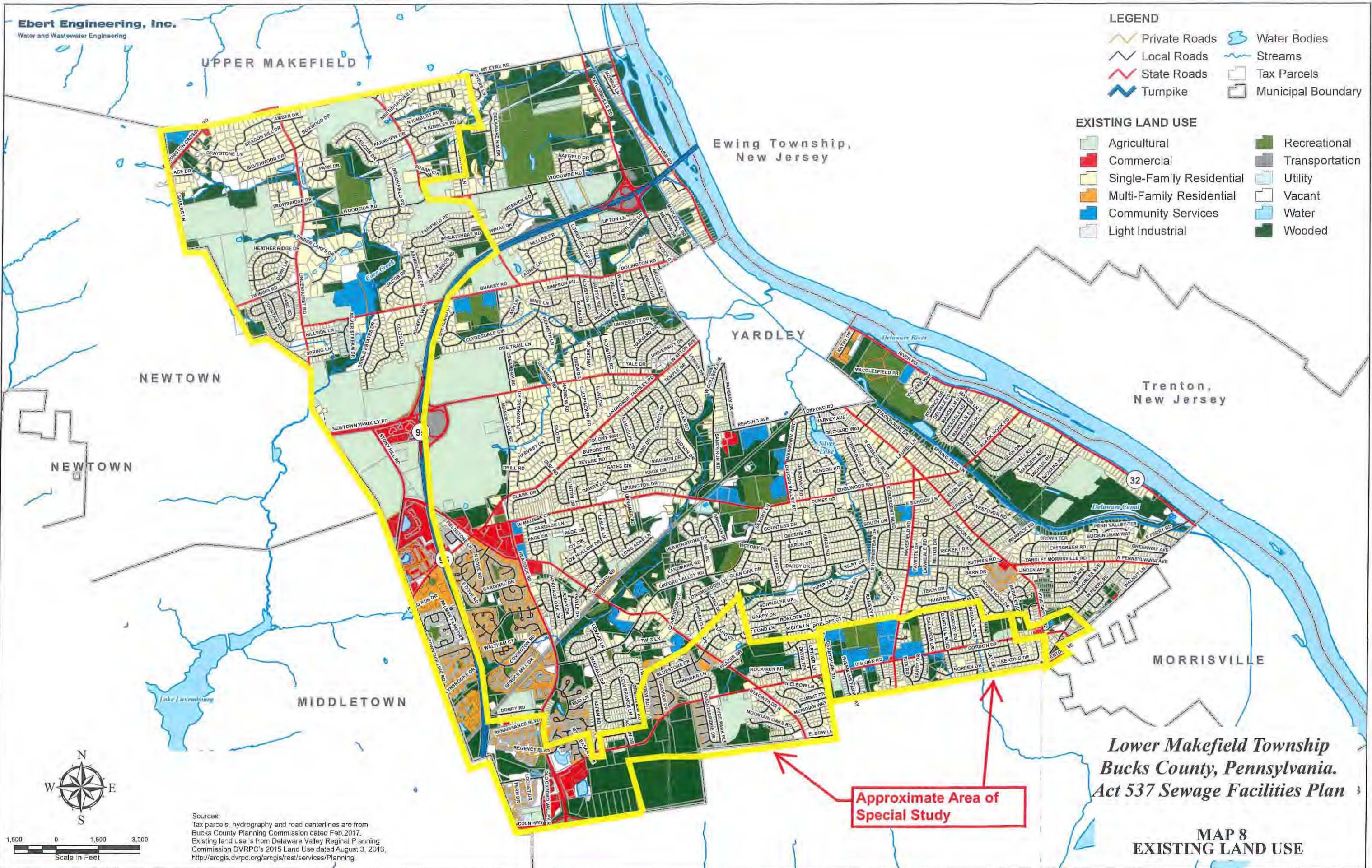
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LEGEND

Private Roads	Water Bodies
Local Roads	Streams
State Roads	Tax Parcels
Turnpike	Municipal Boundary

EXISTING LAND USE

Agricultural	Recreational
Commercial	Transportation
Single-Family Residential	Utility
Multi-Family Residential	Vacant
Community Services	Water
Light Industrial	Wooded



Sources:
Tax parcels, hydrography and road centerlines are from Bucks County Planning Commission dated Feb. 2017.
Existing land use is from Delaware Valley Regional Planning Commission DVRPC's 2015 Land Use dated August 3, 2016, <http://arcgis.dvrpc.org/arcgis/rest/services/Planning>.

Approximate Area of Special Study

*Lower Makefield Township
Bucks County, Pennsylvania.
Act 537 Sewage Facilities Plan*

**MAP 8
EXISTING LAND USE**

B. Lower Makefield Township Zoning Ordinance

The current Township Zoning Ordinance recognizes specific types of land use, including resource conservation, agricultural, commercial, industrial, farm residential, residential and mixed residential. The Zoning Ordinance contains specific requirements for the use of certain types of sewage facilities depending on the zoning district. Factors such as lot size, slopes, proposed land use and density, and floodplains are noted in consideration of the requirements. The current Township Zoning Map was last issued on September 10, 2015. Current land uses within the Township are depicted on Map No. 8, entitled “Existing Land Use”. As noted throughout this report, the Core Creek Interceptor, Middletown Township, Falls Township Contract, and Falls Township Service Study Areas consist primarily of existing residential development with areas of agricultural use. Commercial development is primarily limited to three areas, including two locations west of I-95 and one in the southern end of the Township. Some commercial development is also present within the Falls Township sewer service areas.

The following Zoning Districts are represented in the Lower Makefield Township Zoning Ordinance (within the Study Areas):

Zoning District	Zoning District Description	Minimum Lot Size	Selected By-Right Uses
R-1	Residential Low Density	15,000 sq. ft. to 1 acre	Agricultural, single family detached dwelling, nursery/horticulture/greenhouse, public recreation facility, or forestry/timber. Farmland preservation development is permitted.
R-2	Residential Medium Density	12,500 sq. ft. to 1 acre	Agricultural, single family detached dwelling, nursery/horticulture/greenhouse, public recreation facility, or forestry/timber.
R-3M	Single family high density modified	13,500 sq. ft.	Agricultural, single family detached dwelling, nursery/horticulture/greenhouse, or public recreation facility, forestry/timber.
R-4	Residential Multiple Family High Density	2,000 sq. ft. to 34,000 sq. ft.	Agricultural, single family detached dwelling, multifamily, single family attached, duplex, mobile home park, nursery/horticulture/greenhouse, or public recreation facility, forestry/timber.
O/R	Office/Research	2 acres	Agriculture, cemetery, day-care/group care/nursery school/kindergarten, emergency service, financial service, general business/profession/government office, golf course, health/fitness club, nursery/horticulture/greenhouse, nursing home, research and development facility, forestry/timber.

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C-1	Commercial Neighborhood Shopping	0.5 acre	Agriculture, commercial recreation, community center, day-care/group care/nursery school/kindergarten, emergency service, financial service, funeral home, general business/profession/government office, health/fitness club, kennel, library/museum, medical office, nursery/horticulture/greenhouse, nursing home, place of worship, restaurant, retail/personal services, shopping center, veterinary hospital, forestry/timber.
C-2	Commercial Highway Services	1 acre	Agriculture, commercial recreation, day-care/group care/nursery school/kindergarten, emergency service, financial service, funeral home, general business/profession/government office, health/fitness club, hotel/motel, kennel, large retail store, medical office, nursery/horticulture/greenhouse, nursing home, restaurant, retail/personal services, service station, shopping center, veterinary hospital, forestry/timber, age qualified community.
C-3	General Business/Industrial	2 acres	Agriculture, automobile body repair or paint, cemetery, convenience store, crematorium, day-care/group care/nursery school/kindergarten, emergency service, financial service, funeral home, general business/profession/government office, health/fitness club, hospital, kennel, large retail store, light manufacturing, medical office, mobile home park, nursery/horticulture/greenhouse, nursing home, research and development facility, restaurant, restaurant with drive through, retail/personal services, service station, vehicle sales, veterinary hospital, warehouse and distribution, wholesale trade, forestry/timber, age qualified community.

C. Evaluation of Land-Use and Zoning vs. Public Sewer Service Areas

Implicit within the preparation of any Act 537 Plan or Special Study is the review of public sanitary sewer service areas, whether that service is provided by a publicly owned system or by private facilities. As also discussed in other areas of this Special Study, Lower Makefield Township has devised public sewer service areas to incorporate

existing and planned land use and development, and in consideration of the existing Township planning documents discussed above. The current zoning designation areas are consistent with the Township's 537 planning. The future flow projections presented in this Chapter have been developed in consideration of the zoning designations and sanitary sewer service area designations. Future land use is illustrated on Map No. 9, entitled "Future Land Use".

D. Water Quality Designations

According to PA Code Title 25 Chapter 93, the current water quality designations for the receiving streams located in the Study Areas within Lower Makefield Township as are follows:

Waterway	Segment	Chapter 93 Designation
Core Creek	Basin, Source to Inlet of Lake Luxembourg	CWF, MF
Dyers Creek	Basin	WWF, MF
Buck Creek	Basin (includes Brock Creek)	WWF, MF
Mill Creek	Non-Tidal Portion of Basin (includes Queen Anne Creek and Rock Run)	CWF, WWF, TSF, MF
Martins Creek	Non-Tidal Portion of Basin	WWF, MF

TSF = Trout Stocking; MF = Migratory Fishes; WWF = Warm Water Fishes; CWF = Cold Water Fishes; Source: Chapter 93, Source: Water Quality Standards, PA Code Title 25, Chapter 93. PA Dept. of Environmental Protection

According to the above stream designations, exceptional value or high quality streams are not located within the study areas.

MAP NO. 9
FUTURE LAND USE

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F. Existing Development and Sewage Usage

The following table details the recent subdivisions served by public sewer including the total number of EDUs reserved for the subdivision and the number currently developed under the CMP.

PADEP CODE NO.	PARCEL DESCRIPTION	EDU's PLANNED OR APPROVED	EDU's CONNECTED TO DATE	EDU's NEEDED	EDU's PROJECTED (NEXT 4 YEARS)	GPD/EDU (used to calc Projected Flow)	PROJECTED FLOWS (1EDU= 250 GPD)
CONNECTION MANAGEMENT PLAN FLOWS							
CORE CREEK SERVICE AREA							
1-09929-293-3J	Moon Nursery	15	7	8	15	250	3,750
1-09929-273-3J	Sunny shine Ln/Dogwood Dr (Harmony Lane Sub.)	14	0	14	23	250	5,750
-	Grey Nun Retirement Community	114	0	114	0	250	0
1-09929-282-3J	Grace Point Church (aka 1st Baptist Church)	1	0	1	1	250	250
1-09929-295X	Pennwood Middle School Renovations [b]	1	0	1	1	250	250
1-09929-247-3IJ	Brookshire Section I	21	21	0	0	250	0
1-09929-247-3IJ	Brookshire Section II	8	8	0	0	250	0
1-09929-262-E	Troilo Tract	5	5	0	0	250	0
1-09929-255-3IJ	Minehart Subdivision	7	5	2	2	250	500
1-09929-268-E	Fiorelli Grove	3	0	3	3	250	750
-	Aria Hospital [a]	223	0	223	148	250	37,000
-	Shady Brook Farm - Restrooms [d]	1	0	1	1	250	250
1-09929-272-3J	Capstone Terrace	192	0	192	0	250	0
Totals							48,500

MIDDLETOWN TOWNSHIP SERVICE AREA							
1-09929-278-E	Reserve at Yardley (Freeman's Farm)	15	14	1	1	250	250
1-09929-267-X	Regency at Yardley -Singles (North)	191	157	34	34	250	8,500
1-09929-267-X	Regency at Yardley - Carriages (Townhomes) (South)	186	22	164	75	250	18,750
1-09929-267-X	Matrix Lower Makefield Residential (aka Matrix -Condo's)	62	0	62	62	250	15,500
1-09929-267-X	Matrix -Office	6	2	0	0	250	500
Totals							43,500
TOWNSHIP MISCELLANEOUS EDUS							
-	Miscellaneous Residential Development [c] [1]	60	0	60	60	250	12,750
-	Miscellaneous Non-Residential Development [c]	69*	0	69*	69*	250	7,500
Totals							20,250

*1 miscellaneous non-residential edu was assigned to the Shady Brook Farm restroom reducing allocation from 70 to 69.

As part of the Lower Makefield Township CMP, miscellaneous EDUs have been established for connection of failing OLDS redevelopment or minor subdivisions. For residential development, 60 EDUs have been allocated. For non-residential development, 70 EDUs have been allocated. Under the stipulations within the CMP, these miscellaneous EDUs can be utilized to service future sewage needs or for development projects with 10 edus or less throughout the Neshaminy Interceptor Service Area. These additional EDUs were approved by PA DEP on June 27, 2017.

The Planned Developments in Lower Makefield Township are as follows:

Projects under Consideration in the Approval Process							
Project Name	Type	Description	Owner & Applicant	Lot Size (Acres)	Tax Parcel	Zoning	Status/Action
Fieldstone at Lower Makefield Edgewood Road	Major Subdivision	30 single-family residential building lots	Quaker Group Bucks, L. P. / Same	39.2	20-16-73	R-2 Residential Medium Density	Preliminary Plan

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Projects under Consideration in the Approval Process							
Project Name	Type	Description	Owner & Applicant	Lot Size (Acres)	Tax Parcel	Zoning	Status/Action
Dogwood Drive (aka Harmony Lane) <i>Dogwood Drive</i>	Major Subdivision	5 single-family residential building lots	Dogwood Drive, L.P. / Same	14.727	20-8-25	R-2 Residential Medium Density	Recommended for Final Plan Approval at 1/22/2018 PC meeting. Preliminary Approval by BOS 9/19/2017
Capstone Terrace <i>Stony Hill Road at Township Line Road</i>	Land Development	3-story 180,000 sq. ft. office building	Shady Brook Investors, L.P. / Same	14.855	20-16-39 20-12-1 20-12-2	O/R Office Research	Final Plan Preliminary Approval by BOS 11/5/2008
Aria Health (fka Frankford Health System) <i>Route 332 & Stony Hill Road</i>	Land Development	3-story 375,000 sq. ft. hospital, two (2)-40,000 sq. ft. medical buildings with 976 parking spaces & a heliport	Aria Health/ Same	41.178	20-12-1-1	O/R Office Research	Preliminary Plan
Erin Development 1685 Dobry Road <i>Dobry Road</i>	Major Subdivision	76 single-family attached dwelling Age-Qualified Community	Dobry Road, LLC. / ERIN Development	16.57	20-12-28	C-3 General Business Industrial	Preliminary Plan ZHB meeting scheduled for 3/6/2018
Moser Tract (Marrazzo Garden Center) <i>Pine Grove Road & Sutphin Road</i>	Major Subdivision	17 single-family attached townhouse dwellings (non-conforming use)	Dan & Carmela Marrazzo / Same	2.6	20-50-1-1	R-2 Residential Medium Density	Sketch Plan
Snipes Tract Athletic Fields <i>Dolington Road & Quarry Road</i>	Land Development	3 large & 1 small multi-purpose athletic fields, concession/restroom building, skate park, 157	Lower Makefield Township Same	36.26	20-16-2 20-16-1-1	R-2 Residential Medium Density	Preliminary/Final Approval by BOS 5/30/2017. Remanded by Court back to Board of Supervisors.

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Projects under Consideration in the Approval Process							
Project Name	Type	Description	Owner & Applicant	Lot Size (Acres)	Tax Parcel	Zoning	Status/Action
		parking spaces					
Octagon Center – Office Condo Phase II <i>Big Oak Road</i>	Land Development	2,000 sq. ft. Dunkin' Donuts w/ drive-thru window & a 11,909 sq. ft. Day Care Center located adjacent to Lower Bucks Pediatrics	Aurliz LLC / Same	3.88	20-32-3-1	C-3 General Business Industrial	Amended Preliminary Plan PC meeting on 1/22/2018.
Widenmeyer Minor Subdivision/ Lot Line Change (1085 Reading Avenue)	Lot Line Change / Minor Subdivision	Change Lot Line between parcels to have a 1.10 acre lot and a 10.06 acre lot. No new lots will be created.	Maryanne Widenmeyer / Same	11.16	20-35-2-3 20-35-4	R-2 Residential Medium Density	Final Plan Scheduled for 2/12/2018 PC meeting
Caddis Healthcare Real Estate Senior Living Facility (aka Heartis Village at Yardley) <i>Dobry Road</i>	Land Development	3-story 91,830 sq. ft. Assisted Living building, 1-story 17,404 sq. ft. Memory Care building, 71 parking spaces	Mary & Joseph Shennard / Caddis Healthcare Real Estate	8.62	20-32-8-2 20-32-9	C-3 General Business Industrial	Informal Sketch Plan PC meeting on 1/22/2018.
Fieldstone (Harris Tract) <i>Edgewood Rd</i>	Major Subdivision	32 lot or 36 lot single-family residential building lots	Quaker Group Bucks, L.P. / Same	39.2	20-16-73	R-2 Residential Medium Density	Informal Sketch Plan PC meeting on 1/22/2018.
Kaplan Tract <i>Dolington Road</i>	Minor Subdivision	Subdivide 5 acres into 2 lots	Ann Ryan Trust Lawrence Kaplan	4.82	20-3-26-1	R-2 Residential Medium Density	Final Approval by BOS 6/21/2017
Matrix Residential Amended Plan <i>Big Oak</i>	Amended Major Subdivision	62 single-family attached Age-Qualified dwellings	Matrix Lower Makefield Residential, L.P.	19.439	20-32-6	C-3 General Business Industrial	Amended Final Approval by BOS 12/21/2016

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Projects under Consideration in the Approval Process

Project Name	Type	Description	Owner & Applicant	Lot Size (Acres)	Tax Parcel	Zoning	Status/Action
<i>Road</i>		(originally approved for 165 multi-family condominium units)	Same			al	
Artis Senior Living LLC <i>Stony Hill Road</i>	Land Development	72 bed memory care facility with 43 parking spaces	Artis Senior Living LLC Same	5.34	20-12-3 20-12-3-1 20-13-2 20-13-2-1	R-1 Residential Low Density	Preliminary/Final Approval by BOS 5/17/2017
Fieldstone (Harris Tract) <i>Edgewood Road</i>	Minor Subdivision	Subdivide 39 acres into 2 lots	Quaker Group Bucks L. P. Same	39.2	20-16-73	R-2 Residential Medium Density	Final Approval by BOS 9/21/2016
Hildebrand <i>Big Oak Road & Stony Hill Road</i>	Minor Subdivision	Subdivide 10 acres into 2 lots for purchase of the 8.5 acre parcel by Lower Makefield Township	John & Janet Hildebrand Lower Makefield Township	10.17	20-34-14	R-2 Residential Medium Density	Preliminary/Final Approval by BOS 3/15/2017

The proposed connections for 2018 within the Core Creek Interceptor, Middletown Township and Falls Township Contract and Service Study Areas are provided in the following table:

Development Name	Projected # of Connections
Regency at Yardley South (Carriages)	32
JC McGinn Construction (Minehart)	1
Matrix Lower Makefield	16
Dogwood Drive	23
Totals	54

As listed in the Connection Management Plan Flows Table these 2018 connections have already been accounted for on the Connection Management Plan and a copy of this plan is attached in Appendix C.

G. Projected Capacity Requirements (EDU's) for Undeveloped Lands within Proposed Sewer Service Areas

The following projections are for the undeveloped lands within the sewer service areas. These projections are based on the Draft 2015 Comprehensive Plan. Many assumptions must be made when evaluating the capacity requirements of undeveloped lands. The following assumptions were made developing these projections:

- All undeveloped parcels within the service area were evaluated unless deed restrictions are in place prohibiting future development.
- The minimum residential EDU/acre for the respective district was projected for properties served by public sewer. (See Zoning Development table in subsection B above)
- Development Rights purchased by the Township
- Flow per edu is 250 gpd/edu.

Based upon these assumptions we offer the following EDU projections for the respective study areas / sewer service areas:

Potential Developable Parcels Available within the Neshaminy Interceptor Service Area				
Parcel No.	Parcel Description	Gross Area	Zoning District	Projected EDU(S)
CORE CREEK INTERCEPTOR SERVICE AREA				
20-003-034-002	(20 LOTS) HRH MANAGEMENT CORP (Grey Nun)	71.1	R-1	20
20-003-002	(40 LOTS) STERLING FAMILY LTD PART I (Sterling Farm)	44.45	R-1	40
20-003-002.001	(80 LOTS) MCGOWAN, THOMAS D & CAROL a	89.85	R-1	80
20-016-012	(45 LOTS) WRIGHT, ELSIE W ,TR & DOUGLAS ,TR	50.55	R-1	45
20-016-040	(180,000 SF) PRICKETT, CRAIG PAUL	18.33	O/R	72
20-016-040-001	(50,000 SF) PRICKETT, CLARENCE L	5	O/R	20
20-012-001	(500,000 SF) SHADY BROOK AT FLEMINGS INC	51.118	O/R	200
Totals		330.4	-	477

MIDDLETOWN TOWNSHIP SERVICE AREA				
20-012-025-001	(18 UNITS) ANTER ASSOC	9.18	R-4	18
20-032-036-001	(2 LOTS) DHANDHUKIA, BHARAT & ASHA (development potential limited by stream and wetlands)	5.73	R-3	2
	Totals	14.91	-	20
FALLS CONTRACT SERVICE AREA				
20-034-132	GUZIKOWSKI, SANDRA (development rights purchased by Township in 2016, not available)	44.6	AC	0
20-049-036	SCHLEGEL, CHRISTOPHER M & PATRICIA A	5.90	R-2	2
20-049-034-002	SCHLEGEL, CHRISTOPHER M & PATRICIA A	4.88	R-2	2
20-049-034	SNEAD, GERALD L & JANET E	2.98	R-2	2
	Totals	58.36	-	6
FALLS TOWNSHIP SERVICE AREA				
20-049-038	SCHLEGEL, CHRISTOPHER M & PATRICIA A	8.9	R-2	2
20-049-037	BLACK, KENNETH A	2.95	R-2	2
	Totals	11.85	-	4

The Potential Development Plan is attached within this Chapter which outlines the locations of the parcels with development potential in the Neshaminy Interceptor Service Area.

The following tables are the projected hydraulic loading to the Neshaminy Interceptor Service Area:

PARCEL NO.	PARCEL DESCRIPTION	GROSS ACRES	ZONING DISTRICT	PROJECTED EDU(S)	PROJECTED FLOWS (1EDU= 250 GPD)
CORE CREEK INTERCEPTOR SERVICE AREA					
20-003-034-002	(20 LOTS) HRH MANAGEMENT CORP (Grey Nun)	71.1	R-1	20	5,000
20-003-002	(40 LOTS) STERLING FAMILY LTD PART I (Sterling Farm)	44.45	R-1	40	10,000
20-003-002.001	(80 LOTS) MCGOWAN, THOMAS D & CAROL a	89.85	R-1	80	20,000
20-016-012	(45 LOTS) WRIGHT, ELSIE W ,TR & DOUGLAS ,TR	50.55	R-1	45	11,250
20-016-040	(180,000 SF) PRICKETT, CRAIG PAUL	18.33	O/R	72	18,000
20-016-040-001	(50,000 SF) PRICKETT, CLARENCE L	5	O/R	20	5,000

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20-012-001	(500,000 SF) SHADY BROOK AT FLEMINGS INC	51.118	O/R	200	50,000
Totals		330.4	-	477	119,250
PARCEL NO.	PARCEL DESCRIPTION	GROSS ACRES	ZONING DISTRICT	PROJECTED EDU(S)	PROJECTED FLOWS (1EDU= 250 GPD)
MIDDLETOWN TOWNSHIP SERVICE AREA					
20-012-025-001	(18 UNITS) ANTER ASSOC	9.18	R-4	18	4,500
20-032-036-001	(2 LOTS) DHANDHUKIA, BHARAT & ASHA (development potential limited by stream and wetlands)	5.73	R-3	2	500
Totals		14.91	-	20	5,000

PARCEL NO.	PARCEL DESCRIPTION	GROSS ACRES	ZONING DISTRICT	PROJECTED EDU(S)	PROJECTED FLOWS (1EDU= 250 GPD)
FALLS CONTRACT SERVICE AREA					
20-034-132	GUZIKOWSKI, SANDRA (development rights purchased by Township in 2016, not available)	44.6	AC	0	0
20-049-036	SCHLEGEL, CHRISTOPHER M & PATRICIA A	5.90	R-2	2	500
20-049-034-002	SCHLEGEL, CHRISTOPHER M & PATRICIA A	4.88	R-2	2	500
20-049-034	SNEAD, GERALD L & JANET E	2.98	R-2	2	500
Totals		58.36	-	6	1,500

PARCEL NO.	PARCEL DESCRIPTION	GROSS ACRES	ZONING DISTRICT	PROJECTED EDU(S)	PROJECTED FLOWS (1EDU= 250 GPD)
FALLS TOWNSHIP SERVICE AREA					
20-049-038	SCHLEGEL, CHRISTOPHER M & PATRICIA A	8.9	R-2	2	500
20-049-037	BLACK, KENNETH A	2.95	R-2	2	500
Totals		11.85	-	4	1,000

(Revised September 19, 2018)

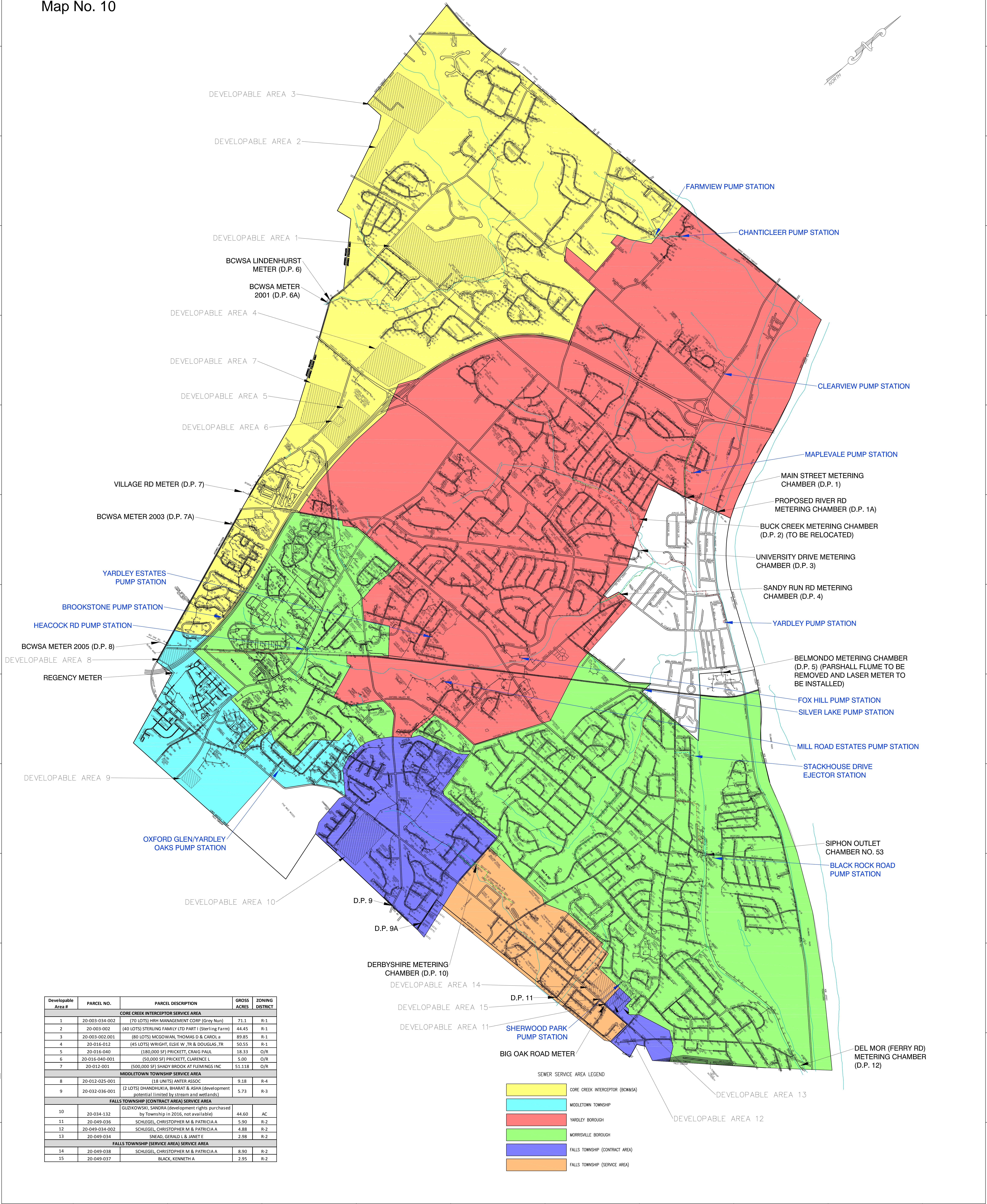
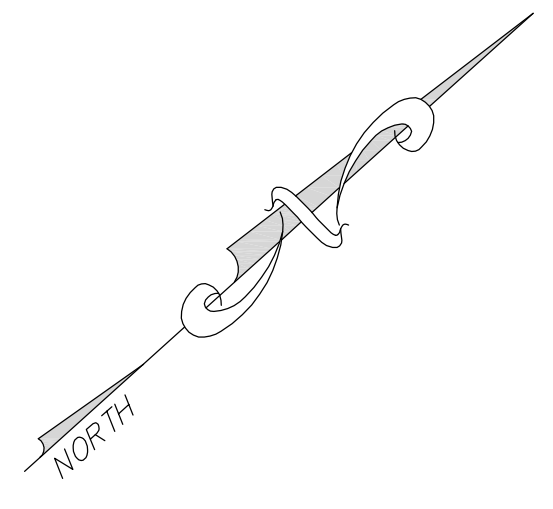
OVERALL SUMMARY OF NESHAMINY INTERCEPTOR SERVICE AREA				
2017 Average Daily Flows for Service Area				
Core Creek Interceptor	613,017	gpd		
Middletown Township	166,607	gpd		
Falls Township Contract Area	304,790	gpd		
Future Flows	Total Future Flows	CMP Flows	2017 Ave Daily Flows	Total
	gpd	gpd	gpd	gpd
Core Creek Interceptor	119,250	48,500	613,017	780,767
Middletown Township	5,000	43,500	166,607	215,107
Falls Township Contract Area	1,500	1,500	304,790	306,290
Falls Township Service Area	1,000	1,000		
Township Miscellaneous EDU(s)	32,500	32,500	-	32,500
	gpd	gpd		gpd

SCHEDULE OF CONNECTIONS				
SERVICE AREA	FUTURE			
	0 TO 5 YEARS	5 TO 10 YEARS	10 TO 15 YEARS	15 TO 20 YEARS
Core Creek Interceptor	150	150	150	262
Middletown Township	50	50	47	47
Falls Township Contract Area	6	-	-	-
Falls Township Service Area	-	4	-	-
Township Miscellaneous EDU(s)	130	-	-	-
TOTAL CONNECTIONS	336	204	197	309

H. Future Growth and Population Projections

According to the most recent Census, Lower Makefield Township had a population of 32,559 persons in 2010, which represents a less than 0.5% decrease in population from 32,681 persons in 2000. According to the 2010 Census, the median age is 44.3 years, with 25.1% of the population between the ages of 35 to 64 years.

Map No. 10



Developable Area #	PARCEL NO.	PARCEL DESCRIPTION	GROSS ACRES	ZONING DISTRICT
CORE CREEK INTERCEPTOR SERVICE AREA				
1	20-003-034-002	(70 LOTS) HRH MANAGEMENT CORP (Grey Nun)	71.1	R-1
2	20-003-002	(40 LOTS) STERLING FAMILY LTD PART I (Sterling Farm)	44.45	R-1
3	20-003-002-001	(80 LOTS) MCGOWAN, THOMAS D & CAROL A	89.85	R-1
4	20-016-012	(45 LOTS) WRIGHT, ELSIE W, JR & DOUGLAS, TR	50.55	R-1
5	20-016-040	(180,000 SF) PRICKETT, CRAIG PAUL	18.33	O/R
6	20-016-040-001	(50,000 SF) PRICKETT, CLARENCE L	5.00	O/R
7	20-012-001	(500,000 SF) SHADY BROOK AT FLEMINGS INC	51.118	O/R
MIDDLETOWN TOWNSHIP SERVICE AREA				
8	20-012-025-001	(18 UNITS) ANTER ASSOC	9.18	R-4
9	20-032-036-001	(2 LOTS) DHANDHUKIA, BHARAT & ASHA (development potential limited by stream and wetlands)	5.73	R-3
FALLS TOWNSHIP (CONTRACT AREA) SERVICE AREA				
10	20-034-132	GUZIKOWSKI, SANDRA (development rights purchased by Township in 2016, not available)	44.60	AC
11	20-049-036	SCHLEGEL, CHRISTOPHER M & PATRICIA A	5.90	R-2
12	20-049-034-002	SCHLEGEL, CHRISTOPHER M & PATRICIA A	4.88	R-2
13	20-049-034	SNEAD, GERALD D & JANET E	2.98	R-2
FALLS TOWNSHIP (SERVICE AREA) SERVICE AREA				
14	20-049-038	SCHLEGEL, CHRISTOPHER M & PATRICIA A	8.90	R-2
15	20-049-037	BLACK, KENNETH A	2.95	R-2

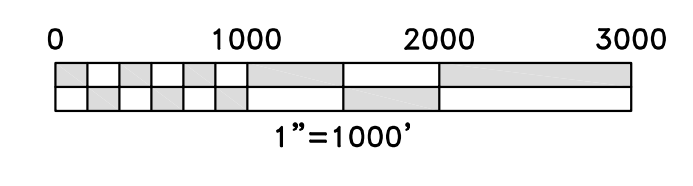
SEWER SERVICE AREA LEGEND

	CORE CREEK INTERCEPTOR (BCW&A)
	MIDDLETOWN TOWNSHIP
	YARDELY BOROUGH
	MORRISVILLE BOROUGH
	FALLS TOWNSHIP (CONTRACT AREA)
	FALLS TOWNSHIP (SERVICE AREA)

NOTE: PROPERTY BOUNDARIES SHOWN ON THE PLAN ARE NOT SURVEY LOCATED.

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POTENTIAL DEVELOPABLE LOTS FOR THE LOWER MAKEFIELD TOWNSHIP ACT 537 PLAN PREPARED FOR LOWER MAKEFIELD TOWNSHIP

Ebert Engineering, Inc.
Water and Wastewater Engineering

PO Box 540 Phone (610) 584 6701
4092 Skipack Pike, Suite 202 Fax (610) 584 6704
Skipack, PA 19474 E-mail: lebert@ebertengineering.com

1	REVISION TO MORRISVILLE BOROUGH SERVICE AREA	08/31/18	Drawn By	Project Engr.	Checked By	Scale	Job No.	Date	Drawing No.
			EMK	FEE	FEE	1"=1000'	068-001	05/16/16	1 OF 1

CHAPTER V
IDENTIFICATION OF ALTERNATIVES

CHAPTER V

ALTERNATIVES FOR IMPROVED WASTEWATER FACILITIES

As discussed in the previous chapters of this Special Study, BCWSA provides sanitary sewer conveyance service to numerous municipalities along the Neshaminy Creek between Newtown Township and Bensalem Township. Treatment capacity is provided by BCWSA through an agreement with the City of Philadelphia Water Department. A Settlement Agreement between BCWSA and the PA DEP included the establishment of the NICAP and the NICMP for the Neshaminy Interceptor and which included the requirement for tributary municipalities to complete updates to their Municipal Act 537 Plans, prepare a Sewer System Needs Analysis for their communities and complete a comprehensive inflow and infiltration (I/I) evaluation for their sanitary sewer systems.

BCWSA performed an evaluation of the interceptor characterizing the current flow conditions in the Neshaminy Interceptor and project conditions as a result of the municipal forecasted needs. The evaluation also considered the effects of reduction of infiltration and inflow from municipal sewer systems completed in conformance with the NICAP/NICMP and Supplemental Agreements which include flow limits for all tributary municipalities to the Neshaminy Interceptor. The detailed BCWSA Neshaminy Interceptor Technical Evaluation is provided in Appendix D.

The alternative to improve the wastewater facilities evaluated by BCWSA were the following types of improvements to the Neshaminy Interceptor:

1. Removal and Replacement of the Existing Sewer with Larger Diameter Pipe:
 - a. Advantages: The replacement pipe size can be increased to provide a surplus capacity in the design; any infiltration presently in the existing Interceptor piping will be removed; all excavations should be limited to the original trench of the pipe, thus eliminating rock excavation.
 - b. Disadvantages: Bypass pumping is required; significant surface disturbance will be sustained, especially with the larger diameter pipes and the deeper pipes; dewatering and environmental concerns would arise due to the close proximity to the Creek.
2. Installing a Relief Sewer alongside the Existing Interceptor:
 - a. Advantages: Bypass pumping can be avoided; excavations can be slightly shallower.
 - b. Disadvantages: Additional easements would likely be required; structures built in the vicinity of the Interceptor could inhibit the installation of a parallel sewer line in many cases; the existing Interceptor would remain in service, but its condition would not be improved in any way; rock excavation would likely be substantial; significant surface disturbance would still be encountered.

(Revised September 19, 2018)

Conclusion on Relief Sewers - Due to the list of negative aspects with a relief sewer, cost estimates for this type of alternative to improve the entire Interceptor were not prepared.

3. Lining the Existing Interceptor:

- a. Advantages: Minimal excavations (only around certain manholes to temporarily remove the cone sections); minimal surface disturbance; avoid excavations in steep banks of the Creek, which would be very difficult to stabilize after construction; rehabilitate the existing infrastructure and extend its service life; increased smoothness in the pipe, which in turn decreases the friction losses; removal of any infiltration in the existing pipe.
- b. Disadvantages: Bypass pumping is required; slight decrease in pipe diameter, which is more than offset by the increase in smoothness of the pipe.

The alternative selected by BCWSA is the lining of the 30 inch, 33 inch, 36 inch, 42 inch and portions of the 48inch Interceptor plus construction of a relief sewer along the 54" portion of the Interceptor at an estimated cost of \$18,173,000. Since this upgrade is based on significant I/I reductions by the municipalities, the modeled conditions utilized by BCWSA could take time to achieve and would need to be maintained in order to accommodate future flows. Connection limitations to Municipal customers who do not achieve the necessary I/I reductions would be instated.

BCWSA Neshaminy Interceptor Improvements-Easements: The construction of the 54 inch Interceptor relief sewer will be within the existing easement that has been acquired by BCWSA. The installation of CIPP lining will also be completed within existing right-of-ways and existing Interceptor easements.

BCWSA Neshaminy Interceptor Improvements - PNDI and BHP: It is anticipated the 54 inch Interceptor relief sewer will be installed by directional drilling within the easement and no excavation is anticipated for installation of liners. If excavation outside the easement area is anticipated during preparation of bid documents, BCWSA will identify the locations and submittal the information to PNDI and BHP for their determinations.

The BCWSA Implementation Schedule is outlines below:

BCWSA 54 Inch Interceptor Relief Sewer (**)	Elapsed Time (From DEP Plan Approval)
Design, Easements and Permits	within 8 months
Bid, Award and Construction Completion 30 inch, 33 inch, 36 inch, 42 inch and 48 inch Interceptor Lining (**)	within 18 months
Design, Easements and Permits	within 12 months
Bid, Award, and Construction Completion	within 24 months

(Revised September 19, 2018)

***Interceptor Manhole Inspections will be conducted during Interceptor Improvements. Manhole Defects identified during inspections will be scheduled for repair within 12 months of discovery.*

The focus of this Special Study is to provide long term sewage facilities planning for the Neshaminy Interceptor Public Sanitary Sewer Service Area in Lower Makefield Township and has evaluated the ability of the existing sanitary sewer infrastructure to meet the projected sanitary sewer needs of the service areas while complying with BCWSA selected alternative.

One of the key components of the Special Study is implementation of a Corrective Action Plan (CAP) to identify and remove I/I from the existing sanitary sewer system in this service area.

The following summarizes the tasks being performed by Lower Makefield Township to improve the wastewater facilities in the Township:

Corrective Action Plan

Lower Makefield Township has prepared a CAP which was reviewed by David Burke, Watershed Manager from PADEP in 2017. DEP's formal approval of the CAP will be effective when this Act 537 Special Study is approved. The CAP includes an I/I abatement plan with a CMP in an effort to further monitor the connections within the Study Areas. A copy of the CAP is attached in Appendix B.

Lower Makefield Township started to implement the Corrective Action Plan in November of 2017 once the CAP was reviewed by PADEP. It is anticipated the program will take roughly eight years to completely implement, and the CAP anticipates strategically and methodically rehabilitating one study area at a time. Within Lower Makefield Township's budget constraints, all necessary repairs will be made to the mains, manholes and laterals (public portion), (does not include the private portion of laterals) within the study area. Lower Makefield Township's goal is to reduce peak flows to the Neshaminy Interceptor and remove I/I from the existing conveyance system in order to minimize the need to enlarge downstream sanitary sewer facilities. This will allow BCWSA to comply with its settlement agreement with the PA DEP and allow BCWSA to comply with its existing agreement with the City of Philadelphia Water Department.

The following outlines the implementation schedule for the Corrective Action Plan and the current status:

- **YEAR ONE**

1. Receipt of PADEP acknowledgement to proceed with the CAP Implementation.
2. Install micro meters in Study Area A-1 within 4 months after receiving approval of CAP - Two meters were installed in Meter Sub-Basin A-1 in mid-November of 2017 (meter nos. FV-1 and NC-108). The flows will be monitored during the wet season of 2017 into 2018 and inspected.

(Revised September 19, 2018)

3. Pre-meter Study Area A-1 during the wet weather season.
4. Televis and complete an inspection report for all sewer mains in Study Area A-1 during wet weather season.
5. Televis and complete an inspection report for all laterals in Study Area A-1 during wet weather season. Laterals will be televised from the main to the transition.
6. Visually inspect and complete a manhole inspection report for all manholes in Study Area A-1 during wet weather season.
7. Monitor and record all issued Certificate of Compliances for laterals located on private property.
8. Identify all found defects and recommended repair method.
9. Install Parson Manhole Inserts in manholes that require them.
10. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
11. Compare flows to existing permanent BCW&SA flow meters and analyze for trends. (Same for all subsequent years)
12. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PADEP before March 31.

- **YEAR TWO**

STUDY AREA A-1

1. Post meter the area during the wet weather season.
2. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
3. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
4. Analyze flows from permanent BCW&SA flow meters for comparison (Same for all subsequent years)
5. Compare actual water usage to the sewer flows to determine I/I in the study area.
6. Determine the effectiveness of the repairs.
7. Determine if additional repairs/rehabilitation are needed.

STUDY AREA A-2

1. Install micro meters in Study Area A-2 at the latest on December 1st of Year 2 wet weather season.
2. Pre-meter Study Area A-2 during the wet weather season.
3. Televis and complete an inspection report for all sewer mains in Study Area A-2 during wet weather season.
4. Televis and complete an inspection report for all laterals in Study Area A-2 during wet weather season. Laterals will be televised from the main to the transition.
5. Visually inspect and complete a manhole inspection report for all manholes in Study Area A-2 during wet weather season.
6. Monitor and record all issued Certificate of Compliances for laterals located on private property.

(Revised September 19, 2018)

7. Identify all found defects and recommended repair method.
8. Install Parson Manhole Inserts in manholes that require them.
9. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
10. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PA DEP before March 31.

- **YEAR THREE**

STUDY AREA A-2

1. Post meter the area during the wet weather season.
2. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
3. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
4. Compare actual water usage to the sewer flows to determine I/I in the study area.
5. Determine the effectiveness of the repairs.
6. Determine if additional repairs/rehabilitation are needed.

STUDY AREA B-1 and B-2

1. Install micro meters in Study Area B-1 and B-2 at the latest on December 1st Year 3.
2. Pre-meter Study Area B-1 and B-2 during the wet weather season.
3. Televis and complete an inspection report for all sewer mains in Study Area B-1 and B-2 during wet weather season.
4. Televis and complete an inspection report for all laterals in Study Area B-1 and B-2 during wet weather season. Laterals will be televised from the main to the transition.
5. Visually inspect and complete a manhole inspection report for all manholes in Study Area B-1 and B-2 during wet weather season.
6. Monitor and record all issued Certificate of Compliances for laterals located on private property.
7. Identify all found defects and recommended repair method.
8. Install Parson Manhole Inserts in manholes that require them.
9. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
10. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PA DEP before March 31.

- **YEAR FOUR**

STUDY AREA B-1 and B-2

1. Post meter the area during the wet weather season.

(Revised September 19, 2018)

2. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
3. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
4. Compare actual water usage to the sewer flows to determine I/I in the study area.
5. Determine the effectiveness of the repairs.
6. Determine if additional repairs/rehabilitation are needed.

STUDY AREA C

1. Install micro meters in Study Area C at the latest on December 1st of Year 4
2. Pre-meter Study Area C during the wet weather season.
3. Televis and complete an inspection report for all sewer mains in Study Area C during wet weather season.
4. Televis and complete an inspection report for all laterals in Study Area C during wet weather season. Laterals will be televised from the main to the transition.
5. Visually inspect and complete a manhole inspection report for all manholes in Study Area C during the wet weather season.
6. Monitor and record all issued Certificate of Compliances for laterals located on private property.
7. Identify all found defects and recommended repair method.
8. Install Parson Manhole Inserts in manholes that require them.
9. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
10. The Annual Chapter 94 Report will provide an update on the progress of the I/I Rehabilitation progress. Submit to PA DEP by March 31.

• YEAR FIVE

STUDY AREA C

1. Post meter the area during the wet weather season.
2. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
3. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
4. Compare actual water usage to the sewer flows to determine I/I in the study area.
5. Determine the effectiveness of the repairs.
6. Determine if additional repairs/rehabilitation are needed.

STUDY AREA D

1. Install micro meters in Study Area D at the latest on December 1st of Year 5
2. Pre-meter Study Area D during the wet weather season.
3. Televis and complete an inspection report for all sewer mains in Study Area D during wet weather season.

(Revised September 19, 2018)

4. Televising and complete an inspection report for all laterals in Study Area D during wet weather season. Laterals will be televised from the main to the transition.
5. Visually inspect and complete a manhole inspection report for all manholes in Study Area D during the wet weather season.
6. Monitor and record all issued Certificate of Compliances for laterals located on private property.
7. Identify all found defects and recommended repair method.
8. Install Parson Manhole Inserts in manholes that require them.
9. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
10. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PA DEP before March 31.

• **YEAR SIX**

STUDY AREA D

1. Post meter the area during the wet weather season.
2. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
3. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
4. Compare actual water usage to the sewer flows to determine I/I in the study area.
5. Determine the effectiveness of the repairs.
6. Determine if additional repairs/rehabilitation are needed.

STUDY AREA E

1. Install micro meters in Study Area E at the latest on December 1st of Year 6
2. Pre-meter Study Area E during the wet weather season.
3. Televising and complete an inspection report for all sewer mains in Study Area E during wet weather season.
4. Televising and complete an inspection report for all laterals in Study Area F during wet weather season. Laterals will be televised from the main to the transition.
5. Visually inspect and complete a manhole inspection report for all manholes in Study Area E during the wet weather season.
6. Monitor and record all issued Certificate of Compliances for laterals located on private property.
7. Identify all found defects and recommended repair method.
8. Install Parson Manhole Inserts in manholes that require them.
9. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
10. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PA DEP before March 31.

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- **YEAR SEVEN**

STUDY AREA E

1. Post meter the area during the wet weather season.
2. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
3. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
4. Compare actual water usage to the sewer flows to determine I/I in the study area.
5. Determine the effectiveness of the repairs.
6. Determine if additional repairs/rehabilitation are needed.

STUDY AREA F

1. Install micro meters in Study Area F at the latest on December 1st of Year 7
2. Pre-meter Study Area F during the wet weather season.
3. Televis and complete an inspection report for all sewer mains in Study Area F during wet weather season.
4. Televis and complete an inspection report for all laterals in Study Area F during wet weather season. Laterals will be televised from the main to the transition.
5. Visually inspect and complete a manhole inspection report for all manholes in Study Area F during the wet weather season.
6. Monitor and record all issued Certificate of Compliances for laterals located on private property.
7. Identify all found defects and recommended repair method.
8. Install Parson Manhole Inserts in manholes that require them.
9. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
10. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PA DEP before March 31.

- **YEAR EIGHT**

STUDY AREA F

1. Post meter the area during the wet weather season.
2. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
3. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
4. Compare actual water usage to the sewer flows to determine I/I in the study area.
5. Determine the effectiveness of the repairs.
6. Determine if additional repairs/rehabilitation are needed.

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- **YEAR NINE**

The Township will continue to flow monitor one study area a year to determine if additional analysis and/or repairs are required based upon increases in flows not due to additional development. If additional repairs are required then the repairs will be performed in the following budget year. The order that the study areas will be reevaluated may change in order of priority based upon field observations and the analysis of flows at the permanent flow metering locations.

Each of the Study Areas will be monitor prior to any improvement work being completed and after improvements are completed. The monitoring after the work completed on the infrastructure will allow for the Township to determine if the improvements were effective in reducing I/I in the system. If it is determined not to be successful, then additional rehabilitation will be performed in the study area.

It is anticipated that this process will take 8 years to complete all Study Areas. This time projections is assumed that the monitoring, improvements to infrastructure and post monitoring can be completed in one cycle. If the process needs to be repeated, the overall time frame may extend by a year. After year eight, the Township will do an overall assessment of the system and development of a yearly I/I abatement program.

Pump Stations within Core Creek Interceptor Study Area

There are two pump stations located within the Core Creek Interceptor Study Area which have been identified as hydraulically overloaded in 2017. Lower Makefield Township has identified these two pump stations as an area of need, and they will be taking the necessary steps to address this issue.

The following outlines the evaluation, remediation and timing of the remediation of the pump station:

Brookstone Pump Station

This wet well dry well pumping station is located just south of Lynbrook Drive and services the Brookstone residential development. The collected wastewater is pumped to the BCWSA Meter 2003, where it enters and flows to the Neshaminy Interceptor. The pumping station is equipped with two pumps. The pump station conveys the wastewater through a six inch forcemain to the discharge location. An on-site permanent generator provides emergency power to the pump station.

Upon a detailed inspection of the pump station in July 2018, it was discovered the pump station was no longer secured in place and moving when the pumps engaged. The pump station will be upgrade from a dry well station to a submersible pump station. The existing dry well will be abandoned in place and a new wet well will installed for the submersible pumps and valve box.

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The following are the calculations of the required pumping capacity that either the new impellers or pumps must meet or exceed:

Existing Annual Average (AA) Flow	=	70,557 gpd
Projected Future Flows	=	0 gpd
Total AA Flows	=	70,557 gpd
PADEP Peak Factor	=	3.9
Required Pumping Capacity	=	70,557 gpd x 3.9 (peak factor)
	=	275,172 gpd
	=	275,172 gpd / 1,440 min/day
	=	191 gpm
	=	Use 200 gpm (min) pumping capacity

The pumping capacity of each of the two pumps will be 200 gpm through the upgrade of the pump station to be a submersible station.

The existing annual average flow rate exceeds the annual average flow capacity of the pump station. The 2018 Chapter 94 Report will report this pump station as an existing hydraulic overload in 2017. The existing hydraulic overload condition can be removed once Lower Makefield Township upgrades the pump station. The PADEP will be notified once this occurs in 2018.

Chanticleer Pumping Station

This pumping station is located just southeast of Dyers Lane and services the two small residential developments along Dyers Lane and Delaware Rim Drive. Although the pump station is situated within the Yardley Borough sewer service area, water is pumped from this pumping station to the Farmview Pump Station that conveys the wastewater to the Core Creek Interceptor Service Area. The pumping station is equipped with two submersible pumps. The pump station conveys the wastewater through a two inch forcemain to the discharge location. A portable on-site generator provides emergency power to the pump station. It is noted that the portable generator is permanently stored at the pump station.

The existing flows to the Chanticleer Pump Station in 2017 were 18,540 gpd. There are fourteen proposed edu(s) to be connected to this pump station in the next five years. This includes five edu(s) from the proposed Dogwood Drive Subdivision and nine existing residential dwellings that can be serviced by the proposed sanitary sewer extension. While there are other existing residential dwellings in the area who have selected to remain on the existing on-lot systems, a total of twenty three (23) edu(s) were reserved on the Connection Management Plan should one of those systems malfunction. There have been no documented malfunctions of on-lot systems in this area. With the addition of these existing homes, the total projected flows to this pump station are 24,290 gpd (18,540 gpd existing plus 5,750 gpd proposed 23 edus x 250 gpd/edu).

The existing single pump pumping capacity of the Chanticleer Pump Station was confirmed by a drawdown test performed in 2017. The pumping capacity of the pump station with the largest pump out of service is 49.3 gpm (70,992 gpd). The PADEP requires a peak factor of 4.2 for

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pump stations servicing flows less than 30,000 gpd. The existing pump station can therefore service an average daily flow of 16,903 gpd and is currently hydraulically overloaded.

The pump station has to be upgraded to meet both the existing and projected flows. The following are the calculations of the required pumping capacity:

Existing Annual Average (AA) Flow	=	18,540 gpd
Projected Future AA Flows	=	5,750 gpd
Total AA Flows	=	24,290 gpd
PADEP Peak Factor	=	4.2
Required Pumping Capacity	=	24,290 gpd x 4.2 (peak factor)
	=	102,018 gpd
	=	102,018 gpd / 1,440 min/day
	=	70.84 gpm
	=	Use 75 gpm (min) pumping capacity

The Chanticleer Pump Station has an existing two inch forcemain that is near the recommended maximum velocity with the existing 49 gpm pumps (5.11 ft/sec), and the recommended pumping rate of 75 gpm would produce a velocity of 7.66 ft/sec. This would exceed the recommended velocity in a forcemain (2 to 6 ft/sec). It is recommended to replace the existing nine hundred feet of two inch forcemain with a three inch forcemain in the same trench. This will allow for a velocity of 3.33 ft/sec in the forcemain at a pumping rate of 75 gpm.

The estimated cost to replace the forcemain which is located in a non-paved open space area is approximately \$36,000.00 (900 linear feet x \$40.00/linear foot). The proposed three inch forcemain will be installed within the same trench as the existing two inch forcemain. It may also be necessary to replace the existing pumps as part of the upgrade of the pump station. Lower Makefield Township is currently working with a developer, who will perform this upgrade.

Pump Station in Middletown Township Service Area

There is one pump station located within the Middletown Township Service Area which has been identified to have a potential future hydraulic overload with the 20-year planning flows. However it is not proposed to perform this upgrade at this time and to monitor the flows only.

The following outlines the evaluation, remediation and timing of the remediation of the pump station:

Oxford Glen/Yardley Oaks Pumping Station

This wet well dry well pumping station is located at the intersection of Acorn Drive and Woodview Drive and services the surrounding residential developments. The pumping station is equipped with two pumps, which pump an average of 134.5 gpm (193,680 gpd) each, as

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confirmed by a drawdown test performed in 2017. An on-site generator provides emergency power.

The annual average flow capacity of the existing pump station based upon the drawdown test has been calculated below:

Peak Pumping Capacity	=	134.5 gpm
	=	134.5 gpm x 1,440 min/day
	=	193,680 gpd
PADEP Peak Factor	=	4.0
Annual Average (AA) Flow	=	193,680 gpd / 4.0 (peak factor)
	=	48,420 gpd
Existing Flows	=	39,117 gpd
Projected Flows	=	12,000 gpd
Total Flows	=	51,117 gpd
Required Pumping Capacity	=	51,117 gpd x 3.9 (peak factor)
	=	199,357 gpd
	=	199,357 gpd / 1,440 min/day
	=	138.4 gpm
	=	Use 140 gpm (min) pumping capacity

The average flow rate for the pump station in 2017 was 39,117 gpd. The annual average flow rate does not exceed the annual average flow capacity of the pump station, and there are no reported overload conditions at this pump station. With the 20-year flow projection, the pump station pumps may need to be upgraded to adequately service the 20-year planning projections. The Township will continue to monitor this pump station through the Chapter 94 Report. If it is determined an upgrade will be necessary, a planning effort will be performed at that time and PA DEP will be notified.

Connection Management Plan

Lower Makefield Township prepared an updated CMP and Lower Makefield Township requested and submitted the information to BCWSA and PADEP. As part of the CMP request, miscellaneous EDUs have been established for connection of failing OLDS or minor subdivisions. For residential development, 60 EDUs have been allocated. For non-residential development, 70 EDUs have been allocated. Under the stipulations within the CMP, these miscellaneous EDUs can be utilized to service future sewage needs or for development projects with 10 edus or less. Table No. 1 in Chapter III summarizes the proposed 54 sewer connections from 2014 through 2021, which have been incorporated into the CMP.

The proposed connections were approved by PA DEP in a letter dated January 31, 2018. To date, BCWSA has only released connections for 2014 and 2015. Proposed connections for 2016 and

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2017 have not been released. Until BCWSA releases the proposed connections on the CMP, no additional connections can be made.

The CMP is in place by the Township and they will continue to enforce the application to monitor the number of connections to the system located within the Core Creek Interceptor, Middletown Township, Falls Township Contract, and Falls Township Service Areas.

No Action Alternative

As outlined in Chapter V, H, of the Act 537 Plan instructions requires a no-action alternative be evaluated as part of any Act 537 planning. The projected sewage flows from Lower Makefield Township Neshaminy Interceptor Service Area coupled with the existing flow and flow projections from other Municipalities contributing to the Neshaminy Interceptor sewage flow and the need to comply with hydraulic loading capacity of the infrastructure, render this alternative without merit.

CHAPTER VI
EVALUATION OF ALTERNATIVES

CHAPTER VI

ALTERNATIVES EVALUATION

The purpose of this Chapter is to compare the alternatives identified in Chapter V against other regional and local environmental, financial, and planning documents, and identify any potential conflicts between the alternatives for the project and the goals of the other documents and programs.

A. Consistency Evaluation

1. Comprehensive Water Quality Management Plans (COWAMP)

Originally developed under Sections 4 and 5 of the Clean Streams Law and 208 of the Clean Water Act, COWAMP plans have not been subjected to continuing updates, unlike some of the other planning documents listed below. Due to their early development, regional wastewater treatment was a common theme in the 1990 Act 537 Plan for Lower Makefield Township where the regional wastewater treatment options are discussed, and conclude that collection and conveyance to the City of Philadelphia Northeast Pollution Control Plant and Morrisville Borough Wastewater Treatment Plant are the best alternatives for its commensurate basin. To the extent of its limited applicability, the evaluated alternatives are not inconsistent with these indications.

Additionally, no inconsistencies are apparent with Title II of the Clean Water Act or Titles II and VI of the Water Quality Act of 1987.

2. Chapter 94 Municipal Wasteload Management Plan

As discussed throughout this Act 537 Special Study, the portion of Lower Makefield Township that flows to the Neshaminy Interceptor is subject to a Connection Management Plan per the agreement between BCWSA and the PA DEP to address capacity concerns with the Neshaminy Interceptor and the Totem Road Pump Station.

As part of the PA DEP Consent Order for the Neshaminy Interceptor, each municipality that contributes to the interceptor has to reduce their I/I issues. As the Neshaminy Interceptor is now near its capacity, the goal of the Consent Order is to reduce the existing average and peak flows to the point where the existing interceptor can meet both the existing and future demands of the entire service area. The Lower Makefield Township I/I program is being mandated through a CAP that was required by the Settlement Agreement between the PA DEP and the BCWSA and is an important component of the overall CAP for the Neshaminy Interceptor.

Lower Makefield Township currently has two pump stations located within the Neshaminy Interceptor service area that are hydraulically overloaded. The first pump station is the Brookstone Pump Station. The hydraulic overload has been

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caused by wear on the existing impellers, which has reduced the pumping capacity of the pump station. Either the impellers will be replaced or new pumps will be installed in 2018. It is noted that there are no documented surcharges or overflows that have occurred at this pump station.

The second pump station is the Chanticleer Pump Station, where the current pumping capacity does not meet PA DEP's current peak factor requirements. There have been no documented surcharges or overflows at this pump station. There are, however, a total of twenty three (23) edus that are proposed to connect to this pump station in the future. In order to handle the additional flows, it is proposed to replace the existing two inch force main with a three inch force main. Lower Makefield Township will either replace the force main or work with the developer of a proposed subdivision within the service area to have this improvement completed. It is anticipated that this work will be accomplished in 2018.

3. State Water Plan

The State Water Plan was recently updated, and provides the following general guidelines:

- Identify and prioritize water resource and water supply development projects
- Provide information to public and private decision makers regarding water availability
- Identify opportunities for improving operation of the Commonwealth's existing water resources infrastructure
- Guide the development and implementation of policies and programs by State agencies that will reduce the risk of flooding and water shortages
- Guide policies on activities that directly and significantly affect the quantity and quality of water available
- Educate public officials and the public at large regarding the sources and uses of water in this Commonwealth

Due to the nature of the subject planning effort, no inconsistencies are apparent.

4. Lower Makefield Township Comprehensive Plan

The 2003 Lower Makefield Township Comprehensive Plan envisions the continuation of the quality of life in Lower Makefield. Elements of this quality of life include protecting community aesthetics, preserving aspects of the natural and historic environment, accommodating expected growth without adversely affecting residents, and creating and supporting necessary community services that enhance life. The 2003 Plan states that all future major development areas shall be connected to the existing public sewer system.

The evaluated alternatives do not present any inconsistencies.

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5. **Anti-Degradation Requirements of Pa Code Title 25 Chapters 93, 95, and 102**

These chapters are primarily concerned with water quality issues as they relate to point discharges (Chapter 93 and 95) and erosion and sedimentation control regulations (Chapter 102). In particular, they are concerned with maintaining existing water quality standards, which are typically enforced via NPDES discharge permits. As the public sewer options presented in Chapter V involve connection to an existing WWTP, which is in compliance with the current permit limits, no inconsistencies currently exist. None of the receiving waterways in Lower Makefield Township are classified as high quality (HQ) or exceptional value (EV), and no additional point discharges (i.e. small flow treatment facilities) are proposed in the alternatives.

Individual conventional and alternate on-lot sewage disposal systems are not subjected to NPDES permitting requirements, and would not generate any inconsistencies.

For the purposes of this report, Chapter 102 states that an erosion and sedimentation control plan shall be developed for any “disturbance activity that will result in a total earth disturbance of 5,000 square feet (464.5 square meters) or more.” Within the scope of the public sewer options, this amount of disturbance is unlikely to occur. In the event that the disturbance limits are exceeded, Lower Makefield Township (or the appropriate entity) will be responsible for ensuring full compliance with the requirements of this part.

6. **Pennsylvania Prime Agricultural Land Policy**

Lower Makefield Township’s 2003 Comprehensive Plan recognizes the requirements of the Pennsylvania Municipalities Planning Code to facilitate comprehensive plans that “address the protection of natural resources including wetlands, woodlands, prime agricultural land, and steep slopes.”

To that end, Lower Makefield Township has established an Agricultural Preservation Plan within which property owners may voluntarily enter if minimum criteria have been met, namely property size and the inclusion of prime soils. The Farmland Preservation Corporation, established by Lower Makefield Township as part of their agricultural land preservation efforts, owns about 311 acres of farmland in the Township. In addition, the Township has endorsed the formation of an Agricultural Security District that includes about 794 acres of land on 19 properties. Additionally, the Township Zoning Ordinance standards seek to protect farmland by requiring protection of farmland as part of cluster development in the R-1 district. The R-1 district also permits accessory uses that support farming activities.

As there are no alternatives that would cause an immediate or irreversible loss of any of these areas, no inconsistencies exist.

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7. **County Stormwater Management Plan**

County stormwater management plans are an extension of Act 167 of 1978, and facilitate more localized provisions to address issues, such as existing and future hydrologic conditions, land development patterns, floodplain issues, existing stormwater management issues, and provide for periodic updates to identified concerns and needed improvements. Within the scope of this planning effort and identified alternatives, no inconsistencies are expected.

8. **Wetland Protection under Chapter 105**

No alternatives have been identified which will have a direct impact on any wetlands, and therefore, no inconsistencies exist.

Regardless of this information, it is acknowledged that any activities within any wetland areas will be in full compliance with all applicable Federal and Local regulations.

9. **Pennsylvania Natural Diversity Inventory (PNDI)**

The only alternative selected by this Act 537 plan Special Study that involves construction is the potential replacement of the Chanticleer Pump Station force main. There were no conflicts identified. A copy of the PNDI results is contained at the end of this chapter.

It is noted that any future projects, wastewater alternatives, or changes that fall under the jurisdiction of the Pennsylvania Natural Diversity Inventory Program will be required to document consistency.

10. **Pennsylvania Historic Preservation Act of 1978**

Given that no new structures or development activities are currently planned as part of the selected alternatives, notification under the Pennsylvania Historic Preservation Act of 1978 is not required. The proposed three inch forcemain replacement for the Chanticleer Pump Station will be installed within the same location as the existing two inch forcemain. No additional easements or rights of way will be required for the replacement of the forcemain. Therefore, notification under the Pennsylvania Historic Preservation Act of 1978 is not required.

It is noted that any future projects, wastewater alternatives, or changes that fall under the jurisdiction of Pennsylvania's Historic Preservation Act will be required to document consistency.

B. Resolution of Inconsistencies

Based on the above and within the scope of the identified alternatives, no inconsistencies are noted and no resolutions are necessary.

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C. Evaluation of Alternatives and Associated Costs

The evaluation of the alternatives that were presented in Chapter V along with the BCWSA's evaluation of the Neshaminy Interceptor will be more fully explored in this Chapter. The alternatives for the below listed five areas will be discussed in this Chapter:

1. Neshaminy Interceptor (BCWSA Alternatives)
2. Core Creek Service Area
3. Middletown Township Service Area
4. Falls Township Contract Area
5. Falls Township Service Area

Neshaminy Interceptor (BCWSA Alternatives)

As discussed in the previous chapters of this Special Study, BCWSA provides sanitary sewer conveyance service to numerous municipalities along the Neshaminy Creek between Newtown Township and Bensalem Township. Treatment capacity is provided by BCWSA through an agreement with the City of Philadelphia Water Department. A Settlement Agreement between BCWSA and the PA DEP included the establishment of a NICAP and NICMP for the Neshaminy Interceptor and included the requirement for tributary municipalities to complete updates to their Municipal Act 537 Plans, prepare a Sewer System Needs Analysis for their communities and complete a comprehensive inflow and infiltration (I/I) evaluation for their sanitary sewer systems.

BCWSA performed an evaluation of the interceptor characterizing the current flow conditions in the Neshaminy Interceptor and project conditions as a result of the municipal forecasted needs. The evaluation also considered the effects of reduction of infiltration and inflow from municipal sewer systems completed in conformance with the NICAP/NICMP and Supplemental Agreements which include flow limits for all tributary municipalities to the Neshaminy Interceptor. The detailed BCWSA Neshaminy Interceptor Technical Evaluation is provided in Appendix D.

The alternative to improve the wastewater facilities evaluated by BCWSA were the following types of improvements to the Neshaminy Interceptor:

1. Removal and Replacement of the Existing Sewer with Larger Diameter Pipe:
 - a. Advantages: The replacement pipe size can be increased to provide a surplus capacity in the design; any infiltration presently in the existing Interceptor piping will be removed; all excavations should be limited to the original trench of the pipe, thus eliminating rock excavation.
 - b. Disadvantages: Bypass pumping is required; significant surface disturbance will be sustained, especially with the larger diameter pipes and the deeper pipes; dewatering and environmental concerns would arise due to the close proximity to the Creek.

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2. Installing a Relief Sewer alongside the Existing Interceptor:

- a. Advantages: Bypass pumping can be avoided; excavations can be slightly shallower.
- b. Disadvantages: Additional easements would likely be required; structures built in the vicinity of the Interceptor could inhibit the installation of a parallel sewer line in many cases; the existing Interceptor would remain in service, but its condition would not be improved in any way; rock excavation would likely be substantial; significant surface disturbance would still be encountered.

Conclusion on Relief Sewers - Due to the list of negative aspects with a relief sewer, cost estimates for this type of alternative to improve the entire Interceptor were not prepared.

3. Lining the Existing Interceptor:

- a. Advantages: Minimal excavations (only around certain manholes to temporarily remove the cone sections); minimal surface disturbance; avoid excavations in steep banks of the Creek, which would be very difficult to stabilize after construction; rehabilitate the existing infrastructure and extend its service life; increased smoothness in the pipe, which in turn decreases the friction losses; removal of any infiltration in the existing pipe.
- b. Disadvantages: Bypass pumping is required; slight decrease in pipe diameter, which is more than offset by the increase in smoothness of the pipe.

BCWSA Neshaminy Interceptor Improvements-Easements: The construction of the 54 inch Interceptor relief sewer will be within the existing easement that has been acquired by BCWSA. The installation of CIPP lining will also be completed within existing right-of-ways and existing Interceptor easements.

BCWSA Neshaminy Interceptor Improvements - PNDI and BHP: It is anticipated the 54 inch Interceptor relief sewer will be installed by directional drilling within the easement and no excavation is anticipated for installation of liners. If excavation outside the easement area is anticipated during preparation of bid documents, BCWSA will identify the locations and submit the information to PNDI and BHP for their determinations.

The BCWSA Implementation Schedule is outlined below:

BCWSA 54 Inch Interceptor Relief Sewer (**)	Elapsed Time (From DEP Plan Approval)
Design, Easements and Permits	8 months
Bid, Award and Construction Completion 30 inch, 33 inch, 36 inch, 42 inch and 48 inch Interceptor Lining (**)	18 months
Design, Easements and Permits	12 months
Bid, Award, and Construction Completion	24 months

***Interceptor Manhole Inspections will be conducted during Interceptor Improvements. Manhole Defects identified during inspections will be scheduled for repair within 12 months of discovery.*

The alternative selected by BCWSA is the lining of the 30 inch, 33 inch, 36, 42 inch and portions of the 48inch Interceptor plus construction of a relief sewer along the 54" portion of the Interceptor at an estimated cost of \$18,173,000. Since this upgrade is based on significant I/I reductions by the municipalities, the modeled conditions utilized by BCWSA could take time to achieve and would need to be maintained in order to accommodate future flows. Connection limitations to Municipal customers who do not achieve the necessary I/I reductions would be instated.

Core Creek Service Area

Collection and Conveyance System

The existing gravity sanitary sewer collection and conveyance system has sufficient capacity projected and existing flows for this service area as identified in Chapter IV. The entire gravity sanitary sewer system in this sanitary sewer service area will be evaluated in more detail as part of the Corrective Action Plan (CAP) to identify and reduce any sources of inflow and infiltration. The CAP will utilize a systematic metering program combined with the existing permanent flow meters to identify the locations of high flows. Once the general areas of high flows during wet weather events are identified then Lower Makefield Township will televise the areas with potential I/I to identify the sources of the I/I. The identification of the sources of I/I will allow Lower Makefield Township and its engineer to recommend the best method of repairing the gravity sanitary sewer mains. The options for the repair of gravity sanitary sewer mains will include the following:

- Grouting of individual joints and cracks
- Spot repairs using 2 to 4 foot long Cured In Place Pipe Liners
- Cured In Place Pipe Liners from manhole to manhole
- Replacement of the existing gravity sanitary sewers

The use of grouting has proven to be a short term fix for removing I/I. It is effective but often times it simply leads to leaks occurring in nearby joints and often times the grouted joints will leak again in about ten years. The use of grouting will only be utilized in

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certain circumstances where the leaks do not warrant a more permanent fix or to temporarily remove the I/I until a decision or the budget allows for a permanent solution. It may be necessary to initially grout areas due to budgetary concerns but this option will be less desirable compared to a more permanent fix of utilizing cured in place pipe liners.

The use of two to four foot long cured in place pipe liners for spot repairs is a very effective permanent method of repairing cracks or broken pipes in sections of gravity sanitary sewer mains that are in good overall condition except for a few areas. There are sometimes small sections of gravity sanitary sewers that have cracks or breaks as a result of either another utility crossing the sanitary sewer main or as a result of an improper bedding of a small section of the sanitary sewer. In these situations the use of spot repairs is a cost effective permanent solution that can be implemented.

The use of manhole to manhole cured in placed pipe liners will be utilized where the sanitary sewer main is in overall good structural conditions but there are numerous leaks. This is a more cost effective method of providing a permanent solution compared to replacing the existing gravity sanitary sewer mains. This alternative will be utilized where the conditions of the existing gravity sanitary sewer mains warrant a permanent solution due to an entire section of the gravity sanitary sewer main being in poor condition. This option also can be accomplished in a fairly short time frame which will reduce the duration of any by-pass pumping.

The complete replacement of a gravity sanitary sewer main will be considered when the existing sanitary sewer main is in poor structural condition that will not allow for the installation of a cured in place pipe liner. The advantage of this option is that it allows for a permanent solution utilizing the current construction materials and methods. The other advantage is that the pipe size can be increased to provide additional capacity in the conveyance system and can eliminate bottlenecks if they occur in this location. It is noted that if existing pipes are replaced with larger diameter pipes, PA DEP should be contacted to determine whether additional sewage planning would be required. The disadvantage is the increased costs compared to the cured in place pipe liners as well as the fact that the bypass pumping is considerably longer. The use of this option will also involve earth disturbance often along environmentally sensitive areas. The use of this option will be limited to areas where there are no other feasible options.

The selection of any of the above alternatives will be determined on a case by case basis as part of the CAP. The PA DEP will be informed of the progress of the repairs to the gravity collection and conveyance system as part of the CAP updates to the PA DEP. The reduction in flows as a result of the completion of the repairs will also be reported to the PA DEP. PA DEP will also be notified of repairs so a determination can be made if additional sewage planning would be required.

The manholes will also be evaluated as part of the CAP. The identification of any leaks into the manholes will identify the best method of repairing the manholes. The types of repairs could be any of the following:

- Raising manhole cone section to be above 100 year flood elevation or to avoid sheet flow across the manhole

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- Replacement of a standard manhole frame and cover with a watertight frame and cover
- Grouting of manhole pipe penetrations
- Installation of a spray on liner on the entire interior of the manhole
- Replacement of the entire manhole

Lower Makefield Township will select and implement any of the above to resolve either structural issues or to remove sources of I/I as part of the implementation of the CAP. The PA DEP will be updated on the selected solution and reason for the selection of the method of repair as part of the updates on the CAP to the PA DEP.

Lower Makefield Township currently has \$50,000.00 per year budgeted for the repair of the gravity collection system. There may also be larger capital projects that are identified as a result of the implementation of the CAP. Lower Makefield has incorporated some of those costs into the large bond issuance that they performed in 2016. Approximately five million dollars of the bond funding was allocated towards its overall sanitary sewer system which also includes the Morrisville Municipal Authority service area.

Pump Stations

There are three pump stations in the Core Creek Interceptor Service Area. The pump stations are as follows:

- Chanticleer Pump Station
- Brookstone Pump Station
- Farmview Pump Station

The following is a analysis of the capacity and condition of each pump station.

Chanticleer Pump Station

The flow to the Chanticleer Pump Station in 2017 was 18,540 gpd. In 2017, a drawdown test was performed on the pump station. The pumping capacity of the pump station with the largest pump out of service is 49.3 gpm (70,992 gpd). The PADEP requires a peak factor of 4.2 for pump stations servicing flows less than 30,000 gpd. The existing pump station can therefore service an average daily flow of 16,903 gpd and is currently hydraulically overloaded.

The pump station has to be upgraded to meet both the existing and projected flows. The following are the calculations of the required pumping capacity:

Existing Annual Average (AA) Flow	=	18,540 gpd
Projected Future AA Flows	=	5,750 gpd
Total AA Flows	=	24,292 gpd
PADEP Peak Factor	=	4.2
Required Pumping Capacity	=	24,292 gpd x 4.2 (peak factor)
	=	102,026 gpd
	=	102,026 gpd / 1,440 min/day
	=	70.9 gpm
	=	Use 75 gpm (min) pumping capacity

The Chanticleer Pump Station has an existing two inch force main that is near the recommended maximum velocity with the existing 49 gpm pumps (5.11 ft/sec), and the recommended pumping rate of 75 gpm would produce a velocity of 7.66 ft/sec. This would exceed the recommended velocity in a force main (2 to 6 ft/sec). It is recommended to replace the existing nine hundred feet of two inch force main with a three inch force main. This will allow for a velocity of 3.33 ft/sec in the force main at a pumping rate of 75 gpm.

The estimated cost to replace the force main which is located in a non-paved open space area is approximately \$36,000.00 (900 linear feet x \$40.00/linear foot). The proposed three inch forcemain will be installed within the same trench as the existing two inch forcemain. It may also be necessary to replace the existing pumps as part of the upgrade of the pump station. Lower Makefield Township is currently working with a developer, who will perform this upgrade.

The option to replace just the pumps was evaluated but the velocity in the force main would have exceeded the recommended velocity of two to six feet per second. The increased friction head would have also required a significantly larger motor which would have led to not only increased electrical costs but also the potential to have to replace the incoming electric service and may have required a larger emergency generator. As a result this alternative was not selected.

The alternative to replace the force main was evaluated. The advantages of this option are the reduced electrical costs and the ability to potentially replace the existing pumps with similar sized pumps. Lower Makefield Township wants to replace the existing single phase pumps with pumps that utilize three phase electrical power in order to increase the reliability of the pumps. The horsepower of the new pumps however will be same. This will allow for the emergency generator to remain the same. The incoming electric service will remain the same but the electric supply to the pumps will be changed from single phase to three phase. The estimated cost to replace the pumps, controls and convert the single phase electric power to three phase is estimated at \$65,000.00.

The entire cost of this upgrade will be approximately \$100,000.00. Lower Makefield Township is currently in discussions with the developer of one of the proposed projects

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on these requirements. Lower Makefield Township has the existing funds available to implement this alternative

Brookstone Pump Station

This wet well dry well pumping station is located just south of Lynbrook Drive and services the Brookstone residential development. The collected wastewater is pumped to the BCWSA Meter 2003, where it enters and flows to the Neshaminy Interceptor. The pumping station is equipped with two pumps. The pump station conveys the wastewater through a six inch forcemain to the discharge location. An on-site permanent generator provides emergency power to the pump station.

Upon a detailed inspection of the pump station in July 2018, it was discovered the pump station was no longer secured in place and moves during periods of elevated groundwater. The pump station will be upgrade from a dry well station to a submersible pump station. The existing dry well will be abandoned in place and a new wet well will installed for the submersible pumps and a new valve and meter vault will be installed.

The following are the calculations of the required pumping capacity that either the new impellers or pumps must meet or exceed:

Existing Annual Average (AA) Flow	=	70,557 gpd
Projected Future Flows	=	0 gpd
Total AA Flows	=	70,557 gpd
PADEP Peak Factor	=	3.9
Required Pumping Capacity	=	70,557 gpd x 3.9 (peak factor)
	=	275,172 gpd
	=	275,172 gpd / 1,440 min/day
	=	191 gpm
	=	Use 200 gpm (min) pumping capacity

The pumping capacity of each of the two pumps will be 200 gpm through the upgrade of the pump station to be a submersible station.

The pump station is at the end of its design life and has a structural issue causing the whole station to move when the pumps turn on. This pump station could be a potential issue and hazard, therefore the Township will be replacing this pump station starting within the calendar year of 2018.

The advantage of replacing this pump station that this will provide a long term solution to the Township. The disadvantage is that the cost to upgrade the pump station is approximately \$232,101 to replace.

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Farmview Pump Station

The flow to the Farmview Pump Station in 2017 was 39,091 gpd. In 2017, a drawdown test was performed on the pump station. The pumping capacity of the pump station with the largest pump out of service is 166.3 gpm (239,472 gpd). The PADEP requires a peak factor of 3.9 for pump stations servicing flows less than 60,000 gpd. The existing pump station can therefore service an average daily flow of 61,403 gpd. There is approximately 20,777 gpd of available capacity in this pump station.

It is noted that the Chanticleer Pump Station conveys its wastewater to the Farmview Pump Station. There are a total of twenty three (23) proposed connections to the Chanticleer Pump Station. This will contribute a future flow of 5,750 gpd (23 edus x 250 gpd/edu). There are no projected future flows to the gravity sanitary sewer system that conveys its wastewater to the Farmview Pump Station. The projected flows to this pump station will be 44,841 gpd (39,091 gpd + 5,750 gpd). After the connection of these projected flows there will still be 16,562 gpd (61,403 gpd - 44,841 gpd) of available capacity.

Middletown Township Service Area

Collection and Conveyance System

The existing gravity sanitary sewer collection and conveyance system has sufficient capacity projected and existing flows for this service area as identified in Chapter IV. The entire gravity sanitary sewer system in this sanitary sewer service area will be evaluated in more detail as part of the Corrective Action Plan (CAP) to identify and reduce any sources of inflow and infiltration. The CAP will utilize a systematic metering program combined with the existing permanent flow meters to identify the locations of high flows. Once the general areas of high flows during wet weather events are identified then Lower Makefield Township will televise the areas with potential I/I to identify the sources of the I/I. The identification of the sources of I/I will allow Lower Makefield Township and its engineer to recommend the best method of repairing the gravity sanitary sewer system. The alternatives are the same as the Core Creek Alternative Analysis and are referenced above.

Pump Stations

There is one pump stations in the Middletown Township Service Area. The pump station is the Yardley Oaks Pump Station.

Yardley Oaks Pump Station

This wet well dry well pumping station is located at the intersection of Acorn Drive and Woodview Drive and services the surrounding residential developments. The pumping station is equipped with two pumps, which pump an average of 134.5 gpm (193,680 gpd) each, as confirmed by a drawdown test performed in 2017. An on-site generator provides emergency power.

(Revised September 19, 2018)

The annual average flow capacity of the existing pump station based upon the drawdown test has been calculated below:

$$\begin{aligned} \text{Peak Pumping Capacity} &= 134.5 \text{ gpm} \\ &= 134.5 \text{ gpm} \times 1,440 \text{ min/day} \\ &= 193,680 \text{ gpd} \\ \\ \text{PADEP Peak Factor} &= 4.0 \\ \\ \text{Annual Average (AA) Flow} &= 193,680 \text{ gpd} / 4.0 \text{ (peak factor)} \\ &= 48,420 \text{ gpd} \\ \\ \text{Existing Flows} &= 39,117 \text{ gpd} \\ \text{Projected Flows} &= 12,000 \text{ gpd} \\ \text{Total Flows} &= 51,117 \text{ gpd} \\ \text{Required Pumping Capacity} &= 51,117 \text{ gpd} \times 3.9 \text{ (peak factor)} \\ &= 199,357 \text{ gpd} \\ &= 199,357 \text{ gpd} / 1,440 \text{ min/day} \\ &= 138.4 \text{ gpm} \\ &= \text{Use } \mathbf{140 \text{ gpm (min) pumping capacity}} \end{aligned}$$

The average flow rate for the pump station in 2017 was 39,117 gpd. The annual average flow rate does not exceed the annual average flow capacity of the pump station, and there are no reported overload conditions at this pump station. With the 20-year flow projection, the pump station pumps may need to be upgraded to adequately service the 20-year planning projections. The Township will continue to monitor this pump station through the Chapter 94 Report. If it is determined an upgrade will be necessary, a planning effort will be performed at that time and PA DEP will be notified.

Falls Township Contract Area

Collection and Conveyance System

The existing gravity sanitary sewer collection and conveyance system has sufficient capacity projected and existing flows for this service area as identified in Chapter IV. The entire gravity sanitary sewer system in this sanitary sewer service area will be evaluated in more detail as part of the Corrective Action Plan (CAP) to identify and reduce any sources of inflow and infiltration. The CAP will utilize a systematic metering program combined with the existing permanent flow meters to identify the locations of high flows. Once the general areas of high flows during wet weather events are identified then Lower Makefield Township will televise the areas with potential I/I to identify the sources of the I/I. The identification of the sources of I/I will allow Lower Makefield Township and its engineer to recommend the best method of repairing the gravity sanitary sewer system. The alternatives are the same as the Core Creek Alternative Analysis and are referenced above.

(Revised September 19, 2018)

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EE, Inc.

Pump Stations

There are no pump stations in the Falls Township Contract Area.

Falls Township Service Area

Collection and Conveyance System

The existing gravity sanitary sewer collection and conveyance system has sufficient capacity projected and existing flows for this service area as identified in Chapter IV. Since the sanitary sewers in this service area are owned and maintained by the Township of Falls Authority (TOFA), this area was not included in Lower Makefield Township's Corrective Action Plan (CAP). Any repairs to this area to reduce I/I will be conducted by TOFA and reported to PA DEP and Lower Makefield Township. The alternatives are the same as the Core Creek Alternative Analysis and are referenced above.

Pump Stations

The only pump station in this service area is the Derbyshire Pump Station. This pump station is only used to bypass flows during high flow events.

D. Funding

The following presents a broad listing of the available methods and programs that may be utilized to address the funding needs of the selected alternative.

Assessment of Taxes, Fees, and Special Charges

Local governments can generate revenue through the assessment of taxes, fees, special charges and fines. The typical example is the determination of debt service as a function of the cost of capital improvements and the number of users. These costs are occasionally passed on to the existing users to repay the debt. For systems that are proposing a significant number of additional users, new fees and rates can be estimated for the purposes of debt repayment. Funds for capital improvements must first be obtained by one or more of the methods listed below.

Grant Programs

Grants are transfers of money that do not need to be repaid. Municipalities and authorities can apply for grants with federal, state, corporate and non-profit organizations by submitting proposals or funding requests.

The Pennworks program is similar but adds the requirements that:

"Projects are those which involve the acquisition of land, easements or rights-of-way and the construction, improvement, expansion, extension, repair or rehabilitation of either (1) a system for the supply, treatment, storage or distribution of water not used solely for residential purposes, or (2) a system for the collection, treatment or disposal of

(Revised September 19, 2018)

wastewater (including industrial waste and the separation of sanitary sewers and storm sewers) not used solely for residential purposes. In addition, the project must involve the investment of capital in Pennsylvania enterprises and communities or result in the creation of new or the preservation of existing jobs in this Commonwealth."

Loans

A loan is the temporary transfer of a specific amount of money that must be repaid in a predetermined amount of time, typically with specified interest rate. It is helpful to evaluate loan options as loan terms can vary by rate, time and reporting requirements. If the project costs will be less than \$5 million dollars it is usually prudent to use loans rather than bonds.

There are several types of loans including governmental and commercial programs. Government loans have consistently lower than market interest rates but may require significant application procedures and requirements. Some examples of government environmental loan programs include the EPA Clean Water State Revolving Fund, and the EPA Safe Drinking Water State Revolving Funds (SRF), and the United States Department of Agriculture (USDA) Rural Development Program. Communities who have entered into a binding enforcement agreement have priority for SRF funding. The Commonwealth's PENNVEST program is one such example, and represents one of the most common financing instruments used for large scale capital investment projects. PENNVEST loans can also be used to finance individual on-lot sewage disposal system projects by private homeowners.

Bonds

A bond is a written promise to repay borrowed money on a definite schedule, usually at a fixed rate of interest for the life of the bond. It is the largest source of environmental infrastructure financing. It is the most complex and expensive way to acquire funds, but money is available for immediate capital needs. Legal and administrative fees can be costly and voter approval may be required. This Tool is usually more cost effective for projects costing more than \$5 million because the fees are the same for large or small bond issue.

The bond market matches governments and corporations that need to borrow money with investors who have funds to lend. Bond dealers at securities firms and banks act as intermediaries, buying from issuers and selling to investors in the primary market.

E. Phasing

As outlined in the Corrective Action Plan and in Chapter III of this Special Study, Lower Makefield Township will address I/I issues using a phased approach, based on the known problem areas. Phasing I/I work will allow LMT to address areas of greatest concern first and to spread out associated costs and work to complete the I/I work.

The upgrades to the pump stations will be accomplished in 2018.

(Revised September 19, 2018)

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EE, Inc.

F. Administrative and Legal Authority

The administrative and legal authority to effect the alternatives discussed in this report include, but are not limited to, the provisions of Pa Code Title 25 Chapter 71.



Pennsylvania Fish & Boat Commission

Division of Environmental Services
Natural Diversity Section
595 E Rolling Ridge Dr.
Bellefonte, PA 16823
814-359-5237

March 19, 2018

IN REPLY REFER TO
SIR# 49082

Ebert Engineering, Inc.
Tara Bernard
4092 Skippack Pike
Skippack, Pennsylvania 19474

**RE: Species Impact Review (SIR) – Rare, Candidate, Threatened and Endangered Species
PNDI Search No. 650214_1
Chanticleer Force Main Replacement
BUCKS County: Lower Makefield Township**

Dear Tara Bernard:

This responds to your inquiry about a Pennsylvania Natural Diversity Inventory (PNDI) Internet Database search “potential conflict” or a threatened and endangered species impact review. These projects are screened for potential conflicts with rare, candidate, threatened or endangered species under Pennsylvania Fish & Boat Commission jurisdiction (fish, reptiles, amphibians, aquatic invertebrates only) using the Pennsylvania Natural Diversity Inventory (PNDI) database and our own files. These species of special concern are listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, and the Pennsylvania Fish & Boat Code (Chapter 75), or the Wildlife Code.

An element occurrence of a rare, candidate, threatened, or endangered species under our jurisdiction is known from the vicinity of the proposed project. However, given the nature of the proposed project, the immediate location, or the current status of the nearby element occurrence(s), no adverse impacts are expected to the species of special concern.

This response represents the most up-to-date summary of the PNDI data and our files and is valid for two (2) years from the date of this letter. An absence of recorded species information does not necessarily imply species absence. Our data files and the PNDI system are continuously being updated with species occurrence information. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered, and consultation shall be re-initiated.

Our Mission:

www.fish.state.pa.us

To protect, conserve and enhance the Commonwealth's aquatic resources and provide fishing and boating opportunities.

If you have any questions regarding this review, please contact Robert Morgan at 814-359-5129 and refer to the SIR # 49082. Thank you for your cooperation and attention to this important matter of species conservation and habitat protection.

Sincerely,

A handwritten signature in black ink that reads "Christopher A. Urban". The signature is written in a cursive style with a large, prominent initial "C".

Christopher A. Urban, Chief
Natural Diversity Section

CAU/RTM/dn

Ebert Engineering, Inc.

Water and Wastewater Engineering

February 19, 2018

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

Subject: PNDI Project Environmental Review Receipt
Project Search ID: 650214
Lower Makefield Township, Bucks County

Re: Further project review

EE, Inc. No.: 068-003

Dear Sir / Madam:

In accordance with the enclosed environmental review receipt, please find the following information:

- Signed copy of Project Environmental Review Receipt
- Project Narrative
- USGS 7.5 minute quadrangle map (Lambertville, PA-NJ and Pennington, NJ-PA)
- Aerial photograph of project location

The PNDI search notes there is a potential for a sensitive species located on site. Please provide additional information on the sensitive species of concern.

Thank you for your assistance and please contact this office should you have any questions or require any additional information.

Sincerely,

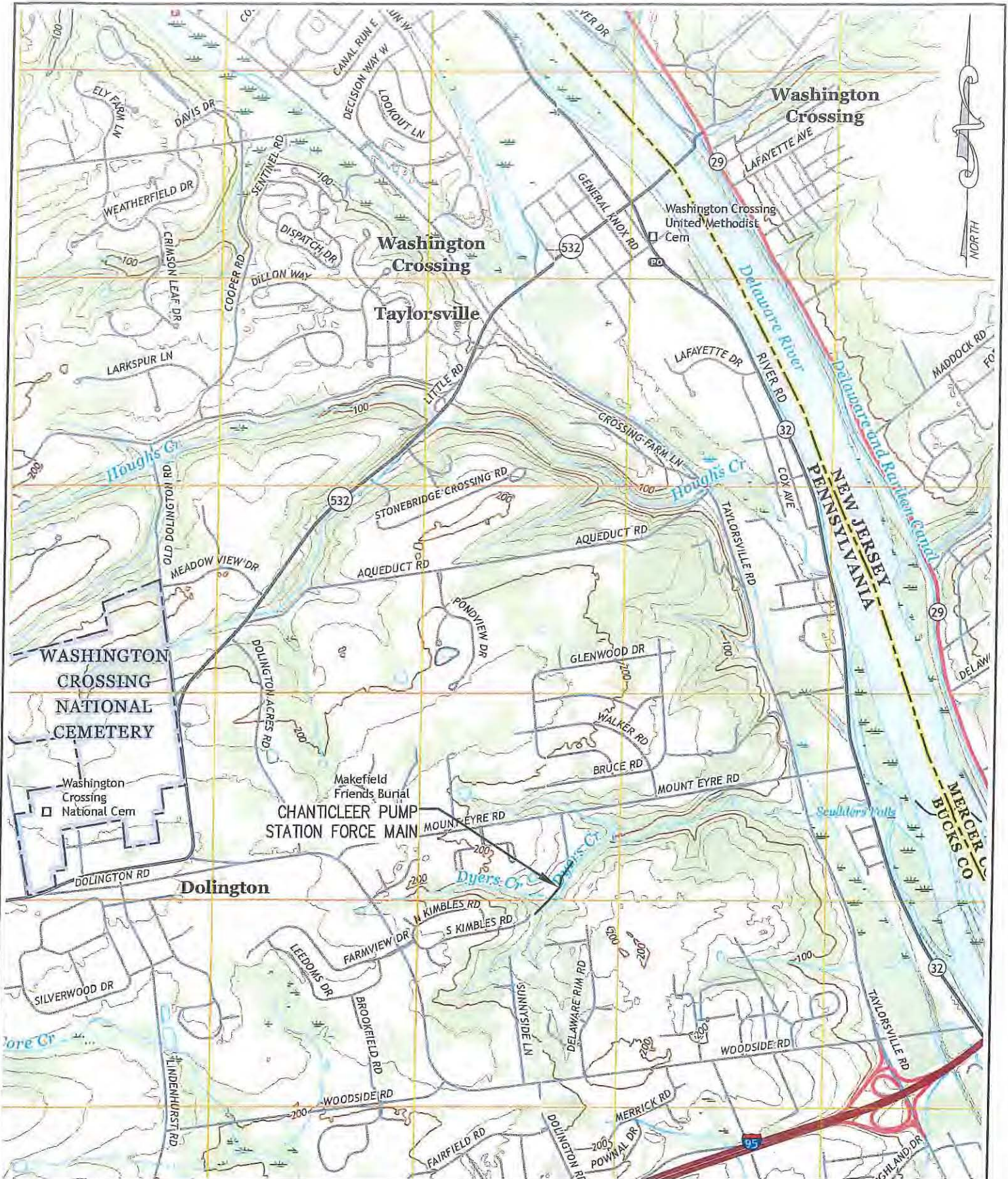


Christina Ruble
Planning Specialist

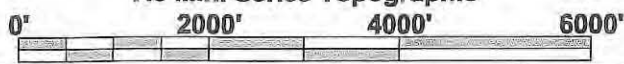
Project Narrative

The Chanticleer Pump Station is located just southeast of Dyers Lane and services the two small residential developments along Dyers Lane and Delaware Rim Drive in Lower Makefield Township, Bucks County. The pump station conveys the wastewater through a two inch force main to the discharge location at the existing Farmview Pump Station on S. Kimbles Road. The Chanticleer Pump Station has an existing two inch force main that extends 900 linear feet from Dyers Lane to S. Kimbles Road.

The Chanticleer Pump Station will be upgraded to increase the capacity of the pump station. As part of the upgrades, the existing two inch force main will need to be replaced with a three inch force main in order for the flow within the pipe to remain within the recommended velocity range (2 to 6 ft/sec). The existing force main will be excavated, and the new force main will be installed within the same trench. Directional drilling will be used to install the force main beneath Dyers Creek to minimize disturbance. The existing force main will be removed at the time of construction of the new force main. All work will be conducted to minimize disturbance. The total estimated area of disturbance is less than ½ acre.



Lower Makefield Township, PA
 LAMBERTVILLE, NJ-PA Quadrangle
 PENNINGTON, NJ-PA Quadrangle
 7.5 Min. Series Topographic



Ebert Engineering, Inc.
 Water and Wastewater Engineering

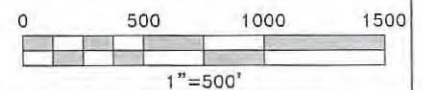
PO Box 540
 4092 Skippack Pike, Suite 202
 Skippack, PA 19474

Phone (610) 584 6701
 Fax (610) 584 6704

E-mail febert@ebertengineering.com



APPROXIMATE LOCATION OF EXISTING CHANTICLEER PUMP STATION FORCE MAIN TO BE REPLACED



CHANTICLEER FORCE MAIN AERIAL
 FOR THE
 SEWAGE FACILITIES ACT 537 PLAN
 PREPARED FOR
 LOWER MAKEFIELD TOWNSHIP

Ebert Engineering, Inc.
 Water and Wastewater Engineering
 PO Box 540 Phone (610) 584 6701
 4092 Skippack Pike, Suite 202 Fax (610) 584 6704
 Skippack, PA 19474 E-mail febert@ebertengineering.com

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 This is a copy and not the original drawing. Any liability whatsoever is limited to the original drawing or our last revision to the original. Reproductions of this drawing without an embossed engineer's seal are not valid.

Number	Description	Date	Drawn By	Project Engr.	Checked By	Scale	Job No.	Date	Drawing No.
			BAR	BAR	FEE	1"=500'	068-003	02/19/18	1 of 1

1. PROJECT INFORMATION

Project Name: **Chanticleer Force Main Replacement**

Date of Review: **2/19/2018 10:06:06 AM**

Project Category: **Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Sewer line maintenance-repair, replacement of existing line**

Project Area: **1.38 acres**

County(s): **Bucks**

Township/Municipality(s): **LOWER MAKEFIELD**

ZIP Code: **18977; 19067**

Quadrangle Name(s): **LAMBERTVILLE; PENNINGTON**

Watersheds HUC 8: **Middle Delaware-Musconetcong**

Watersheds HUC 12: **Buck Creek-Delaware River**

Decimal Degrees: **40.263592, -74.874332**

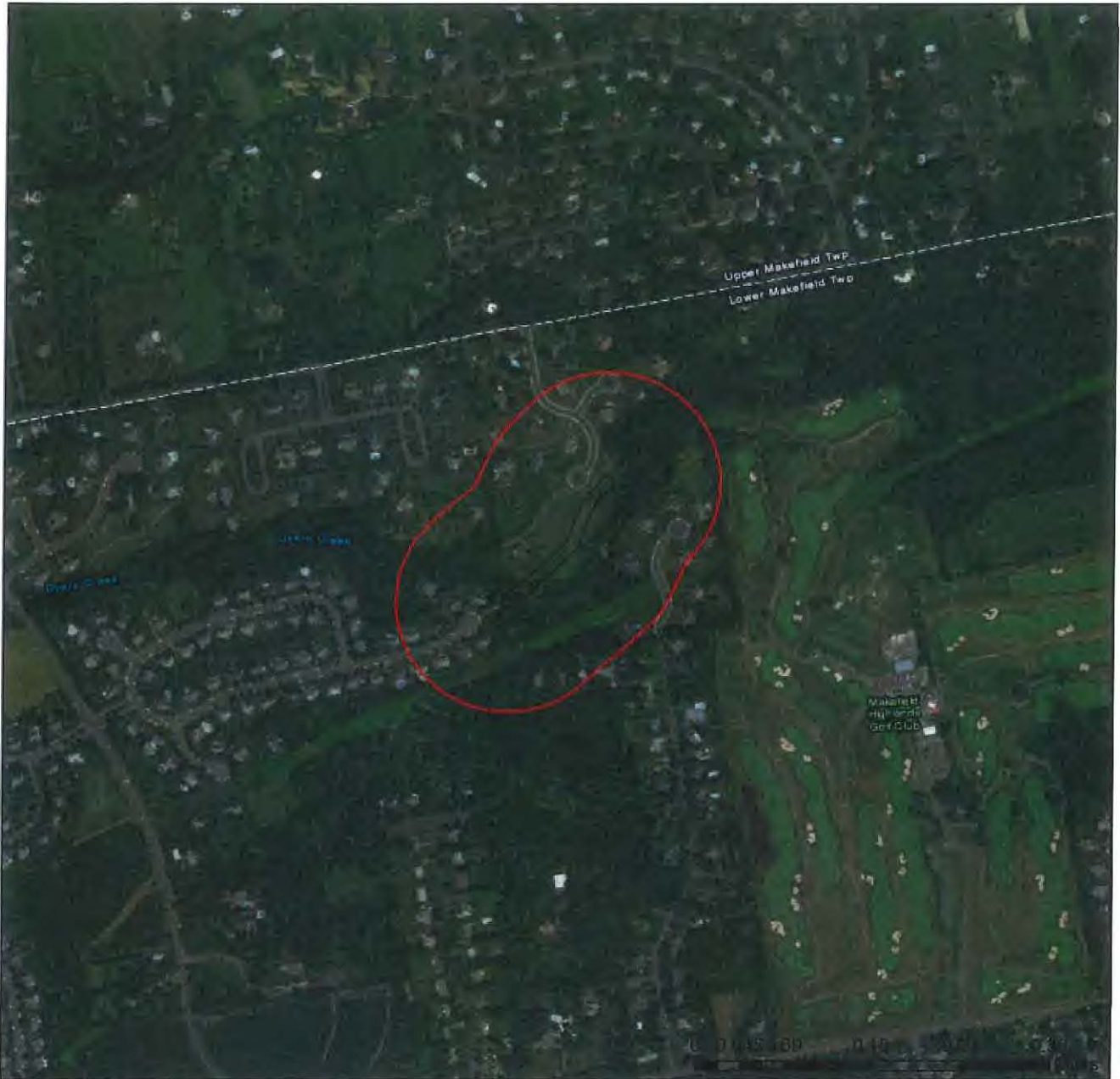
Degrees Minutes Seconds: **40° 15' 48.9308" N, 74° 52' 27.5969" W**

2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
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.

Chanticleer Force Main Replacement

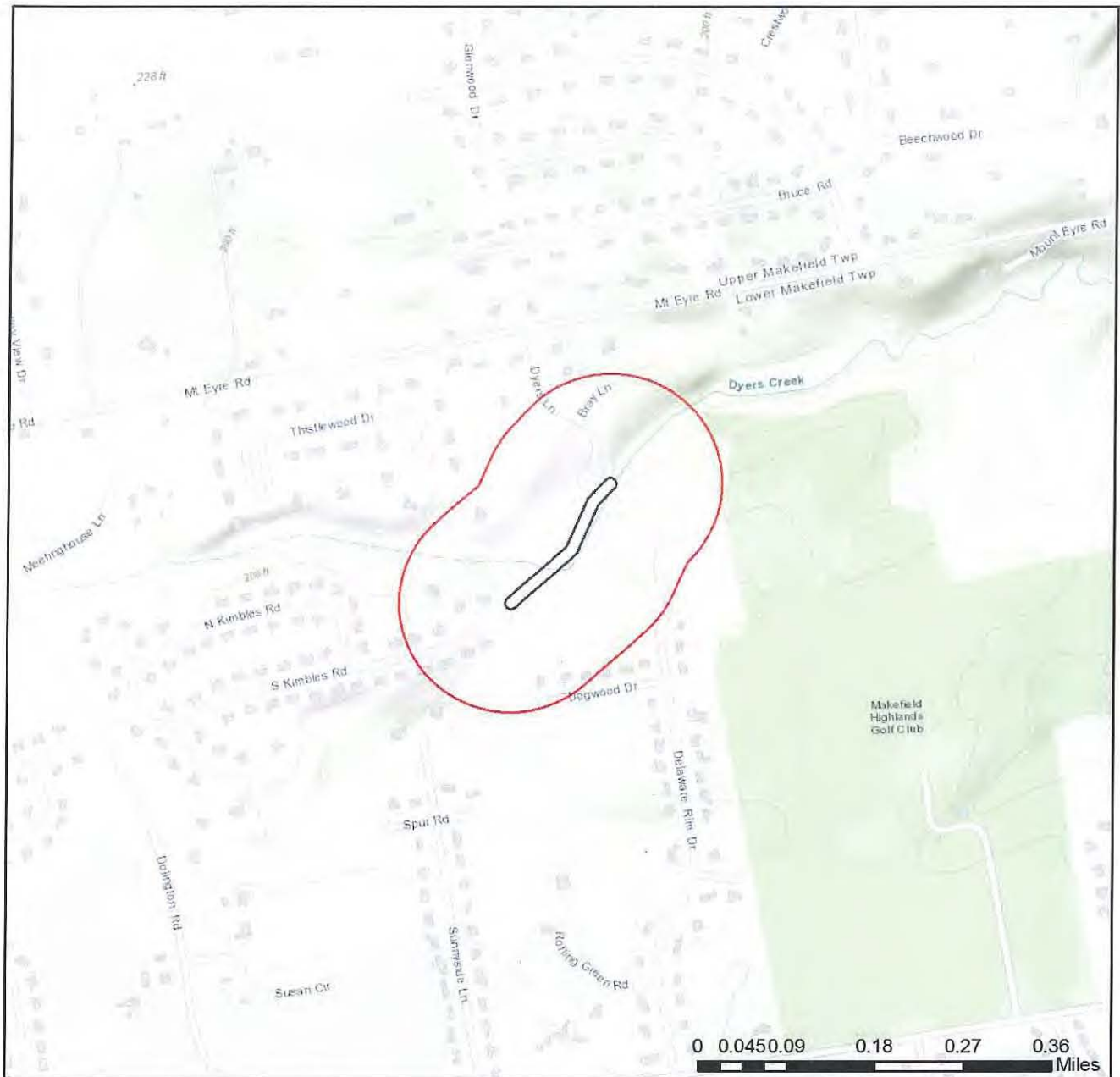


- Project Boundary
- Buffered Project Boundary



Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user

Chanticleer Force Main Replacement



- Project Boundary
- Buffered Project Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



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 jurisdictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources

RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Fish and Boat Commission

RESPONSE:

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

PFBC Species: (Note: The Pennsylvania Conservation Explorer tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)

Scientific Name	Common Name	Current Status
Sensitive Species**		Endangered

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 jurisdictional 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, upload* or email* the following information to the agency(s). Instructions for uploading project materials can be found [here](#). This option provides the applicant with the convenience of sending project materials to a single location accessible to all three state agencies. Alternatively, applicants may email or mail their project materials (see AGENCY CONTACT INFORMATION).

***Note:** U.S.Fish and Wildlife Service requires applicants to mail project materials to the USFWS PA field office (see AGENCY CONTACT INFORMATION). USFWS will not accept project materials submitted electronically (by upload or email).

Check-list of Minimum Materials to be submitted:

____ 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.

____ A map with the project boundary and/or a basic site plan (particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)

In addition to the materials listed above, USFWS REQUIRES the following

____ **SIGNED** copy of a Final Project Environmental Review Receipt

The inclusion of the following information may expedite the review process.

____ 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. Two review options are available to permit applicants for handling PNDI coordination in conjunction with DEP's permit review process involving either T&E Species or species of special concern. Under sequential review, the permit applicant performs a PNDI screening and completes all coordination with the appropriate jurisdictional agencies prior to submitting the permit application. The applicant will include with its application, both a PNDI receipt and/or a clearance letter from the jurisdictional agency if the PNDI Receipt shows a Potential Impact to a species or the applicant chooses to obtain letters directly from the jurisdictional agencies. Under concurrent review, DEP, where feasible, will allow technical review of the permit to occur concurrently with the T&E species consultation with the jurisdictional agency. The applicant must still supply a copy of the PNDI Receipt with its permit application. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. The applicant and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at <https://conservationexplorer.dcnr.pa.gov/content/resources>.

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
Email: RA-HeritageReview@pa.gov

U.S. Fish and Wildlife Service

Pennsylvania Field Office
Endangered Species Section
110 Radnor Rd; Suite 101
State College, PA 16801
NO Faxes Please

PA Fish and Boat Commission

Division of Environmental Services
595 E. Rolling Ridge Dr., Bellefonte, PA 16823
Email: RA-FBPACENOTIFY@pa.gov

PA Game Commission

Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA 17110-9797
Email: RA-PGC_PNDI@pa.gov
NO Faxes Please

7. PROJECT CONTACT INFORMATION

Name: Blake Romanowski, E.I.T.
Company/Business Name: Ebert Engineering, Inc.
Address: P.O. Box 540, 4092 Skippack Pike, Suite 202
City, State, Zip: Skippack, PA, 19474
Phone: (610) 584-6701 Fax: (610) 584-6704
Email: bromanowski@ebertengineering.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.



applicant/project proponent signature

2/19/2018

date

CHAPTER VII
INSTITUTIONAL EVALUATION

CHAPTER VII

INSTITUTIONAL EVALUATION

A. Existing Authorities

Lower Makefield Township has an existing Municipal Authority, created under the PA Municipal Authorities Act. The existing sewer system is operated and maintained by Lower Makefield Township but is owned by the Lower Makefield Township Sewer Authority. The maintenance staff follows a routine schedule of maintaining pump stations, inspecting and cleaning manholes and sewers, and reading wastewater flow meters. The existing Township and Authority are fully capable of managing the implementation of the alternatives selected by this Act 537 Plan Special Study.

B. Institutional Alternatives

Lower Makefield Township employs adequate personnel necessary for the implementation of the selected alternatives, and to provide continued operation and maintenance on the Lower Makefield Township public sanitary sewer system.

Lower Makefield Township has contracted out the billing of sewer rental charges to its customers to Bucks County Water and Sewer Authority (BCWSA).

Lower Makefield Township has evaluated the options of contracting out the operation and maintenance of its pump station and gravity sanitary sewer collection and conveyance system to either another municipal authority such as BCWSA, or to a contractor operator. The evaluation included not only the costs associated with contracting out the work but more importantly the level of service provided to the public sanitary sewer customers of Lower Makefield Township.

While the operation of the pump stations and maintenance of the conveyance could be fairly easily accomplished with a similar level of service, the institutional knowledge of a dedicated and consistent staff will be one of the keys to implementing the CAP successfully. The ability to have the same operators with long-term knowledge of the system will be an asset to best serving the customers of Lower Makefield Township's public sanitary sewer system. The knowledge of working only on a single system will also enable the operators to be able to more quickly respond to any issues within the system and perform preventative maintenance to avoid emergencies.

Lower Makefield Township and its Authority will, in accordance with the public bidding laws, will contract out repairs to its sanitary sewer conveyance system including pump station and force main improvement projects that the existing staff cannot handle in-house. The Lower Makefield Township Sewer department operates under the Public Works department. There are two full time employees that are assigned to the operation

and maintenance of the public sanitary sewer system. When additional labor is required, additional public works personnel are temporarily assigned to accomplish the tasks.

C. Implementation

The selected alternatives will be implemented by the existing Township staff under the direction of the existing Township manager, public works director, and sanitary sewer engineer.

D. Proposed Institutional Alternative

The selected Institutional Alternative is the continued ownership of the Lower Makefield Township public sanitary sewer system by the Lower Makefield Township Sewer Authority with the operation and maintenance being performed by Lower Makefield Township.

CHAPTER VIII
SELECTED ALTERNATIVE AND IMPLEMENTATION SCHEDULE

CHAPTER VIII

SELECTED ALTERNATIVES AND IMPLEMENTATION SCHEDULE

For the Study Areas identified in Chapter II, the following wastewater alternatives have been selected as the alternative to best meet the needs of the Township and its residents. The evaluation of the alternatives was presented in Chapter VI along with the BCWSA's evaluation of the Neshaminy Interceptor. The selected alternatives for the below listed four areas will be identified in this Chapter:

1. Neshaminy Interceptor (BCWSA Alternatives)
2. Core Creek Service Area
3. Middletown Township Service Area
4. Falls Township Contract Area
5. Falls Township Service Area

A. Neshaminy Interceptor (BCWSA Alternatives)

As discussed in the previous chapters of this Special Study, BCWSA provides sanitary sewer conveyance service to numerous municipalities along the Neshaminy Creek between Newtown Township and Bensalem Township. Treatment capacity is provided by BCWSA through an agreement with the City of Philadelphia Water Department. A Settlement Agreement between BCWSA and the Pennsylvania Department of Environmental Protection (PADEP) included the establishment of a Corrective Action Plan (NICAP) and Connection Management Plan (NICMP) for the Neshaminy Interceptor and included the requirement for tributary municipalities to complete updates to their Municipal Act 537 Plans, prepare a Sewer System Needs Analysis for their communities and complete a comprehensive inflow and infiltration (I/I) evaluation for their sanitary sewer systems.

BCWSA performed an evaluation of the interceptor characterizing the current flow conditions in the Neshaminy Interceptor and project conditions as a result of the municipal forecasted needs. The evaluation also considered the effects of reduction of infiltration and inflow from municipal sewer systems completed in conformance with the NICAP/NICMP and Supplemental Agreements which include flow limits for all tributary municipalities to the Neshaminy Interceptor. The detailed BCWSA Neshaminy Interceptor Technical Evaluation is provided in Appendix D.

The alternative to improve the wastewater facilities evaluated by BCWSA were the following types of improvements to the Neshaminy Interceptor:

- Lining of the 30 inch, 33 inch, 36 inch, 42 inch and portions of the 48 inch portions of the interceptor
- Upgrading the size of the 30 inch, 33 inch, 36 inch, 42 inch and portions of the 48 inch portions of the interceptor
- Installing a relief parallel sanitary sewer along the 54" portion of the Interceptor

The alternative selected by BCWSA is the lining of the 30 inch, 33 inch, 36 inch, 42 inch and portions of the 48 inch Interceptor plus construction of a relief sewer along the 54" portion of the Interceptor at an estimated cost of \$18,173,000. Since this upgrade is based on significant I/I reductions by the municipalities, the modeled conditions utilized by BCWSA could take time to achieve and would need to be maintained in order to accommodate future flows. Connection limitations to Municipal customers who do not achieve the necessary I/I reductions would be instated.

Lower Makefield Township will pay its proportionate share of the BCWSA liner project which has been funded through a bond issuance by the BCWSA by paying the increased sewer rental charges to BCWSA in accordance with its existing agreement with BCWSA. Lower Makefield Township Board of Supervisors executed the BCWSA Supplemental Agreement at their public meeting on February 7, 2018.

Lower Makefield Township will achieve its I/I reductions through the implementation of its PA DEP approved Corrective Action Plan (CAP). The CAP is attached to this Act 537 Plan Special Study, and PA DEP's formal approval of the CAP will be effective when this Act 537 Special Study is approved. The cost of implementing the CAP will be funded through both an allocation of approximately \$50,000.00 per year from the sewer operating budget. If larger capital improvement projects are required to implement the CAP, then they can be funded by the 2016 Bond that Lower Makefield Township issued. The bond included an allocation of approximately five million dollars to fund sanitary sewer projects. The allocation of sanitary sewer funds is however for the entire township and not just the Neshaminy Interceptor Service Area.

B. Core Creek Service Area

Collection and Conveyance System

The existing gravity sanitary sewer collection and conveyance system has sufficient capacity projected and existing flows for this service area as identified in Chapter IV. The entire gravity sanitary sewer system in this sanitary sewer service area will be evaluated in more detail as part of the Corrective Action Plan (CAP) to identify and reduce any sources of inflow and infiltration. The CAP will utilize a systematic metering program combined with the existing permanent flow meters to identify the locations of high flows. Once the general areas of high flows during wet weather events are identified then Lower Makefield Township will televise the areas with potential I/I to identify the sources of the I/I. The identification of the sources of I/I will allow Lower Makefield Township and its engineer to recommend the best method of repairing the gravity sanitary sewer mains. The options for the repair of gravity sanitary sewer mains will include the following:

- Grouting of individual joints and cracks
- Spot repairs using 2 to 4 foot long Cured In Place Pipe Liners
- Cured In Place Pipe Liners from manhole to manhole
- Replacement of the existing gravity sanitary sewers

Lower Makefield Township has selected to implement the best long term method of repairing the gravity sanitary sewer system through the use of liners where possible. This will provide a longer term solution than grouting and is less expensive than the replacement of entire sections of the existing gravity sanitary sewer mains. This option also minimizes the amount of by-pass pumping required. This is also consistent with the conclusions of the BCWSA evaluation of alternatives for the Neshaminy Interceptor.

Lower Makefield Township currently has \$50,000.00 per year budgeted for the repair of the gravity collection system in its annual sanitary sewer operating budget. There may also be larger capital projects that are identified as a result of the implementation of the CAP. Lower Makefield Township has incorporated some of those costs into the large bond issuance that they performed in 2016. Approximately five million dollars of the bond funding was allocated towards its overall sanitary sewer system which also includes the Morrisville Municipal Authority service area.

Pump Stations

There are three pump stations in the Core Creek Interceptor Service Area. The pump stations are as follows:

- Chanticleer Pump Station
- Brookstone Pump Station
- Farmview Pump Station

The following identifies the selected alternative for each pump station.

Chanticleer Pump Station

The Chanticleer Pump Station needs to be upgraded in order to provide the required pumping capacity to meet both the existing and proposed flows to the pump station. The pump station capacity will be upgraded to provide a pumping capacity with the largest pump out of service of approximately 75 gpm. This will exceed the required minimum pumping capacity for each of the two pumps of 70.84 gpm. This will allow for the impellers to wear over time and still meet the PA DEP requirements. This will allow Lower Makefield Township to approve the connection of the twenty three projected edus.

This will be accomplished through the replacement of the existing two inch force main with a three inch force main in the same trench. The pumps will also be replaced with new pumps that utilize three phase power to improve the reliability of the pumps and minimize any issues with clogging that occurred with the use of single phase electrically power grinder pumps.

The replacement of the force main was selected as it will allow for the least expensive long term operating costs as it will allow for an increase in flows while not increasing the horsepower and electrical costs. This is due to the reduction in friction in a three inch force main compared to a two inch force main.

The replacement of the existing pumps with new pumps that utilize three phase electrical service will enhance the long term reliability of the pump station as the three phase electrically powered grinder pumps are less likely to clog and become a maintenance issue. The three phase power will be converted from the existing single phase incoming power supply through the use of either a "buck and boost" transformer or a VFD.

The estimated cost to replace the force main which is located in a non-paved open space area is approximately \$36,000.00 (900 linear feet x \$40.00/linear foot). The estimated cost to replace the pumps, controls and convert the single phase electric power to three phase is estimated at \$65,000.00.

The entire cost of this upgrade will be approximately \$100,000.00. Lower Makefield Township is currently in discussions with the developer of one of the proposed projects on these requirements. Lower Makefield Township also has the funds available in its existing operating and reserve accounts to implement this alternative.

Brookstone Pump Station

Upon a detailed inspection of the pump station in July 2018, it was discovered the pump station was no longer secured in place and moves during periods of high groundwater. The pump station will be upgrade from a dry well station to a submersible pump station. The existing dry well will be abandoned in place and a new wet well will installed for the submersible pumps and installation of a new meter and valve vault.

The Brookstone Pump Station capacity will be upgraded to provide a pumping capacity with the largest pump out of service of approximately 200 gpm. This will exceed the required minimum pumping capacity for each of the two pumps of 191 gpm.

The entire cost of this upgrade will be approximately \$232,101.00. Lower Makefield Township has the funds available in its existing operating and reserve accounts to implement this alternative

Farmview Pump Station

The evaluation of the Farmview Pump Station concluded that no changes are required at this time to this pump station and that it has adequate available capacity to service the long term planning needs of its service area.

Under the current requirements of PA DEP's Consent Order, Lower Makefield Township will continue to implement the CAP. Future wastewater needs within the public sanitary sewer service area will be implemented in accordance with the CMP. No new service connections will be issued until EDUs are released by BCWSA.

C. Middletown Township Service Area

Collection and Conveyance System

The existing gravity sanitary sewer collection and conveyance system has sufficient capacity projected and existing flows for this service area as identified in Chapter IV. The entire gravity sanitary sewer system in this sanitary sewer service area will be evaluated in more detail as part of the Corrective Action Plan (CAP) to identify and reduce any sources of inflow and infiltration. The CAP will utilize a systematic metering program combined with the existing permanent flow meters to identify the locations of high flows. Once the general areas of high flows during wet weather events are identified then Lower Makefield Township will televise the areas with potential I/I to identify the sources of the I/I. The identification of the sources of I/I will allow Lower Makefield Township and its engineer to recommend the best method of repairing the gravity sanitary sewer system. The selected alternatives are the same as the Core Creek Alternative Analysis and are referenced above.

Pump Stations

There is one pump station in the Middletown Township Service Area. The pump station is the Yardley Oaks Pump Station.

Yardley Oaks Pump Station

The evaluation of the Yardley Oaks Pump Station concluded that with the 20-year flow projection, the pump station pumps may need to be upgraded in the future to adequately service the 20-year planning projections. The Township will continue to monitor this pump station through the Chapter 94 Report. If it is determined an upgrade is necessary, a planning effort will be performed and PA DEP will be notified at that time.

Under the current requirements of PA DEP's Consent Order, Lower Makefield Township will continue to implement the CAP. Future wastewater needs within the public sanitary sewer service area will be implemented in accordance with the CMP. No new service connections will be issued until EDUs are released by BCWSA.

D. Falls Township Contract Area

Collection and Conveyance System

The existing gravity sanitary sewer collection and conveyance system has sufficient capacity projected and existing flows for this service area as identified in Chapter IV. The entire gravity sanitary sewer system in this sanitary sewer service area will be evaluated in more detail as part of the Corrective Action Plan (CAP) to identify and reduce any sources of inflow and infiltration. The CAP will utilize a systematic metering program combined with the existing permanent flow meters to identify the locations of high flows. Once the general areas of high flows during wet weather events are identified then Lower Makefield Township will televise the areas with potential I/I to identify the sources of the I/I. The identification of the sources of I/I will allow Lower Makefield

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Township and its engineer to recommend the best method of repairing the gravity sanitary sewer system. The alternatives are the same as the Core Creek Alternative Analysis and are referenced above.

Pump Stations

The only pump station in this service area is the Derbyshire Pump Station. This pump station is only used to bypass flows during high flow events.

Under the current requirements of PA DEP's Consent Order, Lower Makefield Township will continue to implement the CAP. Future wastewater needs within the public sanitary sewer service area will be implemented in accordance with the CMP. No new service connections will be issued until EDUs are released by BCWSA.

E. Falls Township Service Area

Collection and Conveyance System

The existing gravity sanitary sewer collection and conveyance system has sufficient capacity projected and existing flows for this service area as identified in Chapter IV. Since the sanitary sewers in this service area are owned and maintained by the Township of Falls Authority (TOFA), this area was not included in Lower Makefield Township's Corrective Action Plan (CAP). Any repairs to this area to reduce I/I will be conducted by TOFA and reported to PA DEP and Lower Makefield Township.

Pump Stations

The only pump station in this service area is the Derbyshire Pump Station. This pump station is only used to bypass flows during high flow events.

E. Designation of Capital Financing Plan

The Township will be financing all the improvements outlined in the previous Chapters. The Township will also work with the Developer of Dogwood Drive for the upgrade of the pumps and force main at the Chanticleer Pump Station. Lower Makefield Township has the necessary funds in its existing operating and reserve funds to finance the implementation of the CAP and the upgrades to the two pump stations. It is noted that some of the monies for the capital projects may come from the 2016 Bond proceeds.

F. Implementation Schedule

The Implementation Schedule for this Special Study is outlined below:

Milestone	Estimated Timeframe for Completion
Lower Makefield Pump Station Upgrades	
Part II Permit Application for the existing Chanticleer and Brookstone Pump Station Upgrades	6 Months
PADEP Review and Approval of Part II Permit for Chanticleer and Brookstone Pump Station Upgrades	9 Months
Bidding for Chanticleer and Brookstone Pump Stations Upgrades	12 Months
Construction of Chanticleer and Brookstone Pump Station Upgrades	18 Months
Corrective Action Plan - Implementation of I/I Abatement	
CAP Year One; Meter Sub Basin A-1	Month 1 – Month 12
CAP Year Two, Make Repairs in Sub Basin A-1; Meter Sub Basin A-2	Year 2
CAP Year Three, Make Repairs in Sub Basin A-2; Meter Sub Basin B-1 and B-2	Year 3
CAP Year Four, Make Repairs in Sub Basin B-1 and B-2; Meter Sub Basin C	Year 4
CAP Year Five, Make Repairs in Sub Basin C; Meter Sub Basin D	Year 5
CAP Year Six, Make Repairs in Sub Basin D; Meter Sub Basin E	Year 6
CAP Year Seven, Make Repairs in Sub Basin E; Meter Sub Basin F	Year 7
CAP Year Eight, Make Repairs in Sub Basin F	Year 8
CAP Year Nine and Beyond LMT will continue the same flow metering and monitoring program following same pattern and address any I/I identified in the following budget year. It is noted that the order of flow monitoring may change based upon field observations and flows recorded at the permanent flow meter locations.	Year Nine and Beyond
BCWSA Interceptor Relief Sewer	
Design, Easements and Permits	8 months
Bid, Award and Construction Completion 30 inch, 33 inch, 36 inch, 42 inch and 48 inch Interceptor Lining	18 months
Design, Easements and Permits	12 months
Bid, Award, and Construction Completion	24 months

(Revised September 19, 2018)

A detailed implementation schedule for the Corrective Action Plan is attached in Appendix B.

APPENDIX A
SUPPLEMENTAL AGREEMENT
NESHAMINY INTERCEPTOR

SUPPLEMENTAL AGREEMENT
NESHAMINY INTERCEPTOR

THIS AGREEMENT made and concluded this 7th day of February, 2018, by and between the **BUCKS COUNTY WATER AND SEWER AUTHORITY**, an authority organized and existing pursuant to the laws of the Commonwealth of Pennsylvania maintaining a principal place of business in Warrington, Pennsylvania (hereinafter referred to as “BCWSA”) and **TOWNSHIP OF LOWER MAKEFIELD**, an authority organized and existing pursuant to the laws of the Commonwealth of Pennsylvania maintaining a principal place of business in Yardley, Pennsylvania (hereinafter referred to as “Township”).

WHEREAS, BCWSA owns and operates the sanitary sewer collection facilities known as the Neshaminy Interceptor;

WHEREAS, BCWSA and Township have an existing Interceptor Agreement dated October 28, 1975;

WHEREAS, the improvements associated with the Neshaminy Interceptor include sanitary sewer pipes, pump stations, metering pits, manholes and other facilities;

WHEREAS, the Neshaminy Interceptor conveys sanitary sewer flow (also referred to herein as “wastewater flow”) from various municipalities and other entities located in portions of Bucks County to an interceptor owned and maintained by the City of Philadelphia which said interceptor then conveys the effluent from the Neshaminy Interceptor to a sewer treatment plant owned and maintained by the City of Philadelphia;

WHEREAS, the City of Philadelphia treats the effluent discharged into the Neshaminy Interceptor pursuant to an Agreement between BCWSA and the City of Philadelphia (hereinafter referred to as “City of Philadelphia Agreement”) which imposes limitations on BCWSA related to flows including peak wet weather flows. A copy of that Agreement is attached hereto, incorporated

herein and marked as Exhibit "A";

WHEREAS, inflow and infiltration, (hereinafter referred to as "I & I"), removal efforts undertaken as a whole by the contributing municipalities, authorities and other users of the Neshaminy Interceptor have not been sufficient to reduce wet weather peak flows to acceptable levels consistent with the City of Philadelphia Agreement;

WHEREAS, the Pennsylvania Department of Environmental Protection ("DEP") has determined and notified BCWSA that the municipalities, authorities and other entities that contribute flow to the Neshaminy Interceptor need to increase their collective and singular efforts to reduce inflow and infiltration into the sewer effluent that is discharged in the Neshaminy Interceptor so as to reduce wet weather peak flows treated at the facilities owned and maintained by the City of Philadelphia;

WHEREAS, completing the tasks required by DEP, such as Act 537 Sewer Facilities Planning ("Act 537") and as set forth in this Supplemental Agreement in compliance with the time limitations noted herein and pursuant to the BCWSA's Connection Management Plan ("CMP") is essential to the economic vitality of all of the municipalities, authorities and other entities served by the Neshaminy Interceptor and is indicative of good environmental stewardship on the part of all of the participants in the Neshaminy Interceptor;

WHEREAS, DEP believes and avers that the Totem Road Pump Station which conveys sewer flows from the Neshaminy Interceptor to the City of Philadelphia may be hydraulically overloaded in the future and may exceed its permitted capacity;

WHEREAS, BCWSA had previously considered the construction of a surge tank to manage peak flows, but DEP was unwilling to approve the construction of a surge tank.

WHEREAS, DEP and BCWSA have entered into a Settlement Agreement where, in the

resolution of the dispute, DEP requires that BCWSA enter into new supplemental agreements with its customers, which said agreements must impose upon such customers certain obligations as set forth in the CMP, and an executed copy of the Settlement Agreement is attached hereto, incorporated herein and marked as Exhibit "B";

WHEREAS, it has been recommended to BCWSA by its engineers, and approved by DEP, that certain improvements be made to the Neshaminy Interceptor by BCWSA so that BCWSA is able to convey additional wet weather flows in order to avoid surcharging within portions of the Neshaminy Interceptor;

WHEREAS, DEP has directed BCWSA to prepare a CMP for the years 2014 through 2018 which shall deal with inflow and infiltration abatement efforts in the Neshaminy Interceptor, collectively and/or singularly, and the release of capacity for member municipalities and authorities in order to facilitate new sewer connections;

WHEREAS, the most recent CMP that has been accepted by DEP, is incorporated by reference as though were fully set forth and is attached as Exhibit "C";

WHEREAS, the Township operates the sanitary sewer system in the Township pursuant to a lease agreement with the Municipal Sewer Authority of Lower Makefield Township, and is, therefore, authorized to enter into this agreement on behalf of the Municipal Sewer Authority of Lower Makefield Township Authority and the Township; and

WHEREAS, this Supplemental Agreement is intended to set forth the terms and conditions upon which BCWSA will construct the Neshaminy Interceptor upgrades, the allocations of collective costs related to same and the flow limitation obligations imposed upon the member municipalities and authorities as it relates to the CMP.

NOW, THEREFORE, intending to be legally bound and for other good and valuable

consideration, the parties hereto agree as follows:

1. Construction of Interceptor Upgrades.

A. It is anticipated by the parties hereto that based upon the completion of the initial Act 537 Planning, as well as engineering studies conducted by BCWSA, and as required by the Settlement Agreement between DEP and BCWSA, that certain portions of the Neshaminy Interceptor will be upgraded by BCWSA to facilitate sanitary sewer flows, which upgrades shall include, but not be limited to lining and the installation of relief sewers along a portion of the Neshaminy Interceptor. The initial improvements proposed to be constructed by BCWSA, as noted herein, shall be hereinafter referred to as the "Phase I" improvements. The parties acknowledge and agree that the Township, has submitted to BCWSA its Sanitary Sewer Needs Assessment, which assisted BCWSA in analyzing the capacity of the Neshaminy Interceptor. BCWSA has completed its alternative analysis for customer needs and Phase I Interceptor upgrades shall consist of lining portions of the Neshaminy Interceptor and constructing relief sewer lines, all of which said costs shall be funded collectively through user fees. Inasmuch as the Township has completed the requirement to provide its Sanitary Sewer Needs Assessment, sewer capacity for 2015 has previously been made available to the Township.

B. Upon completion of the Act 537 Planning, as required by the Settlement Agreement between DEP and BCWSA, and after completion of an analysis of the DEP approved 537 Plans, submitted by the municipalities which contribute sanitary sewer flow to the Neshaminy Interceptor, the parties hereto acknowledge and agree that BCWSA and DEP intend to engage in further planning discussions for the purpose of determining what additional modifications or changes to the Neshaminy Interceptor may be required, in the future, by the Act 537 planning and by and through individual municipal efforts undertaken to remove inflow and infiltration in each

of the municipal systems. To the extent that any additional non-maintenance improvements are required to be made to the Neshaminy Interceptor, either by way of additional lining or the construction of relief sewers (“Improvements”), those future Improvements shall be hereinafter referred to as “Phase II” Improvements. The parties hereto agree to cooperate and meet to discuss any Phase II Improvements or upgrades or any modifications or changes dictated by the Township’s current and/or future Act 537 data or planning submitted to DEP.

C. All Phase II and subsequent Improvements to the Neshaminy Interceptor, or in the event any changes are made to the methods to determine peaking factors, calculating flow limits, or apportioning penalties and fines under this Supplemental Agreement, shall be subject to a discussion in good faith between both parties causing a further amendment to this Supplemental Agreement, as needed.

2. Act 537 Sewer Facilities Planning. The Township prepared and submitted for DEP approval an Act 537 Plan of Study outlining the steps to complete an update to its Act 537 Plan. As such, the municipality did receive connections for 2015. In addition, the Township, by and through the Township, has submitted the municipality’s projection of capacity needs for the next five years. The Township shall continue to advise both BCWSA and DEP of its sewer capacity needs as such information concerning future sewer connections is made available to the municipality and authority. Along with efforts made by the Township to supply information related to sewer capacity needs and planning, the Township shall take immediate steps to meet all requirements associated with implementation of the Township’s Act 537 Plan and shall report progress regarding same to DEP and BCWSA to demonstrate its quantitative efforts to comply with peak flows pursuant to BCWSA’s obligations in the City of Philadelphia Agreement. As such, this Supplemental Agreement shall not limit the municipality’s or authority’s rights and

obligations under Act 537 to address changed circumstances in the municipality's sewer requirements. To that extent, this Supplemental Agreement shall not be considered a final document and shall be revised or amended as needed consistent with changed circumstances, including but not limited to, Act 537 sewer planning requirements and the quantitative efforts demonstrated by and through actions taken in furtherance of, and compliance with the Act 537 Plan as approved by DEP.

Further, upon compliance with the Township's obligations under this Supplemental Agreement, the Township and any other Neshaminy Interceptor customer will project capacity needs within the 5 year projection of their Chapter 94 report. If, as a result of those projections, BCWSA predicts a capacity shortfall, BCWSA will commence with engineering studies and planning to evaluate providing additional capacity in the Neshaminy Interceptor and/or WWTP facilities to provide such capacity. Should BCWSA be unable to provide the requested capacity, the Township may amend its Act 537 Plan to allow for alternative options of sewage conveyance and treatment. Alternative options may be solely undertaken provided that the then current flow which the Township is obligated under agreement to convey through the Neshaminy Interceptor shall continue without interruption.

3. Peak Flows. The Township agrees that it will maintain flow limits consistent with the Agreement between BCWSA and the Philadelphia Water Department, a copy of which is attached hereto, incorporated herein and marked as Exhibit "A", on a prorated basis which said flow limits shall include average annual, maximum daily and instantaneous peak flows which said flows shall be maintained by the Township at the limits identified in the attached Exhibit "D". Neither this Supplemental Agreement nor the parties original Neshaminy Interceptor Participation Agreement shall prevent the Township from amending its Act 537 Plan to explore alternative options for

collection and treatment of its flows, to the extent permitted by DEP, subject to approval of any other regulatory agencies having jurisdiction thereto and pursuant to laws and regulations regarding same; however, nothing in the preceding sentence shall relieve the Township of its obligation to pay for any outstanding bonds for which it is or may be responsible, as noted in prior Agreements between the parties.

For the purpose of determining compliance with the peak flow (PWD), as noted in Exhibit “D,” the peak hourly flow will be used. In furtherance of the standard DEP design requirements for Interceptors, the Township shall also maintain flow limits in accordance with the chart attached hereto as Exhibit “E” and incorporated herein by reference. Compliance with the flow limits required by the DEP design requirements for Interceptors shall be a condition precedent to receiving additional connections, as noted hereafter in this Supplemental Agreement. For the purpose of determining compliance with the peak instantaneous flow limits (DEP), as noted in Exhibit “E,” the peak hourly flow will be used. Irrespective of the flow limits imposed in Exhibit “E,” the Township will still be obligated to implement a DEP approved Inflow and Infiltration Abatement Plan that will allow it to come into compliance with the flow limits in Exhibit “D” on the schedule set forth in the DEP approved CAP/CMP/I & I Abatement Plan, as may be amended in the future, such that the contractual obligations to the City of Philadelphia are met.

Should the Township not meet its flow limits with respect to the obligations to the City of Philadelphia, there shall be no consequences, financial or otherwise, to the Township for not meeting its flow limitations unless exceedances by the Township cause a fine, penalty, or assessment to be levied upon BCWSA by the City of Philadelphia. If the Township is not meeting its flow limitations as defined by this Supplemental Agreement and the failure to meet the flow limitations causes or contributes to a capacity exceedance in the Neshaminy Interceptor system or

causes or contributes to an exceedance of the City of Philadelphia Agreement flow limitations, the consequence to the Township shall be that no additional connections will be permitted until the flow exceedance has been addressed, in addition to any penalties that may be appropriate under this Supplemental Agreement.

Should any fines, penalties, or assessments be levied by the City of Philadelphia, then the provisions of paragraph 6 of the Agreement shall determine the proportionate share to be paid by each Customer, as noted in Paragraph 6 of this Agreement.

The parties acknowledge that the Township have submitted and substantially updated the projection of capacity needs for the next five (5) years. It is understood and agreed that the approval and execution of this Supplemental Agreement is a condition precedent to receiving any connections for 2016 to be utilized by the Township.

Subsequent to 2018, the allowances for average annual, maximum daily and peak hourly flows generated by the Township will be based upon average flow, maximum daily and peak hourly flow limits, which shall be adjusted annually based on DEP's Chapter 94 reporting methodology, which is based on a five (5) year rolling average. Any of the aforementioned flows generated by the Township will be increased by the number of EDUs of additional capacity added to the Neshaminy Interceptor as a result of new connections made to the sanitary sewer system in the Township.

In order to be allocated the additional connections, it shall be a condition precedent that the Township shall notify, in writing, BCWSA of the location of the connections, the number of connections, the EDUs related thereto, and the timing of any new connections subsequent to 2018. The execution of this Supplemental Agreement and/or the approval of an Act 537 Plan does not constitute an automatic guaranty of capacity. Capacity will be made available to all contributors to the Neshaminy Interceptor on a first-come/first-serve basis.

Every application for an additional connection or connections related to a new project shall require either a full planning module or a planning exemption that includes the appropriate certifications of capacity from the authority, municipality, BCWSA, and the City of Philadelphia. The applicant must provide documentation that the planning module or planning exemption request has been approved by DEP. Alternatively, the applicant may provide documentation that DEP has waived planning for the project. As aforesaid, provided that the Township is in compliance with Township's I & I abatement program, additional capacity in the Neshaminy Interceptor shall not be unreasonably withheld provided that the Township has not caused or contributed to a capacity exceedance in the Neshaminy Interceptor system or caused or contributed to an exceedance of the City of Philadelphia Agreement flow limitations. There shall be a further condition precedent with respect to the allocation of any additional capacity to which shall be that the Township is in compliance with its DEP approved I & I abatement program, which shall be determined by DEP.

BCWSA will, however, monitor compliance with the I & I abatement program in connection with reviewing and monitoring flow limitations. Notwithstanding compliance with the aforementioned, no additional capacity will be allocated unless the Neshaminy Interceptor is capable of appropriately conveying the additional capacity to the City of Philadelphia for ultimate treatment.

4. Future Capacity. No capacity in 2018 and beyond shall be made available to the Township unless the Township is meeting its current inflow and infiltration goals as set forth in a DEP approved Inflow and Infiltration Abatement Plan provided that the Township has not caused or contributed to a capacity exceedance in the Neshaminy Interceptor system or caused or contributed to an exceedance of the City of Philadelphia Agreement flow limitations. It is understood and agreed that the obligations of the Township pursuant to the schedule in the DEP

approved CAP/CMP/I & I Abatement Plan, as may be amended in the future, shall reach the point where its maximum daily flow is not to exceed 1.4 times their 5 year average annual flow limit based on DEP methodology and a peak flow of 2.5 times their 5 year average annual flow limit based on DEP methodology as noted in Exhibit "E." Notwithstanding the capacity limitations related to the CMP, the Township will still be required to implement a DEP approved Inflow and Infiltration Abatement Plan that will allow it to comply with flow limits, as set forth above, which are based on BCWSA's obligations with the City of Philadelphia Agreement.

5. Connection Management Plan. The terms and conditions of the CMP between BCWSA and DEP are incorporated by reference as though more fully set forth at length.

6. Fines and Assessment of Costs. Should the City of Philadelphia, the United States Environmental Protection Agency, the Pennsylvania Department of Environmental Protection or any other governmental agency impose upon the BCWSA any fines or claims for additional cost due to the conveyance of peak flows in excess of the limitations imposed pursuant to the City of Philadelphia Agreement, the Township shall be responsible for its proportionate share of said costs if, and only if, the Township has exceeded its capacity as set forth in this Supplemental Agreement. The share of penalty allocated to the Township will be based on the proportionate share of the total flows in the Neshaminy Interceptor attributable to the Township's proportionate use. The determination of the Township's proportionate share shall be based upon meter readings, which said meters measure the flow from all of the participants in the Neshaminy Interceptor, and said meters for all of the participants are of similar capability to measure wastewater flow entering the Neshaminy Interceptor. Said meters are owned and maintained by BCWSA.

If fines or penalties or other claims for additional costs are imposed upon the BCWSA, the

method of determining the proportionate share to be paid by the Township shall be based upon meter readings as described in the paragraph above or upon EDU estimates of wastewater flow where accurate meter measurements are not practical, and such readings and/or estimates are taken at the time of the event which triggers the assessment of additional costs, fines or penalties. The exceedance charge from the Philadelphia Water Department will be distributed to each municipality, authority or other entity (each individually a "Customer" or collectively, "Customers") that exceeds its allowable flows based upon its proportion to the total flow exceedance. The calculation would be as follows:

$$\text{Customer Share of Surcharge (\$)} = (\text{Total of Customer Daily Flow Exceedances for Billing Period (MG)} / \text{Sum of all Customers' Daily Flow Exceedances for Billing Period (MG)}) \times \text{PWD Surcharge Amount (\$) for Billing Period}$$

AN EXAMPLE OF THE PENALTY CALCULATION IS PROVIDED IN EXHIBIT "F".

7. Meters. The meters used to measure the flows at various locations within the Neshaminy Interceptor, including those flows emanating from the Township are inspected and calibrated semi-annually by a third party. BCWSA shall provide to the Township the name and contact information of the third party contractor. Additionally, should the third party contractor change during the course of the relationship between the parties, BCWSA shall provide to the Township the name and contact information of the new contractor responsible for the maintenance of the meters. Complete calibration documentation and complete inspection documentation will be provided to the Township within 5 days of the date of receipt of any calibration, testing, inspection report, communication or writing by any third party to BCWSA regarding the condition, maintenance or inspection of the meters. BCWSA shall make available, via Telog wireless installation, any and all meter readings to the Township within 5 days of receipt of same from the meter contractor. The meters used to determine fees, penalties,

compliance or the like, will be the meters identified in Paragraph 6, owned by BCWSA and utilized for billing purposes, which measure wastewater flow emanating from all of the connection points between the the Township system and the Neshaminy Interceptor.

8. Inspections. BCWSA and the Township shall provide to each other, from time to time, all information relevant and appropriate to the proper administration of the provisions of this Supplemental Agreement. Any inspections to be undertaken by any party of this Supplemental Agreement in accordance with the provisions of this paragraph shall be conducted at reasonable times and with reasonable notice. Complete records of any inspections will be provided to the other party herein within 30 days of the date of any such inspection with the exception of the inspection reports discussed in Paragraph 7 above.

9. Capacity. The parties hereto acknowledge and agree that future sewer capacity is subject to regulations of the City of Philadelphia and DEP. Accordingly, events may occur which prompt the City of Philadelphia and/or DEP to restrict future sanitary sewer connections to the Neshaminy Interceptor.

10. Force Majeure. Notwithstanding any other provisions of this Supplemental Agreement, neither BCWSA nor the Township are responsible for any damages to the other for any failure to comply with this Agreement resulting from an act of God or riot, sabotage, public calamity, flood, strike, breakdown of facilities or common transportation facilities or any other event beyond its reasonable control. For the purposes of this Agreement, a flood or storm that constitutes a force majeure would be a storm named by an agency of the Federal government. The party having the responsibility for the facility so affected, however, shall proceed promptly to remedy the consequences of such event, with such costs to be shared in accordance with the terms and conditions of this Supplemental Agreement or the original Neshaminy Interceptor Agreement

between the Township and BCWSA for the Neshaminy Interceptor. Notwithstanding anything herein to the contrary, if a force majeure event occurs that causes the City of Philadelphia to take any enforcement action against BCWSA or issue any fines/penalties/assessments against BCWSA in accordance with the provisions of the City of Philadelphia Agreement, then the Township cannot rely on this provision as a defense to a claim by BCWSA of a breach of this Supplemental Agreement arising out of the same force majeure event.

11. Default. In the event of a breach of this Supplemental Agreement by either party, the other party may resort to whatever remedies are available, at law or equity, to enforce this Supplemental Agreement. The parties, by executing this Supplemental Agreement, acknowledge and agree that monetary damages are not an adequate remedy so either party may resort to a court of equity in order to enforce the provisions of this Supplemental Agreement and to compel compliance by the defaulting party.

12. Severability. Should any provision herein or for any reason be held illegal or invalid by a court of competent jurisdiction, no other provision of this Supplemental Agreement shall be effected as the Supplemental Agreement would have been executed even if such invalid or illegal provision had not been contained herein.

13. Other Agreements. This Supplemental Agreement shall not limit BCWSA from entering into other agreements with other municipalities or municipal authorities, but, if any such agreement contains terms, standards and/or conditions more favorable to the municipality or municipal authority than the terms, standards and/or conditions of this Supplemental Agreement, then the terms, standards and/or conditions of the other agreements shall be extended, granted, conferred or otherwise provided to the Township.

14. Effective Date. The Effective Date shall be the date of the execution and delivery

hereof by the parties hereto.

15. Waiver. If any party to this Supplemental Agreement does act and insist upon strict performance of this Supplemental Agreement or any other terms, conditions or otherwise, same shall not be considered as a waiver of any of the rights hereunder.

16. Interpretation. This Supplemental Agreement shall be interpreted in accordance with the laws of the Commonwealth of Pennsylvania and shall be binding upon the respective parties, its successors and assigns and may not be assigned to any third party without the written consent of the other party hereto which consent shall not be unreasonably withheld. This Supplemental Agreement shall be interpreted as an amendment or supplement to any and all existing agreements by and between BCWSA and the Township related to the Neshaminy Interceptor and is not meant to be a replacement of the aforementioned agreements.

17. Disputes. To the extent any disputes arise pursuant to the terms and conditions of this Supplemental Agreement and cannot be resolved by the parties, such disputes shall be litigated in the Court of Common Pleas of Bucks County.

IN WITNESS WHEREOF, and intending to be legally bound hereby, the parties hereto have caused this Agreement to be executed, under seal, by affixing their respective hands and seals the day and year first above written.

EXHIBIT A
AGREEMENT BETWEEN BUCKS COUNTY WATER AND SEWER AUTHORITY AND
CITY OF PHILADELPHIA

AGREEMENT

This Agreement, made this 5th day of February, 1988 and effective as of January 1, 1988 by and between the City of Philadelphia, hereinafter called "City", and the Bucks County Water and Sewer Authority, hereinafter called "Authority".

WITNESSETH:

WHEREAS, City owns and operates wastewater collection and treatment facilities to convey, treat and dispose of wastewater its by-products, including sludge, collected from retail customers within the City and from outlying municipalities, townships, authorities and entities including Authority; and

WHEREAS, City desires to reserve wastewater treatment capacity for wholesale suburban customers at its Northeast Water Pollution Control Plant (the "Plant") on a long term basis to ensure the most efficient use of the City's resources and facilities, and to provide full and fair compensation to City; and

WHEREAS, the Council of the City of Philadelphia has by Ordinance, Bill No. 1129, May 20, 1987, directed the Water Commissioner to enter into new agreements for the sale of wastewater treatment service to suburban communities; and

WHEREAS, Authority desires to acquire wastewater treatment capacity from City at the Plant to ensure a sufficient wastewater treatment capacity for the communities it serves; and

WHEREAS, the Plant has limited capacity and City has other suburban customers who purchase wastewater treatment service from City; and

WHEREAS, Authority agrees to pay for its reserved wastewater treatment capacity in accordance with this Agreement;

NOW, THEREFORE, intending to be legally bound and in consideration of the mutual covenants contained in this Agreement, the parties agree as follows:

I. WASTEWATER QUANTITY AND QUALITY

A. Reservation of Capacity - City shall reserve wastewater treatment capacity for the Authority at the Plant as set forth in Exhibit "A" attached hereto and incorporated herein ("Flow and Loadings Limits") commencing on the date of this Agreement.

B. Capital Contribution - Upon execution of this Agreement, in consideration of the reservation of capacity at the Plant, Authority shall pay ELEVEN MILLION NINE HUNDRED THOUSAND DOLLARS (\$11,900,000.00) to City for net cost to City for wastewater conveyance and treatment facilities, systems and equipment completed prior to July 1, 1986 and allocated to the service of Authority under the terms and conditions stated herein plus THREE HUNDRED AND SEVENTY-THREE THOUSAND DOLLARS (\$373,000.00) for wastewater conveyance and treatment facilities, systems and equipment allocated to the service of Authority as stated herein and completed as of December 31, 1987. These sums plus any additional sums

paid to City by Authority for facilities, systems and equipment allocated to Authority under this Agreement shall be referred to as Authority's "Capital Contribution."

C. Pro-rata Share of New Facilities and Renewal and Replacement -

(1) Authority agrees to pay to City its pro-rata share as calculated by City of costs for capital expenditures for renewal and replacement of facilities, and for new facilities, excepting however, new facilities which are intended solely to increase the capacity of the Plant. The costs to be allocated shall be net of grants ~~or~~ other reimbursement from the federal or state government. City shall provide Authority with a Facilities Capital Budget not later than thirty (30) days before the beginning of City's Fiscal Year to notify Authority of its share of the cost of capital improvements and renewal and replacement.

(2) Authority agrees to pay actual costs of capital improvements or renewal and replacement within sixty (60) days of receipt of the bill. In the event that Authority does not pay the bill when due, late charges will accrue in accordance with Section II.B., below.

D. Change in Capacity -

(1) Authority agrees that if the capacity of the Plant is upgraded or downgraded by Federal or State agencies or regulations or if City is directed to acquire additional facilities by Federal or State agencies or regulations,

Authority will pay any costs associated with its revised pro-rata share of capacity as calculated by City. Nothing in this Section I.D. shall serve to revise Authority's flow and loadings limits as set forth in Exhibit A attached hereto and incorporated herein ("The Flow and Loadings Limits Addendum").

(2) In the event that City has excess capacity available, City shall offer it to its suburban customers on a first come, first serve basis. If Authority desires to purchase such excess capacity, it agrees to pay rates and charges then in effect for such capacity, to make a capital contribution therefor and to terms consistent with this Agreement. Nothing in this Section I.D shall be construed as binding upon either party to agree to modify this Agreement, the Flow and Loadings Limits Addendum or binding upon the City to have additional capacity available.

E. Exceedance Charges -

(1) Flow and Loadings Limits - The wastewater delivered by Authority to City shall not exceed the limitations set forth in the Flow and Loadings Limits Addendum. For the purpose of this Agreement the term "Flow Limits" shall mean the maximum amount of wastewater as measured in millions of gallons per day which may be delivered to City for treatment in a given period of time and the term "Loadings Limits" shall mean the maximum biochemical oxygen demand ("BOD") loadings and suspended solids ("SS") loadings which shall be delivered to City for treatment annually.

(2) The Flow Limits shall be as set forth in the Flow and Loadings Limits Addendum. The Flow Limits for "Stage 1" shall remain in effect until acceptance of wastewater flow by City via the Force Main as set forth in Section IV.O, below. Thereafter, the Flow Limits for "Stage 2" shall govern this Agreement.

(3) The "Loadings Limits" for SS and BOD shall be as set forth in the Flow and Loadings Limits Addendum.

(4) Exceedance Charges - City shall estimate or measure the quantity and sample the quality of Authority's wastewater flow. Authority shall be liable to pay penalties to City for exceedances of agreed-upon Flow Limits and Loadings Limits as set forth in the Flow and Loadings Limits Addendum and the "Exceedance Charges Addendum" (attached hereto and incorporated herein as Exhibit "B").

(5) Plan to Eliminate Exceedances - In the event that Authority's wastewater flow exceeds the Flow Limits set forth in the Flow and Loadings Limits Addendum on five (5) or more occasions in one calendar year or eight (8) or more occasions in two consecutive calendar years, or ever exceeds the maximum annual average, or if Authority exceeds the Loadings Limits, either for BOD or SS, Authority agrees:

a) That upon written notice of exceedances from City, Authority shall develop and submit to City within one hundred and eighty (180) days of written notice a written report detailing a plan of action to eliminate the exceedances within five (5) years from the date of sub-

mission of the written report. City shall promptly approve or disapprove the plan. Approval of the plan outlined in the report will not be unreasonably withheld. City shall notify the Authority in writing within sixty (60) days of receipt of the plan of approval or disapproval and shall include reasons for failure to approve.

b) If Authority fails to submit a report outlining a plan to eliminate exceedances, or if City cannot approve such a plan, Authority shall be liable to City for a penalty of One Thousand Dollars (\$1,000.00) per week until such time as Authority submits a plan which City can approve.

II. WASTEWATER TREATMENT CHARGE

A. Wastewater Treatment Charges - Authority agrees to pay wastewater treatment charges. The wastewater treatment charges shall consist of:

(1) An operation and maintenance charge based upon actual or estimated wastewater flows and actual or estimated BOD and SS Loadings of wastewater delivered to the Plant by Authority. The operation and maintenance charge shall be based upon the cost (as defined below at Paragraph II.A. (3)) of conveying and treating wastewater delivered by the Authority. Such charges shall be based upon quantity, quality and flow rates of wastewater delivered as well as charges based upon billing, metering, sampling and other related

fixed costs.

(2) A management fee equal to ten percent (10%) of the charges set forth in paragraph (1).

(3) For the purpose of this Agreement the term "Cost" shall include all direct and indirect expenses, including but not limited to, labor, materials, equipment, power, chemicals, rentals, benefits and departmental overhead. Departmental overhead shall include, but not be limited to, such items of cost as administrative, financial, legal, accounting and engineering support.

(4) Authority shall have the right upon written request to review City's method of computing and allocating the cost of providing wastewater treatment service to Authority.

B. Billing and Penalties for Late Payment -

(1) Upon the execution of this Agreement, City shall render bills to Authority on a quarterly basis for the charges set forth in this Agreement. City reserves the right to bill Authority on a more or less frequent basis in the future.

(2) Bills shall be payable to City by Authority within thirty (30) days of receipt of bill by Authority. Authority shall notify City in writing of disputed charges prior to their due date. Authority may withhold payment of disputed charges, but in the event the dispute is resolved in favor of City, payment withheld shall be subject to late fees running from the original due date for said charges. In no event

shall City be liable to Authority for payment of interest or late fees of any nature on disputed charges.

(3) Late fees at the rate of one and one-quarter percent (1-1/4%) per month simple interest shall be added to any balance unpaid thirty (30) days after billing.

(4) City, upon six (6) months prior written notice to Authority, may increase or decrease late fees to a level reflecting additional or decreased costs incurred by City.

C. Notice of Changes in Rates - City shall provide notice to Authority of any change in rates or billing practices at least ninety (90) days in advance of the effective date of such new rates or practices.

III. CONSTRUCTION, OPERATION AND MAINTENANCE OF AUTHORITY'S CONVEYANCE SYSTEM AND RELATED MATTERS

A. Design and Construction of Sewers - Authority shall design, construct, own, operate and repair at its sole cost and expense sanitary sewers and connections to the City system necessary to convey its wastewater to the City limits.

B. Approved Connection Points - The locations of approved points of connection and provisions concerning these connections are described in Exhibit "C", attached hereto and incorporated herein (the "Connection Points"). No additional Connection Points shall be made without prior written approval from City acting through its Water Commissioner.

C. Plan to Eliminate Unauthorized Discharge - If any of Authority's Connection Points are determined by the City or any governmental regulatory agency to be maintenance problems or sources of unauthorized discharges, Authority agrees to immediately submit a plan to City outlining action to be taken to eliminate within forty-five days of written notification the problem or unauthorized discharge. City shall promptly approve or disapprove said plan. Any action taken pursuant to this section III.C. shall be at the sole expense of Authority.

IV. FORCE MAIN EXTENSION

A. Authority to Construct Force Main - Authority agrees to construct an extension of its connection piping and necessary appurtenances into City (the "Force Main") to reconnect with City's Upper Delaware Low Level Interceptor System in the vicinity of State Road and Shelmire Avenue in a location to be approved by City after completion of a route feasibility study performed at the sole cost of Authority.

B. Rights of Entry - For the purpose of constructing the Force Main, City shall assist Authority in acquiring rights of entry, easements and rights of way upon land necessary for construction of the Force Main. Rights of way or easements on land for which the City does not hold title required to construct the Force Main shall be acquired at the sole cost of Authority, City assisting in such acquisitions where possible.

C. Right to Revoke - In the event the Force Main is located within any City street and if such City street is needed

for a public purpose, City shall have the right upon twelve months prior written notice to Authority, to revoke or modify any right to place the Force Main within City's streets. In the event City exercises this right of revocation or modification, Authority shall, at its sole cost and expense:

1) Promptly relocate the Force Main according to the directions and requirements of City and restore the surface of the affected streets; or

2) with City's approval, not unreasonably withheld, pay City the increased cost of any project constructed by City in a different location as a result of Authority's failure to make such relocation.

D. Authority to Pay for New Sewer - Authority at its sole expense, shall construct the Force Main in the route to be approved by City in accordance with City's Standard Specifications, where applicable. Authority shall pay all construction expenses relating to the Force Main, including, but not limited to, design, preparation of plans and drawings, construction, and "as-built" plans. Authority shall also pay City for consultation with City's personnel and reasonable costs incurred by City in connection with City's periodic inspection, repair and testing of the Force Main.

E. Review - City shall have the right to review from time to time, plans, shop drawings, materials, workmanship and contract drawings for the Force Main.

F. Other Required Approvals - Any review by the Water Commissioner ("Commissioner") shall not be deemed to constitute approval required by any other department, board or commission of City, including, but not limited to, the Department of Licenses and Inspections and the Streets Department.

G. Emergencies During Construction - City shall have the right throughout the construction of the Force Main to take steps deemed necessary by the Commissioner to alleviate any emergency or potentially hazardous condition or conditions threatening public health, safety or welfare.

H. Drawings - Upon completion of the Force Main, Authority shall deliver to City a full set of shop drawings and "as-built" plans.

I. Materials and Workmanship - The materials used in the Force Main shall conform to the requirements of the plans and specifications and shall be well adapted for the kind of service required. The work shall be of first class construction, free from defects and the work shall be performed in a good and workmanlike manner.

J. Defective Work or Material - Authority shall remove, at its own expense, any work or material judged by City as defective or not in accordance with the plans and specifications and shall reconstruct, rebuild and replace the same until such time as City shall approve the work or material.

K. No Representation or Warranty by City -

(1) Notwithstanding anything contained in this Agreement, any review and/or approval by the City, or acceptance of the Force Main by the City, shall not constitute any representation, warranty or guarantee by City as to the substance or quality of documents, work or other matter reviewed, approved or accepted. No person or firm may rely in any way on such approval and at all times Authority and Authority's agents, contractors and subcontractors must use their own independent judgment as to the accuracy and quality of all such documents and other matters.

(2) The presence of City's representatives during construction shall not lessen the obligation of Authority for construction in accordance with the plans and specifications, free of defects.

L. Insurance -

(1) Prior to the commencement of construction of the Force Main and until one (1) year after acceptance of wastewater flow via the Force Main, Authority shall obtain and maintain in full force and effect or cause its contractor to obtain and maintain in full force and effect: (i) A policy or policies of comprehensive general liability and property damage insurance, with broad form endorsement, protecting Authority and City against all claims, suits and actions, for or on account of any damage or injury to property or persons, including death, arising out of this Agreement and the con-

struction contemplated by this Agreement. The insurance policy or policies shall be in the minimum aggregate amount of Two Million Dollars (\$2,000,000.00). Authority or Authority's contractor may obtain the levels of insurance required by this Section with a blanket and/or umbrella policy or policies; (ii) Automobile insurance (owned, nonowned, hired and leased) with total limits per occurrence of not less than One Million Dollars (\$1,000,000.00); and (iii) Workers' Compensation insurance as required by law, and employer's liability insurance with a limit of not less than One Hundred Thousand Dollars (\$100,000.00).

(2) Each insurance policy shall be in form and content reasonably satisfactory to the City Solicitor, shall name the City of Philadelphia as an additional insured, and shall also (i) contain a contractual liability endorsement applicable to Authority's obligations under Section VIII.C. of this Agreement, and (ii) provide that the insurance provided in the policy or policies shall not operate to limit or void coverage of any one insured with respect to claims against the same insured by any other insured. Each policy shall contain a clause that the policy cannot be cancelled, modified or permitted to expire unless and until at least thirty (30) days prior written notice is given to City. Authority shall provide City with a certificate or certificates of insurance evidencing such coverage at least fifteen (15) days prior to commencement of construction of the Force Main and shall, upon the request of the City, provide the

City within a reasonable time after such request, but in no event more than sixty (60) days, with a copy of such insurance policy or policies. At least thirty (30) days prior to the expiration of each policy, Authority shall deliver to City a certificate or certificates evidencing a replacement policy or policies to become immediately effective upon the termination of the previous policy. Each insurance policy obtained pursuant to this Section shall be obtained from insurers having a Best rating of A+7 or better and licensed to transact business in the Commonwealth of Pennsylvania.

(3) If Authority fails to cause such insurance to be maintained, City shall not be limited in the proof of any damages which City may claim against Authority or any other person or entity to the amount of the insurance premium or premiums not paid or incurred and which would have been payable upon such insurance, but City shall also be entitled to recover as damages for such breach the uninsured amount of any loss and damages, expenses of suit and costs, including, without limitation, reasonable cancellation fees, suffered or incurred during any period when Authority shall have failed or neglected to provide insurance as aforesaid.

M. Surety Bond - Prior to the commencement of construction of the Force Main and until one (1) year after acceptance of wastewater flow via the Force Main, Authority shall obtain and maintain in full force and effect:

(1) A performance bond, in the form attached to this Agreement as Exhibit "E" and made a part hereof, with a

surety company approved by City naming City as an obligee in the amount of Six Million Dollars (\$6,000,000.00) as security for the faithful performance of the obligations of Authority under this Agreement; and

(2) A labor and materialmen's bond in the form attached to this Agreement as Exhibit "F" and made a part hereof, with a surety company approved by City naming City as an obligee in the amount of Six Million Dollars (\$6,000,000.00) as security for the full payment of Authority's contractors and subcontractors and others furnishing labor and materials for the Force Main.

N. Conditions for Start of Construction - Prior to commencement of construction of the Force Main, Authority shall obtain:

(1) all policies of insurance required in Section IV.L. of this Agreement;

(2) the surety bonds required in Section IV.M. of this Agreement;

(3) all permits and approvals required pursuant to Section IV.F. of this Agreement.

O. Acceptance of Wastewater Flow Via Force Main - Authority shall notify City and obtain City's approval prior to the conveyance of wastewater flow to the Plant via the Force Main. Prior to acceptance of wastewater flow via the Force Main, all metering equipment must be installed and operable and Authority must present to City for its approval an emergency plan of action to be,

carried out in the event it is necessary to bypass or shut down the Force Main.

V. MAINTENANCE AND REPAIRS

A. Maintenance -

(1) Authority shall own and maintain the Force Main and equipment and the electronics associated with the meter installed in Bucks County. City shall own and maintain telemetering equipment installed in Bucks County which shall consist of equipment which converts the signal produced by the meter into a signal which can be transmitted over telephone lines. City shall also own and maintain all equipment located in City necessary to receive and record telemetered information.

(2) Authority shall submit to City for its approval, a plan to City prior to delivery of any wastewater flow to City via the Force Main setting forth a maintenance schedule and maintenance procedures for the metering equipment and electronics to be maintained by Authority under this section V.A. City shall review and approve or disapprove such plan within sixty (60) days of receipt. The plan shall demonstrate that Authority will obtain prompt service by qualified meter maintenance personnel to repair any meter or electronic malfunction or breakdown in a timely manner. City shall receive written reports of maintenance and inspection work performed on the meter.

(3) In the event of a malfunction or breakdown of the

meter, metering equipment or electronics associated with the meter, Authority shall provide City with a report from the independent contractor performing the repairs detailing the cause of the malfunction or breakdown and the repairs undertaken.

(4) A flow accuracy test utilizing metering equipment independent of the Authority's magnetic flow meter to verify the accuracy of the meter shall be performed by Authority's independent contractor annually. If the annual calibration check indicates that recalibration is required, the meter shall be recalibrated as required and another calibration check shall be performed within three (3) months and at three (3) month intervals thereafter until Authority and City determine that recalibration is no longer necessary. Thereafter, annual calibration checks shall resume. Accuracy within two percent (2%) shall be acceptable. City shall have the right to review the qualifications and approve or disapprove the independent contractor chosen by Authority to perform flow accuracy testing. Such approval shall not be unreasonably withheld or delayed. City shall receive a written report of the test directly from the independent contractor. Authority shall pay all costs associated with the flow accuracy testing.

B. Should Authority fail to maintain and repair the Force Main or metering equipment within thirty (30) days after notification by City or immediately in the event of an emergency or

hazardous condition, City shall have the right to proceed with repair or maintenance and to recover the cost thereof from Authority. In addition, Authority shall be liable for a penalty payable to City in the amount of fifteen (15) percent of the cost of maintenance or repairs.

C. Sampling - City shall have the right to enter the area served by Authority at any time upon reasonable advance telephone notice to sample Authority's wastewater for quality.

D. Flow and Strength Estimates - Where City, in its sole discretion, determines that it is impractical or uneconomical to meter and/or sample wastewater, or when actual strength and flow data is unavailable for reasons beyond the control of City or Authority, City shall estimate, using its standard methods for estimating flow and/or strength figures for billing purposes.

E. Billing Information - Upon request, City shall provide to Authority strength and flow data utilized in billing Authority, including descriptions of its standard methods for estimating flow and/or strength figures.

VI. WASTEWATER QUALITY RESTRICTIONS

A. Interjurisdictional Pretreatment Agreement - City and Authority shall enter into the contract attached hereto and incorporated herein as Exhibit "D" (the "Interjurisdictional Pretreatment Agreement"). Authority agrees to comply with all of the provisions contained therein.

B. Sludge Utilization -

(1) Authority recognizes the importance and urgent need to utilize sludge in a timely and proper manner. Immediately upon signing of this Agreement, Authority and City shall work to develop an environmentally sound sludge utilization program meeting Federal and State standards within the area served by Authority. Authority shall propose a sludge utilization program which does not require a Pennsylvania Department of Environmental Resources permit by March 15, 1988 and thereafter shall continue to work with City to develop other applications for sludge utilization in the area served by Authority.

(2) Authority shall actively support City's community education program for sludge by identifying community groups for City which have an interest in sludge utilization and by providing City with appropriate facilities in Bucks County at which City may conduct educational programs.

VII. PAYMENT OF MONIES DUE AND OWING

Upon execution, Authority and City agree to fulfill their respective financial obligations under a prior agreement of October 1, 1982 as modified herein. Retroactive to July 1, 1986, City shall waive the capital portion of the lump sum charge in consideration of the Capital Contribution made under this Agreement and effective as of that date.

VIII. MISCELLANEOUS

A. Inspection and Audit - The parties agree that each shall keep complete records and accounts concerning their responsibilities under this Agreement. Each party shall at all times have the right to examine and inspect said records and accounts upon 30 days written notice. If required by any law or regulation, Authority shall make said records and accounts immediately available to Federal and State auditors.

B. Arbitration of Disputes - If any dispute shall arise between the parties hereto, concerning terms, conditions and covenants of this Agreement, the same shall be submitted to a Board of Arbitration. The Board of Arbitration shall be composed of three (3) arbitrators, one appointed by City, one by Authority, and the third to be agreed upon jointly by the arbitrators selected by City and Authority.

The arbitrators representing Authority and City shall be named within five (5) days from the request for the appointment of such Board. If after a period of ten (10) days from the date of the appointment, the two (2) arbitrators appointed by City and Authority cannot agree on the third arbitrator, then either appointed arbitrator may request the American Arbitration Association or its successor to furnish a list of three (3) members of said Association, who are not residents of either Philadelphia or Bucks Counties, from which the third arbitrator shall be selected.

The arbitrator appointed by Authority shall then eliminate one (1) name from the list furnished by the American Arbitration Association within five (5) days after its publication, following which the arbitrator appointed by City shall eliminate one (1) name from the list within five (5) days thereafter. The individual whose name remains on the list shall be the third arbitrator and shall act as the Chairman of the Board of Arbitrators.

Each party shall bear the costs of its own arbitrator and the parties shall equally divide the costs of the third arbitrator and all other common costs.

The Board of Arbitrators, thus established, shall commence the arbitration proceedings within ten (10) days after the third arbitrator is selected and shall make its determination within thirty (30) days after the appointment of the third arbitrator. The decision of such arbitrators shall be final and binding upon the parties, except in the case of fraud.

C. Claims, Insurance and Related Matters -

(1) Authority agrees to defend, indemnify and save harmless City from and against all claims, actions, causes, suits, demands, losses, interest, penalties and liabilities arising from performance of the terms and conditions of this Agreement by reason of:

a) City's inability, due to causes beyond its control, to perform any of the provisions of this

Agreement;

b) Injury (including death) to persons and damages to property resulting from operations under this Agreement to convey Authority's wastewater to the Plant and to construct the Force Main whether due to the negligence or gross negligence of City, Authority or their employees, servants or agents or the inherent nature of their operations;

c) EPA or Pennsylvania Department of Environmental Resources action of any kind whatsoever, whether direct or indirect, for any work undertaken by Authority, its contractors or consultants, necessary and required by this Agreement due to rejection of said work by the EPA or Pennsylvania Department of Environmental Resources;

d) Any grant fund, or any portion thereof, received by Authority and later determined to be ineligible for reimbursement by the appropriate regulatory agency or grant auditors.

(2) City and Authority agree that in the event of EPA or Pennsylvania Department of Environmental Resources action or any other governmental regulatory action against City of any kind whatsoever, for activities carried out under this Agreement either by City or Authority or their employees, servants or agents, City and Authority shall equitably apportion responsibility for payment of any costs, fines, penalties or damages arising from such action.

(3) Anything in this Agreement to the contrary notwithstanding, Authority shall not be liable for injuries (including death) or property damage occurring during the course of treatment at the Plant, except, to the extent that such injuries and damages increase City's operating costs, Authority shall be responsible for its proportionate share of those increased costs.

(4) Nothing set forth in this Agreement shall limit or debar City from resorting to any appropriate remedy in law or equity, or any combination of remedies for non-compliance with this section VIII.C of this Agreement.

(5) Nothing contained in this Agreement shall be deemed to confer upon any third person any right against City or Authority or to vest in said third person any cause of action against City or Authority or to authorize any such person to institute any suit or suits against City or Authority.

(6) City shall have the right to approve counsel appointed on its behalf pursuant to this Agreement, unless appointed by Authority's insurer.

D. No Transfer of Rights - Authority shall not confer, transfer, convey, assign or license to any third party any rights obtained under this Agreement without the express written consent of the City. Such consent shall not be unreasonably withheld.

E. Term -

(1) Except as set forth in Section VII, this Agreement shall be effective as of January 1, 1988, and shall continue

in force and effect until terminated as hereinafter set forth.

(2) City shall have the right to terminate this Agreement for "cause" at any time, but only upon five(5) years written notice. "Cause" shall mean:

a) continuing exceedances of the flow and loadings limits which are not corrected as required by this Agreement and which impair the safe and efficient operation of the system or which cause City to be in violation of permits issued by PaDER or EPA; or

b) failure by Authority to meet its financial obligations under this Agreement for a period of six consecutive months; or

c) failure by Authority to comply with a decision or determination of a Board of Arbitration or court of competent jurisdiction rendered under this Agreement within three months of the date of the decision or determination.

(3) In the event that City terminates this Agreement for cause, Authority shall forfeit its capital contribution, including the cost of the Force Main.

(4) Authority or City may terminate this Agreement for any reason after it has been in effect for thirty-five (35) years, but only by giving written notice five (5) years before the effective date of termination.

(5) In the event this Agreement terminates for any

reason, except for cause as set forth in subparagraph (2) of this Section VIII. E., City shall pay to Authority an amount equal to the Authority's share of the then-remaining value of all systems, equipment and facilities, except the Force Main, used to convey and treat Authority's wastewater under this Agreement (the "Assets"). The remaining value of the Assets shall be calculated as follows:

- a) The remaining useful life of each component of the Assets shall be separately calculated.
- b) The original and all subsequent contributions by the Authority towards the cost of acquisition, renewal and replacement of each component of the Assets shall be multiplied by a fraction whose numerator is the remaining useful life of the component, and whose denominator is the sum of the years the component has been in service since January 1, 1988, plus the remaining useful life.
- c) The amount thus calculated shall be paid to the Authority in cash on the effective date of termination.
- d) The calculation required hereunder shall be made by an independent appraiser selected jointly by the City and the Authority. The expense of the appraisal shall be divided equally between the City and the Authority. If the City and the Authority cannot agree on an appraiser, then one shall be selected by the same method to be used to select a third arbitrator under Section VIII.B. of this Agreement.

(6) Upon termination of this Agreement for whatever reason or upon expiration of this Agreement, Authority shall pay to City the costs of abandoning the Force Main, if any. Such costs shall be established by City as of the abandonment.

F. Ownership, Management and Control of Plant Facilities - City retains sole ownership and control of the Plant and all other sewage treatment facilities in the City except the Force Main, and agrees to operate, maintain, repair, and improve its facilities associated with service to Authority. City retains the sole and exclusive right to make all managerial and other decisions regarding its sewage treatment facilities, including but not limited to those decisions regarding maintenance, upkeep, expansion, or replacement of all or a portion of its sewage treatment facilities. Upon termination of this Agreement for any reason, by either party, ownership of the Force Main shall revert to City. Authority shall transfer its interest in all rights of way and easements for the Force Main to City in consideration of City's payment to Authority of one dollar (\$1.00). Said transfer of rights of way and easements to City shall be recorded in the real property records of Philadelphia County.

G. Severability - In the event any provision hereof is held illegal or invalid, no other provision of this Agreement shall be affected; and this Agreement shall then continue in full force as if such illegal or invalid provision had not been contained herein.

H. Successors and Assigns - All the covenants contained in this Agreement shall extend to and bind the respective successors and assigns of the parties hereto with the same effect as if the words "successors and assigns" had, in each case, been specifically mentioned.

I. Waiver - The failure of a party hereto to insist upon strict performance of this Agreement or of any of the terms or conditions hereof shall not be construed as a waiver of any of its rights herein granted.

J. Notices - All notices, payments and communications required to be given in writing under this Agreement shall be sent by United States mail, postage prepaid, or delivered by hand delivery with receipt obtained, to the addresses below or at such other addresses as City or Authority may designate in writing from time to time:

If intended for City:

Water Commissioner
ARA Tower
1101 Market Street
Philadelphia, Pennsylvania 19107

If intended for Authority:

Executive Director
Bucks County Water and Sewer Authority
1275 Almshouse Road
Warrington, Pennsylvania 18976

All notices shall be deemed received five (5) calendar days after mailing or upon actual receipt, whichever is earlier.

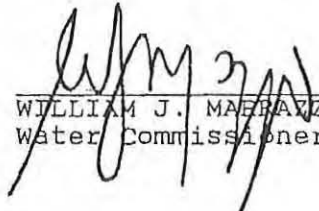
K. Captions - The captions in this Agreement are for convenience only and are not part of the Agreement. The captions do

not in any way define, limit, describe or amplify the provisions of this Agreement or the scope or intent thereof.

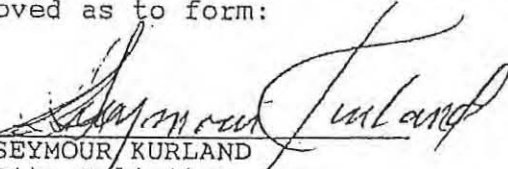
L. Entire Agreement - This Agreement and its Exhibits and Addendums, incorporated herein, represent the entire agreement of the parties hereto and there are no collateral or oral agreements or understandings. This Agreement may be amended or modified only in writing signed by both City and Authority.

IN WITNESS WHEREOF, The City of Philadelphia has caused this Agreement to be executed by its Water Commissioner; and the appropriate officer of the Bucks County Water and Sewer Authority has executed this Agreement on behalf of the Authority, and has hereunto affixed the corporate seal of the said Authority duly attested by the Appropriate officer thereof, the day and year first above written.

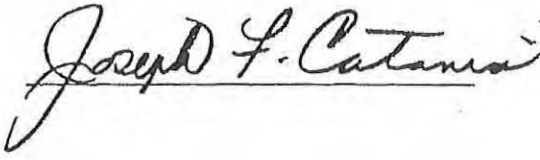
CITY OF PHILADELPHIA

By: 
WILLIAM J. MAERAZZO
Water Commissioner


Approved as to form:

By: 
SEYMOUR KURLAND
City Solicitor

BUCKS COUNTY WATER AND
SEWER AUTHORITY

By: 
Joseph F. Catania

Attest:


Alvin L. Cook
att. by.

FLOW AND LOADINGS LIMITS ADDENDUM

DAYLIGHT FLOW LIMITS

	<u>Maximum Annual Avg.</u>	<u>Instantaneous Max.</u>
STAGE 1	10 MGD	14 cfs ¹
STAGE 2	20 MGD	62 cfs

BOD AND SS LOADINGS

<u>ANNUAL SUSPENDED SOLIDS LOADINGS</u>	<u>ANNUAL BIOCHEMICAL OXYGEN DEMAND LOADINGS</u>
13,400,000 lbs.	13,400,000 lbs.

¹ The allowable flow rate during non-daylight hours in Stage 1 shall not exceed 40 cfs.

EXCEEDANCE CHARGES ADDENDUM

- I. Authority shall be liable to City for the exceedance charges stated below beginning January 1, 1992 or upon completion of the Force Main when Authority exceeds the quantity flow limits set forth in the Flow Limits Addendum.
- A. Volume: \$3,700.00 per unit of flow over the average daily limit during any consecutive 365 day period, such charge to be billed annually. The unit of flow used to determine exceedances shall be each hundred thousand gallons of wastewater flow per day.
- II. Authority shall be liable to City for the exceedance charges stated below beginning January 1, 1988 when Authority exceeds the quality flow limits set forth in the Flow Limits Addendum.
- A. Suspended Solids (SS): \$480.00 per thousand pounds over the limit.
- B. Biochemical oxygen Demand (BOD): \$900.00 per thousand pounds over the limit.

III. Charges for Years Subsequent to 1987

During January 1988 and during January of each calendar year thereafter, the exceedance charges stated above will be adjusted in accordance with the changes in the Consumer price Index for the prior calendar year. The index to be used for this adjustment shall be the Consumer Price index published by the U.S. Bureau of Labor Statistics for all urban consumers (CPI-U) for the Philadelphia SMSA, all items.

APPROVED CONNECTION POINTS TO CITY WASTEWATER SYSTEM

Stage 1

1. Vicinity of State Road and Grant Avenue

Stage 2

1. Vicinity of State Road and Shel mire Avenue

EXHIBIT C

INTERJURISDICTIONAL PRETREATMENT AGREEMENT
BETWEEN
THE CITY OF PHILADELPHIA
AND
THE BUCKS COUNTY WATER AND SEWER AUTHORITY

This Agreement is entered into this 9th day of March , 1986,
between the City of Philadelphia ("City") and the Bucks County Water and
Sewer Authority ("Authority").

RECITAL

Whereas, City owns and operates a wastewater treatment system; and

Whereas, Authority currently utilizes this wastewater treatment system
pursuant to an agreement between City and Authority dated (the
"Service Agreement"); and

Whereas, City must develop and implement an industrial pretreatment
program pursuant to conditions contained in its discharge permit (Permit
#PA0026689) issued by the Pennsylvania Department of Environmental
Resources; and

Whereas, Authority desires to continue to utilize the wastewater treat-
ment system and recognizes its industrial waste control obligations under
40 CFR 403.

In consideration of the following terms and conditions City and
Authority agree:

Exhibit D

1. Within two months of the adoption by the City of its new wastewater control regulations, Authority shall enact and diligently enforce a resolution requiring each member municipality to enact an ordinance substantially identical to the regulations adopted by City and providing as specified below ("Resolution").
2. Authority, by Resolution, shall require each member municipality to enact an ordinance specifically incorporating the following provisions:
 - (a) a requirement that any industrial user responsible for any accidental discharge notify immediately both City and Authority;
 - (b) a prohibition on the use of dilution as a control technique for compliance with discharge limits except as allowed by Federal Pretreatment Standards;
 - (c) a grant of authority to impose mass discharge limits in lieu of, or in conjunction with, concentration discharge limits;
 - (d) a prohibition against and penalty for the knowing transmittal of false information by an industrial user to either City or Authority;
 - (e) a grant of explicit authority to Authority to require the industrial user to install all monitoring and pretreatment facilities.
 - (f) within six (6) months of enactment, each member municipality shall notify City and Authority of every non-domestic user with the potential to discharge an extremely hazardous substance as defined by the Superfund Amendments and Reauthorization Act of 1986 and every industrial user within its jurisdiction.
3. City and Authority shall periodically (at a minimum of every five years) review their respective regulations and resolutions and the

member municipalities' ordinances and jointly draft and adopt equivalent amendments to their respective regulations and resolutions where necessary to ensure the effective administration and operation of the pretreatment program. Whenever City becomes aware of a problem with the pretreatment program which can be mitigated by a change in the resolutions, City may draft an amendment which Authority must adopt. If Authority has adopted a resolution requiring its municipalities to adopt ordinances identical to City's regulations, then, whenever City amends its regulations, Authority shall adopt a resolution requiring its member municipalities to adopt the identical amendment.

4. Authority, by Resolution, shall require each member municipality to adopt as part of its ordinance and enforce, and Authority shall establish by resolution and enforce, specific discharge limits at least as stringent as the specific discharge limits established in City regulations.
5. Authority, by Resolution, shall require each member municipality to adopt as part of its ordinance a provision incorporating by reference into the ordinance categorical pretreatment standards promulgated by the U.S. Environmental Protection Agency (EPA) by authority of the Clean Water Act Sections 307(b) and (c) be automatically incorporated by reference into its member municipalities' ordinances. These standards shall supercede any specific discharge limits in the ordinance which are less stringent than the categorical standards as they apply to the particular industrial subcategory. Authority shall notify all affected industrial users of pertinent categorical standards and monitoring and reporting requirements contained in 40 CFR 403.12 or included as part of the categorical standards.

6. Authority, by Resolution, shall require each member municipality to include in its ordinance definitions for "significant industrial user", "industrial user" and "nondomestic user" which are identical to the definitions adopted by City. City may make the final determination as to whether a particular industrial user is a significant industrial user, industrial user or nondomestic user based on information City may request from Authority or its member municipalities. City shall control, through industrial discharge permits, industrial waste discharges from each significant industrial user, industrial user or nondomestic user discharging into the sewer.
7. If there exists any industrial user discharging to Authority sewer system but located outside the jurisdictional limits of Authority, then Authority shall within 30 days of this agreement notify such jurisdiction of this requirement and provide the City with copies of such notification. Authority shall negotiate and enter into an agreement with this outside jurisdiction. Such agreement shall be substantially equivalent to this Agreement, and shall be jointly executed by Authority, City and the outside jurisdiction. If the outside jurisdiction refuses to negotiate and execute an agreement, then City shall enter into a contract with the industrial user which contains terms and conditions substantially equivalent to City industrial discharge permits.
8. Authority, by Resolution, shall require each member municipality to file with City a certified copy of its ordinance and any amendments thereto. Authority shall fill with City other interjurisdictional agreements and any contract entered into for the purposes of industrial

waste control. If Authority maintains, Authority shall provide City access to and copies of, if requested, all industrial monitoring reports including 40 CFR §403.12 compliance reports, self-monitoring reports, baseline reports, records of violations and actions taken, and any other monitoring or reporting requirements imposed by federal, state or local regulations. Any records or other relevant information maintained shall be for at least six years.

9. Any authorized officer or employee of City may enter and inspect at any reasonable time any part of the sewer system of Authority. The right of entry and inspection shall extend to public streets, easements, and property within which the system is located. Additionally, City shall be permitted, as appropriate, to enter onto private property to inspect industrial waste discharges. Authority shall provide complete sets of sewer plans and make all necessary legal and administrative arrangements for these inspections. The right of inspection shall include on-site inspection of pretreatment and sewer facilities, observation, measurement, sampling, testing, and access to (with the right to copy) all pertinent compliance records located on the premises of the industrial user or non-domestic dischargers.

10. Authority and City hereby agree that the City shall implement a pretreatment program within Authority and shall perform in connection therewith technical and administrative activities which may include: 1) updating the industrial waste survey; 2) providing technical services, such as sampling, process chemical analysis, and engineering advice; 3) permitting; 4) compliance monitoring; 5) enforcement support and 6) monitoring hazardous waste disposal practices. Authority may assume

responsibility for conducting the pretreatment program implemented by City at any time upon 90 days' advanced written notice. To the extent Authority shall administer its own pretreatment program, it shall provide the City in writing a detailed outline of the program 90 days prior to initiating such a program and the City shall have the right to approve or disapprove the program. City may periodically review Authority pretreatment program activities and funding to ensure that Authority and any outside jurisdiction is adequately administering its pretreatment program in conformance with the Federal Pretreatment Regulations (40 CRF 403) and all City requirements.

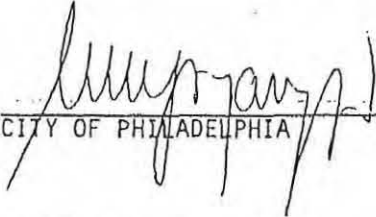
11. City shall review Authority resolution and each member municipality's ordinance and amendments thereto and any interjurisdictional agreements for conformance with 40 CRF part 403, and to ensure inclusion of all other legal provisions mandated by this Agreement. City shall periodically review the enforcement efforts of Authority and any other jurisdiction to ascertain whether pretreatment requirements are being diligently enforced.
12. If City determines that Authority and/or its member municipalities has failed or has refused to fulfill any pretreatment obligations, City may develop and issue a remedial plan containing a description of the nature of the pretreatment deficiencies, an enumeration of corrective steps to be taken and a time schedule for attaining compliance with all pretreatment requirements. Such plans shall be specifically enforceable in a court of competent jurisdiction. Where Authority fails to satisfy the terms of the remedial plan, City may, upon thirty days' written notice, refuse to accept any industrial waste discharges from Authority.

13. In the event that EPA or Pennsylvania Department of Environmental Resources action results in fines, penalties or costs being assessed against City because of industrial or non-domestic waste discharged from Authority, Authority and City shall equitably apportion responsibility for payment of such fines, penalties or costs. Authority shall fully indemnify, defend and hold harmless City for damages or costs arising from personal and property damage pursuant to the Service Agreement.
14. Where a discharge to the wastewater treatment system reasonably appears to present an imminent danger to the health and welfare of persons, or presents or may present an imminent danger to the environment, or threatens to interfere with the operation of the wastewater treatment system, City may immediately initiate steps to identify the source of the discharge, and to hold or prevent said discharge. City may seek injunctive relief against Authority or outside jurisdictions and/or any industrial or non-domestic user contributing to the emergency conditions, and/or may pursue other self-help remedies. Authority shall pay to City the cost of such steps taken to prevent, stop or ameliorate the effects of such discharge.
15. Any disputes arising out of this Agreement shall be submitted to binding arbitration performed in accordance with the procedures set forth in the Service Agreement between Authority and City dated February 5, 1988.
16. The terms of this Agreement may be amended only by written agreement of the parties. In any event, this Agreement shall be reviewed and revised, as necessary, at least every five years.

17. This Agreement modifies only those provisions of the existing Service Agreement between the two parties which conflict with the terms of this Agreement.

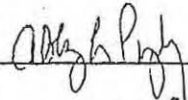
18. This Agreement will remain in effect so long as the Service Agreement remains in effect. Termination of the Service Agreement shall also result in the termination of this Agreement.

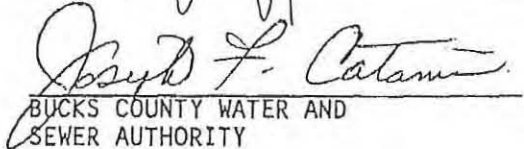
The parties hereto have executed this Agreement on the date shown above.


CITY OF PHILADELPHIA

March 14, 1988
DATE

APPROVED AS TO FORM:
SEYMOUR KURLAND
CITY SOLICITOR

BY: 


BUCKS COUNTY WATER AND
SEWER AUTHORITY

March 9, 1988
DATE


ATTEST

March 9, 1988
DATE

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS, THAT WE, THE BUCKS COUNTY WATER AND SEWER AUTHORITY (hereinafter called the "Principal Obligor"), and _____, Surety, are jointly and severally held and firmly bound unto the Water Department of City of Philadelphia ("City") in the sum of SIX MILLION DOLLARS (\$6,000,000.00) lawful money of the United States of America, to be paid to the said City, its successors and assigns, to which payment, well and truly to be made, we do bind ourselves and each of us, our and each of our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

Sealed with the seal of the said Bucks County Water and Sewer Authority and with the corporate seal of the said _____, Surety, duly attested by the proper officers thereof.

Dated the _____ day of _____, in the year of our Lord One Thousand Nine Hundred and Eighty-Eight (1988).

WHEREAS, the above bounded Principal Obligor agreed to construct a sewer in the City in accordance with the terms and conditions of that certain agreement dated _____, 1988,

EXHIBIT "E"

by and between the City of Philadelphia, acting by and through its Water Department and the Principal Obligor (the "Agreement") and plans and specifications approved by the Water Commissioner of City.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal Obligor shall and do well and truly, in all respects, comply with all the terms, conditions and covenants contained in the above-mentioned Agreement, and shall do and pay unto the City of Philadelphia upon demand, any and all loss, damage and expenses which the said City may or shall sustain by reason of the failure of the said Principal Obligor to comply with the terms of the said Agreement, it being hereby understood and agreed that the reasonable decision of the Water Commissioner or his successor as to such failure in complying with the terms of the said contract Agreement and as to the amount of loss or damage sustained by reason thereof, being binding and conclusive upon the parties hereto, then this obligation to be null and void; otherwise, to be and remain in full force and virtue.

The undersigned Principal Obligor and Surety hereby agree that no modification of the terms of the above-mentioned Agreement or alteration in the work to be done under it, and no forbearance on the part of either City or the Principal Obligor to the other, either by the grant of any extension of time for the performance of the Agreement or otherwise, shall be deemed to release the undersigned or either of them, their or either of their heirs, executors, administrator or assigns, from their lia-

bility hereunder, notice to the Surety of any such modification, alteration, extension of forbearance hereby being waived.

And we do for ourselves and each of us, and each of our heirs, executors, administrators, successors and assigns, hereby authorize and empower any attorney of any court of record in Pennsylvania or elsewhere, upon the filing of this instrument or a copy thereof, duly attested as correct by such attorney, to appear for us or either of us, our or either of our heirs, executors or administrators, successors or assigns, and in our names or in the name of either of us, ~~our or either of our~~ heirs, executors or administrators, successors or assigns, confess a judgment against us or either of us, our or either of our heirs, executors or administrators, successors or assigns, in favor of the Water Department of the City of Philadelphia or any entity performing the functions of the Water Department, for the sum named in this bond, without defalcation, with costs of suit, release of errors, and with five percent (5%) added for collection fees; hereby waiving the benefit of all exemption laws and the holding in inquisition on any real estate that may be levied upon by virtue of such judgment, voluntarily condemning such real estate and authorizing the entry of such condemnation upon any writ of fieri facias and agreeing that said real estate may be sold under the same; and further waiving all errors, defects and imperfections whatsoever in the entering of the said judgment or any process thereon, and hereby agreeing that no writ of error or objection or motion or rule to open or strike off judgment or to

stay execution of appeal, shall be made or taken thereto. The right and power to appear and to enter or confess judgment hereinabove provided for and the right to assess damages under any such judgment shall be exercisable any number of times and shall not be exhausted by one or more uses thereof. And for the doing of these acts this instrument or a copy thereof attested as aforesaid shall be full warrant and authority.

This Performance Bond and the obligations hereunder shall terminate absolutely and be of no further force and effect upon the expiration of the Agreement.

PRINCIPAL:

Attest: John Zettich
[Seal]

By: Joseph F. Catania

Surety:

Attest: _____
[Corporate Seal] Secretary

By: _____
Attorney-in-fact

(If Attorney is not a Pennsylvania resident, this bond must be co-signed for the Surety by a Pennsylvania resident.)

LABOR AND MATERIALMEN'S BOND

KNOW ALL PERSONS BY THESE PRESENTS, THAT WE, The Bucks County Water and Sewer Authority (hereinafter called the "Principal Obligor"), and _____, Surety, are jointly and severally held and firmly bound unto the Water Department of City of Philadelphia ("City") for the use of any and every person, copartnership, association or corporation interested in the sum of SIX MILLION DOLLARS (\$6,000,000.00) lawful money of the United States of America, to be paid to the said City, its successors and assigns, to which payment, well and truly to be made, we do bind ourselves and each of us, our and each of our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

Sealed with the seal of the said Principal Obligor and with the corporate seal of the said _____, Surety, duly attested by the proper officers thereof.

Dated the _____ day of _____, in the year of our Lord One Thousand Nine Hundred and Eighty-Eight (1988).

EXHIBIT "F"

WHEREAS, the above bounded Principal Obligor, agreed to construct a sewer for the Water Department of City in accordance with the terms and conditions of that certain agreement dated _____, 1988, by and between the City of Philadelphia, acting by and through its Water Department and the Bucks County Water and Sewer Authority (the "Agreement") and the plans and specifications approved by the Water Commissioner of City.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal Obligor shall and will promptly pay or cause to be paid to any and every person, copartnership, association or corporation, all sums of money which may be due for material furnished, equipment or machinery rented, services rendered by public utilities, and labor supplied or performed in the prosecution of the work covered by the above-mentioned Agreement, whether or not the said material, equipment, machinery, public utility services or labor enter into and become component parts of the work or improvement contemplated, including, inter alia, (a) all material furnished, equipment or machinery rented, services rendered by public utilities, and labor supplied or performed in preparing the site for the performance of the work covered by said contract, (b) equipment, machinery, public utility services, labor, shoring, sheathing and blasting supplies and other materials used on the site in doing such excavating as may be necessary or required to institute or perform the work specified in the Agreement or machinery rented, services rendered by public utilities and labor supplied or performed in the prose-

cution of work or repair or of maintenance required by or performed under the terms of said Agreement, then this obligation to be null and void; otherwise, to be and remain in full force and virtue.

It is understood and agreed that the City of Philadelphia, by its Water Department, may sue in assumpsit on this bond, for a breach by the Principal under the Agreement, for such sum or sums as may be justly due the City, and have execution thereon; and any such suit shall be commenced not later than the date of termination of the Agreement. ~~It is also understood and agreed that no person, copartnership, association or corporation, who is not a party to the Agreement shall have a right of action upon this bond.~~

The undersigned Principal Obligor and Surety, for themselves and each of them, their and each of their heirs, executors, administrators, successors and assigns, further agree, jointly and severally, that no modification, alteration, addition or extension of the terms of the above-mentioned Agreement or alteration, addition or diminution of the work to be done under it above-mentioned and described, and no forbearance on the part of either the City or of the Principal Obligor to the other, either by the grant of an extension of time for the performance of the Agreement, of the payments to be made under it, or otherwise, shall be deemed to release the undersigned or either of them, their or either of their heirs, executors or administrators, successors or assigns, from respective liability

hereunder; notice to said surety of any such modification, alteration, addition, extension, diminution and/or forbearance hereby being waived.

It is understood and agreed that the term "Principal Obligor" as used herein shall be construed to include both singular and plural, and shall be deemed to include and designate each and every of the individuals, copartnership, associations and artificial body of person who have entered into the above-mentioned Agreement with the City of Philadelphia, who have been designated above as "Principal", and who other than the Surety have signed and executed this present Indenture.

This Labor and Materialmen's Bond and the Obligations hereunder shall terminate absolutely and be of no further force and effect upon the expiration of the Agreement.

PRINCIPAL:

BUCKS COUNTY WATER AND
SEWER AUTHORITY

X Attest: _____

[Seal]

Y By: _____

Surety:

Attest: _____

By: _____

Attorney-in-fact

(If Attorney is not a Pennsylvania resident, this bond must be co-signed for the Surety by a Pennsylvania resident.)

[Corporate Seal]

AMENDMENT TO WASTEWATER
SERVICES AGREEMENT DATED
FEBRUARY 5, 1988

On this 15th day of May, 1997, the City of Philadelphia (hereinafter the "City") and the Bucks County Water and Sewer Authority (hereinafter the "Authority"), pursuant to Section VIII L. of the Wastewater Service Agreement dated February 5, 1988, (hereinafter the "Agreement") hereby amend the Agreement as follows:

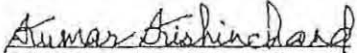
- A. Provisions A(1) through (5), inclusive, which follow immediately below, shall be in effect from May 15, 1997 until May 15, 2000. Thereafter, Provisions A(1) through (5) shall terminate and be null and void.
1. The City will accept the Authority's flow reduction plan as being sufficient to address its excessive flows. The Authority's flow reduction plan is attached hereto as Exhibit A.
 2. The Authority agrees that starting on July 1, 1996 its capital billings will be based on a 23 m.g.d. share of our Northeast treatment plant. The additional 3 m.g.d. of allocated capacity will be purchased on a depreciation and return basis at a cost of \$264,000 per 3 m.g.d. per year to be paid in quarterly installments along with the Authority's regularly scheduled capital billings. The retroactive billings for the 3 m.g.d. of additional allocated capacity from July 1, 1996 shall be paid as part of the Authority's next regularly scheduled quarterly capital billing. The Authority shall continue to pay for its initial allocation of 20 m.g.d. in accordance with Section I.C of the Agreement.
 3. The Authority will continue to pay the City for the additional 3 m.g.d. of allocated capacity until such time that the rolling 365 day average flow returns to 20 m.g.d. or below for a period of 90 consecutive days.
 4. If the rolling 365 day average flow returns to 20 m.g.d. or below for 90 consecutive days, but then, at any time thereafter, increases to over 20 m.g.d, the Authority shall again pay for the 3 m.g.d. of additional allocated capacity until such time that the rolling 365 day average flow again returns to below 20 m.g.d. for a period of 90 consecutive days.
 5. If at any time, from May 15, 1997 until May 15, 2000, the rolling 365 daily average flow exceeds 23 m.g.d., the Authority agrees that the City may exercise its right to once again deny all Act 537 planning modules.

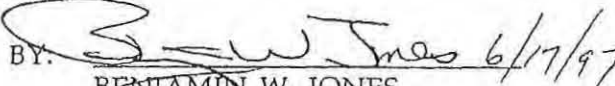
- B. Upon termination of provisions A(1) through (5), inclusive, on May 16, 2000, the City shall determine whether the Authority's flow reduction plan has been successful or has failed. The Authority's flow reduction plan shall be deemed to have failed if on May 16, 2000, the rolling 365 day average flow exceeds 20 m.g.d. If the flow reduction plan has failed, then the Authority agrees that the City may again exercise its rights to deny Act 537 planning modules. If on May 16, 2000 the flow reduction plan succeeds, but at some later point in time the rolling 365 day average flow again exceeds 20 m.g.d., the City reserves its rights to again deny Act 537 planning modules.
- C. This Amendment represents the entire agreement of the parties hereto and there are no collateral or oral agreements or understandings.


IN WITNESS WHEREOF, the City of Philadelphia has caused this Agreement to be executed by its Water Commissioner; and the appropriate officer of the Bucks County Water and Sewer Authority has executed this Agreement on behalf of the Authority, and has hereunto affixed the corporate seal of the said Authority duly attested by the appropriate officer thereof, the day and year first above written.

City of Philadelphia

Bucks County Water and
Sewer Authority

BY: 
KUMAR KISHINCHAND
Water Commissioner

BY:  6/17/97
BENJAMIN W. JONES
Executive Director

Approved as to form:
BY: 
DAVID A. KATZ, ESQ,
Divisional Deputy City Solicitor

Attest:


BUCKS COUNTY WATER AND SEWER AUTHORITY
NESHAMINY INTERCEPTOR FLOW REDUCTION PLAN

I. Agreement of all Neshaminy Interceptor Customers to be Billed

ADS flow meters have been installed at 62 points along the Interceptor. They have been tested and calibrated, and are now in service. Billing for the first quarter of 1997 has been based on metered flows, and that will be the case in the future.

II. Infiltration and Inflow Remediation

A. Bucks County Water and Sewer Authority has inspected and repaired 17,000 feet of spur lines entering the Interceptor. This project was completed this month (April 1997).

B. Bucks County Water and Sewer Authority has available \$11,000,000.00 for I/I remediation in municipal collection systems. It is proposing to use the money on the following terms:

1. Money will be allocated to each municipality in accordance with its needs and its proportionate use of total capacity in the Interceptor.
2. The amount spent on I/I remediation will be treated as a loan to the municipality. The loans will be interest-free for five (5) years, with no principal repayment required during that period. Thereafter, repayment will be at the Bucks County Water and Sewer Authority cost of funds, with amortization over twenty (20) years.
3. It is contemplated that the total remediation program will take thirty-six (36) months to complete, with results on the following schedule:
 - 5% removal in first 6 months
 - 10% removal in next 12 months
 - 20% removal in next 24 months
 - 30% removal in next 36 months
4. The savings in treatment costs as a result of I/I removal will provide the revenue necessary to repay the remediation costs.

III. Weather-Related flow Reduction

Bucks County Water and Sewer Authority believes that the unusual wet weather conditions between January 1996 and December 1996 have contributed to the high flow averages now existing.

<u>Month</u>	<u>Average Precipitation</u> <u>(1994 to 1995)</u>	<u>Actual Precipitation</u> <u>(1996 - 1997)</u>
January 1996	3.14"	4.38"
February 1996	2.54"	2.13"
March 1996	3.80"	4.27"
April 1996	2.11"	3.92"
May 1996	3.17"	3.17"
June 1996	1.00"	4.68"
July 1996	6.35"	5.65"
August 1996	2.85"	4.29"
September 1996	2.60"	4.19"
October 1996	3.46"	4.19"
November 1996	2.97"	2.89"
December 1996	2.03"	8.48"

AMENDMENT II TO THE
WASTEWATER SERVICES AGREEMENT
DATED FEBRUARY 5, 1988

WHEREAS, the City of Philadelphia (the "City") and the Bucks County Water and Sewer Authority (the "Authority") (collectively referred to as the "Parties") entered into a Wastewater Services Agreement dated February 5, 1988 (the "Agreement") whereby the City agreed to treat the Authority's wastewater in accordance with the terms and conditions set forth in the Agreement; and

WHEREAS, the Parties first amended the Agreement on May 15, 1997 to address the Authority's flow exceedances; and

WHEREAS, pursuant to the Agreement, the Authority conveys its wastewater to the City via a Force Main which connects to the City's sewer system in the vicinity of State Road and Shelmire Avenues in Philadelphia, Pennsylvania; (the "Connection Point") and

WHEREAS, the Authority's wastewater conveyed via the Force Main causes hydrogen sulfide gas to be produced in and around the Connection Point; and

WHEREAS, the production of hydrogen sulfide gas results in odors being produced in and around the Connection Point as well as possibly excessive corrosion to the City's sewer system; and

WHEREAS, the Authority and the City now desire to address these odor and possible excessive corrosion problems; and

WHEREAS, the Parties have reached agreement on how to resolve both the odor and corrosion issues; and

WHEREAS, the Parties now wish to memorialize their agreement in this Amendment II to the Wastewater Services Agreement Dated February 5, 1988 (henceforth "Amendment II");

IT IS THEREFORE AGREED BY AND BETWEEN THE CITY AND THE AUTHORITY ON THIS 10th day of January 1999 that the odor and excessive corrosion problems are hereby settled and resolved in accordance with the following terms and conditions as set forth below:

1. The City shall operate a sodium hypochlorite system (the "System") at the Authority's Totem Road Pumping Station located in Bucks County. The System shall be operated in such a manner as to eliminate substantially all odors generated by the sewage flowing from the Authority's Force Main into the City's sewer system. Further, the System shall be operated to eliminate any excessive corrosion. The System shall include, but is not limited to, the following:

(1) sodium hypochlorite, (2) pumps, (3) piping to introduce the sodium hypochlorite into the wastewater, (4) tanks to store the sodium hypochlorite, (5) monitors, (6) telecommunications system, (7) any equipment, devices, appurtenances or other requirements as may be necessary to comply with federal, state or local laws and regulations and (8) any other equipment, devices, appurtenances or procedures as may be necessary, in the City's sole judgment, to eliminate the odors and possible excessive corrosion. The City shall be responsible for ensuring that the telecommunications system is compatible with the existing system.

The System is presently operating and the Parties have agreed to take whatever actions are necessary, as expeditiously as possible, to make the System into a permanent installation.

2. The City shall have sole and exclusive control and authority over all matters relating to the operation, maintenance, inspection, repair and replacement of the System. The permanent installation is being designed by Carroll Engineering Corporation pursuant to a contract with the Authority. The City shall have approval rights for the design of the permanent installation. Should the City not approve the design of the final installation this Agreement shall become null and void.
3. The Authority hereby grants the City, its agents, contractors and subcontractors, full and complete access to only that portion of the Totem Road Pumping Station that is necessary for the operation, maintenance, inspection, repair and replacement of the System. This access specifically excludes entry into the Pump Station unless accompanied by a representative from the Authority. The Authority shall provide the City with the keys to the Totem Road Pumping Station gate so that the City may enter and leave the grounds of the facility as needed. The Authority shall be responsible for maintaining the site to ensure that the City, its agents, contractors and subcontractors have access to the site for the purpose of operating, maintaining, inspecting, repairing and replacing the System which specifically includes ensuring that the sodium hypochlorite delivery trucks have access whenever needed.
4. The Authority agrees to fully cooperate with the City so that the existing System that is now being operated can be made into a permanent installation as expeditiously as possible and within the time frame required by law. The Authority shall have the permanent installation completed by no later than June 30, 2000 or earlier if so required by law.
5. (a) The Authority shall be solely responsible for all costs related to the System ("System Costs") with one exception as set forth in paragraph 5(b). System Costs include, but are not limited to, the following:

- (1) sodium hypochlorite costs;
- (2) equipment costs, including but not limited to, tanks, pumps, piping, monitors, communication systems;
- (3) costs involved in making the System a permanent installation;
- (4) costs related to the operation, maintenance, inspection, repair and replacement of the System;
- (5) utility costs related to the System; and
- (6) costs related to the System incurred prior to the signing of this Amendment II.

The Authority shall be the legal owner of the System.

(b) The one exception to the Authority being responsible for all System Costs relates to the additional costs incurred by the City's in house labor force. To the extent City employees will be involved in the daily operation and maintenance of the System, the City may incur additional in house labor costs. The City agrees not to bill or charge the Authority for any additional City employee labor costs incurred by the City in the daily operation and maintenance of the System. The City shall, to the greatest extent possible, use its own in house forces for the daily operation and maintenance of the System and shall not contract out such daily operation and maintenance activities without the Authority's consent. The City currently uses specialized contractors to perform certain functions that are done on a periodic basis such as the periodic testing, calibration and inspection of equipment. The Authority shall be responsible for the costs associated with these specialized contractors.

The City has retained the Authority's federal grant rebate in the amount of \$163,942. The City shall use this amount to offset System Costs that the City has already incurred and will incur in the future.

6. System Costs related to capital expenditures shall be included with the City's capital cost billings to the Authority pursuant to Paragraph I(c) of the Agreement. System Costs related to operation and maintenance expenditures shall be included with the City's Wastewater Treatment Charges and billed to the Authority in accordance with Paragraph II(A) of the Agreement.
7. Subject to the null and void provisions contained in Paragraph 9, the City agrees not to take any legal, administrative, contract or other actions against the Authority for odors resulting from the Force Main emanating in and around the Connection Point. This prohibition specifically includes any actions to withhold approval of Act 537 Planning Modules.
8. Subject to the null and void provisions contained in Paragraph 9, the City agrees not to file suit, initiate arbitration proceedings or withhold Act 537 Planning Module Approval in order to hold the Authority solely responsible for any

corrosion to the City's sewer prior to the signing of this Amendment II. The parties acknowledge, however, that at some future date the City's sewer will need to be repaired and/or replaced. The Parties agree that such repair and/or replacement costs shall be shared pro rata in accordance with the terms and conditions of the Agreement.


9. Should the City be unable to operate the System as the result of conditions beyond its control, this Amendment II shall become null and void and the Parties are free to exercise all claims, rights, causes of actions and defenses they may possess in order to address the odors and possible excessive corrosion. Conditions beyond the City's control include, but are not limited to:
 - (a) the Authority's failure to cooperate with the City or grant the City, its agents, contractors or subcontractors, access to the Totem Road Pumping Station;
 - (b) federal, state or local statutes, regulations, ordinances or laws, that would prohibit the lawful operation of the System.
10. This Amendment II constitutes the full agreement and understanding of the Parties. There are no other agreements or understandings, either oral or in writing, related to the subject matter of this Amendment II.
11. This Amendment II may only be changed or modified in a writing signed by both Parties.
12. The Authority shall immediately notify the City should it become aware of any malfunctions, leaks or improper discharges from the System. The Authority shall call the City representative on stand by for Flow Control at 215-984-0480.
13. This Amendment II constitutes a full settlement of any obligations owed by the Authority to the City related to the subject matter contained herein.


WHEREFORE, the Parties intending to be legally bound execute this Amendment II immediately below.

City of Philadelphia

Bucks County Water
and Sewer Authority


KUMAR KISHICHAND
Water Commissioner


BENJAMIN W. JONES
Executive Director


DAVID A. KATZ
Divisional Deputy City Solicitor

Attest:



EXHIBIT B
SETTLEMENT AGREEMENT
BETWEEN DEPARTMENT OF ENVIRONMENTAL PROTECTION AND BUCKS
COUNTY WATER AND SEWER AUTHORITY

BUCKS COUNTY WATER AND SEWER AUTHORITY,	:	
Appellant,	:	Pennsylvania
	:	Environmental Hearing
v.	:	Board Docket No.
	:	2012-138-L (Consolidated
	:	with 2012-146-L,
	:	2012-152-L, and
COMMONWEALTH OF PENNSYLVANIA,	:	2012-155-L)
DEPARTMENT OF ENVIRONMENTAL PROTECTION,	:	and
Appellee	:	Docket No. 2013-175-L
	:	
and	:	
	:	
BUCKS COUNTY WATER AND SEWER AUTHORITY,	:	IN REM
Plaintiff-Condemnee	:	EMINENT DOMAIN
	:	PROCEEDINGS
	:	
v.	:	Bucks County Court of
	:	Common Pleas Docket No.
	:	2013-4635
COMMONWEALTH OF PENNSYLVANIA	:	
DEPARTMENT OF ENVIRONMENTAL PROTECTION,	:	
Defendant-Condemnor	:	

SETTLEMENT AGREEMENT

Bucks County Water and Sewer Authority ("BCWSA") and the Pennsylvania Department of Environmental Protection ("Department") (jointly "the parties"), by and through their respective counsel, with the intent of resolving the above-captioned matters, pursuant to 25 Pa. Code § 1021.141, and all other applicable laws, enter into this Settlement Agreement ("Agreement"), and agree as follows:

A. On June 26, 2012, the Department issued a letter to BCWSA informing it that its 2010 Wasteload Management Report established that portions of BCWSA's Neshaminy Interceptor sewer system are in a state of projected hydraulic overload and that there is an existing hydraulic overload in the Totem Road Pump Station.

B. On July 27, 2012, BCWSA filed an appeal of the Department's June 26, 2012 letter ("Appeal 1") with the Pennsylvania Environmental Hearing Board ("EHB"). The Appeal is docketed at EHB Docket Number 2012-138-L.

C. On July 25, 2012, the Department issued a letter to BCWSA informing it that its 2010 Wasteload Management Report shows that portions of BCWSA's Neshaminy Interceptor sewer system are in a state of projected hydraulic overload and that there is a projected hydraulic overload in the Totem Road Pump Station.

D. On August 17, 2012, BCWSA filed an appeal of the Department's July 25, 2012 letter ("Appeal 2"). The Appeal is docketed at EHB Docket Number 2012-152-L.

E. On August 10, 2012, land developer Horizon Lot 2 Associates filed an appeal of the Department's June 26 and July 25, 2012 letters ("Appeal 3"). Counsel for BCWSA entered his appearance on behalf of BCWSA in Appeal 3 on August 17, 2012. The Appeal is docketed at EHB Docket Number 2012-146-L.

F. On August 24, 2012, Northampton Bucks County Municipal Authority ("NBCMA") filed an appeal of the Department's July 25, 2012 letter ("Appeal 4"). Counsel for BCWSA entered his appearance on behalf of BCWSA in Appeal 4 on September 18, 2012. The Appeal is docketed at EHB Docket Number 2012-155-L.

G. The EHB consolidated Appeal 2, Appeal 3, and Appeal 4 into Appeal 1 (hereinafter collectively, "Consolidated Appeals").

H. On August 19, 2013, the Department issued a letter to Bensalem Township, Bucks County (“the incompleteness letter”) finding incomplete a sewage facilities land development planning module which had been submitted for a project known as the “High Tides Café.”

I. On September 20, 2013, BCWSA filed an appeal of the Department’s August 19, 2013 incompleteness letter (“Appeal 5”). The Appeal is docketed at EHB Docket Number 2013-175-L.

J. On June 19, 2013, BCWSA filed a petition for the appointment of a board of viewers (“Petition”) with the Bucks County Court of Common Pleas (“BCCP”). BCWSA alleged that the Department conducted a de facto taking and a regulatory taking of some portion of its Neshaminy Interceptor sewer system and sought compensation for the alleged takings. The Petition is docketed at BCCP Dkt. No. 2013-4635.

K. The parties have engaged in settlement discussions and, as a result of those discussions, have reached agreement on a settlement of the Consolidated Appeals, Appeal 5, and the Petition, in accordance with the terms of the Agreement set forth below.

THEREFORE, the parties desiring to settle this matter without resorting to additional litigation and intending to be bound, hereby agree to the settlement of the Consolidated Appeals, Appeal 5, and the Petition as follows:

1. Within five (5) business days of the Department’s acceptance in writing of BCWSA’s Neshaminy Interceptor Corrective Action Plan (“NICAP”), in the same form

as attached to this Agreement (Exhibit "A"), by separate praecipe to each tribunal, BCWSA shall withdraw and terminate with prejudice the Consolidated Appeals (including its participation in Appeals 3 and 4), Appeal 5, and the Petition, subject to the conditions of this Agreement, and specifically subject to the provisions of 1.(a) and 1.(b) below. The praecipes shall state that the parties agree to bear their respective attorneys' fees, expenses, and costs associated with this Agreement, the Consolidated Appeals, Appeal 5, and the Petition.

(a) The separate praecipes of withdrawal of the Consolidated Appeals and Appeal 5 shall state that the withdrawals are with prejudice, subject to the limitation of the following reservation of rights. The parties will expressly reserve all rights to raise or dispute any and all factual or legal issues concerning the permitted hydraulic capacity of the Totem Road Pump Station in future proceedings in a Homes of Distinction settlement in the Consolidated Appeals and Appeal 5.

(b) BCWSA will withdraw the Petition with prejudice. However, nothing in this agreement shall preclude BCWSA from raising the issues raised in the Petition in any dispute between BCWSA and any third party, as to that third party, or from raising such issues in any federal action initiated by the United States Environmental Protection Agency, or from raising such issues in any action initiated by the Department.

2. Within five (5) business days of the Department's acceptance in writing of BCWSA's NICAP, BCWSA agrees to withdraw in writing its September 2, 2013 Right to Know Law Request to the Department, docketed as RTKL Request No. 4100-13-0154.

3. BCWSA agrees that it shall not file an appeal or take any other adverse action against the Department as a result of its acceptance of the NICAP as final, if accepted in the same form as Exhibit "A."

4. The Department shall continue to enforce the requirements of the Consent Order and Agreement, entered into by the Department, Keystone Turf Club, Inc., Bensalem Racing Association, Inc., Greenwood Racing, Inc., Greenwood Gaming and Entertainment, Inc., Robert Green, and William Hogwood ("Parx Casino and Racing") on May 16, 2011, pursuant to the terms and conditions of that document, attached to this Agreement (Exhibit "B"). Unless otherwise authorized or required by the Department, and in accordance with Exhibit B and NPDES Permit for Concentrated Animal Feeding Operations, NPDES Permit No. PA1120503 (Exhibit "C"), upon full implementation of the Best Management Practices schedule, set forth in Exhibit C, Special Permit Requirements, Part C, Paragraph N, but no later than May 20, 2016, Parx Casino and Racing is required to submit a request to the Department to permanently configure the diversion structure on Parx Casino and Racing's property, located at 3001 Street Road, Bensalem, PA 19020, so that no stormwater entering Basin B at that property will flow into BCWSA's Neshaminy Interceptor system. As contemplated in Exhibits B and C, the Department shall work diligently with Parx Casino and Racing to assure that, no later than May 20, 2016, Parx Casino and Racing will cease conveying stormwater from its racetrack operations into the Neshaminy Interceptor system. Until such a time that the Department approves Parx Casino and Racing's reconfiguring of the diversion structure and the cessation of conveyance of stormwater from the racetrack operations into the Neshaminy Interceptor system, as set forth in Exhibits B and C, a failure of Parx Casino

and Racing to comply with its deadline for full implementation of the Best Management Practices schedule and removal of stormwater flows from its racetrack operations into the Neshaminy Interceptor system by May 20, 2016, and any stormwater from Parx Casino and Racing will not be counted by the Department towards any determination of exceedance or overload when the Department considers acceptance of new connections in Year 2018 and beyond against Neshaminy System municipal customers, provided that BCWSA has provided to the Department all metered sewage flow data for Parx Casino and Racing in BCWSA's annual Wasteload Management Report for each subsequent year that BCWSA seeks connections.

5. Provided that BCWSA terminates the Consolidated Appeals, Appeal 5, and the Petition, as agreed upon above, and provided that BCWSA remains in full compliance with the Department-accepted NICAP, the Department shall accept BCWSA's release of connections for years 2014 through 2017, as set forth in BCWSA's Neshaminy Interceptor Connection Management Plan ("NICMP"), attached to this Agreement (Exhibit "D"), or as modified by BCWSA and accepted by the Department, pursuant to the provisions of Paragraph 6.

6. The parties agree that BCWSA has a right to submit revised CMPs to the Department that alter the NICMP, and that the Department has a right to accept or not accept any such revisions in accordance with the Clean Streams Law, Act of June 22, 1937, P.L. 1987, *as amended*, 35 P.S. §§ 691.1-691.1001 ("Clean Streams Law"), and the regulations promulgated thereunder, including, but not limited to, the Municipal Wasteload Management regulations, 25 Pa. Code §§ 94.1 *et seq.* Acceptance of changes to the NICMP shall be based on an evaluation of the impacts of such changes on

projected flows to the Neshaminy Interceptor system and/or documented I/I removal based on metered flows that confirm additional capacity is available. Year 2018 and beyond allocations will be based on municipal compliance with the flow limits established in their supplementary agreement with BCWSA and the remaining available capacity in the Neshaminy Interceptor Sewer System.


7. The parties agree to bear their respective attorneys' fees, expenses, and costs associated with this Agreement, the Consolidated Appeals, Appeal 5, and the Petition.

8. This Agreement constitutes the entire agreement between the Department and BCWSA, and no alteration, additions, or amendments shall be valid unless mutually agreed to by the parties, set forth in writing, and duly executed by them.

9. By their signatures below, the parties consent to the terms of this Agreement and represent that they are authorized to execute this Agreement on behalf of the party or parties for whom they sign.

10. This Agreement shall terminate and be null and void on December 31, 2018, or earlier, if mutually agreed upon in writing by the parties.

FOR BUCKS COUNTY WATER AND SEWER AUTHORITY



Benjamin Jones
Chief Executive Officer
1275 Almshouse Road
Warrington, PA 18976

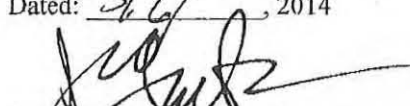
Dated: 3/6, 2014

REVIEWED BY COUNSEL



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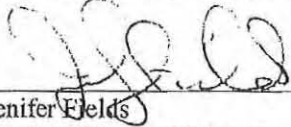
Dated: 3/6, 2014



Jeffrey P. Garton, Esq.
Begley, Carlin and Mandio
680 Middletown Boulevard
Langhorne, PA 19047

Dated: 3/6, 2014

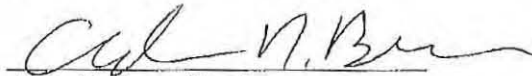
**FOR THE COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION**



Jenifer Fields
Regional Program Manager
Clean Water Program
Pennsylvania Department of Environmental Protection
2 East Main Street
Norristown, PA 19401

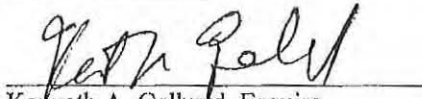
Dated: 3/10, 2014

REVIEWED BY COUNSEL



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2 East Main Street
Norristown, PA 19401

Dated: 3/10, 2014



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Assistant Counsel
Pennsylvania Department of Environmental Protection
Office of Chief Counsel
2 East Main Street
Norristown, PA 19401

Dated: 3/10, 2014

EXHIBIT C
CONNECTION MANAGEMENT PLAN

Connection Management Plan

Updated on 6-19-17 (supersedes 6/8/17 version)

Nishaminy Interceptor Service Area Tributary to Totem Road Pump Station

Development Name	PLANNING STATUS			CONNECTION STATUS						NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calculate Projected Flow)	Projected Ave. Flow (GPD)	2014	2015	2016	2017	
						4,968		1,241,713	1,408	1,389	2,009	950	
GRAND TOTAL FROM ALL MUNICIPALITIES													

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS						NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Hulmeville Borough												
Vile Property		Proposed	1	0	1	1	250	250	1	0	0	0
Wheeler Property [d]		Proposed	2	0	2	2	250	500	0	2	0	0
Loretto Property [b]		Proposed	2	0	2	2	250	500	0	0	0	2
Historic Bldg. Rehab (at Hulme and Water Sts)		Anticipated	0	0	0 [a]	0	250	0	0	0	0	0
Period Property (on Ford Ave.) [d]		Proposed	1	0	1	1	250	250	0	0	1	0
Kiss Electric		Proposed	1	0	1	1	250	250	0	0	1	0
Black Property (Trenton Road) [c]		Proposed	50	0	50	50	250	12,500	0	0	50	0
Langhorne Wood Products Property (Trenton Road) [c]		Proposed	35	0	35	35	250	8,750	0	0	0	35
TOTAL						92		23,000	1	2	52	37

- [a] Anticipated that any new flow would be offset by mitigation actions and/or existing EDU credits.
- [b] This project already had DEP approval to connect, and Borough requested it therefore be removed from the CMP. However, to comply with DEP instructions, it was left on the schedule.
- [c] Added per Hulmeville Municipal Authority letter dated 5/1/17.
- [d] In accordance with DEP requirements, no reallocating of EDU's from named projects is permitted. Therefore, to undo the changes made on the 6/8/17 NICMP, the following was done:
 The two (2) Wheeler Property EDU's were moved back to their original position, in Year 2015.
 The one (1) Period Property EDU was moved back to its original position in Year 2017. However, since Year 2016 EDU's are not yet released, it is requested this EDU be moved to 2016.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshiminy Interceptor Service Area Tributary to Totem Road Pump Station												
PLANNING STATUS			CONNECTION STATUS						NICMP APPROVED EDU'S			
Development Name	DEF Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Miscellaneous Connections		Future	12	0	12	12	250	3,000	3	3	3	3

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Langhorne Manor Borough												
Miscellaneous Connections		Future	2	0	2	2	250	500	0	0	1	1
E&H Properties Construction (TPN 19-7-27-1)	[a]	Proposed	1	0	1	1	250	250	1	0	0	0
McGrath (TPN 19-4-7-1)	[a]	Proposed	1	0	1	1	250	250	0	1	0	0
TOTAL						4		1,000	1	1	1	1

[a] To comply with DEP comment #3 on 4/25/17 email, E&H Properties was assigned the miscellaneous EDU for 2014, and McGrath was assigned the miscellaneous EDU for Year 2015.

Connection Management Plan													
Updated on 6-19-17 (supersedes 6/8/17 version)													
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station													
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S				
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017	
Lower Makefield Township													
Regency at Yardley - Singles	1-09929-267-X	Under Construction	191	157	34	34	250	8,500	30	30	35	35	
Regency at Yardley - Carriages (frm. Townhomes) [c]	1-09929-267-X	Under Construction	186	22	164	75	250	18,750	0	0	30	45	
Matrix Lower Makefield Residential (aka Matrix Condo's)	1-09929-267-X	Approved	62	0	62	62	250	15,500	0	0	62	0	
Matrix - Office	1-09929-267-X	Complete	6	2	0	0	250	0	0	3	1	0	
Brookshire Section I	1-09929-247-31J	Complete	21	21	0	0	250	0	0	0	0	0	
Brookshire Section II	1-09929-247-31J	Complete	8	8	0	0	250	0	0	0	0	0	
Troilo Tract	1-09929-262-E	Complete	5	5	0	0	250	0	0	0	0	0	
Minchart Subdivision	1-09929-255-31J	Under Construction	7	5	2	2	250	500	0	4	2	0	
Fiorelli Grove	1-09929-268-E	Approved	3	0	3	3	250	750	0	3	0	0	
Aria Hospital [a]		Proposed	223	0	223	148	250	37,000	0	0	74	74	
Canstone Terrace	1-09929-272-3J	Proposed	192	0	192	0	250	0	0	0	0	0	
Reserve at Yardley (aka Freeman's Farm)	1-09929-278-E	Under Construction	15	14	1	1	250	250	0	0	3	10	
Moon Nursery [b]		Approved	15	7	8	15	250	3,750	0	15	0	0	
Dogwood Drive (aka Harmony Lane Sub.) [c]		Proposed	13	0	13	13	250	3,250	0	0	5	8	
Grey Nun Retirement Community		Unknown	114	0	114	0	250	0	0	0	0	0	
Grace Point Church (aka 1st Baptist Church)	1-09929-282-3J	Approved	1	0	1	1	250	250	0	1	0	0	
Penwood Middle School Renovations		Approved	1	0	1	1	250	250	0	0	1	0	
Miscellaneous Residential Development [d]		--	60	0	60	60	250	15,000	0	0	60	0	
Miscellaneous Non-Residential Development [d]		--	70	0	70	70	250	17,500	0	0	70	0	
TOTAL						485		121,250	37	59	346	172	

[a] This project was reduced from 375,000 SF hospital with two 40,000 SF buildings to only a 180,000 SF health care village, but an updated EDU projection or connection rate was not provided. Therefore, the Projection Schedule has not been updated from the previous version of this table.

[b] Per 2016 Chapter 94, 6 EDU's were connected in 2016, with 8 proposed for Year 2017.

[c] Per 2016 Chapter 94, 8 EDU's were connected in 2016.

[d] Added per Township Engineer's letter dated 5/28/17.

[e] Per Developer Engineer letter dated 6/6/17 to the Township, revising the name to Dogwood Drive, and changing the status from "complete" (this was an error from a previous Chapter 94 submission) to "proposed". This letter also requests the total project EDU's be changed to 14. However, this request must come from the Township.

= This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDC's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	OPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Newtown Township												
Delaney Court	1-09935-156-E-rev	Under Construction	122	78	44	44	250	11,000	35	25	0	0
Villas	1-09935-160-E	Under Construction	177	173	4	4	250	1,000	22	28	0	0
Bubazon / 14 Eldridge		Approved	2	0	2	2	250	500	0	2	0	0
Smolcynski/ 135 Swamp	1-09935-158-E	Completed	1	1	0	0	250	0	1	0	0	0
Johson Kendall Johnson	1-09935-169-E	Approved	1	0	1	1	250	250	0	0	0	0
Twining (Sullivan)/ 178 Durham	1-09935-152-E	Completed	1	1	0	0	250	0	1	0	0	0
Univest Bank		Completed	10	1	0	0	250	0	2	8	0	0
Walsh/ 385 Stoopville	1-09935-185-3J	Pending	1	0	1	1	250	250	1	0	0	0
Beneficial Bank	1-09935-179-X	Completed	10	1	0	0	250	0	2	8	0	0
Lithos 10 Friends Ln.	1-09935-174-E	Pending	11	0	11	11	250	2,750	0	11	0	0
Platt/ 761 Newtown Yardley	1-09935-189-3J	Pending	56	0	56	56	250	14,000	56	0	0	0
Melky Tract/ Stoopville		Completed	45	45	0	0	250	0	15	30	0	0
Silver Lake Exec Campus		Pending	45	0	45	45	250	11,250	0	45	0	0
Cricklewood (CAD)		Proposed	45	0	45	45	250	11,250	0	0	45	0
Brookshire Estates	1-09935-155-3J	Pending	1	0	1	1	250	250	1	0	0	0
Deluca/ 192 Durham		Completed	1	1	0	0	250	0	1	0	0	0
Luis Flores/ 595 Linton Hill		Pending	2	0	2	2	250	500	2	0	0	0
Promenade	1-09935-184-3J	Proposed	35	0	35	35	250	8,750	18	17	0	0
Mercioni & Kroll (fmr. DeLorezo Tomato Pie)	1-09935-186-X	Under Construction	10	3	7	7	250	1,750	0	10	0	0
Odoba Restaurant/ 250 S Eagle		Proposed	10	0	10	10	250	2,500	10	0	0	0
Wong/ 94 Richborn Rd		Completed	10	1	0	0	250	0	10	0	0	0
Stonehaven Homes/ 162 Durham		Proposed	1	0	1	1	250	250	1	0	0	0
Pickering Manor		Proposed	35	0	35	35	250	8,750	10	10	15	0
Chandler Hat/ 99 Barclay St	1-09935-188-3J	Proposed	7	0	7	7	250	1,750	0	7	0	0
IFM		Proposed	125	0	125	125	250	31,250	0	75	50	0
Wynmere Hunt/ Buck Rd		Proposed	75	0	75	75	250	18,750	0	35	40	0
Stockland Inc/ 4-6 Swamore		Proposed	10	0	10	10	250	2,500	0	10	0	0
BCC College/ Swamo Rd		Proposed	26	0	26	26	250	6,500	0	26	0	0
Ontimal Sports/ 826 Newtown-Yardley Rd	1-09935-190-3J	Completed	6	6	0	0	250	0	6	0	0	0
Meeho's - 15 Swann Rd. (formerly Ryzner (Dilks))		Under Construction	12	6	6	6	250	1,500	12	0	0	0
Newtown Race/ Pheasant Rd		Proposed	25	0	25	25	250	6,250	0	25	0	0
C. Rock/Middle School	1-09935-180-X	Proposed	10	0	10	10	250	2,500	0	0	5	5
Mil Race Office Campus (1051 Lindenhurst Rd)	1-09935-134-X	Proposed	5	0	5	5	250	1,250	5	0	0	0
Business Commons	[a]	Potential	105	0	105	8	250	2,000	8	0	0	0
Newtown Shopping Center	[a]	Potential	105	0	105	7	250	1,750	7	0	0	0
Village @ Newtown E&W	[a]	Potential	105	0	105	7	250	1,750	7	0	0	0
Village @ Newtown South	[a]	Potential	105	0	105	7	250	1,750	7	0	0	0
Corners @ Newtown	[a]	Potential	140	0	140	7	250	1,750	7	0	0	0
Newtown Depot	[a]	Potential	105	0	105	7	250	1,750	7	0	0	0
Newtown Plaza	[a]	Potential	105	0	105	7	250	1,750	7	0	0	0
Misc. Non-Residential		Potential	438	0	438	159	250	39,750	0	54	105	0
Misc. Residential		Potential	351	0	351	52	250	13,000	0	16	36	0
Phila. Archdiocese (291 Durham Rd, TPN 29-3-20)		Completed	1	1	0	0	250	0	1	0	0	0
Brixmor at Village @ Newtown SC	[b]	Proposed	95	0	95	95	250	23,750	0	95	0	0
Villas at Newtown (TPN 29-10-76)		Proposed	6	6	0	6	250	1,500	0	6	0	0
Lauehm Property (TPN 29-007-001 & -002)		Proposed	9	0	9	9	250	2,250	0	9	0	0
Frosenius Dialysis (105 Terry Drive)		Proposed	16	0	16	16	250	4,000	0	16	0	0
Acqua e Faria	[b]	Proposed	1	0	1	1	250	250	0	1	0	0
TOTAL						977		244,250	262	569	297	5

[a] Per Township's letter dated 4-27-15, they were instructed to eliminate these categories and instead move them to a miscellaneous non-residential category. Therefore, Year 2014 projections were left in place, but projections beyond 2014 were based on the miscellaneous category.

[b] Per Township's letter dated 5-12-17, these projects are to utilize Year 2015 Miscellaneous Non-Residential EDU's (originally 138 EDU's in that category, now 54 EDU's).

= This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Lower Southampton Township												
Clabbers		Proposed	3	0	3	3	250	750	0	3	0	0
Dorothy Dessler (Woodside Ave & Spring Ave)		Proposed	3	0	3	3	250	750	0	3	0	0
Tulip Lane		Approved	1	0	1	1	250	250	1	0	0	0
Eastern Dawn Mobile Home Park Expansion [s]		Proposed	52	0	52	52	250	13,000	0	0	52	0
New Tarwank Elementary School		Proposed	24.72	0	24.72	24.72	250	6,180	0	24.72	0	0
Misc. Growth		Potential	S/year	0	S/year	15	250	3,750	0	5	5	5
TOTAL						98.72		24,680	1	36	57	5

[s] To comply with DEP comment #5 on 4/25/17 email, all Year 2015 EDU's were moved to Year 2016, since this was added to the CMP after 2015 EDU's were already released.

Connection Management Plan													
Updated on 6-19-17 (supersedes 6/8/17 version)													
Necharniy Interceptor Service Area Tributary to Totem Road Pump Station													
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S				
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017	
Northampton Township													
Keith Boyd Subdivision	Exemption Granted	Under Construction	4	2	3	2	250	500	3	0	0	0	
Spaeth Subdivision		Under Construction	3	1	2	2	250	500	2	0	0	0	
Sewer District 3 - Residential, Phase I (Harvest Acl)	EHB 2008-184L	Approved	41	18	23	8	250	2,000	2	2	2	2	
Sewer District 3 - Residential, Phase II (Traymore Manor, Greenleaf Manor Area)	EHB 2008-184L	Approved	254	100	154	48	250	12,000	12	12	12	12	
Sewer District 3 - Non-Residential	EHB 2008-184L	Approved	254	129	125	125	250	31,250	125	0	0	0	
Juliette's Garden		Approved	6	0	6	6	250	1,500	6	0	0	0	
Holland Estates	Exemption Granted	Approved	7	2	5	5	250	1,250	5	0	0	0	
Schultz Subdivision	Exemption Granted	Approved	3	1	2	2	250	500	2	0	0	0	
Leehurst Development (Teil Bros)	1-09937-390-3J	Proposed	40	0	40	40	250	10,000	40	0	0	0	
Norton Subdivision (2 lots)	1-09937-384-2	Completed	2	2	0	0	250	0	1	0	0	0	
Sewer District 3 - Non-Residential (Future Growth)	EHB 2008-184L	Proposed	54	3	52	40	250	10,000	10	10	10	10	
Davis Property		Proposed	65	10	55	55	250	13,750	55	0	0	0	
Sewer District 3 - 65 Richard Road	1-09937-373-X	Proposed	2	0	2	2	250	500	2	0	0	0	
295 Buck Road	1-09937-392-X	Proposed	3	1	2	2	250	500	2	0	0	0	
216 Boston Pike		Proposed	1	0	1	1	250	250	1	0	0	0	
Keith Boyd Minor Subdivision - Sunset Dr		Completed	1	1	0	0	250	0	1	0	0	0	
Proposed Development (31.893 acres)		Proposed	10	0	10	10	250	2,500	10	0	0	0	
Proposed Development (12 acres)		Proposed	10	3	10	10	250	2,500	10	0	0	0	
Proposed Development (47.38 acres)		Proposed	10	0	10	10	250	2,500	10	0	0	0	
Proposed Development (6.7 acres)		Proposed	5	0	5	5	250	1,250	5	0	0	0	
Council Rock School District		Proposed	75	0	75	75	250	18,750	75	0	0	0	
Miscellaneous Growth per NRCMA's 2011 Chap 24	(a)	Proposed	Unknown	4	Unknown	71	250	17,750	0	9	35	30	
340 Rocksville Road	1-09937-394-X	Approved	1	0	1	1	250	250	1	0	0	0	
10 Cameron Drive		Completed	1	1	0	0	250	0	1	0	0	0	
Boston Pike - Swider		Completed	1	1	0	0	250	0	1	0	0	0	
Rocksville Road (JM Contracting)		Completed	1	1	0	0	250	0	1	0	0	0	
Chapel Woods Assoc. (582 Beverly Rd)		Proposed	1	0	1	1	250	250	1	0	0	0	
656 East Holland Rd		Proposed	15	0	15	15	250	3,750	15	0	0	0	
Karnous Klothes		Completed	1	1	0	0	250	0	1	0	0	0	
295 Buck Road (Unit 4)		Completed	5	5	0	0	250	0	5	0	0	0	
Crossroads Plaza (TPN 31-15-23-4)		Proposed	5	0	5	3	250	750	0	0	1	2	
Municipal Expansion		Proposed	3	0	4	4	250	1,000	0	0	4	0	
Rienboro Plaza (TPN 31-5-103)		Proposed	5	0	5	3	250	750	0	0	1	2	
Wawa - Richboro		Proposed	2	0	2	2	250	500	0	0	2	0	
777 Hatboro Road (TPN 31-5-82-1)		Proposed	1	0	1	1	250	250	0	1	0	0	
Industrial Redevelopment (TPN 31-1-4)		Proposed	36	0	36	36	250	9,000	0	0	36	0	
Wright Property (TPN 31-10-25-1)		Proposed	40	0	40	40	250	10,000	0	0	20	20	
Sibiev Property (TPN 31-1-7-2)		Proposed	2	0	2	2	250	500	0	0	2	0	
Catalinas/Pinnacle aka Russell Prop (TPN 31-16-75)		Proposed	8	0	8	8	250	2,000	0	0	8	0	
Jake's Waters (TPN 31-15-145)		Completed	4	4	0	0	250	0	0	4	0	0	
875 Buck Road (TPN 31-54-1)		Completed	1	1	0	0	250	0	0	1	0	0	
1671 Bridgetown Pike (TPN 31-39-2-1)		Approved	1	0	1	1	250	250	0	1	0	0	
Holland Middle School Expansion (TPN 31-15-5)		Under Construction	65.5 *	0	13.5	13.5	250	3,375	0	0	63.5	0	
Misc. Change in Use		Potential	150	0	150	30	250	7,500	0	10	10	10	
Russell Tract (TPN 31-5-45) (a)		Pending	5	0	5	5	250	1,250	4	1	0	0	
McKenma - 793 Hatboro Road (TPN 31-5-82)		Pending	2	0	2	2	250	500	0	2	0	0	
Deluca Subdivision (TPN 31-5-40)		Pending	1	0	1	1	250	250	0	1	0	0	
Montague Subdivision (TPN 31-15-20)		Pending	1	0	1	1	250	250	0	1	0	0	
Civic Center Restroom		Proposed	1	0	1	1	250	250	1	0	0	0	
Glasgow Road (TPN 31-15-3 & -8)		Proposed	3	0	3	3	250	750	3	0	0	0	
Northampton Twp Police Station (1111 Township Rd)		Proposed	2	0	2	2	250	500	2	0	0	0	
444 St. Leonards Rd LLC (TPN 31-23-45)		Proposed	0	0	0	0	250	2,250	0	0	0	0	
TOTAL						704.5		176,125	425	51	207	88	

* The total EDU's (65.5) include existing sewer flows.

(a) As requested in NRCMA's email dated 6/2/17, reallocating four (4) Year 2014 miscellaneous EDU's and one (1) Year 2015 miscellaneous EDU to the Russell Tract. The Russell Tract's five (5) Year 2016 EDU's are moved to the miscellaneous category.

= This project has either been partially or fully connected.

Connection Management Plan													
Updated on 6-19-17 (supersedes 6/8/17 version)													
Neshaminy Interceptor Service Area Tributary to Toteau Road Pump Station													
Development Name	DEP Code No.	PLANNING STATUS		CONNECTION STATUS					NICMFP APPROVED EDU'S				
		Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017	
Middletown Township													
Dartmouth Ridge	1-09003-297-11	Completed	20	20	0	0	250	0	2	2	0	0	
Horseshoe (Matrix Townhouses)	1-09003-355-E	Under Construction	150	146	14	14	250	3,500	20	40	40	40	
SMMC (aka St. Mary's Medical Center)		Completed	1	1	0	0	250	0	1	0	0	0	
Saint Mary Health and Awareness		Proposed	78	0	78	78	250	19,500	0	0	39	39	
Perira/PECO Tract (a)	1-09003-342-E	Proposed	30	0	20	20	250	5,000	0	10	10	0	
George School	1-09003-365-X	Completed	2	2	0	0	250	0	2	0	0	0	
Matrix Outlets (formerly Glen Willow Pro)	1-09003-323-3J	Proposed	116	0	116	87	250	21,750	0	29	29	29	
Woods Services Campus Addition	1-09003-356-X	Completed	5	5	0	0	250	0	5	0	0	0	
K&S Greentary		Completed	1	1	0	0	250	0	1	0	0	0	
Community Baptist Church	1-09003-338-3J	Approved	6	0	6	6	250	1,500	0	0	3	3	
Walmart & Sam's Club (d)		Proposed	8	0	8	8	250	2,000	0	0	8	0	
Herline Homes (Willow Ave)		Completed	1	1	0	0	250	0	1	0	0	0	
Chimney Subdivision (per 2005 Approval)		Completed	1	1	0	0	250	0	1	0	0	0	
Matrix Apartments - Big Oak Road (c)		Proposed	150	0	150	150	250	37,500	0	50	50	50	
Stone Farm		Proposed	150	0	125	50	250	12,500	0	0	25	25	
Country Builders (Adams Ave)		Completed	2	2	0	0	250	0	2	0	0	0	
Country Builders (Cedar Ave)		Completed	1	1	0	0	250	0	1	0	0	0	
McGrath-Arbans Ave		Completed	2	2	0	0	250	0	2	0	0	0	
Woods Services Cedarwood Addition		Completed	1	1	0	0	250	0	1	0	0	0	
Bridgetown Mill House (only 5 EDU's proposed)		Proposed	40	0	40	40	250	10,000	0	0	40	0	
Oxford Valley Mall - Restaurant Addition		Proposed	45	0	45	25	250	6,250	0	0	0	25	
Shoppers at Flowers Mill		Proposed	20	0	20	20	250	5,000	0	20	0	0	
Stellato Property (Sumac St.)	1-09003-368-X	Under Construction	1	0	1	1	250	250	1	0	0	0	
570 Rosewood Ave Subdivision (TPN 22-12-592)		Approved	1	0	1	1	250	250	0	0	1	0	
Glenside Ave Property, Lot 5&6 (TPN 22-36-114)		Approved	1	0	1	1	250	250	0	0	1	0	
130 Middletown Blvd/Restaurant (TPN 22-57-20-6)	(a)	Proposed	34	0	34	34	250	8,500	0	0	34	0	
Stone Haven S/D (2651 Lanthorne Yardlee Rd) (c)		Proposed	12	0	12	12	250	3,000	0	0	12	0	
468 Hulmeville Rd (TPN 22-17-52-1&2)		Proposed	2	0	2	2	250	500	0	2	0	0	
488 Hulmeville Rd (TPN 22-17-51-1)		Proposed	1	0	1	1	250	500	0	1	0	0	
629 Hulmeville Rd (TPN 22-17-77)	1-09003-372-3J	Proposed	2	0	2	2	250	500	0	2	0	0	
1597 Fulling Mill Road (TPN 22-5-13)		Under Construction	3	0	3	3	250	750	0	3	1	0	
962 Old Lincoln Hwy (TPN 22-13-205)		Proposed	1	0	1	1	250	250	0	1	0	0	
Barner Subdiv. - 364 Cedar Ave (TPN 22-13-164-21)		Proposed	1	0	1	1	250	250	0	1	0	0	
1006 W. Lincoln Highway (TPN 22-10-56-17)		Proposed	1	0	1	1	250	250	0	0	1	0	
139 Elmwood (TPN 22-8-150)		Proposed	1	0	1	1	250	250	0	0	1	0	
Huberfeld N, Woodbourne Rd (TPN 22-31-13)		Proposed	1	0	1	1	250	250	0	0	1	0	
Tedav Inc. (TPN 22-31-15)		Proposed	12	0	12	3	250	750	0	0	3	0	
1755 Fulling Mill Road (TPN 22-5-15-1)		Proposed	2	0	2	2	250	500	0	0	2	0	
1420 Suner Highway (TPN 22-16-18)		Potential	15	0	14	0	250	0	None projected before Year 2018				
729 Highland Ave. (TPN 22-20-41-57 & 58)		Proposed	3	0	2	2	250	300	0	0	0	2	
Chipotle Mexican Grill (2339 Lincoln Hwy)	(a)	Proposed	7	0	5	7	250	1,750	0	7	0	0	
226 Rosemary Ave (TPN 22-13-156-1)		Proposed	1	0	1	1	250	250	0	0	1	0	
Ash Ave (TPN 22-9-119-5)		Proposed	1	0	1	1	250	250	0	0	1	0	
Eastern Warehouse Distributors, 1050 Wheeler Way (TPN 22-21-66-2)		Proposed	1.12	0	1.12	1.12	250	280	0	0	1.12	0	
Eastern Warehouse Distributors, 355 South Flowers Mill Road		Proposed	5	0	5	5	250	1,250	0	0	5	0	
376 Penicrest Drive (TPN 22-25-20)	(b)	Proposed	1	0	1	1	250	250	0	0	1	0	
1021 W. Maple Ave. (TPN 22-23-190)	(b)	Proposed	2	0	2	2	250	500	0	0	2	0	
151 N. Hawthorne Ave (TPN 22-13-80)	(b)	Proposed	1	0	1	1	250	250	0	0	1	0	
452 Bellevue Ave (existing gas station)	(b)	Proposed	1	0	1	1	250	250	0	0	1	0	
570 Rosewood Ave (subdivision)	(b)	Proposed	1	0	1	1	250	250	0	0	1	0	
Marketplace at Oxford Valley	(b)	Proposed	5	0	5	5	250	1,250	0	0	5	0	
Miscellaneous EDU's (f)		Potential	10	0	10	10	250	2,500	0	0	0	10	
TOTAL									39	168	321	223	

(a) Address of restaurant changed from 2424 E. Lincoln Hwy to 2339 Lincoln Hwy.

(b) These projects were requested per Twp. letters dated 3/17/17, 5/9/17, 5/12/17, & 6/2/17, but because relocations are not permitted, these EDU's are shown in Year 2016

(c) Stone Haven reverts to its prior position on the 2/13/17 NICMFP, with 12 EDU's in Year 2016.

(d) This project previously was known as just Sam's Club, but Walmart is being added to it. Also, it previously had 4 EDU's in Year 2016, but it now needs 8 EDU's (so 4 added to total in 2016).

(e) This project previously had 30 EDU's for Year 2016. It now requires 34 EDU's (so 4 EDU's were added to the total in Year 2016)

(f) Per DEP's suggestion, a miscellaneous category has been added to the NICMFP for Year 2017.

(g) Matrix Apartments and Perira/PECO Tract are reverted back to their positions in the 2/13/17 NICMFP.

* Most and Loonhouser Subdivisions were removed from the NICMFP, as they are no longer proposed.

* This project has either been partially or fully connected

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Pennel Borough												
Schoolhouse Court	1-09938-014-31	Approved	12	0	12	12	250	3,000	12	0	0	0
Art Rental Office (Village at Mill Creek)		Pending	1	0	1	1	250	250	0	0	1	0
Fairview Ave Subdivision	1-09938-018-E	Completed	2	2	0	0	250	0	0	0	1	0
Robbins Ave Apartments		Approved	12	0	12	12	250	3,000	12	0	0	0
WAWA/CVS [a]		Proposed	11	0	11	11	250	2,750	0	11	0	0
200 W. Lincoln Highway [b]		Proposed	4	0	4	4	250	1,000	0	0	4	0
Miscellaneous Residential Development [c]		—	42	0	42	42	250	10,500	0	0	42	0
Miscellaneous Non-Residential Development [c]		—	48	0	48	48	250	12,000	0	0	48	0
TOTAL						130		32,500	24	11	96	0

[a] 2016 Chapter 94 says this project connected in 2016, but stayed within the property's allotted EDU, so no new EDU's were connected.

[b] Ebert Engineering letter dated 3/28/17 requested this project be added to the Year 2016 column. The project requires 4 EDU's, but a credit of 1 existing EDU for the lot is applied.

[c] Added per Ebert Engineering letter dated 3/28/17.

^a This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Falls Township												
Viking Assoc. Townhouses [a]	1-09002-224-3J	Under Construction	40	0	40	40	250	10,000	40	0	0	0
166-168 Lincoln Highway		Proposed	50	0	50	35	250	8,750	0	10	10	15
640 Lincoln Highway		Proposed	8	0	8	8	250	2,000	0	8	0	0
550 W. Trenton Avenue		Proposed	12.4	0	12.4	12.4	250	3,100	0	0	12.4	0
212 Lincoln Highway		Proposed	1	0	1	1	250	250	0	1	0	0
482 West Trenton Avenue		Proposed	1	0	1	1	250	250	0	0	1	0
115 Lincoln Highway/Car Wash (TPN 13-4-555.608.809.612.616&617)		Proposed	2	0	2	2	250	500	0	0	2	0
38 E. Cabot Blvd. [b]		Proposed	19	3	19	19	250	4,750	0	0	19	0
440 Lincoln Hwy (day care)		Proposed	2	0	2	2	250	500	0	0	2	0
139 Trenton Road (day care)		Under Review	5	0	5	5	250	1,250	0	0	5	0
188 Lincoln Highway [a]		Proposed	2	0	2	2	250	500	0	0	2	0
312 N. Oxford Valley Road [a]		Proposed	5	0	5	5	250	1,250	0	0	5	0
Miscellaneous Residential Redevelopment [a]		--	20	0	20	20	250	5,000	0	0	20	0
Miscellaneous Non-Residential Redevelopment [a]		--	30	0	30	30	250	7,500	0	0	30	0
TOTAL						182.4		45,600	40	19	108.4	15

[a] Added per Township Engineer letter dated 3/28/17.

[b] Modified per Township Engineer letter (specifically the table they provided) dated 3/28/17.

= This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Fristol Township												
Med-Flex Facility (Frost & Ford Rds)	[a]	Proposed	11	0	11	11	250	2,600	85	0	0	0
2917 Veteran's Hwy (Fire Ctr)		Complete	2	2	0	0	250	0	2	0	0	0
McDonalds (Ford Rd & Veteran's Hwy)	1-09001-243-31	Complete	9	9	0	0	250	0	9	0	0	0
3113 Veteran's Hwy		Approved	75	0	75	75	250	18,750	75	0	0	0
3011 Veteran's Hwy		Approved	83	0	83	83	250	20,750	83	0	0	0
1111 Veteran's Hwy		Proposed	7	0	7	7	250	1,750	0	7	0	0
1159 Veteran's Hwy (Dunkin Donuts)		Proposed	4	0	4	4	250	1,000	0	4	0	0
2520 & 2526 Durham Rd (AAMCO)		Proposed	10	0	10	10	250	2,500	0	10	0	0
Community College Pkg Site (for bank)		Proposed	3	0	3	3	250	750	0	3	0	0
Ford Rd and Veteran's Hwy (former Getty Station)		Proposed	9	0	9	9	250	2,250	0	9	0	0
Deon Square (518 S. Oxford Valley Rd)		Complete	5	5	0	0	250	0	0	5	0	0
2405 New Falls Road		Complete	1	1	0	0	250	0	0	1	0	0
Avenue B (TPN S-16-62)	1-09001-265-X	Waived	1	0	1	1	250	250	0	0	1	0
TOTAL				1		263		50,600	254	39	1	0

[a] Twp. Engineer's letter dated 3/7/16 revised the proposed flow for Med-Flex from 25,425 gpd to just 2,600 gpd (11 EDU's).
 = This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS						NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Newtown Borough												
Steenleview		Pending	170	38	132	132	250	33,000	200	0	0	0
Stockland Trust		Pending	50	0	50	50	250	12,500	0	20	20	10
Miscellaneous		Pending	25	0	25	56	250	14,000	19	15	12	10
111 S. State Street [a]		Proposed	1	0	1	1	251	251	1	0	0	0
TOTAL						239		59,500	220	35	32	20

[a] RV&B email dated 2/8/17 stated NBCJMA has reserved 1 EDU for this project. This 1 EDU was taken from Year 2014 Miscellaneous Category.
= This project has either been partially or fully connected (per 2015 Chapter 94, Phase I connected 20 EDU's, 2 were existing)

EXHIBIT D
LOWER MAKEFIELD TOWNSHIP
FLOW LIMITATIONS (PWD)

The following flow limitations are based on the five (5) year average that includes 2012 through 2016. Flows noted below shall be adjusted based upon connections made during the five (5) year period.

I.	Five-year Average Flow (2012-2016)	734,000 gpd
II.	Maximum Daily Flow	1,027,600 gpd
III.	Instantaneous Peak Flow	1,468,000 gpd

It should be noted that the Peak Instantaneous Flow at the connection points with Lower Makefield Township will be based on peak hourly flow.

EXHIBIT E
LOWER MAKEFIELD TOWNSHIP
FLOW LIMITATIONS (DEP)

The following flow limitations are based on the five (5) year average that includes 2012 through 2016. Flows noted below shall be adjusted based upon projections and connections made during the period five (5) year metering period.

- | | | |
|-----|----------------------------|---------------|
| I. | (2012 - 2016) Average Flow | 734,000 gpd |
| II. | Instantaneous Peak Flow | 1,835,000 gpd |

It should be noted that the Peak Instantaneous Flow at the connection points with Lower Makefield Township will be based on peak hourly flow.

**EXHIBIT F
PENALTY CALCULATION
Neshaminy Interceptor
Sample Penalty Calculation for Customer Contributions to PWD Limit Exceedances**

Column # ==>	A	B	C=A-B	D	E	F=D-E	G	H	I=C/Hx100	J	K=IxI
	ABC Imp F IOAE			Totem Road Pump Station			Exceedance Surcharge Allocation				
Date	Max Daily Cmgd)	Limit (mgd)	Exceedance (mgd)	Totem Rd Flow Ogd)	Limit (mgd)	Exceedance (mgd)	Sum of All Customers' Max Daily (mgd)	Sum of All Customers' Total Exceedance (mgd)	ABC Imp Share of Total Exceedance	RWD Surcharge	ABC Timp Share
5/18/2025	7.39	2.76	4.63	51.85	37.00	14.85	54.05	27.90	16.6%	6170,763.50	623,327.53
5/19/2025	3.82	2.76	1.06	40.59	37.00	3.59	33.27	7.23	14.6%	641,273.50	66,043.52
6/16/2025	4.20	2.76	1.44	38.27	37.00	1.27	34.42	8.29	17.4%	614,616.50	62,536.88
6/17/2025	6.80	2.76	4.04	45.28	37.00	8.23	50.24	24.06	16.3%	695,243.00	615,935.70
6/18/2025	4.01	2.76	1.25	40.71	37.00	3.71	39.16	13.03	9.6%	642,619.00	64,083.89

**APPENDIX B – LOWER MAKEFIELD TOWNSHIP
CORRECTIVE ACTION PLAN**

CORRECTIVE ACTION PLAN

FOR THE

THE TOWNSHIP OF LOWER MAKEFIELD COLLECTION SYSTEM

LOCATED IN

LOWER MAKEFIELD TOWNSHIP
BUCKS COUNTY, PENNSYLVANIA

PREPARED FOR

THE TOWNSHIP OF LOWER MAKEFIELD
1100 EDGEWOOD ROAD
YARDLEY, PA 19067

PREPARED BY

Ebert Engineering, Inc.

Water and Wastewater Engineering

P.O. Box 540
4092 Skippack Pike, Suite 202
Skippack, PA 19474

EE PROJECT NUMBER 068-024

SEPTEMBER 21, 2017
LAST REVISED: OCTOBER 25, 2017

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APPENDIX A BCW&SA and Lower Makefield Township Agreement

APPENDIX B Overall Sanitary Sewer Map

APPENDIX C Flow Meter Location Exhibit

I. PURPOSE

The purpose of this report is to present Lower Makefield Township, Bucks County Corrective Action Plan (CAP) as required by Bucks County Water and Sewer Authority (BCWSA) and Pennsylvania Department of Environmental Protection (PADEP).

The primary reason for the tributaries of the Neshaminy Interceptor to undertake corrective action is to conform to Bucks County Water and Sewer Authority's Corrective Action Plan for the Neshaminy Interceptor, which has a projected hydraulic overload. The goals of this CAP are to reduce flows, especially wet weather peak flows, discharging from Lower Makefield Township sewers into the Neshaminy Interceptor and its service area and to reduce the risk of surcharging and sanitary sewer overflows in the Neshaminy Interceptor and its service area. This CAP will outline the necessary steps to accomplish reduction in I/I. The target for I/I reduction is approximately 10% of the current base flow and the ability to maintain or exceed this target reduction of base flow moving forward.

The Township of Lower Makefield is located in the southern part of Bucks County, Pennsylvania and the majority of the Township is service by public sanitary sewer system. Lower Makefield Township has two major sanitary sewer service areas. The first major service area is the Neshaminy Interceptor Service Area. The sub-areas within the Neshaminy Interceptor are the Core Creek Interceptor, Middletown Township, Falls Township Service Area and Falls Township Contract Area service areas. The wastewater generated within this major service area is conveyed and discharged into the Neshaminy Interceptor. From the Neshaminy Interceptor, the wastewater flows to the City of Philadelphia Northeast Water Pollution Control Plant for treatment and disposal under NPDES Permit No. PA0026689. The sanitary sewer lines are owned and operated by Lower Makefield Township with the exception of the Falls Township Service Area where the sewer lines are the responsibility of Falls Township. The conveyance sanitary sewer lines flow to metering chambers which are owned and operated by Bucks County Water and Sewer (BCWSA).

The second major service area is Morrisville Borough Wastewater Treatment Plant Service Area. This service area consists of two sub-areas, Yardley Borough Service Area and Morrisville Borough Service Area. The wastewater generated by this service area is conveyed to the Morrisville Borough Wastewater Treatment Plant (WWTP) for treatment and disposal under NPDES Permit No. PA0026701.

This Corrective Action Plan (CAP) will only address the service areas that flow directly to the BCWSA Neshaminy Interceptor.

II. SANITARY SEWER SYSTEM DESCRIPTION

As noted above, this CAP focuses solely on the areas that convey the wastewater that is conveyed to the Neshaminy Interceptor. The following is a description of the three sub areas that discharge into BCWSA's Neshaminy Interceptor.

1. Core Creek Interceptor Service Area – The Core Creek Interceptor Service Area is on the west and northwest of Lower Makefield Township and identified in yellow on the Overall Sanitary Sewer Map attached in Appendix B.

The following is a description of the Core Creek Interceptor Service Area:

- a. Overall Basin Area- 2,555 acres
- b. Number of Public Sewer Customers- 6,946
- c. Linear feet of Pipe- 158,899
- d. Number of Manholes- 890
- e. Number of Meters - 4 (all owned and maintained by BCWSA)
- f. Number of Sanitary Sewer Overflows (SSOs): 0 - Core Creek interceptor has been documented with high flows during rain events
- g. Number of Pump Stations - 3: Farmview Pump Station, Chanticleer Pump Station and Brookstone Pump Station.

A description of the pump station is as follows:

- i. The Farmview Pump Station - Is a submersible pumping station is located east of the cul-de-sac of S. Kimbles Road and services the surrounding residential developments. The pumping station is equipped with two submersible pumps which pump an average of 169 gpm (243,360 gpd) each. An on-site generator provides emergency power.

The average flow rate for the pump station in 2016 was 36,841 gpd. There are no anticipated connections to this pump station over the next five years.

- ii. Chanticleer Pump Station - This pumping station is located along just south east of Dyers Lane servicing the two small residential developments along Dyers Lane and Delaware Rim Drive. The pumping station is equipped with two submersible pumps, each with a nominal capacity of 49 gpm (70,560 gpd). A portable on-site generator provides emergency power to the pump station.

In 2016, the Chanticleer Pump Station currently had an average monthly flow rate of 20,858 gpd. The annual average flow rate exceeds the annual average flow capacity of the pump station. There is however no reported overload conditions present at this pump station. The Authority Engineer will further evaluate the capacity in 2017 and make recommendations to the Lower Makefield Township Board of Supervisors and Sewer Authority to address this issue. There are nine (9) projected connections to this pump station over the next five years.

- iii. Brookstone Pump Station - This wet well dry well pumping station is located just south of Lynbrook Drive and services the Brookstone residential development. The collected wastewater is pumped to the BCWSA Meter 2003 where it enters and flows to the Neshaminy Interceptor. The pumping station is equipped with two pumps, each with a nominal capacity of 76 gpm (109,440 gpd). An on-site permanent generator provides emergency power to the pump station.

The Brookstone Pump Station is currently has an average monthly flow rate for the pump station in 2016 was 60,564 gpd. The annual average flow rate exceeds the annual average flow capacity of the pump station. There is however no reported overload conditions present at this pump station. The Authority Engineer will further evaluate the capacity in 2017 and make recommendations to the Lower Makefield Township Board of Supervisors and Sewer Authority to address this issue. There are no future connections anticipated at this pump station over the next five years.

2. Middletown Township Service Area -The Middletown Township Service Area is on the west and southwest of Lower Makefield Township and identified in turquoise on the Overall Sanitary Sewer Map attached in Appendix B. The following is a description of the Middletown Township Service Area:
 - a. Overall Basin Area- 497 acres
 - b. Number of Public Sewer Customers- 1,861
 - c. Linear feet of Pipe- 51,818
 - d. Number of Manholes- 297
 - e. Number of Meters- 1: BCWSA 2005 (Owned and maintained by BCWSA)
 - f. Number of Sanitary Sewer Overflows (SSOs)
 - g. Number of Pump Stations - 1: Oxford Glen/Yardley Oaks Pump Station

A description of each pump station is as follows:

- i. The Oxford Glen/Yardley Oaks Pump Station: Is a wet well dry well pumping station that is located at the intersection of Acorn Drive and Woodview Drive and services the surrounding residential developments. The pumping station is equipped with two pumps which pump an average of 141 gpm (203,040 gpd) each. An on-site generator provides emergency power.

The average flow rate for the pump station in 2016 was 193,680 gpd. The annual average flow rate exceeds the annual average flow capacity of the pump station. There is however no reported overload conditions present at this pump station. The Authority Engineer will further evaluate the capacity in 2017 and make recommendations to the Lower Makefield Township Board of Supervisors and Sewer Authority to address this issue. There are no anticipated connections to this pump station over the next five years.

3. Falls Township Contract Area - The Falls Township Contract Area is an area located in southern Lower Makefield Township that borders Falls Township and identified in purple on the attached Overall Sanitary Sewer Map in Appendix B.

The following is a description of the Falls Township Contract Area Service Area:

- a. Overall Basin Area- 628 acres
- b. Number of Public Sewer Customers- 2,618
- c. Linear feet of Pipe- 62,774
- d. Number of Manholes- 283
- e. Number of Meters – 2
 - i. Derbyshire
 - ii. Big Oak Road
- f. Number of Sanitary Sewer Overflows (SSOs) - 0
- g. Number of Pump Stations - 1 – Derbyshire By-Pass Pump Station

A description of each pump station is as follows:

- i. Derbyshire By-Pass Pump Station – The Township permitted and installed a by-pass pump in a manhole adjacent to the Derbyshire Metering Station to prevent surcharging of the sanitary sewer mains in this service area. When the flows cannot be conveyed by gravity a float activates a by-pass pump that pumps the flows through a force main to the exiting sanitary

sewer collection system that conveys the flows to the Morrisville Municipal Authority Service Area.

The Township is now recording the pump run hours and will present the information in the Chapter 94 Reports. The Township will now provide additional monitoring of this pump station during all wet weather events to document the approximate start time and end time of all pumping events as well as using the pump run time to calculate the approximate volume of flow that was by-passed.

4. Falls Township Service Area – The Falls Township Service Area is an area located in southern Lower Makefield Township that borders Falls Township and is identified in orange on the attached Overall Sanitary Sewer Map in Appendix B.

The area is owned and maintained by the Township of Falls Authority (TOFA) and all properties are direct customers of TOFA. As such this service area is covered by the TOFA I/I Abatement Plan and is not part of the Township's CAP.

III. STUDY AREAS

Lower Makefield Township divided their sanitary sewer system flowing to BCWSA's Neshaminy Interceptor into 8 study areas as shown in the Flow Meter Location Exhibit in Appendix C. Lower Makefield Township will investigate and rehabilitate the required mains, manholes, and laterals in the identified study area. Post metering within the selected area will be completed to measure the effectiveness of the repairs. Based on the comparison of the pre-metering to the post-metering data, Lower Makefield Township will determine if the selected area has been satisfactorily rehabilitated.

A. Study Area Priorities

The order in which Lower Makefield Township will rehabilitate the study areas will be based on meter data, SSO's, knowledge of the system, previous work completed and wet weather observations.

Lower Makefield intends on rehabilitating one Study area at a time, however, Lower Makefield will continue to monitor their entire sewer system. If problem areas are found that require repair outside of the current Study Area, then Lower Makefield Township will make the necessary repair. These repairs will be counted toward Lower Makefield's I/I removal efforts for the release of future connections.

Lower Makefield will begin their I/I removal efforts in Study Area A-1 (northernmost portion of the Core Creek Interceptor Service Area). This study area was selected as there is a known problem in the area of Core Creek Interceptor between Manholes NC-83 to NC-93 which is located inside of Area A-2. Study Area A-1 drains directly into this section of the Core Creek Interceptor and it is important to reduce the upstream flows of this problem area before evaluating the problem area itself. It may be a possibility the flows from Study Area A-1 are causing the issues in Study Area A-2 and that will be determine with the I/I investigation. All the information will be recorded and provide to PADEP.

The known problem area of the Core Creek Interceptor between Manholes NC-83 and NC-93 has manhole lids that are not sealed correctly and the sanitary sewers use concrete pipes where numerous joints are not properly sealed and the connections to the manholes are no longer properly sealed. Therefore, based on visual clues, this section of pipe would appear to be a contributing source of I/I to the Neshaminy Interceptor. This is part of the original sanitary sewer system for the Grey Nuns of Sacred Heart located in Lower Makefield Township that was previously owned and operated by Bucks County Water and Sewer Authority. Since the last revision to this CAP on October 25, 2017, there have been developments on the Core Creek Interceptor. Lower Makefield Township televised the Interceptor where it was determined the majority of the I/I was due to the manhole covers and minimal joint leakage. BCW&SA have not confirmed in writing but have acknowledged that BCW&SA owns the Interceptor. As of this revised report, that is the current status of the efforts and developments on the Interceptor. Lower Makefield Township will continue to work on this issue and will provide PA DEP with updates in the Chapter 94 Reports submitted yearly.

Currently, it is anticipated that the second study area to be rehabilitated will be A-2. The A-1 Study Area flows into the A-2 Study Area portion of the Core Creek Interceptor where there continues to be problems with the interceptor. The order of completion of the remaining study areas will be determined by meter data, visual observations, and Lower Makefield's knowledge of the system. Each year, Lower Makefield will identify and confirm the order of completion of the study areas in their mid-year and annual reports.

B. The following is a description of the study areas:

1. STUDY AREA 1: A-1

Study Area 1 is the northernmost portion of the Core Creek Interceptor Service Area and is identified on the Flow Meter Location Exhibit. The following table outlines the information of the study area:

A	Name of Drainage Basin	Core Creek Interceptor
B	Area in Acres	1,092
C	Linear Feet of Pipe	55,952
D	Number of Manholes	243
E	Number of Public Sewer Connections	
F	Number of Pump Stations	0
G	Number of SSOs	0 (Core Creek interceptor has documented high flows during rain events)
H	Regional Meter Location	0
I	Regional Meter (Direct or Deduct)	-
J	Number of Temporary Meters	3

The pipe in this area contains significant I/I as the infrastructure includes some of the original sanitary sewer installed in Lower Makefield Township.

2. STUDY AREA 2: A-2

Study Area 2 is part of the Core Creek Interceptor Service Area. It receives flows from sub-basin A-1. Being that the Core Creek Interceptor has such substantial I/I, it is most feasible to rehabilitate sub-basin A-2 directly after sub-basin A-1. The following table outlines the information of the study area:

A	Name of Drainage Basin	Core Creek Interceptor
B	Area in Acres	856
C	Linear Feet of Pipe	45,831
D	Number of Manholes	215
E	Number of Public Sewer Connections	
F	Number of Pump Stations	0
G	Number of SSOs	0 (Core Creek interceptor has documented high flows during rain events)
H	Regional Meter Location	Lindenhurst Meter and BCWSA Meter 2001

I	Regional Meter (Direct or Deduct)	Direct
J	Number of Temporary Meters	3

The following Tables describe the future study areas and all of the study areas are shown on the Flow Meter Location Exhibit attached in Appendix C. (Tables are not listed in any specific order):

3. STUDY AREA 4: B-2

A	Name of Drainage Basin	Core Creek Interceptor
B	Area in Acres	190
C	Linear Feet of Pipe	6,392
D	Number of Manholes	31
E	Number of Public Sewer Connections	
F	Number of Pump Stations	0
G	Number of SSOs	0
H	Regional Meter Location	BCWSA Village Road Meter
I	Regional Meter (Direct or Deduct)	Direct
J	Number of Temporary Meters	0

4. STUDY AREA 5: C

A	Name of Drainage Basin	Core Creek Interceptor
B	Area in Acres	186
C	Linear Feet of Pipe	23,421
D	Number of Manholes	109
E	Number of Public Sewer Connections	
F	Number of Pump Stations	1 - Brookstone
G	Number of SSOs	0
H	Regional Meter Location	BCWSA Meter 2003
I	Regional Meter (Direct or Deduct)	Direct
J	Number of Temporary Meters	3

5. STUDY AREA 6: D

A	Name of Drainage Basin	Middletown Township
B	Area in Acres	497
C	Linear Feet of Pipe	51,818
D	Number of Manholes	297
E	Number of Public Sewer Connections	
F	Number of Pump Stations	1 – Oxford Glen/ Yardley Oaks
G	Number of SSOs	0

H	Regional Meter Location	BCWSA Meter 2005
I	Regional Meter (Direct or Deduct)	Direct
J	Number of Temporary Meters	3

6. STUDY AREA 7: E

A	Name of Drainage Basin	Falls Township Contract Area
B	Area in Acres	565
C	Linear Feet of Pipe	57,518
D	Number of Manholes	263
E	Number of Public Sewer Connections	
F	Number of Pump Stations	0
G	Number of SSOs	0
H	Regional Meter Location	Derbyshire Metering Chamber
I	Regional Meter (Direct or Deduct)	Direct
J	Number of Temporary Meters	4

7. STUDY AREA 8:F

A	Name of Drainage Basin	Falls Township Contract Area
B	Area in Acres	62
C	Linear Feet of Pipe	4,428
D	Number of Manholes	17
E	Number of Public Sewer Connections	
F	Number of Pump Stations	0
G	Number of SSOs	0
H	Regional Meter Location	Big Oak Road Meter
I	Regional Meter (Direct or Deduct)	Direct
J	Number of Temporary Meters	1

It is noted that Study Area B-1 and B-2 will be rehabilitated simultaneously due to their relative small size and short length of pipe. Study Areas B-1 and B-2 are broken up into separate Study Areas. A meter will be placed at Yardley Newtown Road to meter Area B-1. B-2 Area will be metered by BCWSA regional meter.

IV. CORRECTIVE ACTION PLAN (CAP)

Lower Makefield Township's Corrective Action Plan (CAP) will include mapping, metering, review of water meter records, wet weather investigations, investigating the age

A. MAINS

1. Mapping:

- a. The Service Areas are shown on the Overall Sanitary Sewer Map attached in Appendix B
- b. The Study Areas are shown on the Flow Meter Location Exhibit attached in Appendix C.

2. Metering:

Each study area will be metered by a regional meter that is either owned by BCWSA or Lower Makefield Township. The regional meters are existing and permanent and will remain in place throughout the duration of the corrective action plan.

Each study area will also be metered with micro (temporary) meters. These meters will be installed at a minimum of the beginning of the wet weather season (December) and will remain in place through end of the wet weather season (May).

The general metering procedure is as follows:

a. Permanent Metering

Lower Makefield Township will utilize existing, permanent meters in each of the study areas that were previously installed and provide a summary of the assessment of the flow data from the permanent meters in each annual report to the PA DEP. These meters are at the outlet of each study area and are the basis of how each study area was determined. The Big Oak Road Meter and the Derbyshire Meter in Study Areas E and F respectively, are owned and maintained by Lower Makefield Township. The remaining permanent meters are owned and maintained by BCWSA. These meters will be used as an extra meter for each Study Area and will provide the cumulative flow for each individual area.

These meters will be analyzed in each annual report as well as prior to implementing the corrective action plan. Reviewing and analyzing the data from these meters for the past year prior to commencing the corrective action plan will aid in determining the priority of each of the sub-areas. The annual CAP report will

include a comparison of average daily, minimum daily, maximum daily and peak hourly flows over the course of the year for the permanent meters. I/I will be visibly shown with this flow data as the daily flows would be significantly higher during wet weather events.

b. Micro Meters

Lower Makefield will purchase, install and maintain a total of 4 micro meters. A map of the metering locations for each of the study areas is attached in Appendix C. The micro meters will be used as follows:

1. Year 1 – The selected study area will be divided into smaller sub-areas. These sub-areas will be metered with micro meters. Micro and regional meter data from the first wet weather season will be used to establish a base line (pre-metering) of the average daily, average dry day, maximum daily and peak hourly flows.
2. Year 2 – (The second wet weather season for selected study area) – after the completion of the rehabilitation work, data from the micro meters will be analyzed (post metering) to determine if the flows were reduced and if and additional action on the study area is required.

In addition, during Year 2 wet weather season, pre-metering will also be done in the next highest priority study area. This metering procedure will be repeated until all the study areas have been successfully rehabilitated.

3. Review of Water Meter Records:

Lower Makefield will review water meter records of all public sewer customers located within the selected study area to determine the actual water use. The actual water use will be compared to the metered sewer flows using micro meters and the existing permanent meters to determine I/I and the sub areas with highest priority.

4. Wet Weather Investigations:

During the wet weather season, (after each rain event greater than 1-inch of rain), Lower Makefield Township will open selected manholes within the selected study area to visually inspect the manhole as well as evaluate the amount of flow. If possible, wet weather investigations will be

completed during the time of day when the flows are known to be low (2-4 pm or 11 pm to 4 am).

Wet weather investigations will also include plugging the pipe at the upstream manhole location (during known periods of low flow) and monitoring the flow at the downstream manhole to determine if there is I/I in the main.

Wet weather investigations will be used to identify areas that require additional investigations (televising) to determine sources of I/I.

It should be noted, pumps have been installed at the Derbyshire meter manhole to be utilized during wet weather events. The Township has received a Water Quality Management Permit from PA DEP. The pump is operated manually by the Authority and only during time of wet weather. Lower Makefield Township in the past has not documented the usage of the pump. Going forward, Lower Makefield Township will take records of the operation of this pump. The pump run hour, approximate duration of operation during each operation, estimated volume by-passed and the frequency. This will be reported in the annual Chapter 94 Report.

5. Age / Location of Pipe Segment:

The Core Creek Interceptor is part of Lower Makefield Township original sanitary sewer collection and conveyance system. Most of the pipe material for these segments is VCP. These areas may contain significant sources of I/I due to the age of the material and the number of joints. There has been known issues with this interceptor during wet weather events, therefore this was part of the determining factor to start with Study Area A-1 and A-2.

The Core Creek Interceptor is identified on the Overall Sanitary Sewer Plan. The known problem areas of the Core Creek Interceptor are between Manholes NC-83 to NC-93.

6. Knowledge of the System:

Lower Makefield Township has ongoing knowledge of their sanitary sewer system as developed in the annual Chapter 94 Report. The Chapter 94 Report can be used as baseline knowledge as it states which pump stations have an annual average flow exceeding the annual average flow capacity if the currently PADEP recommended peaking factors are applied. Lower Makefield Township will, within each study area, investigate known problem areas.

7. Televising:

Lower Makefield Township will include televising as part of the contract to the awarded contractor performing the rehabilitation to the sewer system.

Lower Makefield will televise all the mains and laterals (from the main to the transition) within the selected study area during the wet weather season. Videos and reports will be reviewed to determine defects in need of repair. All analysis of televised inspections for pipes and manholes will be in accordance with the National Association of Sewer Service Companies (NASSCO) standards.

8. Repair and Rehabilitation:

Identified defects in the mains contained within the selected study area will be repaired during the summer months. Anticipated repair methods are as follows:

- a. Root Treatment – roots within pipe segments will be physically removed with a root cutter. Areas within the study area with excessive root growth will be chemically treated.
- b. Grouting – Mains that contain leaks only at the joints will be grouted. All grouted pipe segments will be cleaned and televised. Each joint will be air tested and grouted if required.
- c. Spot Repairs – Mains that contain a limited number of defects in the pipe (cracks, holes, broken) will be repaired by excavating and installing an exterior sleeve or an interior fiberglass liner segment.
- d. Cured in Place Pipe (CIPP) lining – Mains that contain a limited number of defects in the pipe will be spot repair with short sections of CIPP. Entire manhole to manhole pipe sections can be CIPP lined if there are too many defects to do smaller spot repairs. CIPP is the preferred method of pipe repair.
- e. Replacement of pipe segments – if its determined that a defect cannot be repaired by any of the above methods, the portion of the pipe containing the defect will be excavated and replaced with a new PVC pipe section.

B. MANHOLES

During the wet weather events, Lower Makefield personnel will visually inspect each manhole within the study area. A manhole inspection report will be completed for every manhole that is inspected.

Found defects will be repaired as follows:

- a. Grouting – If possible, Lower Makefield will grout all identified leaks. If grouting does not eliminate the leak, the manhole will be lined.
- b. Spraywall Lining – All identified leaking manholes that could not be successfully grouted will be lined. Lower Makefield typically uses SpectraShield epoxy liner for manhole lining projects.
- c. Parson Manhole Inserts – Lower Makefield Township will install Parson Manhole Inserts in any manhole that is found to need such an insert (lids that have large pick holes) or are in areas prone to surface runoff or ponding.

C. LATERALS

The Lower Makefield Township lateral inspection program will include the following:

A. Public portion of the lateral (from the main to the transition)

1. Televising – All laterals within the selected study area will be televised from the main to the transition if during the video inspection of the sanitary sewer I/I sources are identified in the laterals. If it is found during video inspections or wet weather investigations that any observation of significant, sustained, or clear water flowing from a private lateral connection, than it will be noted that this is indication of a stormwater or groundwater source directly connected to the lateral. At that point, further investigation of that specific lateral will be required to ensure the illicit stormwater or groundwater connection to the sanitary lateral is disconnected. The municipal engineer will inspect the repair/removal of the illicit connections to the sanitary laterals to ensure all illicit connections are actually removed.
2. Cleanouts – Lower Makefield Township will visually inspect and repair all cleanouts that are located at the right of way line for each parcel in the selected study area.

3. Repair and Rehabilitation – Lower Makefield Township will repair the laterals as follows:

- i. Root treatment – roots located in laterals will be physically removed by a root cutter. Areas within the study area with excessive root growth will be chemically treated.
- ii. Install/repair missing and/or damaged cleanout caps.

Once a defective lateral has been identified, Lower Makefield Township will review the defect to determine the best repair solution. Factors that will be considered in determining the best repair solution include but are not limited to: location, depth, severity of the defect and presence of a clean out. Keeping these factors in mind, a practical repair method will be selected on for the lateral. Anticipated repair methods include: lining or excavation and replacement.

B. Private Sector portion of the lateral (from the transition to the house)

Lower Makefield Township currently has an ordinance in §166-29 – Prohibited Discharges that states “Surface water that has accumulated in or been drained into sump holes in basements, crawl spaces or other areas shall not be discharged into the sanitary sewer system.” The ordinance also states “no down spouts, rain gutters, vents, or surface drains shall be constructed in such a manner to permit water to be drained into the sanitary sewer system.”

Lower Makefield Township will incorporate a visual lateral inspection program. These visual inspections will ensure that there are no visible illicit connections to the sanitary sewer whether it is from a roof drain or sump pump. It will also allow the Township to verify that all homes have appropriate mushroom style caps on the cleanouts and that cleanouts are above grade as to not allow any rain water to enter the sanitary system.

Lower Makefield Township currently does not have a sewer lateral inspection ordinance which requires the inspection of the private sector of sanitary sewer laterals. As part of the Corrective Action Plan, Lower Makefield Township will draft and vote on an ordinance which requires the inspection of any sanitary sewer lateral whenever ownership of a property is transferred. The ordinance will state that a certified registered plumber will be required to video inspect the lateral and make any repairs necessary prior to property transfer. Upon repair of any lateral defects, the homeowner will be issued a Sewer Lateral Compliance Certification certifying that the home has passed the lateral inspection.

Lower Makefield Township has the proper ordinances in place to allow them to inspect properties for illicit connections and allows for the township to fine the violator request the proper repair. Lower Makefield Township has the right per §166-31- Inspections to “enter upon any or all properties for the purpose of inspecting the system and connections, observing, measuring, and sampling waste discharged into the sewer system for the purpose of determining whether or not the property owner has in use a sump pump and whether or not the sump pump is installed in violation of this article.” Then per §166-32 –Violations and Penalties of the Township Code “Any person who shall violate a provision of this article or shall fail to comply with any of the requirements thereof shall be punishable by a fine of not more than \$1,000, plus costs of prosecution, including reasonable attorney’s fees incurred by the Township. Each day that a violation continues shall be deemed a separate offense. If the defendant neither pays nor timely appeals the judgment, the Township may enforce the judgment pursuant to the applicable rules of civil procedure.”

V. REPORTING

A. Annual Reporting (Chapter 94 Report)

As required by PADEP, Lower Makefield Township will submit their annual Chapter 94 report by March 31. The report will include an update on the status of their CAP. The update will include the following:

1. An overall map of the Township showing all study areas. Rehabilitated study areas will be identified.
2. Anticipated sequence of study areas based on the Township’s knowledge at the time of writing the report. The sequence is subject to change based on meter data, SSO’s, pump stations and found deficiencies.
3. Summary of findings.
4. Summary of work completed.
5. Analysis of permanent and micro meter data (average daily, minimum daily, maximum daily and peak hourly.)
6. Comparison of pre-and post-meter data if applicable.
7. Comparison of actual water use to flow data for the current study area.
8. Re-evaluate and confirm Study Area priorities.
9. Revise Connection Management Plan, update anticipated projects and request release of connections.
10. Anticipated schedule for the next five years.
11. Summary of anticipated budget for the next five years.

VI. SUMMARY OF YEARLY TASKS

The following is a summary of yearly tasks for the program. It is anticipated the program will take roughly eight years to completely implement. Lower Makefield Township's goal is to eliminate SSO's, reduce flows to overloaded pump stations and reduce flows to BCWSA's Neshaminy Interceptor during wet weather events.

A. YEAR ONE

1. Receipt of CAP Approval letter from PADEP.
2. Install micro meters in Study Area A-1 within 4 months after receiving approval of CAP.
3. Pre-meter Study Area A-1 during the wet weather season.
4. Televis and complete an inspection report for all sewer mains in Study Area A-1 during wet weather season.
5. Televis and complete an inspection report for all laterals in Study Area A-1 during wet weather season. Laterals will be televised from the main to the transition.
6. Visually inspect and complete a manhole inspection report for all manholes in Study Area A-1 during wet weather season.
7. Monitor and record all issued Certificate of Compliances for laterals located on private property.
8. Identify all found defects and recommended repair method.
9. Install Parson Manhole Inserts in manholes that require them.
10. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
11. Compare flows to existing permanent BCW&SA flow meters and analyze for trends. (Same for all subsequent years)
12. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PADEP before March 31.

B. YEAR TWO

1. STUDY AREA A-1
 - a. Post meter the area during the wet weather season.
 - b. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
 - c. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
 - d. Analyze flows from permanent BCW&SA flow meters for comparison (Same for all subsequent years)

- e. Compare actual water usage to the sewer flows to determine I/I in the study area.
- f. Determine the effectiveness of the repairs.
- g. Determine if additional repairs/rehabilitation are needed.

Lower Makefield Township anticipates rehabilitating one study area at a time. Within Lower Makefield's budget constraints, all necessary repairs will be made to the mains, manholes and laterals (public portion), (does not include the private portion of laterals) within the study area. If Lower Makefield Township determines that the study area has been successfully rehabilitated, they will move on to the next study area.

2. STUDY AREA A-2

- a. Install micro meters in Study Area A-2 at the latest on December 1st of Year 2 wet weather season.
- c. Pre-meter Study Area A-2 during the wet weather season.
- d. Televis and complete an inspection report for all sewer mains in Study Area A-2 during wet weather season.
- e. Televis and complete an inspection report for all laterals in Study Area A-2 during wet weather season. Laterals will be televised from the main to the transition.
- f. Visually inspect and complete a manhole inspection report for all manholes in Study Area A-2 during wet weather season.
- g. Monitor and record all issued Certificate of Compliances for laterals located on private property.
- h. Identify all found defects and recommended repair method.
- i. Install Parson Manhole Inserts in manholes that require them.
- j. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
- k. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PADEP before March 31.

C. YEAR THREE

1. STUDY AREA A-2

- a. Post meter the area during the wet weather season.
- b. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
- c. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).

- d. Compare actual water usage to the sewer flows to determine I/I in the study area.
 - e. Determine the effectiveness of the repairs.
 - f. Determine if additional repairs/rehabilitation are needed.
2. STUDY AREA B-1 and B-2
- a. Install micro meters in Study Area B-1 and B-2 at the latest on December 1st Year 3.
 - c. Pre-meter Study Area B-1 and B-2 during the wet weather season.
 - d. Televis and complete an inspection report for all sewer mains in Study Area B-1 and B-2 during wet weather season.
 - e. Televis and complete an inspection report for all laterals in Study Area B-1 and B-2 during wet weather season. Laterals will be televised from the main to the transition.
 - f. Visually inspect and complete a manhole inspection report for all manholes in Study Area B-1 and B-2 during wet weather season.
 - g. Monitor and record all issued Certificate of Compliances for laterals located on private property.
 - h. Identify all found defects and recommended repair method.
 - i. Install Parson Manhole Inserts in manholes that require them.
 - j. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
 - k. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PADEP before March 31.

D. YEAR FOUR

1. STUDY AREA B-1 and B-2
- a. Post meter the area during the wet weather season.
 - b. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
 - c. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
 - d. Compare actual water usage to the sewer flows to determine I/I in the study area.
 - e. Determine the effectiveness of the repairs.
 - f. Determine if additional repairs/rehabilitation are needed.

2. STUDY AREA C

- a. Install micro meters in Study Area C at the latest on December 1st of Year 4
- b. Pre-meter Study Area C during the wet weather season.
- c. Televis and complete an inspection report for all sewer mains in Study Area C during wet weather season.
- d. Televis and complete an inspection report for all laterals in Study Area C during wet weather season. Laterals will be televised from the main to the transition.
- e. Visually inspect and complete a manhole inspection report for all manholes in Study Area C during the wet weather season.
- f. Monitor and record all issued Certificate of Compliances for laterals located on private property.
- g. Identify all found defects and recommended repair method.
- h. Install Parson Manhole Inserts in manholes that require them.
- i. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
- j. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PADEP by March 31.

E. YEAR FIVE

1. STUDY AREA C

- a. Post meter the area during the wet weather season.
- b. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
- c. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
- d. Compare actual water usage to the sewer flows to determine I/I in the study area.
- e. Determine the effectiveness of the repairs.
- f. Determine if additional repairs/rehabilitation are needed.

2. STUDY AREA D

- a. Install micro meters in Study Area D at the latest on December 1st of Year 5
- b. Pre-meter Study Area D during the wet weather season.
- c. Televis and complete an inspection report for all sewer mains in Study Area D during wet weather season.

- d. Televising and complete an inspection report for all laterals in Study Area D during wet weather season. Laterals will be televised from the main to the transition.
- e. Visually inspect and complete a manhole inspection report for all manholes in Study Area D during the wet weather season.
- f. Monitor and record all issued Certificate of Compliances for laterals located on private property.
- g. Identify all found defects and recommended repair method.
- h. Install Parson Manhole Inserts in manholes that require them.
- i. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
- j. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PADEP by March 31.

F. YEAR SIX

1. STUDY AREA D

- a. Post meter the area during the wet weather season.
- b. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
- c. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
- d. Compare actual water usage to the sewer flows to determine I/I in the study area.
- e. Determine the effectiveness of the repairs.
- f. Determine if additional repairs/rehabilitation are needed.

2. STUDY AREA E

- a. Install micro meters in Study Area E at the latest on December 1st of Year 6
- b. Pre-meter Study Area E during the wet weather season.
- c. Televising and complete an inspection report for all sewer mains in Study Area E during wet weather season.
- d. Televising and complete an inspection report for all laterals in Study Area F during wet weather season. Laterals will be televised from the main to the transition.
- e. Visually inspect and complete a manhole inspection report for all manholes in Study Area E during the wet weather season.
- f. Monitor and record all issued Certificate of Compliances for laterals located on private property.
- g. Identify all found defects and recommended repair method.

- h. Install Parson Manhole Inserts in manholes that require them.
- i. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
- j. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PADEP by March 31.

G. YEAR SEVEN

1. STUDY AREA E

- a. Post meter the area during the wet weather season.
- b. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
- c. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
- d. Compare actual water usage to the sewer flows to determine I/I in the study area.
- e. Determine the effectiveness of the repairs.
- f. Determine if additional repairs/rehabilitation are needed.

2. STUDY AREA F

- a. Install micro meters in Study Area F at the latest on December 1st of Year 7
- b. Pre-meter Study Area F during the wet weather season.
- c. Televis and complete an inspection report for all sewer mains in Study Area F during wet weather season.
- d. Televis and complete an inspection report for all laterals in Study Area F during wet weather season. Laterals will be televised from the main to the transition.
- e. Visually inspect and complete a manhole inspection report for all manholes in Study Area F during the wet weather season.
- f. Monitor and record all issued Certificate of Compliances for laterals located on private property.
- g. Identify all found defects and recommended repair method.
- h. Install Parson Manhole Inserts in manholes that require them.
- i. Prioritize and schedule the repair of defects (Mains, Manholes and laterals) within budget constraints.
- j. The Annual Chapter 94 Report will provide an update on the I/I Rehabilitation progress. Submit to PADEP by March 31.

H. YEAR EIGHT

1. STUDY AREA F

- a. Post meter the area during the wet weather season.
- b. Analyze flow data (average daily, minimum daily, maximum daily, peak hourly flows).
- c. Compare pre-and post-meter data to determine the reduction of flows (average daily, minimum daily, maximum daily, peak hourly flows).
- d. Compare actual water usage to the sewer flows to determine I/I in the study area.
- e. Determine the effectiveness of the repairs.
- f. Determine if additional repairs/rehabilitation are needed.

I. YEAR NINE AND BEYOND

The Township will continue to flow monitor one study area a year to determine if additional analysis and/or repairs are required based upon increases in flows not due to additional development. If additional repairs are required then the repairs will be performed in the following budget year. The order that the study areas will be reevaluated may change in order of priority based upon field observations and the analysis of flows at the permanent flow metering locations.

- J. This process will be repeated until all study areas have been rehabilitated. After year eight, the Township will do an overall assessment of the system and development of a yearly I/I abatement program.

**APPENDIX A- BCWSA AND LOWER MAKEFIELD
TOWNSHIP AGREEMENT**

SUPPLEMENTAL AGREEMENT
NESHAMINY INTERCEPTOR

THIS AGREEMENT made and concluded this 7th day of February, 2018, by and between the **BUCKS COUNTY WATER AND SEWER AUTHORITY**, an authority organized and existing pursuant to the laws of the Commonwealth of Pennsylvania maintaining a principal place of business in Warrington, Pennsylvania (hereinafter referred to as "BCWSA") and **TOWNSHIP OF LOWER MAKEFIELD**, an authority organized and existing pursuant to the laws of the Commonwealth of Pennsylvania maintaining a principal place of business in Yardley, Pennsylvania (hereinafter referred to as "Township").

WHEREAS, BCWSA owns and operates the sanitary sewer collection facilities known as the Neshaminy Interceptor;

WHEREAS, BCWSA and Township have an existing Interceptor Agreement dated October 28, 1975;

WHEREAS, the improvements associated with the Neshaminy Interceptor include sanitary sewer pipes, pump stations, metering pits, manholes and other facilities;

WHEREAS, the Neshaminy Interceptor conveys sanitary sewer flow (also referred to herein as "wastewater flow") from various municipalities and other entities located in portions of Bucks County to an interceptor owned and maintained by the City of Philadelphia which said interceptor then conveys the effluent from the Neshaminy Interceptor to a sewer treatment plant owned and maintained by the City of Philadelphia;

WHEREAS, the City of Philadelphia treats the effluent discharged into the Neshaminy Interceptor pursuant to an Agreement between BCWSA and the City of Philadelphia (hereinafter referred to as "City of Philadelphia Agreement") which imposes limitations on BCWSA related to flows including peak wet weather flows. A copy of that Agreement is attached hereto, incorporated

herein and marked as Exhibit "A";

WHEREAS, inflow and infiltration, (hereinafter referred to as "I & I"), removal efforts undertaken as a whole by the contributing municipalities, authorities and other users of the Neshaminy Interceptor have not been sufficient to reduce wet weather peak flows to acceptable levels consistent with the City of Philadelphia Agreement;

WHEREAS, the Pennsylvania Department of Environmental Protection ("DEP") has determined and notified BCWSA that the municipalities, authorities and other entities that contribute flow to the Neshaminy Interceptor need to increase their collective and singular efforts to reduce inflow and infiltration into the sewer effluent that is discharged in the Neshaminy Interceptor so as to reduce wet weather peak flows treated at the facilities owned and maintained by the City of Philadelphia;

WHEREAS, completing the tasks required by DEP, such as Act 537 Sewer Facilities Planning ("Act 537") and as set forth in this Supplemental Agreement in compliance with the time limitations noted herein and pursuant to the BCWSA's Connection Management Plan ("CMP") is essential to the economic vitality of all of the municipalities, authorities and other entities served by the Neshaminy Interceptor and is indicative of good environmental stewardship on the part of all of the participants in the Neshaminy Interceptor;

WHEREAS, DEP believes and avers that the Totem Road Pump Station which conveys sewer flows from the Neshaminy Interceptor to the City of Philadelphia may be hydraulically overloaded in the future and may exceed its permitted capacity;

WHEREAS, BCWSA had previously considered the construction of a surge tank to manage peak flows, but DEP was unwilling to approve the construction of a surge tank.

WHEREAS, DEP and BCWSA have entered into a Settlement Agreement where, in the

resolution of the dispute, DEP requires that BCWSA enter into new supplemental agreements with its customers, which said agreements must impose upon such customers certain obligations as set forth in the CMP, and an executed copy of the Settlement Agreement is attached hereto, incorporated herein and marked as Exhibit "B";

WHEREAS, it has been recommended to BCWSA by its engineers, and approved by DEP, that certain improvements be made to the Neshaminy Interceptor by BCWSA so that BCWSA is able to convey additional wet weather flows in order to avoid surcharging within portions of the Neshaminy Interceptor;

WHEREAS, DEP has directed BCWSA to prepare a CMP for the years 2014 through 2018 which shall deal with inflow and infiltration abatement efforts in the Neshaminy Interceptor, collectively and/or singularly, and the release of capacity for member municipalities and authorities in order to facilitate new sewer connections;

WHEREAS, the most recent CMP that has been accepted by DEP, is incorporated by reference as though were fully set forth and is attached as Exhibit "C";

WHEREAS, the Township operates the sanitary sewer system in the Township pursuant to a lease agreement with the Municipal Sewer Authority of Lower Makefield Township, and is, therefore, authorized to enter into this agreement on behalf of the Municipal Sewer Authority of Lower Makefield Township Authority and the Township; and

WHEREAS, this Supplemental Agreement is intended to set forth the terms and conditions upon which BCWSA will construct the Neshaminy Interceptor upgrades, the allocations of collective costs related to same and the flow limitation obligations imposed upon the member municipalities and authorities as it relates to the CMP.

NOW, THEREFORE, intending to be legally bound and for other good and valuable

consideration, the parties hereto agree as follows:

1. Construction of Interceptor Upgrades.

A. It is anticipated by the parties hereto that based upon the completion of the initial Act 537 Planning, as well as engineering studies conducted by BCWSA, and as required by the Settlement Agreement between DEP and BCWSA, that certain portions of the Neshaminy Interceptor will be upgraded by BCWSA to facilitate sanitary sewer flows, which upgrades shall include, but not be limited to lining and the installation of relief sewers along a portion of the Neshaminy Interceptor. The initial improvements proposed to be constructed by BCWSA, as noted herein, shall be hereinafter referred to as the "Phase I" improvements. The parties acknowledge and agree that the Township, has submitted to BCWSA its Sanitary Sewer Needs Assessment, which assisted BCWSA in analyzing the capacity of the Neshaminy Interceptor. BCWSA has completed its alternative analysis for customer needs and Phase I Interceptor upgrades shall consist of lining portions of the Neshaminy Interceptor and constructing relief sewer lines, all of which said costs shall be funded collectively through user fees. Inasmuch as the Township has completed the requirement to provide its Sanitary Sewer Needs Assessment, sewer capacity for 2015 has previously been made available to the Township.

B. Upon completion of the Act 537 Planning, as required by the Settlement Agreement between DEP and BCWSA, and after completion of an analysis of the DEP approved 537 Plans, submitted by the municipalities which contribute sanitary sewer flow to the Neshaminy Interceptor, the parties hereto acknowledge and agree that BCWSA and DEP intend to engage in further planning discussions for the purpose of determining what additional modifications or changes to the Neshaminy Interceptor may be required, in the future, by the Act 537 planning and by and through individual municipal efforts undertaken to remove inflow and infiltration in each

of the municipal systems. To the extent that any additional non-maintenance improvements are required to be made to the Neshaminy Interceptor, either by way of additional lining or the construction of relief sewers (“Improvements”), those future Improvements shall be hereinafter referred to as “Phase II” Improvements. The parties hereto agree to cooperate and meet to discuss any Phase II Improvements or upgrades or any modifications or changes dictated by the Township’s current and/or future Act 537 data or planning submitted to DEP.

C. All Phase II and subsequent Improvements to the Neshaminy Interceptor, or in the event any changes are made to the methods to determine peaking factors, calculating flow limits, or apportioning penalties and fines under this Supplemental Agreement, shall be subject to a discussion in good faith between both parties causing a further amendment to this Supplemental Agreement, as needed.

2. **Act 537 Sewer Facilities Planning.** The Township prepared and submitted for DEP approval an Act 537 Plan of Study outlining the steps to complete an update to its Act 537 Plan. As such, the municipality did receive connections for 2015. In addition, the Township, by and through the Township, has submitted the municipality’s projection of capacity needs for the next five years. The Township shall continue to advise both BCWSA and DEP of its sewer capacity needs as such information concerning future sewer connections is made available to the municipality and authority. Along with efforts made by the Township to supply information related to sewer capacity needs and planning, the Township shall take immediate steps to meet all requirements associated with implementation of the Township’s Act 537 Plan and shall report progress regarding same to DEP and BCWSA to demonstrate its quantitative efforts to comply with peak flows pursuant to BCWSA’s obligations in the City of Philadelphia Agreement. As such, this Supplemental Agreement shall not limit the municipality’s or authority’s rights and

obligations under Act 537 to address changed circumstances in the municipality's sewer requirements. To that extent, this Supplemental Agreement shall not be considered a final document and shall be revised or amended as needed consistent with changed circumstances, including but not limited to, Act 537 sewer planning requirements and the quantitative efforts demonstrated by and through actions taken in furtherance of, and compliance with the Act 537 Plan as approved by DEP.

Further, upon compliance with the Township's obligations under this Supplemental Agreement, the Township and any other Neshaminy Interceptor customer will project capacity needs within the 5 year projection of their Chapter 94 report. If, as a result of those projections, BCWSA predicts a capacity shortfall, BCWSA will commence with engineering studies and planning to evaluate providing additional capacity in the Neshaminy Interceptor and/or WWTP facilities to provide such capacity. Should BCWSA be unable to provide the requested capacity, the Township may amend its Act 537 Plan to allow for alternative options of sewage conveyance and treatment. Alternative options may be solely undertaken provided that the then current flow which the Township is obligated under agreement to convey through the Neshaminy Interceptor shall continue without interruption.

3. Peak Flows. The Township agrees that it will maintain flow limits consistent with the Agreement between BCWSA and the Philadelphia Water Department, a copy of which is attached hereto, incorporated herein and marked as Exhibit "A", on a prorated basis which said flow limits shall include average annual, maximum daily and instantaneous peak flows which said flows shall be maintained by the Township at the limits identified in the attached Exhibit "D". Neither this Supplemental Agreement nor the parties original Neshaminy Interceptor Participation Agreement shall prevent the Township from amending its Act 537 Plan to explore alternative options for

collection and treatment of its flows, to the extent permitted by DEP, subject to approval of any other regulatory agencies having jurisdiction thereto and pursuant to laws and regulations regarding same; however, nothing in the preceding sentence shall relieve the Township of its obligation to pay for any outstanding bonds for which it is or may be responsible, as noted in prior Agreements between the parties.

For the purpose of determining compliance with the peak flow (PWD), as noted in Exhibit “D,” the peak hourly flow will be used. In furtherance of the standard DEP design requirements for Interceptors, the Township shall also maintain flow limits in accordance with the chart attached hereto as Exhibit “E” and incorporated herein by reference. Compliance with the flow limits required by the DEP design requirements for Interceptors shall be a condition precedent to receiving additional connections, as noted hereafter in this Supplemental Agreement. For the purpose of determining compliance with the peak instantaneous flow limits (DEP), as noted in Exhibit “E,” the peak hourly flow will be used. Irrespective of the flow limits imposed in Exhibit “E,” the Township will still be obligated to implement a DEP approved Inflow and Infiltration Abatement Plan that will allow it to come into compliance with the flow limits in Exhibit “D” on the schedule set forth in the DEP approved CAP/CMP/I & I Abatement Plan, as may be amended in the future, such that the contractual obligations to the City of Philadelphia are met.

Should the Township not meet its flow limits with respect to the obligations to the City of Philadelphia, there shall be no consequences, financial or otherwise, to the Township for not meeting its flow limitations unless exceedances by the Township cause a fine, penalty, or assessment to be levied upon BCWSA by the City of Philadelphia. If the Township is not meeting its flow limitations as defined by this Supplemental Agreement and the failure to meet the flow limitations causes or contributes to a capacity exceedance in the Neshaminy Interceptor system or

causes or contributes to an exceedance of the City of Philadelphia Agreement flow limitations, the consequence to the Township shall be that no additional connections will be permitted until the flow exceedance has been addressed, in addition to any penalties that may be appropriate under this Supplemental Agreement.

Should any fines, penalties, or assessments be levied by the City of Philadelphia, then the provisions of paragraph 6 of the Agreement shall determine the proportionate share to be paid by each Customer, as noted in Paragraph 6 of this Agreement.

The parties acknowledge that the Township have submitted and substantially updated the projection of capacity needs for the next five (5) years. It is understood and agreed that the approval and execution of this Supplemental Agreement is a condition precedent to receiving any connections for 2016 to be utilized by the Township.

Subsequent to 2018, the allowances for average annual, maximum daily and peak hourly flows generated by the Township will be based upon average flow, maximum daily and peak hourly flow limits, which shall be adjusted annually based on DEP's Chapter 94 reporting methodology, which is based on a five (5) year rolling average. Any of the aforementioned flows generated by the Township will be increased by the number of EDUs of additional capacity added to the Neshaminy Interceptor as a result of new connections made to the sanitary sewer system in the Township.

In order to be allocated the additional connections, it shall be a condition precedent that the Township shall notify, in writing, BCWSA of the location of the connections, the number of connections, the EDUs related thereto, and the timing of any new connections subsequent to 2018. The execution of this Supplemental Agreement and/or the approval of an Act 537 Plan does not constitute an automatic guaranty of capacity. Capacity will be made available to all contributors to the Neshaminy Interceptor on a first-come/first-serve basis.

Every application for an additional connection or connections related to a new project shall require either a full planning module or a planning exemption that includes the appropriate certifications of capacity from the authority, municipality, BCWSA, and the City of Philadelphia. The applicant must provide documentation that the planning module or planning exemption request has been approved by DEP. Alternatively, the applicant may provide documentation that DEP has waived planning for the project. As aforesaid, provided that the Township is in compliance with Township's I & I abatement program, additional capacity in the Neshaminy Interceptor shall not be unreasonably withheld provided that the Township has not caused or contributed to a capacity exceedance in the Neshaminy Interceptor system or caused or contributed to an exceedance of the City of Philadelphia Agreement flow limitations. There shall be a further condition precedent with respect to the allocation of any additional capacity to which shall be that the Township is in compliance with its DEP approved I & I abatement program, which shall be determined by DEP.

BCWSA will, however, monitor compliance with the I & I abatement program in connection with reviewing and monitoring flow limitations. Notwithstanding compliance with the aforementioned, no additional capacity will be allocated unless the Neshaminy Interceptor is capable of appropriately conveying the additional capacity to the City of Philadelphia for ultimate treatment.

4. **Future Capacity.** No capacity in 2018 and beyond shall be made available to the Township unless the Township is meeting its current inflow and infiltration goals as set forth in a DEP approved Inflow and Infiltration Abatement Plan provided that the Township has not caused or contributed to a capacity exceedance in the Neshaminy Interceptor system or caused or contributed to an exceedance of the City of Philadelphia Agreement flow limitations. It is understood and agreed that the obligations of the Township pursuant to the schedule in the DEP

approved CAP/CMP/I & I Abatement Plan, as may be amended in the future, shall reach the point where its maximum daily flow is not to exceed 1.4 times their 5 year average annual flow limit based on DEP methodology and a peak flow of 2.5 times their 5 year average annual flow limit based on DEP methodology as noted in Exhibit "E." Notwithstanding the capacity limitations related to the CMP, the Township will still be required to implement a DEP approved Inflow and Infiltration Abatement Plan that will allow it to comply with flow limits, as set forth above, which are based on BCWSA's obligations with the City of Philadelphia Agreement.

5. Connection Management Plan. The terms and conditions of the CMP between BCWSA and DEP are incorporated by reference as though more fully set forth at length.

6. Fines and Assessment of Costs. Should the City of Philadelphia, the United States Environmental Protection Agency, the Pennsylvania Department of Environmental Protection or any other governmental agency impose upon the BCWSA any fines or claims for additional cost due to the conveyance of peak flows in excess of the limitations imposed pursuant to the City of Philadelphia Agreement, the Township shall be responsible for its proportionate share of said costs if, and only if, the Township has exceeded its capacity as set forth in this Supplemental Agreement. The share of penalty allocated to the Township will be based on the proportionate share of the total flows in the Neshaminy Interceptor attributable to the Township's proportionate use. The determination of the Township's proportionate share shall be based upon meter readings, which said meters measure the flow from all of the participants in the Neshaminy Interceptor, and said meters for all of the participants are of similar capability to measure wastewater flow entering the Neshaminy Interceptor. Said meters are owned and maintained by BCWSA.

If fines or penalties or other claims for additional costs are imposed upon the BCWSA, the

method of determining the proportionate share to be paid by the Township shall be based upon meter readings as described in the paragraph above or upon EDU estimates of wastewater flow where accurate meter measurements are not practical, and such readings and/or estimates are taken at the time of the event which triggers the assessment of additional costs, fines or penalties. The exceedance charge from the Philadelphia Water Department will be distributed to each municipality, authority or other entity (each individually a "Customer." or collectively, "Customers") that exceeds its allowable flows based upon its proportion to the total flow exceedance. The calculation would be as follows:

Customer Share of Surcharge (\$) = (Total of Customer Daily Flow Exceedances for Billing Period (MG) / Sum of all Customers' Daily Flow Exceedances for Billing Period (MG)) X PWD Surcharge Amount (\$) for Billing Period

AN EXAMPLE OF THE PENALTY CALCULATION IS PROVIDED IN EXHIBIT "F".

7. Meters. The meters used to measure the flows at various locations within the Neshaminy Interceptor, including those flows emanating from the Township are inspected and calibrated semi-annually by a third party. BCWSA shall provide to the Township the name and contact information of the third party contractor. Additionally, should the third party contractor change during the course of the relationship between the parties, BCSWA shall provide to the Township the name and contact information of the new contractor responsible for the maintenance of the meters. Complete calibration documentation and complete inspection documentation will be provided to the Township within 5 days of the date of receipt of any calibration, testing, inspection report, communication or writing by any third party to BCWSA regarding the condition, maintenance or inspection of the meters. BCWSA shall make available, via Telog wireless installation, any and all meter readings to the Township within 5 days of receipt of same from the meter contractor. The meters used to determine fees, penalties,

compliance or the like, will be the meters identified in Paragraph 6, owned by BCWSA and utilized for billing purposes, which measure wastewater flow emanating from all of the connection points between the the Township system and the Neshaminy Interceptor.

8. Inspections. BCWSA and the Township shall provide to each other, from time to time, all information relevant and appropriate to the proper administration of the provisions of this Supplemental Agreement. Any inspections to be undertaken by any party of this Supplemental Agreement in accordance with the provisions of this paragraph shall be conducted at reasonable times and with reasonable notice. Complete records of any inspections will be provided to the other party herein within 30 days of the date of any such inspection with the exception of the inspection reports discussed in Paragraph 7 above.

9. Capacity. The parties hereto acknowledge and agree that future sewer capacity is subject to regulations of the City of Philadelphia and DEP. Accordingly, events may occur which prompt the City of Philadelphia and/or DEP to restrict future sanitary sewer connections to the Neshaminy Interceptor.

10. Force Majeure. Notwithstanding any other provisions of this Supplemental Agreement, neither BCWSA nor the Township are responsible for any damages to the other for any failure to comply with this Agreement resulting from an act of God or riot, sabotage, public calamity, flood, strike, breakdown of facilities or common transportation facilities or any other event beyond its reasonable control. For the purposes of this Agreement, a flood or storm that constitutes a force majeure would be a storm named by an agency of the Federal government. The party having the responsibility for the facility so affected, however, shall proceed promptly to remedy the consequences of such event, with such costs to be shared in accordance with the terms and conditions of this Supplemental Agreement or the original Neshaminy Interceptor Agreement

between the Township and BCWSA for the Neshaminy Interceptor. Notwithstanding anything herein to the contrary, if a force majeure event occurs that causes the City of Philadelphia to take any enforcement action against BCWSA or issue any fines/penalties/assessments against BCWSA in accordance with the provisions of the City of Philadelphia Agreement, then the Township cannot rely on this provision as a defense to a claim by BCWSA of a breach of this Supplemental Agreement arising out of the same force majeure event.

11. Default. In the event of a breach of this Supplemental Agreement by either party, the other party may resort to whatever remedies are available, at law or equity, to enforce this Supplemental Agreement. The parties, by executing this Supplemental Agreement, acknowledge and agree that monetary damages are not an adequate remedy so either party may resort to a court of equity in order to enforce the provisions of this Supplemental Agreement and to compel compliance by the defaulting party.

12. Severability. Should any provision herein or for any reason be held illegal or invalid by a court of competent jurisdiction, no other provision of this Supplemental Agreement shall be effected as the Supplemental Agreement would have been executed even if such invalid or illegal provision had not been contained herein.

13. Other Agreements. This Supplemental Agreement shall not limit BCWSA from entering into other agreements with other municipalities or municipal authorities, but, if any such agreement contains terms, standards and/or conditions more favorable to the municipality or municipal authority than the terms, standards and/or conditions of this Supplemental Agreement, then the terms, standards and/or conditions of the other agreements shall be extended, granted, conferred or otherwise provided to the Township.

14. Effective Date. The Effective Date shall be the date of the execution and delivery

hereof by the parties hereto.

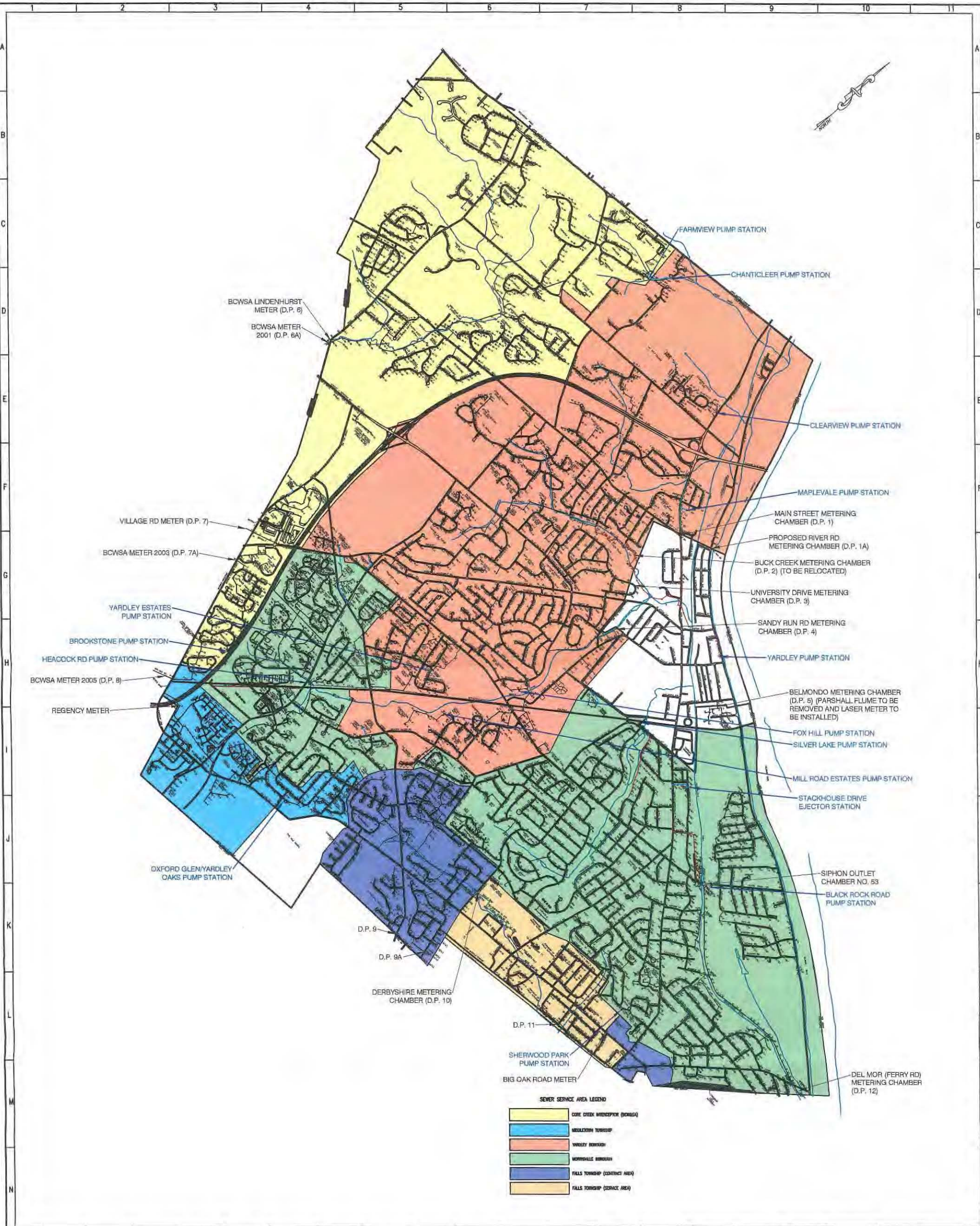
15. Waiver. If any party to this Supplemental Agreement does act and insist upon strict performance of this Supplemental Agreement or any other terms, conditions or otherwise, same shall not be considered as a waiver of any of the rights hereunder.

16. Interpretation. This Supplemental Agreement shall be interpreted in accordance with the laws of the Commonwealth of Pennsylvania and shall be binding upon the respective parties, its successors and assigns and may not be assigned to any third party without the written consent of the other party hereto which consent shall not be unreasonably withheld. This Supplemental Agreement shall be interpreted as an amendment or supplement to any and all existing agreements by and between BCWSA and the Township related to the Neshaminy Interceptor and is not meant to be a replacement of the aforementioned agreements.

17. Disputes. To the extent any disputes arise pursuant to the terms and conditions of this Supplemental Agreement and cannot be resolved by the parties, such disputes shall be litigated in the Court of Common Pleas of Bucks County.

IN WITNESS WHEREOF, and intending to be legally bound hereby, the parties hereto have caused this Agreement to be executed, under seal, by affixing their respective hands and seals the day and year first above written.

APPENDIX B- OVERALL SANITARY SEWER MAP



This document, and the lines and notes hereon, are the property of Ebert Engineering, Inc. and are not to be used in whole or in part, for any other project without the written authorization of Ebert Engineering, Inc. No liability shall be assumed for any errors or omissions. Any liability shall be limited to the original printing or not within the original. Reproduction of this drawing without the engineer's seal and signature is prohibited.

GENERAL PLAN OF SANITARY SEWERS WITH SEWER SERVICE AREAS FOR LOWER MAKEFIELD TOWNSHIP		Ebert Engineering, Inc. Water and Wastewater Engineering 4027 W. Spruce Street, Suite 202 Shippensburg, PA 17252 Phone: 717.354.4731 Fax: 717.354.4734	
1	REVISION TO MORRISVILLE BOROUGH SERVICE AREA	08/31/18	Drawn by: [] Project Engr.: [] Checked by: [] Scale: 1"=1000' Job No.: 068-001 Date: 05/16/18 Drawing No.: 1 OF 1

APPENDIX C- FLOW METER LOCATION EXHIBIT

**APPENDIX C - BCWSA AGREEMENT AND
CONNECTION MANAGEMENT PLAN**



January 31, 2018

Mr. John Butler
Bucks County Water and Sewer Authority
1275 Almshouse Road
Warrington, PA 18976

Re: Municipal Wasteload Management Program
BCWSA Neshaminy Connection Management Plan
(NICMP)
Bucks County

Dear Mr. Butler:

The Department of Environmental Protection (DEP) received submissions on September 29, 2017, and January 24, 2018 regarding the above referenced matter from Mr. John Swenson of Carroll Engineering Corporation on behalf of the Bucks County Water and Sewer Authority (BCWSA). The information provided by Mr. Swenson includes proposed revisions to BCWSA's Neshaminy Interceptor Connection Management Plan (NICMP) as well as the requests from various municipalities that initiated the proposed revisions. The NICAP and NICMP were submitted to fulfill BCWSA's obligations under 25 Pa. Code § 94.22, to address the projected hydraulic overload within portions of the Neshaminy Interceptor, as discussed in the DEP's letters of June 26, 2012 and July 25, 2012, to BCWSA.

DEP has reviewed the proposed NICMP revisions and hereby accepts the revisions proposed in the most current NICMP, dated January 22, 2018.

The March 10, 2014, Settlement Agreement between DEP and BCWSA provided for the release of the 2014 connections upon acceptance of the NICAP. Your NICAP was accepted on March 10, 2014, and fully allocated your proposed 2014 connections equating to a total flow of 334,750 gallons of sewage per day (gpd).

According to your NICMP, the 2015 connections may be released to those municipalities that have complied with the submission of the Act 537 Plans of Study (POS) and the submission of the public sewer capacity needs analyses that was due by September 30, 2014. Our records show that all tributary municipalities have complied with the submission of Act 537 POSs for the Neshaminy service areas of their municipalities to DEP. BCWSA has confirmed that all tributary municipalities have complied with the submission of the public sewer capacity needs analyses and has therefore released the 2015 connections to all municipalities.

According to your NICMP, the 2016 connections may be released to those municipalities that have complied with the execution of the supplementary agreement with BCWSA and have submitted completed and adopted plans to DEP no later than October 1, 2015. A completed Act 537 plan contains executed supplemental agreements as identified in the NICAP and NICMP, as well as incorporates BCWSA's Neshaminy Interceptor Alternative Analysis. Many Act 537 plans previously submitted to DEP do not contain the supporting supplemental agreement or the Neshaminy Interceptor Alternative Analysis. Therefore, these submissions are incomplete and do not yet qualify for the release of 2016 connections. The following municipalities have submitted complete Act 537 Plans and BCWSA has confirmed the release of 2016 connections to these municipalities: Bensalem Township, Hulmeville Borough, Langhorne Borough, Langhorne Manor Borough, and Middletown Township. Each of the remaining tributary municipalities are advised by copy of this letter to contact Ms. Kelly Boettlin at 484.250.5184 to discuss the status of their Act 537 plan update as necessary.

According to your NICMP, the 2017 connections may be released to those municipalities that have implemented their 537 Plans in accordance with the plan's implementation schedule and have proceeded with their comprehensive I/I plan for repairs, maintenance and/or replacement of facilities to reduce excessive wet weather flows. Our records show that the following municipalities may be eligible for the release of 2017 connections: Bensalem Township, Hulmeville Borough, Langhorne Borough, Langhorne Manor Borough, and Middletown Township. These municipalities should check with BCWSA to determine the release of 2017 connections to their respective municipalities.

Please be advised that 25 Pa. Code § 71.52(a)(3)(v) requires sewage facilities planning modules to incorporate and be consistent with the requirements of 25 Pa. Code § 71.21, relating to the content of official plans. 25 Pa. Code § 71.21(a)(5)(i)(B) requires consistency between the proposed alternative and the objectives and policies of municipal wasteload management under Title 25 Pa. Code Chapter 94. BCWSA should ensure that it only certifies capacity for those projects where capacity has been released consistent with their NICMP.

If you have any questions, please contact Ms. Kelly Boettlin at 484.250.5184.

Sincerely,


for Regional Manager
Clean Water

cc: Bensalem Township
Middletown Township
Langhorne Borough
Langhorne Manor Borough
Lower Southampton Township
Township of Falls Authority
Falls Township
Pennel Borough
Hulmeville Borough
Lower Makefield Township
Bristol Township
Northampton Township
Northampton, Bucks County, Municipal Authority
Newtown, Bucks County, Joint Municipal Authority
Newtown Township
Newtown Borough
Mr. Ponert - City of Philadelphia Water Department
Ms. Boettlin
Bill Gelles, Esq. – DEP OCC
Steve Hann, Esq.
Lynn Rauch, Esq.
Jeffrey Garton, Esq.
Mr. Napoleon, BCWSA
Mr. Jones, BCWSA
Mr. Swenson – Carroll Engineering Corporation
Senator Robert Tomlinson
Senator Charles McIlhinney, Jr.
Planning Section
Re 30 (GJE18CLW)030-10

Connection Management Plan												
Updated on 1-22-15												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS					NICMP APPROVED EDU'S				
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
GRAND TOTAL FROM ALL MUNICIPALITIES						5,019		1,254,251	1,405	1,389	2,017	975

Connection Management Plan

Updated on 8-22-13

Nebraska Interceptor Service Area Tributary to Tolson Road Pump Station

Development Name	DEP Code No.	PLANNING STATUS				CONNECTION STATUS						NICMP APPROVED EDU'S						
		Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	CFD/EDU (used to calc Projected Flow)	Projected Avg. Flow (CPD)	2014	2015	2016	2017						
Hudsonville Ecotough																		
Vie Property		Proposed	1	0	1	1	250											
Wheeler Property		Proposed	2	0	2	2	250											
Loren Property		Proposed	2	0	2	2	500											
Hintonz Bldg Rehab (at Hulme and Water St)		Anticipated	0	0	0	0	0											
Ferrod Property (on Ford Ave.)		Proposed	1	0	1	1	250											
Kiss Electric		Proposed	1	0	1	1	250											
Black Property (Trenton Road)		Proposed	50	0	50	50	250											
Lamborne Wood Products Property (Trenton Road)		Proposed	35	0	35	35	250											
TOTAL						92							23,000	1	2	52	0	37

(a) Anticipated that any new flow would be offset by mitigation actions and/or existing EDU credits.

Connection Management Plan												
Updated on 1-22-18												
Neshaminy Interceptor Service Area Tributary to Tatem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Lanshorne Borough												
Miscellaneous Connections		Future	12	0	12	12	250	1,000	3	3	3	3

Construction Management Plan

Updated on 1-23-18

Nehalem Interceptor Service Area Tributary to Tuleen Road Pump Station

Development Name	DEP Code No.	PLANNING STATUS				CONNECTION STATUS				NICMFP APPROVED EDU'S							
		Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GF/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017					
Lower McKeefield Township																	
Regency at Yardley - Samples	1-09929-267-X	Under Construction	191	157	34	34	250	8,500	30	30	35	35					
Regency at Yardley - Carriages (fm. Towelbarns)	1-09929-267-X	Under Construction	186	22	164	75	250	18,750	0	0	30	45					
Matrix Lower McKeefield Residential (aka Matrix Condo's)	1-09929-267-X	Approved	62	0	62	62	250	15,500	0	0	62	0					
Matrix - Office	1-09929-267-X	Complete	6	2	0	0	250	0	0	0	3	1	0				
Brookshire Section I	1-09929-247-3H	Complete	21	21	0	0	250	0	0	0	0	0	0				
Brookshire Section II	1-09929-247-3H	Complete	8	0	0	0	250	0	0	0	3	0	0				
Treble Trust	1-09929-262-E	Complete	5	5	0	0	250	0	0	0	0	0	0				
Meehart Subdivision	1-09929-255-3H	Under Construction	7	5	2	2	250	500	1	0	4	2	0				
Fonelli Grove	1-09929-268-E	Approved	3	0	3	3	250	750	0	0	3	0	0				
Auta Hospital [a]	1-09929-272-3J	Proposed	223	0	223	148	250	37,000	0	0	0	74	74				
Carstone Terrace	1-09929-272-3J	Proposed	192	0	192	0	250	0	0	0	0	0	0				
Reserve at Yardley (aka Freeman's Farm)	1-09929-278-E	Under Construction	15	14	1	1	250	250	0	0	0	0	0				
Moore Nursery	1-09929-278-E	Approved	15	7	8	15	250	3,750	0	15	0	0	0				
Deerwood Drive (aka Harmony Lane Sub.)	1-09929-273-3J	Proposed	14	0	14	23	250	5,750	0	0	14	9	0				
Grace Point Church (aka 1st Baptist Church)	1-09929-282-3J	Approved	114	0	114	0	250	0	0	0	0	0	0				
Panwood Middle School Renovation	1-09929-282-3J	Approved	1	0	1	1	250	250	0	0	1	0	0				
Miscellaneous Residential Development		Approved	60	0	60	51	250	12,750	0	0	0	51	0				
Miscellaneous Non-Residential Development		Proposed	70	0	70	69	250	17,250	0	0	0	69	0				
Shady Brook Farm - Restroom		Proposed	1	0	1	1	250	250	0	0	1	0	0				
TOTAL						486		121,500	37	59	345	173					

[a] This project was reduced from 375,000 SF hospital with two 40,000 SF buildings to only a 180,000 SF health care village, but an updated EDU projection or connection rate was not provided. Therefore, the Projection Schedule has not been updated from the previous version of this table.

[b] Per Township Engineer's letter dated 1/2/18, one miscellaneous non-residential EDU from the Year 2016 column is to be used for this project.

[c] Per the table provided with Township Engineer's letter dated 1/2/18, it appears the 9 EDU's in Year 2017 column were intended to be moved to Year 2016 and utilize Miscellaneous Residential EDU's. This apparently was also requested in the Twp Engineer's letter dated 7/6/17 (part of the 9/25/17 NICMFP Update Submission), but the change was not made then. Therefore, 9 EDU's were added to the 5 EDU's in the Year 2016 column (for total of 14 EDU's), and 9 EDU's were removed from the Year 2017 Miscellaneous Residential category. The 9 EDU's in the Year 2017 column were MR as is.

— = This project has either been partially or fully connected

Connection Management Plan												
Updated on 1-22-16												
Neshaminy Interceptor Service Area Tributary to Tatem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Lower Southampton Township												
Clabbers		Proposed	3	0	3	3	250	750	0	3	0	0
Dorothy Detsalet (Woodside Ave & Spring Ave)		Proposed	3	0	3	3	250	750	0	3	0	0
Tulip Lane		Approved	1	0	1	1	250	250	1	0	0	0
Eastern Dawn Mobile Home Park Expansion		Proposed	52	0	52	52	250	13,000	0	0	52	0
New Tawanka Elementary School		Proposed	24.72	0	24.72	24.72	250	6,180	0	24.72	0	0
Misc. Growth		Potential	5/year	0	5/year	15	250	3,750	0	5	5	5
TOTAL						98.72		24,680	1	36	57	5

Connection Management Plan												
Updated on 6-22-18												
Neshaminy Interceptor Service Area Tributary to Tatem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Northampton Township												
Keith Boyd Subdivision	Exemption Granted	Under Construction	4	3	1	3	250	750	3	0	0	0
Spaeth Subdivision	1-09937-401-3J	Under Construction	3	1	2	2	250	500	2	0	0	0
Sewer District 3 - Residential, Phase I (Harvest Ac)	EHB 2005-184L	Approved	41	18	23	8	250	2,000	2	2	2	2
Sewer District 3 - Residential, Phase II (Traymore Manor, Grenoble Manor Area)	EHB 2005-184L	Approved	254	108	146	48	250	12,000	12	12	12	12
Sewer District 3 - Non-Residential	EHB 2005-184L	Approved	254	138	116	125	250	31,250	125	0	0	0
Juliette's Garden	1-09937-402-3J	Under Construction	6	3	3	6	250	1,500	6	0	0	0
Holland Estates	Exemption Granted	Approved	7	2	5	5	250	1,250	5	0	0	0
Schultz Subdivision	Exemption Granted	Approved	3	1	2	3	250	750	3	0	0	0
Lechurst Development (Toll Bros)	1-09937-390-3J	Under Construction	40	11	29	40	250	10,000	40	0	0	0
Norton Subdivision (2 lots)	1-09937-384-2	Completed	1	0	0	1	250	250	1	0	0	0
Sewer District 3 - Non-Residential (Future Growth)	EHB 2005-184L	Proposed	54	2	52	40	250	10,000	10	10	10	10
Davis Property	1-09937-408-3J, -409-3J	Under Construction	65	10	55	55	250	13,750	55	0	0	0
Sewer District 3 - 65 Richard Road	1-09937-393-X	Proposed	2	0	2	2	250	500	2	0	0	0
295 Buck Road	1-09937-392-X	Proposed	3	1	2	2	250	500	3	0	0	0
216 Busleton Pike		Proposed	1	0	1	1	250	250	1	0	0	0
Keith Boyd Minor Subdivision - Sunset Dr		Completed	1	1	0	1	250	250	1	0	0	0
Proposed Development (31.89 acres)		Proposed	10	0	10	10	250	2,500	10	0	0	0
Proposed Development (12 acres)		Proposed	10	0	10	10	250	2,500	10	0	0	0
Proposed Development (47.38 acres)		Proposed	10	0	10	10	250	2,500	10	0	0	0
Proposed Development (6.7 acres)		Proposed	5	0	5	5	250	1,250	5	0	0	0
Council Rock School District		Proposed	75	0	75	75	250	18,750	75	0	0	0
Miscellaneous Growth per NBCMA's 2011 Chap 94		Proposed	Unknown	4	Unknown	71	250	17,750	1	5	35	30
340 Rockville Road	1-09937-394-X	Completed	1	1	0	1	250	250	1	0	0	0
10 Cameron Drive		Completed	1	1	0	1	250	250	1	0	0	0
Burleton Pike - Snyder	1-09937-397-X	Completed	1	1	0	1	250	250	1	0	0	0
Rockville Road (JM Contracting)		Completed	1	1	0	1	250	250	1	0	0	0
Chapel Woods Assoc. (582 Beverly Rd)		Proposed	1	0	1	1	250	250	1	0	0	0
656 East Holland Rd (Waverly)	1-09937-218-3	Approved	15	0	15	15	250	3,750	15	0	0	0
Kampus Klothes		Completed	1	1	0	1	250	250	1	0	0	0
295 Buck Road (Unit 4)		Completed	5	5	0	4	250	1,000	4	0	0	0
Crossroads Plaza (TPN 31-15-2)-41		Proposed	5	0	5	3	250	750	0	0	1	2
Municipal Expansion		Proposed	4	0	4	4	250	1,000	0	0	4	0
Richboro Plaza (TPN 31-5-103)		Proposed	5	0	5	3	250	750	0	0	1	2
Wawa - Richboro		Under Construction	2	0	2	2	250	500	0	0	2	0
777 Harbor Road (TPN 31-5-82-1)		Proposed	1	0	1	1	250	250	0	1	0	0
Industrial Redevelopment (TPN 31-1-4)		Proposed	36	0	36	36	250	9,000	0	0	36	0
Wright Property (TPN 31-26-25-1)		Proposed	40	0	40	40	250	10,000	0	0	20	20
Sibley Property (TPN 31-1-7-2)		Proposed	2	0	2	2	250	500	0	0	2	0
Catalano/Pinnacle aka Russell Prop (TPN 31-10-75)		Proposed	8	0	8	8	250	2,000	0	0	1	0
Jake's Eatery (TPN 31-15-145)		Completed	4	4	0	4	250	1,000	0	4	0	0
875 Buck Road (TPN 31-54-1)		Completed	1	1	0	1	250	250	0	1	0	0
1671 Bridgetown Pike (TPN 31-39-7-1)		Approved	1	0	1	1	250	250	0	1	0	0
Holland Middle School Expansion (TPN 31-35-5)	1-09937-413-3J	Under Construction	63.5 *	0	13.5	13.5	250	3,375	0	0	63.5	0
Misc. Change in Use		Potential	150	0	150	30	250	7,500	0	10	10	10
Russell Tract (TPN 31-5-45)	1-09937-410-3J	Approval Pending	5	0	5	5	250	1,250	4	1	0	0
McKenna - 793 Hathorn Road (TPN 31-5-82)	1-09937-408-3J	Approval Pending	2	0	2	2	250	500	0	2	0	0
Deluca Subdivision at 500 New Road (TPN 31-5-40)	1-09937-412-3J	Approval Pending	1	0	1	1	250	250	0	1	0	0
Montrose Subdivision (TPN 31-15-20)		Approval Pending	1	0	1	1	250	250	0	1	0	0
Civic Center Restroom	1-09937-419-X	Under Construction	1	0	1	1	250	250	1	0	0	0
Glasgow Road (TPN 31-13-3 & -8)	1-09937-415-X & -416-X	Under Construction	3	0	3	3	250	750	3	0	0	0
Northampton Twp Police Station (111 Township Rd)	1-09937-418-3J	Pending	3	0	3	3	250	750	3	0	0	0
444 St. Leonards Rd LLC (TPN 31-23-45)	1-09937-417-3J	Pending	9	1	8	8	250	2,000	8	0	0	0
Stoney Ford Rd (TPN 31-35-48-2)		Proposed	1	0	1	1	250	250	0	1	0	0
TOTAL						721.5		180,375	425	52	207	88


* The total EDU's (63.5) include existing sewer flows. Informed that no additional EDU's were needed for the expansion.

- This project has either been partially or fully connected

Connection Management Plan													
Updated on 1-23-18													
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station													
Development Name	DEP Code No.	PLANNING STATUS		CONNECTION STATUS					NICMP APPROVED EDU'S				
		Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017	
Permdel Borough													
Schoolhouse Court	1-09938-014-3J	Approved	12	0	12	12	250	3,000	12	0	0	0	
Apt Rental Office (Village at Mill Creek)		Pending	1	0	1	1	250	250	0	0	1	0	
Fairview Ave Subdivision	1-09938-018-E	Completed	2	2	0	0	250	0	0	0	1	0	
Robbins Ave Apartments		Approved	12	0	12	12	250	3,000	12	0	0	0	
WAWA/CVS		Proposed	11	0	11	11	250	2,750	0	11	0	0	
200 W Lincoln Highway		Proposed	4	0	4	4	250	1,000	0	0	4	0	
Miscellaneous Residential Development		--	42	0	42	42	250	10,500	0	0	42	0	
Miscellaneous Non-Residential Development		--	48	0	48	48	250	12,000	0	0	48	0	
TOTAL						130		32,500	24	11	56	0	

 - This project has either been partially or fully connected.

Connection Management Plan												
Updated on 1-22-18												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Falls Township												
Viking Assoc. Townhouses (a)	1-09002-224-3J	Under Construction	40	0	40	40	250	10,000	40	0	0	0
166-168 Lincoln Highway		Proposed	50	0	50	35	250	8,750	0	10	10	15
640 Lincoln Highway		Proposed	8	0	8	8	250	2,000	0	8	0	0
550 W. Trenton Avenue		Proposed	12.4	0	12.4	12.4	250	3,100	0	0	12.4	0
212 Lincoln Highway		Proposed	1	0	1	1	250	250	0	1	0	0
482 West Trenton Avenue		Proposed	1	0	1	1	250	250	0	0	1	0
115 Lincoln Highway/Car Wash (TPN 13-4-555,608,609,612,616&617)		Proposed	2	0	2	2	250	500	0	0	2	0
38 E. Cabot Blvd		Proposed	19	3	19	19	250	4,750	0	0	19	0
440 Lincoln Hwy (day care)		Proposed	2	0	2	2	250	500	0	0	2	0
139 Trenton Road (day care)		Under Review	5	0	5	5	250	1,250	0	0	5	0
188 Lincoln Highway		Proposed	2	0	2	2	250	500	0	0	2	0
312 N. Oxford Valley Road		Proposed	5	0	5	5	250	1,250	0	0	5	0
Miscellaneous Residential Redevelopment		--	20	0	20	20	250	5,000	0	0	20	0
Miscellaneous Non-Residential Redevelopment		--	30	0	30	30	250	7,500	0	0	30	0
TOTAL						182.4		45,600	40	19	102.4	15

 - This project has either been partially or fully connected

Connection Management Plan

Updated on 1-22-18

Neshaminy Interceptor Service Area Tributary to Teteron Road Pump Station

Development Name	DEP Code No.	PLANNING STATUS					CONNECTION STATUS					NICMIP APPROVED EDU'S							
		Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GP/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017							
Blissel Township																			
Med-Plex Facility (Frost & Ford Rds)		Proposed	11	0	11	0	11	0	11	0	0	0	0	0	0	0	0	0	0
2917 Veteran's Hwy (Tire City)		Complete	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
McDonalds (Ford Rd & Veteran's Hwy)	1-09001-243-3J	Complete	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3113 Veteran's Hwy		Approved	75	0	75	0	75	0	75	0	0	0	0	0	0	0	0	0	0
2011 Veteran's Hwy		Approved	83	0	83	0	83	0	83	0	0	0	0	0	0	0	0	0	0
1011 Veteran's Hwy		Proposed	7	0	7	0	7	0	7	0	0	0	0	0	0	0	0	0	0
1159 Veteran's Hwy (Dunkin Donuts)		Proposed	4	0	4	0	4	0	4	0	0	0	0	0	0	0	0	0	0
2520 & 2526 Dartmouth Rd (AAMCO)		Proposed	10	0	10	0	10	0	10	0	0	0	0	0	0	0	0	0	0
Community College Pad Site (for bank)		Proposed	3	0	3	0	3	0	3	0	0	0	0	0	0	0	0	0	0
Ford Rd and Veteran's Hwy (former Getty Station)		Proposed	9	0	9	0	9	0	9	0	0	0	0	0	0	0	0	0	0
Dean Square (518 S. Oxford Valley Rd)		Complete	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2405 New Falls Road		Complete	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Avenue B (TPN 5-16-62)	1-09001-265-X	Waived	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0
TOTAL							203				50,600	254	39	1	0	0	0	0	0

• This project has either been partially or fully connected.

Connection Management Plan

Updated on 1-22-18

Neahaminy Interceptor Service Area Tributary to Tetra Road Pump Station

Development Name	DEP Code No.	PLANNING STATUS				CONNECTION STATUS					NICMP APPROVED EDU'S							
		Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Ave. Flow (GPD)	2014	2015	2016	2017						
Neahaminy Borough																		
Sheshequo		Pending	170	38	132	132	250	33,000	200	0	0	0	0	0	0	0	0	0
Stockland Trust		Pending	50	0	50	50	250	12,500	0	20	20	10	10	10	10	10	10	10
Miscellaneous		Pending	25	0	25	56	350	14,000	19	15	12	10	10	10	10	10	10	10
111 S. State Street		Proposed	1	0	1	1	251	251	1	0	0	0	0	0	0	0	0	0
TOTAL						238		59,500	220	35	32	20	20	20	20	20	20	20

- This project has either been partially or fully connected (per 2016 Chapter 94, Phase 1 connected 20 EDU's, 2 were existing)



Carroll Engineering Corporation

June 5, 2017

Terry Fedorchak, Township Manager
Township of Lower Makefield
1100 Edgewood Road
Yardley, PA 19067

Dear Mr. Fedorchak:

Subject: BCWSA – Response to NICMP Request dated 3/28/17

We received a letter from Ebert Engineering, Inc. dated March 28, 2017, requesting the addition of sixty (60) miscellaneous residential EDU's and seventy (70) miscellaneous non-residential EDU's to the Year 2016 column of the NICMP.

The miscellaneous EDU's will be added to the NICMP as requested and submitted to DEP for their review, but with the following caveat. We were informed that the Department's intent of recently suggesting miscellaneous EDU's be added to the NICMP was to cover random, single lot developments that could not be reasonably predicted by the municipalities.

Therefore, the miscellaneous EDU's may only be utilized for small projects of 10 EDU's or less (calculated at BCWSA's standard of 250 gpd/EDU), and shall be reviewed by the Authority on a case-by-case basis for approval.

Where possible, we believe all involved municipalities should make efforts to reallocate EDU's already on the current NICMP if they are not expected to be utilized in the near future. This supports the goals of the NICMP, which are to plan for the future while implementing actions to reduce wet weather peak flows. Requests to add Year 2017 EDU's to the NICMP can continue, as long as they are associated with a named project and parcel number(s).

Should you have any questions or require additional information, feel free to contact this office.

Very truly yours,

CARROLL ENGINEERING CORPORATION

John A. Swenson, P.E.
Vice President

JAS/SMH:lcm

cc: Jenifer Fields, P.E., Regional Manager, PADEP
Elizabeth Mahoney, Sewage Planning Supervisor, PADEP
Kelly Boettlin, Sewage Planning Specialist, PADEP
John Butler, Chief Operating Officer, BCWSA
James Napoleon, Engineering Manager, BCWSA
Frederick Ebert, P.E., President, Ebert Engineering, Inc.
Steven Hartman, P.E., CEC

Today's Commitment to Tomorrow's Challenges

Corporate Office:
949 Easton Road
Warrington, PA 18976
215.343.6700

630 Freedom Business Center
Third Floor
King of Prussia, PA 19406
610.489.6100

101 Lindenwood Drive
Suite 225
Malvern, PA 19355
484.875.3075

105 Raider Boulevard
Suite 206
Hillsborough, NJ 08844
908.874.7500

17-2550.99 (1725500033)

www.carrollengineering.com



Carroll Engineering Corporation

June 22, 2017

CERTIFIED MAIL

Jenifer Fields, P.E., Regional Manager
PA Department of Environmental Protection
2 East Main Street
Norristown, PA 19401

Dear Ms. Fields:

Subject: BCWSA – NICMP Requested Revisions (12th Request - REVISED)

This submission supersedes the NICMP Update Request sent to you on June 9th (those CMP Tables were dated 6/8/17). We are enclosing one (1) complete set of the revised NICMP, with a separate table for each municipality (though only the tables listed below have been modified).

Please note that all acceptable revisions shown on the 6/8/17 CMP tables still remain on the enclosed CMP tables and are relisted below for convenience. However, the enclosed CMP tables now take into account the PADEP directive that no reallocation of EDU's to earlier years will be allowed in place of projects on the approved NICMP. For ease of review, the text below in **bold** has been revised from the 6/9/17 letter.

A. Middletown Township:

1. Chipotle Mexican Grill (2424 E Lincoln Highway): We were advised that the location of this proposed restaurant is changing to 2339 Lincoln Highway, which is still in Middletown Township. The CMP has been revised to reflect this change.
2. **To undo the reallocation of EDU's from the Matrix Apartments and PECO/Pereira Tract projects, the following changes were made:**
 - a) **Year 2015 Matrix Apartments and PECO/Pereira Tract EDU's remain in Year 2015 as originally approved.**
 - b) **Stonehaven is reverted to its prior position, with 12 EDU's in Year 2016.**
 - c) **376 Pennerest Drive (1 EDU), 1021 West Maple Ave (2 EDU's), 131 N. Hawthorne Ave (1 EDU), 452 Bellevue Ave (1 EDU) and 570 Rosewood Ave (1 EDU) are added in Year 2016.**
 - d) **Walmart is added to the Sam's Club project, and the original 4 EDU's in Year 2016 is modified to 8 EDU's, all in Year 2016.**

Today's Commitment to Tomorrow's Challenges

Corporate Office:
949 Easton Road
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- e) **Four (4) EDU's are added to 130 Middletown Boulevard's existing 30 EDU's in Year 2016, making it a total of 34 EDU's (Year 2016).**
- f) **Five (5) EDU's are added for the Marketplace at Oxford Valley in Year 2016.**
- g) **The Leonhauser and Moss Subdivisions were removed from the NICMP, as it was indicated in prior correspondence that these were no longer proposed.**

3. Ten (10) EDU's are added as Miscellaneous EDU's in Year 2017 for small unanticipated projects.

B. Newtown Borough: Per Remington, Vernick & Beach Engineers' email dated February 8, 2017 (copy attached), NBCJMA has reserved one (1) EDU for this subdivision at 111 S. State Street. In order to comply, one (1) EDU was removed from the miscellaneous category for Year 2014 and applied to this project.

C. Lower Makefield Township:

- 1. Per Ebert Engineering letter dated March 28, 2017 (copy attached), the Township is requesting the addition of miscellaneous EDU's (60 residential and 70 non-residential). They are asking that this be added to the Year 2016 Column.
- 2. Per Gilmore & Associates letter dated June 6, 2017 (copy attached), the developer is requesting the project name be changed to only Dogwood Drive, the status be changed from "complete" to "proposed", and the total project EDU's be revised from 13 to 14. A prior Chapter 94 submission erroneously indicated this project was complete. The addition of an extra EDU was not made to this submission, since that type of request can only come from the Township.

D. Pennel Borough: Per Ebert Engineering letter dated March 28, 2017 (copy attached), the Borough is requesting the following:

- 1. The addition of miscellaneous EDU's (42 residential and 48 non-residential). They are asking that this be added to the Year 2016 Column.
- 2. 200 W. Lincoln Highway: It is requested that this project be added for three stores going into this space. The first store is a Rita's Water Ice, and will require two (2) EDU's based upon water consumption of 400 gpd. They then assigned one (1) EDU for each of the two remaining stores. This is a total of four (4) EDU's. The lot already has one (1) existing EDU, so only three (3) additional EDU's are needed.

E. Hulmeville Borough:

- 1. Per Hulmeville Municipal Authority's letter dated 5/1/17, the following requests were made:
 - Black Property (Trenton Road): Requested this be added to Year 2016 for 50 EDU's.

- ♦ Langhorne Wood Products Property (Trenton Road): Requested this be added to Year 2017 schedule for 35 EDU's.
2. **In the June 8, 2017 NICMP Update, one (1) Year 2015 EDU listed for the Wheeler Property was reallocated to the Feriod Property. This EDU has been moved back to the Wheeler Property, and the one (1) EDU required for the Feriod Property is added to Year 2016.**
- F. Township of Falls Authority: Per the Authority Engineer's letter dated 3/28/17, the following requests were made:
1. The addition of miscellaneous EDU's (20 residential and 30 non-residential). They are asking that this be added to the Year 2016 Column.
 2. Per the table provided by their Engineer, they are requesting that 38 E. Cabot Blvd.'s 2016 EDU's be revised to 19 EDU's (though 16 is shown on the CMP table as 3 were existing). Also, their table is showing new projects (188 Lincoln Highway and 312 N. Oxford Valley Rd), each with Year 2016 EDU's. The NICMP table was adjusted accordingly.
- G. Newtown Township: Per the Township's letter dated 5/12/17, Village at Newtown and Acqua e Farina are to utilize their miscellaneous non-residential EDU's from Year 2015 column. Acqua e Farina is to use 1 EDU. Fresenius Dialysis was already on the prior NICMP. Villages at Newtown were on the prior NICMP, listed as "Brixmor at Village @ Newtown SC", for 28 EDU's in Year 2015. Another 67 miscellaneous Year 2015 EDU's are now requested for this project, bringing the total to 95 EDU's. The Year 2015 Miscellaneous EDU's are then left with 54 in the balance.
- H. Northampton Township: Per NBCMA's email dated June 2, 2017, they are requesting that 5 miscellaneous EDU's be reallocated to the Russell Tract, which is currently shown on the NICMP in Year 2016. In the "Miscellaneous Growth per NBCMA's 2011 Chapter 94" category, 4 EDU's will be removed from Year 2014 and 1 EDU from Year 2015. Russell Tract's 5 EDU's in Year 2016 will be moved to the miscellaneous category.
- I. Bensalem Township:
1. **In the February 13, 2017 NICMP Update, EDU's listed for Byberry Woods were reallocated to 2670 Galloway Road. This included EDU's in Year 2015, 2016 and 2017. These EDU's have been moved back to the Byberry Woods project, and the 30 EDU's required for 2670 Galloway Road are added to Year 2016.**
 2. **Ten (10) EDU's are added as Miscellaneous EDU's in Year 2017 for small unanticipated projects.**

Jenifer Fields, P.E., Regional Manager
Page Four
June 22, 2017

If you would, please acknowledge receipt of this CMP Update. Should you have any questions or require additional information, feel free to contact this office.

Very truly yours,

CARROLL ENGINEERING CORPORATION



John A. Swenson, P.E.
Vice President

JAS/SMH:cam
Enclosures

cc: Elizabeth Mahoney, Sewage Planning Supervisor, PADEP (w/Enclosures)
Kelly Boettlin, Sewage Planning Specialist 2, PADEP (w/Enclosures)
Benjamin W. Jones, Chief Executive Officer, BCWSA (w/Enclosures)
John Butler, Chief Operating Officer, BCWSA (w/Enclosures)
Jeffrey P. Garton, Esquire, Begley Carlin & Mandio (w/Enclosures)
Steve Hann, Esquire, Hamburg, Rubin, Mullin, Maxwell & Lupin (w/Enclosures)
James Napoleon, Engineering Manager, BCWSA (w/Enclosures)
Steven Hartman, P.E., CEC (w/Enclosures)

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS					NICMP APPROVED EDU'S				
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
GRAND TOTAL FROM ALL MUNICIPALITIES						4,968		1,241.713	1,408	1,389	2,009	950

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS					NICMP APPROVED EDU'S				
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Bensalem Township												
Crespo S/D	1-09004-231-E	Approved	13	0	13	13	250	3,250	6	7	0	0
Wellington Estates		Complete	8	8	0	0	250	0	8	0	0	0
DeLuca Residential (Wellington Estates)		Complete	29	29	0	0	250	0	7	7	6	0
APBJ Properties		Complete	7	7	0	0	250	0	3	4	0	0
Jackson Village	1-09004-278-E	Approved	12	0	12	8	250	2,000	0	0	4	4
Holland Enterprises S/D (Saddle Brook)	1-09004-279-E	Under Construction	116	62	54	54	250	13,500	35	27	27	27
Liberty Plaza	1-09004-285-E	Approved	10	0	10	6	250	1,500	0	0	3	3
Guarnaccia S/D	1-09004-250-E	Approved	9	0	9	6	250	1,500	0	2	2	2
Capital Solutions		Approved	8	0	8	8	250	2,000	0	8	0	0
Tremont Village		Approved	128	0	128	85	250	21,250	0	0	42	45
Costa (formerly DiEdeidjo)		Under Construction	15	5	10	10	250	2,500	5	5	5	0
Liberty Heritage Homes		Under Construction	13	8	5	0	250	0	0	0	4	4
Byberry Woods (SD Real Estate)	[c]	Proposed	39	0	39	39	250	9,750	0	12	12	15
Gyatri Motel		Proposed	40	0	40	40	250	10,000	0	0	20	20
Neoteric		Proposed	5	0	5	5	250	1,250	0	0	5	0
Livengrin [b]		Proposed	15	0	15	11	250	2,750	0	0	11	0
Park Casino [a]	1-09004-313-3J	Proposed	712	0	712	474	250	118,500	0	0	237	237
Pei Wei (aka Panda)		Complete	4	4	0	0	250	0	0	0	4	0
Horizon Lot No. 2		Proposed	11	0	11	11	250	2,750	11	0	0	0
High Tides Cafe	1-09004-329-3J	Complete	12	12	0	0	250	0	12	0	0	0
4492 Bensalem Blvd.	1-09004-336-X	Complete	1	1	0	0	250	0	1	0	0	0
Snyder Subdivision (Cypress Ave)	1-09004-335-3J	Under Construction	2	1	1	1	250	250	2	0	0	0
Sarappo (4028 Bristol Pike)		Proposed	2	0	2	2	250	500	2	0	0	0
Snyder Property (4351 Pine Street)	1-09004-328-X	Proposed	1	0	1	1	250	250	0	1	0	0
Disirolamo (3981 Grace Ave.)	1-09004-323-3J	Complete	1	1	0	0	250	0	0	1	0	0
Lesnevez (Hulmeville and Galloway)	1-09004-320-E	Proposed	7	0	7	7	250	1,750	0	7	0	0
Snyder (4800 Cypress Ave.)	1-09004-321-E	Proposed	1	0	1	1	250	250	0	1	0	0
Woelk (2498 Annia Lane)	1-09004-311-X	Proposed	1	0	1	1	250	250	0	1	0	0
Robert Tisone (4337 Chestnut Ave)	1-09004-310-E	Proposed	1	0	1	1	250	250	0	1	0	0
Snyder (Boston Ave. TPN 2-5-321-1)		Complete	1	1	0	0	250	0	1	0	0	0
Nerusa (6378 Lewisville Ave. TPN 2-56-136-3)		Proposed	1	0	1	1	250	250	1	0	0	0
Mathews (3414 Oakford Ave. TPN 2-4-294. lot 2)		Proposed	1	0	1	1	250	250	1	0	0	0
Woelk (4450 Bensalem Blvd. TPN 2-73-70-1)		Proposed	1	0	1	1	250	250	1	0	0	0
Marketplace at Neshaminy		Proposed	30	0	30	30	250	7,500	5.4	0	24.6	0
Re-routing of Pump Station B-11 Force Main		Proposed	200	0	200	200	250	50,000	0	200	0	0
Tofu Processing Facility (via Pump Station B-11)		Proposed	111	0	111	111	250	27,750	0	111	0	0
Marriott Hotel (TPN 02-1-18-17, Horizon Blvd)		Proposed	51.2	0	51.2	51.2	250	12,800	0	0	51.2	0
Faith Unity Mosque (TPN 2-1-55 & 2-33-111)		Proposed	1.51	0	1.51	1.51	250	378	0	0	1.51	0
Byberry Road Twin Dwellings (TPN 2-74-110)		Proposed	16	0	16	16	250	4,000	0	0	0	16
2670 Galloway Road (TPN 02-33-7)	[c]	Proposed	30	0	30	30	250	7,500	0	0	30	0
Miscellaneous EDU's	[d]	Potential	10	0	10	10	250	2,500	0	0	0	10
TOTAL						1,237		309,178	101	395	489	381

[a] Used 712 EDUs as listed on the 2012 Chapter 94 Report.

[b] In accordance Livengrin Foundation letter dated 9/26/16 and DEP's email dated 9/19/16, this project is being treated as a facility of public need.

[c] In accordance with DEP requirements, no reallocating of EDU's from named projects is permitted. Therefore, to undo the changes made on the 2/13/17 NICMP, the following was done:
All of 2670 Galloway Road's EDU's are now shown in Year 2016.

Byberry Woods' EDU's are now reverted back to the 12/22/16 NICMP breakdown, with 12 in 2015, 12 in 2016 and 15 in 2017.

= This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS						NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Hulmeville Borough												
Vile Property		Proposed	1	0	1	1	250	250	1	0	0	0
Wheeler Property	[d]	Proposed	2	0	2	2	250	500	0	2	0	0
Loretti Property	[b]	Proposed	2	0	2	2	250	500	0	0	0	2
Historic Bldg. Rehab (at Hulme and Water Sts)		Anticipated	0	0	0 [a]	0	250	0	0	0	0	0
Period Property (on Ford Ave.)	[d]	Proposed	1	0	1	1	250	250	0	0	1	0
Kiss Electric		Proposed	1	0	1	1	250	250	0	0	1	0
Black Property (Trenton Road)	[c]	Proposed	50	0	50	50	250	12,500	0	0	50	0
Langhorne Wood Products Property (Trenton Road)	[c]	Proposed	35	0	35	35	250	8,750	0	0	0	35
TOTAL						92		23,000	1	2	52	37

- [a] Anticipated that any new flow would be offset by mitigation actions and/or existing EDU credits.
- [b] This project already had DEP approval to connect, and Borough requested it therefore be removed from the CMP. However, to comply with DEP instructions, it was left on the schedule.
- [c] Added per Hulmeville Municipal Authority letter dated 5/1/17.
- [d] In accordance with DEP requirements, no reallocating of EDU's from named projects is permitted. Therefore, to undo the changes made on the 6/8/17 NICMP, the following was done:
 The two (2) Wheeler Property EDU's were moved back to their original position, in Year 2015.
 The one (1) Period Property EDU was moved back to its original position in Year 2017. However, since Year 2016 EDU's are not yet released, it is requested this EDU be moved to 2016.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS						NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Langhorne Borough												
Miscellaneous Connections		Future	12	0	12	12	250	3,000	3	3	3	3

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS						NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Lanthorpe Manor Borough												
Miscellaneous Connections		Future	2	0	2	2	250	500	0	0	1	1
E&H Properties Construction (TPN 19-7-27-1)	[a]	Proposed	1	0	1	1	250	250	1	0	0	0
McGrath (TPN 19-4-7-1)	[a]	Proposed	1	0	1	1	250	250	0	1	0	0
TOTAL						4		1,000	1	1	1	1

[a] To comply with DEP comment #3 on 4/25/17 email, E&H Properties was assigned the miscellaneous EDU for 2014, and McGrath was assigned the miscellaneous EDU for Year 2015.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Lower Makefield Township												
Regenev at Yardley - Singles	1-09929-267-X	Under Construction	191	157	34	34	250	8,500	30	30	35	35
Regenev at Yardley - Carriaces (frm. Townhomes) [c]	1-09929-267-X	Under Construction	186	22	164	75	250	18,750	0	0	30	45
Matrix Lower Makefield Residential (aka Matrix Condo's)	1-09929-267-X	Approved	62	0	62	62	250	15,500	0	0	62	0
Matrix - Office	1-09929-267-X	Complete	6	2	0	0	250	0	0	3	1	0
Brookshire Section I	1-09929-247-31J	Complete	21	21	0	0	250	0	1	0	0	0
Brookshire Section II	1-09929-247-31J	Complete	8	8	0	0	250	0	5	3	0	0
Troilo Tract	1-09929-262-E	Complete	5	5	0	0	250	0	1	0	0	0
Minehart Subdivision	1-09929-255-31J	Under Construction	7	5	2	2	250	500	0	4	2	0
Fiorelli Grove	1-09929-268-E	Approved	3	0	3	3	250	750	0	3	0	0
Aria Hospital [a]		Proposed	223	0	223	148	250	37,000	0	0	74	74
Capstone Terrace	1-09929-272-3J	Proposed	192	0	192	0	250	0	0	0	0	0
Reserve at Yardley (aka Freeman's Farm)	1-09929-278-E	Under Construction	15	14	1	1	250	250	0	0	5	10
Moon Nursery [b]		Approved	15	7	8	15	250	3,750	0	15	0	0
Dogwood Drive (aka Harmony Lane Sub.) [c]		Proposed	13	0	13	13	250	3,250	0	0	5	8
Grey Nun Retirement Community		Unknown	114	0	114	0	250	0	0	0	0	0
Grace Point Church (aka 1st Baptist Church)	1-09929-282-3J	Approved	1	0	1	1	250	250	0	1	0	0
Pennwood Middle School Renovations		Approved	1	0	1	1	250	250	0	0	1	0
Miscellaneous Residential Development [d]		--	60	0	60	60	250	15,000	0	0	60	0
Miscellaneous Non-Residential Development [d]		--	70	0	70	70	250	17,500	0	0	70	0
TOTAL						485		121,250	37	59	345	172

[a] This project was reduced from 375,000 SF hospital with two 40,000 SF buildings to only a 180,000 SF health care village, but an updated EDU projection or connection rate was not provided. Therefore, the Projection Schedule has not been updated from the previous version of this table.

[b] Per 2016 Chapter 94, 6 EDU's were connected in 2016, with 8 proposed for Year 2017.

[c] Per 2016 Chapter 94, 8 EDU's were connected in 2016.

[d] Added per Township Engineer's letter dated 3/28/17.

[e] Per Developer Engineer letter dated 6/6/17 to the Township, revising the name to Dogwood Drive, and changing the status from "complete" (this was an error from a previous Chapter 94 submission) to "proposed". This letter also requests the total project EDU's be changed to 14. However, this request must come from the Township.

- This project has either been partially or fully connected.

Connection Management Plan												
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Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Newtown Township												
Delaney Court	1-09935-156-E-rev	Under Construction	122	78	44	44	250	11,000	35	25	0	0
Villas	1-09935-160-E	Under Construction	177	173	4	4	250	1,000	22	28	0	0
Brabazon / 14 Eldridge		Approved	2	0	2	2	250	500	0	2	0	0
Smolevskii/ 135 Swamp	1-09935-158-E	Completed	1	1	0	0	250	0	1	0	0	0
Johnson Kendall Johnson	1-09935-169-E	Approved	1	0	1	1	250	250	0	0	1	0
Twining (Sullivan)/ 178 Durham	1-09935-152-E	Completed	1	1	0	0	250	0	1	0	0	0
Univest Bank		Completed	10	1	0	0	250	0	2	5	0	0
Walsh/ 385 Stoopville	1-09935-185-3J	Pending	1	0	1	1	250	250	1	0	0	0
Beneficial Bank	1-09935-179-X	Completed	10	1	0	0	250	0	2	8	0	0
Lithos 10 Friends Ln.	1-09935-174-E	Pending	11	0	11	11	250	2,750	0	11	0	0
Platt/ 761 Newtown Yardley	1-09935-189-3J	Pending	56	0	56	56	250	14,000	56	0	0	0
Melsky Tract/ Stoopville		Completed	45	45	0	0	250	0	15	30	0	0
Silver Lake Exec Campus		Pending	45	0	45	45	250	11,250	0	45	0	0
Cricklewood (CAU)		Proposed	45	0	45	45	250	11,250	0	0	45	0
Brookshire Estates	1-09935-155-3J	Pending	1	0	1	1	250	250	1	0	0	0
Deluca/ 192 Durham		Completed	1	1	0	0	250	0	1	0	0	0
Luis Flores/ 595 Linton Hill		Pending	2	0	2	2	250	500	2	0	0	0
Promenade	1-09935-184-3J	Proposed	35	0	35	35	250	8,750	18	17	0	0
Marziatti & Kroll (fmr. DeLorenzo Tomato Pie)	1-09935-186-X	Under Construction	10	3	7	7	250	1,750	0	10	0	0
Odoba Restaurant/ 250 S Eaele		Proposed	10	0	10	10	250	2,500	10	0	0	0
Wong/ 94 Richboro Rd		Completed	10	1	0	0	250	0	10	0	0	0
Stonehaven Homes/ 162 Durham		Proposed	1	0	1	1	250	250	1	0	0	0
Pickering Manor		Proposed	35	0	35	35	250	8,750	10	10	15	0
Chandler Hall/ 99 Barclay St	1-09935-188-3J	Proposed	7	0	7	7	250	1,750	0	7	0	0
IHM		Proposed	125	0	125	125	250	31,250	0	75	50	0
Wynmere Hunt/ Buck Rd		Proposed	75	0	75	75	250	18,750	0	35	40	0
Stockland Inc/ 4-6 Sveamore		Proposed	10	0	10	10	250	2,500	0	10	0	0
BCC College/ Swamp Rd		Proposed	26	0	26	26	250	6,500	0	26	0	0
Optimal Sports/ 826 Newtown-Yardley Rd	1-09935-190-3J	Completed	6	6	0	0	250	0	6	0	0	0
Meallo's - 15 Swano Rd. (formerlv Ryzner (Dilks)		Under Construction	12	6	6	6	250	1,500	12	0	0	0
Newtown Race/ Pheasant Rd		Proposed	25	0	25	25	250	6,250	0	25	0	0
C. Rock/Middle School	1-09935-180-X	Proposed	10	0	10	10	250	2,500	0	0	5	5
Mill Race Office Campus (1051 Lindenburst Rd)	1-09935-134-X	Proposed	5	0	5	5	250	1,250	5	0	0	0
Business Commons	[a]	Potential	105	0	105	8	250	2,000	8	0	0	0
Newtown Shopping Center	[a]	Potential	105	0	105	7	250	1,750	7	0	0	0
Village @ Newtown E&W	[a]	Potential	105	0	105	7	250	1,750	7	0	0	0
Village @ Newtown South	[a]	Potential	105	0	105	7	250	1,750	7	0	0	0
Corners @ Newtown	[a]	Potential	140	0	140	7	250	1,750	7	0	0	0
Newtown Depot	[a]	Potential	105	0	105	7	250	1,750	7	0	0	0
Newtown Plaza	[a]	Potential	105	0	105	7	250	1,750	7	0	0	0
Misc. Non-Residential		Potential	438	0	438	159	250	39,750	0	54	105	0
Misc. Residential		Potential	351	0	351	52	250	13,000	0	16	36	0
Phila. Archdiocese (291 Durham Rd. TPN 29-3-20)		Completed	1	1	0	0	250	0	1	0	0	0
Brixmor at Village @ Newtown SC	[b]	Proposed	95	0	95	95	250	23,750	0	95	0	0
Villas at Newtown (TPN 29-10-76)		Proposed	6	6	0	6	250	1,500	0	6	0	0
Laughlin Property (TPN 29-007-001 & -002)		Proposed	9	0	9	9	250	2,250	0	9	0	0
Fresenius Dialysis (105 Terry Drive)		Proposed	16	0	16	16	250	4,000	0	16	0	0
Acqua e Farina	[b]	Proposed	1	0	1	1	250	250	0	1	0	0
TOTAL						977		244,250	262	569	297	5

[a] Per Township's letter dated 4-27-15, they were instructed to eliminate these categories and instead move them to a miscellaneous non-residential category.

Therefore, Year 2014 projections were left in place, but projections beyond 2014 were based on the miscellaneous category.

[b] Per Township's letter dated 5-12-17, these projects are to utilize Year 2015 Miscellaneous Non-Residential EDU's (originally 138 EDU's in that category, now 54 EDU's).

= This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	DEP Code No.	PLANNING STATUS		CONNECTION STATUS					NICMP APPROVED EDU'S			
		Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Lower Southampton Township												
Clabbers		Proposed	3	0	3	3	250	750	0	3	0	0
Dorothy Dessalet (Woodside Ave & Spring Ave)		Proposed	3	0	3	3	250	750	0	3	0	0
Tulip Lane		Approved	1	0	1	1	250	250	1	0	0	0
Eastern Dawn Mobile Home Park Expansion [a]		Proposed	52	0	52	52	250	13,000	0	0	52	0
New Tawanka Elementary School		Proposed	24.72	0	24.72	24.72	250	6,180	0	24.72	0	0
Misc. Growth		Potential	5/year	0	5/year	15	250	3,750	0	5	5	5
TOTAL						98.72		24,680	1	36	57	5

[a] To comply with DEP comment #5 on 4/25/17 email, all Year 2015 EDU's were moved to Year 2016, since this was added to the CMP after 2015 EDU's were already released.

Connection Management Plan													
Updated on 6-19-17 (supersedes 6/8/17 version)													
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station													
Development Name	PLANNING STATUS		CONNECTION STATUS						NICMP APPROVED EDU'S				
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017	
Northampton Township													
Keith Boyd Subdivision	Exemption Granted	Under Construction	4	2	2	2	250	500	3	0	0	0	
Spaeth Subdivision		Under Construction	3	1	2	2	250	500	2	0	0	0	
Sewer District 3 - Residential, Phase I (Harvest Ae)	EHB 2008-184L	Approved	41	18	23	8	250	2,000	2	2	2	2	
Sewer District 3 - Residential, Phase II (Traymore Manor, Grenoble Manor Area)	EHB 2008-184L	Approved	254	100	154	48	250	12,000	12	12	12	12	
Sewer District 3 - Non-Residential	EHB 2008-184L	Approved	254	129	125	125	250	31,250	125	0	0	0	
Juliette's Garden		Approved	6	0	6	6	250	1,500	6	0	0	0	
Holland Estates	Exemption Granted	Approved	7	3	5	5	250	1,250	5	0	0	0	
Schultz Subdivision	Exemption Granted	Approved	3	1	2	2	250	500	3	0	0	0	
Leehurst Development (Toll Bros)	1-09937-390-3J	Proposed	40	0	40	40	250	10,000	40	0	0	0	
Norton Subdivision (2 lots)	1-09937-384-2	Completed	2	2	0	0	250	0	1	0	0	0	
Sewer District 3 - Non-Residential (Future Growth)	EHB 2008-184L	Proposed	54	2	52	40	250	10,000	10	10	10	10	
Davis Promeriv		Proposed	65	10	55	55	250	13,750	55	0	0	0	
Sewer District 3 - 65 Richard Road	1-09937-393-X	Proposed	2	0	2	2	250	500	2	0	0	0	
295 Buck Road	1-09937-392-X	Proposed	3	1	2	2	250	500	2	0	0	0	
216 Bustleton Pike		Proposed	1	0	1	1	250	250	1	0	0	0	
Keith Boyd Minor Subdivision - Sunset Dr		Completed	1	1	0	0	250	0	1	0	0	0	
Proposed Development (31.893 acres)		Proposed	10	0	10	10	250	2,500	10	0	0	0	
Proposed Development (12 acres)		Proposed	10	0	10	10	250	2,500	10	0	0	0	
Proposed Development (47.38 acres)		Proposed	10	0	10	10	250	2,500	10	0	0	0	
Proposed Development (6.7 acres)		Proposed	5	0	5	5	250	1,250	5	0	0	0	
Council Rock School District		Proposed	75	0	75	75	250	18,750	75	0	0	0	
Miscellaneous Growth per NBCMA's 2011 Chan 94	[a]	Proposed	Unknown	4	Unknown	71	250	17,750	0	6	35	30	
340 Rockville Road	1-09937-394-X	Approved	1	0	1	1	250	250	1	0	0	0	
10 Cameron Drive		Completed	1	1	0	0	250	0	1	0	0	0	
Bustleton Pike - Snyder		Completed	1	1	0	0	250	0	1	0	0	0	
Rockville Road (JM Contracting)		Completed	1	1	0	0	250	0	1	0	0	0	
Chapel Woods Assoc. (582 Beverly Rd)		Proposed	1	0	1	1	250	250	1	0	0	0	
656 East Holland Rd		Proposed	15	0	15	15	250	3,750	15	0	0	0	
Kampus Clothes		Completed	1	1	0	0	250	0	1	0	0	0	
295 Buck Road (Unit 4)		Completed	5	5	0	0	250	0	4	0	0	0	
Crossroads Plaza (TPN 31-15-23-4)		Proposed	5	0	5	3	250	750	0	0	1	2	
Municipal Expansion		Proposed	4	0	4	4	250	1,000	0	0	4	0	
Richboro Plaza (TPN 31-5-103)		Proposed	5	0	5	3	250	750	0	0	1	2	
Wawa - Richboro		Proposed	2	0	2	2	250	500	0	0	2	0	
777 Harboro Road (TPN 31-5-82-1)		Proposed	1	0	1	1	250	250	0	1	0	0	
Industrial Redevelopment (TPN 31-1-4)		Proposed	36	0	36	36	250	9,000	0	0	36	0	
Wright Property (TPN 31-10-25-1)		Proposed	40	0	40	40	250	10,000	0	0	20	20	
Sibley Property (TPN 31-1-7-2)		Proposed	2	0	2	2	250	500	0	0	2	0	
Catalano/Pinnacle aka Russell Prop (TPN 31-10-75)		Proposed	8	0	8	8	250	2,000	0	0	8	0	
Jake's Eatery (TPN 31-15-145)		Completed	4	4	0	0	250	0	0	4	0	0	
875 Buck Road (TPN 31-54-1)		Completed	1	1	0	0	250	0	0	1	0	0	
1671 Bridgetown Pike (TPN 31-39-7-1)		Approved	1	0	1	1	250	250	0	1	0	0	
Holland Middle School Expansion (TPN 31-35-5)		Under Construction	63.5 *	0	13.5	13.5	250	3,375	0	0	63.5	0	
Misc. Change in Use		Potential	150	0	150	30	250	7,500	0	10	10	10	
Russell Tract (TPN 31-5-45)	[a]	Pending	5	0	5	5	250	1,250	4	1	0	0	
McKenna - 793 Harboro Road (TPN 31-5-82)		Pending	2	0	2	2	250	500	0	2	0	0	
Deluca Subdivision (TPN 31-5-40)		Pending	1	0	1	1	250	250	0	1	0	0	
Montague Subdivision (TPN 31-15-20)		Pending	1	0	1	1	250	250	0	1	0	0	
Civic Center Restroom		Proposed	1	0	1	1	250	250	1	0	0	0	
Glasgow Road (TPN 31-13-3 & -8)		Proposed	3	0	3	3	250	750	3	0	0	0	
Northampton Twp Police Station (111 Township Rd)		Proposed	3	0	3	3	250	750	3	0	0	0	
444 St. Leonards Rd LLC (TPN 31-23-45)		Proposed	9	0	9	9	250	2,250	9	0	0	0	
TOTAL						704.5		176,125	425	52	207	88	

* The total EDU's (63.5) include existing sewer flows.

[a] As requested in NBCMA's email dated 6/2/17, re-allocating four (4) Year 2014 miscellaneous EDU's and one (1) Year 2015 miscellaneous EDU to the Russell Tract. The Russell Tract's five (5) Year 2016 EDU's are moved to the miscellaneous category.

= This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS			CONNECTION STATUS					NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Middletown Township												
Durham Ridge	1-09003-297-31J	Completed	20	20	0	0	250	0	0	0	0	0
Hovnanian (Matrix Townhouses)	1-09003-355-E	Under Construction	160	146	14	14	250	3,500	20	40	40	40
SMMC (aka St Mary's Medical Center)		Completed	1	1	0	0	250	0	1	0	0	0
Saint Mary Health and Awareness		Proposed	78	0	78	78	250	19,500	0	0	39	39
Periera/PECO Tract [e]	1-09003-342-E	Proposed	20	0	20	20	250	5,000	0	10	10	0
George School	1-09003-363-X	Completed	2	2	0	0	250	0	2	0	0	0
Matrix Orchards (formerly Glen Willow Prop)	1-09003-323-3J	Proposed	116	0	116	87	250	21,750	0	29	29	29
Woods Services Campus Addition	1-09003-366-X	Completed	5	5	0	0	250	0	5	0	0	0
K&S Greenday		Completed	1	1	0	0	250	0	0	1	0	0
Community Baptist Church	1-09003-338-3I	Approved	6	0	6	6	250	1,500	0	0	3	3
Walmart & Sam's Club [d]		Proposed	8	0	8	8	250	2,000	0	0	8	0
Herline Homes (Willow Ave)		Completed	1	1	0	0	250	0	1	0	0	0
Clamoffer Subdivision (per 2005 Approval)		Completed	1	1	0	0	250	0	1	0	0	0
Matrix Apartments - Big Oak Road [e]		Proposed	150	0	150	150	250	37,500	0	50	50	50
Stone Farm		Proposed	150	0	125	50	250	12,500	0	0	25	25
Country Builders (Adams Ave)		Completed	2	2	0	0	250	0	2	0	0	0
Country Builders (Cedar Ave)		Completed	1	1	0	0	250	0	1	0	0	0
McGrath-Arbittus Ave		Completed	2	2	0	0	250	0	2	0	0	0
Woods Services Cedarwood Addition		Completed	1	1	0	0	250	0	1	0	0	0
Bridgetown Mill House (only 5 EDU's proposed)		Proposed	40	0	40	40	250	10,000	0	0	40	0
Oxford Valley Mall - Restaurant Additions		Proposed	45	0	45	25	250	6,250	0	0	0	25
Shoppes at Flowers Mill		Proposed	20	0	20	20	250	5,000	0	20	0	0
Stellato Property (Sumac St.)	1-09003-368-X	Under Construction	1	0	1	1	250	250	1	0	0	0
570 Rosewood Ave Subdivision (TPN 22-12-592)		Approved	1	0	1	1	250	250	0	0	1	0
Glenside Ave Property, Lot 5&6 (TPN 22-36-114)		Approved	1	0	1	1	250	250	0	0	1	0
130 Middletown Blvd./Restaurant (TPN 22-57-20-6)	[c]	Proposed	34	0	34	34	250	8,500	0	0	34	0
Stone Haven S/D (2651 Lamshorne Yardley Rd)	[c]	Proposed	12	0	12	12	250	3,000	0	0	12	0
468 Hulmeville Rd (TPN 22-17-52-1&2)		Proposed	2	0	2	2	250	500	0	2	0	0
468 Hulmeville Rd (TPN 22-17-51-1)		Proposed	1	0	1	2	250	500	0	1	1	0
629 Hulmeville Rd (TPN 22-17-77)	1-09003-372-3J	Proposed	2	0	2	2	250	500	0	2	0	0
1597 Folling Mill Road (TPN 22-5-13)		Under Construction	3	2	1	3	250	750	0	2	1	0
962 Old Lincoln Hwy (TPN 22-13-205)		Proposed	1	0	1	1	250	250	0	1	0	0
Barner Subdiv. - 364 Cedar Ave (TPN 22-13-164-21)		Proposed	1	0	1	1	250	250	0	1	0	0
1006 W. Lincoln Highway (TPN 22-19-56-17)		Proposed	1	0	1	1	250	250	0	0	1	0
139 Elmwood (TPN 22-8-150)		Proposed	1	0	1	1	250	250	0	0	1	0
Huberfeld/N. Woodbourne Rd (TPN 22-31-13)		Proposed	1	0	1	1	250	250	0	0	1	0
Today Inc. (TPN 22-31-15)		Proposed	12	0	12	3	250	750	0	0	3	0
1755 Folling Mill Road (TPN 22-5-15-1)		Proposed	2	0	2	2	250	500	0	0	2	0
1420 Super Highway (TPN 22-16-18)		Potential	15	1	14	0	250	0	None projected before Year 2018			
729 Highland Ave. (TPN 22-20-41-57 & 58)		Proposed	3	0	3	2	250	500	0	0	0	2
Chipotle Mexican Grill (2339 Lincoln Hwy)	[a]	Proposed	7	0	5	7	250	1,750	0	7	0	0
226 Rosemary Ave. (TPN 22-13-156-1)		Proposed	1	0	1	1	250	250	0	0	1	0
Ash Ave. (TPN 22-9-119-5)		Proposed	1	0	1	1	250	250	0	0	1	0
Eastern Warehouse Distributors, 1050 Wheeler Way (TPN 22-21-66-2)		Proposed	1,12	0	1,12	1,12	250	280	0	0	1,12	0
Eastern Warehouse Distributors, 355 South Flowers Mill Road		Proposed	5	0	5	5	250	1,250	0	0	5	0
376 Pennerest Drive (TPN 22-24-20)	[b]	Proposed	1	0	1	1	250	250	0	0	1	0
1021 W. Maple Ave. (TPN 22-23-190)	[b]	Proposed	2	0	2	2	250	500	0	0	2	0
131 N. Hawthorne Ave (TPN 22-13-88)	[b]	Proposed	1	0	1	1	250	250	0	0	1	0
452 Bellevue Ave (existing gas station)	[b]	Proposed	1	0	1	1	250	250	0	0	1	0
570 Rosewood Ave (subdivision)	[b]	Proposed	1	0	1	1	250	250	0	0	1	0
Marketplace at Oxford Valley	[b]	Proposed	5	0	5	5	250	1,250	0	0	5	0
Miscellaneous EDU's [f]		Potential	10	0	10	10	250	2,500	0	0	0	10
TOTAL						604.12		151,030	39	168	321	223

[a] Address of restaurant changed from 2424 E. Lincoln Hwy to 2339 Lincoln Hwy.

[b] These projects were requested per Twp. letters dated 3/17/17, 5/9/17, 5/17/17, & 6/2/17, but because reallocations are not permitted, these EDU's are shown in Year 2016.

[c] Stone Haven reverts to its prior position on the 2/13/17 NICMP, with 12 EDU's in Year 2016.

[d] This project previously was known as just Sam's Club, but Walmart is being added to it. Also, it previously had 4 EDU's in Year 2016, but it now needs 8 EDU's (so 4 added to total in 2016).

[e] This project previously had 30 EDU's for Year 2016. It now requires 34 EDU's (so 4 EDU's were added to the total in Year 2016).

[f] Per DEP's suggestion, a miscellaneous category has been added to the NICMP for Year 2017.

[g] Matrix Apartments and Periera/PECO Tract are reverted back to their positions in the 2/13/17 NICMP.

* Moss and Leonhauser Subdivisions were removed from the NICMP, as they are no longer proposed.

= This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS						NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Penndel Borough												
Schoolhouse Court	1-09938-014-3J	Approved	12	0	12	12	250	3,000	12	0	0	0
Apt Rental Office (Village at Mill Creek)		Pending	1	0	1	1	250	250	0	0	1	0
Fairview Ave Subdivision	1-09938-018-E	Completed	2	2	0	0	250	0	0	0	1	0
Robbins Ave Apartments		Approved	12	0	12	12	250	3,000	12	0	0	0
WAWA/CVS [a]		Proposed	11	0	11	11	250	2,750	0	11	0	0
200 W. Lincoln Highway [b]		Proposed	4	0	4	4	250	1,000	0	0	4	0
Miscellaneous Residential Development [c]		--	42	0	42	42	250	10,500	0	0	42	0
Miscellaneous Non-Residential Development [c]		--	48	0	48	48	250	12,000	0	0	48	0
TOTAL						130		32,500	24	11	96	0

[a] 2016 Chapter 94 says this project connected in 2016, but stayed within the property's allotted EDU, so no new EDU's were connected.

[b] Ebert Engineering letter dated 3/28/17 requested this project be added to the Year 2016 column. The project requires 4 EDU's, but a credit of 1 existing EDU for the lot is applied.

[c] Added per Ebert Engineering letter dated 3/28/17.

-- = This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS						NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Falls Township												
Viking Assoc. Townhouses [a]	1-09002-224-3J	Under Construction	40	0	40	40	250	10,000	40	0	0	0
166-168 Lincoln Highway		Proposed	50	0	50	35	250	8,750	0	10	10	15
640 Lincoln Highway		Proposed	8	0	8	8	250	2,000	0	8	0	0
550 W. Trenton Avenue		Proposed	12.4	0	12.4	12.4	250	3,100	0	0	12.4	0
212 Lincoln Highway		Proposed	1	0	1	1	250	250	0	1	0	0
482 West Trenton Avenue		Proposed	1	0	1	1	250	250	0	0	1	0
115 Lincoln Highway/Car Wash (TPN 13-4-555.608.609.612.616&617)		Proposed	2	0	2	2	250	500	0	0	2	0
38 E. Cabot Blvd. [b]		Proposed	19	3	19	19	250	4,750	0	0	19	0
440 Lincoln Hwy (day care)		Proposed	2	0	2	2	250	500	0	0	2	0
139 Trenton Road (day care)		Under Review	5	0	5	5	250	1,250	0	0	5	0
188 Lincoln Highway [a]		Proposed	2	0	2	2	250	500	0	0	2	0
312 N. Oxford Valley Road [a]		Proposed	5	0	5	5	250	1,250	0	0	5	0
Miscellaneous Residential Redevelopment [a]		--	20	0	20	20	250	5,000	0	0	20	0
Miscellaneous Non-Residential Redevelopment [a]		--	30	0	30	30	250	7,500	0	0	30	0
TOTAL						182.4		45,600	40	19	108.4	15

[a] Added per Township Engineer letter dated 3/28/17.

[b] Modified per Township Engineer letter (specifically the table they provided) dated 3/28/17.

-- This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS						NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Bristol Township												
Med-Flex Facility (Frost & Ford Rds)	[a]	Proposed	11	0	11	11	250	2,600	85	0	0	0
2917 Veteran's Hwy (Tire City)		Complete	2	2	0	0	250	0	2	0	0	0
McDonalds (Ford Rd & Veteran's Hwy)	1-09001-243-3J	Complete	9	9	0	0	250	0	9	0	0	0
3113 Veteran's Hwy		Approved	75	0	75	75	250	18,750	75	0	0	0
3011 Veteran's Hwy		Approved	83	0	83	83	250	20,750	83	0	0	0
1111 Veteran's Hwy		Proposed	7	0	7	7	250	1,750	0	7	0	0
1159 Veteran's Hwy (Dunkin Donuts)		Proposed	4	0	4	4	250	1,000	0	4	0	0
2520 & 2526 Durham Rd (AAMCO)		Proposed	10	0	10	10	250	2,500	0	10	0	0
Community College Pad Site (for bank)		Proposed	3	0	3	3	250	750	0	3	0	0
Ford Rd and Veteran's Hwy (former Getty Station)		Proposed	9	0	9	9	250	2,250	0	9	0	0
Deon Square (518 S. Oxford Valley Rd)		Complete	5	5	0	0	250	0	0	5	0	0
2405 New Falls Road		Complete	1	1	0	0	250	0	0	1	0	0
Avenue B (TPN 5-16-62)	1-09001-265-X	Waived	1	0	1	1	250	250	0	0	1	0
TOTAL						203		50,600	254	39	1	0

[a] Twp. Engineer's letter dated 3/7/16 revised the proposed flow for Med-Flex from 25,425 gpd to just 2,600 gpd (11 EDU's).
 = This project has either been partially or fully connected.

Connection Management Plan												
Updated on 6-19-17 (supersedes 6/8/17 version)												
Neshaminy Interceptor Service Area Tributary to Totem Road Pump Station												
Development Name	PLANNING STATUS		CONNECTION STATUS						NICMP APPROVED EDU'S			
	DEP Code No.	Construction Status per Municipality	EDU's Planned or Approved	EDU's Connected To Date	EDU's Needed	EDU's Projected (2014-2017)	GPD/EDU (used to calc Projected Flow)	Projected Avg. Flow (GPD)	2014	2015	2016	2017
Newtown Borough												
Steepleview		Pending	170	38	132	132	250	33,000	200	0	0	0
Stockland Trust		Pending	50	0	50	50	250	12,500	0	20	20	10
Miscellaneous		Pending	25	0	25	56	250	14,000	19	15	12	10
111 S. State Street [a]		Proposed	1	0	1	1	251	251	1	0	0	0
TOTAL						239		59,500	220	35	32	20

[a] RV&B email dated 2/3/17 stated NBCJMA has reserved 1 EDU for this project. This 1 EDU was taken from Year 2014 Miscellaneous Category.
 = This project has either been partially or fully connected (per 2016 Chapter 94, Phase 1 connected 20 EDU's, 2 were existing)

**APPENDIX D – BCWSA NESHAMINY INTERCEPTOR TECHNICAL
EVALUATION**

**NESHAMINY INTERCEPTOR EVALUATION
FOR
MUNICIPAL 537 PLANNING IN LOWER BUCKS COUNTY**

March 2015
(Revised September 2015)
(Last Revised January 2016)

I. PURPOSE

The Bucks County Water and Sewer Authority (BCWSA) provides sanitary sewer conveyance service to Lower Bucks County municipalities along the Neshaminy Creek between Newtown Township and Bensalem Township. Treatment plant capacity is also provided by BCWSA through an agreement with the City of Philadelphia Water Department.

A Settlement Agreement between BCWSA and the Pennsylvania Department of Environmental Protection (PADEP) included the establishment of a Corrective Action Plan (NICAP) and Connection Management Plan (NICMP) for the Neshaminy Interceptor and which included the requirement for tributary municipalities to complete updates to their Municipal 537 Plans, prepare a Sewer System Needs Analysis for their communities and complete a comprehensive inflow and infiltration (I/I) evaluation for their sanitary sewer systems.

This Interceptor evaluation will characterize the current flow conditions in the Neshaminy Interceptor and project conditions as a result of the municipal forecasted needs. This analysis will also consider the effects of reduction of infiltration and inflow from municipal sewer systems completed in conformance with the NICAP/NICMP and Supplemental Agreements which include flow limits for all tributary municipalities to the Neshaminy Interceptor. The original Evaluation (dated March 2015) utilized limits which mirrored the flow limits contained in the BCWSA Agreement with the City of Philadelphia. The September 2015 Evaluation utilized limits in accordance with DEP design standards, although the limits contained in the BCWSA Agreement with the City of Philadelphia still apply to penalties and fines (see individual supplementary agreements between BCWSA and municipalities for specific language). This version of the Evaluation (January 2016) revises Tables 1 and 3 of the report, as well as the Recommended Alternative. Additional lining of the 42"/48" Interceptor and a relief sewer of the 54" Interceptor has been included.

It is expected that the results of this evaluation will be incorporated into the individual municipal 537 Plan Updates, to complete the evaluation of sewer facilities necessary to serve the future needs.

II. BACKGROUND

The Authority provides sewage conveyance services to a large portion of Lower Bucks County by means of the Neshaminy Interceptor sewer, the main pump station at Totem Road, and the force main to the City of Philadelphia. The Neshaminy Interceptor begins in Newtown Township and proceeds down the Neshaminy Creek Valley for a distance of 14 miles where the Interceptor terminates at the Totem Road Pump Station in Bensalem Township. The Interceptor begins as a 12-inch diameter sewer, increasing in size up to 84-inch diameter as it picks up sewage from various gravity collection sewers, branch interceptors and force mains. The Core Creek Interceptor, a major branch of the Neshaminy Interceptor, extends the service area into Lower Makefield Township.

The Totem Road Pumping Station lifts sewage from the Neshaminy Interceptor and pumps it through parallel 36-inch and 42-inch diameter force mains to Philadelphia. The parallel force mains extend 27,000 feet to their point of terminus on Grant Avenue in Philadelphia. The force mains are combined into a single 42-inch force main at Grant Avenue and extend an additional 21,000 feet, where flows are discharged into the City of Philadelphia's Delaware Interceptor at Rhawn Street which conveys the flows to the Northeast Philadelphia Water Pollution Control Plant for treatment. The Authority owns 24 million gallons per day (MGD) capacity in the Northeast Plant for the Neshaminy Interceptor Service Area. The City of Philadelphia's maximum daily flow limit is 33 MGD and the peak instantaneous flow limit is 48 MGD. The average flow from the Neshaminy Interceptor Service Area for Year 2014 was 18.64 MGD.

The Neshaminy Interceptor Service Area provides wholesale sanitary sewer service to portions of the following municipalities: Bristol Township, Falls Township, Hulmeville Borough, Langhorne Manor Borough, Lower Makefield Township, Lower Southampton Township, Newtown Borough, Newtown Township, Northampton Township and Pennel Borough.

The Neshaminy Interceptor also provides retail sanitary sewer service to portions of the following municipalities: Bensalem Township, Langhorne Borough and Middletown Township.

III. PREVIOUS PLANNING, PERMITTING AND AGREEMENTS

A. Planning

Lower Bucks County 201 Facilities Plan: Completed in October 1985, this plan called for the conveyance of Neshaminy Interceptor flows to the Philadelphia Northeast Water Control Plant (NEWCP) including upgrades to the NEWCP plant, the Totem Road Pumping Station (to 60 mgd) and the extension of and paralleling of existing Force Mains.

Relief of 18 inch Neshaminy Interceptor (between Newtown Creek and Core Creek): Planning for this project was completed in approximately May 1988 for the construction of a relief sewer through Middletown Township to convey projected future sanitary sewer flows from Newtown Borough and Township and a portion of Northampton Township.

Lower Bucks Comprehensive Sewerage Plan: Completed in October 1988, this report updated the 201 Facilities Plan to include the phase out of the Newtown-Bucks County Joint Municipal Authority's Wastewater Treatment Plant (WWTP), the phase out of the Pennel Municipal Authority WWTP and phase out of the Falls Municipal Authority's WWTP. All flows from these 3 plants were to be sent through the Neshaminy Interceptor and via the replacement Totem Road Pumping Station and Force Mains to the NEWCP.

B. Agreements

1987 PWD Agreement

This agreement provided for the upgrade of the Totem Road Pumping Station and the extension of the force main further into the City. Treatment capacity was increased to an average of 20 mgd with a peak instantaneous flow of 40 mgd.

1996 PWD Agreement

This agreement provided for a temporary “rental” of average annual flow capacity as a result of an exceedance of the 20 mgd flow limit based on a 365 day rolling average basis.

2005 PWD Amendment (III) to Agreement

This agreement increased the average annual capacity at the NEWCP to 24 mgd and the peak instantaneous flow limit to 48 mgd. It also established a maximum daily flow limit of 33 mgd. This resolved a moratorium placed on the Neshaminy Interceptor Service Area in Year 2004, due to exceedance of the average annual flow in Spring 2003.

DEP Settlement Agreement

This agreement established a Corrective Action Plan and Connection Management Plan for all municipalities tributary to the Neshaminy Interceptor and included requirements for Supplemental Municipal Agreements containing flow limits, Municipal 537 Planning Updates, Comprehensive Infiltration and Inflow Evaluation of sanitary sewer systems and removal of excessive wet weather flows.

Supplemental Municipal Agreements

These agreements were to be completed by March 31, 2015. Flow limits were established using 5 year historical average flows from tributary municipalities and maximum day and peak instantaneous flow limits reflecting the factors used to establish the flow limits in the PWD Amendment III Agreement.

IV. NESHAMINY INTERCEPTOR EVALUATION – COMPUTER MODELING

A. Introduction

The portion of the Neshaminy Interceptor from the connection of the Core Creek Interceptor down to the Totem Road Pump Station has been modeled using Bentley SewerCAD V8i. This portion of the Interceptor consists of 30”, 33”, 36”, 42”, 48”, 54”, 60”, 72” and 84” diameter reinforced concrete pipe, with the majority of the Interceptor being installed in the mid to late 1960’s. See FIGURE A for a plan showing this portion of the Interceptor.

The portion of the Neshaminy Interceptor above the Core Creek Interceptor was not included in this model, since that portion was paralleled in Year 1988 with 30” pipe. The purpose of this model was to evaluate the Neshaminy Interceptor to convey existing flows with anticipated Inflow and Infiltration (I&I) reductions to achieve future flow limits and determine the best course of action to provide the necessary capacity for future municipal needs.

B. Modeling Calibration

For calibration purposes, the model was initially set up using the actual hourly flows recorded at each customer meter connecting to the Interceptor during a December 26, 2009 storm event. This was the storm used for the preliminary design of the Neshaminy Interceptor Surge Tank, which has not been constructed. The storm produced 2.16" of rain according to the Northeast Philadelphia Airport rain gauge, with additional snow melt caused by the estimated 2 to 4 inches of snow already on the ground surface at the time of the rain. The results were compared to the meter data from the nine (9) "N" meters that the Authority has installed in the Neshaminy Interceptor, and appropriate adjustments were made to the model to match observed conditions.

C. Existing Flow Conditions

The Totem Road Pump Station, which receives all the flows from the Neshaminy Interceptor and conveys them to the City of Philadelphia's Northeast Water Pollution Control Plant, is limited by agreement to 2 times the average daily flow. Based on a purchased average daily flow of 24 MGD, the peak limit is 48 MGD. For this reason, the original model scenario used the average flow from each customer meter, multiplied by a factor of 2.0 to arrive at the peak flow that connection would contribute to the Interceptor. Per DEP design requirements, the average flow from each customer meter is now multiplied by a factor of 2.5 to arrive at the peak instantaneous flow that connection would contribute to the Interceptor. An average daily hydrograph was developed for each customer meter using actual flows from a period of time during October 2009, in order to develop a flow pattern for each connection. The hydrographs were then converted to the 5-year average flow (2010-2014) for each customer meter, and peaked by a factor of 2.5, which represents the peak instantaneous limit established for Municipal customer systems in this Evaluation.

Table 1 (below) presents the 5-year average flow from each customer, the 5-year average flow reduced by 10% to account for peak flow reduction, the metered peak flow during the December 26, 2009 wet weather event, the customer peak limit based on a factor of 2.0 times the 5-year average flow (PWD Allowable Peak), and the customer peak instantaneous limit based on a factor of 2.5 times the 5-year average flow.

The assumed 10% reduction was used for the sole purpose of evaluating the initial phase of Neshaminy Interceptor improvements. It is expected that as a result of reducing peak flows to 2.5, average flows will be reduced as well. We have estimated 10%, but it could be more or less. If the average flow does not reduce by 10%, but the peak hour ratio is 2.5 or less, no enforcement action needs to be taken as long as Neshaminy Interceptor flows do not exceed the COP limits, or do not cause surcharging in the Interceptor.

TABLE 1

Customer	Avg. Daily Flow (ADF) (2010-2014)	ADF Reduced by 10% (via peak flow redux)	Metered Peak Instant Flow (12/26/09)	PWD Allowed Peak Flow 2 x ADF (peak hour)	Design Peak Flow 2.5 x ADF (peak 15-minute)
	(mgd)	(mgd)	(mgd)	(mgd)	(mgd)
Bensalem Township	4.46	4.01	15.22	8.03	10.03
Hulmeville Borough	0.07	0.07	0.45	0.13	0.17
Langhorne Borough	0.39	0.35	1.58	0.70	0.88
Langhorne Manor Borough	0.04	0.03	0.14	0.07	0.08
Lower Makefield Township	0.72	0.65	1.83	1.30	1.63
Newtown Township/Boro	1.97	1.78	3.80	3.55	4.44
Lower Southampton Township	0.49	0.44	1.21	0.88	1.10
Northampton Township	3.73	3.36	8.82	6.72	8.40
Middletown Township	3.58	3.23	9.90	6.45	8.06
George School	0.07	0.07	0.31	0.13	0.17
Core Creek Park	0.002	0.002	n/a	0.00	0.00
Korman Corporation	0.03	0.02	0.09	0.05	0.06
Pemdel Borough	0.26	0.23	1.17	0.47	0.58
Falls Township	2.73	2.46	6.76	4.92	6.15
Bristol Township	0.15	0.13	0.85	0.26	0.33
TOTAL	18.71	16.84	--	--	--
Totem Road PS (attenuated)	18.09		54.00	--	--
PWD Agreement Limits	24.00		--	48.00	--

D. Future Flows

Each customer was to provide the Authority with their ultimate future needs, so that any planned improvements to the Interceptor would be adequately designed. Subsequent to the original evaluation in March 2015, each customer was to provide specific 10-year future needs projections in addition to estimated 10-year I&I flows to be removed from their systems. To date, most of the 10-year projections have been received. Not all municipalities provided 10-year estimated I&I Removal.

Future flows used in this evaluation are estimates and do not reflect a specific allocation to any municipality. Future flow capacity will be allocated to municipalities on a “first come, first serve” basis through the DEP planning process. Act 537 planning application processing will be dependent on actual flow quantities as measured at the PWD sewer connection, established municipal flow targets, and flow triggers established in this evaluation.

In order to proceed with the modeling, 10-year future flows were estimated based on a straight-line basis (10-year/25-year = 40%). The majority of the ultimate future needs received from the customers were generally noted to be 25-year projections. Table 2 (see below) summarizes the 10-year projections provided by the municipalities compared to the projections used in the model.

TABLE 2

Customer	10-Year Add'l Future Average Flow [per updated customer projections] (mgd)	10-Year Add'l Future Average Flow [based on straight-line basis] (mgd)
Bensalem Township [a]	0.68	0.39
Hulmeville Borough	0.02	0.01
Langhorne Borough	0.03	0.02
Langhorne Manor Borough	0.002	0.002
Lower Makefield Township	0.22	0.16
Newtown Township/Boro	0.36	0.18
Lower Southampton Township	0.06	0.03
Northampton Township	0.29	0.13
Middletown Township	0.22	0.20
George School	0.00	0.00
Core Creek Park	0.00	0.00
Kornan Corporation	0.00	0.00
Pennel Borough [b]	0.06	0.06
Falls Township	0.02	0.03
Bristol Township [b]	0.04	0.04
TOTAL	2.00	1.24

[a] 0.17 mgd (ADF) of future flow enters one run above TRPS, which does not have hydraulic issues.

[b] Specific 10-year projection was not provided, so 40% of ultimate projection was used in both columns.

The future flows were added to the existing flow scenario (2.5xADF) described in Paragraph C above. Future flows were calculated at the Authority standard of 250 GPD/EDU. They were peaked by a factor of 2.5. A standard hydrograph was developed for all future flows, no matter which municipality they are associated with.

The intent is to make improvements to the Neshaminy Interceptor to satisfy the 10-year future needs. The improvements are contingent upon customers removing I&I from their systems. Flow triggers will be put in place, so that if the tributary municipalities are unable to remove the required I&I or if the rate/timing of future connections are higher/faster than anticipated, additional Interceptor improvements may go into effect, depending on the circumstances.

Table 3 (below) presents the additional future peak flow projections for each customer (multiplied by a factor of 2.5) and the projected future peak flow if adding the additional future flow to the "2.5xADF" flow (with I&I removal).

TABLE 3

Customer	10-Year Add'l Future Peak Flow* (mgd)	10-Year Projected Future Peak Instant Flow** (10-Yr Future + 2.5xADF) (mgd)
Bensalem Township	0.97	11.01
Hulmeville Borough	0.02	0.19
Langhorne Borough	0.05	0.93
Langhorne Manor Borough	0.01	0.09
Lower Makefield Township	0.40	2.03
Newtown Township/Boro	0.45	4.89
Lower Southampton Township	0.07	1.18
Northampton Township	0.32	8.72
Middletown Township	0.49	8.55
George School	0.00	0.17
Core Creek Park	0.00	0.00
Korman Corporation	0.00	0.06
Penndel Borough	0.14	0.72
Falls Township	0.07	6.22
Bristol Township	0.11	0.44
TOTAL	3.10	--
Totem Road PS (attenuated)	--	39.30

* Calculated at "Ultimate Future Avg Flow" x 0.4 (40% Straight-line Basis) x 2.5 (Peak Factor)

** With I&I removed from the systems (and subsequent 10% reduction to ADF)

E. Model Results

1. Existing Average Flow and a Peak Factor of 2.5: In this scenario, the hydraulic design capacity of the Interceptor is exceeded, beginning midway through the 48" pipe and continuing up to the 30" Interceptor. The modeled flow at Totem Road Pump Station was calculated to be 40.46 MGD, which is below the 48 MGD peak limit imposed by the City of Philadelphia.
2. 10-Year Future Flow Conditions: The addition of future flow to the 2.5xADF scenario will only increase the pipe capacity exceedances in the Interceptor. The Interceptor's surcharged and pressurized state under the Future Flow Conditions is not acceptable.

The following Upgrade Alternatives were considered:

- a. Lining of the 30", 33", 36" and 42" portions of the Interceptor plus lining the first 3,000 feet of 48" Interceptor plus construction of a relief sewer along the 54" portion of the Interceptor

All Alternatives rely on municipal customers reducing their peak instantaneous flows to 2.5 times their average flow. By reducing peak flows, a corresponding reduction to existing flows should occur. For purposes of this evaluation, it is estimated that average flows will reduce by 10%.

This alternative (including the reduction in average daily flow by 10%) would reduce the hydraulic grade line (HGL) to within top of sewer pipe for existing and future flows at a peaking factor of 2.5. The estimated cost for this Alternative is \$18,173,000. The detailed cost estimate is included in Figure B.

- b. Upgrading the size of the 30", 33", 36" and 42" portions of the Interceptor plus construction of a relief sewer along the 54" portion of the Interceptor

This alternative would reduce the HGL to within the sewer pipe. The estimated cost for this alternative is \$24,206,000. The detailed cost estimate is included in Figure C.

F. Alternative Analysis

The following types of improvements to the Neshaminy Interceptor were considered for this evaluation:

1. Removal and Replacement of the Existing Sewer with Larger Diameter Pipe:
 - a. Advantages: The replacement pipe size can be increased to provide a surplus capacity in the design; any infiltration presently in the existing Interceptor piping will be removed; all excavations should be limited to the original trench of the pipe, thus eliminating rock excavation.
 - b. Disadvantages: Bypass pumping is required; significant surface disturbance will be sustained, especially with the larger diameter pipes and the deeper pipes; dewatering and environmental concerns would arise due to the close proximity to the Creek.

2. Installing a Relief Sewer alongside the Existing Interceptor:

- a. Advantages: Bypass pumping can be avoided; excavations can be slightly shallower.
- b. Disadvantages: Additional easements would likely be required; structures built in the vicinity of the Interceptor could inhibit the installation of a parallel sewer line in many cases; the existing Interceptor would remain in service, but its condition would not be improved in any way; rock excavation would likely be substantial; significant surface disturbance would still be encountered.

Conclusion on Relief Sewers - Due to the list of negative aspects with a relief sewer, cost estimates for this type of alternative to improve the entire Interceptor were not prepared.

3. Lining the Existing Interceptor:

- a. Advantages: Minimal excavations (only around certain manholes to temporarily remove the cone sections); minimal surface disturbance; avoid excavations in steep banks of the Creek, which would be very difficult to stabilize after construction; rehabilitate the existing infrastructure and extend its service life; increased smoothness in the pipe, which in turn decreases the friction losses; removal of any infiltration in the existing pipe.
- b. Disadvantages: Bypass pumping is required; slight decrease in pipe diameter, which is more than offset by the increase in smoothness of the pipe.

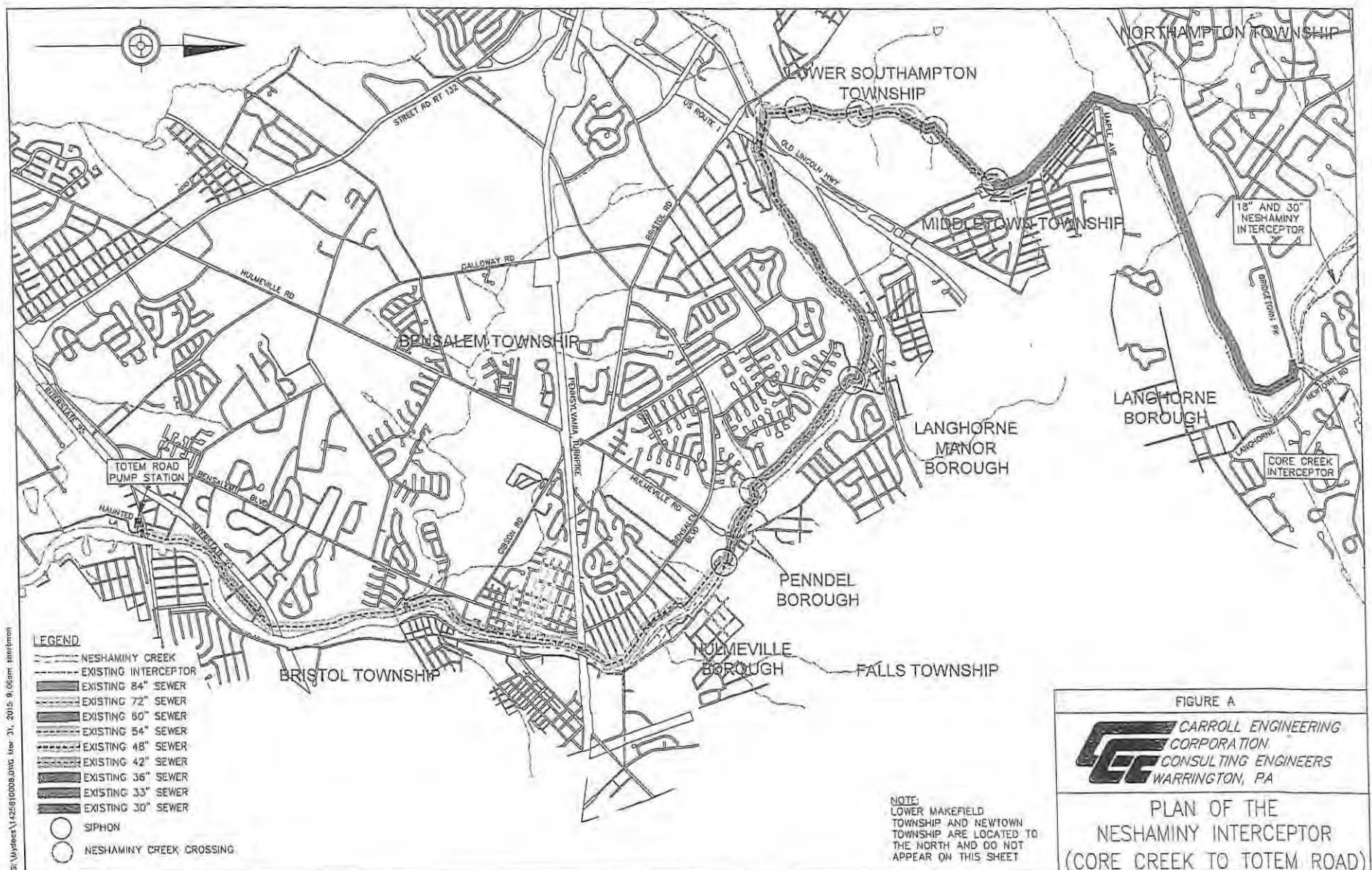
G. **Recommendations**

Lining of the 30", 33", 36" and 42" portions of the Interceptor plus lining the first 3,000 feet of 48" Interceptor plus construction of a relief sewer along the 54" portion of the Interceptor at an estimated cost of \$18,173,000.

Since this upgrade is based on significant I/I reductions, these modeled conditions could take some time to achieve and would need to be maintained in order to accommodate future flows. Connection limitations to Municipal customers who do not achieve the necessary reductions may be necessary.

H. Flow Triggers


1. Should the tributary municipalities be unable to remove the required I&I or if the rate/timing of future connections are higher/faster than anticipated, additional Interceptor improvements may go into effect, or connection restrictions put in place for municipalities which exceed their flow limits.
2. The existing 5-year average flow (2010-2014), as measured at Totem Road Pump Station, is 18.09 MGD. Should the 5-year historic average flow (to be recalculated on an annual basis) surpass 19.00 MGD, the following steps will be taken:
 - a. Evaluate the maximum day and peak flows to the City of Philadelphia (via Totem Road Pump Station) and determine if peak factors have been reduced.
 - b. Consider sewer connection moratoriums (to be determined by customer metered flow evaluations and compliance with Supplementary Agreements).
 - c. Consider further improvements to the Interceptor.



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NOTE:
LOWER MAKEFIELD
TOWNSHIP AND NEWTOWN
TOWNSHIP ARE LOCATED TO
THE NORTH AND DO NOT
APPEAR ON THIS SHEET

FIGURE A



CARROLL ENGINEERING CORPORATION
CONSULTING ENGINEERS
WARRINGTON, PA

**PLAN OF THE
NESHAMINY INTERCEPTOR
(CORE CREEK TO TOTEM ROAD)**

FIGURE B

OPINION OF PROBABLE CONSTRUCTION COST
 LINING EXISTING 30", 33", 36", 42" AND FIRST 3,000' +/- OF 48" NESHAMINY INTERCEPTOR SEWER
 PLUS RELIEF SEWER OF 54" NESHAMINY INTERCEPTOR SEWER
 PREPARED JANUARY 2016

NO.	LINING PROJECT ITEM	UNITS	QUANTITY	UNIT PRICE	TOTAL PRICE
1	30" Liner	LF	1,730	\$ 220.00	\$ 380,600.00
2	33" Liner	LF	8,748	\$ 250.00	\$ 2,187,000.00
3	36" Liner	LF	5,406	\$ 270.00	\$ 1,459,600.00
4	42" Liner	LF	13,692	\$ 300.00	\$ 4,107,600.00
5	48" Liner	LF	3,089	\$ 320.00	\$ 988,500.00
6	Cleaning Sewer	LF	32,665	\$ 2.00	\$ 65,300.00
7	Removal of Existing MH Top Section (<10' deep)	EA	50	\$ 2,300.00	\$ 115,000.00
8	Replace Top Section of MH (<10' deep)	EA	50	\$ 5,425.00	\$ 271,300.00
9	Clearing (assume entire easement, for access to each lining setup)	Acre	17	\$ 14,700.00	\$ 253,800.00
10	Erosion and Sedimentation Controls	LF	32,665	\$ 5.00	\$ 163,300.00
11	TV Inspection	LF	32,665	\$ 1.00	\$ 32,700.00
12	Restoration and Seeding (exclude paved areas)	LF	29,571	\$ 6.00	\$ 177,400.00
13	Estimated Monthly Bypass Equipment Rent	Month	3.8	\$ 65,500.00	\$ 248,900.00
14	Relocate/Reset Bypass Piping	EA	17	\$ 5,000.00	\$ 85,000.00
15	Watchman for overnight and weekends	LS	1	\$ 293,000.00	\$ 293,000.00
16	Fuel for Bypass Pumps	Days	110	\$ 650.00	\$ 71,500.00
17	Bypass Delivery/Pickup	LS	1	\$ 12,000.00	\$ 12,000.00
18	Pre/Post Construction Video	LS	1	\$ 15,000.00	\$ 15,000.00
19	Bonds & Insurance (2%)	LS	1	\$ 218,600.00	\$ 218,600.00
20	Mobilization (2%)	LS	1	\$ 218,600.00	\$ 218,600.00

Construction Subtotal \$ 11,364,700.00
 Contingency (25%) \$ 2,841,200.00
 Construction Total \$ 14,205,900.00
 25% Soft Costs (Engineering, Legal, Administration) \$ 2,841,200.00
 TOTAL LINING PROJECT COST (ROUNDED) \$ 17,048,000.00

NO.	54" RELIEF SEWER PROJECT ITEM	UNITS	QUANTITY	UNIT PRICE	TOTAL PRICE
1	24"/36" PVC Gravity Sewer	LF	2,100	\$ 90.00	\$ 189,000.00
2	Stone Bedding	CY	960	\$ 60.00	\$ 57,600.00
3	Soil Excavation	CY	3,700	\$ 5.50	\$ 20,350.00
4	Rock Excavation (depth estimated)	CY	2,200	\$ 75.00	\$ 165,000.00
5	Suitable Backfill (with compaction)	CY	4,400	\$ 5.00	\$ 22,000.00
6	Clean Fill Imported to Site	CY	750	\$ 20.00	\$ 15,000.00
7	Hauling Excess Material	CY	2,200	\$ 10.00	\$ 22,000.00
8	6' Diameter MH (10'-15' deep)	EA	4	\$ 11,600.00	\$ 46,400.00
9	6' Diameter MH (10'-15' deep) - Doghouse	EA	1	\$ 15,000.00	\$ 15,000.00
10	6' Diameter MH (15'-20' deep)	EA	1	\$ 19,500.00	\$ 19,500.00
11	6' Diameter MH (>20' deep)	EA	1	\$ 25,350.00	\$ 25,350.00
12	Core Drill Existing Manholes for Connection	EA	2	\$ 3,000.00	\$ 6,000.00
13	Small Stream Crossing	LS	1	\$ 20,000.00	\$ 20,000.00
14	Clearing	Acre	2	\$ 13,000.00	\$ 27,695.13
15	Erosion and Sedimentation Controls	LF	2,100	\$ 5.00	\$ 10,500.00
16	TV Inspection	LF	2,100	\$ 1.00	\$ 2,100.00
17	Pipe Testing	LF	2,100	\$ 2.00	\$ 4,200.00
18	Restoration and Seeding	LF	2,100	\$ 6.00	\$ 12,600.00
19	Estimated Monthly Bypass Equipment Rent (<72" Portion)	Month	0	\$ 80,000.00	\$ 13,600.00
20	Bypass Delivery/Pickup	LS	1	\$ 4,000.00	\$ 4,000.00
21	Dewatering (200' well point system)	Days	30	\$ 600.00	\$ 18,000.00
22	Pre/Post Construction Video	LS	1	\$ 5,000.00	\$ 5,000.00
23	Bonds & Insurance (2%)	LS	1	\$ 14,500.00	\$ 14,500.00
24	Mobilization (2%)	LS	1	\$ 14,500.00	\$ 14,500.00

Construction Subtotal \$ 749,895.13
 Contingency (25%) \$ 187,500.00
 Construction Total \$ 937,395.13
 25% Soft Costs (Engineering, Legal, Administration) \$ 187,500.00
 TOTAL RELIEF SEWER PROJECT COST (ROUNDED) \$ 1,125,000.00

GRAND TOTAL PROJECT COST (ROUNDED)					\$ 18,173,000.00
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FIGURE C

OPINION OF PROBABLE CONSTRUCTION COST
 REMOVE AND REPLACE EXISTING 30", 33", 36" & 42" NESHAMINY INTERCEPTOR SEWER
 PLUS RELIEF SEWER OF 54" NESHAMINY INTERCEPTOR SEWER
 PREPARED JANUARY 2016

NO.	ITEM	UNITS	QUANTITY	UNIT PRICE	TOTAL PRICE
1	36" (PVC)	LF	1,730	\$ 79.00	\$ 136,700.00
2	42" (PVC)	LF	14,154	\$ 96.00	\$ 1,358,800.00
3	48" (PVC)	LF	13,692	\$ 117.00	\$ 1,602,000.00
4	Excavation (reuse material)	CY	98,185	\$ 6.00	\$ 589,100.00
5	Hauling Excess Material	CY	40,011	\$ 11.70	\$ 468,100.00
6	Suitable Backfill (with compaction)	CY	66,707	\$ 6.00	\$ 400,200.00
7	Stone Bedding	CY	24,421	\$ 62.00	\$ 1,514,100.00
8	Removal of Existing Sewer Pipe (30"-36")	LF	15,884	\$ 45.00	\$ 714,800.00
9	Removal of Existing Sewer Pipe (42")	LF	13,692	\$ 57.00	\$ 780,400.00
10	Disposal of Removed Pipe	Ton	9,713	\$ 81.00	\$ 786,700.00
11	6' Diameter MH (<10' deep)	EA	22	\$ 8,500.00	\$ 187,000.00
12	6' Diameter MH (10'-15' deep)	EA	27	\$ 13,100.00	\$ 353,700.00
13	6' Diameter MH (15'-20' deep)	EA	13	\$ 22,100.00	\$ 287,300.00
14	6' Diameter MH (>20' deep)	EA	3	\$ 28,700.00	\$ 86,100.00
15	Removal of Existing MH (<10' deep)	EA	22	\$ 2,300.00	\$ 50,600.00
16	Removal of Existing MH (10'-15' deep)	EA	27	\$ 3,200.00	\$ 86,400.00
17	Removal of Existing MH (15'-20' deep)	EA	13	\$ 4,300.00	\$ 55,900.00
18	Removal of Existing MH (>20' deep)	EA	3	\$ 5,300.00	\$ 15,900.00
19	Longitudinal Road Work (incl. traffic control, repaving, stone)	LF	2,580	\$ 215.00	\$ 554,700.00
20	Neshaminy Creek Crossings (non-siphons) - Three Total	LF	1,134	\$ 226.00	\$ 256,300.00
21	Small Stream Crossings	EA	2	\$ 11,300.00	\$ 22,600.00
22	Jack and Bore (Route 1, 60" Casing Pipe)	LF	200	\$ 850.00	\$ 170,000.00
23	Jack and Bore (Old Lincoln Hwy, 60" Casing Pipe)	LF	100	\$ 850.00	\$ 85,000.00
24	Boring Pits (incl. dewatering and excavation/backfill)	EA	4	\$ 11,300.00	\$ 45,200.00
25	Clearing	Acre	16	\$ 14,700.00	\$ 228,500.00
26	Erosion and Sedimentation Controls	LF	29,576	\$ 5.00	\$ 147,900.00
27	TV Inspection	LF	29,576	\$ 1.00	\$ 29,600.00
28	Pipe Testing	LF	29,576	\$ 2.00	\$ 59,200.00
29	Restoration and Seeding	LF	26,482	\$ 6.00	\$ 158,900.00
30	Estimated Monthly Bypass Equipment Rent	Month	18	\$ 65,500.00	\$ 1,179,000.00
31	Relocate/Reset Bypass Piping	EA	15	\$ 5,000.00	\$ 75,000.00
32	Watchman for overnight and weekends	LS	1	\$ 1,629,000.00	\$ 1,629,000.00
33	Fuel for Bypass Pumps	Days	500	\$ 650.00	\$ 325,000.00
34	Bypass Delivery/Pickup	LS	1	\$ 6,000.00	\$ 6,000.00
35	Dewatering (200' well point system)	Days	500	\$ 680.00	\$ 340,000.00
36	Pre/Post Construction Video	LS	1	\$ 10,000.00	\$ 10,000.00
37	Bonds & Insurance (2%)	LS	1	\$ 295,900.00	\$ 295,900.00
38	Mobilization (2%)	LS	1	\$ 295,900.00	\$ 295,900.00
	Construction Subtotal				\$ 15,387,500.00
	Contingency (25%)				\$ 3,846,900.00
	Construction Total				\$ 19,234,400.00
	25% Soft Costs (Engineering, Legal, Administration)				\$ 3,846,900.00
	TOTAL REPLACEMENT PROJECT COST (ROUNDED)				\$ 23,081,000.00
	TOTAL RELIEF SEWER PROJECT COST (ROUNDED) [from Figure B]				\$ 1,125,000.00
	GRAND TOTAL PROJECT COST (ROUNDED)				\$ 24,206,000.00



Carroll Engineering Corporation

Important Document

October 8, 2015

Terry Fedorchak, Township Manager
Township of Lower Makefield
1100 Edgewood Road
Yardley PA 19067

COPY

Dear Mr. Fedorchak:

Subject: Neshaminy Interceptor Evaluation and Technical Information

Enclosed for your use is the revised Neshaminy Interceptor Capacity Evaluation for incorporation into your 537 Plan Updates. Municipal needs projections were incorporated into this analysis to evaluate the adequacy of the Interceptor to convey flows. Also enclosed is a Technical Information Packet that was generated from the model used to evaluate the Neshaminy Interceptor.

The Evaluation includes the following revisions:

- Municipal connections to the Interceptor were peaked at 2.5 times the average daily flow, in lieu of 2.0.
- Existing average flows were reduced by 10%, to account for planned removal of Inflow and Infiltration.
- 10-year future flows were added to the existing flows, in lieu of utilizing the ultimate projections.
- Flow triggers were added, which could necessitate additional Interceptor improvements or connection restrictions.

We understand that PADEP would like to hold a work session at their offices in Norristown to discuss these enclosures as well as the Supplemental Agreements. We anticipate that someone from PADEP will be in touch to schedule that work session.

Should you have any questions, please feel free to contact this office.

Very truly yours,

CARROLL ENGINEERING CORPORATION

John A. Swenson, P.E.
Vice President

JAS:cam
Enclosures

- cc: Cosmo Servidio, Regional Director, PADEP (w/Enclosures)
 Jenifer Fields, P.E., Program Manager, PADEP (w/Enclosures)
 Benjamin W. Jones, CEO, BCW&SA (w/Enclosures)
 John Butler, Chief Operating Officer, BCW&SA (w/Enclosures)
 John Genovesi, P.E., Tri-State Engineers & Land Surveyors, Inc. (w/Enclosures)

Today's Commitment to Tomorrow's Challenges

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908.874.7500

Neshaminy Interceptor Evaluation
for
Municipal 537 Planning in Lower Bucks County

March 2015
(Revised September 2015)

I. Purpose

The Bucks County Water and Sewer Authority (BCWSA) provides sanitary sewer conveyance service to Lower Bucks County municipalities along the Neshaminy Creek between Newtown Township and Bensalem Township. Treatment plant capacity is also provided by BCWSA through an agreement with the City of Philadelphia Water Department.

A Settlement Agreement between BCWSA and the Pennsylvania Department of Environmental Protection (PADEP) included the establishment of a Corrective Action Plan (NICAP) and Connection Management Plan (NICMP) for the Neshaminy Interceptor and which included the requirement for tributary municipalities to complete updates to their Municipal 537 Plans, prepare a Sewer System Needs Analysis for their communities and complete a comprehensive inflow and infiltration (I/I) evaluation for their sanitary sewer systems.

This Interceptor evaluation will characterize the current flow conditions in the Neshaminy Interceptor and project conditions as a result of the municipal forecasted needs. This analysis will also consider the effects of reduction of infiltration and inflow from municipal sewer systems completed in conformance with the NICAP/NICMP and Supplemental Agreements which include flow limits for all tributary municipalities to the Neshaminy Interceptor. The original Evaluation (dated March 2015) utilized limits which mirrored the flow limits contained in the BCWSA Agreement with the City of Philadelphia. This modified Evaluation utilizes limits in accordance with DEP design standards, although the limits contained in the BCWSA Agreement with the City of Philadelphia still apply to penalties and fines (see individual supplementary agreements between BCWSA and municipalities for specific language).

It is expected that the results of this evaluation will be incorporated into the individual municipal 537 Plan Updates, to complete the evaluation of sewer facilities necessary to serve the future needs.

II. Background

The Authority provides sewage conveyance services to a large portion of Lower Bucks County by means of the Neshaminy Interceptor sewer, the main pump station at Totem Road, and the force main to the City of Philadelphia. The Neshaminy Interceptor begins in Newtown Township and proceeds down the Neshaminy Creek Valley for a distance of 14 miles where the Interceptor terminates at the Totem Road Pump Station in Bensalem Township. The Interceptor begins as a 12-inch diameter sewer, increasing in size up to 84-inch diameter as it picks up sewage from various gravity collection sewers, branch interceptors and force mains. The Core Creek Interceptor, a major branch of the Neshaminy Interceptor, extends the service area into Lower Makefield Township.

The Totem Road Pumping Station lifts sewage from the Neshaminy Interceptor and pumps it through parallel 36-inch and 42-inch diameter force mains to Philadelphia. The parallel force mains extend 27,000 feet to their point of terminus on Grant Avenue in Philadelphia. The force mains are combined into a single 42-inch force main at Grant Avenue and extend an additional 21,000 feet, where flows are discharged into the City of Philadelphia's Delaware Interceptor at Rhawn Street which conveys the flows to the Northeast Philadelphia Water Pollution Control Plant for treatment. The Authority owns 24 million gallons per day (MGD) capacity in the Northeast Plant for the Neshaminy Interceptor Service Area. The City of Philadelphia's maximum daily flow limit is 33 MGD and the peak instantaneous flow limit is 48 MGD. The average flow from the Neshaminy Interceptor Service Area for Year 2014 was 18.64 MGD.

The Neshaminy Interceptor Service Area provides wholesale sanitary sewer service to portions of the following municipalities: Bristol Township, Falls Township, Hulmeville Borough, Langhorne Manor Borough, Lower Makefield Township, Lower Southampton Township, Newtown Borough, Newtown Township, Northampton Township and Pennel Borough.

The Neshaminy Interceptor also provides retail sanitary sewer service to portions of the following municipalities: Bensalem Township, Langhorne Borough and Middletown Township.

III. Previous Planning, Permitting and Agreements

A. Planning

Lower Bucks County 201 Facilities Plan: Completed in October 1985, this plan called for the conveyance of Neshaminy Interceptor flows to the Philadelphia Northeast Water Control Plant (NEWCP) including upgrades to the NEWCP plant, the Totem Road Pumping Station (to 60 mgd) and the extension of and paralleling of existing Force Mains.

Relief of 18 inch Neshaminy Interceptor (between Newtown Creek and Core Creek): Planning for this project was completed in approximately May 1988 for the construction of a relief sewer through Middletown Township to convey projected future sanitary sewer flows from Newtown Borough and Township and a portion of Northampton Township.

Lower Bucks Comprehensive Sewerage Plan: Completed in October 1988, this report updated the 201 Facilities Plan to include the phase out of the Newtown-Bucks County Joint Municipal Authority's Wastewater Treatment Plant (WWTP), the phase out of the Pennel Municipal Authority WWTP and phase out of the Falls Municipal Authority's WWTP. All flows from these 3 plants were to be sent through the Neshaminy Interceptor and via the replacement Totem Road Pumping Station and Force Mains to the NEWCP.

B. Agreements

1987 PWD Agreement

This agreement provided for the upgrade of the Totem Road Pumping Station and the extension of the force main further into the City. Treatment capacity was increased to an average of 20 mgd with a peak instantaneous flow of 40 mgd.

1996 PWD Agreement

This agreement provided for a temporary "rental" of average annual flow capacity as a result of an exceedance of the 20 mgd flow limit based on a 365 day rolling average basis.

2005 PWD Amendment (III) to Agreement

This agreement increased the average annual capacity at the NEWCP to 24 mgd and the peak instantaneous flow limit to 48 mgd. It also established a maximum daily flow limit of 33 mgd. This resolved a moratorium placed on the Neshaminy Interceptor Service Area in Year 2004, due to exceedance of the average annual flow in Spring 2003.

DEP Settlement Agreement

This agreement established a Corrective Action Plan and Connection Management Plan for all municipalities tributary to the Neshaminy Interceptor and included requirements for Supplemental Municipal Agreements containing flow limits, Municipal 537 Planning Updates, Comprehensive Infiltration and Inflow Evaluation of sanitary sewer systems and removal of excessive wet weather flows.

Supplemental Municipal Agreements

These agreements were to be completed by March 31, 2015. Flow limits were established using 5 year historical average flows from tributary municipalities and maximum day and peak instantaneous flow limits reflecting the factors used to establish the flow limits in the PWD Amendment III Agreement.

IV. Neshaminy Interceptor Evaluation – Computer Modeling

A. Introduction

The portion of the Neshaminy Interceptor from the connection of the Core Creek Interceptor down to the Totem Road Pump Station has been modeled using Bentley SewerCAD V8i. This portion of the Interceptor consists of 30", 33", 36", 42", 48", 54", 60", 72" and 84" diameter reinforced concrete pipe, with the majority of the Interceptor being installed in the mid to late 1960's. See FIGURE A for a plan showing this portion of the Interceptor.

The portion of the Neshaminy Interceptor above the Core Creek Interceptor was not included in this model, since that portion was paralleled in Year 1988 with 30" pipe. The purpose of this model was to evaluate the Neshaminy Interceptor to convey existing flows with anticipated Inflow and Infiltration (I&I) reductions to achieve future flow limits and determine the best course of action to provide the necessary capacity for future municipal needs.

B. Modeling Calibration

For calibration purposes, the model was initially set up using the actual hourly flows recorded at each customer meter connecting to the Interceptor during a December 26, 2009 storm event. This was the storm used for the preliminary design of the Neshaminy Interceptor Surge Tank, which has not been constructed. The storm produced 2.16" of rain according to the Northeast Philadelphia Airport rain gauge, with additional snow melt caused by the estimated 2 to 4 inches of snow already on the ground surface at the time of the rain. The results were compared to the meter data from the nine (9) "N" meters that the Authority has installed in the Neshaminy Interceptor, and appropriate adjustments were made to the model to match observed conditions.

C. Existing Flow Conditions

The Totem Road Pump Station, which receives all the flows from the Neshaminy Interceptor and conveys them to the City of Philadelphia's Northeast Water Pollution Control Plant, is limited by agreement to 2 times the average daily flow. Based on a purchased average daily flow of 24 MGD, the peak limit is 48 MGD. For this reason, the original model scenario used the average flow from each customer meter, multiplied by a factor of 2.0 to arrive at the peak flow that connection would contribute to the Interceptor. Per DEP design requirements, the average flow from each customer meter is now multiplied by a factor of 2.5 to arrive at the peak instantaneous flow that connection would contribute to the Interceptor. An average daily hydrograph was developed for each customer meter using actual flows from a period of time during October 2009, in order to develop a flow pattern for each connection. The hydrographs were then converted to the 5-year average flow (2010-2014) for each customer meter, and peaked by a factor of 2.5, which represents the peak instantaneous limit established for Municipal customer systems in this Evaluation.

Table 1 (below) presents the 5-year average flow from each customer, the metered peak flow during the December 26, 2009 wet weather event, the customer peak limit based on a factor of 2.0 times the 5-year average flow (PWD Allowable Peak), and the customer peak instantaneous limit based on a factor of 2.5 times the 5-year average flow.

TABLE 1

Customer	Avg. Daily Flow (ADF) (2010-2014) (mgd)	Metered Peak Instant Flow (12/26/09) (mgd)	PWD Allowed Peak Flow 2 x ADF (peak hour) (mgd)	Design Peak Flow 2.5 x ADF (peak 15-minute) (mgd)
Bensalem Township	4.46	15.22	8.92	11.15
Hulmeville Borough	0.07	0.45	0.15	0.18
Langhorne Borough	0.39	1.58	0.78	0.98
Langhorne Manor Borough	0.04	0.14	0.08	0.09
Lower Makefield Township	0.72	1.83	1.45	1.81
Newtown Township/Boro	1.97	3.80	3.95	4.93
Lower Southampton Township	0.49	1.21	0.98	1.23
Northampton Township	3.73	8.82	7.47	9.33
Middletown Township	3.58	9.90	7.17	8.96
George School	0.07	0.31	0.15	0.19
Core Creek Park	0.002	n/a	0.004	0.005
Korman Corporation	0.03	0.09	0.05	0.07
Penndel Borough	0.26	1.17	0.52	0.65
Falls Township	2.73	6.76	5.46	6.83
Bristol Township	0.15	0.85	0.29	0.37
TOTAL	18.71	--	--	--
Totem Road PS (attenuated)	18.09	54.00	--	--
PWD Agreement Limits	24.00	--	48.00	--

D. Future Flows

Each customer was to provide the Authority with their ultimate future needs, so that any planned improvements to the Interceptor would be adequately designed. Subsequent to the original evaluation in March 2015, each customer was to provide specific 10-year future needs projections in addition to estimated 10-year I&I flows to be removed from their systems. To date, most of the 10-year projections have been received. Few of the municipalities provided 10-year estimated I&I Removal.

In order to proceed with the modeling, 10-year future flows were estimated based on a straight-line basis (10-year/25-year = 40%). The majority of the ultimate future needs received from the customers were generally noted to be 25-year projections. Table 2 (see below) summarizes the 10-year projections provided by the municipalities compared to the projections used in the model.

TABLE 2

Customer	10-Year Add'l Future Average Flow [per updated customer projections]	10-Year Add'l Future Average Flow [based on straight-line basis]
	(mgd)	(mgd)
Bensalem Township [a]	0.68	0.39
Hulmeville Borough	0.02	0.01
Langhorne Borough	0.03	0.02
Langhorne Manor Borough	0.002	0.002
Lower Makefield Township	0.22	0.16
Newtown Township/Boro	0.36	0.18
Lower Southampton Township	0.06	0.03
Northampton Township	0.29	0.13
Middletown Township	0.22	0.20
George School	0.00	0.00
Core Creek Park	0.00	0.00
Korman Corporation	0.00	0.00
Penndel Borough [b]	0.06	0.06
Falls Township	0.02	0.03
Bristol Township [b]	0.04	0.04
TOTAL	2.00	1.24

[a] 0.17 mgd (ADF) of future flow enters one run above TRPS, which does not have hydraulic issues.

[b] Specific 10-year projection was not provided, so 40% of ultimate projection was used in both columns.

The future flows were added to the existing flow scenario (2.5xADF) described in Paragraph C above. Future flows were calculated at the Authority standard of 250 GPD/EDU. They were peaked by a factor of 2.5. A standard hydrograph was developed for all future flows, no matter which municipality they are associated with.

The intent is to make improvements to the Neshaminy Interceptor to satisfy the 10-year future needs. The improvements are contingent upon customers removing I&I from their systems. Flow triggers will be put in place, so that if the tributary municipalities are unable to remove the required I&I or if the rate/timing of future connections are higher/faster than anticipated, additional Interceptor improvements may go into effect, depending on the circumstances

Table 3 (below) presents the additional future peak flow projections for each customer (multiplied by a factor of 2.5) and the projected future peak flow if adding the additional future flow to the "2.5xADF" flow (with I&I removal).

TABLE 3

Customer	10-Year Add'l Future Peak Flow* (mgd)	10-Year Projected Future Peak Instant Flow** (10-Yr Future + 2.5xADF) (mgd)
Bensalem Township	0.97	12.12
Hulmeville Borough	0.02	0.21
Langhorne Borough	0.05	1.02
Langhorne Manor Borough	0.01	0.10
Lower Makefield Township	0.40	2.21
Newtown Township/Boro	0.45	5.38
Lower Southampton Township	0.07	1.30
Northampton Township	0.32	9.65
Middletown Township	0.49	9.45
George School	0.00	0.19
Core Creek Park	0.00	0.00
Korman Corporation	0.00	0.07
Penndel Borough	0.14	0.79
Falls Township	0.07	6.90
Bristol Township	0.11	0.48
TOTAL	3.10	--
Totem Road PS (attenuated)	--	39.30

* Calculated at "Ultimate Future Avg Flow" x 0.4 (40% Straight-line Basis) x 2.5 (Peak Factor)

** With I&I removed from the systems (and subsequent 10% reduction to ADF)

E. Model Results

1. Existing Average Flow and a Peak Factor of 2.5: In this scenario, the hydraulic design capacity of the Interceptor is exceeded, beginning midway through the 48" pipe and continuing up to the 30" Interceptor. The modeled flow at Totem Road Pump Station was calculated to be 40.46 MGD, which is below the 48 MGD peak limit imposed by the City of Philadelphia.
2. 10-Year Future Flow Conditions: The addition of future flow to the 2.5xADF scenario will only increase the pipe capacity exceedances in the Interceptor.- The Interceptor's surcharged and pressurized state under the Future Flow Conditions is not acceptable.

The following Upgrade Alternatives were considered:

- a. Lining of the 30", 33", 36" and majority of 42" portions of the Interceptor

All Alternatives rely on municipal customers reducing their peak instantaneous flows to 2.5 times their average flow. By reducing peak flows, a corresponding reduction to existing flows should occur. For purposes of this evaluation, it is estimated that average flows will reduce by 10%.

This alternative (including the reduction in average daily flow by 10%) would reduce the hydraulic grade line (HGL) to top of sewer pipe for existing and future flows at a peaking factor of 2.5. The estimated cost for this Alternative is \$13,336,000. The detailed cost estimate is included in Figure B.

- b. Upgrading the size of the 30", 33", 36" and 42" portions of the Interceptor
This alternative would reduce the HGL to within the sewer pipe. The estimated cost for this alternative is \$23,081,000. The detailed cost estimate is included in Figure C.

F. Alternative Analysis

The following types of improvements to the Neshaminy Interceptor were considered for this evaluation:

1. Removal and Replacement of the Existing Sewer with Larger Diameter Pipe:
 - a. Advantages: The replacement pipe size can be increased to provide a surplus capacity in the design; any infiltration presently in the existing Interceptor piping will be removed; all excavations should be limited to the original trench of the pipe, thus eliminating rock excavation.
 - b. Disadvantages: Bypass pumping is required; significant surface disturbance will be sustained, especially with the larger diameter pipes and the deeper pipes; dewatering and environmental concerns would arise due to the close proximity to the Creek.
2. Installing a Relief Sewer alongside the Existing Interceptor:
 - a. Advantages: Bypass pumping can be avoided; excavations can be slightly shallower.
 - b. Disadvantages: Additional easements would likely be required; structures built in the vicinity of the Interceptor could inhibit the installation of a parallel sewer line in many cases; the existing Interceptor would remain in service, but its condition would not be improved in any way; rock excavation would likely be substantial; significant surface disturbance would still be encountered.

Conclusion on Relief Sewers - Due to the list of negative aspects with a relief sewer, cost estimates for this type of alternative were not prepared.
3. Lining the Existing Interceptor:
 - a. Advantages: Minimal excavations (only around certain manholes to temporarily remove the cone sections); minimal surface disturbance; avoid excavations in steep banks of the Creek, which would be very difficult to stabilize after construction; rehabilitate the existing infrastructure and extend its service life; increased smoothness in the pipe, which in turn decreases the friction losses; removal of any infiltration in the existing pipe.
 - b. Disadvantages: Bypass pumping is required; slight decrease in pipe diameter, which is more than offset by the increase in smoothness of the pipe.

G. Recommendations

Lining of the 30 inch, 33 inch, 36 inch and majority of 42 inch Interceptor at an estimated cost of \$13,336,000.

Since this upgrade is based on significant *I/I* reductions, these modeled conditions could take some time to achieve and would need to be maintained in order to accommodate future flows. Connection limitations to Municipal customers who do not achieve the necessary reductions may be necessary.

H. Flow Triggers

1. Should the tributary municipalities be unable to remove the required I&I or if the rate/timing of future connections are higher/faster than anticipated, additional Interceptor improvements may go into effect, or connection restrictions put in place for municipalities which exceed their flow limits.
2. The existing 5-year average flow (2010-2014), as measured at Totem Road Pump Station, is 18.09 MGD. Should the 5-year historic average flow (to be recalculated on an annual basis) surpass 19.00 MGD, the following steps will be taken:
 - a. Evaluate the maximum day and peak flows to the City of Philadelphia (via Totem Road Pump Station) and determine if peak factors have been reduced.
 - b. Consider sewer connection moratoriums (to be determined by customer metered flow evaluations and compliance with Supplementary Agreements).
 - c. Consider further improvements to the Interceptor.

FIGURE B

OPINION OF PROBABLE CONSTRUCTION COST
 LINING EXISTING 30", 33", 36" & MAJORITY OF 42" NESHAMINY INTERCEPTOR SEWER
 PREPARED SEPTEMBER 2015

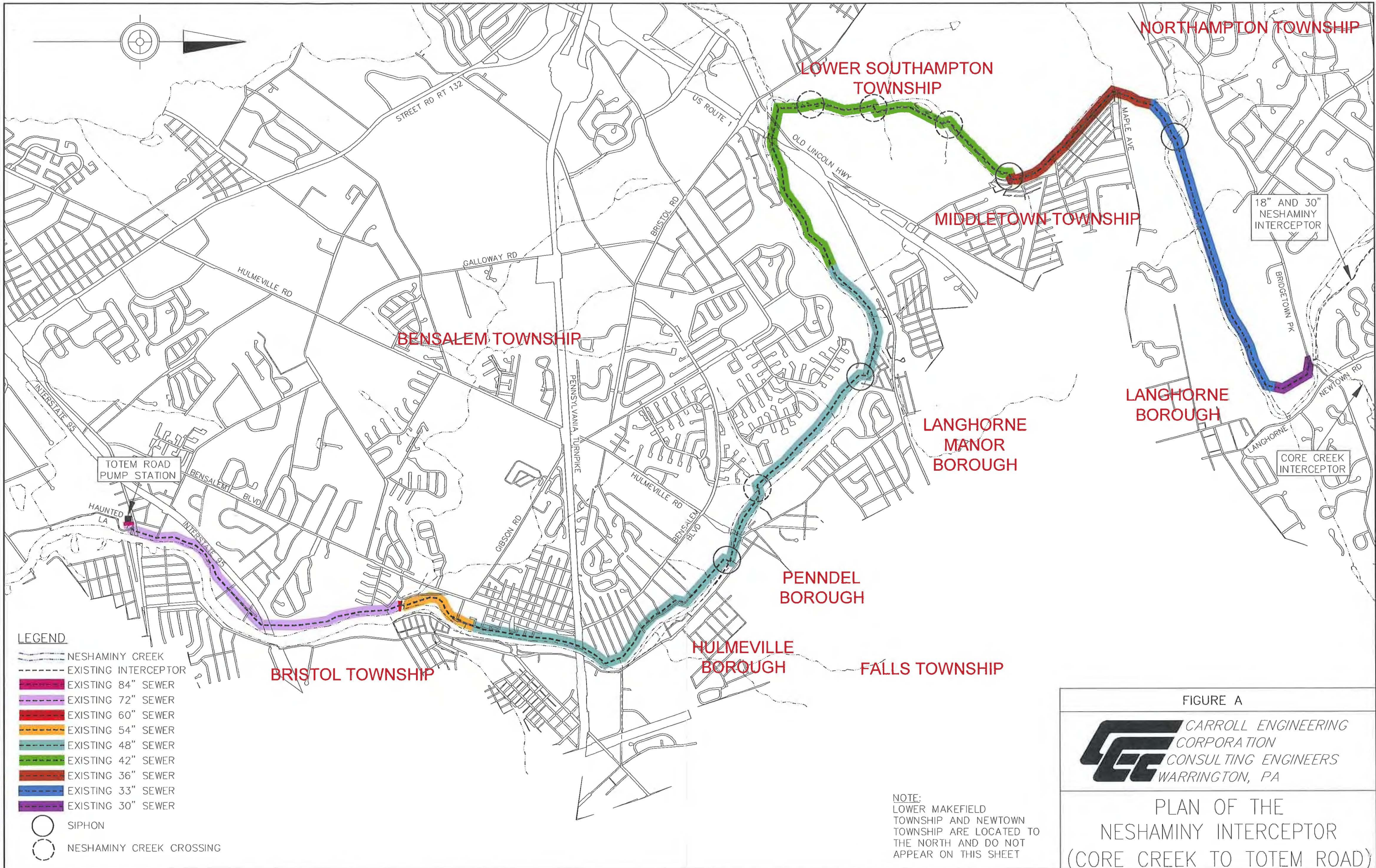
No.	Item	Units	Quantity	Unit Price	Total Price
1	30" Liner	LF	1,730	\$ 220.00	\$ 380,600.00
2	33" Liner	LF	8,748	\$ 250.00	\$ 2,187,000.00
3	36" Liner	LF	5,406	\$ 270.00	\$ 1,459,600.00
4	42" Liner	LF	10,389	\$ 300.00	\$ 3,116,700.00
5	Cleaning Sewer	LF	26,273	\$ 2.00	\$ 52,500.00
6	Removal of Existing MH Top Section (<10' deep)	EA	40	\$ 2,300.00	\$ 92,000.00
7	Replace Top Section of MH (<10' deep)	EA	40	\$ 5,425.00	\$ 217,000.00
8	Clearing (assume entire easement, for access to each lining setup)	Acre	13	\$ 14,700.00	\$ 195,000.00
9	Erosion and Sedimentation Controls	LF	26,273	\$ 5.00	\$ 131,400.00
10	TV Inspection	LF	26,273	\$ 1.00	\$ 26,300.00
11	Restoration and Seeding (exclude paved areas)	LF	23,179	\$ 6.00	\$ 139,100.00
12	Estimated Monthly Bypass Equipment Rent	Month	2.8	\$ 65,500.00	\$ 183,400.00
13	Relocate/Reset Bypass Piping	EA	14	\$ 5,000.00	\$ 70,000.00
14	Watchman for overnight and weekends	LS	1	\$ 230,000.00	\$ 230,000.00
15	Fuel for Bypass Pumps	Days	80	\$ 650.00	\$ 52,000.00
16	Bypass Delivery/Pickup	LS	1	\$ 6,000.00	\$ 6,000.00
17	Pre/Post Construction Video	LS	1	\$ 10,000.00	\$ 10,000.00
18	Bonds & Insurance (2%)	LS	1	\$ 171,000.00	\$ 171,000.00
19	Mobilization (2%)	LS	1	\$ 171,000.00	\$ 171,000.00
	Construction Subtotal				\$ 8,890,600.00
	Contingency (25%)				\$ 2,222,700.00
	Construction Total				\$ 11,113,300.00
	25% Soft Costs (Engineering, Legal, Administration)				\$ 2,222,700.00
	TOTAL PROJECT COST (ROUNDED)				\$ 13,336,000.00

FIGURE C

OPINION OF PROBABLE CONSTRUCTION COST
 REMOVE AND REPLACE EXISTING 30", 33", 36" & 42" NESHAMINY INTERCEPTOR SEWER
 PREPARED SEPTEMBER 2015

No.	Item	Units	Quantity	Unit Price	Total Price
1	36" (PVC)	LF	1,730	\$ 79.00	\$ 136,700.00
2	42" (PVC)	LF	14,154	\$ 96.00	\$ 1,358,800.00
3	48" (PVC)	LF	13,692	\$ 117.00	\$ 1,602,000.00
4	Excavation (reuse material)	CY	98,185	\$ 6.00	\$ 589,100.00
5	Hauling Excess Material	CY	40,011	\$ 11.70	\$ 468,100.00
6	Suitable Backfill (with compaction)	CY	66,707	\$ 6.00	\$ 400,200.00
7	Stone Bedding	CY	24,421	\$ 62.00	\$ 1,514,100.00
8	Removal of Existing Sewer Pipe (30"-36")	LF	15,884	\$ 45.00	\$ 714,800.00
9	Removal of Existing Sewer Pipe (42")	LF	13,692	\$ 57.00	\$ 780,400.00
10	Disposal of Removed Pipe	Ton	9,713	\$ 81.00	\$ 786,700.00
11	6' Diameter MH (<10' deep)	EA	22	\$ 8,500.00	\$ 187,000.00
12	6' Diameter MH (10'-15' deep)	EA	27	\$ 13,100.00	\$ 353,700.00
13	6' Diameter MH (15'-20' deep)	EA	13	\$ 22,100.00	\$ 287,300.00
14	6' Diameter MH (>20' deep)	EA	3	\$ 28,700.00	\$ 86,100.00
15	Removal of Existing MH (<10' deep)	EA	22	\$ 2,300.00	\$ 50,600.00
16	Removal of Existing MH (10'-15' deep)	EA	27	\$ 3,200.00	\$ 86,400.00
17	Removal of Existing MH (15'-20' deep)	EA	13	\$ 4,300.00	\$ 55,900.00
18	Removal of Existing MH (>20' deep)	EA	3	\$ 5,300.00	\$ 15,900.00
19	Longitudinal Road Work (incl. traffic control, repaving, stone)	LF	2,580	\$ 215.00	\$ 554,700.00
20	Neshaminy Creek Crossings (non-siphons) - Three Total	LF	1,134	\$ 226.00	\$ 256,300.00
21	Small Stream Crossings	EA	2	\$ 11,300.00	\$ 22,600.00
22	Jack and Bore (Route 1, 60" Casing Pipe)	LF	200	\$ 850.00	\$ 170,000.00
23	Jack and Bore (Old Lincoln Hwy, 60" Casing Pipe)	LF	100	\$ 850.00	\$ 85,000.00
24	Boring Pits (incl. dewatering and excavation/backfill)	EA	4	\$ 11,300.00	\$ 45,200.00
25	Clearing	Acre	16	\$ 14,700.00	\$ 228,500.00
26	Erosion and Sedimentation Controls	LF	29,576	\$ 5.00	\$ 147,900.00
27	TV Inspection	LF	29,576	\$ 1.00	\$ 29,600.00
28	Pipe Testing	LF	29,576	\$ 2.00	\$ 59,200.00
29	Restoration and Seeding	LF	26,482	\$ 6.00	\$ 158,900.00
30	Estimated Monthly Bypass Equipment Rent	Month	18	\$ 65,500.00	\$ 1,179,000.00
31	Relocate/Reset Bypass Piping	EA	15	\$ 5,000.00	\$ 75,000.00
32	Watchman for overnight and weekends	LS	1	\$ 1,629,000.00	\$ 1,629,000.00
33	Fuel for Bypass Pumps	Days	500	\$ 650.00	\$ 325,000.00
34	Bypass Delivery/Pickup	LS	1	\$ 6,000.00	\$ 6,000.00
35	Dewatering (200' well point system)	Days	500	\$ 680.00	\$ 340,000.00
36	Pre/Post Construction Video	LS	1	\$ 10,000.00	\$ 10,000.00
37	Bonds & Insurance (2%)	LS	1	\$ 295,900.00	\$ 295,900.00
38	Mobilization (2%)	LS	1	\$ 295,900.00	\$ 295,900.00
	Construction Subtotal				\$ 15,387,500.00
	Contingency (25%)				\$ 3,846,900.00
	Construction Total				\$ 19,234,400.00
	25% Soft Costs (Engineering, Legal, Administration)				\$ 3,846,900.00
	TOTAL PROJECT COST (ROUNDED)				\$ 23,081,000.00


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- LEGEND**
- NESHAMINY CREEK
 - - - EXISTING INTERCEPTOR
 - EXISTING 84" SEWER
 - EXISTING 72" SEWER
 - EXISTING 60" SEWER
 - EXISTING 54" SEWER
 - EXISTING 48" SEWER
 - EXISTING 42" SEWER
 - EXISTING 36" SEWER
 - EXISTING 33" SEWER
 - EXISTING 30" SEWER
 - SIPHON
 - NESHAMINY CREEK CROSSING

NOTE:
 LOWER MAKEFIELD
 TOWNSHIP AND NEWTOWN
 TOWNSHIP ARE LOCATED TO
 THE NORTH AND DO NOT
 APPEAR ON THIS SHEET

FIGURE A



CARROLL ENGINEERING
 CORPORATION
 CONSULTING ENGINEERS
 WARRINGTON, PA

PLAN OF THE
 NESHAMINY INTERCEPTOR
 (CORE CREEK TO TOTEM ROAD)

**APPENDIX E – LOWER MAKEFIELD TOWNSHIP PLANNING
COMMISSION**

TOWNSHIP OF LOWER MAKEFIELD
PLANNING COMMISSION
MINUTES – March 12, 2018

The regular meeting of the Planning Commission of the Township of Lower Makefield was held in the Municipal Building on March 12, 2018. Mr. Tracey called the meeting to order at 7:35 p.m.

Those present:

Planning Commission: John Tracey, Chair
Dawn DiDonato-Burke, Vice Chair
Craig Bryson, Member

Others:

Benjamin Hauser, Township Solicitor
Daniel Grenier, Supervisor Liaison
Michael Kirk, Code Enforcement Officer

Absent:

Chad Wallace, Planning Commission Secretary
Charles Halboth, Planning Commission Member

ACT 537 PLAN SPECIAL STUDY FOR THE NESHAMINY INTERCEPTOR

Ms. Tara Bernard, from Ebert Engineering, was present and reviewed the Neshaminy Interceptor Study and stated they are seeking approval from the Planning Commission.

Mr. Tracey questioned Ms. Bernard about the length of pipe to be relined. Mr. Bryson described the length to be relined and explained the Township's involvement in the Act 537 approval process and where the Township is not involved.

Mr. Bryson moved to approve, Mr. Tracey seconded and it was unanimously approved as submitted.

There being no further business, Mr. Tracey moved, Mr. Bryson seconded, and it was unanimously carried to adjourn at 7:46pm.

Respectfully submitted,

John Tracey, Chair

APPENDIX F – BUCKS COUNTY PLANNING COMMISSION



Township of Lower Makefield

April 17, 2018

Ms. Debra Canale
Bucks County Planning Commission
Neshaminy Manor Center
1260 Almshouse Road
Doylestown, PA 18901

Re: Act 537 Plan Special Study – Neshaminy Interceptor
Lower Makefield Township, Bucks County, PA
Response to March 7, 2018 Review Letter

Dear Ms. Canale,

We are in receipt of the Bucks County Planning Commission review letter dated March 7, 2018 for the Lower Makefield Township Act 537 Sewage Facilities Plan Special Study for Neshaminy Interceptor. Lower Makefield Township (LMT) has reviewed the comments and we offer the following responses. The Bucks County Planning Commission (BCPC) comments have been repeated followed by our responses below for clarity.

BCPC Review Comment No. 1: Chapter III, E. Sewage Disposal Needs

Information on page III-13 indicates that, "As discussed above and presented on Table 1, the projected future sewage needs are 344 EDUs within the next four years." However, within Table No. 1. Summary of Existing and Proposed Sewage Flows per Connection Management Plan (1/31/2018), the total under "EDUs Projected (next 4 years)" is shown as 486 and actually totals 404. The plan should be revised to correct this discrepancy.

LMT Response No. 1:

The information on page III-13 has been updated to be consistent with the current Connection Management Plan dated January 22, 2018 that was approved by the PA DEP by letter dated January 31, 2018. The correct numbers of projected future sewage needs are 486 EDUs within the next four years.

Table No. 1 "Summary of Existing and Proposed Sewage Flows per Connection Management Plan (1/31/2018) has been updated to correctly identify the 486 EDUs consistent with the PA DEP approved connection management plan.

A copy of the updated information on page III-13 and Table No. 1 are attached to this letter and have been modified in the Act 537 Plan that will be adopted by the Lower Makefield Township Board of Supervisors and submitted to the PA DEP for review and approval. The Act 537 Plan is now consistent with the most recent Connection Management Plan dated January 22, 2018 and approved by the PA DEP by letter dated January 31, 2018.

BCPC Review Comment No. 2: Table No. 1. Summary of Existing and Proposed Sewage Flows per Connection Management Plan (1/31/2018)

Totals are provided for some of the columns. However, some of the totals indicated do not add up correctly and some numbers appear to be misplaced in the wrong column. Information in the chart should be corrected.

LMT Response No. 2:

Table No. 1 has been updated to be consistent with the Connection Management Plan dated January 22, 2018 that was approved by the PA DEP by letter dated January 31, 2018. The totals have been corrected and all of the data is now in the correct columns. As stated in the response to Comment No. 1, Table No.1 has been updated in the Act 537 Plan that will be adopted by the Lower Makefield Township Board of Supervisors and submitted to the PA DEP for review and approval.

BCPC Review Comment No. 3: Chapter IV, G. Projected Capacity Requirements (EDUs) for Undeveloped Lands within Proposed Sewer Service Areas

a. Referenced Plan

The Plan indicates that projections for future capacity needs of current undeveloped lands are based on the 2015 Comprehensive Plan. Our understanding is that the Township's Comprehensive Master Plan Update (2015) is currently a draft and has not been officially adopted. It is recommended that the Act 537 plan update be revised to note such.

LMT Response No. 3a:

Page IV-11 in Section IV has been revised accordingly to state the 2015 Comprehensive Plan as a draft.

b. Information on potentially developable parcels—

Information in the chart titled "Potential Developable Parcels Available within the Neshaminy Interceptor Service Area" indicates that TMP #20-003-034-002 contains 71.1 gross acres. However, the map titled "Potential Developable Lots" indicates that this parcel contains 17.1 acres. This discrepancy should be resolved.

LMT Response No. 3b:

Page IV-11 in Section IV has been revised to correct the error on the table of Potential Developable Parcels. TMP #20-003-034-002 contains 71.1 acres and could potentially be developed to include 20 lots. The table on the attached plan titled "Potential Developable Lots" has also been revised accordingly. Copies of the updated pages are attached for your information. The pages have also been updated in the Act 537 Plan that will be adopted by the Lower Makefield Township Board of Supervisors and submitted to the PA DEP for review and approval.

c. Schedule of Connections

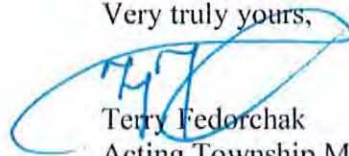
Within the Schedule of Connections chart, the Total Connections numbers under the 15 to 20 Years column do not add up correctly. The chart should be corrected.

LMT Response No. 3c:

Page IV-14 has been revised to correctly identify the Total Connections for 15 to 20 years from 259 connections to 309 connections.

If you need any additional information or have any questions concerning the matter, please feel free to contact our office.

Very truly yours,



Terry Fedorchak
Acting Township Manager

TF/bzc
Attachment(s)

cc: Lower Makefield Township Board of Supervisors
Lower Makefield Township Planning Commission
Genevie Kostick, BCHD
John Butler, BCWSA
Frederick Ebert, P.E., Ebert Engineering, Inc.



BCPC

Bucks County Planning Commission

The Almshouse Neshaminy Manor Center 1260 Almshouse Road
Doylestown, Pennsylvania 18901 215.345.3400 FAX 215.345.3886
E-mail: bcpc@buckscounty.org

PLANNING COMMISSION:
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David R. Nyman
Carol A. Pierce
Walter S. Wydro

Evan J. Stone
Executive Director

March 7, 2018
BCPC #20-8-WS1
Approved: April 4, 2018

MEMORANDUM

TO: Lower Makefield Township Board of Supervisors
Lower Makefield Township Planning Commission

FROM: Bucks County Planning Commission

SUBJECT: Proposal for an Update to the Official Act 537 Sewage Facilities Plan
Applicant: Lower Makefield Township
Received: February 23, 2018
Hearing Date: April 18, 2018

In accordance with the provisions of the Pennsylvania Sewage Facilities Planning Act (Act 537) and Section 304 of the Pennsylvania Municipalities Planning Code, this proposal was sent to the Bucks County Planning Commission for review. The following review was prepared by the staff and endorsed by the Bucks County Planning Commission at its meeting on March 7, 2018.

GENERAL INFORMATION

Proposed Action: Update the Act 537 Sewage Facilities Plan to the future wastewater management needs of the Neshaminy Interceptor Service Area of Lower Makefield Township. The preparation of the plan was undertaken to confirm long-term capacity needs of the sewer service area as part of the Pennsylvania Department of Environmental Protection's (DEP) requirement that all municipalities tributary to the Neshaminy Interceptor (owned and operated by the Bucks County Water and Sewer Authority (BCWSA)) be included in an evaluation of the interceptor's future capacity needs.

Proposed Provisions: The objective of the Lower Makefield Township Act 537 Sewage Facilities Plan Special Study for Neshaminy Interceptor is to address the planning requirements necessary for the township's collection and conveyance system to accommodate existing and future wastewater disposal needs in the area directly tributary to the BCWSA Neshaminy Interceptor.

A primary component of the Special Study is implementation of a Corrective Action Plan (CAP) to identify and remove inflow and infiltration (I/I) from the existing sanitary sewer system in this service area. The Pennsylvania Department of Environmental Protection (PaDEP) approved Lower Makefield Township's CAP for the Neshaminy Interceptor on November 2, 2017.



The public sanitary sewer system within Lower Makefield Township is divided into six service areas, three of which send flows to the Neshaminy Interceptor, which ultimately conveys wastewater to the City of Philadelphia Northeast Water Pollution Control Plant for treatment and disposal. The three service areas that contribute flows to the Neshaminy Interceptor and which are analyzed for this Special Study include: the Core Creek Interceptor Service Area; the Middletown Township Service Area; and the Falls Township Contract Area.

Within the service areas analyzed, the study identifies two pump stations that are hydraulically overloaded. In order to meet both existing and proposed sewage flows, the study concludes that upgrades are necessary to the Chanticleer Pump Station and the Brookstone Pump Station within the Core Creek Interceptor Service Area.

The Neshaminy Interceptor will be upgraded by the BCWSA to adequately address the future needs of Lower Makefield Township as well as other contributing municipalities for a 10-year planning period. The costs for the upgrade to the Interceptor will be shared by all of the contributing municipalities. The BCWSA will distribute the costs through their fees to individual municipalities.

COMMENTS

The Plan recommendation to reduce I/I and upgrade the overloaded pump stations appears to enable the township to address the present and future wastewater needs in the noted service areas that contribute flows to the Neshaminy Interceptor. The continued use of public sewer service in the study area is consistent with the township's existing Act 537 Plan and the township's comprehensive plan. However, we note the following comments for the township's consideration:

1. **Chapter III, E. Sewage Disposal Needs**—Information on page III-13 indicates that, “As discussed above and presented on Table 1, the projected future sewage needs are 344 EDUs within the next four years.” However, within Table No. 1. Summary of Existing and Proposed Sewage Flows per Connection Management Plan (1/31/2018), the total under “EDUs Projected (next 4 years)” is shown as 486 and actually totals 404. The plan should be revised to correct this discrepancy.
2. **Table No. 1. Summary of Existing and Proposed Sewage Flows per Connection Management Plan (1/31/2018)**—Totals are provided for some of the columns. However, some of the totals indicated do not add up correctly and some numbers appear to be misplaced in the wrong column. Information in the chart should be corrected.
3. **Chapter IV, G. Projected Capacity Requirements (EDUs) for Undeveloped Lands within Proposed Sewer Service Areas**
 - a. **Referenced plan**—The Plan indicates that projections for future capacity needs of current undeveloped lands are based on the 2015 Comprehensive Plan. Our understanding is that the township's Comprehensive Master Plan Update (2015) is currently a draft and has not been officially adopted. It is recommended that the Act 537 plan update be revised to note such.
 - b. **Information on potentially developable parcels**—Information in the chart titled “Potential Developable Parcels Available within the Neshaminy Interceptor Service Area” indicates that TMP #20-003-034-002 contains 71.1 gross acres. However, the

map titled "Potential Developable Lots" indicates that this parcel contains 17.1 acres. This discrepancy should be resolved.

- c. **Schedule of Connections**—Within the Schedule of Connections chart, the Total Connections numbers under the 15 to 20 Years column do not add up correctly. The chart should be corrected.

Once the plan is approved by the Pennsylvania Department of Environmental Protection, we request that the township send a final copy of the Act 537 plan to the Bucks County Planning Commission in accordance with Section 306(b) of the Pennsylvania Municipalities Planning Code.

LMW:dc

cc: Terry Fedorchak, Lower Makefield Township Manager (via email)
Genevie Kostick, BCHD
Elizabeth Mahoney, Sewage Planning Supervisor, Watershed Management, PaDEP
Ben Jones, Executive Director, Bucks County Water and Sewer Authority
Act 537 file

Corrective Action Plan

Lower Makefield Township has prepared a CAP which was approved by David Burke, Watershed Manager from PADEP on November 3, 2017. The CAP includes an I/I abatement plan with a CMP in an effort to further monitor the connections within the Service Areas.

The goal of the CAP is to reduce peak flows to the Neshaminy Interceptor and reduce the amount of I/I in the collection system to prevent the need to expand downstream sanitary sewer facilities. A copy of the CAP is attached in Appendix B.

Lower Makefield Township will begin their I/I removal efforts in the northern portion of the Township. This area was selected based on the known problem area in the Core Creek Interceptor Manholes NC-83 to NC-93.

As described earlier in this Chapter, Lower Makefield Township will need to upgrade both the Brookstone Pump Station and the Chanticleer Pump Station. The Brookstone Pump Station will have the pumping capacity restored to approximately 200 gpm through either a replacement of the impellers in the existing pumps or the installation of two new pumps. The Chanticleer Pump Station will be upgraded to increase its pumping capacity from 49 gpm to approximately 75 gpm through the replacement of the existing two inch forcemain with a three inch forcemain and potentially replacing the two existing pumps.

E. Lower Makefield Township Sewage Disposal Needs

For the purposes of this Special Study plan, only the Core Creek Interceptor, Middletown Township, and Falls Township Contract Sewer Service Areas were evaluated. Lower Makefield Township is in the process of updating their overall Act 537 Plan, which will address all of the Township sewage disposal needs.

Each of the Service Areas is located within the planned public sanitary sewer service area. As discussed above and presented on Table 1, the projected future sewage needs are 486 EDUs within the next four years.

Lower Makefield Township has prepared a CAP which contains an I/I abatement plan outlining the action plan for removal of the I/I within the system. The work will be documented and submitted to BCWSA and PADEP for review. As PADEP reviews and accepts the documented work, edus will be released to Lower Makefield Township to utilize for proposed development or needs throughout the Township.

F. Existing Private / Onlot Sewage Facilities

Limited properties within the Township remain on individual on-lot sewage disposal systems (OLDS). Many of the remaining OLDS are utilized by residences and were constructed prior to current PA DEP design regulations. System types include seepage pits, seepage trenches, and seepage beds. There are no known cesspools or retaining

tanks in the Township. Any existing and subsequent improvements to existing OLDS systems will continue under the authority of the Bucks County Department of Health on-lot sewage permitting program.

The infrastructure for public sanitary sewer is in place and can be utilized to service remaining OLDS, should they malfunction in the future. The goal of the Township is to have the entire Township connected to public sewer.

G. Septage Generation

There are no sewage treatment plants within the Lower Makefield Township. Therefore, no septage is generated within the Township requiring transport or disposal.

G. Projected Capacity Requirements (EDU's) for Undeveloped Lands within Proposed Sewer Service Areas

The following projections are for the undeveloped lands within the proposed sewer service areas. These projections are based on the Draft 2015 Comprehensive Plan. Many assumptions must be made when evaluating the capacity requirements of undeveloped lands. The following assumptions were made developing these projections:

- All undeveloped parcels within the service area were evaluated unless deed restrictions are in place prohibiting future development.
- The minimum residential EDU/acre for the respective district was projected for properties served by public sewer. (See Zoning Development table in subsection B above)
- Development Rights purchased by the Township
- Flow per edu is 250 gpd/edu.

Based upon these assumptions we offer the following EDU projections for the respective study areas / sewer service areas:

Potential Developable Parcels Available within the Neshaminy Interceptor Service Area				
Parcel No.	Parcel Description	Gross Area	Zoning District	Projected EDU(S)
CORE CREEK INTERCEPTOR SERVICE AREA				
20-003-034-002	(20 LOTS) HRH MANAGEMENT CORP (Grey Nun)	71.1	R-1	20
20-003-002	(40 LOTS) STERLING FAMILY LTD PART I (Sterling Farm)	44.45	R-1	40
20-003-002.001	(80 LOTS) MCGOWAN, THOMAS D & CAROL a	89.85	R-1	80
20-016-012	(45 LOTS) WRIGHT, ELSIE W ,TR & DOUGLAS ,TR	50.55	R-1	45
20-016-040	(180,000 SF) PRICKETT, CRAIG PAUL	18.33	O/R	72
20-016-040-001	(50,000 SF) PRICKETT, CLARENCE L	5	O/R	20
20-012-001	(500,000 SF) SHADY BROOK AT FLEMINGS INC	51.118	O/R	200
	Totals	330.4	-	477

MIDDLETOWN TOWNSHIP SERVICE AREA				
20-012-025-001	(18 UNITS) ANTER ASSOC	9.18	R-4	18
20-032-036-001	(2 LOTS) DHANDHUKIA, BHARAT & ASHA (development potential limited by stream and wetlands)	5.73	R-3	2
Totals		14.91	-	20
FALLS CONTRACT SERVICE AREA				
20-034-132	GUZIKOWSKI, SANDRA (development rights purchased by Township in 2016, not available)	44.6	AC	0
Totals		44.6	-	0

The Potential Development Plan attached within this Chapter which outlines the locations of the parcels with development potential in the Neshaminy Interceptor Service Area.

The following tables are the project hydraulic loading to the Neshaminy Interceptor Service Area:

PARCEL NO.	PARCEL DESCRIPTION	GROSS ACRES	ZONING DISTRICT	PROJECTED EDU(S)	PROJECTED FLOWS (1EDU= 250 GPD)
CORE CREEK INTERCEPTOR SERVICE AREA					
20-003-034-002	(20 LOTS) HRH MANAGEMENT CORP (Grey Nun)	71.1	R-1	20	5,000
20-003-002	(40 LOTS) STERLING FAMILY LTD PART I (Sterling Farm)	44.45	R-1	40	10,000
20-003-002.001	(80 LOTS) MCGOWAN, THOMAS D & CAROL a	89.85	R-1	80	20,000
20-016-012	(45 LOTS) WRIGHT, ELSIE W ,TR & DOUGLAS ,TR	50.55	R-1	45	11,250
20-016-040	(180,000 SF) PRICKETT, CRAIG PAUL	18.33	O/R	72	18,000
20-016-040-001	(50,000 SF) PRICKETT, CLARENCE L	5	O/R	20	5,000
20-012-001	(500,000 SF) SHADY BROOK AT FLEMINGS INC	51.118	O/R	200	50,000
Totals		330.4	-	477	119,250

Falls Township Contract Area	1,500 gpd	1,500 gpd	304,790 gpd	306,290 gpd
Township Miscellaneous EDU(s)	20,250 gpd	-	-	20,250 gpd

SCHEDULE OF CONNECTIONS				
SERVICE AREA	FUTURE			
	0 TO 5 YEARS	5 TO 10 YEARS	10 TO 15 YEARS	15 TO 20 YEARS
Core Creek Interceptor	150	150	150	262
Middletown Township	50	50	47	47
Falls Township Contract Area	6	-	-	-
Township Miscellaneous EDU(s)	45	-	-	-
TOTAL CONNECTIONS	251	200	197	309

H. Future Growth and Population Projections

According to the most recent Census, Lower Makefield Township had a population of 32,559 persons in 2010, which represents a less than 0.5% decrease in population from 32,681 persons in 2000. According to the 2010 Census, the median age is 44.3 years, with 25.1% of the population between the ages of 35 to 64 years.



The Almshouse Neshaminy Manor Center 1260 Almshouse Road
Doylestown, Pennsylvania 18901 215.345.3400 FAX 215.345.3886
E-mail: bcpc@buckscounty.org

PLANNING COMMISSION:
Edward Kisselback, Jr., *Chairman*
Robert M. Pellegrino, *Vice Chairman*
R. Tyler Tomlinson, Esq., *Secretary*

Craig E. Bryson
Joan M. Cullen
James J. Dowling
David R. Nyman
Carol A. Pierce
Walter S. Wydro

Evan J. Stone
Executive Director

March 7, 2018
BCPC #20-8-WS1
Approved: April 4, 2018

MEMORANDUM

TO: Lower Makefield Township Board of Supervisors
Lower Makefield Township Planning Commission

FROM: Bucks County Planning Commission

SUBJECT: Proposal for an Update to the Official Act 537 Sewage Facilities Plan
Applicant: Lower Makefield Township
Received: February 23, 2018
Hearing Date: April 18, 2018

In accordance with the provisions of the Pennsylvania Sewage Facilities Planning Act (Act 537) and Section 304 of the Pennsylvania Municipalities Planning Code, this proposal was sent to the Bucks County Planning Commission for review. The following review was prepared by the staff and endorsed by the Bucks County Planning Commission at its meeting on March 7, 2018.

GENERAL INFORMATION

Proposed Action: Update the Act 537 Sewage Facilities Plan to the future wastewater management needs of the Neshaminy Interceptor Service Area of Lower Makefield Township. The preparation of the plan was undertaken to confirm long-term capacity needs of the sewer service area as part of the Pennsylvania Department of Environmental Protection's (DEP) requirement that all municipalities tributary to the Neshaminy Interceptor (owned and operated by the Bucks County Water and Sewer Authority (BCWSA)) be included in an evaluation of the interceptor's future capacity needs.

Proposed Provisions: The objective of the Lower Makefield Township Act 537 Sewage Facilities Plan Special Study for Neshaminy Interceptor is to address the planning requirements necessary for the township's collection and conveyance system to accommodate existing and future wastewater disposal needs in the area directly tributary to the BCWSA Neshaminy Interceptor.

A primary component of the Special Study is implementation of a Corrective Action Plan (CAP) to identify and remove inflow and infiltration (I/I) from the existing sanitary sewer system in this service area. The Pennsylvania Department of Environmental Protection (PaDEP) approved Lower Makefield Township's CAP for the Neshaminy Interceptor on November 2, 2017.



The public sanitary sewer system within Lower Makefield Township is divided into six service areas, three of which send flows to the Neshaminy Interceptor, which ultimately conveys wastewater to the City of Philadelphia Northeast Water Pollution Control Plant for treatment and disposal. The three service areas that contribute flows to the Neshaminy Interceptor and which are analyzed for this Special Study include: the Core Creek Interceptor Service Area; the Middletown Township Service Area; and the Falls Township Contract Area.

Within the service areas analyzed, the study identifies two pump stations that are hydraulically overloaded. In order to meet both existing and proposed sewage flows, the study concludes that upgrades are necessary to the Chanticleer Pump Station and the Brookstone Pump Station within the Core Creek Interceptor Service Area.

The Neshaminy Interceptor will be upgraded by the BCWSA to adequately address the future needs of Lower Makefield Township as well as other contributing municipalities for a 10-year planning period. The costs for the upgrade to the Interceptor will be shared by all of the contributing municipalities. The BCWSA will distribute the costs through their fees to individual municipalities.

COMMENTS

The Plan recommendation to reduce I/I and upgrade the overloaded pump stations appears to enable the township to address the present and future wastewater needs in the noted service areas that contribute flows to the Neshaminy Interceptor. The continued use of public sewer service in the study area is consistent with the township's existing Act 537 Plan and the township's comprehensive plan. However, we note the following comments for the township's consideration:

1. **Chapter III, E. Sewage Disposal Needs**—Information on page III-13 indicates that, “As discussed above and presented on Table 1, the projected future sewage needs are 344 EDUs within the next four years.” However, within Table No. 1. Summary of Existing and Proposed Sewage Flows per Connection Management Plan (1/31/2018), the total under “EDUs Projected (next 4 years)” is shown as 486 and actually totals 404. The plan should be revised to correct this discrepancy.
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3. **Chapter IV, G. Projected Capacity Requirements (EDUs) for Undeveloped Lands within Proposed Sewer Service Areas**
 - a. **Referenced plan**—The Plan indicates that projections for future capacity needs of current undeveloped lands are based on the 2015 Comprehensive Plan. Our understanding is that the township's Comprehensive Master Plan Update (2015) is currently a draft and has not been officially adopted. It is recommended that the Act 537 plan update be revised to note such.
 - b. **Information on potentially developable parcels**—Information in the chart titled “Potential Developable Parcels Available within the Neshaminy Interceptor Service Area” indicates that TMP #20-003-034-002 contains 71.1 gross acres. However, the

map titled "Potential Developable Lots" indicates that this parcel contains 17.1 acres. This discrepancy should be resolved.

- c. **Schedule of Connections**—Within the Schedule of Connections chart, the Total Connections numbers under the 15 to 20 Years column do not add up correctly. The chart should be corrected.

Once the plan is approved by the Pennsylvania Department of Environmental Protection, we request that the township send a final copy of the Act 537 plan to the Bucks County Planning Commission in accordance with Section 306(b) of the Pennsylvania Municipalities Planning Code.

LMW:dc

cc: Terry Fedorchak, Lower Makefield Township Manager (via email)
Genevie Kostick, BCHD
Elizabeth Mahoney, Sewage Planning Supervisor, Watershed Management, PaDEP
Ben Jones, Executive Director, Bucks County Water and Sewer Authority
Act 537 file

APPENDIX G – BUCKS COUNTY HEALTH DEPARTMENT



COUNTY OF BUCKS

DEPARTMENT OF HEALTH

Health Building, Neshaminy Manor Center, Doylestown, PA 18901 – 215-345-3318

FIELD OFFICES

Bucks County Government Services Center, 7321 New Falls Road, Levittown, PA 19055 – 267-580-3510
Bucks County Government Services Center, 261 California Road, Quakertown, PA 18951 – 215-529-7000

County Commissioners

ROBERT G. LOUGHERY, Chairman
CHARLES H. MARTIN Vice-Chairman
DIANE M. ELLIS-MARSEGLIA, LCSW

Director

David C. Damsker, M.D., MPH

March 5, 2018

Frederick E. Ebert, P.E.
Ebert Engineering, Inc.
P.O. Box 540
4092 Skippack Pike
Skippack, PA 19474

RE: Lower Makefield Township Sanitary Sewer Update
Act 537 Special Study – Neshaminy Interceptor
Lower Makefield Township, Bucks County

Dear Mr. Ebert:

Please be advised that the Department has received a copy of the Lower Makefield Township Act 537 Special Study for the Neshaminy Interceptor service area on February 23, 2018.

The Department has no adverse comments concerning the special study evaluating the ability of the existing sanitary sewer to meet the projected needs of the service area in the future.

If you have any questions or comments, feel free to contact me at (215)345-3333.

Sincerely,

Genevieve A. Kostick, Supervisor
Sewage Program Coordinator
Bucks County Department of Health

cc: Terry Fedorchak, Township Manager
Phil Smith, Director of Environmental Health
Dr. David Damsker, BCDH Director
District file

APPENDIX H – PUBLIC NOTICE

PUBLIC COMMENT
LOWER MAKEFIELD TOWNSHIP ADOPTION
OF
LOWER MAKEFIELD ACT 537 SPECIAL PLAN UPDATE FOR NESHAMINY
INTERCEPTOR

Public Comment Period:

First Day: March 5, 2018

Last Day: April 3, 2018

Number of Comments Received: 1



Certified By

James R. Majewski, PE, PP, CFM
Lower Makefield Township
Director of Planning and Zoning

Date of Certification: 4/5/18

Comments:

1. Resident Name: Municipal Authority of the Borough of Morrisville

Resident Address: 35 Union Street Morrisville, PA 19067

Comment:

Comments were received in a letter dated April 2, 2018 from the Municipal Authority of the Borough of Morrisville.



Township of Lower Makefield

April 17, 2018

Mr. John Warena
Morrisville Municipal Authority
35 Union Street
Morrisville, PA 19067

Subject: Lower Makefield Township Act 537 Plan
Neshaminy Interceptor Sewer Service Area Special Study
Re: Response to April 2, 2018 Public Comment Letter

Dear Mr. Warena,

We are in receipt of the Morrisville Municipal Authority (MMA) April 2, 2018 public comment letter for the Lower Makefield Township Act 537 Sewage Facilities Plan Special Study for the Neshaminy Interceptor Sewer Service Area. Lower Makefield Township (LMT) has reviewed the comments and we offer the following responses. The comments have been repeated followed by our responses below for clarity.

MMA Comment No. 1:

The Executive Summary of the LMT 537 Plan asserts that "Lower Makefield Township took this opportunity to review its existing and proposed public sanitary sewer service areas, existing and future needs, resolve zoning inconsistencies, and provide guidance to future wastewater disposal policies and procedures."

1.1 Was any review done, or were any calculations performed, that considered the feasibility of diverting flow from the Neshaminy Interceptor to the MMA WWTP?

LMT Response No. 1.1:

One of the requirements that the PA DEP has in their Settlement Agreement with Bucks County Water & Sewer Authority (BCWSA) was for all customers of the Neshaminy Interceptor sign a Supplemental Agreement with BCW&SA. Lower Makefield Township was required to sign the Supplemental Agreement and include a copy of the executed agreement in the submission of the Act 537 Plan Special Study.

Lower Makefield Township Act 537 Plan

April 17, 2018

Page 2 of 7

The Supplemental Agreement addresses this issue. Lower Makefield Township is required to comply with the requirements of the Supplemental Agreement which Lower Makefield Township signed at that February 7, 2018 Board of Supervisor's public meeting. In the second paragraph under Section 2, entitled "Act 537 Sewer Facilities Planning" states as follow:

"Should BCWSA be unable to provide the requested capacity, the Township may amend its Act 537 Plan to allow for alternative options of sewage conveyance and treatment. Alternative options may be solely undertaken provided that the then current flow which the Township is obligated under agreement to convey through the Neshaminy Interceptor shall continue without interruption."

This section requires that all current flows remain in the Neshaminy Interceptor. There is however a provision in the first paragraph under Section 3, entitled "Peak Flows" that allows for the diversion of existing flows under certain conditions. The portion of the agreement that addresses this is listed below:

"Neither this Supplemental Agreement nor the parties original Neshaminy Interceptor Participation Agreement shall prevent the Township from amending its Act 537 Plan to explore alternative options for collection and treatment of its flows, to the extent permitted by DEP, subject to approval of any regulatory agencies having jurisdiction thereto and pursuant to laws and regulations regarding same; however, nothing in the preceding sentence shall relieve the Township of its obligation to pay for any outstanding bonds for which it is or may be responsible, as noted in the prior Agreements between the parties."

With the above understanding of the requirements of the existing agreement that Lower Makefield Township has with BCWSA, Lower Makefield Township has reviewed its options and determined that for the short term that all existing and future flows in the Neshaminy Interceptor Sewer Service area will continue to flow to the Neshaminy Interceptor. However, the Lower Makefield Township Board of Supervisors did request that this option be further explored in the Act 537 Plan Update that Lower Makefield Township is currently working on for the Morrisville Municipal Authority Sewer Service Area. The alternative analysis of the MMA Service Area Act 537 Plan will fully explore this option as well as the financial impacts of this option.

- 1.2 *It appears that the annual average daily flows from LMT into the Neshaminy Interceptor are (about) 1.085 MGD. The "twenty year planning horizon" flows are (about) 1.325 MGD. That represents an increase, after implementing all corrective action, of over 22%. What is being done to accommodate those increases?*

LMT Response No. 1.2:

The supplemental agreement addresses the need for additional capacity in the future to address the twenty year planning horizon. The agreement has several sections where the need for additional future capacity is addressed and excerpts are provided below. The Agreement also allows, as was discussed, above for Lower Makefield Township to evaluate other options through the Act 537 Planning process if the Neshaminy Interceptor and BCWSA cannot provide the required capacity to meet the future needs of Lower Makefield Township.

The existing agreement with BCWSA contemplates Phase II improvements to the Neshaminy Interceptor in Section 1. entitled "Construction of Interceptor Upgrades" in the first paragraph under Paragraph B. discusses the potential for Phase II improvements to provide additional capacity to meet Lower Makefield Township's wastewater needs for this service area for the twenty year planning horizon. The portion of the agreement that addresses this is listed below:

"To the extent that any additional non-maintenance improvements are required to be made to the Neshaminy Interceptor, either by way of additional lining or the construction of relief sewers ("Improvements"), those future Improvements shall be hereinafter referred to as "Phase II" Improvements. The parties hereto agree to cooperate and meet to discuss any Phase II Improvements or upgrades or any modifications or changes dictated by Township's current and/or future Act 537 data or planning submitted to DEP."

In the second paragraph of the agreement under Section 2. entitled "Act 537 Sewer Facilities Planning" requires BCWSA to perform additional engineering studies and planning in order to provide additional capacity as may be required by Lower Makefield Township in the future. The portion of the agreement that addresses this issue is listed below:

"If, as a result of those projections, BCWSA predicts a capacity shortfall, BCWSA will commence with engineering studies and planning to evaluate providing additional capacity in the Neshaminy Interceptor and/or WWTP facilities to provide such capacity."

MMA Comment No. 2.

The Morrisville Authority and LMT had, in the past, discussed diversion of the "Derbyshire" flows to the MMA WWTP.

2.1 Has any further consideration been given to that proposal?

LMT Response No. 2.1:

The existing agreement with BCWSA requires that all existing proportional costs of the bonds and debts which BCWSA has incurred on behalf of Lower Makefield Township be paid in full prior to allowing Lower Makefield Township from diverting any existing flows from the Neshaminy Interceptor. This requirement makes the diversion of the "Derbyshire" flows not financially feasible at this time.

2.2 Would redirecting Derbyshire flows provide substantive amelioration of LMT's contribution to the Neshaminy Interceptor capacity problems?

LMT Response No. 2.2:

The redirecting of Derbyshire flows would reduce Lower Makefield Township's flows to the Neshaminy Interceptor by approximately 280,000 gpd. However, the current Neshaminy Interceptor capacity issues have been addressed to the satisfaction of the PA DEP and redirection of flows is not a selected alternative in the PA DEP approved Neshaminy Interceptor Corrective Action Plan. While Lower Makefield Township could explore this option in the future, it would require that Lower Makefield Township fully pay for all of its proportional bond debts that BCWSA has incurred on behalf of Lower Makefield Township. Furthermore, Lower Makefield Township would also not be reimbursed for the cost of the capacity that it previously purchased from BCWSA.

MMA Comment No. 3:

Do you agree or disagree that the current LMT CAP does not adequately address the hydraulic capacities of the Neshaminy Interceptor over the next 20 years?

LMT Response No. 3:

The hydraulic capacity of the Neshaminy Interceptor over the next twenty years will be an unknown until all of the customers of the Neshaminy Interceptor implement their respective I/I Abatement Plans. There are also other measures that could influence the available capacity of the Neshaminy Interceptor over the next twenty years such as Phase II Improvements (referenced above as defined in the agreement) that would increase the current capacity. There also may be other treatment alternatives that become available over the next twenty years that could also increase the available capacity.

Therefore at this time, Lower Makefield Township believes that the combination of the successful implementation of the Lower Makefield Township Corrective Active Plan as well as all of the other customers of the Neshaminy Interceptor combined with the commitments from BCWSA in the agreement will provide the necessary capacity to meet the twenty year flow requirements of this service area of Lower Makefield Township.

MMA Comment No. 4:

At a meeting of the Lower Makefield Board of Supervisors on February 7, 2018, it was announced that Sewer Engineer Fred Ebert would begin a study of alternatives to sending LMT sewer flows to the MMA WWTP.

4.1 Has that study begun?

LMT Response No. 4.1:

Lower Makefield Township has formed a committee composed of members from the Sewer Authority and the Board of Supervisors to perform a detailed alternative analysis of all options for the long term treatment and disposal of existing and future wastewater needs of Lower Makefield Township that includes the option of sending Lower Makefield Township flows to the MMA WWTP. The forming of the committee was the start of the overall study. The committee will schedule its first meeting at the upcoming April 2018 Sewer Authority meeting. It was previously anticipated that the committee meeting would have been scheduled at the March 2018 Sewer Authority meeting but that public meeting was canceled due to weather conditions.

4.2 When is that study expected to conclude?

LMT Response No. 4.2:

It is too early in the process to have established a schedule for the completion of the study. The study will require input from many other entities and Lower Makefield Township cannot control the timing of their responses for information. Updates on the progress of the study will be provided to the public at the regularly scheduled public meetings of the Lower Makefield Township Sewer Authority as well as periodic updates at the Board of Supervisors meetings of Lower Makefield Township.

4.3 Will the findings of that study have any impact on the findings of this LMT 537 Plan?

LMT Response No. 4.3:

The findings of the study will have no impact on this Act 537 Plan. This Act 537 Plan provides the required planning for the Neshaminy Interceptor Service Area of Lower Makefield Township until it is modified by a future PA DEP Act 537 Plan Sewage Facilities Planning effort. It is possible that the results of the study could initiate a completely separate and independent planning effort that could amend this Act 537 Plan. However until such time as that another Act 537 Planning effort is authorized by

Lower Makefield Township Act 537 Plan

April 17, 2018

Page 6 of 7

the Lower Makefield Township Board of Supervisors and approved by the PA DEP, this Act 537 Plan, once approved by the PA DEP, will be the official Act 537 Plan for the Neshaminy Interceptor Public Sewer Service area of Lower Makefield Township.

MMA Comment No. 5:

Two of the alternatives disclosed publicly were (a) sending all LMT flows to Philadelphia via the BCWSA Neshaminy Interceptor; and (b) sending all flows currently going to the Morrisville WWTP to the Lower Bucks Joint Municipal Authority WWTP.

LMT Response No 5:

The context of the public discussion was concerning the Board of Supervisors providing direction and input for the Lower Makefield Township Act 537 Plan for the Morrisville Municipal Sewer Service Area. This is a separate issue from this Act 537 Plan for the Neshaminy Interceptor Sewer Service Area. The results of the study could result in the future need to amend this Act 537 Plan as with any Act 537 Plan over time.

5.1 Has each alternative been discussed with the respective sewer authority engineers; and, if so, when?

LMT Response No. 5.1:

There have been no discussions with the respective sewer authority engineers.

5.2 Does the BCWSA have capacity to accept all current and future LMT flows?

LMT Response No. 5.2:

It is currently not known if BCWSA has capacity to accept all current and future Lower Makefield Township wastewater flows. This will be one of the objectives of the study.

5.3 Does the LBJMA have capacity to accept all LMT flows currently being sent to the MMA WWTP?

LMT Response No. 5.3:

It is currently not known if LBJMA has capacity to accept all Lower Makefield Township wastewater flows that are currently being sent to the MMA WWTP. This will be one of the objectives of the study.

Lower Makefield Township Act 537 Plan

April 17, 2018

Page 7 of 7

5.4 Has, or will, a cost analysis be done of each alternative?

LMT Response No. 5.4:

A cost analysis has not been done for each alternative. A cost analysis will be completed for all options that are determined to technically be feasible.

MMA Comment No. 6:

It is the position of the Morrisville Municipal Authority that the comments and inquiries herein made are relevant to the sufficiency of the subject LMT 537 Plan. If you assert that any comment or inquiry is outside the scope of the subject LMT 537 Plan, please explain.

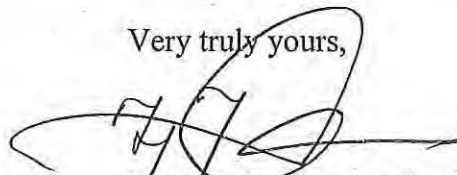
LMT Response No. 6:

The majority of the comments are outside of the scope of this Special Study that only addresses the Neshaminy Interceptor Sewer Service Area. They will be addressed as part of the Lower Makefield Township Act 537 Plan for the Morrisville Municipal Authority Sewer Service Area. It is noted that depending on the results of the study the Morrisville Municipal Authority Sewer Service Area Act 537 Plan could be expanded to include all of Lower Makefield Township if the selected alternative changes the method for the conveyance, treatment and disposal of wastewater includes areas outside of the Morrisville Municipal Authority Service Area.

Lower Makefield Township has however fully answered all of the questions that are contained in the April 2, 2018 public comment letter submitted by Mr. John J. Warena on behalf of the Morrisville Municipal Authority.

If you need any additional information or have any questions concerning the matter, please feel free to contact our office.

Very truly yours,



Terry Fedorchak, Acting Manager
Lower Makefield Township

cc: Mr. Frederick Ebert, P.E., Ebert Engineering, Inc.
Ms. Kelly Boettlin, PA DEP
Lower Makefield Township Board of Supervisors



MUNICIPAL AUTHORITY OF
THE BOROUGH OF MORRISVILLE

35 UNION STREET
MORRISVILLE, PA 19067
(O) (215) 295-8181 • (215) 295-3760 (F)

JOHN J. WARENDA, JR.
EXECUTIVE DIRECTOR
warendacsq@gmail.com

April 2, 2018

Terry Fedorchak, Manager
Lower Makefield Township
1100 Edgewood Road
Morrisville, PA 19067

Re: Lower Makefield Township Act 537
Sewage Facilities Plan Special Study

Dear Mr. Fedorchak:

In accordance with applicable provisions of Chapter 71, Title 25 of the Pennsylvania Code the Morrisville Municipal Authority ("MMA") submits the following comments regarding the Lower Makefield Township Act 537 Sewage Facilities Plan Special Study ("LMT 537 Plan" or "Plan"). Observations and comments are based on content of the Plan as it, with appendices, appears on the LMT municipal website. The MMA did not receive a copy of the Plan independently from LMT. Please review and submit these comments pursuant to 25 Pa. Code §§ 71.31(c).

Although rich in detail, the interrelationships among subject municipalities, sewage collection systems, and wastewater treatment facilities are not difficult to understand when focused on relevant historical context. Chapter 1 of the LMT 537 Plan offers a summary. A timeline incorporating that summary follows:

1949: Engineers Albright & Friel submit a "Report to the Borough Council of Morrisville, on Sanitary Sewer System and Sewerage Treatment." Albright & Friel also circulated a memorandum dated December 12, 1951 stating that "*a study should be made with the thought in mind of providing the necessary sewage facilities for the areas which will be built beyond those which are now being developed.*"

1954: Morrisville accepts bids and begins construction of its public sewage collection system and sewer plant (WWTP).

1956: The new MMA sewer system and sewage treatment plant are completed and go online.

1960: Bucks County “Master Plan for Water Supply and Sewerage Facilities.” This is still before any public sewage collection system existed in Lower Makefield Township (or Yardley Borough). The MMA public sewage collection system and the MMA Wastewater Treatment Plant (WWTP) have been in service about four (4) years.

1964: The MMA, Lower Makefield Township, and Yardley Borough enter into the first Service Agreement allocating capacity to Yardley and LMT in the MMA WWTP.

Mid-1960’s: Lower Makefield and Yardley Borough build public sewage collection systems, and connect them to the MMA WWTP.

1969: Lower Makefield prepares its first “Sewage Facilities Plan.” It is incorporated into the 1970 Bucks County Act 537 Plan, which updates the 1960 County Master Plan.

1970: The 1970 Bucks County Act 537 Plan proposes that the MMA WWTP begin serving additional areas of LMT, as well as part of Upper Makefield Township by 1980.¹

1975: Development in Lower Makefield requires additional sewage treatment. LMT adopts a 1975 “Sewage Facilities Plan.” This continues to be the township’s “Official Sewage Facilities Plan.”

1977: The 1975 LMT Plan is incorporated into the “Bucks County Sewerage Facilities Plan Update.” It, again, alludes to extending sewer service into Upper Makefield with treatment to be provided by the MMA WWTP.

1990: There is a Lower Makefield Township 537 Plan revision to divert some flows to the Bucks County Water and Sewer Authority (BCWSA) Core Creek Interceptor, pending upgrades to the MMA WWTP. Those upgrades are completed in due course, and flows return to Morrisville.

1999: Lower Makefield 537 Plan is revised to provide sewage facilities planning for failing on-lot disposal systems. Those flows go to the MMA WWTP.

2014: Discussions begin among officials of Lower Makefield and Yardley Borough over concern about increasing capital expenditures.

2015: The MMA initiates public discussions of the need for building a new wastewater treatment facility, either in-place or at a new location. Those efforts, including meetings attended by LMT officials in October, 2015, January, 2016, as well as subsequent dates through 2017, are well documented and widely reported.

¹ The possibility of service to Upper Makefield had been mentioned in a July, 2015 correspondence outline of Morrisville’s regional wastewater planning needs. Letter of July 16, 2015; Executive Director to Board of Directors.

The point of the foregoing is to identify important pieces of Lower Makefield sewer history that are missing from the “Special Study” devoted to alternative sewage facilities planning. To put those bits into a more straightforward context:

- Old Ideas. The history of sewage facilities planning – whether in the form of the County “Master Plan;” pre-Act 537 Plans; Act 537 Plans; or, even, various service agreements among participating municipalities or agencies in furtherance of 537 planning – all include references to wastewater treatment facilities in Morrisville Borough/Falls Township serving a regional area including all of Lower Makefield, and also refer to Upper Makefield and Newtown Township.
- Planning dynamics. In the absence of capacity problems with the Neshaminy Interceptor, there is no LMT 537 Plan (i.e., no “Special Study”) and the situational dynamics are different. The MMA, however, would be no less engaged in planning for the new MMA facility; and, offering better treatment, at a new site, with more (or expandable) capacity, would be no less wise.
- There’s a Better Plan. Consequently, Lower Makefield has at least two broad paths to ameliorating its contribution to the capacity problems of the Neshaminy Interceptor: Collection system upgrades feeding into the Neshaminy Interceptor (the NICAP); or, Removing flows from the Neshaminy Interceptor.²

“However, the previous plans did not adequately address the hydraulic capacities of the Neshaminy Interceptor”

(See, LMT 537 Plan, page I-4)

Neither does this one.

Given the history – and certainly considering the more recent history cited above – it is a challenge to explain exclusion from the subject LMT 537 Plan of any reference to redirecting current BCWSA/Neshaminy Interceptor flows to the proposed new MMA wastewater treatment facility (“New WWTF”). The Lower Makefield Corrective Action Plan (CAP) approved by the Pennsylvania Department of Environmental Protection (PaDEP) less than six (6) months ago adopts sensible – required – Inflow & Infiltration (I/I) reduction, and pipe lining,

²“Neither this Supplemental Agreement nor the parties (sic) original Neshaminy Interceptor Participation Agreement shall prevent the Township from amending its Act 537 Plan to explore alternative options for collection and treatment of its flows, to the extent permitted by DEP, subject to approval of any other regulatory agencies having jurisdiction thereto (sic) and pursuant to laws and regulations regarding same; however, nothing in the preceding sentence shall relieve the Township of its obligation to pay for any outstanding bonds for which it is or may be responsible, as noted in prior Agreements between the parties.” See, first paragraph, item #3, “Supplemental Agreement Neshaminy Interceptor,” LMT 537 Plan, Appendix “A.”

recommendations. It includes pump station upgrades as well. But these measures probably should be implemented irrespective of any capacity crisis; and, the PaDEP acted in response to recommendations that presumed no opportunity to relieve flow from the Neshaminy Interceptor.

Without relieving even more flow, connection moratoriums remain more likely than not in a foreseeable future. Why would the LMT537 Plan not consider substantive relief to the “*hydraulic capacities of the Neshaminy Interceptor?*”

-
- Please consider and respond to, as appropriate, the following comments and questions:

1. The Executive Summary of the LMT 537 Plan asserts that “Lower Makefield Township took this opportunity to review its existing and proposed public sanitary sewer service areas, existing and future needs, resolve zoning inconsistencies, and provide guidance to future wastewater disposal policies and procedures.”

1.1 Was any review done, or were any calculations performed, that considered the feasibility of diverting flow from the Neshaminy Interceptor to the MMA WWTP?

1.2 It appears that the annual average daily flows from LMT into the Neshaminy Interceptor are (about) 1.085 MGD. The “twenty year planning horizon” flows are (about) 1.325 MGD. That represents an increase, after implementing all corrective action, of over 22%. What is being done to accommodate those increases?

2. The Morrisville Authority and LMT had, in the past, discussed diversion of the “Derbyshire” flows to the MMA WWTP.

2.1 Has any further consideration been given to that proposal?

2.2 Would redirecting Derbyshire flows provide substantive amelioration of LMT’s contribution to the Neshaminy Interceptor capacity problems?

3. Do you agree or disagree that the current LMT CAP does not adequately address the hydraulic capacities of the Neshaminy Interceptor over the next 20 years?

4. At a meeting of the Lower Makefield Board of Supervisors on February 7, 2018, it was announced that Sewer Engineer Fred Ebert would begin a study of alternatives to sending LMT sewer flows to the MMA WWTP.

- 4.1 Has that study begun?
 - 4.2 When is that study expected to conclude?
 - 4.3 Will the findings of that study have any impact on the findings of this LMT 537 Plan?
5. Two of the alternatives disclosed publicly were (a) sending all LMT flows to Philadelphia via the BCWSA Neshaminy Interceptor; and (b) sending all flows currently going to the Morrisville WWTP to the Lower Bucks Joint Municipal Authority WWTP.
- 5.1 Has each alternative been discussed with the respective sewer authority engineers; and, if so, when?
 - 5.2 Does the BCWSA have capacity to accept all current and future LMT flows?
 - 5.3 Does the LBJMA have capacity to accept all LMT flows currently being sent to the MMA WWTP?
 - 5.4 Has, or will, a cost analysis be done of each alternative?
6. It is the position of the Morrisville Municipal Authority that the comments and inquiries herein made are relevant to the sufficiency of the subject LMT 537 Plan. If you assert that any comment or inquiry is outside the scope of the subject LMT 537 Plan, please explain.

Diversion of the Neshaminy Interceptor flows to Morrisville would immediately eliminate Lower Makefield's "Neshaminy" problem. It is both permanent and yields long-term growth and capacity assurances. It offers adaptability to changing conditions, at far less cost, consistent with the Commonwealth's "State Water Plan" cited in the LMT 537 Plan.

And, if diversion does not also open capacity in the Neshaminy Interceptor to other municipalities, it certainly relieves capacity sufficiently to provide more deliberate planning possibilities for municipalities remaining in the BCWSA system. It does, in fact, give BCWSA the chance to plan for additional development in some of the Central and Upper Bucks reaches of its service areas.

A consideration in propounding these comments and questions is to assure that the Pennsylvania Department of Environmental Protection (PaDEP) weighs what we at the Morrisville Authority believe to be not only additional, but perchance more elegant, benefits to the increasingly clear plan to build a new WWTF on a new site.

Terry Fedorchak, Manager
Lower Makefield Township
April 2, 2018
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Please include this correspondence as part of the record of any further submissions which are required by the Pennsylvania Department of Environmental Protection regarding the Lower Makefield Township Act 537 Sewage Facilities Plan Special Study for Neshaminy Interceptor.

Thank you and your engineers for their considerable work. I or one of our appropriate engineering or legal consultants will be happy to receive your comments or questions, and to meet regarding the particular issues raised herein, at a mutually convenient time and place.

Sincerely,

John J. Warena
Executive Director

cc: Board of Directors
Robert M. Campbell, P.E.
Thomas J. Jennings, Esquire
Harry J. Glosser, Esquire
Fred Ebert, P.E.
Donna Suevo | Sewage Planning Supervisor
Elizabeth Mahoney | Environmental Group Manager
Kelly Boettlin | Sewage Planning Specialist

Bucks County, SS.

NOTICE

In accordance with the requirements of Title 25, Chapter 71 of the Pennsylvania Code, Lower Makefield Township is accepting written comments over the next 30 days on the proposed adoption of the Lower Makefield Township Official Sewage Facilities (Act 537) Special Study for the Neshaminy Interceptor.

This Special Study for the Neshaminy Interceptor addresses the long term sewage facilities planning for the portion of Lower Makefield Township where the public sanitary sewer needs are met by conveying the wastewater to the Bucks County Water and Sewer Authority (BCWSA) owned Neshaminy Interceptor.

The selected alternatives identified in the Special Study include upgrades to the Chanticleer and Brookstone Pump Stations, as well as implementation of a Corrective Action Plan (CAP) to identify and remove inflow and infiltration (I/I) from the existing sanitary sewer system. The proposed upgrades and additional capacity gained from these alternatives is expected to be adequate for the 20 year planning period.

Also incorporated into the Special Study is the alternative analysis and the selected alternatives of the BCWSA Neshaminy Interceptor Evaluation dated March 2015 (last revised January 2016). The alternative selected by BCWSA is the lining of the 30 inch, 33 inch, 36 inch and majority of 42 inch Interceptor plus lining the first 3,000 feet of 48" Interceptor plus construction of a relief sewer along the 54" portion of the Interceptor. Lower Makefield Township will pay its proportionate share of the BCWSA liner project.

There is a 30-day period during which the Special Study is available to be viewed at the Lower Makefield Township building at 1100 Edgewood Road, Yardley, PA 19067 between the normal hours of operation. The review period shall extend until the close of business on the thirtieth day after the date of this public notice. Written comments may be submitted to Terry Fedorchak, Township Manager, at the above Township Building address.

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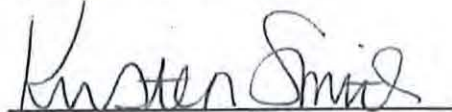
LOWER MAKEFIELD TOWNSHIP
1100 EDGEWOOD RD
YARDLEY, PA 19067

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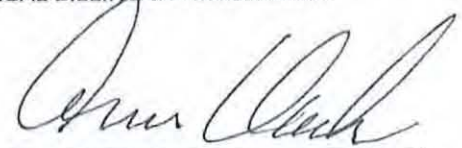
Kristen Smith being duly affirmed according to law, deposes and says that he/she is the Legal Billing Co-ordinator of the COURIER TIMES INCORPORATED, Publisher of The Bucks County Courier Times, a newspaper of general circulation, published and having its place of business at Levittown, Bucks County, Pa; that said newspaper was established in 1910; that securely attached hereto is a facsimile of the printed notice which is exactly as printed and published in said newspaper on

March 05, 2018

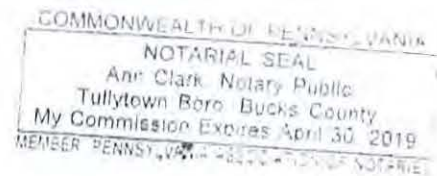
and is a true copy thereof; and that this affiant is not interested in said subject matter of advertising; and all of the allegations in this statement as to the time, place and character of publication are true.



LEGAL BILLING CO-ORDINATOR



Affirmed and subscribed to me before me this 5th day of March 2018 A.D.



PUBLIC NOTICE

In accordance with the requirements of Title 25, Chapter 71 of the Pennsylvania Code, Lower Makefield Township is accepting written comments over the next 30 days on the Official Sewage Facilities (Act 537) Special Study for Lower Makefield Township. This Plan provides for improved wastewater facilities in accordance with the Township's local and regional goals. The Act 537 Special Study proposes a Corrective Action Plan and Infiltration and Inflow abatement program for completion in a seven year timeline. The proposed corrective actions will reduce existing flows to the Neshaminy Interceptor and therefore comply with the Administrative Consent Order with Bucks County Water and Sewer Authority.

All written comments must be submitted within 30 days from date of this publication to:
Lower Makefield Township, 1100 Edgewood Road, Yardley, PA 19067 (267-274-1110).

**APPENDIX I – LOWER MAKEFIELD TOWNSHIP RESOLUTION FOR
PLAN REVISION**

LOWER MAKEFIELD TOWNSHIP, BUCKS COUNTY
RESOLUTION NO. 2374
OFFICIAL ACT 537 SEWAGE FACILITIES PLAN

Resolution of the Supervisors of Lower Makefield Township, Bucks County, Pennsylvania (herein after the Municipality).

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Protection (Department) adopted thereunder, Chapter 71 of Title 25 of the Pennsylvania Code, requires the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health hazards with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality, and

WHEREAS, Lower Makefield Township, has prepared said Official Act 537 Sewage Facilities Special Study which provides for sewage facilities for the portion of Lower Makefield Township that is currently serviced by the Neshaminy Interceptor and the selected alternative is the continuation of having the existing public sanitary sewer service areas wastewater needs met through conveyance of the wastewater through the Neshaminy Interceptor which is owned and operated by the Bucks County Water and Sewer Authority (BCWSA) to the Philadelphia Northeast Wastewater Control Plant for treatment. The following are the selected alternatives to service this portion of Lower Makefield Township:

Lower Makefield Township will pay their proportionate share for work to be completed by Bucks County Water and Sewer Authority (BCWSA) for the lining of the 30 inch, 33 inch, 36 inch, 42 inch and the first 3,000 feet of the 48 inch portions Neshaminy Interceptor plus construction of a relief sewer along the 54 inch portion of the Interceptor consistent with the selected alternatives from BCWSA for the Neshaminy Interceptor. The implementation of the Lower Makefield Township Corrective Action Plan to reduce infiltration and inflow to accommodate current and future sewage flow demand in the Township. The change of the Brookstone Pump Station to a submersible style pump station from a dry well wet well style pump station with an average daily flow capacity of 73,846 gpd. The upgrade of the existing Chanticleer Pump Station and force main that includes the installation of a new three inch force main (900 lf) in the same trench as the existing two inch force main as well as the replacement of the two existing pumps and controls to increase the permitted capacity of the pump station to an average daily flow of 25,714 gpd.

Lower Makefield Township is committed to implement the plan within the time limits established in the implementation schedule in accordance with Section 71.31(f) of the PA DEP's regulations.

WHEREAS, Lower Makefield Township finds that the Official Act 537 Plan described above conforms to applicable zoning, subdivision, other municipal ordinances and plans and a comprehensive program of pollution control and water quality management.

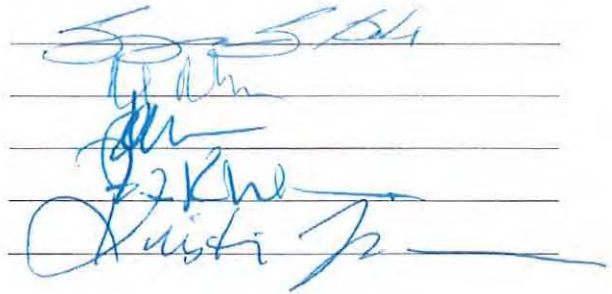
NOW, THEREFORE, BE IT RESOLVED that the Township of Lower Makefield hereby adopts and submits to the Department of Environmental Protection for its approval as a revision to the "Official Plan" of the Municipality, the above referenced Facility Plan. The Municipality hereby

assures the Department of the complete and timely implementation of the said plan as required by law. (Section 5, Pennsylvania Sewage Facilities Act as amended).

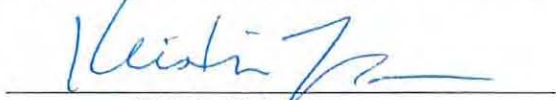
ATTEST



LOWER MAKEFIELD TOWNSHIP
BOARD OF SUPERVISORS



I, Kristin Tyler, Secretary, Lower Makefield Township Board of Supervisors, hereby certify that the foregoing is a true copy of the Township's Resolution No. 2374, adopted this 20th day of September, 2018.



Kristin Tyler

**APPENDIX J – ACT 537 PLAN CONTENT AND ENVIRONMENTAL
ASSESSMENT CHECKLIST**



INSTRUCTIONS FOR COMPLETING ACT 537 PLAN CONTENT AND ENVIRONMENTAL ASSESSMENT CHECKLIST

Remove and recycle these instructions prior to submission.

CHECKLIST INSTRUCTIONS

These instructions are designed to assist the applicant in completing the *Act 537 Plan Content and Environmental Assessment Checklist*.

This checklist is composed of three parts: one for "General Information," one for "Administrative Completeness," and one for "General Plan Content". A plan must be **administratively complete** in order to be formally reviewed by the Department of Environmental Protection (DEP). The "General Plan Content" portion of the checklist identifies each of the issues that must be addressed in your Act 537 Plan Update based on the pre-planning meeting between you and/or your consultant and DEP.

Use the right-hand column blanks in the checklist to identify the page in the plan on which each planning issue is found or to reference a previously approved update or special study (title and page number).

If you determine a planning issue is not applicable even though it was previously thought to be needed, please explain your decision within the text of the plan (or as a footnote) and indicate the page number where this documentation is found.

When information required as part of an official plan update revision has been developed separately or in a previous update revision, incorporate the information by reference to the planning document and page.

For specific details covering the Act 537 planning requirements, refer to 25 *Pa. Code* Chapters 71 and 73 of DEP's regulations.

Wastewater projects proposing funding through the following sources must prepare an "Environmental Report" as described in the Uniform Environmental Review (UER) process and include it with the plan submission designated as "Plan-Appendix A". The following funding programs use the UER process.

- The Clean Water State Revolving Loan Fund (PENNVEST, DEP, EPA)
- The RUS Water and Waste Disposal Grant and Loan Program (USDA-RD)
- The Community Development Block Grant Program (DCED, HUG)
- Other Federal Funding Efforts (EPA)

The checklist items or portions of checklist items required in the Act 537 Plan Update revision and that are also included in the UER process are indicated by shading. Most of the "Environmental Report" document may be constructed from the Act 537 Official Plan Update revision by using "copy & paste" techniques. The technical guidance document *Guidelines for the Uniform Environmental Review Process in Pennsylvania* (381-5511-111) is available electronically in DEP's eLibrary online at www.dep.pa.gov.

After Municipal Adoption by Resolution, submit 3 copies of the plan, any attachments or addenda and this checklist to DEP.

A copy of this completed checklist must be included with your Act 537 plan. DEP will use the "DEP USE ONLY" column during the completeness evaluation of the plan. This column may also be used by DEP during the pre-planning meeting with the municipality to identify planning elements that are not required to be included in the plan.



ACT 537 PLAN CONTENT AND ENVIRONMENTAL ASSESSMENT CHECKLIST

PART 1 GENERAL INFORMATION

A. Project Information

1. Project Name Lower Makefield Township Act 537 Special Study
2. Brief Project Description Act 537 Special Study for the Neshaminy Interceptor public sanitary sewer service area

B. Client (Municipality) Information

Municipality Name	County	City	Boro	Twp
Lower Makefield Township	Bucks	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Municipality Contact Individual - Last Name	First Name	MI	Suffix	Title
Fedorchak	Terry		Mr	Township Manager
Additional Individual Last Name	First Name	MI	Suffix	Title
Majewski	James	R	Mr	Director of Planning & Zoning
Municipality Mailing Address Line 1		Mailing Address Line 2		
1100 Edgewood Road				
Address Last Line -- City		State	ZIP+4	
Yardley		PA	19067	
Phone + Ext.	FAX (optional)	Email (optional)		
267-274-1110		tfedor@lmt.org jimm@lmt.org		

C. Site Information

Site (or Project) Name	(Municipal Name) Act 537 Plan
Neshaminy Interceptor Special Study	
Site Location Line 1	Site Location Line 2
Edgewood Road	

D. Project Consultant Information

Last Name	First Name	MI	Suffix
Ebert	Frederick	E	Mr
Title	Consulting Firm Name		
President	Ebert Engineering		
Mailing Address Line 1	Mailing Address Line 2		
PO Box 540	4092 Skippack Pike, Suite 202		
Address Last Line - City	State	ZIP+4	Country
Skippack	PA	19474	USA
Email	Phone + Ext.	FAX	
febert@ebertengineering.com	610-584-6701	610-584-6704	

PART 2 ADMINISTRATIVE COMPLETENESS CHECKLIST

DEP Use Only	Indicate Page #(s) in Plan	In addition to the main body of the plan, the plan must include items one through eight listed below to be accepted for formal review by DEP. Incomplete plans may be <i>denied</i> unless the municipality is clearly requesting an advisory review.
_____	<u>TOC</u>	1. Table of Contents 2. Plan Summary
_____	<u>i-ii</u>	A. Identify the proposed service areas and major problems evaluated in the plan. (Reference - 25 Pa. Code §71.21(a)(7)(i)).
_____	<u>ii-v</u>	B. Identify the alternative(s) chosen to solve the problems and serve the areas of need identified in the plan. Also, include any institutional arrangements necessary to implement the chosen alternative(s). (Reference - 25 Pa. Code §71.21(a)(7)(ii)).
_____	<u>ii-v</u>	C. Present the estimated cost of implementing the proposed alternative (including the user fees) and the proposed funding method to be used. (Reference - 25 Pa. Code §71.21(a)(7)(ii)).
_____	<u>vi</u>	D. Identify the municipal commitments necessary to implement the Plan. (Reference - 25 Pa. Code §71.21(a)(7)(iii)).
_____	<u>vi-vii</u>	E. Provide a schedule of implementation for the project that identifies the <i>major</i> milestones with dates necessary to accomplish the project to the point of operational status. (Reference - 25 Pa. Code §71.21(a)(7)(iv)).
_____	<u>Appx I</u>	3. Municipal Adoption: <i>Original</i> , signed and sealed Resolution of Adoption by the municipality which contains, at a minimum, alternatives chosen and a commitment to implement the Plan in accordance with the implementation schedule. (Reference - 25 Pa. Code §71.31(f)) Section V.F. of the Planning Guide.
_____	<u>Appx E, F, G</u>	4. Planning Commission / County Health Department Comments: Evidence that the municipality has requested, reviewed and considered comments by appropriate official planning agencies of the municipality, planning agencies of the county, planning agencies with area wide jurisdiction (where applicable), and any existing county or joint county departments of health. (Reference - 25 Pa. Code §71.31(b)) Section V.E.1 of the Planning Guide.
_____	<u>Appx H</u>	5. Publication: Proof of Public Notice which documents the proposed plan adoption, plan summary, and the establishment and conduct of a 30-day comment period. (Reference - 25 Pa. Code §71.31(c)) Section V.E.2 of the Planning Guide.
_____	<u>Appx H</u>	6. Comments and Responses: Copies of <i>all</i> written comments received and municipal response to <i>each</i> comment in relation to the proposed plan. (Reference - 25 Pa. Code §71.31(c)) Section V.E.2 of the Planning Guide.
_____	<u>vi-vii</u>	7. Implementation Schedule: A complete project implementation schedule with milestone dates specific for each existing and future area of need. Other activities in the project implementation schedule should be indicated as occurring a finite number of days from a major milestone. (Reference - 25 Pa. Code §71.31(d)) Section V.F. of the Planning Guide. Include dates for the future initiation of feasibility evaluations in the project's implementation schedule for areas proposing completion of sewage facilities for planning periods in excess of five years. (Reference - 25 Pa. Code §71.21(c)).
_____	_____	8. Consistency Documentation: Documentation indicating that the appropriate agencies have received, reviewed and concurred with the method proposed to resolve identified inconsistencies within the proposed alternative and consistency requirements in 25 Pa. Code §71.21(a)(5)(i-iii). (Reference - 25 Pa. Code §71.31(e)). Appendix B of the Planning Guide.

PART 3 GENERAL PLAN CONTENT CHECKLIST		
DEP Use Only	Indicate Page #(s) in Plan	Item Required
_____	<u>I</u>	I. Previous Wastewater Planning
_____		A. Identify, describe and briefly analyze all past wastewater planning for its impact on the current planning effort:
_____	<u>I-1 TO I-3</u>	1. Previously undertaken under the Pennsylvania Sewage Facilities Act (Act). (Reference - Act 537, 35 P.S. §750.5(d)(1)).
_____	<u>I-4 TO I-5</u>	2. Has not been carried out according to an approved implementation schedule contained in the plans. (Reference - 25 Pa. Code §71.21(a)(5)(i)(A-D)), Section V.F of the Planning Guide.
_____	<u>I-4 TO I-5</u>	3. Is anticipated or planned by applicable sewer authorities or approved under a Chapter 94 Corrective Action Plan. (Reference - 25 Pa. Code §71.21(a)(5)(i)(A&B)). Section V.D. of the Planning Guide.
_____	<u>I-4</u>	4. Through planning modules for new land development, planning "exemptions" and addenda. (Reference - 25 Pa. Code §71.21(a)(5)(i)(A)).
_____	<u>II</u>	II. Physical and Demographic Analysis utilizing written description and mapping (All items listed below require maps, and all maps should show all current lots and structures and be of appropriate scale to clearly show significant information).
_____	<u>II-1 TO II-3</u>	A. Identification of planning area(s), municipal boundaries, Sewer Authority/Management Agency service area boundaries. (Reference - 25 Pa. Code §71.21(a)(1)(i)).
_____	<u>II-6</u>	B. Identification of physical characteristics (streams, lakes, impoundments, natural conveyance, channels, drainage basins in the planning area). (Reference - 25 Pa. Code §71.21(a)(1)(ii)).
_____	<u>II-8 TO II-17</u>	C. Soils - Analysis with description by soil type and soils mapping for areas not presently served by sanitary sewer service. Show areas suitable for in-ground onlot systems, elevated sand mounds, individual residential spray irrigation systems (IRSIS), and areas unsuitable for soil dependent systems. (Reference - 25 Pa. Code §71.21(a)(1)(iii)). Show Prime Agricultural Soils and any locally protected agricultural soils. (Reference - 25 Pa. Code §71.21(a)(1)(iii)).
_____	<u>II-20</u>	D. Geologic Features - (1) Identification through analysis, (2) mapping and (3) their relation to existing or potential nitrate-nitrogen pollution and drinking water sources. Include areas where existing nitrate-nitrogen levels are in excess of 5 mg/L. (Reference - 25 Pa. Code §71.21(a)(1)(iii)).
_____	<u>II-22</u>	E. Topography - Depict areas with slopes that are suitable for conventional systems; slopes that are suitable for elevated sand mounds and slopes that are unsuitable for onlot systems. (Reference - 25 Pa. Code §71.21(a)(1)(ii)).
_____	<u>II-22</u>	F. Potable Water Supplies - Identification through mapping, description and analysis. Include public water supply service areas and available public water supply capacity and aquifer yield for groundwater supplies. (Reference - 25 Pa. Code §71.21(a)(1)(vi)). Section V.C. of the Planning Guide.
_____	<u>II-6</u>	G. Wetlands-Identify wetlands as defined in 25 Pa. Code Chapter 105 by description, analysis and mapping. Include National Wetland Inventory mapping and potential wetland areas per the United States Department of Agricultural (USDA) Natural Resources Conservation Service (NRCS) mapped hydric soils. Proposed collection, conveyance and treatment facilities and lines must be located and labeled, along with the identified wetlands, on the map. (Reference - 25 Pa. Code §71.21(a)(1)(v)). Appendix B, Section II.I of the Planning Guide.

_____	<u>III</u>	III. Existing Sewage Facilities in the Planning Area - Identifying the Existing Needs	A. Identify, map and describe municipal and non-municipal, individual and community sewerage systems in the planning area including:
_____	<u>III-1 TO III-8</u>		1. Location, size and ownership of treatment facilities, main intercepting lines, pumping stations and force mains including their size, capacity, point of discharge. Also include the name of the receiving stream, drainage basin, and the facility's effluent discharge requirements. (Reference - 25 Pa. Code §71.21(a)(2)(i)(A)).
_____	<u>III-1 TO III-8</u>		2. A narrative and schematic diagram of the facility's basic treatment processes including the facility's National Pollutant Discharge Elimination System (NPDES) permitted capacity, and the Clean Streams Law permit number. (Reference - 25 Pa. Code §71.21(a)(2)(i)(A)).
_____	<u>III-9 TO III-10</u>		3. A description of problems with existing facilities (collection, conveyance and/or treatment), including existing or projected overload under 25 Pa. Code Chapter 94 (relating to municipal wasteload management) or violations of the NPDES permit, Clean Streams Law permit, or other permit, rule or regulation of DEP. (Reference - 25 Pa. Code §71.21(a)(2)(i)(B)).
_____	<u>N/A</u>		4. Details of scheduled or in-progress upgrading or expansion of treatment facilities and the anticipated completion date of the improvements. Discuss any remaining reserve capacity and the policy concerning the allocation of reserve capacity. Also discuss the compatibility of the rate of growth to existing and proposed wastewater treatment facilities. (Reference - 25 Pa. Code §71.21(a)(4)(i & ii)).
_____	<u>N/A</u>		5. A detailed description of the municipality's operation and maintenance (O & M) requirements for small flow treatment facility systems, including the status of past and present compliance with these requirements and any other requirements relating to sewage management programs (SMPs). (Reference - 25 Pa. Code §71.21(a)(2)(i)(C)).
_____	<u>N/A</u>		6. Disposal areas, if other than stream discharge, and any applicable groundwater limitations. (Reference - 25 Pa. Code §71.21(a)(4)(i & ii)).
_____	<u>III-10</u>		B. Using DEP's publication titled <i>Act 537 Sewage Disposal Needs Identification</i> (3800-BK-DEP1949), identify, map and describe areas that utilize individual and community onlot sewage disposal and, unpermitted collection and disposal systems ("wildcat" sewers, borehole disposal, etc.) and retaining tank systems in the planning area including:
_____	<u>III-13 TO III-14</u>		1. The types of onlot systems in use. (Reference - 25 Pa. Code §71.21(a)(2)(ii)(A)).
_____	<u>N/A</u>		2. A sanitary survey complete with description, map and tabulation of documented and potential public health, pollution, and operational problems (including malfunctioning systems) with the systems, including violations of local ordinances, the Act, the Clean Stream Law or regulations promulgated thereunder. (Reference - 25 Pa. Code §71.21(a)(2)(ii)(B)).
_____	<u>N/A</u>		3. A comparison of the types of onlot sewage systems installed in an area with the types of systems which are appropriate for the area according to soil, geologic conditions, topographic limitations sewage flows, and 25 Pa. Code Chapter 73 (relating to standards for sewage disposal facilities). (Reference - 25 Pa. Code §71.21(a)(2)(ii)(C)).
_____	<u>N/A</u>		4. An individual water supply survey to identify possible contamination by malfunctioning onlot sewage disposal systems consistent with DEP's <i>Act 537 Sewage Disposal Needs Identification</i> publication. (Reference - 25 Pa. Code §71.21(a)(2)(ii)(B)).

_____	<u>N/A</u>	5. Detailed description of O & M requirements of the municipality for individual and small volume community onlot systems, including the status of past and present compliance with these requirements and any other requirements relating to SMPs. (Reference - 25 Pa. Code §71.21(a)(2)(i)(C)).
_____	<u>III-14</u>	C. Identify wastewater sludge and septage generation, transport and disposal methods. Include this information in the sewage facilities alternative analysis including:
_____	<u>III-14</u>	1. Location of sources of wastewater sludge or septage (Septic tanks, holding tanks, wastewater treatment facilities). (Reference – 25 Pa. Code §71.71).
_____	<u>III-14</u>	2. Quantities of the types of sludges or septage generated. (Reference - 25 Pa. Code §71.71).
_____	<u>III-14</u>	3. Present disposal methods, locations, capacities and transportation methods. (Reference - 25 Pa. Code §71.71).
_____	<u>IV</u>	IV. Future Growth and Land Development
_____	<u>IV-1</u>	A. Identify and briefly summarize all municipal and county planning documents adopted pursuant to the Pennsylvania Municipalities Planning Code (Act 247) including:
_____	<u>IV-3 TO IV-4</u>	1. All land use plans and zoning maps that identify residential, commercial, industrial, agricultural, recreational and open space areas. (Reference - 25 Pa. Code §71.21(a)(3)(iv)).
_____	<u>IV-5</u>	2. Zoning or subdivision regulations that establish lot sizes predicated on sewage disposal methods. (Reference – 25 Pa. Code §71.21(a)(3)(iv)).
_____	<u>III</u>	3. All limitations and plans related to floodplain and stormwater management and special protection (25 Pa. Code Chapter 93) areas. (Reference - 25 Pa. Code §71.21(a)(3)(iv)) Appendix B, Section II.F of the Planning Guide.
_____	<u>III-6 TO III-12</u>	B. Delineate and describe the following through map, text and analysis.
_____	<u>IV-5</u>	1. Areas with existing development or plotted subdivisions. Include the name, location, description, total number of equivalent dwelling units (EDUs) in development, total number of EDUs currently developed and total number of EDUs remaining to be developed (include time schedule for EDUs remaining to be developed). (Reference - 25 Pa. Code §71.21(a)(3)(i)).
_____	<u>IV-6 TO IV-14</u>	2. Land use designations established under the Pennsylvania Municipalities Planning Code (35 P.S. 10101-11202), including residential, commercial and industrial areas. (Reference - 25 Pa. Code §71.21(a)(3)(ii)). Include a comparison of proposed land use as allowed by zoning and existing sewage facility planning. (Reference - 25 Pa. Code §71.21(a)(3)(iv)).
_____	<u>IV-1 TO IV-5</u>	3. Future growth areas with population and EDU projections for these areas using historical, current and future population figures and projections of the municipality. Discuss and evaluate discrepancies between local, county, state and federal projections as they relate to sewage facilities. (Reference - 25 Pa. Code §71.21(a)(1)(iv) and (a)(3)(iii)).
_____	<u>IV-1 TO IV-5</u>	4. Zoning, and/or subdivision regulations; local, county or regional comprehensive plans; and existing plans of any other agency relating to the development, use and protection of land and water resources with special attention to: (Reference - 25 Pa. Code §71.21(a)(3)(iv)). --public ground/surface water supplies --recreational water use areas --groundwater recharge areas --industrial water use --wetlands

- _____ IV-7 TO
_____ IV-14
- _____ 5. Sewage planning necessary to provide adequate wastewater treatment for 5 and 10-year future planning periods based on projected growth of existing and proposed wastewater collection and treatment facilities. (Reference - 25 Pa. Code §71.21(a)(3)(v)).
- _____ V **V. Identify Alternatives to Provide New or Improved Wastewater Disposal Facilities**
- _____ V-1 A. Conventional collection, conveyance, treatment and discharge alternatives including:
- _____ V-1 1. The potential for regional wastewater treatment. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-1 2. The potential for extension of existing municipal or non-municipal sewage facilities to areas in need of new or improved sewage facilities. (Reference - 25 Pa. Code §71.21(a)(4)(i)).
- _____ V-1 3. The potential for the continued use of existing municipal or non-municipal sewage facilities through one or more of the following: (Reference - 25 Pa. Code §71.21(a)(4)(ii)).
- _____ V-1 a. Repair. (Reference - 25 Pa. Code §71.21(a)(4)(ii)(A)).
- _____ V-1 b. Upgrading. (Reference - 25 Pa. Code §71.21(a)(4)(ii)(B)).
- _____ V-1 c. Reduction of hydraulic or organic loading to existing facilities. (Reference - 25 Pa. Code §71.71).
- _____ V-1 d. Improved O & M. (Reference - 25 Pa. Code §71.21(a)(4)(ii)(C)).
- _____ V-1 e. Other applicable actions that will resolve or abate the identified problems. (Reference - 25 Pa. Code §71.21(a)(4)(ii)(D)).
- _____ V-1 4. Repair or replacement of existing collection and conveyance system components. (Reference - 25 Pa. Code §71.21(a)(4)(ii)(A)).
- _____ V-2 5. The need for construction of new community sewage systems including sewer systems and/or treatment facilities. (Reference - 25 Pa. Code §71.21(a)(4)(iii)).
- _____ V-2 6. Use of innovative/alternative methods of collection/conveyance to serve needs areas using existing wastewater treatment facilities. (Reference - 25 Pa. Code §71.21(a)(4)(ii)(B)).
- _____ V-2 B. The use of individual sewage disposal systems including IRSIS systems based on:
- _____ V-2 1. Soil and slope suitability. (Reference - 25 Pa. Code §71.21(a)(2)(ii)(C)).
- _____ V-2 2. Preliminary hydrogeologic evaluation. (Reference - 25 Pa. Code §71.21(a)(2)(ii)(C)).
- _____ V-2 3. The establishment of a SMP. (Reference - 25 Pa. Code §71.21(a)(4)(iv)). See also Part "F" below.
- _____ V-2 4. The repair, replacement or upgrading of existing malfunctioning systems in areas suitable for onlot disposal considering: (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-2 a. Existing technology and sizing requirements of 25 Pa. Code Chapter 73. (Reference - 25 Pa. Code §73.31-§73.72).
- _____ V-2 b. Use of expanded absorption areas or alternating absorption areas. (Reference - 25 Pa. Code §73.16).
- _____ V-2 c. Use of water conservation devices. (Reference - 25 Pa. Code §71.73(b)(2)(iii)).

- _____ V-2 C. The use of small flow sewage treatment facilities or package treatment facilities to serve individual homes or clusters of homes with consideration of: (Reference - 25 Pa. Code §71.64(d)).
- _____ V-2 1. Treatment and discharge requirements. (Reference - 25 Pa. Code §71.64(d)).
- _____ V-2 2. Soil suitability. (Reference - 25 Pa. Code §71.64(c)(1)).
- _____ V-2 3. Preliminary hydrogeologic evaluation. (Reference - 25 Pa. Code §71.64(c)(2)).
- _____ V-2 4. Municipal, Local Agency or other controls over O & M requirements through a SMP. (Reference - 25 Pa. Code §71.64(d)). See Part "F" below.
- _____ V-2 D. The use of community land disposal alternatives including:
- _____ V-2 1. Soil and site suitability. (Reference - 25 Pa. Code §71.21(a)(2)(ii)(C)).
- _____ V-2 2. Preliminary hydrogeologic evaluation. (Reference - 25 Pa. Code §71.21(a)(2)(ii)(C)).
- _____ V-2 3. Municipality, Local Agency or other controls over O & M requirements through a SMP. (Reference - 25 Pa. Code §71.21(a)(2)(ii)(C)). See Part "F" below.
- _____ V-2 4. The rehabilitation or replacement of existing malfunctioning community land disposal systems. (See Part "V", B, 4, a, b, c above). See also Part "F" below.
- _____ V-2 E. The use of retaining tank alternatives on a temporary or permanent basis including: (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-2 1. Commercial, residential and industrial use. (Reference - 25 Pa. Code §71.63(e)).
- _____ V-2 2. Designated conveyance facilities (pumper trucks). (Reference - 25 Pa. Code §71.63(b)(2)).
- _____ V-2 3. Designated treatment facilities or disposal site. (Reference - 25 Pa. Code §71.63(b)(2)).
- _____ V-2 4. Implementation of a retaining tank ordinance by the municipality. (Reference - 25 Pa. Code §71.63(c)(3)). See Part "F" below.
- _____ V-2 5. Financial guarantees when retaining tanks are used as an interim sewage disposal measure. (Reference - 25 Pa. Code §71.63(c)(2)).
- _____ V-3 F. SMPs to assure the future O & M of existing and proposed sewage facilities through:
- _____ V-3 1. Municipal ownership or control over the O & M of individual onlot sewage disposal systems, small flow treatment facilities, or other traditionally non-municipal treatment facilities. (Reference - 25 Pa. Code §71.21(a)(4)(iv)).
- _____ V-3 2. Required inspection of sewage disposal systems on a schedule established by the municipality. (Reference - 25 Pa. Code §71.73(b)(1)).
- _____ V-3 3. Required maintenance of sewage disposal systems including septic and aerobic treatment tanks and other system components on a schedule established by the municipality. (Reference - 25 Pa. Code §71.73(b)(2)).
- _____ V-3 4. Repair, replacement or upgrading of malfunctioning onlot sewage systems. (Reference - 25 Pa. Code §71.21(a)(4)(iv) and §71.73(b)(5)) through:
- _____ V-3 a. Aggressive pro-active enforcement of ordinances that require O & M and prohibit malfunctioning systems. (Reference - 25 Pa. Code §71.73(b)(5)).
- _____ V-3 b. Public education programs to encourage proper O & M and repair of sewage disposal systems.
- _____ V-3 5. Establishment of joint municipal SMPs. (Reference - 25 Pa. Code

- _____ §71.73(b)(8)).
- _____ V-3 6. Requirements for bonding, escrow accounts, management agencies or associations to assure O & M for non-municipal facilities. (Reference - 25 Pa. Code §71.71).
- _____ V-3 G. Non-structural comprehensive planning alternatives that can be undertaken to assist in meeting existing and future sewage disposal needs including: (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 1. Modification of existing comprehensive plans involving:
- _____ V-3 a. Land use designations. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 b. Densities. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 c. Municipal ordinances and regulations. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 d. Improved enforcement. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 e. Protection of drinking water sources. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 2. Consideration of a local comprehensive plan to assist in producing sound economic and consistent land development. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 3. Alternatives for creating or changing municipal subdivision regulations to assure long-term use of on-site sewage disposal that consider lot sizes and protection of replacement areas. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 4. Evaluation of existing local agency programs and the need for technical or administrative training. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 H. A no-action alternative which includes discussion of both short-term and long-term impacts on: (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 1. Water quality/public health. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 2. Growth potential (residential, commercial, industrial). (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 3. Community economic conditions. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 4. Recreational opportunities. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 5. Drinking water sources. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ V-3 6. Other environmental concerns. (Reference - 25 Pa. Code §71.21(a)(4)).
- _____ VI **VI. Evaluation of Alternatives**
- _____ VI-1 A. Technically feasible alternatives identified in Section V of this checklist must be evaluated for consistency with respect to the following: (Reference - 25 Pa. Code §71.21(a)(5)(i)).
- _____ VI-1 1. Applicable plans developed and approved under **Sections 4 and 5 of the Clean Streams Law or Section 208 of the Clean Water Act** (33 U.S.C.A. 1288). (Reference - 25 Pa. Code §71.21(a)(5)(i)(A)). Appendix B, Section II.A of the Planning Guide.
- _____ VI-1 2. Municipal wasteload management **Corrective Action Plans or Annual Reports** developed under 25 Pa. Code Chapter 94. (Reference - 25 Pa. Code §71.21(a)(5)(i)(B)). The municipality's recent Wasteload Management (25 Pa. Code Chapter 94) Reports should be examined to determine if the proposed alternative is consistent with the recommendations and findings of the report. Appendix B, Section II.B of the Planning Guide.
- _____ VI-1 3. Plans developed under **Title II of the Clean Water Act** (33 U.S.C.A.

1281-1299) or **Titles II and VI of the Water Quality Act of 1987** (33 U.S.C.A. 1251-1376). (Reference - 25 Pa. Code §71.21(a)(5)(i)(C)). Appendix B, Section II.E of the Planning Guide.

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| _____ | <u>VI-2</u> | 4. Comprehensive plans developed under the Pennsylvania Municipalities Planning Code. (Reference - 25 Pa. Code §71.21(a)(5)(i)(D)). The municipality's comprehensive plan must be examined to assure that the proposed wastewater disposal alternative is consistent with land use and all other requirements stated in the comprehensive plan. Appendix B, Section II.D of the Planning Guide. |
| _____ | <u>VI-2</u> | 5. Antidegradation requirements as contained in 25 Pa. Code Chapters 93, 95 and 102 (relating to water quality standards, wastewater treatment requirements and erosion control) and the Clean Water Act. (Reference - 25 Pa. Code §71.21(a)(5)(i)(E)). Appendix B, Section II.F of the Planning Guide. |
| _____ | <u>VI-2</u> | 6. State Water Plans developed under the Water Resources Planning Act (42 U.S.C.A. 1962-1962 d-18). (Reference - 25 Pa. Code §71.21(a)(5)(i)(F)). Appendix B, Section II.C of the Planning Guide. |
| _____ | <u>VI-3</u> | 7. Pennsylvania Prime Agricultural Land Policy contained in Title 4 of the Pennsylvania Code, Chapter 7, Subchapter W. Provide narrative on local municipal policy and an overlay map on prime agricultural soils. (Reference - 25 Pa. Code §71.21(a)(5)(i)(G)). Appendix B, Section II.G of the Planning Guide. |
| _____ | <u>VI-3</u> | 8. County Stormwater Management Plans approved by DEP under the Storm Water Management Act (32 P.S. 680.1-680.17). (Reference - 25 Pa. Code §71.21(a)(5)(i)(H)). Conflicts created by the implementation of the proposed wastewater alternative and the existing recommendations for the management of stormwater in the county Stormwater Management Plan must be evaluated and mitigated. If no plan exists, no conflict exists. Appendix B, Section II.H of the Planning Guide. |
| _____ | <u>VI-4</u> | 9. Wetland Protection. Using wetland mapping developed under Checklist Section II.G, identify and discuss mitigative measures including the need to obtain permits for any encroachments on wetlands from the construction or operation of any proposed wastewater facilities. (Reference - 25 Pa. Code §71.21(a)(5)(i)(I)) Appendix B, Section II.I of the Planning Guide. |
| _____ | <u>VI-4</u> | 10. Protection of rare, endangered or threatened plant and animal species as identified by the Pennsylvania Natural Diversity Inventory (PNDI). (Reference - 25 Pa. Code §71.21(a)(5)(i)(J)). Provide DEP with a copy of the completed <i>PNDI Manual Project Submission Form</i> . Also provide a copy of the response letters from the 4 jurisdictional agencies regarding the findings of the PNDI search. Appendix B, Section II.J of the Planning Guide. |
| _____ | <u>VI-4</u> | 11. Historical and archaeological resource protection under P.C.S. Title 37, Section 507 relating to cooperation by public officials with the Pennsylvania Historical and Museum Commission (PHMC). (Reference - 25 Pa. Code §71.21(a)(5)(i)(K)). Provide DEP with a completed copy of a <i>Cultural Resource Notice</i> and a return receipt for its submission to PHMC. Provide a copy of the response letter or review stamp from the Bureau of Historic Preservation (BHP) indicating the project will have no effect on, or that there may be potential impacts on, known archaeological and historical sites and any avoidance and mitigation measures required. Appendix B, Section II.K of the Planning Guide. |

- _____ VI-4 B. Provide for the resolution of any inconsistencies in any of the points identified in Section VI.A. of this checklist by submitting a letter from the appropriate agency stating that the agency has received, reviewed and concurred with the resolution of identified inconsistencies. (Reference - 25 Pa. Code §71.21(a)(5)(ii)). Appendix B of the Planning Guide.
- _____ VI-4 TO VI-12 C. Evaluate alternatives identified in Section V of this checklist with respect to applicable water quality standards, effluent limitations or other technical, legislative or legal requirements. (Reference - 25 Pa. Code §71.21(a)(5)(iii)).
- _____ VI-4 TO VI-12 D. Provide cost estimates using present worth analysis for construction, financing, ongoing administration, O & M and user fees for alternatives identified in Section V of this checklist. Estimates shall be limited to areas identified in the plan as needing improved sewage facilities within 5 years from the date of plan submission. (Reference - 25 Pa. Code §71.21(a)(5)(iv)).
- _____ VI-12 TO VI-13 E. Provide an analysis of the funding methods available to finance the proposed alternatives evaluated in Section V of this checklist. Also provide documentation to demonstrate which alternative and financing scheme combination is the most cost-effective; and a contingency financial plan to be used if the preferred method of financing cannot be implemented. The funding analysis shall be limited to areas identified in the plan as needing improved sewage facilities within 5 years from the date of the plan submission. (Reference - 25 Pa. Code §71.21(a)(5)(v)).
- _____ VI-13 F. Analyze the need for immediate or phased implementation of each alternative proposed in Section V of this checklist including: (Reference - 25 Pa. Code §71.21(a)(5)(vi)).
- _____ VI-13 1. A description of any activities necessary to abate critical public health hazards pending completion of sewage facilities or implementation of SMPs. (Reference - 25 Pa. Code §71.21(a)(5)(vi)(A)).
- _____ VI-13 2. A description of the advantages, if any, in phasing construction of the facilities or implementation of a SMP justifying time schedules for each phase. (Reference - 25 Pa. Code §71.21(a)(5)(vi)(B)).
- _____ VI-13 G. Evaluate administrative organizations and legal authority necessary for plan implementation. (Reference - 25 Pa. Code §71.21(a)(5)(vi)(D)).
- _____ VII **VII. Institutional Evaluation**
- _____ VII-1 A. Provide an analysis of all existing wastewater treatment authorities, their past actions and present performance including:
- _____ VII-1 1. Financial and debt status. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 2. Available staff and administrative resources. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 3. Existing legal authority to:
- _____ VII-1 a. Implement wastewater planning recommendations. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 b. Implement system-wide O & M activities. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 c. Set user fees and take purchasing actions. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 d. Take enforcement actions against ordinance violators. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 e. Negotiate agreements with other parties. (Reference - 25 Pa. Code §71.61(d)(2)).

- _____ VII-1 f. Raise capital for construction and O & M of facilities. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 B. Provide an analysis and description of the various institutional alternatives necessary to implement the proposed technical alternatives including:
- _____ VII-1 1. Need for new municipal departments or municipal authorities. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 2. Functions of existing and proposed organizations (sewer authorities, onlot maintenance agencies, etc.). (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 3. Cost of administration, implementability, and the capability of the authority/agency to react to future needs. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 C. Describe all necessary administrative and legal activities to be completed and adopted to ensure the implementation of the recommended alternative including:
- _____ VII-1 1. Incorporation of authorities or agencies. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 2. Development of all required ordinances, regulations, standards and inter-municipal agreements. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 3. Description of activities to provide rights-of-way, easements and land transfers. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 4. Adoption of other municipal sewage facilities plans. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 5. Any other legal documents. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VII-1 6. Dates or timeframes for items 1-5 above on the project's implementation schedule.
- _____ VII-2 D. Identify the proposed institutional alternative for implementing the chosen technical wastewater disposal alternative. Provide justification for choosing the specific institutional alternative considering administrative issues, organizational needs and enabling legal authority. (Reference - 25 Pa. Code §71.61(d)(2)).
- _____ VIII-1 TO VIII-5 **VIII. Implementation Schedule and Justification for Selected Technical & Institutional Alternatives**
- _____ VIII-1 TO VIII-5 A. Identify the technical wastewater disposal alternative which best meets the wastewater treatment needs of each study area of the municipality. Justify the choice by providing documentation which shows that it is the best alternative based on:
- _____ VIII-1 TO VIII-5 1. Existing wastewater disposal needs. (Reference - 25 Pa. Code §71.21(a)(6)).
- _____ VIII-1 TO VIII-5 2. Future wastewater disposal needs. (5 and 10 year growth areas). (Reference - 25 Pa. Code §71.21(a)(6)).
- _____ VIII-1 TO VIII-5 3. O & M considerations. (Reference - 25 Pa. Code §71.21(a)(6)).
- _____ VIII-1 TO VIII-5 4. Cost-effectiveness. (Reference - 25 Pa. Code §71.21(a)(6)).
- _____ VIII-1 TO VIII-5 5. Available management and administrative systems. (Reference - 25 Pa. Code §71.21(a)(6)).
- _____ VIII-1 TO VIII-5 6. Available financing methods. (Reference - 25 Pa. Code §71.21(a)(6)).
- _____ VIII-1 TO VIII-5 7. Environmental soundness and compliance with natural resource planning and preservation programs. (Reference - 25 Pa. Code §71.21(a)(6)).

- _____ VIII-6 B. Designate and describe the capital financing plan chosen to implement the selected alternative(s). Designate and describe the chosen back-up financing plan. (Reference - 25 Pa. Code §71.21(a)(6))
- _____ VIII-6 C. Designate and describe the implementation schedule for the recommended alternative, including justification for any proposed phasing of construction or implementation of a SMP. (Reference – 25 Pa. Code §71.31(d))

_____ _____ **IX. Environmental Report (ER) generated from the UER Process**

- _____ _____ A. Complete an ER as required by the UER process and as described in the DEP Technical Guidance (381-5511-111). Include this document as "Appendix A" to the Act 537 Plan Update Revision. **Note: An ER is required only for Wastewater projects proposing funding through any of the funding sources identified in the UER.**

ADDITIONAL REQUIREMENTS FOR PENNVEST PROJECTS

Municipalities that propose to implement their official sewage facilities plan updates with PENNVEST funds must meet 6 additional requirements to be eligible for such funds. See *A Guide for Preparing Act 537 Update Revisions* (362-0300-003), Appendix N for greater detail or contact the DEP regional office serving your county listed in Appendix J of the same publication.

DEP Use Only	Indicate Page #(s) in Plan	Item Required
_____	_____	1. Environmental Impact Assessment. (Planning Phase) The UER replaces the Environmental Impact Assessment that was a previous requirement for PENNVEST projects.
_____	_____	2. Cost Effectiveness (Planning Phase) The cost-effectiveness analysis should be a present-worth (or equivalent uniform annual) cost evaluation of the principle alternatives using the interest rate that is published annually by the Water Resources Council. Normally, for PENNVEST projects the applicant should select the most cost-effective alternative based upon the above analysis. Once the alternative has been selected the user fee estimates should be developed based upon interest rates and loan terms of the selected funding method.
_____	_____	3. Second Opinion Project Review. (Design Phase)
_____	_____	4. Minority Business Enterprise/Women's Business Enterprise (Construction Phase)
_____	_____	5. Civil Rights. (Construction Phase)
_____	_____	6. Initiation of Operation/Performance Certification. (Post-construction Phase)

I/A TECHNOLOGIES

PARTIAL LISTING OF INNOVATIVE AND ALTERNATIVE TECHNOLOGIES

TREATMENT TECHNOLOGIES

Aquaculture
Aquifer Recharge
Biological Aerated Filters
Constructed Wetlands
Direct Reuse (NON-POTABLE)
Horticulture
Overland Flow
Rapid Infiltration
Silviculture
Microscreens
Controlled Release Lagoons
Swirl Concentrator

SLUDGE TREATMENT TECHNOLOGIES

Aerated Static Pile Composting
Enclosed Mechanical Composting (In vessel)
Revegetation of Disturbed Land
Aerated Windrow Composting

ENERGY RECOVERY TECHNOLOGIES

Anaerobic Digestion with more than 90 percent
Methane Recovery
Cogeneration of Electricity
Self-Sustaining Incineration

**INDIVIDUAL & SYSTEM-WIDE
COLLECTION TECHNOLOGIES**

Cluster Systems
Septage Treatment
Small Diameter Gravity Sewers
Step Pressure Sewers
Vacuum Sewers
Variable Grade Sewers
Septic Tank Effluent Pump with
Pressure Sewers