APPENDIX A

2013 WASTELOAD MANAGEMENT (CHAPTER 94) REPORTS

HERITAGE HILLS WASTEWATER TREATMENT PLANT
&
DUTCHESS FARMS WASTEWATER TREATMENT PLANT

CHAPTER 94
MUNICIPAL WASTELOAD MANAGEMENT
ANNUAL REPORT

2013 CHAPTER 94 ANNUAL REPORT
UPPER MAKEFIELD TOWNSHIP
HERITAGE HILLS
WASTEWATER TREATMENT PLANT
BUCKS COUNTY

MARCH 13, 2014

PREPARED BY:
CKS ENGINEERS, INC.
88 SOUTH MAIN STREET
DOYLESTOWN, PA 18901

PREPARED FOR:
UPPER MAKEFIELD TOWNSHIP
1076 EAGLE ROAD
NEWTOWN, PA 18940

PREPARER

THOMAS F. ZARKO, P.E.
CKS ENGINEERS, INC.
TOWNSHIP WATER/SEWER CONSULTANT

PERMITTEE

DAVID NYMAN
INTERIM TOWNSHIP MANAGER

TABLE OF CONTENTS

1. INTRODUCTION

This report is written in compliance with The Pennsylvania Code; Title 25: Chapter 94: Municipal Wasteload Management regulations. The information contained in this report is relative to the 2013 operation and maintenance of the public wastewater collection, conveyance and treatment system associated with the Heritage Hills Wastewater Treatment Plant (WWTP) located in Upper Makefield Township, Bucks County, Pennsylvania. The wastewater system is owned by Upper Makefield Township.

The sanitary sewer service area of the Heritage Hills WWTP consists of four (4) residential subdivisions, all within Upper Makefield Township. The neighborhoods served are known as:

1. Heritage Hills
2. Traditions I
3. Traditions II
4. Lakeside

A total of 585 residential equivalent dwelling units (EDUs) are connected to the collection system and treatment plant. No new connections were made in 2013. The collection and conveyance system also includes four (4) sewage pumping stations. The collection system and pumping stations are in excellent condition and there are no known or suspected overflows or capacity problems.

The Heritage Hills Wastewater Treatment Plant is designed to treat a maximum of 172,544 gallons of wastewater per day. The treatment process begins with a comminutor chamber, followed by an equalization tank, from which wastewater is pumped into an oxygen uptake tank, followed by one of two (2) anoxic tanks. From there the influent is split into one of two (2) carrousel aerobic treatment basins followed by one of two (2) final clarifiers. Settled sludge is pumped into a sludge digester. Supernatant (clarified effluent) from the clarifiers flows through a chlorine contact tank and a gravity sand filter, before being aerated and discharged. Effluent is discharged to 14 effluent discharge basins for absorption into the soil and recharge of groundwater. If bad weather or mechanical problems prevent discharge to the basins, the operator can discharge effluent directly to the Delaware River. Settled, digested liquid sludge is periodically removed for offsite disposal. A standby emergency generator is available in case of power outages.

Presently, the Heritage Hills WWTP NPDES Permit No. PA 0052035 sets standards for conventional pollutants only, which include $CBOD_5$, Suspended Solids, Ammonia as N, total residual chlorine, pH, fecal coliform and dissolved oxygen.

2. HYDRAULIC AND ORGANIC LOADINGS

During 2013, monthly average flows through the Heritage Hills WWTP was 47,630 gallons per day. This is a slight increase over the previous year's average of 43,200 gallons per day. Precipitation for 2013 totaled approximately 45.2 inches, compared to a long-term annual average for the area of 44 inches. All flows treated at the Heritage Hills WWTP are from domestic service; no commercial or industrial sources are connected to the plant.

As noted above, the monthly average flow through the plant was 0.048 MGD. Peak average monthly flows occurred in August at 0.0662 MGD. The 3 month maximum flow average of 0.0534 MGD occurred from June through August. The hydraulic capacity of the plant is 172,544 gallons per day. All hydraulic loadings experienced during 2013 were significantly below the rated hydraulic capacity of the plant. No hydraulic overload exists. Table 1, Hydraulic Loadings - 2013 below presents all relevant flow data for the year.

TABLE 1
HYDRAULIC LOADINGS - 2013

Month	Average Daily Flow	Maximum Daily Flow	Precipitation
January	0.0446	0.0568	3.0
February	0.0400	0.0517	1.6
March	0.0414	0.0561	2.5
April	0.0463	0.2760	2.4
May	0.0525	0.4560	3.3
June	0.0536 *	0.3540	10.2
July	0.0404 *	0.0570	5.6
August	0.0662 *	0.5518	4.1
September	0.0413	0.0511	1.9
October	0.0448	0.0556	1.7
November	0.0495	0.0750	4.0
December	0.0510	0.0690	4.9

Total Flow (million gallons):	16.3
Annual Average Daily Flow (mgd):	0.04763
Maximum Daily Flow (mgd):	0.5518 (August)
3 Month Maximum Average Daily Flow (mgd):	0.0534 (* June - August)

Source: 2013 Monthly Operator's Reports

Table 2 below presents flow data at the Heritage Hills WWTP over the past five years.

TABLE 2

HYDRAULIC LOADING (MGD)

MONTH	2009	2010	2011	2012	2013
January	0.059	0.056	0.065	0.050	0.045
February	0.052	0.053	0.051	0.039	0.040
March	0.048	0.055	0.070	0.040	0.041
April	0.050	0.047	0.075	0.039	0.046
May	0.050	0.050	0.040	0.042	0.052
June	0.054	0.049	0.041	0.040	0.054
July	0.048	0.049	0.063	0.040	0.040
August	0.055	0.050	0.070	0.041	0.066
September	0.055	0.050	0.065	0.041	0.041
October	0.058	0.054	0.050	0.044	0.045
November	0.058	0.061	0.055	0.048	0.050
December	0.063	0.063	0.058	0.053	0.051
Annual Average (AA)	0.054	0.053	0.059	0.043	0.048
3 Month Max. Average	0.060	0.059	0.066	0.048	0.053
Ratio (3 Month Max to AA Ratio)	1.11	1.11	1.13	1.12	1.12

5-Year Average Hydraulic Ratio = 1.12

Table 3, Organic Loadings - 2013, illustrates the monthly organic (BOD_5) loadings experienced at the Heritage Hills WWTP. Influent BOD samples are taken once a month using a composite sampler at the plant's headworks.

TABLE 3

ORGANIC LOADING - 2013

DATE	BOD_5 (mg/l)	FLOW (MGD)	MONTHLY AVERAGE (lbs./day)
January 8	173	0.0466	67
February 12	409	0.0349	119
March 12	264	0.0426	94
April 9	195	0.0381	62
May 14	218	0.0346	63
June 11	213	0.0508	90
July 9	400	0.0410	137
August 13	173	0.0510	74
September 10	186	0.0465	72
October 8	198	0.0455	75
November 12	143	0.0508	61
December 12	213	0.0454	81
Average Loading			83

Loading = BOD_5 Concentration (mg/l) x Flow (MGD) x 8.34
Source: 2013 Monthly Operator's Report

Based on this average influent BOD loading and the number of EDUs serviced at the end of 2013 (585 EDUs), an average organic loading of 0.14 lbs./day/EDU was calculated. The past five years of average organic loading are shown in Table 4 below. The ratio of Maximum Monthly Loading to the Annual Average is shown in this table. The five year average of these ratios is calculated as 1.71. The organic loading capacity of the treatment plant is 361 lbs./day. The organic loadings experienced in 2013 were all significantly less than the rated organic capacity of the plant.

TABLE 4

ORGANIC LOADING
(lbs./day)

MONTH	2009	2010	2011	2012	2013
January	136	275	137	75	67
February	199	288	109	60	119
March	146	108	80	70	94
April	141	106	81	81	62
May	125	61	66	87	63
June	188	94	104	87	90
July	218	88	No Data	73	137
August	121	166	84	74	74
September	60	73	84	79	72
October	218	147	104	95	75
November	135	86	121	166	61
December	152	98	107	87	81
Annual Average	153	133	98	86	83
Ratio (Month Max to Annual Average Ratio) *	1.42	2.17	1.40	1.93	1.65

5-Year Average Organic Loading = 111 lbs/day

5-Year Average Organic Ratio = 1.71

3. 5-YEAR HYDRAULIC AND ORGANIC LOADING PROJECTIONS

As of December 2013, 585 EDUs were connected to the Heritage Hills WWTP. Chapter 94 Reports for the plant from past years were reviewed to determine the number of connections made during that time period. A five-year adjusted average flow was calculated using the method recommended by the PA DEP. A five year adjusted average flow of 52,700 gallons per day (0.053 MGD) was calculated. This data is shown in Table 5 below.

TABLE 5 - 5 YEAR ADJUSTED AVERAGE FLOW

		ADDITIONAL FLOWS CONNECTED					
YEAR	**ANNUAL AVERAGE FLOW (GPD)**	**2009**	**2010**	**2011**	**2012**	**2013**	**ANNUAL ADJUSTED FLOW (GPD)**
2009	54,000	3,000	350	1,000	0	0	58,350
2010	53,000		350	1,000	0	0	54,350
2011	59,000			1,000	0	0	60,000
2012	43,200				0	0	43,200
2013	47,630					0	47,630
TOTAL	256,830					TOTAL	263,530
5 YEAR AVG.	51,366			5 YEAR ADJUSTED AVERAGE			52,700

Additional flows connected to the Heritage Hills WWTP in 2009, 2010, and 2011 were from the pump and haul operation from the Dutchess Farm Subdivision.

As of December 2013, 585 EDUs were connected to the treatment plant.

TABLE 6 - 5 YEAR FLOW PROJECTION

YEAR	ADJUSTED ANNUAL AVERAGE (GPD)	PROJECTED CHANGE IN FLOW (GPD)	PROJECTED ANNUAL AVERAGE FLOW (GPD)	PROJECTED MAX MONTH FLOW (GPD)
2014	52,700	0	52,700	59,000
2015	52,700	0	52,700	59,000
2016	52,700	0	52,700	59,000
2017	52,700	0	52,700	59,000
2018	52,700	0	52,700	59,000

The permitted capacity of the wastewater treatment plant (172,544 gpd) is sufficient to accommodate projected flows through 2018. By December 2018, the average daily flow to the wastewater treatment plant is projected to be approximately 53,000 gpd with a 3-month maximum average daily flow of 59,000 gpd. The projected 3-month maximum average daily flow is based on the ratio of the 3-month maximum average daily flow to the annual average daily flow over the past 5 years (1.12).

Figure 1 illustrates the hydraulic loading to the wastewater treatment plant for January 2009 through December 2013 on a monthly basis. Projections are also illustrated on an average annual basis for 2014 through 2018.

Appendix A contains the calibration service reports for the Heritage Hills Wastewater Treatment Plant influent flow meter and recorder.

Projected organic loadings for the Heritage Hills WWTP are based on the average of the past five years annual average loadings (111 lbs./day) divided by the number of EDUs connected to the collection system (585 EDUs). This gives an equivalent loading of approximately 0.2 lbs./day/EDU. The projected maximum month loading is equal to the projected annual average multiplied by the 5-year average organic ratio of 1.71 shown in Table 4. The projected organic loadings and projected maximum monthly loadings are significantly below the Heritage Hills WWTP rated organic capacity of 361 lbs./day. Projected organic loadings to 2018 are shown in Table 7 below.

Figure 2 illustrates the organic loading to the wastewater treatment plant for January 2009 through December 2013 on a monthly basis. Projections of future organic loading for 2014 through 2018 are also shown.

TABLE 7
PROJECTED ORGANIC LOADINGS

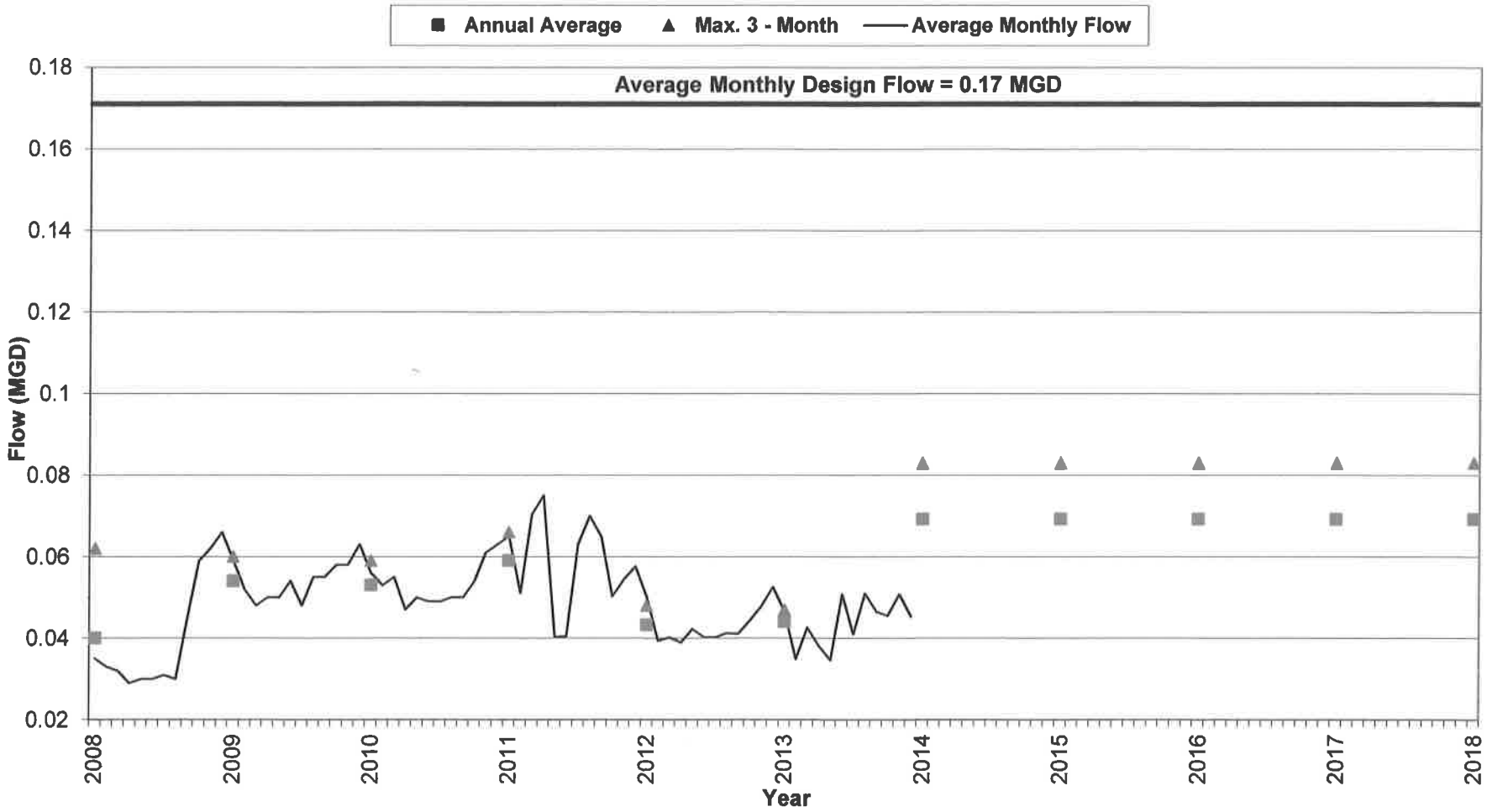
Year	Total New EDUs	Total EDUs	Average Daily Loading from New EDUs (lbs/day)	Projected Total Average Daily Loading (lbs/day)	PROJECTED MAX. MONTH LOADING (lbs/day)
2009	0	585	0	153 *	218 *
2010	0	585	0	133 *	288 *
2011	0	585	0	98 *	137 *
2012	0	585	0	86 *	166 *
2013	0	585	0	83 *	137 *
2014	0	585	0	111	190
2015	0	585	0	111	190
2016	0	585	0	111	190
2017	0	585	0	111	190
2018	0	585	0	111	190

* Figure 2 illustrates the historical organic loading to the plant for January 2009 through December 2013 on a monthly basis and the annual average.

** Future organic loading projections noted above and shown on Figure 2 are based on the 5 year average daily organic loading 111 lbs/day or 0.2 lbs/day/EDU.

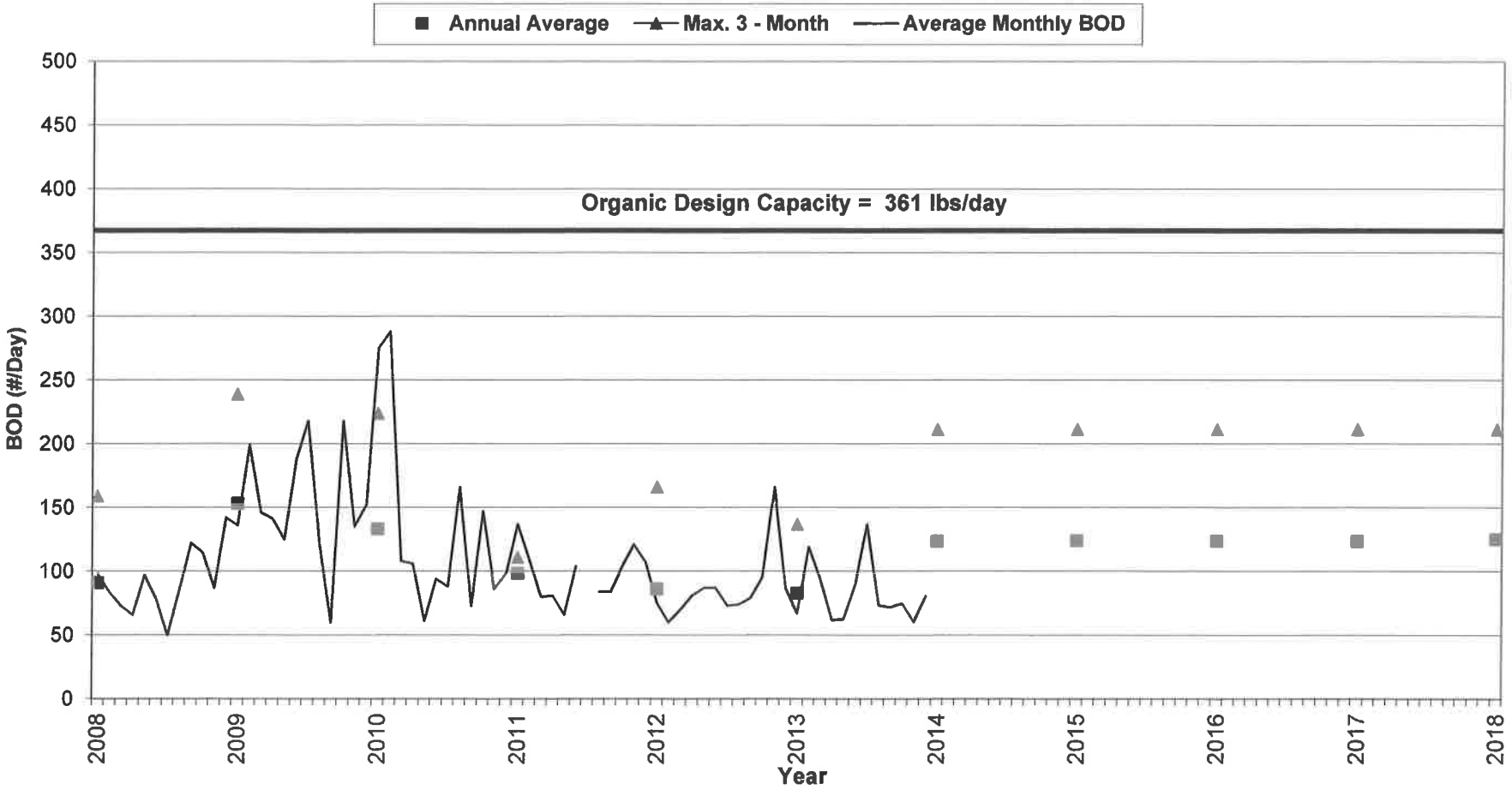
Projected maximum month loadings noted above are based on the projected average daily loading multiplied by the 5-year average organic ratio (1.71) calculated in Table 4.

Upper Makefield Township
Heritage Hills Wastewater Treatment Plant
Figure 1 - Hydraulic Loading - 2009 - 2018



NOTE: Refer to tables 1, 2, 5 & 6 of this report for the basis of information presented in this figure

Upper Makefield Township
Heritage Hills Wastewater Treatment Plant
Figure 2 - Organic Loading - 2009 - 2018



NOTE: Refer to Tables 3, 4 & 7 of this report for the basis of information presented in this figure.

4. SEWER EXTENSIONS

During 2013 no sewer extensions were constructed tributary to the Heritage Hills WWTP. There are currently no approved sewer extensions within the service area of the WWTP. Future extension to service existing residential and commercial properties along Taylorsville Road are projected to be beyond the 5-year planning window.

5. PROGRAM FOR SANITARY SEWER MONITORING, MAINTENANCE AND REPAIR

Upper Makefield Township uses the services of a Contract Operation company to perform the routine operations and maintenance of the Heritage Hills WWTP and the associated collection and conveyance system. A licensed wastewater treatment operator monitors the plant for proper operation and adjusts process controls as necessary to produce treated effluent which meets or exceeds the requirements of the plant's NPDES Permit. Sampling is performed regularly to provide data required in the plant's Discharge Monitoring Reports (DMRs). Regulatory compliance samples are analyzed by a State Licensed laboratory. Operation control samples are taken and analyzed on-site. Contract Operations Staff performs regular maintenance on plant equipment, as well as the sewage pumping stations. Repairs are performed as required and outside contractors may be used to perform repairs if necessary.

During 2013, both aerator drive units for the carrousel treatment tanks were replaced.

6. CONDITIONS OF THE SEWER SYSTEM

The sanitary sewer system is generally confined to the following residential areas:

1. Heritage Hills
2. Traditions I
3. Traditions II
4. Lakeside

The sewage collection system was constructed in the past 20 years. The collection system is constructed of 8" PVC piping and pre-cast concrete manholes. The present condition of the collection and conveyance system is excellent, with no known or suspected overflows, surcharging, or capacity problems. System maintenance is performed on an as-needed basis. No extraordinary maintenance of the wastewater collection system was performed in 2013.

7. WASTEWATER PUMP STATIONS

Four (4) pump stations serve the sanitary collection system. Each of these pump stations is currently operating within its capacity. The pump stations are referenced as follows:

1. Lakeside
2. Sentinel
3. Traditions I
4. Traditions II

The pump stations are equipped with run-time hour meters. Run-times for each pump are shown in Table 5, Pump Station Run Times (Hours).

TABLE 5
PUMP STATION RUN TIMES (HOURS)

	Lakeside		Sentinel		Traditions I		Traditions II	
Month	**Pump #1**	**Pump #2**	**Pump #1**	**Pump #2**	**Pump #1**	**Pump #2**	**Pump #1**	**Pump #2**
January	30.0	34.7	21.2	22.3	71.8	11.2	25.1	41.3
February	26.6	35.4	17.8	19.1	66.2	0.0	25.3	34.7
March	29.8	35.6	20.2	21.4	75.2	6.7	83.7	41.6
April	27.3	32.2	19.1	20.0	37.8	37.6	24.9	46.2
May	31.4	37.2	20.8	22.1	41.6	39.5	26.8	45.3
June	29.5	37.1	22.3	24.1	44.2	44.0	44.2	44.0
July	30.7	35.8	22.5	23.5	39.8	37.4	31.2	40.8
August	27.3	33.2	22.1	23.7	39.6	36.4	34.0	46.4
September	28.1	33.4	21.3	22.5	42.8	40.3	31.5	43.4
October	30.5	41.3	21.3	22.7	43.5	42.2	30.1	44.7
November	31.5	36.8	23.6	22.7	44.4	44.3	27.8	47.0
December	29.4	34.6	23.1	24.5	45.1	46.6	32.0	47.8
Total Hours	352.1	427.3	255.3	268.6	592.0	386.2	416.6	523.2
Avg. Daily Run Time Hr	1.0	1.2	0.7	0.7	1.6	1.1	1.1	1.4

Based upon the pump station run times as outlined in Table 5 above, and the rated capacity of the pumping equipment installed at each of the Township's four (4) pump stations, the annual average and maximum 3-month average flows to the pumping stations for 2009 - 2013 were determined. The aforementioned historical pumping station flow data is presented within Appendix C of this report.

There is currently no indication of need for both pumps at any station to operate simultaneously, which would indicate the influent flow rate exceeding the capacity of the pump station.

Each pump station is inspected on regular basis, and routine maintenance is performed as needed. During 2013, each pump station operated as designed. There were no significant repairs or equipment outages reported by the operators during the year. In the event of one wastewater pump being out of service for electrical or mechanical repair, the second pump is capable of handling the maximum day and peak hour flows.

Each pump station is equipped with an automatic alarm monitor and dialer to report alarm conditions to the operator on duty. High wet well level and failure of normal electrical power are included in the alarm monitoring and reporting system.

No new connections to the pumping stations are anticipated during 2014 - 2018. A graphic presentation of historical and projected annual average and peak flows to each pumping station from 2009 - 2018, along with the design capacity of each pumping station, is included within Appendix B of this report. As illustrated on the hydraulic loading graphs attached to this report, each pumping station will operate within its respective design capacity through 2018.

8. INDUSTRIAL WASTE

The Heritage Hills WWTP receives only domestic sewage. No industrial users exist within the current service area.

9. CORRECTIVE ACTION PLAN

No hydraulic or organic overloads exist at the Heritage Hills WWTP, nor are any hydraulic or organic overloads projected. Therefore, no Corrective Action Plan or Capacity Management Plan is required.

10. CALIBRATION REPORTS

The influent and effluent flowmeters at the Heritage Hills WWTP are serviced and calibrated semi-annually. Calibration reports are included in Appendix A of this Chapter 94 Annual Report.

11. TRIBUTARY MUNICIPALITY REPORTS

The service area of the Heritage Hills WWTP is entirely within Upper Makefield Township. No connections with other municipalities exist; therefore, no other reports are required.

APPENDIX A

METER CALIBRATION SERVICE REPORTS
PAONE ELECTRIC, LLC
APRIL 22 AND SEPTEMBER 30, 2013

PAONE ELECTRIC, LLC
PO Box 397 ◆ Gilbertsville, PA 19525-0397 610-367-2363

SERVICE REPORT

Customer Information:

Heritage Hills WWTP
1076 Eagle Road
Newtown, PA 18940

Report No. UMT13004-1
Date Issued: 04/22/13
By: William M. Paone

SITE: Heritage Hills WWTP

Service Description

Plant Influent - Partlow MRC5000 Circular Chart Recorder
Chart set up for 0-400 GPM, input set up for 0-354 GPM, signal checked at 4ma=0 GMP, 8ma=90 GPM, 12ma=176GPM, 16ma=266GPM, 20ma= 354 GPM, Minor adjustments needed, all checks good

Plant Influent - Badger 2100MB Ultra Sonic Flow Meter
Used with a 10" Palmer Bowlus Flume, set up for 0-354 GPM, 6" max head rise, sensor offset is 19.25", V-cal is 25.25", totalizer = cts x 100, output dampening = 8s, signal set for 0GPM at 4ma, 354GPM at 20ma, signal output checked, all other checks good

Plant Effluent - Partlow MRC5000 Circular Chart Recorder
Chart set up for 0-400 GPM, input set up for 0-400 GPM, signal checked at 4ma=0 GMP, 8ma=100 GPM, 12ma=200 GPM, 16ma=300 GPM, 20ma= 400 GPM, Minor adjustments needed, all checks good

Plant Effluent - Siemens 6" Mag Meter
Set up for 0-400 GPM, pipe diameter = 6", signal checked at 4ma=0 GMP, 8ma=100 GPM, 12ma=200 GPM, 16ma=300 GPM, 20ma= 400 GPM, low flow cut off = 1.5%, totalizer = cts x 1000, no adjustments needed, **Vault contains some water, Sump is not operational or missing**

All instruments were found free from defects and in good working condition. I hope you find this information helpful. I may be reached at 610-955-6000 if you have any questions.

Respectfully,

William M. Paone
PAONE ELECTRIC, LLC

NFPA MEMBER 2011-2012

PAONE ELECTRIC, LLC
PO Box 397 ◆ Gilbertsville, PA 19525-0397 610-367-2363

SERVICE REPORT

Customer Information:
Heritage Hills WWTP
1076 Eagle Road
Newtown, PA 18940

Report No. UMT13004-2
Date Issued: 09-30-13
By: William M. Paone

SITE: Heritage Hills WWTP

Service Description

Plant Influent - Partlow MRC5000 Circular Chart Recorder
Chart set up for 0-400 GPM, input set up for 0-354 GPM, signal checked at 4ma=0 GMP, 8ma=90 GPM, 12ma=176GPM, 16ma=266GPM, 20ma= 354 GPM, No adjustments needed, all checks good

Plant Influent - Badger 2100MB Ultra Sonic Flow Meter
Used with a 10" Palmer Bowlus Flume, set up for 0-354 GPM, 6" max head rise, sensor offset is 19.25", V-cal is 25.25", totalizer = cts x 100, output dampening = 8s, signal set for 0GPM at 4ma, 354GPM at 20ma, signal output checked, all other checks good

Plant Effluent - Partlow MRC5000 Circular Chart Recorder
Chart set up for 0-400 GPM, input set up for 0-400 GPM, signal checked at 4ma=0 GMP, 8ma=100 GPM, 12ma=200 GPM, 16ma=300 GPM, 20ma= 400 GPM, No adjustments needed, all checks good

Plant Effluent - Siemens 6" Mag Meter
Set up for 0-400 GPM, pipe diameter = 6", signal checked at 4ma=0 GMP, 8ma=100 GPM, 12ma=200 GPM, 16ma=300 GPM, 20ma= 400 GPM, low flow cut off = 1.5%, totalizer = cts x 1000, no adjustments needed, **Vault contains water, Sump is not operational or missing**

All instruments were found free from defects and in good working condition. I hope you find this information helpful. I may be reached at 610-955-6000 if you have any questions.

Respectfully,

William M. Paone
PAONE ELECTRIC, LLC

NFPA MEMBER 2012-2013

APPENDIX B

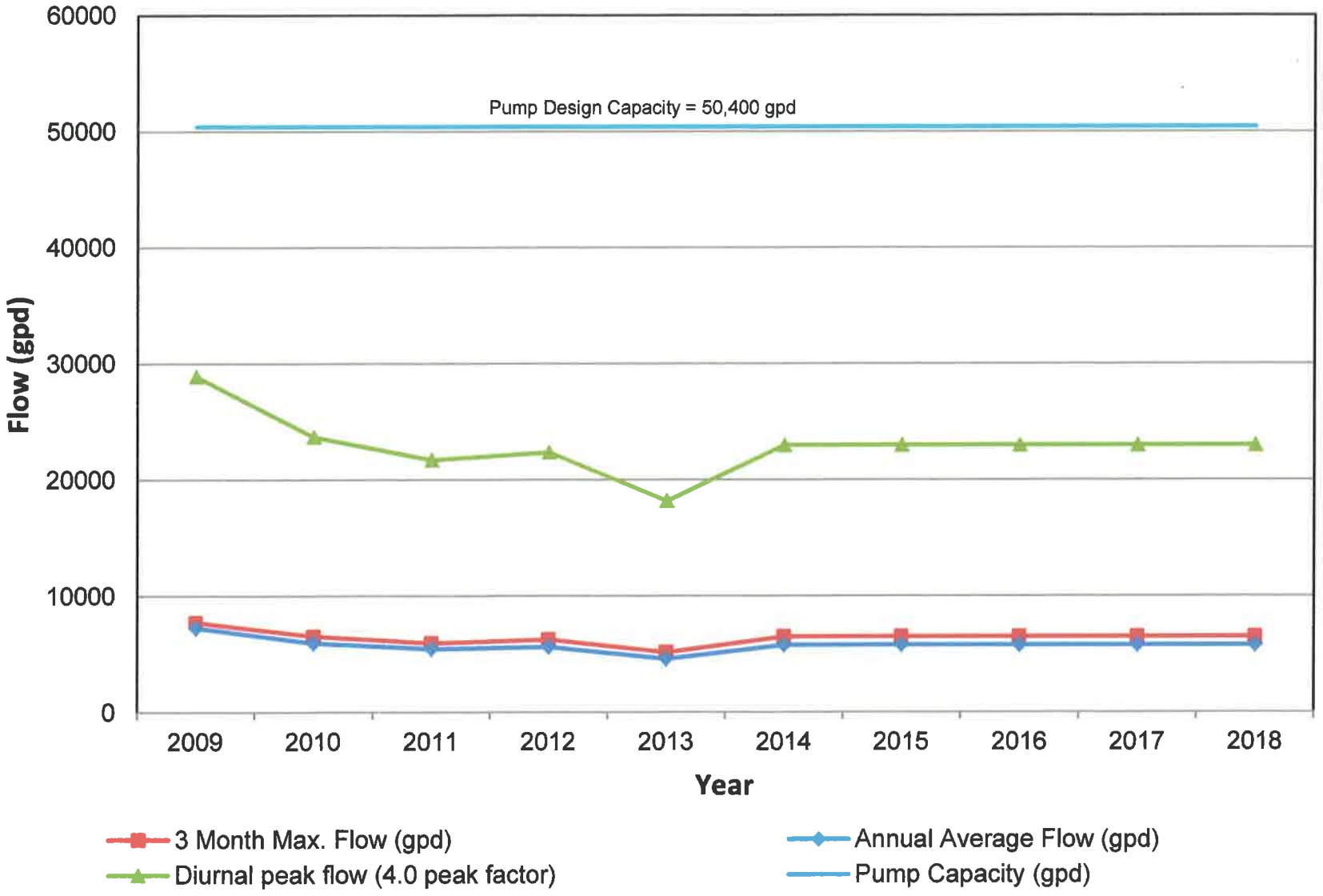
WASTEWATER PUMP STATION HISTORICAL/PROJECTED HYDRAULIC LOADING DATA

UPPER MAKEFIELD TOWNSHIP
2013 MUNICIPAL WASTELOAD MANAGEMENT REPORT
HISTORICAL PUMP STATION FLOW DATA
LAKESIDE PUMPING STATION
2009-2013

MONTH	MONTHLY TOTAL FLOW TO PUMPING STATION				
	2009	2010	2011	2012	2013
January	250,320	217,770	201,600	208,530	135,870
February	214,620	168,630	151,200	167,370	130,200
March	202,650	96,600	181,020	174,090	137,340
April	189,840	179,970	169,470	166,320	124,950
May	221,970	183,540	180,180	183,120	144,060
June	202,860	171,570	160,650	200,340	139,860
July	223,230	182,910	151,410	177,870	139,650
August	201,390	178,920	139,860	149,730	127,050
September	200,340	164,010	133,140	130,620	129,150
October	216,930	185,220	148,470	159,180	150,780
November	255,570	192,570	148,680	149,100	143,430
December	220,920	208,740	186,270	146,160	134,400
Annual Average (gallons/month)	216,720	177,538	162,663	167,703	136,395
Annual Average (gallons/day)	7,224	5,918	5,422	5,590	4,547
Max. 3-Month Ave (gallons/month)	231,140	195,510	177,940	187,110	142,870
Max. 3-Month Ave (gallons/day)	7,705	6,517	5,931	6,237	4,762
FLOW PROJECTION FACTOR Maximum 3-Month Average Divided by Annual Average	1.067	1.101	1.094	1.116	1.047
Average Factor (5-YearAverage)	1.085				

PUMP DESIGN FLOW RATE = 35 GPM or 50,400 GPD

UPPER MAKEFIELD TOWNSHIP
2013 MUNICIPAL WASTELOAD MANAGEMENT REPORT
LAKESIDE PUMPING STATION
FIGURE 3 - HYDRAULIC LOADING - 2009-2018

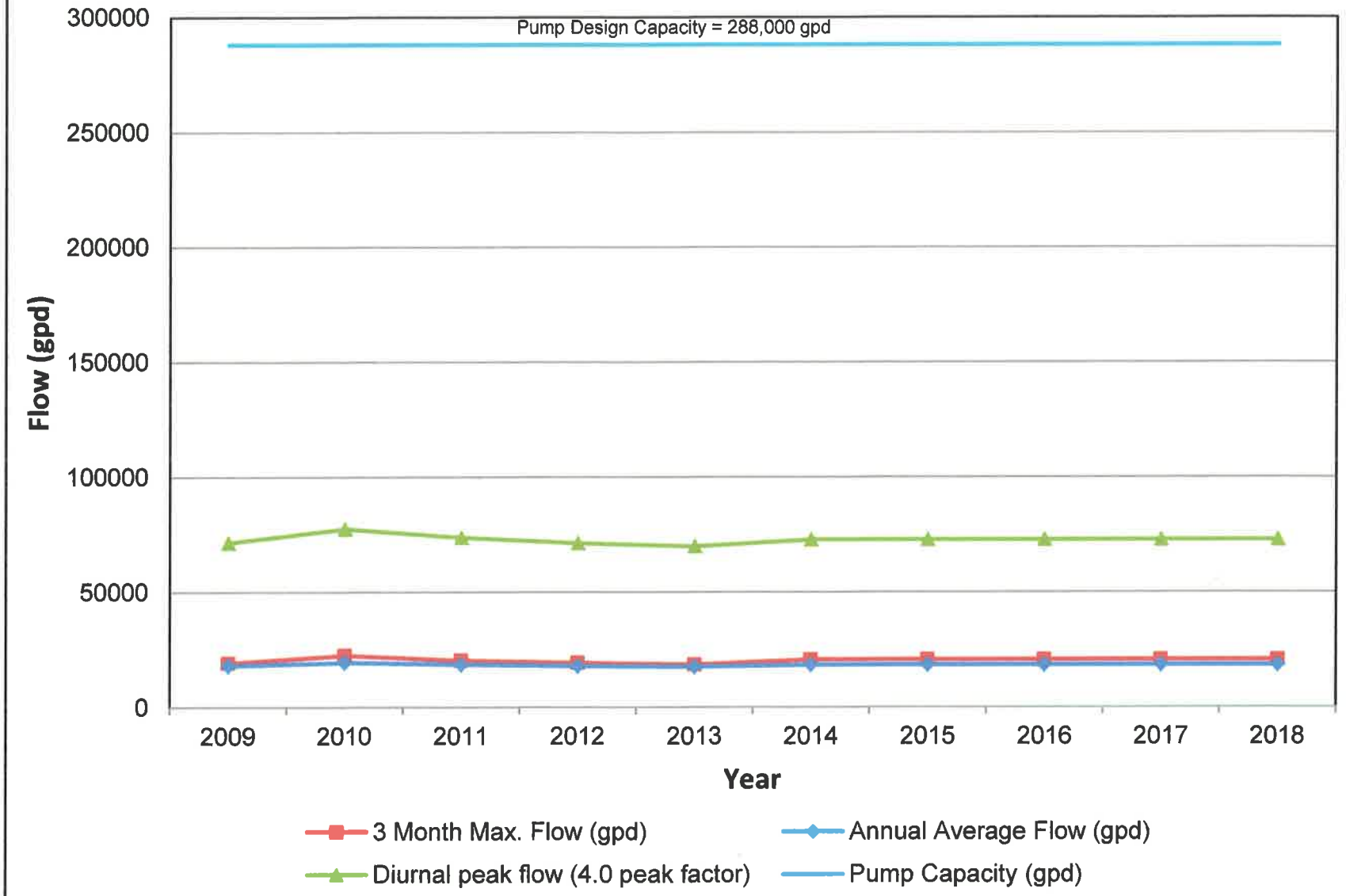


UPPER MAKEFIELD TOWNSHIP
2013 MUNICIPAL WASTELOAD MANAGEMENT REPORT
HISTORICAL PUMP STATION FLOW DATA
SENTINEL PUMPING STATION
2009-2013

MONTH	MONTHLY TOTAL FLOW TO PUMPING STATION				
	2009	2010	2011	2012	2013
January	541,200	552,000	528,000	537,600	522,000
February	444,000	472,800	456,000	447,600	442,800
March	471,600	998,400	535,200	498,000	499,200
April	506,400	484,800	512,400	498,000	469,200
May	556,800	511,200	542,400	504,000	514,800
June	552,000	625,200	520,800	514,800	556,800
July	529,200	532,800	510,000	565,200	552,000
August	606,000	553,200	628,800	566,400	549,600
September	538,800	548,400	608,400	553,200	525,600
October	577,200	561,600	584,400	553,200	528,000
November	522,000	543,600	577,200	543,600	555,600
December	584,400	582,000	625,200	634,800	571,200
Annual Average (gallons/month)	535,800	580,500	552,400	534,700	523,900
Annual Average (gallons/day)	17,860	19,350	18,413	17,823	17,463
Max. 3-Month Ave (gallons/month)	574,000	674,400	607,200	577,200	552,800
Max. 3-Month Ave (gallons/day)	19,133	22,480	20,240	19,240	18,427
FLOW PROJECTION FACTOR Maximum 3-Month Average Divided by Annual Average	1.071	1.162	1.099	1.079	1.055
Average Factor (5-YearAverage)	1.093				

PUMP DESIGN FLOW RATE = 200 GPM or 288,000 GPD

UPPER MAKEFIELD TOWNSHIP
2012 MUNICIPAL WASTELOAD MANAGEMENT REPORT
SENTINEL PUMPING STATION
FIGURE 3 - HYDRAULIC LOADING - 2009- 2018

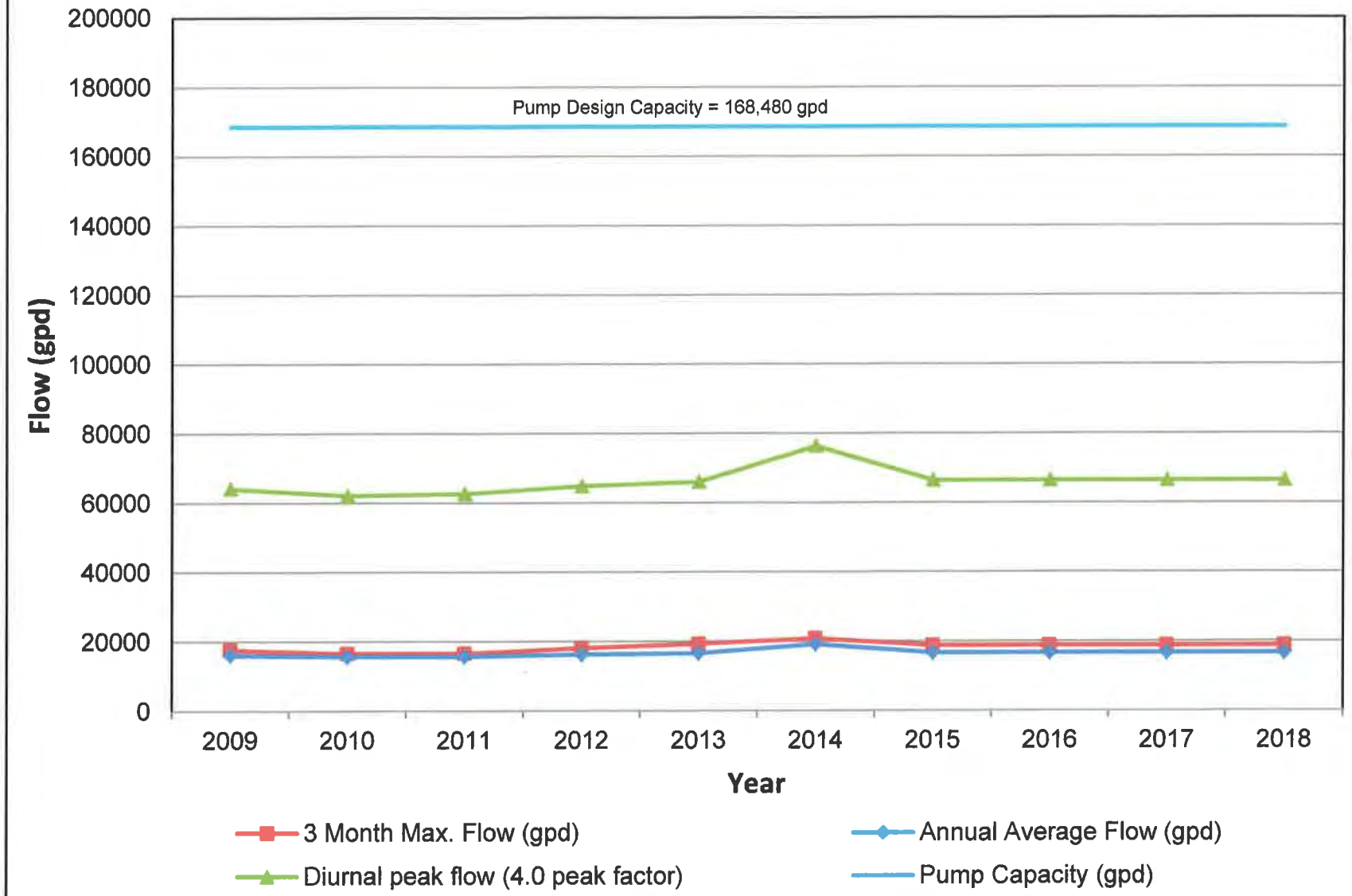


UPPER MAKEFIELD TOWNSHIP
2013 MUNICIPAL WASTELOAD MANAGEMENT REPORT
HISTORICAL PUMP STATION FLOW DATA
TRADITIONS I PUMPING STATION
2009-2013

MONTH	MONTHLY TOTAL FLOW TO PUMPING STATION				
	2009	2010	2011	2012	2013
January	489,294	465,426	439,452	478,764	582,660
February	395,928	392,418	378,378	369,252	464,724
March	435,942	476,658	412,074	431,028	574,938
April	499,122	506,142	474,552	467,532	529,308
May	485,082	505,440	476,658	497,718	569,322
June	443,664	448,578	494,910	483,678	619,164
July	452,790	464,022	534,222	467,532	541,944
August	445,770	464,022	497,016	503,334	533,520
September	456,300	456,300	498,420	510,354	583,362
October	473,148	458,406	501,228	535,626	601,614
November	484,380	493,506	513,162	560,898	622,674
December	525,096	502,632	610,038	631,800	643,734
Annual Average (gallons/month)	465,543	469,463	485,843	494,793	572,247
Annual Average (gallons/day)	15,518	15,649	16,195	16,493	19,075
Max. 3-Month Ave (gallons/month)	494,208	496,080	541,476	576,108	622,674
Max. 3-Month Ave (gallons/day)	16,474	16,536	18,049	19,204	20,756
FLOW PROJECTION FACTOR Maximum 3-Month Average Divided by Annual Average	1.062	1.057	1.115	1.164	1.088
Average Factor (5-YearAverage)	1.097				

PUMP DESIGN FLOW RATE = 117 GPM or 168,480 GPD

UPPER MAKEFIELD TOWNSHIP
2013 MUNICIPAL WASTELOAD MANAGEMENT REPORT
TRADITIONS I PUMPING STATION
FIGURE 3 - HYDRAULIC LOADING - 2009- 2018

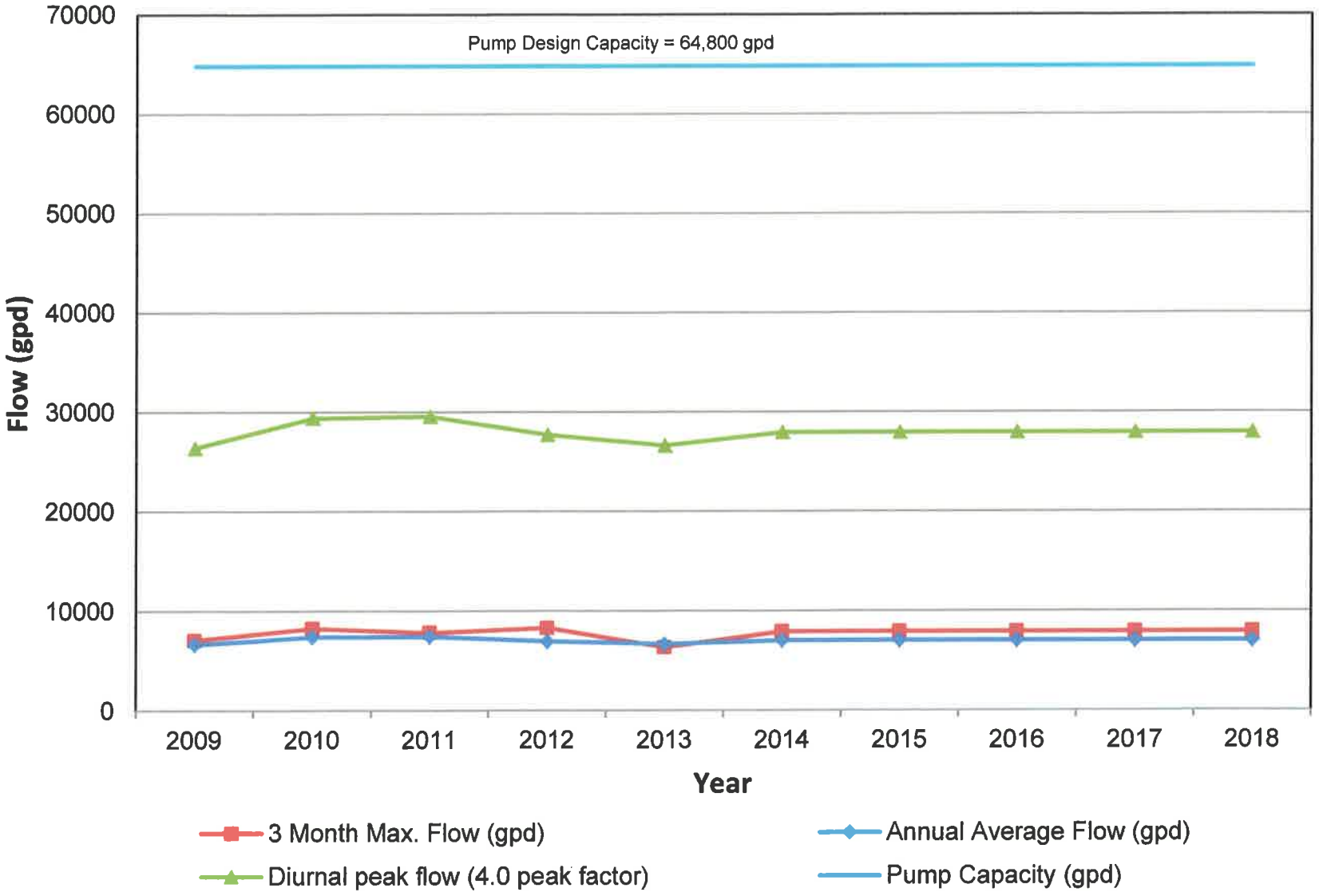


UPPER MAKEFIELD TOWNSHIP
2013 MUNICIPAL WASTELOAD MANAGEMENT REPORT
HISTORICAL PUMP STATION FLOW DATA
TRADITIONS II PUMPING STATION
2009-2013

MONTH	MONTHLY TOTAL FLOW TO PUMPING STATION				
	2009	2010	2011	2012	2013
January	186,300	192,780	202,230	185,220	179,280
February	159,300	164,970	170,370	157,140	162,000
March	184,950	219,780	211,410	177,660	338,310
April	203,040	219,780	227,880	210,060	191,970
May	220,320	229,230	252,180	225,450	194,670
June	209,790	222,750	211,140	235,980	179,280
July	199,800	219,780	230,040	283,230	194,400
August	210,600	292,680	252,720	208,440	217,080
September	189,540	214,920	218,970	184,680	118,597
October	187,380	232,740	217,350	188,730	201,960
November	195,480	206,280	233,280	210,600	201,960
December	228,960	228,960	231,930	225,180	215,460
Annual Average (gallons/month)	197,955	220,388	221,625	207,698	199,581
Annual Average (gallons/day)	6,599	7,346	7,388	6,923	6,653
Max. 3-Month Ave (gallons/month)	211,050	246,780	233,910	248,220	241,650
Max. 3-Month Ave (gallons/day)	7,035	8,226	7,797	8,274	8,055
FLOW PROJECTION FACTOR Maximum 3-Month Average Divided by Annual Average	1.066	1.120	1.055	1.195	1.211
Average Factor (5-YearAverage)	1.129				

PUMP DESIGN FLOW RATE = 45 GPM or 64,800 GPD

UPPER MAKEFIELD TOWNSHIP
2013 MUNICIPAL WASTELOAD MANAGEMENT REPORT
TRADITIONS II PUMPING STATION
FIGURE 3 - HYDRAULIC LOADING - 2009- 2018



CHAPTER 94
MUNICIPAL WASTELOAD MANAGEMENT
ANNUAL REPORT

2013 CHAPTER 94 ANNUAL REPORT
UPPER MAKEFIELD TOWNSHIP
DUTCHESS FARMS
WASTEWATER TREATMENT PLANT
BUCKS COUNTY

MARCH 13, 2014

PREPARED BY:
CKS ENGINEERS, INC.
88 SOUTH MAIN STREET
DOYLESTOWN, PA 18901

PREPARED FOR:
UPPER MAKEFIELD TOWNSHIP
1076 EAGLE ROAD
NEWTOWN, PA 18940

PREPARER

THOMAS F. ZARKO, P.E.
CKS ENGINEERS, INC.
TOWNSHIP WATER/SEWER CONSULTANT

PERMITTEE

DAVID NYMAN
INTERIM TOWNSHIP MANAGER

TABLE OF CONTENTS

1. INTRODUCTION

This report is written in compliance with The Pennsylvania Code; Title 25: Chapter 94: Municipal Wasteload Management regulations. The information contained in this report is relative to the 2013 operation and maintenance of the public wastewater collection, conveyance and treatment system associated with the Dutchess Farms Wastewater Treatment Plant (WWTP) located in Upper Makefield Township, Bucks County, Pennsylvania. The wastewater system is owned by Toll Brothers, Inc. and is operated by Upper Makefield Township under a Maintenance Agreement.

The sanitary sewer service area of the Dutchess Farms WWTP consists of one (1) residential subdivision.

A total of 67 residential equivalent dwelling units (EDUs) will be connected to the collection system and treatment plant upon completion of the development. Currently, 25 homes are occupied and contributing flow to the collection system. The collection system is in excellent condition and there are no known or suspected overflows or capacity problems.

The Dutchess Farms Wastewater Treatment Plant is designed to treat a maximum of 20,225 gallons of wastewater per day. The treatment process includes aerated equalization tanks and a sewage grinder unit. Flow moves through a series of tanks for biological treatment by the activated sludge process and includes nitrification of the wastewater. The process train includes an aeration tank, aeration/anoxic/reaeration tanks with anoxic mixers, a final settling/clarification tank and a post aeration tank. Alum is added in the reaeration tank for control of phosphorous. The plant includes tertiary filters and ultraviolet disinfection. Disposal of effluent is discharged to a manmade wetland with plantings to uptake nitrogen and allow absorption by the soil.

Presently, the Dutchess Farms WWTP NPDES Permit No. PA 0058858 sets standards for conventional pollutants only, which include $CBOD_5$, Suspended Solids, Ammonia as N, nitrite and nitrate, phosphorous, pH, fecal coliform and dissolved oxygen.

2. HYDRAULIC AND ORGANIC LOADINGS

The wastewater treatment plant for Dutchess Farms began operation in February 2012. During 2013, monthly average flows through the Dutchess Farms WWTP averaged 3,900 gallons per day. Precipitation for 2013 totaled approximately 57.7 inches, compared to a long-term annual average for the area of 44 inches. All flows treated at the Dutchess Farms WWTP are from domestic service; no commercial or industrial sources are connected to the plant.

As noted above, the monthly average flow through the plant was 0.0039 MGD. Peak daily flows occurred in September at 0.008 MGD. The 3 month maximum flow average of 0.0046 MGD occurred from September through November. The hydraulic capacity of the plant is 20,225 gallons per day. All hydraulic loadings experienced during 2013 were significantly below the rated hydraulic capacity of the plant. No hydraulic overload exists. Table 1, Hydraulic Loadings - 2013 below presents all relevant flow data for the year.

TABLE 1
HYDRAULIC LOADINGS - 2013

Month	Average Daily Flow	Maximum Daily Flow	Precipitation
January	3,390	4,180	5.3
February	3,510	7,170	11.0
March	3,240	6,290	7.6
April	3,770	6,820	2.5
May	3,970	6,840	3.3
June	3,710	6,770	7.3
July	3,680	6,670	5.0
August	4,060	6,580	3.9
September	5,080 *	8,030	2.4
October	4,750 *	6,900	3.3
November	4,080 *	7,560	2.0
December	3,730	5,830	4.1

Annual Average Daily Flow: 3,914 gpd (0.0039 MGD)

Maximum Daily Flow: 8,030 (September)

3 Month Maximum Average Daily Flow: 4,637 (* September - November)

Source: 2013 Monthly Operator's Reports

Table 2 below presents flow data at the Dutchess Farms WWTP over the past two years.

TABLE 2

	HYDRAULIC LOADING (MGD)	
MONTH	**2012**	**2013**
January	--	0.0034
February	0.0031	0.0035
March	0.0030	0.0032
April	0.0030	0.0038
May	0.0045	0.0040
June	0.0035	0.0037
July	0.0037	0.0037
August	0.0032	0.0041
September	0.0032	0.0051
October	0.0031	0.0048
November	0.0030	0.0041
December	0.0042	0.0037
Annual Average (AA)	0.0035	0.0039
3 Month Max. Average	0.0039	0.0047
Ratio (3 Month Max to AA Ratio)	1.1	1.2

2-Year Average Hydraulic Ratio = 1.15

Table 3, Organic Loadings - 2013, illustrates the monthly organic (BOD_5) loadings experienced at the Dutchess Farms WWTP. Influent BOD samples are taken once a month using a composite sampler at the plant's headworks.

TABLE 3

ORGANIC LOADING - 2013

DATE	BOD_5 (mg/l)	FLOW (MGD)	MONTHLY AVERAGE (lbs./day)
January 8	259	0.0034	7.3
February 12	301	0.0035	8.8
March 12	276	0.0032	7.4
April 9	290	0.0038	9.2
May 4	315	0.0040	10.5
June 11	172	0.0037	5.3
July 9	364	0.0037	11.2
August 13	180	0.0041	6.2
September 10	140	0.0051	6.0
October 8	230	0.0048	9.2
November 12	197	0.0041	6.7
December 17	345	0.0037	10.6
Average Loading			8.2

Loading = BOD_5 Concentration (mg/l) x Flow (MGD) x 8.34
Source: 2013 Monthly Operator's Report

Based on this average influent BOD loading and the number of EDUs serviced at the end of 2013 (25 EDUs), an average organic loading of 0.3 lbs./day/EDU was calculated. The ratio of Maximum Monthly Loading to the Annual Average is shown in Table 4. The design organic loading capacity of the treatment plant is 40 lbs./day. The organic loadings experienced in 2013 were all significantly less than the rated organic capacity of the plant.

TABLE 4

ORGANIC LOADING
(lbs./day)

MONTH	2012	2013
January	--	7.3
February	7.5	8.8
March	2.3	7.4
April	2.1	9.2
May	12.2 *	10.5 *
June	4.1 *	5.3 *
July	23.9 *	11.2 *
August	4.6	6.2
September	3.1	6.0
October	6.5	9.2
November	5.9	6.7
December	9.9	10.6
Annual Average	7.5	8.2
Ratio (Month Max. to Annual Average Ratio)	3.2	1.4
2-Year Average Organic Ratio = 2.3		
3-Month Max. Average *	13.4	9.0
Ratio (3-Month Max. to Annual Average)	1.8	1.1
2-Year Average (3-Month Max. Ratio) = 1.45		

3. 5-YEAR HYDRAULIC AND ORGANIC LOADING PROJECTIONS

As of December 2013, 25 EDUs were connected to the Dutchess Farms WWTP. A five-year adjusted average flow was calculated using the method recommended by the PA DEP. Since the plant began operation in 2012, a five year adjusted average flow of 3,580 gallons per day (0.0036 MGD) was calculated. This data is shown in Table 5 below.

TABLE 5 - 5 YEAR ADJUSTED AVERAGE FLOW

		ADDITIONAL FLOWS CONNECTED					
YEAR	**ANNUAL AVERAGE FLOW (GPD)**	**2009**	**2010**	**2011**	**2012**	**2013**	**ANNUAL ADJUSTED FLOW (GPD)**
2009	0	0	0	0	3,500	0	3,500
2010	0			0	3,500	0	3,500
2011	0				3,500	0	3,500
2012	3,500					0	3,500
2013	3,900						3,900
TOTAL	7,400					TOTAL	17,900
2 YEAR AVG.	3,700			5 YEAR ADJUSTED AVERAGE			3,580

As of December 2013, 25 EDUs were connected to the treatment plant.

TABLE 6 - 5 YEAR FLOW PROJECTION

YEAR	ADJUSTED ANNUAL AVERAGE (GPD)	PROJECTED CHANGE IN FLOW (GPD)	PROJECTED ANNUAL AVERAGE FLOW (GPD)	PROJECTED MAX MONTH FLOW (GPD)
2014	3,900	2,500	6,400	7,360
2015	6,400	2,500	8,900	10,235
2016	8,900	2,500	11,400	13,110
2017	11,400	2,500	13,900	15,985
2018	13,900	500	14,400	16,560

During 2013, average monthly flow of 3,900 gpd for the 25 occupied homes equates to an average flow rate of only 156 gallons per day per EDU. Projected new construction of homes is anticipated at 10 homes per year through 2017 and the final two homes in 2018. Flow was estimated at 250 gallons per additional EDU.

If the construction of homes occurs as projected, the permitted capacity of the wastewater treatment plant (20,225 gpd) will be sufficient to accommodate projected increased flows through 2018. By December 2018, the average daily flow to the wastewater treatment plant is projected to be approximately 14,400 gpd with a 3-month maximum average daily flow of 16,560 gpd. The projected 3-month maximum average daily flow is based on the ratio of the 3-month maximum average daily flow to the annual average daily flow over the past two years (1.15).

Figure 1 illustrates the hydraulic loading to the wastewater treatment plant for 2012 and 2013 on a monthly basis. Projections are also illustrated on an average annual basis for 2013 through 2018.

Appendix A contains the calibration service reports for the Dutchess Farms Wastewater Treatment Plant flow meter and recorder.

Projected organic loadings for the Dutchess Farms WWTP are based on the average of the past years annual average loadings (8.2 lbs./day) divided by the number of EDUs connected to the collection system (25 EDUs). This gives an equivalent loading of 0.3 lbs./day/EDU. The addition of 42 proposed EDUs increases the plant loading by 12.6 lbs./day to 20.8 lbs./day. The projected maximum month loading is equal to the projected annual average multiplied by the 2-year average organic ratio of 1.45 shown in Table 4. The projected organic loadings are significantly below the Dutchess Farms WWTP rated organic capacity of 40 lbs./day. Projected organic loadings to 2018 are shown in Table 7 below.

Figure 2 illustrates the organic loading to the wastewater treatment plant for 2013 on a monthly basis. Projections of future organic loading for 2014 through 2018 are also shown.

TABLE 7
PROJECTED ORGANIC LOADINGS

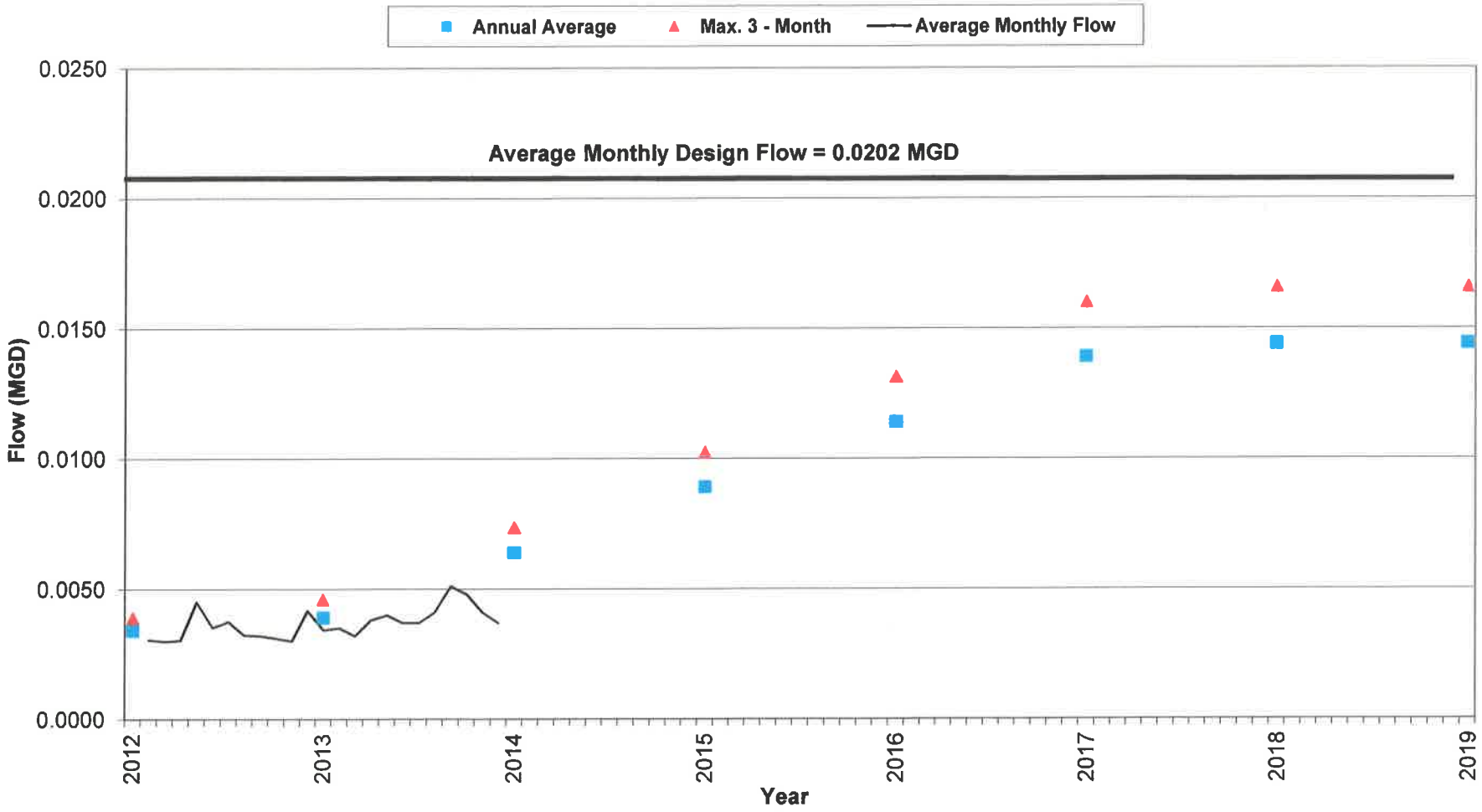
Year	Total New EDUs	Total EDUs	Average Daily Loading from New EDUs (lbs/day)	Projected Total Average Daily Loading (lbs/day)	PROJECTED MAX. MONTH LOADING (lbs/day)
2013	0	25	0	8.2	11.2
2014	10	35	3	11.2	16.2
2015	10	45	3	14.2	20.6
2016	10	55	3	17.2	24.9
2017	10	65	3	20.2	29.3
2018	2	67	0.6	20.8	30.2

* Figure 2 illustrates the historical organic loading to the plant for 2013 on a monthly basis and the annual average.

** Future organic loading projections noted above and shown on Figure 2 are based on the 5 year average daily organic loading 8.2 lbs/day or 0.3 lbs/day/EDU.

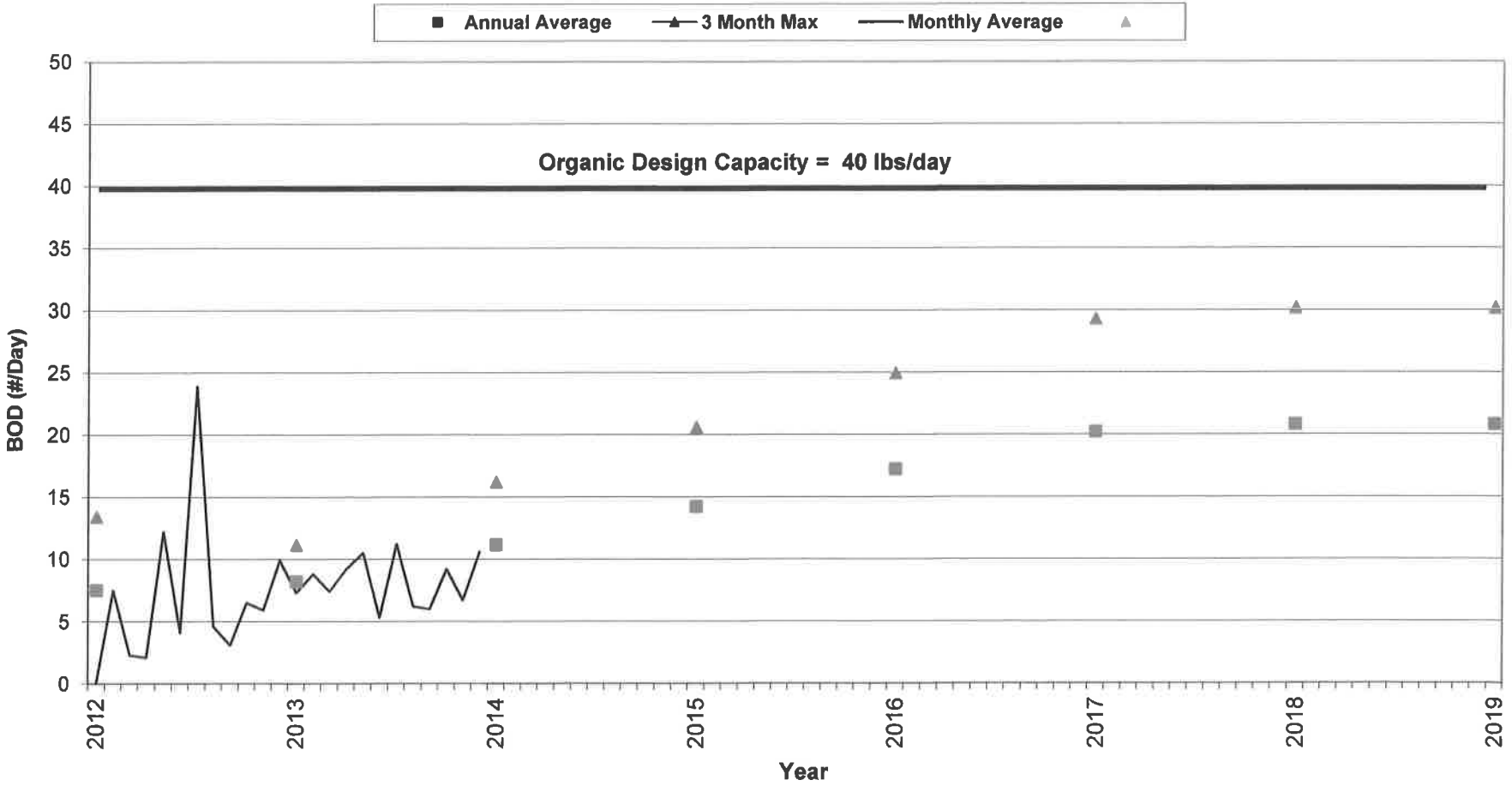
Projected maximum month loadings noted above are based on the projected average daily loading multiplied by the 2-year average organic ratio (1.45) calculated in Table 4.

Upper Makefield Township
Dutchess Farms Wastewater Treatment Plant
Figure 1 - Hydraulic Loading - 2012 - 2018



NOTE: Refer to tables 1, 2, 5 & 6 of this report for the basis of information presented in this figure

Upper Makefield Township
Dutchess Farms Wastewater Treatment Plant
Figure 2 - Organic Loading - 2012 - 2019



NOTE: Refer to Tables 3, 4 & 7 of this report for the basis of information presented in this figure.

4. SEWER EXTENSIONS

During 2013 no sewer extensions were constructed tributary to the Dutchess Farms WWTP. There are currently no approved sewer extensions within the service area of the WWTP.

5. PROGRAM FOR SANITARY SEWER MONITORING, MAINTENANCE AND REPAIR

Upper Makefield Township uses the services of a Contract Operation company to perform the routine operations and maintenance of the Dutchess Farms WWTP and the associated collection and conveyance system. A licensed wastewater treatment operator monitors the plant for proper operation and adjusts process controls as necessary to produce treated effluent which meets or exceeds the requirements of the plant's NPDES Permit. Sampling is performed regularly to provide data required in the plant's Discharge Monitoring Reports (DMRs). Regulatory compliance samples are analyzed by a State Licensed laboratory. Operation control samples are taken and analyzed on-site. Contract Operations Staff performs regular maintenance on plant equipment. Repairs are performed as required and outside contractors may be used to perform repairs if necessary.

During 2013, no significant repairs were made to the plant equipment.

6. CONDITIONS OF THE SEWER SYSTEM

The sanitary sewer system is confined to the Dutchess Farms residential area; the sewage collection system was constructed in the past 10 years. The collection system is constructed of 8" PVC piping and pre-cast concrete manholes. The present condition of the collection and conveyance system is excellent, with no known or suspected overflows, surcharging, or capacity problems. System maintenance is performed on an as-needed basis. No extraordinary maintenance of the wastewater collection system was performed in 2013.

7. WASTEWATER PUMP STATIONS

No sewage pumping stations are included in the Dutchess Farms wastewater treatment plant service area.

8. INDUSTRIAL WASTE

The Dutchess Farms WWTP receives only domestic sewage. No industrial users exist within the current service area.

9. CORRECTIVE ACTION PLAN

No hydraulic or organic overloads exist at the Dutchess Farms WWTP, nor are any hydraulic or organic overloads projected. Therefore, no Corrective Action Plan or Capacity Management Plan is required.

10. CALIBRATION REPORTS

The effluent flow meters at the Dutchess Farms WWTP are serviced and calibrated semi-annually. Calibration reports are included in Appendix A of this Chapter 94 Annual Report.

11. TRIBUTARY MUNICIPALITY REPORTS

The service area of the Dutchess Farms WWTP is entirely within Upper Makefield Township. No connections with other municipalities exist; therefore, no other reports are required.

APPENDIX A

METER CALIBRATION SERVICE REPORTS
PAONE ELECTRIC, LLC
OCTOBER 2, 2013

PAONE ELECTRIC, LLC
PO Box 397 ◆ Gilbertsville, PA 19525-0397 610-367-2363

SERVICE REPORT

Customer Information:
Upper Makefield Twp WSA
1076 Eagle Road
Newtown, PA 18940

Report No. UMT13004-3
Service Date: 10-02-13
By: William M. Paone

SITE: Dutchess Farms WWTP

Service Description

Meter calibration / inspection

Chart recorder: Partlow MRC5000 (Effluent)

- Input set up for 0 - 34.7 GPM, Chart set up for 0 - 100%, signal checked at 4ma = 0 GPM, 8ma = 8.68 GPM, 12ma = 17.35 GPM, 16ma = 26.03 GPM, 20ma = 34.7 GPM

Flow meter: Eastech (Ultrasonic), sensor FB1/FB4 (Effluent)

- Set up for distance = inches, rate = GPM, volume = Gal, Used with a 22.5 DEG V-notch, Total resolution = 10^1, Maximum level = 5.70", Maximum flow 34.7GPM, Offset = 16.89", Vmt = 22.6", Sensor dampening = 15s, Lost echo 30s fail to zero

All signals and settings checked with a Fluke 725 Process Meter. Devices were found in good working condition and operating as expected.

I hope you find this information helpful. I may be reached at 610-955-6000 if you have any questions.

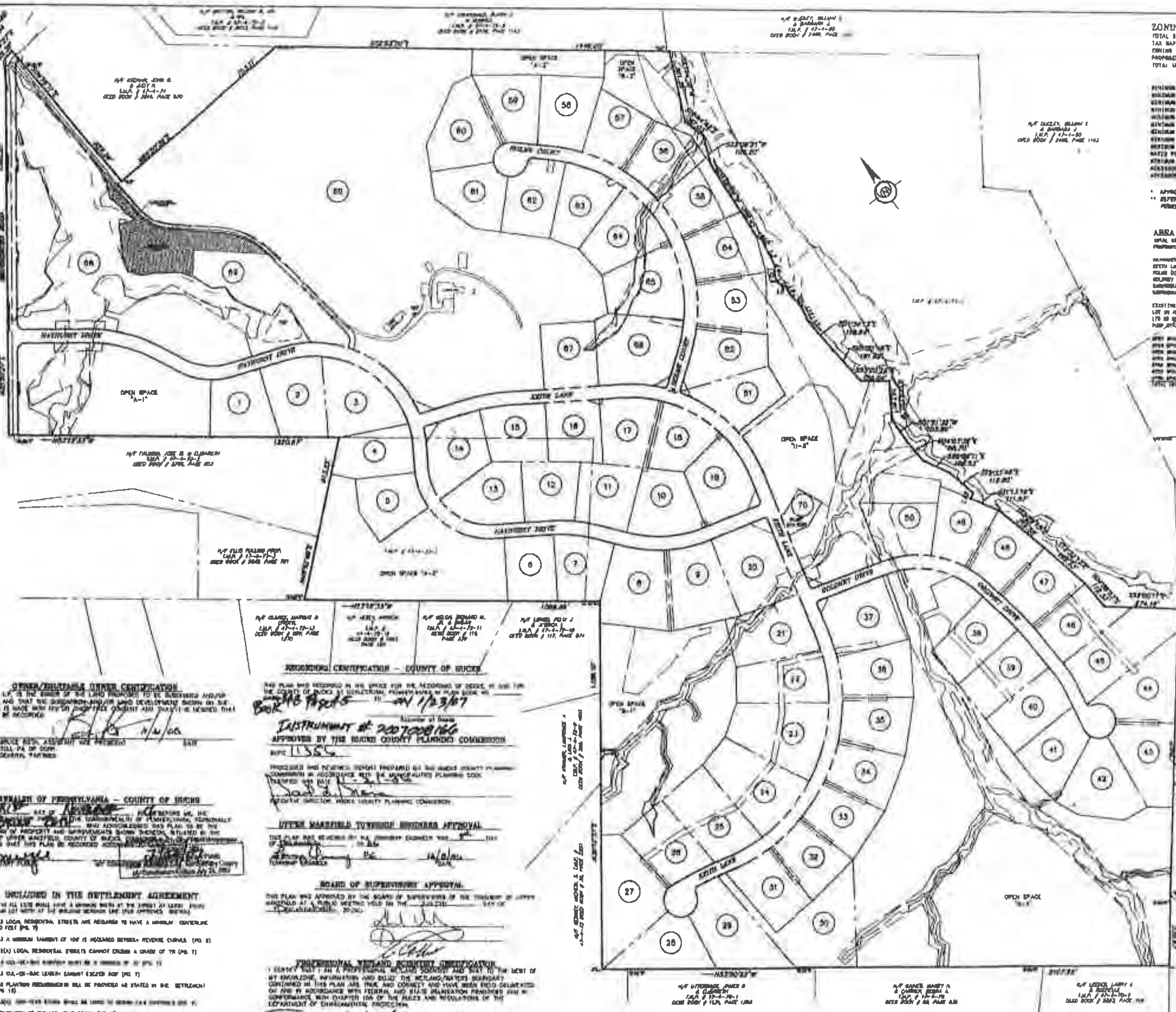
Respectfully,

William M. Paone
PAONE ELECTRIC, LLC

NFPA MEMBER 2012-2013

APPENDIX B

SERVICE AREA MAP



ZONING REQUIREMENTS - DUTCHESS FARM ESTATES:

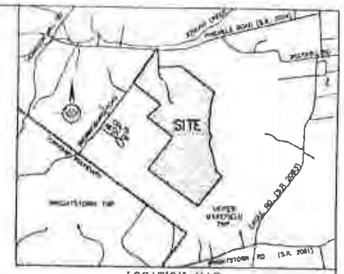
TOTAL SITE AREA = 187.698 ACRES
TAX MAP PARCEL NOS. 47-4-74-1 AND 47-4-74-1
ZONING DISTRICT: CM CONSERVATION MANAGEMENT ZONING DISTRICT
PROPOSED USE: SINGLE FAMILY DETACHED DWELLING
TOTAL NUMBER OF PROPOSED LOTS = 67 AND 1 EXISTING LOT

	REQUIRED	PROPOSED
[illegible]	5.00	187.70 AC
[illegible]	0.33	0.36*
[illegible]	1.00	1.00
[illegible]	160	160
[illegible]	35	35
[illegible]	60	60
[illegible]	40	40
[illegible]	60	60
[illegible]	20	< 20
[illegible]		
[illegible]	50	50
[illegible]	80	80
[illegible]	15	15

* APPROVED PER SETTLEMENT AGREEMENTS 1 & 2
** REFER TO DESIGN CRITERIA PER SETTLEMENT AGREEMENT CHART FOR MODIFICATIONS PERMITTED PER SETTLEMENT AGREEMENTS 1 & 2.

AREA TABULATION - DUTCHESS FARM ESTATES:

[illegible]



LOCATION MAP
SCALE: 1"=2000'

RECORD PLANS - GENERAL NOTES:

[illegible]

OUTBOUND LINE TABLE

LINE	BEARING	LENGTH
L1	[illegible]	21.30
L2	[illegible]	23.08
[illegible]	[illegible]	[illegible]

OWNER INFORMATION:

OWNER/EQUITABLE OWNER CERTIFICATION

RECORDER'S CERTIFICATION - COUNTY OF BUCKS

Book 348 Page 45 1/23/07

INSTRUMENT # 2007008166

APPROVED BY THE BUCKS COUNTY PLANNING COMMISSION

COMMONWEALTH OF PENNSYLVANIA - COUNTY OF BUCKS

UPPER MAKEFIELD TOWNSHIP ENGINEER APPROVAL

BOARD OF SUPERVISORS' APPROVAL

PROFESSIONAL WETLAND SCIENTIST CERTIFICATION

I CERTIFY THAT I AM A PROFESSIONAL WETLAND SCIENTIST AND THAT TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF THE WETLAND/WATERS BOUNDARY CONTAINED IN THIS PLAN ARE TRUE AND CORRECT AND HAVE BEEN FIELD DELINEATED ON AND IN ACCORDANCE WITH FEDERAL AND STATE DELINEATION PRACTICES AND IN CONFORMANCE WITH CHAPTER 105 OF THE RULES AND REGULATIONS OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Thomas D. Cordrey 11-21-06
THOMAS D. CORDREY, PWS
WETLAND SCIENTIST
DEL VAL SOILS AND ENVIRONMENTAL CONSULTANTS, INC.

WAIVERS INCLUDED IN THE SETTLEMENT AGREEMENT

[illegible]

WAIVER REQUEST LIST

[illegible]

DESIGN CRITERIA PER SETTLEMENT AGREEMENT

MINIMUM LOT SIZE MINIMUM FRONT YARD DEPTH MINIMUM SIDE YARD WIDTH	1 ACRE (GROSS LOT AREA) 60 FEET 40 FEET (IN WOODLANDS 20 FT W/ 60 FT AGGREGATE) (APPLIES TO LOTS 32, 35, 36, 40 - 44 AND 48)	FLOODPLAIN FILLING, FLOODPLAIN SOILS FILLING AND WETLAND DISTURBANCE	THE MINIMUM AMOUNT NECESSARY TO CONSTRUCT THE PROPOSED DEVELOPMENT DEPICTED ON THE CONCEPTUAL PLANS AND/OR THE TRAFFIC OR DRAINAGE IMPROVEMENTS TO THE INTERSECTION OF PINEVILLE AND BROWNSBURG ROADS. HOWEVER, ANY DISTURBANCE REQUIRED TO CONSTRUCT HOUSES, POOLS, SHEDS AND GARAGES SHALL ONLY BE PERMITTED IN ACCORDANCE WITH THE PROVISIONS OF APPLICABLE ORDINANCES.
MINIMUM DISTANCE FROM REAR YARD SETBACK LINE OF PROPOSED LOTS TO THE LOT LINE OF EXISTING HOUSES	40 FEET (EXCEPT THAT THE SAID DISTANCE SHALL BE INCREASED TO 80 FEET FOR LOTS 1, 2, 4, 6 AND 7 WHICH ARE DEPICTED ON THE CONCEPTUAL PLAN		
MINIMUM DISTANCE BETWEEN HOUSES MINIMUM LOT WIDTH AT THE BUILDING SETBACK LINE MAXIMUM HEIGHT OF HOUSES AND OTHER STRUCTURES MAXIMUM IMPERVIOUS COVERAGE ON EACH LOT (BASED ON NET LOT AREA)	80 FEET 160 FEET 35 FEET 20% ON ALL LOTS EXCEPT LOT 68, WHERE IMPERVIOUS COVERAGE SHALL BE LIMITED TO THE EXISTING IMPERVIOUS COVERAGE, PLUS 5 PERCENT	DISTURBANCE OF WOODLANDS	SUBJECT TO THE PROVISIONS OF SUBPARAGRAPH 3.a.(6), THE MINIMUM AMOUNT NECESSARY TO CONSTRUCT THE PROPOSED DEVELOPMENT DEPICTED ON THE CONCEPTUAL PLAN. HOWEVER, ANY DISTURBANCE REQUIRED TO CONSTRUCT HOUSES, POOLS, SHEDS AND GARAGES SHALL ONLY BE PERMITTED IN ACCORDANCE WITH THE PROVISIONS OF SUBPARAGRAPH 3.a.(6) AND APPLICABLE ORDINANCES
MINIMUM OPEN SPACE	AS DEPICTED ON THE CONCEPTUAL PLANS		
MINIMUM UNRESTRICTED AREA	AS DEPICTED ON THE CONCEPTUAL PLANS	HEDGEROWS	THE HEDGEROWS NOTED ON THE CONCEPTUAL PLAN TO BE PRESERVED SHALL BE PROTECTED BY THE REEVE FARM DECLARATION.
MAXIMUM AGRICULTURAL SOILS DISTURBANCE	AS DEPICTED ON THE CONCEPTUAL PLANS		

PROFESSIONAL ENGINEER CERTIFICATION

PROFESSIONAL SURVEYOR CERTIFICATION

REV	DESCRIPTION	DATE	BY
13	[illegible] LETTER DATED 9-27-06, FINAL CONSTRUCTION PLANS	11-3-06	KMD
12	[illegible] LETTER DATED 9-12-06	9-13-06	KMD
11	REVISED PER AGENCY REVIEW, FINAL PLANS, APPLICANT	7-21-05	KMD
10	REVISED PER BCCD REVIEW LETTER	[illegible]	CJR
9	REVISED PER TOWNSHIP REVIEW LETTERS	[illegible]	[illegible]
8	N.P.D.E.S. REVISIONS PER LETTER DATED 8-14-04	7-27-04	DAR
7	FINAL PLANS/N.P.D.E.S. REVISIONS	[illegible]	[illegible]
6	REVISED PER JANUARY 2004 REVIEW LETTERS	[illegible]	[illegible]
5	REVISED PER DECEMBER 2003 REVIEW LETTERS	[illegible]	[illegible]
4	BCCD SUBMISSION / NPDES APPLICATION	[illegible]	CJR
3	REVISED PER OCTOBER 2003 REVIEW LETTERS	[illegible]	[illegible]
2	REVISED PER JULY 2003 REVIEW LETTERS	[illegible]	[illegible]
1	REVISED PER REVIEW LETTERS	[illegible]	[illegible]

EQUITABLE OWNER
TOLL PA II, L.P.
250 GIBRALTAR ROAD
HORSHAM, PA 19044

TAX MAP PARCEL NO
47-4-74-1 & 47-1-73-1

TOWNSHIP FILE No.

GROSS AREA: 187.70 AC
TOTAL LOTS: 66 PROPOSED, 2 TOWNSHIP
DATE: 3-24-03
SCALE: 1"=200'

Final Land Development Plan
OVERALL RECORD PLAN
(SHEET 1 OF 10)
DUTCHESS FARM ESTATES
BROWNSBURG ROAD
UPPER MAKEFIELD TOWNSHIP BUCKS COUNTY PENNSYLVANIA

THOMAS B. HENDRICKS
PROFESSIONAL LAND SURVEYOR
PA LICENSE NO. SU-044668-E

ESE

EASTERN STATES ENGINEERING
250 GIBRALTAR ROAD, SUITE 2E
HORSHAM, PA 19044
TEL: (215) 914-2050
FAX: (215) 293-5488
CIVIL ENGINEERS LAND SURVEYORS LANDSCAPE ARCHITECTS LAND PLANNERS

FILE NO.: RP50.01

SHEET NO 9 of 63

PLAN BOOK 348 - PAGE 45

CKS Engineers, Inc.
88 South Main Street
Doylestown, PA 18901
215-340-0600 • FAX 215-340-1655

David W. Connell, P.E.
Joseph J. Nolan, P.E.
Thomas F. Zarko, P.E.
James F. Weiss
Patrick P. DiGangi, P.E.
Ruth Cunnane

April 7, 2014
Ref: #6716 - 2

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Commonwealth of Pennsylvania
Department of Environmental Protection
Southeast Regional Office
2 East Main Street
Norristown, PA 19401

Attention: Kelly Sweeney, Sewage Planning Specialist, Water Management

Reference: Upper Makefield Township, Bucks County, Pennsylvania
Dutchess Farms Wastewater Treatment Plant
2013 Municipal Wasteload Management (Chapter 94) Report

Dear Ms. Sweeney:

Enclosed please find two copies of corrected pages 4, 5, 8, and organic loading graph for the Upper Makefield Township Chapter 94 Report pertaining to the Dutchess Farms Wastewater Treatment Plant for calendar year 2013. These corrections have been made in response to your e-mailed comments of March 31, 2014 (copy attached).

Please do not hesitate to contact me if you have any questions concerning the enclosed report.

Very truly yours,
CKS ENGINEERS, INC.
Township Water/Sewer Consultants

Michael H. McRee, P.E.

MHM/mak

Enclosures

cc: David Nyman, Interim Township Manager (w/encl.)
Michael Sullivan, Private Utility Enterprises, Inc. (w/encl.)
Jeff Greenwood, Private Utility Enterprises, Inc. (w/encl.)
Michael Nice, Toll Brothers, Inc. (w/encl.)
✓Thomas F. Zarko, P.E., CKS Engineers, Inc. (w/encl.)
File

Mike McRee

From: Thomas Zarko <tfzarko@cksengineers.com>
Sent: Monday, March 31, 2014 4:06 PM
To: 'Michael McRee'
Subject: FW: Upper Makefield Township - Dutchess Farms STP

Follow Up Flag: Follow up
Flag Status: Flagged

Mike;

Please prepare a response to this.

Thomas F. Zarko, PE
Vice President
CKS Engineers, Inc.
88 South Main Street
Doylestown, PA 18901

Tele: (215) 340-0600
Fax: (215) 340-1655

E-Mail: tfzarko@cksengineers.com

From: Sweeney, Kelly [mailto:ksweeney@pa.gov]
Sent: Monday, March 31, 2014 2:52 PM
To: tfzarko@cksengineers.com
Cc: O'neil, Steve
Subject: Upper Makefield Township - Dutchess Farms STP

Tom,

I am reviewing the Chapter 94 Report for Upper Makefield Township's Dutchess Farms STP. I have completed a preliminary review. The following information needs to be provided so that I can complete the review.

Organic Sampling Protocol: Describe the organic sampling protocol (type of sample; location of sample; sampling frequency; how hauled-in septage is accounted for, if applicable).

Organic Calculations: The monthly average organic loads should be calculated using the concentration of BOD5 and the flow on the day the sample was taken. The submitted calculations appear to be based on the monthly average flow. Please submit corrected calculations.

Organic Projections: The peaking factor for organic projections should be based on the ratio of the one-month peak and the annual average load, not the three-month peak. Please submit corrected calculations.

If you have any questions, please contact me.

Thank you for your help!

Kelly

Kelly A. Sweeney | Sewage Planning Specialist II
Department of Environmental Protection | Clean Water
Southeast Regional Office
2 East Main Street | Norristown, PA 19401
Phone: 484.250.5182 | Fax: 484.250.5971
www.depweb.state.pa.us

Table 3, Organic Loadings - 2013, illustrates the monthly organic (BOD_5) loadings experienced at the Dutchess Farms WWTP. Influent BOD samples are taken once a month by a grab sample at the plant's headworks. The plant receives no septage.

TABLE 3

ORGANIC LOADING - 2013

DATE	BOD_5 (mg/l)	FLOW (MGD)	MONTHLY AVERAGE (lbs./day)
January 8	259	0.0030	6.5
February 12	301	0.0033	8.3
March 12	276	0.0020	4.6
April 9	290	0.0017	4.1
May 4	315	0.0031	8.1
June 11	172	0.0049	7.0
July 9	364	0.0044	13.4
August 13	180	0.0054	8.1
September 10	140	0.0070	8.2
October 8	230	0.0056	10.7
November 12	197	0.0029	4.8
December 17	345	0.0036	10.4
Average Loading			7.9

Loading = BOD_5 Concentration (mg/l) x Flow (MGD) x 8.34
Source: 2013 Monthly Operator's Report

Based on this average influent BOD loading and the number of EDUs serviced at the end of 2013 (25 EDUs), an average organic loading of 0.3 lbs./day/EDU was calculated. The ratio of Maximum Monthly Loading to the Annual Average is shown in Table 4. The design organic loading capacity of the treatment plant is 40 lbs./day. The organic loadings experienced in 2013 were all significantly less than the rated organic capacity of the plant.

TABLE 4

ORGANIC LOADING
(lbs./day)

MONTH	2012	2013
January	--	6.5
February	7.5	8.3
March	2.3	4.6
April	2.1	4.1
May	12.2 *	8.1
June	4.1 *	7.0
July	23.9 *	13.4 *
August	4.6	8.1 *
September	3.1	8.2 *
October	6.5	10.7
November	5.9	4.8
December	9.9	10.4
Annual Average	7.5	7.9
Ratio (Month Max. to Annual Average Ratio)	3.2	1.7
3-Month Max. Average *	13.4	9.9
Ratio (3-Month Max. to Annual Average)	1.8	1.3

TABLE 7
PROJECTED ORGANIC LOADINGS

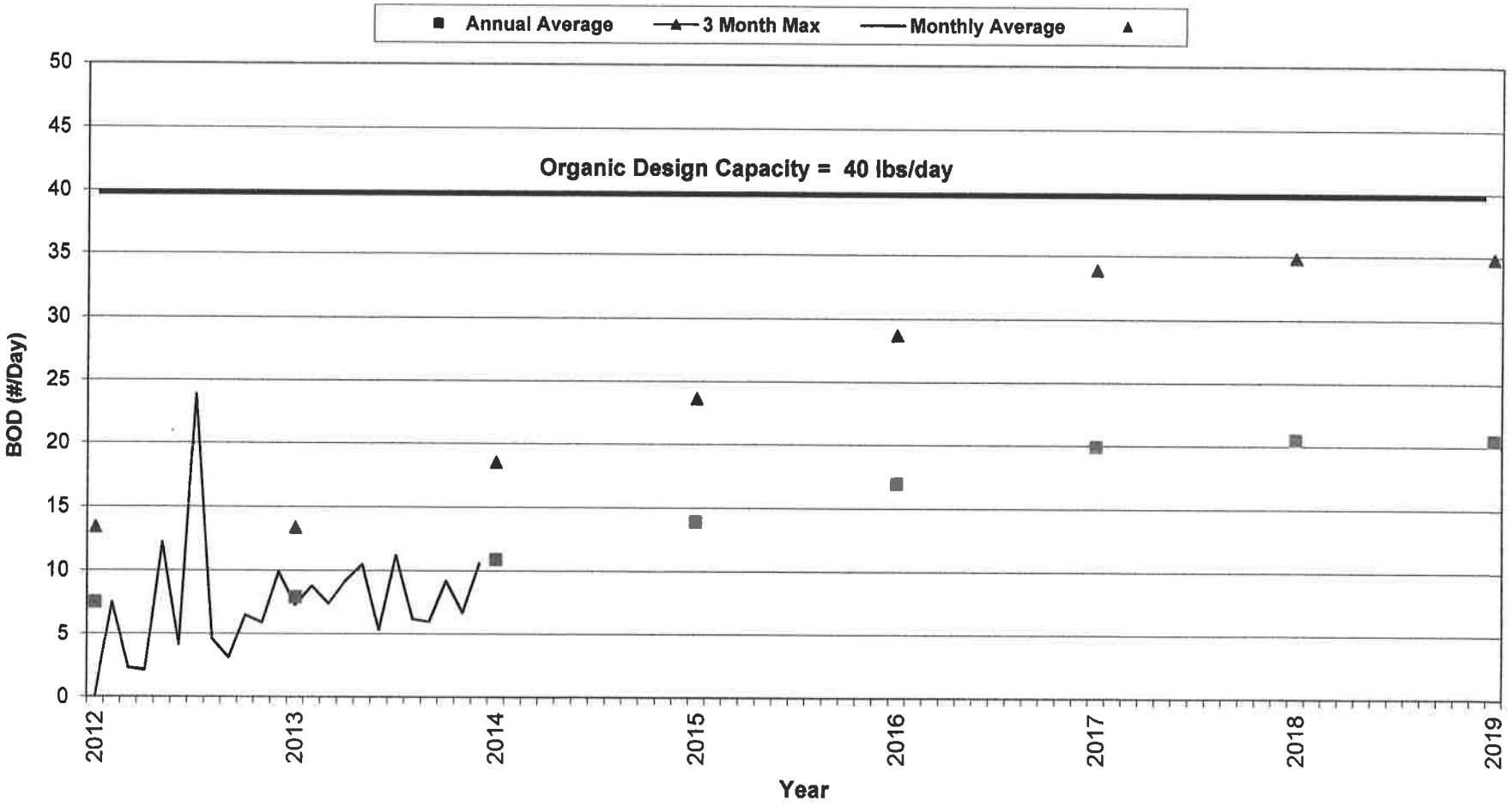
Year	Total New EDUs	Total EDUs	Average Daily Loading from New EDUs (lbs/day)	Projected Total Average Daily Loading (lbs/day)	PROJECTED MAX. MONTH LOADING (lbs/day)
2013	0	25	0	7.9	13.4
2014	10	35	3	10.9	18.5
2015	10	45	3	13.9	23.6
2016	10	55	3	16.9	28.7
2017	10	65	3	19.9	33.8
2018	2	67	0.6	20.5	34.8

* Figure 2 illustrates the historical organic loading to the plant for 2013 on a monthly basis and the annual average.

** Future organic loading projections noted above and shown on Figure 2 are based on the 5 year average daily organic loading 7.9 lbs/day or 0.3 lbs/day/EDU.

Projected maximum month loadings noted above are based on the projected average daily loading multiplied by the ratio to the maximum month (1.7) as calculated in Table 4.

Upper Makefield Township
Dutchess Farms Wastewater Treatment Plant
Figure 2 - Organic Loading - 2012 - 2019



NOTE: Refer to Tables 3, 4 & 7 of this report for the basis of information presented in this figure.