
EXHIBIT E1

**CHAPTER 94 REPORT FOR 2016 -
KING ROAD WASTE WATER TREATMENT FACILITY**

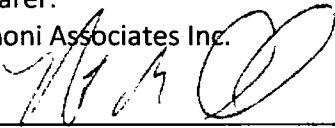
**CHAPTER 94
MUNICIPAL WASTELOAD MANAGEMENT
ANNUAL REPORT**

2016

**LIMERICK TOWNSHIP
KING ROAD WWTP SERVICE AREA
MONTGOMERY COUNTY, PENNSYLVANIA**

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LMSD 0100.2016

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1.0 INTRODUCTION

This Report is submitted in compliance with the latest regulation set forth under Title 25, Part I, Subpart C, Article II, Chapter 94 Municipal Wasteload Management Regulations of the Pennsylvania Department of Environmental Protection (PADEP) concerning sewerage facilities.

1.1 Delineation of Sewerage Service Areas

Limerick Township, Montgomery County, PA borders Upper Frederick and New Hanover Townships to the north; Lower Frederick Township to the northeast; Lower Pottsgrove Township to the northwest; Perkiomen Township to the east; Upper Providence Township to the southeast; the Borough of Royersford to the south and Chester County boundaries to the west.

The size of the Township is approximately 22 square miles. Approximately 75% of the township is zoned residential, 22% industrial and 3% commercial. The Township zoning ordinance allows for a number of land uses as described below.

- **Residential-Agricultural (R-1)** is intended to preserve agricultural and natural areas while allowing limited compatible residential development. This encompasses much of the land north of Ridge Pike.
- **Low Density Residential (R-2)** is intended to provide residential neighborhoods that primarily include single family detached dwelling units at a low density
- **Medium Density Residential (R-3)** is intended for residential neighborhoods with a mix of dwelling types at a medium density.
- **Medium-High Density Residential (R-4)** is intended for a mix of housing types at medium- high densities around village centers.
- **Village Residential (R-5)** is intended for a mix of housing types and densities within a village area, with emphasis on pedestrian circulation.
- **Mobile Home Park (MHP)** is intended to provide that mobile homes are integrated into the community.
- **Village Commercial (VC)** is intended to encourage compact mixed development within the historic village areas.
- **Retail Business (RB)** is intended to encourage commercial development that is less restrictive than the VC district, but less permissive than the HC district.
- **Highway Commercial (HC)** is intended to focus larger commercial development in areas where public facilities and appropriate lot sizes are available.
- **Office/Limited Industrial (O/LI)** is intended to provide appropriate areas for a mix of business oriented land uses.
- **Limited Light Industrial (LLI)** is intended for a wide range of industrial uses while avoiding heavy industrial uses that are likely to cause nuisances and hazards.

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- **Heavy Industrial (HI)** is intended for a wide range of industrial uses and complementary commercial uses. A coordinated interior road system and control of nuisances and hazards are encouraged.
- **Heavy Industrial and Energy (HI/E)** is intended to provide appropriate areas for heavy industrial use.

The Township has entered into an inter-municipal Sewer Agreement with the downstream municipality, Borough of Royersford, to provide for sewer conveyance, and treatment of wastewater at the Royersford Wastewater Treatment Plant. The Agreements establish the following items: terms of the relationship; location of connection points; flow limits, loading and billing information; and other necessary requirements for the wastewater which passes through the Borough of Royersford's sewer collection and conveyance system. A copy of the inter-municipal sewer agreement can be found in Appendix D.

1.2 General Description of Existing Sewage Facilities

-
- The wastewater system in the Township consists of multiple collectors and interceptors ranging in size from eight (8) to thirty-six (36) inches, seventeen (17) dedicated sewage pumping stations, a 1.7 MGD wastewater treatment plant (King Road) and a 0.7 MGD wastewater treatment plant (Possum Hollow). The wastewater systems are owned and operated by Limerick Township, which took ownership and operational responsibility from the Municipal Authority in September 2008.

1.3 Description of Treatment Plant

The King Road Wastewater Treatment Plant (WWTP) was built in 2007 and is located at 529 King Road. The primary source of wastewater is residential, although there are several industrial and commercial operations located throughout the Township. All of the WWTP's incoming sewage flows thru a 16" diameter force main that runs from Pump Station #6 located in Limerick Center and Plaza.

Under NPDES Permit # PA0051934 (expires at midnight on 2/29/2020), the plant is permitted for the following:

Flow:

Design	1.70 MGD
One (1) Hour Peak	5.10 MGD
Sustained Peak	4.80 MGD

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Influent:

	Average	Maximum Daily
BOD ₅	3,900 ppd	6,238 ppd
TSS	3,900 ppd	6,238 ppd
NH ₃ -N	709 ppd	1,133 ppd

Effluent:

BOD ₅	10 mg/l
TSS	15 mg/l
NH ₃ -N	1.0 mg/l

The treatment process at the King Road Wastewater Treatment Plant is summarized below.

- A pretreatment process contained within and around the headworks building consisting of a mechanical fine screen, aerated grit chamber, and grit classifier.
- The plant utilizes an AeroMod activated sludge biological treatment system that includes two-stage aeration and clarification.
- In-line ultraviolet disinfection and effluent metering.
- Two (2) aerobic sludge digesters and holding tanks converted from the former treatment units. Sludge is mechanically thickened by a rotary drum thickener and then hauled off-site.

Treated effluent is discharged to the Schuylkill River.

All sludge generated at the WWTP is hauled away as thickened liquid to the Pottstown Wastewater Treatment Plant for further processing before final disposal.

The overall condition of the WWTP is in good condition, operating well and consistently producing effluent that meets the permitted requirements.

At the WWTP, Township staff monitors and visually inspects the treatment processes and supporting mechanical equipment daily for any signs of failure or malfunctioning. Discharge Monitoring Reports (DMRs) are generated and forwarded to the PaDEP monthly, providing useful data of the WWTP operation to produce a clean effluent in accordance with the NPDES effluent limitation. The frequency of sampling and analysis for the final effluent can be found in the NPDES permit which is provided in Appendix D.

The WWTP was designed, permitted, and built in 2007 without an influent flow meter. The Township currently utilizes the measured effluent flow for calculating and reporting the loadings at the WWTP. Since there are no equalization facilities at the WWTP, the effluent flow measured after final treatment also reasonably measures the flow coming

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into the plant. Should daily flows increase, Township staff then inspect the collection system for leaks. The Township is currently working towards ascertaining a method to meet the DEP's request of influent flow monitoring that is able to continuously measure, indicate, and report the flows entering the WWTP. This may include metering the influent/effluent at the two (2) pump stations that feed the WWTP and then adding the flows together to determine the influent loading at the plant.

Routine maintenance is performed at the WWTP on a regular basis. Maintenance includes the following:

- Service/lubricate equipment
- Monthly exercising of the emergency generator
- Wet wells are cleaned
- Weirs are cleaned
- Pumps are checked for wear
- Meters calibrated (calibration records are provided in the Appendix D).

There were no major repairs or rehabilitation of equipment at the WWTP in 2016.

1.4 Current WWTP Service Area

The Township's existing sewerage facilities map is located in Appendix B. The King Road plant serves approximately 10.8 square miles and, as of December 31, 2016, consists of the approximately 6,799 EDUs.

The current service area for the WWTP consists of the connections found in Table 1.4-A. These connections are either existing or under construction (connection by lateral). Total Connections are based on number of water billing users, residential and non-residential. There were 137 connections constructed and/or connected in 2016 as can be seen on Table 1.4-A. Proposed and/or projected connections can be found in Table 2.2-A and is discussed in section 2.2 of this report

As previously mentioned, the Township has entered into inter-municipal Sewer Agreements with the downstream municipality, Borough of Royersford, to provide for sewer conveyance, and treatment of wastewater at the Royersford Wastewater Treatment Plant. Limerick Township has 103 connections resulting in an estimated 127 EDUs that discharge from the Chester View Apartments development into the Borough of Royersford's collection system.

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Limerick Township Sewer Department
2016 Wasteload Management Report

Table 1.4-A

2016 Connection Data

Connection Date	Address	Town	EDU'S	Type	Sewage Service Area	Pump Station Service
1/5/2016	29 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #2
1/8/2016	50 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #2
1/8/2016	100 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	101 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	102 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	103 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	104 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	105 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	106 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	107 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	108 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	109 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	110 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	111 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	112 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	113 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	114 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	115 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	116 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	117 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	118 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	119 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	120 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/8/2016	121 Dogwood Ct.	Royersford	1	Residential	King Road WWTP	PS #5
1/13/2016	100 Cypress Ct, Apt 110	Royersford	1	Residential	King Road WWTP	PS #5
1/14/2016	100 Cypress Ct, Apt 111	Royersford	1	Residential	King Road WWTP	PS #5
1/15/2016	318 Graterford Rd.	Schwenksville	1	Residential	King Road WWTP	PS #20
1/15/2016	100 Cypress Ct, Apt 114	Royersford	1	Residential	King Road WWTP	PS #5
1/16/2016	100 Cypress Ct, Apt 116	Royersford	1	Residential	King Road WWTP	PS #5
1/17/2016	100 Cypress Ct, Apt 117	Royersford	1	Residential	King Road WWTP	PS #5
1/18/2016	100 Cypress Ct, Apt 124	Royersford	1	Residential	King Road WWTP	PS #5
1/19/2016	100 Cypress Ct, Apt 210	Royersford	1	Residential	King Road WWTP	PS #5
1/20/2016	100 Cypress Ct, Apt 211	Royersford	1	Residential	King Road WWTP	PS #5
1/21/2016	12 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
1/21/2016	35 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
1/21/2016	100 Cypress Ct, Apt 212	Royersford	1	Residential	King Road WWTP	PS #5
1/22/2016	100 Cypress Ct, Apt 213	Royersford	1	Residential	King Road WWTP	PS #5
1/23/2016	100 Cypress Ct, Apt 214	Royersford	1	Residential	King Road WWTP	PS #5
1/24/2016	100 Cypress Ct, Apt 215	Royersford	1	Residential	King Road WWTP	PS #5

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1/25/2016	100 Cypress Ct, Apt 216	Royersford	1	Residential	King Road WWTP	PS #5
1/26/2016	100 Cypress Ct, Apt 217	Royersford	1	Residential	King Road WWTP	PS #5
1/27/2016	33 Mt. Veiw Ln	Schwenksville	1	Residential	King Road WWTP	PS #20
1/27/2016	100 Cypress Ct, Apt 310	Royersford	1	Residential	King Road WWTP	PS #5
1/28/2016	100 Cypress Ct, Apt 311	Royersford	1	Residential	King Road WWTP	PS #5
1/29/2016	100 Cypress Ct, Apt 312	Royersford	1	Residential	King Road WWTP	PS #5
1/30/2016	100 Cypress Ct, Apt 313	Royersford	1	Residential	King Road WWTP	PS #5
1/31/2016	100 Cypress Ct, Apt 314	Royersford	1	Residential	King Road WWTP	PS #5
2/1/2016	100 Cypress Ct, Apt 315	Royersford	1	Residential	King Road WWTP	PS #5
2/2/2016	7 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
2/2/2016	54 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #2
2/2/2016	100 Cypress Ct, Apt 316	Royersford	1	Residential	King Road WWTP	PS #5
2/3/2016	100 Cypress Ct, Apt 317	Royersford	1	Residential	King Road WWTP	PS #5
3/9/2016	67 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #2
3/9/2016	66 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #2
3/9/2016	314 Graterford Rd.	Schwenksville	1	Residential	King Road WWTP	PS #20
3/10/2016	16 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
3/15/2016	20 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
3/21/2016	46 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
4/1/2016	65 Putter Ln	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
4/1/2016	131 Masters Dr	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
4/5/2016	5 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #2
4/12/2016	10 Mountain View Ln	Schwenksville	1	Residential	King Road WWTP	PS #20
4/20/2016	3383 Pruss Hill Rd.	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
4/25/2016	29 Mountain View Ln	Schwenksville	1	Residential	King Road WWTP	PS #20
5/4/2016	116 Redwood Dr.	Royersford	1	Residential	King Road WWTP	PS #5
5/4/2016	204 Redwood Dr.	Royersford	1	Residential	King Road WWTP	PS #5
5/4/2016	104 Sage Ct.	Royersford	1	Residential	King Road WWTP	PS #5
5/4/2016	116 Sage Ct.	Royersford	1	Residential	King Road WWTP	PS #5
5/5/2016	46 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #3
5/10/2016	196 W Ridge Pike	Limerick	2	Commercial	King Road WWTP	PS #10
5/10/2016	708-712 W Ridge Pike	Limerick	4	Commercial	Possum Hollow WWTP	PS #18
5/11/2016	341 Sunset Rd.	Schwenksville	1	Residential	King Road WWTP	PS #20
5/17/2016	58 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #3
5/18/2016	108 Sage Ct	Royersford	1	Residential	King Road WWTP	PS #5
5/19/2016	36 W Ridge Pike Ste 101	Limerick	1	Commercial	King Road WWTP	PS #6
5/23/2016	57 Mt View Ln	Schwenksville	1	Residential	King Road WWTP	PS #20
5/25/2016	9 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
5/25/2016	29 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
5/26/2016	208 Redwood Dr.	Royersford	1	Residential	King Road WWTP	PS #5
5/26/2016	124 Sage Ct.	Royersford	1	Residential	King Road WWTP	PS #5

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5/26/2016	312 Redwood Dr	Royersford	1	Residential	King Road WWTP	PS #5
5/26/2016	320 Redwood Dr	Royersford	1	Residential	King Road WWTP	PS #5
5/26/2016	212 Redwood Dr	Royersford	1	Residential	King Road WWTP	PS #5
5/26/2016	108 Redwood Dr.	Royersford	1	Residential	King Road WWTP	PS #5
5/26/2016	304 Redwood Dr.	Royersford	1	Residential	King Road WWTP	PS #5
5/26/2016	500 Redwood Dr. Apt 116	Royersford	1	Residential	King Road WWTP	PS #5
6/3/2016	400 Redwood Dr Apt 310	Royersford	1	Residential	King Road WWTP	PS #5
6/15/2016	25 Mt. View Ln	Schwenksville	1	Residential	King Road WWTP	PS #20
6/15/2016	86 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #3
6/15/2016	71 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #3
6/20/2016	36 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
6/20/2016	12 Tee Ct.	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
6/21/2016	500 Redwood Dr. Apt 212	Royersford	1	Residential	King Road WWTP	PS #5
6/21/2016	500 Redwood Dr. Apt 313	Royersford	1	Residential	King Road WWTP	PS #5
6/21/2016	316 Redwood Dr.	Royersford	1	Residential	King Road WWTP	PS #5
6/27/2016	500 Redwood Dr. Apt 311	Royersford	1	Residential	King Road WWTP	PS #5
6/27/2016	120 Sage Ct.	Royersford	1	Residential	King Road WWTP	PS #5
6/28/2016	26 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
6/30/2016	500 Redwood Dr. Apt 210	Royersford	1	Residential	King Road WWTP	PS #5
6/30/2016	9 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #3
7/7/2016	24 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
7/13/2016	400 Redwood Dr. Apt 111	Royersford	1	Residential	King Road WWTP	PS #5
7/13/2016	400 Redwood Dr. Apt 110	Royersford	1	Residential	King Road WWTP	PS #5
7/20/2016	42 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
7/20/2016	44 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
7/28/2016	400 Redwood Dr. Apt 13	Royersford	1	Residential	King Road WWTP	PS #5
7/28/2016	500 Redwood Dr. Apt 213	Royersford	1	Residential	King Road WWTP	PS #5
7/28/2016	308 Redwood Dr.	Royersford	1	Residential	King Road WWTP	PS #5
7/28/2016	400 Redwood Dr. Apt 212	Royersford	1	Residential	King Road WWTP	PS #5
8/8/2016	38 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
8/8/2016	112 Sage Ct.	Royersford	1	Residential	King Road WWTP	PS #5
8/8/2016	400 Redwood Dr. Apt 213	Royersford	1	Residential	King Road WWTP	PS #5
8/9/2016	33 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
8/10/2016	328 Sunset Rd.	Schwenksville	1	Residential	King Road WWTP	PS #11
8/11/2016	50 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
8/25/2016	53 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
8/25/2016	345 Sunset Rd.	Schwenksville	1	Residential	King Road WWTP	PS #11
8/26/2016	400 Redwood Dr. Apt 312	Royersford	1	Residential	King Road WWTP	PS #5
8/30/2016	1 Phaeton Way	Royersford	1	Residential	King Road WWTP	PS #3
8/30/2016	400 Redwood Dr. Apt 210	Royersford	1	Residential	King Road WWTP	PS #5

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8/30/2016	400 Redwood Dr. Apt 211	Royersford	1	Residential	King Road WWTP	PS #5
8/30/2016	400 Redwood Dr. Apt 217	Royersford	1	Residential	King Road WWTP	PS #5
8/30/2016	500 Redwood Dr. Apt 117	Royersford	1	Residential	King Road WWTP	PS #5
8/30/2016	500 Redwood Dr. Apt 312	Royersford	1	Residential	King Road WWTP	PS #5
8/30/2016	500 Redwood Dr. Apt 316	Royersford	1	Residential	King Road WWTP	PS #5
9/6/2016	49 Mountain View Ln	Schwenksville	1	Residential	King Road WWTP	PS #20
9/12/2016	26 Putter Ln	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
9/22/2016	400 Redwood Dr. Apt 124	Royersford	1	Residential	King Road WWTP	PS #5
9/22/2016	500 Redwood Dr. Apt 211	Royersford	1	Residential	King Road WWTP	PS #5
9/22/2016	500 Redwood Dr. Apt 111	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	400 Redwood Dr. Apt 114	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	400 Redwood Dr. Apt 116	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	400 Redwood Dr. Apt 117	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	400 Redwood Dr. Apt 214	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	400 Redwood Dr. Apt 215	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	400 Redwood Dr. Apt 216	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	400 Redwood Dr. Apt 313	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	400 Redwood Dr. Apt 314	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	400 Redwood Dr. Apt 315	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	400 Redwood Dr. Apt 316	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	400 Redwood Dr. Apt 317	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	500 Redwood Dr. Apt 110	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	500 Redwood Dr. Apt 114	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	500 Redwood Dr. Apt 124	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	500 Redwood Dr. Apt 214	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	500 Redwood Dr. Apt 215	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	500 Redwood Dr. Apt 216	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	500 Redwood Dr. Apt 217	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	500 Redwood Dr. Apt 310	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	500 Redwood Dr. Apt 314	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	500 Redwood Dr. Apt 315	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	500 Redwood Dr. Apt 317	Royersford	1	Residential	King Road WWTP	PS #5
9/27/2016	112 Redwood Dr.	Royersford	1	Residential	King Road WWTP	PS #5
10/12/2016	70 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #3
10/13/2016	18 Railroad St.	Limerick	1	Residential	King Road WWTP	PS #5
10/17/2016	48 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
10/17/2016	25 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
10/17/2016	23 Montella Cir	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
10/26/2016	6 Phaeton Way	Limerick	1	Residential	King Road WWTP	PS #3
10/26/2016	41 Mt. View Ln	Schwenksville	1	Residential	King Road WWTP	PS #20

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11/3/2016	38 Mt. View Ln	Schwenksville	1	Residential	King Road WWTP	PS #20
11/10/2016	5 Montella Circ	Pottstown	1	Residential	Possum Hollow WWTP	PS #18
12/15/2016	336 Graterford Rd	Schwenksville	1	Residential	King Road WWTP	PS #20
2016 Total			167			

King Road WWTP	
Existing Connections:	6,662
New Connections:	137
Total Connections:	6,799

Possum Hollow WWTP	
Existing Connections:	1,606
New Connections:	30
Total Connections:	1,636

**Total Township
Connections: 8,435**

2.0 HYDRAULIC & ORGANIC LOADINGS [§ 94.12.Sec. (a) (1), (2), (3)]

2.1 Historical & Present Loadings

A. Hydraulic Loading

The permitted hydraulic capacity of the WWTP is 1.7 million gallons per day (MGD). Table 2.1-A shows monthly average wastewater flows for the WWTP during 2016.

Table 2.1-A

King Road Hydraulic Loading (MGD)						Rainfall (in)
Month	2012	2013	2014	2015	2016	2016
January	0.807	0.805	0.811	0.816	0.846	0.85
February	0.745	0.796	0.969	0.783	1.045	5.65
March	0.759	0.793	0.884	0.993	0.79	1.75
April	0.729	0.798	0.937	0.815	0.763	2.55
May	0.773	0.776	0.949	0.762	0.876	2.55
June	0.705	0.916	0.825	0.831	0.796	2.55
July	0.694	0.758	0.718	0.808	0.737	4.99
August	0.751	0.754	0.744	0.74	0.749	2.33
September	0.774	0.735	0.734	0.742	0.722	2.33
October	0.795	0.714	0.714	0.795	0.744	1.3
November	0.737	0.708	0.774	0.752	0.761	3.42
December	0.802	0.835	0.841	0.846	0.853	3.16
Annual Average (AA)	0.756	0.782	0.825	0.807	0.807	2.79
3 Month Max Avg	0.778	0.830	0.930	0.864	0.894	
Ratio Max/AA	1.03	1.06	1.13	1.07	1.11	
5-year Avg Hydraulic Ratio	1.08					

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The monthly average flows ranged from 0.722 MGD in September to 1.045 MGD in February. The annual average flow of 0.807 MGD was generated by approximately 6,799 connections which results in a calculated unit flow of 119 gallons per equivalent dwelling unit (EDU) which is lower than the average flow per EDU of 230 gpd per the Township's Ordinance. The calculated unit flow is used later in the report for development of the projected hydraulic loadings.

It should be noted that the maximum 3-month average flow of 0.894 MGD did not exceed the plant's permitted hydraulic capacity of 1.7 MGD for 3-consecutive months in 2016. ***Therefore, the WWTP was not hydraulically overloaded in 2016.***

Table 2.1-A also shows historical (past 5 years) hydraulic flows at the WWTP, including monthly total rainfall data for the reporting year. Based on these historical flows, a hydraulic ratio (peaking factor) of the 3-month maximum flow divided by the annual average flow was calculated in each year. A 5-Year average hydraulic ratio of 1.08 has been calculated and is used later in the report for development of the projected hydraulic loadings.

A hydraulic loading graph incorporating the historical monthly average and annual average flows to the WWTP is located in Appendix A.

B. Organic Loading

The permitted organic capacity of the WWTP is 3,900 pounds per day (ppd) of BOD₅. Table 2.1-B1 shows average daily influent organic loadings for the WWTP during 2016, expressed in pounds per day (ppd) of calculated organic load.

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Table 2.1-B1					
King Road Organic Loading (lbs / day)					
Month	2012	2013	2014	2015	2016
January	1,853	1,798	1,361	1,874	1,936
February	2,128	1,636	2,158	1,712	2,440
March	1,887	1,548	1,810	1,774	1,961
April	1,814	1,581	2,691	1,923	1,752
May	3,092	1,574	1,743	1,870	2,066
June	1,102	1,862	1,813	1,837	1,803
July	1,535	1,451	1,642	2,335	1,474
August	1,449	1,548	1,803	1,606	1,566
September	1,618	1,582	1,422	1,489	1,446
October	1,879	1,545	1,834	1,672	1,500
November	2,028	1,740	1,923	1,621	1,769
December	1,885	1,530	2,165	1,838	2,050
Annual Average	1,856	1,616	1,864	1,796	1,813
Max Month	3,092	1,862	2,691	2,335	2,440
Ratio (Max Month to Annual Average Ratio)	1.67	1.15	1.44	1.30	1.35
5-Year Average Organic Ratio =					1.38

The average daily organic load ranged from 1,446 ppd to 2,440 ppd for the WWTP during 2016. The annual average organic load of 1,813 ppd was generated by approximately 6,799 connections which resulted in a calculated organic load of 0.267 pounds per day (ppd) per equivalent dwelling unit (EDU) which is used later in the report for development of the projected organic loadings.

It should be noted that the maximum average daily organic loading of 2,440 pounds per day of BOD₅ for the month of February did not exceed the plant's permitted organic capacity of 3,900 ppd in 2016. ***Therefore, the WWTP was not organically overloaded in 2016.***

Table 2.1-B1 also shows historical (past 5 years) organic loading at the WWTP. Based on the historical organic loadings, an organic ratio (peaking factor) of the maximum average organic divided by the annual average organic loading was calculated in each year. A 5-Year average organic ratio of 1.38 has been calculated and is used later in the report for development of the projected

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organic loadings. It was influent BOD₅ that is used to determine the organic capacity of a treatment plant.

Table 2.1-B2 shows a summary of the WWTP’s influent organic sampling events in 2016. The average daily organic load is calculated by multiplying the influent BOD₅ concentration by the recorded flow the day of the influent BOD₅ concentration was sampled and the unit conversion factor 8.34. The calculated average daily organic load for the month is the average of all the sampling events in that month.

Based on the organic sampling events at the WWTP, an annual average daily influent concentration strength of 268.20 mg/l was calculated in 2016. The organic concentration strength is a flow based calculation of the sum of the entire year average daily organic loadings divided by the total flow the day the samples were taken.

Regarding current influent sampling of organic load (5-day biochemical oxygen demand or “BOD₅”):

1. 24-hour composite samples of treatment plant influent are collected and analyzed weekly at the force main discharge chamber prior to screening and grit removal. The sample collection is not flow proportioned. The treatment plant does not accept hauled-in waste.
2. Weekly organic loadings are calculated by multiplying the flow on sample day (in MGD) by that day’s BOD₅ concentration in milligrams per liter (mg/l) sampled and a conversion factor of 8.34.
3. Monthly average organic loading is the average of the weekly loading values in a calendar month.

An organic loading graph incorporating the historical annual average and maximum average daily organic loadings to the WWTP is located in Appendix A.

Table 2.1-B2				
King Road Organic Loading Sampling Data				
	A	B	C = A x B x 8.34	
Date of Sample	BOD5 (mg/l)	Flow (MGD)	Daily BOD5 (lbs/day)	Monthly Average (lbs/day)
1/6/2016	268	0.779	1741	
1/13/2016	283	0.815	1924	
1/20/2016	315	0.722	1897	
1/27/2016	326	0.802	2181	1935.75

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2/3/2016	239	1.638	3265	
2/10/2016	277	0.900	2079	
2/17/2016	173	1.073	1548	
2/24/2016	274	1.255	2868	2440
3/2/2016	218	0.828	1505	
3/9/2016	365	0.794	2417	
3/16/2016	270	0.808	1819	
3/23/2016	325	0.718	1946	
3/30/2016	326	0.779	2118	1961
4/6/2016	273	0.749	1705	
4/13/2016	298	0.776	1929	
4/20/2016	255	0.757	1610	
4/27/2016	297	0.712	1764	1752
5/4/2016	255	0.845	1797	
5/11/2016	272	0.834	1892	
5/18/2016	338	0.817	2303	
5/25/2016	339	0.803	2270	2065.5
6/1/2016	269	0.805	1806	
6/8/2016	271	0.876	1980	
6/15/2016	266	0.917	2034	
6/22/2016	281	0.765	1793	
6/29/2016	229	0.735	1404	1803.4
7/6/2016	220	0.771	1415	
7/13/2016	302	0.730	1839	
7/20/2016	262	0.702	1534	
7/27/2016	178	0.746	1107	1473.75
8/3/2016	198	0.722	1192	
8/10/2016	278	0.755	1750	
8/17/2016	246	0.742	1522	
8/24/2016	261	0.792	1724	
8/31/2016	283	0.695	1640	1565.6
9/7/2016	273	0.719	1637	
9/14/2016	272	0.684	1552	
9/21/2016	194	0.722	1168	
9/28/2016	253	0.677	1428	1446.25
10/5/2016	281	0.783	1835	
10/12/2016	298	0.713	1772	
10/19/2016	214	0.738	1317	
10/26/2016	179	0.720	1075	1499.75
11/2/2016	266	0.708	1571	

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11/9/2016	257	0.710	1522	
11/16/2016	208	0.715	1240	
11/23/2016	355	0.736	2179	
11/30/2016	240	1.165	2332	1768.8
12/7/2016	233	0.982	1908	
12/14/2016	301	0.767	1925	
12/21/2016	304	0.839	2127	
12/28/2016	356	0.754	2239	2049.75
Daily BOD5 Average (ppd):				1810.48
Flow Average (MGD):				0.809
AA Daily Influent Concentration (mg/l):				268.20

Sampling Data per Township Provided DMRs

2.2 Projected Loadings

A. Projected Connections

Prior to 2016, the total number of connections was 6,662. During 2016, there were 137 new connections to the WWTP. Development within the Township will continue. Table 2.2-A shows a summary of total existing connections and EDU connections projected to occur within the next five (5) years that are existing, under construction, or awaiting Act 537 planning approval.

Accordingly, the WWTP projected hydraulic loadings for the next five (5) years are shown in Table 2.2-B3. The annual average and maximum 3-month average flows are indicated. Likewise, the annual average and maximum daily organic loadings are indicated. Graphs incorporating the historical and projected loadings for the next five (5) years to the WWTP are located in Appendix A for hydraulic and organic loadings.

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**Table 2.2-A King Road Wastewater Treatment Plant
Active or Planned Developments (as of 12/31/2016)**

Name	Remaining No. of EDUs	Sewage Flow (GPD)	Pump Station Service Area	Projected Buildout Schedule				
				2017	2018	2019	2020	2021
A. Active or Planned Developments								
181 Limerick Center Road	5	1,150	PS #6	0	5			
292 W. Ridge Pike Moscariello	72	16,560	PS #10	0	72			
430 Linfield Trappe Road (Restaurant)	10	2,300	PS #5	10				
1310 Main Street	9	2,070	PS #5	9				
826 Associates	4	920	PS #3	2	2			
Bradford Woods	1	230	PS #12			1		
Brunk/Ashbrook	1	230	PS #6	1				
Brownback Road Subdivision	4	920	PS #5	2	2			
Cherry Ridge	192	44,160	PS #5	192				
Club Views	84	19,320	PS #6	0	84			
Country Club Estates	7	1,610	PS #19	7				
Demcor	50	11,500	PS #20					
Diamond Credit Union/Starbucks	3	690	PS #6	0	3			
Diesinger Subdivision	2	460	PS #20			2		
Graterford Road	9	2,070	PS #3			9		
Heritage Crossing Shopping Center	26	5,980	PS #6	2	24			
Iacobucci, Golf Ridge	1	230	PS #3		1			
Leroy Wensel, Limerick Village	1	230	PS #5		1			
Lewis Ridge Retail	12	2,760	PS #3	12				
Lewis Square	203	46,690	PS #6	0	203			
Limerick View Shopping Center (Home Depot)	34	7,820	PS #6	34				
Limerick PF LTD	27	6,210	PS #5					

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Limerick Square Shopping Center (Brandolini)	32	7,360	PS #6	32				
Linfield Corporate Center (Gambone)	178	40,940	PS #5	20	20	20	20	40
Linfield National Golf Club - Clubhouse	15	3,450	PS #5	15				
Linsenmaier	99	22,770	PS #5		50	49		
Mountainview Estates (incl. Sunset Road)	43	9,890	PS #20	20	23			
Pottstown Honda	1	230	PS #5	1				
Sankey (Residential)	119	27,370	PS #3		60	59		
Staybridge Suites Restaurant	23	5,290	PS #6	23				
Texas Roadhouse Seating Addition	21	4,830	PS #6	0	21			
Telvil	26	5,980	PS #2		13	13		
Township Line Road (incl. Bradford Woods)	6	1,380	PS #12	6				
Villas	4	920	PS #5	4				
Walmart	13	2,990	PS #6	13				
Subtotal	1,337	307,510		405	584	153	20	40

**Table 2.2-A King Road Wastewater Treatment Plant
Projected Developments (as of 12/31/2016)**

Name	Remaining No. of EDUs	Sewage Flow (GPD)	Pump Station Service Area	Projected Buildout Schedule				
				2017	2018	2019	2020	2021
Projected Developments								
Albert S. Herr and Sons	2	237	PS #3	2				
Al Blough	4	475	PS #3	4				
Gregory Dinnocenti (39 Springford Rd)	5	593	PS #19	5				
Harold Herr	2	237			2			
Linfield Industrial Park (Publicker Site)	25	2967	PS #5		25			
Moore	5	593	PS #3		5			
Oehlert Brothers	3	356	PS #6	3				
Ridge Swamp Associates, LLP	50	5933	PS #3		25	25		

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Tomaselli Subdivision	5	593	PS #20			3	2	
Waltz Golf Farm	2	237	PS #10		2			
Miscellaneous Connections	15	1780		2	2	2	2	2
Subtotal	118	14003		16	61	30	4	2

EDU Totals	1,455			421	645	183	24	42
Current No. of EDUs	6,799							
Flow Totals		321,513		96830	148350	42090	5520	9660
Cummulative EDU Totals (2016 = 6799 EDUs)				7,220	7,865	8,048	8,072	8,114
Cummulative Flow Totals (2016 = 806833 gpd)				903,663	1,052,013	1,094,103	1,099,623	1,109,283

*Flow Totals Based off of Township Planning flow Rate of 230 gpd/EDU

B. Basis for Projected Hydraulic Loading

The projected hydraulic loadings were developed as follow:

1. First, by calculating new flow at the WWTP in each calendar year; the number of new EDUs that connected multiplied by the calculated unit flow in the calendar year. The unit flow is based on the total flow at the WWTP divided by the total number of connection to in the plant. New flows were calculated for each year as can be seen in Table 2.2-B1.
2. Second, a 5-Year adjusted annual average flow is derived by adjusting 2012 thru 2016 calendar years' flow by adding new flow to the previous calendar years' annual average flow as can be seen in Table 2.2-B2.
3. The adjusted annual average flow of 0.836 MGD in lieu of the 0.795 is used as the previous year's annual average flow (2016) in Table 2.2-B3 to begin hydraulic projections.
4. Third, the projected annual average flows for the Township are based on projected new connections' flows that are added to the previous year annual average flow for the next 5 years. New connections are multiplied by 2016 unit flow of 119 gallons per day per EDU. The projected annual average flow at the end of the next five year period is estimated to be 0.992 MGD.

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5. Last, the maximum 3-month average flow projections (2017 to 2021) to the plant on Table 2.2-B3 were calculated by multiplying the 5-Year Average Hydraulic Ratio of 1.08 times the projected annual average flow to the WWTP. The projected maximum 3-month average daily flow at the end of the next five (5) years is estimated to be 1.071 MGD.

As evident in Table 2.2-B3 and the hydraulic loading graph, projections for maximum 3-month average flow to the WWTP will not exceed the permitted hydraulic capacity of 1.7 MGD for the next five (5) years. ***Therefore, the WWTP is not projected to be hydraulically overloaded within the next five (5) years.***

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Table 2.2-B1			
King Road Historical Added Flow			
Year	# EDUs Connected	gpd/EDU*	New Flow
2012	64	105	0.007
2013	39	105	0.004
2014	39	129	0.005
2015	220	121	0.027
2016	137	119	0.016

*Planning Flow Rate: 230

*Calculated Flow Rate: 119

Table 2.2-B2							
King Road 5-Year Adjusted Flow Projections							
Year	AA Flow in MGD	All Projects Connected					Adjusted AA Flow
		2012	2013	2014	2015	2016	
2012	0.756	0.007	0.004	0.005	0.027	0.016	0.815
2013	0.782		0.004	0.005	0.027	0.016	0.834
2014	0.825			0.005	0.027	0.016	0.873
2015	0.807				0.027	0.016	0.850
2016	0.807						0.807
Total	3.170						4.179
5 Yr Avg	0.795						0.836

Table 2.2-B3						
King Road Adjusted Flow Projections						
Year	Previous Year's Annual Average Flow	New EDUs	Increased Flow (MGD)	Projected Annual Average Flow (MGD)	Hydraulic Ratio	Projected Max Month Flow (MGD)
2017	0.836	421	0.050	0.886	1.08	0.956
2018	0.886	645	0.077	0.962	1.08	1.038
2019	0.962	183	0.022	0.984	1.08	1.062
2020	0.984	24	0.003	0.987	1.08	1.065
2021	0.987	42	0.005	0.992	1.08	1.070

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C. Basis for Projected Organic Loading

The projected organic loadings were developed as follow:

1. First, the 2016 annual average organic load of 1,813 ppd is used as the previous annual average organic load in Table 2.2-C to begin organic projections.
2. Second, the projected annual average organic loadings for the Township are based on projected new connections' organic load that are added to the previous calendar year organic loading for the next 5 years. New connections are multiplied by the 2016 calculated organic load of 0.27 ppd per EDU. The projected annual average organic load at the end of the next five (5) year period is estimated to be 2,107.99, ppd.
3. Last, the maximum average daily organic loading projections (2016 to 2020) to the plant on Table 2.2-C were calculated by multiplying the 5-Year Average Daily Organic Ratio of 1.38 times the projected annual average daily organic load. The projected maximum average daily organic loading at the end of the next five years period is estimated to be 2,153 ppd.

As evident in Table 2.2-C and the organic loading graph, projections for maximum average daily organic loading to the WWTP will not exceed the permitted organic rating of 3,900 ppd for the next five years. ***Therefore, the WWTP is not projected to be organically overloaded within the next five (5) years.***

Table 2.2-C							
Loading Projections							
Year	Previous Year's Annual Average Loading	New EDUs	Load/EDU	Increased Load (ppd)	Projected Annual Average Loading (ppd)	Organic Ratio	Projected Max Month Loading (lbs/day)
2016	-	220	0.27	58.68	1,813.46	-	2,440
2017	1,813.46	421	0.27	112.29	1,925.75	1.38	2,657.54
2018	1,925.75	645	0.27	172.04	2,097.79	1.38	2,894.95
2019	2,097.79	183	0.27	48.81	2,146.60	1.38	2,962.31
2020	2,146.60	24	0.27	6.40	2,153.00	1.38	2,971.14
2021	2,153.00	42	0.27	11.20	2,164.21	1.38	2,986.60

*Calculated Loading: 0.27

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3.0 SEWER EXTENSIONS [§ 94.12Sec. (a) (4)]

The following is a summary of new/proposed sewer extensions in 2016 for the Township.

3.1 Extensions Constructed

There were no sewer extensions constructed in 2016.

3.2 Extensions Exempted

There were no exemptions granted in 2016.

3.3 Proposed Project Extensions and Planned Build-out

There are multiple active and planned developments for the King Road Service Area. As discussed previously, a list summarizing the planned developments and anticipated EDU allotment are included in Table 2.2-A.

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4.0 SEWER SYSTEM MONITORING, MAINTENANCE, REPAIR, & REHABILITATION[§ 94.12.Sec. (a)
(5)]

The Township has the duty to monitor, maintain, repair and rehabilitate the WWTP and sanitary sewer collection and conveyance system on a regularly basis. The Township has a certified operator and staff in the Sewer Department that operates and maintains the sanitary sewer collection and conveyance system and the WWTP. Assistance with larger tasks is provided by additional staff from the Township Sewer Department or is contracted out.

The sanitary sewers are inspected for leaks if there is an increase in daily flow monitored at the WWTP. The Township has a backhoe, dump trucks, and hand tools available for routine maintenance and excavation. Maintenance and repairs to the sewer system that cannot be performed by the Township's staff are carried out by independent contractors hired on an "as needed" basis.

There were no problematic sewer sections found to be in need of repair or rehabilitated in 2016.

4.1 Monitoring and Maintenance

The sanitary sewer collection and pumping systems are monitored daily. Township staff visits the pump stations weekly to check for operational problems, to perform periodic and routine maintenance, and to perform routine monitoring such as recording the total time each pumping unit is operated per day. Each pump station is continuously monitored 24 hours a day via alarm system/auto dialer which contacts the Township personnel currently on duty, then the WWTP Superintendent and then the WWTP phone in case of an emergency. This cycle continues every 10 minutes until the alarm is acknowledged. The following conditions are electronically monitored:

- Wetwell high and low water levels
- Pump motor failure
- Loss of electrical service
- Emergency generator start at relative pump stations

There are no permanent flow meters on the influent sewers entering the pumping stations. The Township is currently working towards ascertaining a method to meet the DEPs request of influent flow monitoring at the pump stations to record actual flow data that will provide annual average and peak instantaneous flows within the sanitary sewer collection system.

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4.2 Repair and Rehabilitation

Repair and/or rehabilitation efforts within the Limerick Township collection and conveyance system in 2016 include:

January 2016

- Pump Station #12 (Bradford Woods) room heater failed, replaced with heater from the decommissioned Pump Station #11
- Pump Station #6 (Royersford Rd.) new VFD was purchased for pump #2, installed the new VFD, tested and then removed the rental VFD, replaced MP2 pump control with other unit to control pump operations
- Pump Station #20 (Graterford Rd.) pump # 2 breaker tripped causing high pump hours with pump not running on time hour meter was counting, found problem to be incorrectly adjusted breaker sensitivity
- Pump Station #5 from the Possum Hollow Plant used tractor to put new check valve
- Lateral Inspection Carriage Crossing: 29 & 50 Phaeton Way, PS #2, KR
- Lateral Inspection Spring Ford Estates: 13 & 35 Montella Circle, Lot 4 & 19, PS #18, PH
- Lateral Inspection 33 Mountain view Lane, PS #20 (Graterford Rd.), KR
- Lateral Inspection 318 Graterford Rd., PS #20, KR
- Lateral Repair 326 Laurel Drive. Estimated 5 feet for replacement of trap.

February 2016

- Pump Station #10 new battery and trickling charger installed on generator
- Pump Station #5 new check valve installed by contractor, old check valve was returned to plant for future scrap
- Pump Station #6 had 1500 gallons of peroxide delivered for odor control
- Pump Station #14 Pulled pump #2 and sent to Deckmans for repair
- Pump Station #12 Pump #2 replaced impeller, wear rings and O-rings
- Pump Station #1 new Crystal Ball monitoring system installed, alarm dialer was removed, rewired electrical cabinet and installed new motor starters and installed a level transducer
- Lateral Inspection Carriage Crossing: 54 Phaeton Way, PS #2, KR
- Lateral Inspection Spring Ford Estates: 7 Montella Circle, Lot 4, PS #18, PH
- Lateral Repair 43 Oak Lane had an overflow in vent. Dave Erman and Brian Hill provided a courtesy plunge for the vent which solved the problem.

March 2016

- Pump Station #2 (N. Limerick Rd.) repaired Louver Motor for generator ventilation
- Pump Station #5 (Trinley Rd.) replaced well pump

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- Pump Station #6 (Royersford Rd.) generator failed to start during maintenance check due to engine over speed error, adjustment was made to the timer and retests proved successful
- Pump Station #10 (Sunnybrook) replaced entire generator with the generator removed from PS #11 (decommissioned)
- Pump Station #14 (Bradford Woods) replaced failed pump with a Sultzer pump
- Pump Station #16 (Brook Evans) replaced sump Pump Float
- Lateral Inspection Carriage Crossing: 66 & 67 Phaeton Way, PS #2, KR
- Lateral Inspection Spring Ford Estates: 16, 20, & 46 Montella Circle, PS #18, PH
- Lateral Inspection 314 Gratersford Rd., PS #20, KR
- Lateral Inspection 131 Masters Drive & 65 Putter Lane, PS#18, PH

April 2016

- Pump Station # 3 grease and rag removal using Kleins as our contractor
- Pump Station # 5 grease and rag removal using Kleins as our contractor
- Pump Station # 6 grease and rag removal using Kleins as our contractor, prebid meeting with a good turnout
- Pump Station # 10 grease and rag removal using Kleins as our contractor
- Pump Station #7 repaired and improved Peroxide system and returned to service with very good odor elimination
- Pump Station #5 generator contractor was called for a rough idling generator during normal maintenance, they made a few adjustments and recommended a few improvements including generator load test and transfer switch controls upgrade
- Pump Station #1 received a quote to repair the fence around our pumping station (\$990)
- Pump station #18 (Ravens Claw) installed a Crystal Ball Monitoring system and back up controller
- Lateral Inspection Carriage Crossing: 5 & 46 Phaeton Way, PS #2, KR
- Lateral Inspection 3383 Pruss Hill Rd., PS #18, PH
- Lateral Inspection 10 & 29 Mountainview, PS #20, KR

May 2016

- Pump Station #2 removed the grinder, replaced with new grinder with one in stock
- Pump Station #5 and #6 had crane inspections, some minor repairs needed.
- Pump Station #6 replaced the grinder (1 of 2) in PS #6
- Pump Station #14 (Bradford Woods) completed the Crystal Ball monitoring system and pump controls upgrade
- Pump Station #8 removal, decommissioned loose manhole ring on West Cherry. to fill this manhole in with concrete/stone
- Pump Station #16 had the rebuilt Muffin Monster grinder installed, the first rebuild they completed in a few years

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- Pump Station #1 (Airport Rd) Gambone repaired manhole, completed inspection
- Lateral Inspection 46 Phaeton Way, PS 2, KR
- Lateral Inspection 18 Railroad St., PS 5, KR
- Lateral Inspection 712 W. Ridge Pike, PS 18, PH (Craft Ale House and Limerick Hardware)
- Lateral Inspection 58 Phaeton Way, PS 2, KR
- Lateral Inspection 341 Sunset Rd., PS 20, KR
- Lateral Inspection 36 W. Ridge Pike, STE 101, Citadel Bank, PS 6, KR
- Lateral Inspection 57 Mountain View Lane, Lot 15, PS 20, KR
- Lateral Inspection 09 Montella Circle, Lot 5, PS 18, PH
- Lateral Inspection 29 Montella Circle, Lot 15, PS 18, PH

June 2016

- Pump Station #6 found a small leak in valve pit on an unserviceable valve, will try to incorporate repair with other work being performed at this station with the upgrade
- Pump Station #2 Klines pumped out wet well, new control system was installed indoors which included new breakers, motor starters, overloads, Crystal Ball controller and monitoring system for reporting and a transducer. The generator was also serviced to include new oil, coolant, filters and hoses
- Pump Station #12 generator was serviced to include new oil, coolant, filters and hoses
- Pump Station #13 generator was serviced to include new oil, coolant, filters and hoses
- Pump Station #14 generator was serviced to include new oil, coolant, filters and hoses, the coolant overflow container was replaced from spare at PS #9
- Pump Station #15 Klines pumped out the wet well, generator completed quarterly PM
- Pump Station #5 Premium Power replaced the governor on the generator and tested, upgrade also completed on transfer switch
- Pump Station #1 Klines pumped out the wet well.
- Pump Station #17 Klines pumped out the wet well.
- Lateral Inspection 86 Phaeton Way, Lot 11
- Lateral Inspection 71 Phaeton Way, Lot 04
- Lateral Inspection 9 Phaeton Way, Lot 09
- Lateral Inspection 25 Mountain View Ln., Lot 7
- Lateral Inspection 36 Montella Circle, Lot 26
- Lateral Inspection 26 Montella Circle, Lot 31

July 2016

- Pump Station #3 generator needed a new battery and charger
- Pump Station #4 replaced battery

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- Pump Station #5 grinder failed and the crew had to pull it out and use the bar screens to protect the pump, this is a large station and we ordered a replacement grinder to come in next month
- Pump Station #6 replace roof, set up the site for the dig
- Pump Station #1 replaced generator radiator
- Pump Station #17 raised wet well and serviced pump #2, back in service
- Pump Station #18 extended antenna to improve cell reception for monitoring
- Lateral Inspection 24 Montella Circle, Lot 32
- Lateral Inspection 42 Montella Circle, Lot 23
- Lateral Inspection 44 Montella Circle, Lot 22

August 2016

- Pump Station #6 and #7 received 1300 gallons of peroxide to help with odor control
- Pump Station #3 repairs (electrical short), Pump Station #4 repairs (level sensor), Pump Station #5 repairs (transfer switch controller) and Pump Station #13 (motor starter coil)
- Pump Station #2, 18, and 20 performed schedule maintenance
- Pump Station #5 had the crane repaired by American Crane
- Pump Station #1 Gambone used a camera to video main feeding the pump station
- Lateral Inspection 38 Montella Circle, Lot 25 338 Sunset Rd.
- Lateral Inspection 33 Montella Circle, Lot 17 345 Sunset Rd.
- Lateral Inspection 50 Montella Circle, Lot 19 53 Fruitville Rd.
- Lateral Inspection 1 Phaeton Way, Lot 7

September 2016

- Pump Station #3 (South Limerick) Installed a Crystal Ball monitoring system with pressure transducer, first outside install
- Pump Station #5 (Trinley) completed the install of the other check valve, replaced fan belts for wet well blowers and replaced the switch and conduit for wet well lighting
- Pump Station #10 removed grinder (Muffin Monster) for repair or replacement
- Pump Station #17 Klines cleaned the wet well
- Pump Station #18 full generator maintenance
- Lateral Inspection 49 Mountainview Lane
- Lateral Inspection 328 Sunset Rd.
- Lateral Inspection 26 Putter Lane
- Lateral Inspection 320 Swamp Pike (Oxford)

October 2016

- Pump Station #4 Pump #1 was removed for repair
- Pump Station #6 grinder kept shutting off so we switched power packs, Pump #1 was not pumping due to bad speed signal so the pump settings were adjusted to run one speed, this will be fixed in the upgrade

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- Pump Station #20 had Flyght controls come out to address an alarm issue with the control system, adjusted timers and believe the problem is repaired for now
- Pump Station #1 grinder failure, replaced all the hydraulic hoses which were leaking
- Pump Station #18 odor complaint, changed pump settings with some success, installed new filters but they did not work well as there were other leaks
- Lateral Insepection 62 and 70 Phaeton Way
- Lateral Insepection 23, 25, and 48 Montella Circle
- Lateral Insepection 38 Mountain View Lane

November 2016

- Pump Station #5 Verizon repaired a faulty phone line outside our station property as the Verbatim alarm dialer was not working, later in the month we ran the generator for several hours as PECO did repairs
- Pump Station #18 installed filters on the wet well vents to help with the odors in the morning, put seals on the wet well doors
- Pump Station #15 transfer switch wasn't working during a PM, found a blown fuse
- Pump Station #3 looking at the logistics to rebuild the pumps and install higher flow impellers instead of completely rebuilding the station
- Pump Station #4 was returned from Dekman's for rebuild and was installed
- Pump Station #19 removed a pump for poor performance and sent off to Flyght for repair
- Lateral Insepection Phaeton Way
- Lateral Insepection 5 Montella Circle, Lot 3

December 2016

- Pump Station #5 installed a Crystal Ball to monitor operations and report alarms.
- Pump Station #19 received the rebuilt pumps from Flyght and installed with no problems, replaced faucet as it would not shut off
- Pump Station #6 line stop was installed by contractor as part of upgrade contract
- Pump Station #17 wet well cleaned by contractor
- Lateral Inspection 2 Phaeton Way
- Lateral Inspection 116 N. Limerick Rd
- Lateral Inspection 9 Pennstone Ct. – Lot 26

As required by DEP operating permit Limerick Township flushed and televised sewer mains and lateral in the Township. Televised 8" sewer mains in Kings Road Plant area totaled 1.63 miles and 1.58 miles in Possum Hollow Plant area. In July and August 2016, 6,835 feet of gravity sewer system was flushed and televised.

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4.3 Infiltration/Inflow

Like most gravity sewer systems in the area, the Township's sanitary sewer system is subject to I&I during substantial wet weather events.

The Township addresses I&I through routine maintenance and monitoring at the pump stations and through an ongoing program to televise their collection system and make repairs as needed. It is believed that the current I&I preventative measures are adequate as the hydraulic loadings are not projected to be exceeded in the next 5 years (See Section 2.2 of the report). In the instance that I&I is believed to be an issue, the Township attempts to isolate the problem area by utilizing a portable flow meter to determine the probably source with televising. Corrective action of the problem is then taken by the Township based on the nature of the source.

Limerick Township has implemented ordinances designed to deal with illegal sump pump connections and lateral installations. Township Ordinances 254 and 143 have been included in Appendix D. These ordinances include:

- Required written Authority approved permit prior to any and all actions regarding the sewerage system (reference Ordinance No. 254 §140-6A).
- General procedures for dealing with unsatisfactory wastewater systems (reference Ordinance No. 254 §140-5E).
- Required inspection and approval of building wastewater systems (reference Ordinance No. 254 §140-5B).
- Efforts to ensure proper sanitary sewer installation including multiple stipulations for the use of master plumbers included in the installation of house drainage systems, connection of house drainage system to a public sanitary sewer or lateral thereof, and supervision of all plumbing work within the township (reference Ordinance No.143 §129-8: P-123.1, P-123.6, P-123.7).
- Strictly prohibiting floor drains, basement sump-pump, and area drain connections to the sanitary sewer system (reference Ordinance No.143 §129-8: P-1211.4).

Limerick Township has implemented procedures for lateral and sump pump inspections. The Lateral Inspection Procedure has been included in Appendix C. Proper sump pump discharge connections are inspected: (1) during lateral inspections for new home construction or (2) during water meter inspection and/or upon receiving permission from the homeowner. In the instance where an inspection reveals an illegal discharge connection, the Township requests the owner to rectify and then re-inspects. Should the owner fail to correct the situation, the manner is sent to the Codes Office for review and enforcement.

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5.0 CONDITION OF SEWER SYSTEM [§ 94.12.Sec. (a) (6)]

The Township is divided into two (2) service areas. The Township collects sanitary sewage in each service area and conveys it to the respective WWTP. A majority of the Township's sanitary sewer system was originally constructed between 1986 and 1992 and has since been extended to accommodate additional developments as needed. The sanitary sewer system consists of interceptors ranging in size from eight (8) inch to thirty-six (36) inches and several pump stations. A bulk the gravity system is constructed of PVC pipe while a majority of the force mains are made of ductile iron pipe. The sanitary sewer collection system totals approximately 533,280 feet (101 miles) of pipe. The Possum Hollow Service area accounts for approximately 89,760 feet (17 miles) of this pipe; while the King Road Service area accounts for the remaining 443,530 feet (84 miles) of pipe. There are seven (7) private pump stations in addition to the seventeen (17) active Township owned pumping stations. Private sewer lines also exist within the system.

The overall condition of the sewer system is in fair to good condition, typical of systems of similar age and construction.

There is no portion of the system where conveyance capacity is being exceeded or will be exceeded in the next 5 years.

5.1 Discussion of Repaired, Replaced, or Rehabilitated Sewers

There are no known portions of the sewer collection system that have been identified as requiring immediate repair or replacement.

Significant I&I from the Ridgeview Terrace Mobile Home Park is the root cause of the backup pump in Pump Station #10 operating during major storm events. On September 24, 2009 RHG Properties, the owner of the Ridgeview Terrace Mobile Home Park at the time, entered into an agreement with the Township to address these I&I issues. In 2011/2012 GPS Properties took over ownership of the Ridge View Terrace Mobile Home Park. On September 28, 2012 a Consent Decree between the United States Environmental Protection Agency (EPA) and the PADEP and GPS Properties was filed. Due to the EPA mandate, repair and rehabilitation information within the mobile home park is unknown. Per a conference call between Pennoni and the DEP, held on January 14, 2013, the Department offered to lend assistance to the Township in ascertaining the quarterly status reports from the EPA. To date, we have not been provided any additional information.

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5.2 Sanitary Sewer Overflows

There are no combined sewers in the Township sewer collection system; hence, there are no possibilities for any combined sewer overflows (CSO). One sanitary sewer overflows (SSO) occurred at 120 Elio Circle in 2016. See attached in Appendix C

5.3 Sanitary Sewer Surcharges

There were no reported events or evidence to indicate that any sanitary sewer surcharges occurred in the King Road Service area in 2016.

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6.0 SEWERAGE PUMPING STATIONS [§ 94.12.Sec. (a) (7)]

There are seventeen (17) sewage pump stations currently operating within the two (2) service areas in the Township. Pump Stations 1, 18, 17, and 16 operate within the Possum Hollow service area; while Pump Stations 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15 and 19 operate within the King Road service area. A pump station flow schematic diagram of the service area has been included within Appendix D. These pump stations are owned and maintained by the Township and are described below.

1. Pump Station #2 AKA North Limerick Road Pump Station

Pump Station #2 is located on North Limerick Road and is equipped with two (2) explosion proof 130-gpm submersible pumps. Wastewater is discharged through a four (4) inch force main that ties into the existing sewer at Manhole 229 located on Ridge Pike where it flows by gravity to Pump Station #3 and inevitably on to the WWTP.

Pump Station #2 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged.

There is no flow meter or monitoring equipment currently at this site. Currently, flows are derived from a pump run timer. An auto-dialer is installed on this pump station to alert Township personnel of high flow conditions. This station is not believed to be hydraulically over loaded. The Township is anticipating to overhaul this station with new pumps, controls, and a SCADA system within the next few years.

2. Pump Station #3 AKA South Limerick Road Pump Station

Pump Station #3 is located along South Limerick Road and is equipped with two (2) explosion proof 1,150-gpm submersible pumps. Wastewater is discharged through a twelve (12) inch force main that ties into the existing sewage collection system at Manhole A107 located on East Cherry Lane where it flows by gravity to Pump Station #5 and inevitably on to the WWTP.

Pump Station #3 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged.

There is no flow meter or monitoring equipment currently at this site. Currently, flows are derived from a pump run timer. An auto-dialer is installed on Pump Station #3 to alert Township personnel of high flow conditions. It is proposed to add flow monitoring capabilities to Pump Station #3 when it is in need of

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upgrading or overhauling or if it is believed that it is approaching its design capacity.

There were no instances recorded of the lag pump coming on in conjunction with the lead pump in 2016. This station is not believed to be hydraulically overloaded. The Township is anticipating overhaul of Pump Station #3 with new pumps, controls, and a SCADA system within the next few years to accommodate new connections.

3. Pump Station #4 AKA Benner Road Pump Station

Pump Station #4 is located along Major Hollow Road and is equipped with two (2) explosion proof 120-gpm submersible pumps. Wastewater is discharged through a four (4) inch force main that ties into the eighteen (18) inch force main from Pump Station #5 around the intersection of Benner and Major Road that ties into Manhole A16 located on Lewis Road where it flows by gravity to Pump Station #6 and on to the WWTP.

Pump Station #4 last underwent major upgrades in 2010 which included:

- Two (2) new Flygt submersible pumps each rated at 120 gpm @104 TDH
- New pump controller and starter panel
- New Muffin Monster grinder
- Replacement of four (4) inch force main

Pump Station #4 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged.

The 2010 upgrades included a pump controller that has the capability of calculating and recording the peak influent flow. Data was unavailable in 2016. An auto-dialer is installed on this pump station to alert Township personnel of high flow conditions.

Pump Station #4 is not believed to be hydraulically overloaded.

4. Pump Station #5 AKA Trinley Road Pump Station

Pump Station #5 is located near Trinley Road and is equipped with two (2) explosion proof 1,900-gpm submersible pumps. Wastewater is discharged through an eighteen (18) inch force main that ties into Manhole A16 located on Lewis Road where it flows by gravity to Pump Station #6 and on to the WWTP.

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Pump Station #5 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged.

Pump Station #5 does not have the capability to monitor or measure the influent flows. Currently, flows taken from a magmeter located on the discharge side of the pump station. The magmeter is not configured to log the instantaneous flows, only the totalized flow which is recorded by hand daily. An auto-dialer is installed on Pump Station #5 to alert Township personnel of high flow conditions.

This station is not believed to be hydraulically over loaded.

5. Pump Station #6 AKA #6a - Southeast Pump Station

Pump Station #6 is located northeast of Route 422 and Royersford Road and is equipped with two (2) 2,225-gpm dry pit non-clog sewage pumps. Wastewater is discharged through a sixteen (16) inch force main that ties into the headworks building of the WWTP.

Pump Station #6 last underwent major upgrades in 2010 which included:

- Two (2) new VFD pump motor controls
- New pump control and monitor unit
- New wet well exhaust and intake roof fans

The controls for each of the VFDs are currently set to operate at a maximum of 94% of their maximum speed under normal operating conditions in an effort to optimize the pump station efficiency. The discharge rate for both pumps operating simultaneously is below the permitted discharge for one (1) pump operating. In the event that one (1) pump is out of service, the system is equipped with a high flow switch that will override the pump limits and operate the pump at full capacity.

The controls for the VFD try to “match” the flow that comes into the WWTP. Because of this operation, the flow in the force main may not be high enough to provide adequate scour velocity. The control software accounts for this and automatically turns both pumps on in order to “flush” the force main. This flushing sequence is considered maintenance and therefore any events where both the lead and lag pumps come on in conjunction for short durations (20 minutes or less) have been omitted from the analysis.

Pump Station #6 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged.

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Pump Station #6 does not have the capability to monitor or measure the influent flows. Currently, flows taken from a magmeter located on the discharge side of the pump station. The magmeter is not configured to log the instantaneous flows, only the totalized flow which is recorded by hand daily. An auto-dialer is installed on Pump Station #6 to alert Township personnel of high flow conditions.

Throughout 2015 there were instances where the lag pump came online in conjunction with the lead pump. This is within the approved design parameters. Pump Station #6 is proposed for expansion in 2016.

6. Pump Station #7 AKA King Road Pump Station

Pump Station #7 is located along King Road and is equipped with two (2) explosion proof 260-gpm submersible pumps. Wastewater is discharged through a four (4) inch force main that ties into the sixteen (16) inch force main from Pump Station #6 around the intersection of Walnut Drive and King Road. The sixteen (16) inch force main discharges directly to the headworks of the WWTP.

Pump Station #7 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged.

There is no flow meter or monitoring equipment currently at this site. Flows are derived from a pump run timer. An auto-dialer is installed on Pump Station #7 to alert Township personnel of high flow conditions. It is proposed to add flow monitoring capabilities to Pump Station #7 when it is in need of upgrading or overhauling or if it is believed that it is approaching its design capacity.

This station is not believed to be hydraulically over loaded.

7. Pump Station #10 AKA Ridge Pike Pump Station

Pump Station #10 is located along Ridge Pike and is equipped with two (2) explosion proof, 180-gpm submersible pumps. Wastewater is discharged through a six (6) inch force main that ties into an eight (8) inch gravity sewer at Manhole A206 located approximately ¼ mile east of the intersection of Limerick Road and Ridge Pike which conveys sewage to Pump Station #3 and inevitably to the WWTP.

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Pump Station #10 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged. Pump Station #10 also includes an emergency bypass connection that the Township can connect one of their portable pumps to in the event that one of the pumps becomes inoperable.

Pump Station #10 includes a pump controller that has the capability of calculating and recording the peak influent flow. The instantaneous peak influent values were analyzed and provided in table 6.1-A.2 where available. The Instantaneous Peak Flow was taken on 2/24/2016 during a storm event of 1.62" (an average wet weather event in 2016). An auto-dialer is installed on Pump Station #10 to alert Township personnel of high flow conditions.

Influent Flow data has been recorded via portable flow monitors.

8. Pump Station #11 AKA Winnie Tract Subdivision / Llewellyn Lane Pump Station

This station was taken offline in June 2015 and demolished in October 2015. Flow to Pump Station #11 is now conveyed to Pump Station #20.

9. Pump Station #12 AKA Township Line Road Pump Station

Pump Station #12 is located along Township Line Road within the Bradford Woods subdivision and is equipped with two (2) explosion proof 94-gpm submersible pumps. Wastewater is discharged through a four (4) inch force main that ties into an existing manhole located near the intersection of Township Line Road and Graterford Road where it flows by gravity to Pump Station #6 and on to the WWTP.

Pump Station #12 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged.

Currently, flow data is obtained from a magmeter located on the discharge side of the pump station. The maximum pumping rate recorded was the pumping rate of the pumps. The magmeter is not configured to log the instantaneous flows, only the totalized flow which is recorded by hand daily. An auto-dialer is installed on Pump Station #12 to alert Township personnel of high flow conditions.

This station is not believed to be hydraulically over loaded.

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10. Pump Station #13 AKA Cambridge Drive - Grinder Pump Station

Pump Station #13 is located along the cul-de-sac at the end of Bradford Drive within the Bradford Woods subdivision and is equipped with two (2) 27.5-gpm submersible grinder pumps. Wastewater is discharged through a two (2) inch force main that ties into an existing manhole on Bradford Drive where it flows by gravity to Pump Station #14 and inevitably to the WWTP.

Pump Station #13 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged. Pump Station #13 also includes an emergency bypass connection that the Township can connect one of their portable pumps to in the event that one of the pumps becomes inoperable.

Currently, flow data is obtained from a magmeter located on the discharge side of the pump station. The maximum pumping rate recorded was the pumping rate of the pumps. The magmeter is not configured to log the instantaneous flows, only the totalized flow which is recorded by hand daily. An auto-dialer is installed on Pump Station #13 to alert Township personnel of high flow conditions.

This station is not believed to be hydraulically overloaded.

11. Pump Station #14 AKA Cambridge Drive Pump Station

Pump Station #14 is located along Bradford Drive within the Bradford Woods subdivision and is equipped with two (2) 103-gpm submersible pumps. Wastewater is discharged through a four (4) inch force main that ties into the four (4) inch force main from Pump Station #12 around the intersection of Township Line Road and Tanglewood Drive that ties into an existing manhole where it flows by gravity to Pump Station #6 and on to the WWTP.

Pump Station #14 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged.

Pump Station #14 includes a pump controller that has the capability of calculating and recording the peak influent flow. The instantaneous peak influent values were analyzed and provided in table 6.1-A.2 where available. The Instantaneous Peak Flow was taken on 2/24/2016 during a storm event of 1.62" (an average wet weather event in 2016). An auto-dialer is installed on Pump Station #14 to alert Township personnel of high flow conditions.

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This station is not believed to be hydraulically over loaded.

12. Pump Station #15 AKA Landis Brooke Pump Station

Pump Station #15 is located along Sunny Brooke Road within the Estates of Landis Brooke subdivision and is equipped with two (2) 33-gpm submersible grinder pumps. Wastewater is discharged through a two (2) inch force main that ties into the existing sewer manhole on Sunny Brooke Road where it flows by gravity to Pump Station #10 and inevitably on to the WWTP.

Pump Station #15 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged.

There is no flow meter or monitoring equipment currently at this site. Currently, flows are derived from a pump run timer. An auto-dialer is installed on Pump Station #15 to alert Township personnel of high flow conditions. It is proposed to add flow monitoring capabilities to Pump Station #15 when it is in need of upgrading or overhauling or if it is believed that it is approaching its design capacity.

This station is not believed to be hydraulically over loaded.

13. Pump Station #19 AKA Springford Country Club Pump Station

Pump Station #19 is located along Country Club Road within the Country Club Estates Subdivision and is equipped with two (2) explosion proof 96-gpm submersible pumps. Wastewater is discharged through a four (4) inch force main to a manhole located on Country Club Road where it flows by gravity to Pump Station #6 and on to the WWTP.

Pump Station #19 also has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged.

Pump Station #19 includes a pump controller that has the capability of calculating and recording the peak influent flow. The instantaneous peak influent values were analyzed and provided in table 6.1-A.2 where available. The Instantaneous Peak Flow was taken on 2/24/2016 during a storm event of 1.62" (an average wet weather event in 2016). An auto-dialer is installed on Pump Station #19 to alert Township personnel of high flow conditions.

This station is not believed to be hydraulically over loaded.

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14. Pump Station #20 AKA Graterford Pump Station

Pump Station #20 began receiving flows conveyed from Pump Station #11 (now demolished) in June 2015 and was accepted by the Township in October 2015. Pump Station #20 is located along Graterford Road northeast of Township Line Road and is equipped with two (2) explosion proof 320-gpm non-clog submersible pumps. Wastewater is discharged through a 6-inch ductile iron force main to a manhole located on Township Line Road where it flows by gravity to Pump Station #6 and on to the WWTP.

Pump Station #20 has an emergency generator associated with it and an auto-dialer that alerts Township personnel when the generator is engaged.

Pump Station #20 includes a pump controller that has the capability of calculating flow rates, but is not currently capable of outputting the flow data for recording or storage. An auto-dialer is installed on Pump Station #19 to alert Township personnel of high flow conditions.

In general, the pumping stations are running without any mechanical problems and are in good condition. Each pump station is inspected, at a minimum, once a week and adjustments made as necessary. All necessary maintenance is done by the Authority's personnel or by service contractors. The Township's extensive preventative maintenance program continues to maintain all facilities in good working condition.

The Township reports that the pump stations were capable of pumping peak instantaneous flows during dry weather conditions without problem.

Major repairs and/or upgrades during 2016 are listed in the pump station descriptions and Section 4.2. Presently, the Township is currently working towards ascertaining a method to meet the DEPs request of influent flow monitoring that is able to measure, indicate, and record the flow at the pump stations to document peak hour or instantaneous readings during a major storm event(s).

6.1 Hydraulic Load Projection to the Pump Stations

Pump stations #4, #5, #10, #14 and #19 have been identified as having controllers capable of calculating and recording peak influent flows. Peak influent flows are included in this report except for pump station #4, due to issues with the equipment. The Township has been working with equipment vendors in an effort to utilize this controller feature for the requested purpose.

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There were no flow metering devices installed at pumping stations #2, #3, #6, #7, #11, #12, or #15 to indicate present peak hourly or instantaneous flow recordings during major storm events in 2016; therefore, an actual peaking factor ratio of peak flow to annual average flow cannot be determined for each pump station. The peaking factor from the 2010 Wasteload Management Report was used to project the hydraulic loading at each pump station.

The annual flow data for the pumping stations is summarized in Table 6.1-A1 and 6.1-A2 of this Report. Table 6.1-A2 - "King Road Pump Station Capacity Projections" compares the present maximum and projected 2-year maximum flows to the available maximum pumping rate at each station. Please note that the peak instantaneous flow was not available and; therefore, the peaking factor was taken from the previous year's report. Flow projections have been calculated using the Townships standard planning flow rate of 230 gpd/edu. The Townships growth projections have been taken from Table 2.2-A.

As can be seen in Table 6.1-A2 there is no projected overload within the next 5-years. The 2-year projected maximum loading does not present an overload condition either.

A projected overload of Pump Station #11 was identified in past Chapter 94 reports which referenced a Corrective Action Plan that was originally included in the 2004 Chapter 94 report. The CAP described the need for the design and permitting of a new pump station and interceptor along Graterford Road and the decommissioning of Pump Station #11. The Graterford Road Pump Station received PADEP Part 2 Water Quality Management Permits and was accepted by the Township in October 2015.

With the exception of Pump Station #10 where influent flows are under EPA jurisdiction, there are no projected hydraulic overloads at the Township's pump stations based on the calculated peak flows.

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**Table 6.1-A1
King Road Pump Station Flow Data (MGD)**

Month	PS #1	PS #2	PS #3	PS #4	PS #5	PS #6	PS #7	PS #10	PS #11	PS #12	PS #13	PS #14	PS #15	PS #16	PS #17	PS #18	PS #19	PS #20
January	0.0670	0.0410	0.2680	0.0160	0.5200	0.8820	0.0250	0.0380	0.0000	0.0290	0.0076	0.0210	0.0082	0.1260	0.1600	0.1120	0.0069	0.0590
February	0.0620	0.0530	0.3660	0.0300	0.6090	1.1000	0.0260	0.0560	0.0000	0.0370	0.0779	0.0170	0.0088	0.1370	0.2120	0.1430	0.0066	0.0830
March	0.0531	0.0369	0.1918	0.0160	0.4542	0.8138	0.0211	0.0366	0.0000	0.0246	0.0065	0.0176	0.0067	0.1049	0.1586	0.0932	0.0080	0.0648
April	0.0570	0.0420	0.2540	0.0140	0.4540	0.8210	0.0130	0.0350	0.0000	0.0260	0.0070	0.0180	0.0090	0.1110	0.1690	0.0790	0.0080	0.0790
May	0.0730	0.0470	0.2750	0.0190	0.4920	0.8670	0.0240	0.0384	0.0000	0.0290	0.0075	0.2216	0.0078	0.1110	0.1760	0.0733	0.0096	0.0852
June	0.0730	0.0470	0.2750	0.0190	0.4920	0.8670	0.0240	0.0384	0.0000	0.0290	0.0075	0.2216	0.0078	0.1110	0.1760	0.0733	0.0096	0.0852
July	0.0769	0.0259	0.2356	0.0448	0.4230	0.7396	0.0231	0.0296	0.0000	0.0223	0.0069	0.0155	0.0088	0.1221	0.1365	0.0727	0.0107	0.0592
August	0.0806	0.0280	0.2400	0.0226	0.4280	0.7539	0.0232	0.0307	0.0000	0.0224	0.0073	0.0145	0.0068	0.1239	0.1395	0.0749	0.0255	0.0529
September	0.0788	0.0285	0.2084	0.0194	0.4002	0.8140	0.0252	0.0277	0.0000	0.0795	0.0795	0.0138	0.0072	0.1295	0.1465	0.0744	0.0131	0.0558
October	0.0660	0.0330	0.2580	0.0160	0.4340	0.8080	0.0270	0.0240	0.0000	0.0230	0.0082	0.0150	0.0077	0.3820	0.0970	0.0760	0.0110	0.0540
November	0.0490	0.0330	0.2450	0.0180	0.3680	0.7580	0.0250	0.0260	0.0000	0.0220	0.0090	0.0140	0.0080	0.0940	0.1410	0.0780	0.0980	0.0520
December	0.0480	0.0330	0.2950	0.0200	15.2800	0.8700	0.0280	0.0370	0.0000	0.0990	0.0100	0.0150	0.0090	0.1030	0.1640	0.0890	0.0110	0.0640
Annual Average	0.0654	0.0374	0.2593	0.0212	1.6962	0.8412	0.0237	0.0348	0.0000	0.0369	0.0196	0.0504	0.0080	0.1379	0.1563	0.0866	0.0182	0.0604
Max Month	0.0806	0.0530	0.3660	0.0448	15.2800	1.1000	0.0280	0.0560	0.0000	0.0990	0.0795	0.2216	0.0090	0.3820	0.2120	0.1430	0.0980	0.0852
Note: Pump Station Data for both the King Road and Possum Hollow Service Areas																		

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**Table 6.1-A2
King Road Pump Station Capacity Projections (MGD)**

Pump Station ID	No. of Pumps	Hydraulic Design Capacity (gpm)	Annual Average Permitted Capacity (gpd)	Annual Average Flows (gpd)	Maximum Monthly Flows (gpd)	Peak Instantaneous Flow (gpm)	Peaking Factor	Projected 2-Year EDU Buildout	Projected 5-Year EDU Buildout	GPD/EDU*	2-Year Projected Annual Average Flow	5-Year Projected Annual Average Flow	2-Year Projected Maximum Flow (gpd)	Projected Overload?
PS #1	2	142	204,480	65,363	80,603	-	1.53	0	0	230	65,360	65,363	99,837	No
PS #2	2	130	187,200	37,353	53,000	-	1.55	6	12	230	38,730	40,113	60,128	No
PS #3	2	1,150	1,656,000	259,319	366,000	-	1.51	113	206	230	285,310	306,699	431,959	No
PS #4	2	120	172,800	21,234	44,800	-	2.07	0	0	230	21,230	21,234	43,912	No
PS #5	2	1,900	2,736,000	1,696,199	15,280,000	-	0.18	246	375	230	1,752,780	1,782,449	313,849	No
PS #6	2	2,225	3,204,000	841,189	1,100,000	-	1.57	447	447	230	944,000	943,999	1,482,363	No
PS #7	2	260	374,400	23,716	28,000	-	1.24	0	0	230	23,720	23,716	29,432	No
PS #10	2	180	259,200	34,789	56,000	139	3.57	74	74	230	51,810	51,809	185,184	No
PS #11	2	90	129,600	0	0	-	1.57	N/A	N/A	N/A	NA/	N/A	N/A	N/A
PS #12	2	94	135,360	36,899	99,000	-	1.34	6	7	230	38,280	38,509	51,433	No
PS #13	2	28	39,600	19,574	79,503	-	1.13	0	0	230	19,570	19,574	22,016	No
PS #14	2	103	148,320	50,385	221,600	76	0.50	0	0	230	50,380	50,385	25,012	No
PS #15	2	33	47,520	7,982	9,000	-	1.24	0	0	230	7,980	7,982	9,915	No
PS #16	3	1,213	1,746,720	137,949	382,000	-	4.57	5	5	230	139,100	139,099	636,044	No
PS #17	3	810	1,166,400	156,347	212,000	203	1.38	336	635	230	233,630	302,397	322,145	No
PS #18	2	510	734,400	86,567	143,000	199	2.00	127	170	230	115,780	125,667	231,664	No
PS #19	2	96	138,240	18,169	98,000	21	0.31	9	9	230	20,240	20,239	6,305	No
PS #20	2	320	460,800	60,449	85,200	-	5.41	0	39	230	60,450	69,419	326,941	No

*Planning
Flow Rate: 230

*Calculated
Flow Rate: 119

Note:

Hydraulic Design Capacity does not include the capacity of backup pumps

Pump Station data for both King Road and Possum Hollow Service Areas

Peaking Factors from previous years report

Peak Instantaneous Value taken on 2/24/2016 during storm event of 1.62"

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7.0 INDUSTRIAL WASTES [§ 94.12.Sec. (a) (8)]

The primary source of wastewater to the treatment plant is residential. The Township is currently not required to implement a Municipal Industrial Pretreatment Program (MIPP); however, the Township must assure that the effluent discharge from the plant is in compliance with the limitations outlined in their NPDES Permit. Rules and Regulations Governing Use of the Sewer System was adopted in 1986 to facilitate maintaining compliance. Amendments made in 1994, 2001, and 2006, enable the Township, as successor to the Municipal Authority, to enforce compliance with the standards set in the Rules, to require all industrial facilities to be permitted and to complete on-site inspections of industrial facilities. A copy of the resolution as amended is provided in Appendix C in this report.

At present time there are no permitted industrial wastewater dischargers in the King Road WWTP service area.

There are no significant problems caused at the WWTP due to industrial discharge.

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8.0 PREVENTION OF OVERLOAD CONDITIONS [§ 94.12.Sec. (a) (9)]

8.1 Hydraulics

While there is no projected hydraulic overload of the Township's sewage facilities based on the calculations provided, there is evidence that a possible overload condition could exist at Pump Stations #10 and #11. As previously discussed, the occurrence of the lag pump coming online in conjunction with the lead pump may indicate a possible overload condition at the pump station. Pump Station #10 overloading is a result of high inflow from the Ridge View Terrace Mobile Home Park along Ridge Pike. Ridge View Terrace is currently under mandate from US EPA to eliminate I&I. Pump Station #11 was replaced in June 2015.

The WWTP receives increased influent volume during wet weather, which is an indication of I&I into the sewage collection system. Potential sources for this I&I include leaks in sewer joints and manholes; failed house connections; direct inflow into low manholes; root intrusion; illegal connections from building sump pumps; and possibly storm drains connected to the collection system.

Based on the Township's extensive flow monitoring and televising efforts, it is believed that a majority of the I&I comes from faulty laterals and illegal sump pump connections. The Township is currently looking into modifying their ordinances and developing a plan to assess and have these problems corrected.

8.2 Organics

There is no current or projected organic overloads, therefore no action is required at this time.

APPENDIX A

Hydraulic and Organic Loading

APPENDIX B

Wastewater Facilities Map and Year 2016 Connections

APPENDIX C

Attachment 1	NPDES Permit
Attachment 2	Pump Station Flow Schematic Diagram
Attachment 3	Meter Calibration Records
Attachment 4	Township Industrial Discharge Resolution
Attachment 5	Inter-Municipal Sewer Agreement
Attachment 6	Sewer and Plumbing Ordinances
Attachment 7	Lateral Inspection Procedures
Attachment 8	Sanitary Sewer Overflow Report

NPDES Permit

Pump Station Flow Schematic Diagram

Meter Calibration Records

Township Industrial Discharge Resolution

Inter-Municipal Sewer Agreement

Sewer and Plumbing Ordinances

Lateral Inspection Procedures

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