

**Year of 2015 Chapter 94 Annual Report
Buckingham Township
Stonymead WWTP
Bucks County**

**Prepared by:
Graham W. Orton
Buckingham Township
PO Box 413
Buckingham PA, 18912**

**Prepared for:
Buckingham Township
Stonymead Wastewater treatment Plant
PO Box 413
Buckingham, PA 18912
Address of wastewater treatment facility:
3487 Wellsford Lane New Hope, PA 18938**

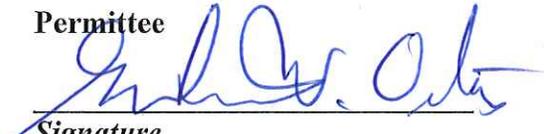
Preparer



Signature

**Graham W. Orton
Buckingham Township**

Permittee



Signature

**Graham W. Orton
Buckingham Township**

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INTRODUCTION

The Stonymead WWTP serves the Stonymead development in the northwest corner of Buckingham Township. The service area is all in Buckingham Township and the Township is the operator but the developer still owns the system.

The Stonymead Plant was completed in 2004. The plant consists of 3 sequential treatment lagoons and an adjacent sprayfield.

HYDRAULIC AND ORGANIC LOADINGS

Line graphs showing 5-year past and projected Hydraulic and Organic loading are inserted between pages 8 and 9.

The permitted capacities of the Stonymead WWTP:

Annual Average (AA) Capacity = 8,625 gpd

Hydraulic Design Capacity is more than permitted = 9,188 gpd

Hydraulic Re-rating request is more than permitted = 11,000+ gpd

Organic Design Capacity = 24.9 lb/day

Hydraulic Loading:

- a. The calendar year's AA flow is less than the permitted and constructed AA capacity.
- b. There were no 3 consecutive month periods where the 3-month average flow exceeded the hydraulic design capacity of the WWTP.
- c. A CAP and CMP were required after review of both the 2008 and 2009 Chapter 94 Reports. The Township requested an extension due to the developer's problems with meeting his obligations and has not submitted a final CAP which may not be needed. We are requesting a plant re-rating to 11,000+ gpd. The Act 537 changes are under DEP review. Approval is expected. The developer was unable to provide the necessary re-rating and punchlist completion funding so the Township obtained the remainder of the cash escrow.
- d. A High Flow Maintenance Plan (HFMP) has not been prepared for the Stonymead WWTP. This is a lagoon treatment plant which is not affected by short duration rain events. Very wet winters can cause the plant to enter the freeboard storage designed and constructed as a safety feature. We have shown that Trucking to other facilities is a viable HFMP. The plant has never entered freeboard.
- e. Table 1 below provides hydraulic loading data in the DEP recommended format.

Table 1						
Hydraulic Loading (MGD)						Rainfall (inches)
Month	2011	2012	2013	2014	2015	2015
January	.004279	.003888	.004239	.005669	.004963	4.28
February	.003400	.003264	.004772	.005165	.004525	2.51
March	.004177	.003637	.004280	.005961	.005513	5.71
April	.003807	.004890	.005386	.005473	.005476	3.64
May	.003516	.003657	.005752	.005815	.005601	1.30
June	.003619	.003483	.006131	.006232	.005803	5.91
July	.003130	.002708	.006277	.005086	.006046	5.15
August	.003132	.003058	.004208	.005789	.005490	4.08
September	.003723	.003693	.004866	.005670	.005623	4.68
October	.003137	.004027	.004969	.005094	.006094	6.06
November	.003399	.005042	.006164	.005677	.006068	3.31
December	.003829	.004397	.007085	.005352	.006307	7.10
Annual Average (AA)	.003596	.003812	.005344	.005582	.005626	
3 Month Max. Average	.003953	.004489	.006073	.005840	.006156	
Ratio (3 Month Max to AA ratio)	1.10	1.18	1.14	1.05	1.09	
5-Year Average Hydraulic Ratio = 1.11						

Organic loading of the Stonymead WWTP:

- f. Organic loadings at the Stonymead WWTP were estimated in prior reports. We estimated 4 people per home contributing 0.17 lb/BOD₅ per day. The Township was forced to install a sampling port in March of 2011 after the developer did not. There is data after March 9th, 2011.
- g. Since the loading is 100% domestic and the WWTP is designed for 24.9 pounds of BOD₅ per day or nearly 37 EDU's at this per-person loading, no overload was expected. This is confirmed from the 2011-5 samples.
- h. Data reported in reports prior to 2013 were estimates and not used in the 2014 or 2015 reports.
- i. Based on the data available there is no existing or projected organic overload condition for the average but is close for the peak 1-month.

A discussion of the influent organic sampling protocol that details:

j. Sampling frequency, recommended as follows:

Recommended Sampling Frequency for Influent BOD₅	
Annual Average Capacity	Minimum Sampling Frequency
> 1.0 MGD	Once per week
0.050 to 1.0 MGD	Twice per month
<0.050 MGD	Once per month

- k. Type of sample taken – grabbed up to 3 per month after March 9th, 2011. Currently the standard is two grab samples per month.
- l. The influent BOD₅ sample is taken from the low pressure forcemain before the raw sewage enters the primary treatment lagoon.
- m. There is no septage hauled to this plant
- n. Influent loadings were historically partly calculated using estimates. Table 2 below, is completed for 2015.

Table 2				
Organic Loading Sampling Data				
Date of sample	A BOD₅ (mg/l)	B Flow (MGD) – sample day or < 1 wk ave.	C = A x B x 8.34 Daily BOD₅ (lbs/day)	Monthly Average (lbs/day)
1/8/15	514	0.00456	19.5	
1/15/15	146	0.00453	5.5	12.5
2/4/15	193	0.00443	7.1	
2/11/15	237	0.00401	7.9	7.5
3/5/15	189	0.00489	7.7	
3/11/15	200	0.00421	7.0	7.4
4/2/2015	210	0.00496	8.7	
4/8/2015	157	0.00522	6.8	7.8
5/6/15	269	0.00564	12.7	
5/13/15	100	0.00610	5.1	8.9
06/3/15	174	0.00567	8.2	
06/10/15	220	0.00654	12.0	10.1
7/1/15	313	0.00505	13.2	
7/8/15	172	0.00588	8.4	10.8
08/5/15	219	0.00475	8.7	
08/12/15	218	0.00475	8.6	8.7
9/3/15	145	0.00513	6.2	
9/9/15	310	0.00453	11.7	9.0
10/1/15	173	0.00653	9.4	
10/8/15	163	0.00517	7.0	8.2
11/5/15	298	0.00435	10.8	
11/12/15	180	0.00506	7.6	9.2
12/2/15	149	0.00475	5.9	
12/9/15	313	0.00547	14.3	10.1
Year 2015	220			9.2

Table 3 below shows the Stonymead WWTP's 2011 - 2015 actual organic loading data:

Table 3					
Organic Loading (lbs/day)					
Month	2011	2012	2013	2014	2015
January		6.8	4.5	5.5	12.5
February		5.8	7.3	4.7	7.5
March	4.4	11.3	7.2	8.7	7.4
April	7.1	11.3	5.9	9.5	7.8
May	8.3	7.2	6.4	8.3	8.9
June	6.5	5.3	13.7	12.1	10.1
July	5.6	5.6	6.7	4.9	10.8
August	2.8	3.9	11.2	6.3	8.7
September	7.7	8.5	10.0	11.9	9.0
October	2.5	1.1	2.8	6.9	8.2
November	5.2	9.0	7.0	4.8	9.2
December	6.6	7.5	7.3	9.2	10.1
Annual Average	5.7	6.9	7.7	7.7	9.2
Ratio (Max Month to Annual Average Ratio)*	1.30 using march – Dec. data	1.64	1.78	1.57	1.36
5-Year Average Organic Ratio = 1.53					

*While the hydraulic loading “peaking factor” is determined using the 3-Month-Max to AA ratio, the organic loading “peaking factor” is determined using the Maximum Month (i.e., the single highest monthly average in the calendar year) to AA ratio. We used the 1.53 as our 2015 report basis.

5-YEAR HYDRAULIC AND ORGANIC LOADING PROJECTIONS

- b. The Department has requested that flow projections be determined using a “5-year adjusted annual average flow,” rather than a 5-year average or current calendar year AA flow. We have completed that information which generates a 2020 SERO peak 3-month flow of 0.009751 versus our old method’s 0.010236 MGD. Either prediction could prove to be true. We believe that the early and recent high flows per EDU (+/- 300 gpd/EDU) were and are true. The Township required, as part of the development agreement, that the developer address this problem since he remained the system owner. The developer was not able to commit the resources necessary to confirm flows in a timely manner so the Township secured the site escrow and has nearly completed the punchlist items. The plan is to install water meters on each home’s well and to install timers in each home’s residential grinder pump station (metering small wastewater flows is not accurate). To produce the attached charts, we have used our historic method of projecting which actually is very similar to the SERO approach once a baseline average is computed. For the original method’s annual average, we accounted for new EDU’s as if they were added mid-year. The 2016 base average and three-month peak flows were calculated

using the 2015 average flow. This 12-month average EDU of 309 gpd was used to project flows from the expected new Stonymead homes. If suspected I & I between the homes and their grinder pumps is eliminated, the flow may drop below 300 gpd/EDU but we doubt this development will conform to the norm of < 200 gpd/EDU. A hydraulic re-rating to about 11,800 gpd is in the Act 537 planning review process. To the 2015 hydraulic average (309 gpd/EDU) ½ of 2015 added EDUs (one in this case) and ½ of the expected new 2016 EDUs (at 309 gpd/EDU for Stonymead and, in 2019 & 2020, 265 gpd/EDU for Bittersweet) to get the 2016 expected average, repeating this process through 2020. We use the same method for the 3-month peak except we add the full peak per new EDU volume (371 gpd for Stonymead or 318 gpd for Bittersweet per EDU). We have graphed the projected flows using both the original Township method and the SERO method.

- c. In the absence of data through March of 2011, we historically have estimated BOD₅ on pounds per home basis. The 2011-15 observed data indicates that our original estimates were too high.
- d. To project organic loading, we use 0.17 pounds of BOD₅ per person per day and use 4 people per new EDU (census = 2.7 people/EDU). The resulting 0.68 is higher than the observed average of about 0.5 lbs./EDU/day.
- e. The average 5-year hydraulic and organic loading is not projected to exceed the Stonymead W.WTP re-rated capacity of about 11,800 gpd and 24.9 lbs/day. Peak SERO calculated one month organic loading is projected to equal constructed capacity in 2020. Using the original method, the one-month peak organic load is projected to be 1 ppd less than constructed capacity in 2020. Hydraulic loading with both methods is expected to be below the re-rated capacity
- f. Table 4 lists the organic projections we calculated using the SERO-recommended method. It should be noted that sampling the low pressure sewer has proven to be a challenge.

Table 4		
Organic Loading Projections		
Year	Annual Average BOD ₅ Loading Projections ¹ (lbs/day)	Maximum Monthly BOD ₅ Loading Projections ² (lbs/day)
2016	9.9	15.1
2017	10.5	16.1
2018	11.2	17.1
2019	13.3	20.3
2020	16.3	24.9

¹AA projections = (Current report year's calculated AA loadings) + (loadings from proposed EDUs)

²Max Month projections = (AA projection) x (4-year Average Organic Ratio of 1.53)

Calculating the Five-Year Adjusted Annual Average For Chapter 94 Flow Projections

- A. Determining the new flow in million gallons per day (MGD), which corresponds to the new EDUs (278 gpd) connected for each calendar year:

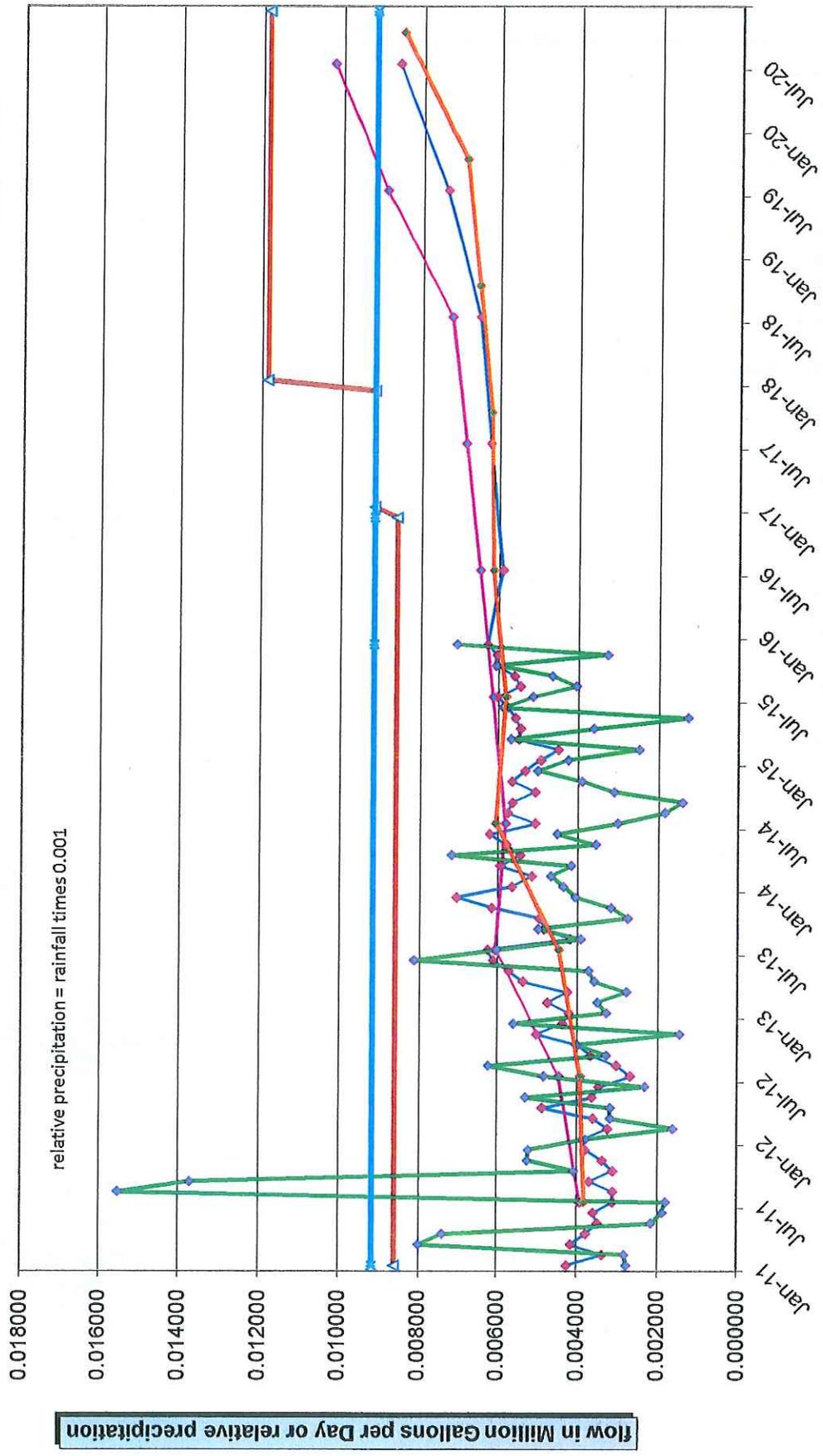
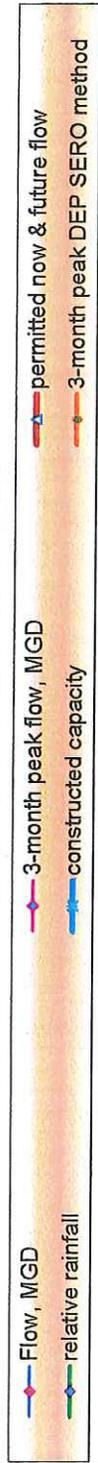
Table 5			
Year	# of EDUs connected	gpd/EDU	New Flow (MGD)
2011	1	309	0.00031
2012	0	309	0
2013	2	309	0.00062
2014	0	309	0
2015	1	309	0.00031

- B. Adjusting each calendar year by adding the flows from new connections to the annual average flow for each of the previous calendar years.

Table 6								
Year	AA Flow in MGD	All projects connected (providing flows approved in planning modules)					Adjusted AA Flow	
		2011	2012	2013	2014	2015		
2011	.003596		0	0.00062	0	0.00031	0.004526	
2012	.003812			0.00062	0	0.00031	0.004822	
2013	.005344				0	0.00031	0.005654	
2014	.005582					0.00031	0.005892	
2015	.005626						0.005626	
Total	0.023960						Total	0.026520
5 Yr Avg	0.004792						5 Yr Adj Avg	0.005304

- C. Next we calculate the five-year flow projections, starting with the five-year adjusted annual average flow. Since May of 2013, it appears that there may be other customers who have introduced storm and/or surface/ground water into the sanitary system or the water use in these very large homes is much more than average.

Stonymead WWTP Hydraulic Loading Graph



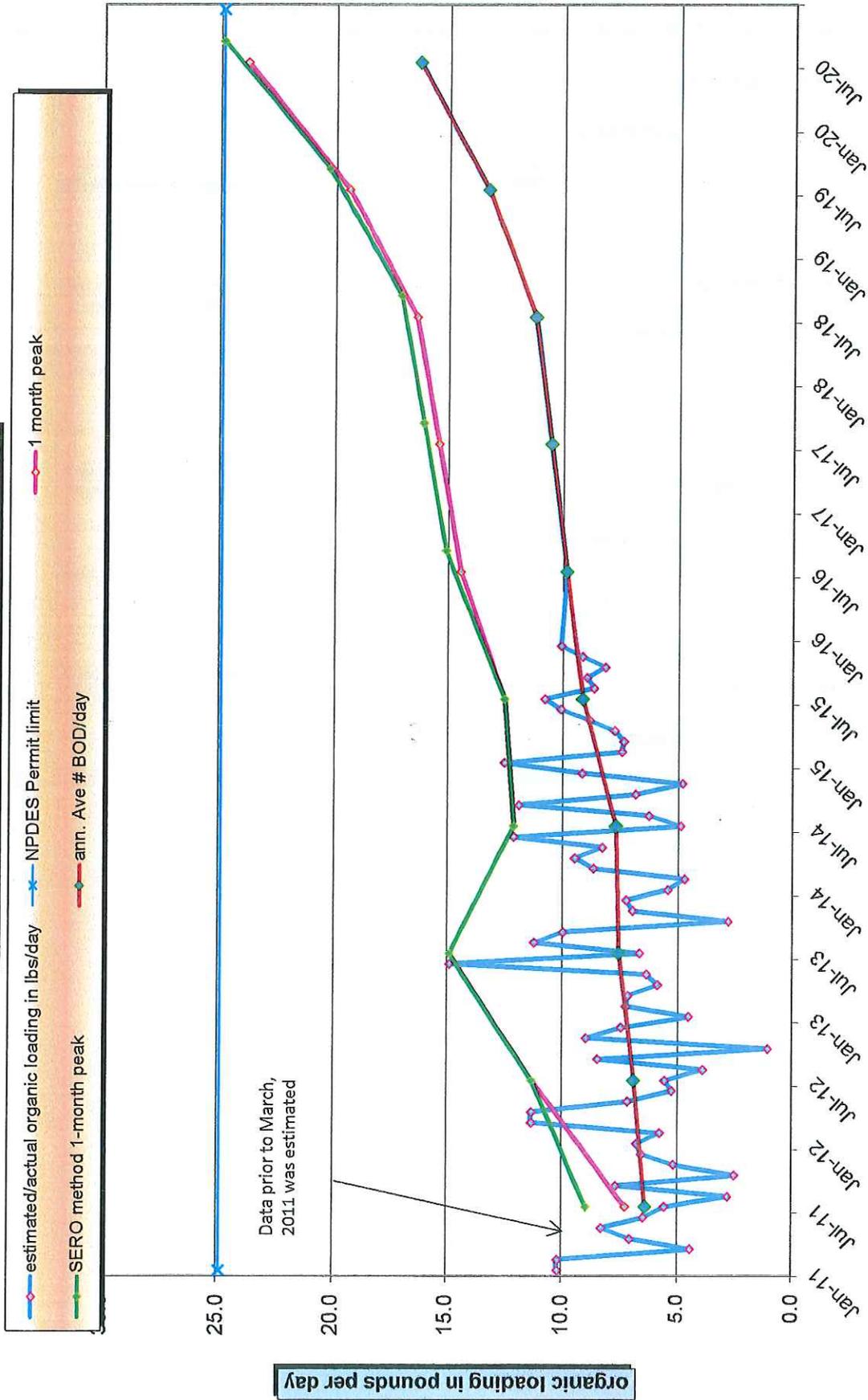
Stonymeade WWTP Hydraulic Loading

month	flow MGD	ave flow MGD	3 month peak flow MGD	3 month peak SERO method	flow limit MGD	flow limit constructed	precip. in/month	relative precip.	Comments	connected EDUs	Remaining 265 gpd EDUs
Jan-11	0.004279				0.00863	0.00919	2.79	0.003	Stonymeade orig agr. 27 lots 2002		
Feb-11	0.003400						2.85	0.003	15 homes connected - end of 2010	15	17.8
Mar-11	0.004177						8.02	0.008	3-mo peak to ave ratio 1.099		
Apr-11	0.003807						7.42	0.007			
May-11	0.003516						2.17	0.002			
Jun-11	0.003619						1.89	0.002			
Jul-11	0.003130	0.003596	0.003952	0.003952			1.81	0.002	connected 1 Stonymeade homes		
Aug-11	0.003132						15.53	0.016	50-month Ave EDU gpd		
Sep-11	0.003723						13.73	0.014	279		
Oct-11	0.003137						4.09	0.004	2011 3-month peak EDU gpd		
Nov-11	0.003399						5.26	0.005	247		
Dec-11	0.003829						5.24	0.005	16 homes connected - end of 2011	16	16.8
Jan-12	0.003888						3.82	0.004			
Feb-12	0.003264						1.63	0.002	3-mo peak to ave ratio 1.178		
Mar-12	0.003637						3.20	0.003			
Apr-12	0.004890						3.20	0.003			
May-12	0.003657						5.31	0.005			
Jun-12	0.003483						2.35	0.002			
Jul-12	0.002708	0.003812	0.004489	0.004489			4.86	0.005	connected 0 Stonymeade homes		
Aug-12	0.003058						6.24	0.006	62-month Ave EDU gpd		
Sep-12	0.003693						3.30	0.003	271		
Oct-12	0.004027						4.04	0.004	2012 3-month peak EDU gpd		
Nov-12	0.005042						1.48	0.001	281		
Dec-12	0.004397						5.61	0.006	16 homes connected - end of 2012	16	16.8
Jan-13	0.004239						3.31	0.003			
Feb-13	0.004772						3.53	0.004	3-mo peak to ave ratio 1.136		
Mar-13	0.004280						2.80	0.003			
Apr-13	0.005386						3.61	0.004			
May-13	0.005752						3.75	0.004			
Jun-13	0.006131						8.15	0.008	17th home occupied in 1-13		
Jul-13	0.006277	0.005344	0.006073	0.006073			6.03	0.006	connected 2 Stonymeade homes		
Aug-13	0.004208						3.95	0.004	74-month Ave EDU gpd		
Sep-13	0.004866						5.00	0.005	278		
Oct-13	0.004969						2.78	0.003	2013 3-month peak EDU gpd		
Nov-13	0.006164						3.20	0.003	337		
Dec-13	0.007085						4.08	0.004	18 homes connected - end of 2013	18	14.8
Jan-14	0.005669						4.38	0.004			
Feb-14	0.005165						4.69	0.005	3-mo peak to ave ratio 1.046		
Mar-14	0.005961						4.18	0.004			
Apr-14	0.005473						7.20	0.007			
May-14	0.005815						3.58	0.004			
Jun-14	0.006232						4.54	0.005			
Jul-14	0.005086	0.005582	0.005840	0.005840			3.04	0.003	connected 0 Stonymeade homes		
Aug-14	0.005789						1.86	0.002	86-month Ave EDU gpd		
Sep-14	0.005670						1.42	0.001	283		
Oct-14	0.005094						3.13	0.003	2014 3-month peak EDU gpd		
Nov-14	0.005677						3.93	0.004	324		
Dec-14	0.005352						5.02	0.005	18 homes connected - end of 2014	18	14.8
Jan-15	0.004963						4.28	0.004			
Feb-15	0.004525						2.51	0.003	3-mo peak to ave ratio 1.094		
Mar-15	0.005513						5.71	0.006			
Apr-15	0.005476						3.64	0.004			
May-15	0.005801						1.30	0.001			
Jun-15	0.005803						5.91	0.006	connected 1 Stonymeade home		
Jul-15	0.006046	0.005626	0.006156	0.006156			5.15	0.005	Bittersweet EDU = 265 gpd		
Aug-15	0.005490						4.08	0.004	2015 Stonymeade EDU = 309 gpd new EDU value based on 2015 running annual average		
Sep-15	0.005623						4.68	0.005	added peak EDUs are 1.2 x ave EDU		
Oct-15	0.006094						6.06	0.006			
Nov-15	0.006068						3.31	0.003	19 homes connected - end of 2015		
Dec-15	0.006307					0.00919	7.10	0.007		19	13.8
Jan-16									possible new limit of 9,190 gpd		
Feb-16									limit could be as high as 12,000 gpd not used this time		
Mar-16											
Apr-16									5-yr 3-mo peak to ave ratio 1.111		
May-16											
Jun-16									connect 1 Stonymeade home		
Jul-16	0.005935	0.005935	0.006527						Bittersweet EDU = 265 gpd		
Aug-16									2015 Stonymeade EDU = 309 gpd new EDU value based on 2015 running annual average		
Sep-16									added peak EDUs are 1.2 x ave EDU		
Oct-16				0.006230					20 homes connected - end of 2016		
Nov-16					0.00863	0.00919					
Dec-16					0.00919						
Jan-17									possible new limit of 9,190 gpd		
Feb-17									limit could be as high as 12,000 gpd		
Mar-17											
Apr-17									offsetting sero data to display		

Stonymeade WWTP Hydraulic Loading

month	flow MGD	ave flow MGD	3 month peak flow MGD	3 month peak SERO method	flow limit MGD	flow limit constructed	precip. in/month	relative precip.	Comments	connected EDUs	Remaining 265 gpd EDUs
May-17									<i>Stonymeade orig agr. 27 lots 2002</i>		
Jun-17											
Jul-17	0.006244	0.006244	0.006898						connect 1 Stonymeade home		
Aug-17											
Sep-17											
Oct-17				0.006573							
Nov-17											
Dec-17					0.00919				21 homes connected - end of 2017	21	11.8
Jan-18					0.01186				possible rerated flow		
Feb-18											
Mar-18											
Apr-18											
May-18											
Jun-18											
Jul-18	0.006553	0.006553	0.007269						connect 1 Stonymeade home		
Aug-18									<i>limit of 7 Bittersweet homes</i>		
Sep-18											
Oct-18				0.006916							
Nov-18											
Dec-18									22 homes connected - end of 2018	22	10.8
Jan-19											
Feb-19											
Mar-19											
Apr-19											
May-19											
Jun-19											
Jul-19	0.007392	0.007392	0.008912						connect 4 Bittersweet homes ? connect 1 Stonymeade home		
Aug-19											
Sep-19											
Oct-19				0.008526							
Nov-19											
Dec-19									27 homes connected - end of 2019	27	5.8
Jan-20											
Feb-20											
Mar-20											
Apr-20											
May-20											
Jun-20											
Jul-20	0.008628	0.008628	0.010236						connect 3 Bittersweet homes ? connect 1 Stonymeade home		
Aug-20											
Sep-20											
Oct-20				0.009751							
Nov-20											
Dec-20					0.01186	0.00919			29 homes connected - end of 2019	31	1.8

Stonymeade WWTP Organic Loading Graph



Stonymead WWTP Organic Loading

Table IA-2						
month	organic load # BOD/day	ann. Ave # BOD/day estimated	1 month peak # BOD/day estimated	1 month peak SERO method	organic limit # BOD/day	Comments
Jan-11	10.2				24.9	15 homes connected - end of 2010
Feb-11	10.2					
Mar-11	4.4					
Apr-11	7.1					
May-11	8.3					
Jun-11	6.5					
Jul-11	5.6	6.4	7.3	9.0		peak not using j-f ests. connected 1 home
Aug-11	2.8					used 1.4 multiplier for full year
Sep-11	7.7					
Oct-11	2.5					
Nov-11	5.2					
Dec-11	6.6					16 homes connected - end of 2011
Jan-12	6.8					
Feb-12	5.8					
Mar-12	11.3					
Apr-12	11.3					
May-12	7.2					
Jun-12	5.3					
Jul-12	5.6	6.9	11.3	11.3		connected 0 homes 1,628
Aug-12	3.9					
Sep-12	8.5					
Oct-12	1.1					doubtful data
Nov-12	9.0					
Dec-12	7.5					16 homes connected - end of 2012
Jan-13	4.5					
Feb-13	7.3					
Mar-13	7.2					
Apr-13	5.9					1,961
May-13	6.4					
Jun-13	14.9					Twp peak multiplier is 1.794 - 2yr ave connected 2 homes
Jul-13	6.7	7.6	14.9	14.9		22-mo ave as base for 2013 proj 1,794
Aug-13	11.2					
Sep-13	10.0					
Oct-13	2.8					
Nov-13	7.0					
Dec-13	7.3					18 homes connected - end of 2013
Jan-14	5.5					
Feb-14	4.7					
Mar-14	8.7					
Apr-14	9.5					1,565
May-14	8.3					1,763
Jun-14	12.1					Twp peak multiplier is 1.763 - 2yr ave connected 0 homes
Jul-14	4.9	7.7	12.1	12.1		12-mo ave as base for 2014-5 proj ok 7,733
Aug-14	6.3					
Sep-14	11.9					
Oct-14	6.9					
Nov-14	4.8					
Dec-14	9.2					18 homes connected - end of 2014
Jan-15	12.5					
Feb-15	7.5					
Mar-15	7.4					
Apr-15	7.8					1,361
May-15	8.9					1,463
Jun-15	10.1					Twp peak multiplier is 1.463 - 2yr ave connected 1 home
Jul-15	10.8	9.2	12.5	12.5		12-mo ave as base for 2014-5 proj ok 9,183
Aug-15	8.7					
Sep-15	9.0					
Oct-15	8.2					
Nov-15	9.2					
Dec-15	10.1					19 homes connected - end of 2015

Stonymead WWTP Organic Loading

Table IA-2						Comments
month	organic load # BOD/day	ann. Ave # BOD/day estimated	1 month peak # BOD/day estimated	1 month peak SERO method	organic limit # BOD/day	
Jan-16						
Feb-16						
Mar-16						
Apr-16						
May-16						
Jun-16						SERO multiplier is
Jul-16	9.9	9.9	14.4			Twp peak multiplier is 1.463 - 2yr ave connect 1 Stonymead home
Aug-16						12-mo ave as base for 2014 proj
Sep-16				15.1		offsetting sero data to display
Oct-16						
Nov-16						
Dec-16						20 homes connected - end of 2016
Jan-17						
Feb-17						
Mar-17						
Apr-17						
May-17						
Jun-17						
Jul-17	10.5	10.5	15.4			connect 1 Stonymead home
Aug-17						
Sep-17				16.1		
Oct-17						
Nov-17						
Dec-17						21 homes connected - end of 2017
Jan-18						
Feb-18						
Mar-18						
Apr-18						
May-18						
Jun-18						
Jul-18	11.2	11.2	16.4			connect 1 Stonymead home
Aug-18						
Sep-18				17.1		
Oct-18						
Nov-18						
Dec-18						22 Stonymead homes connected 2018
Jan-19						
Feb-19						
Mar-19						
Apr-19						
May-19						
Jun-19						connect 4 Bittersweet homes ? connect 1 Stonymead home
Jul-19	13.3	13.3	19.4			
Aug-19						
Sep-19				20.3		
Oct-19						
Nov-19						23 Stonymead homes connected 2019
Dec-19						27 homes connected - end of 2019
Jan-20						
Feb-20						
Mar-20						
Apr-20						
May-20						
Jun-20						connect 3 Bittersweet homes ? connect 1 Stonymead home
Jul-20	16.3	16.3	23.9			
Aug-20						
Sep-20				24.9		
Oct-20						
Nov-20						24 Stonymead homes connected 2020
Dec-20					24.9	31 homes connected - end of 2019

Table 7					
Adjusted Projections – using SERO 2015 base flow					
Adjusted Projections					
Year	Previous Year's Annual Average Flow¹	New EDUs	Increased Flow² (MGD)	Projected Annual Average Flow³ (MGD)	Projected 3-month Max Month Flow⁴ (MGD)
2016	0.005304	1	0.000309	0.005613	0.006230
2017	0.005613	1	0.000309	0.005922	0.006573
2018	0.005922	1	0.000309	0.006231	0.006916
2019	0.006231	5	0.001450	0.007681	0.008526
2020	0.007681	4	0.001104	0.008785	0.009751

¹ The first year's projection (2016 in this example) starts with the 5-year adjusted annual average that was calculated in A through B, above.

² Increased Flow = (New EDUs x 265 gpd/EDU Bittersweet & 309 Stonymead)/1,000,000

³ Projected Annual Average Flow = Previous Year's AA Flow + Increased flow

⁴ Projected Max Month = Projected Annual Avg. Flow x 5-year average hydraulic ratio of 1.11.

D. Considerations on projection figures:

If the planning projections as they are shown are correct and the flow per EDU remains high, the Stonymead WWTP will need to be re-rated or on-site development limited even though the original Stonymead home would still be serviced by its OLDS. There are additional non-wastewater-related issues that could limit the number of homes to less than the originally planned 27.

Apparently there is some discrepancy in the actual Act 537 planning numbers that have been picked up in the DEP SERO review. Since Stonymead WWTP has a low-pressure sewer collection system, I & I should be less than in a gravity system once individual customer issues are addressed.

Using both methods of projecting flow (with a > 300 gpd EDU) and both methods of predicting organic loading, a CAP would consist of merely a plant re-rating which is being pursued. The reality is that very small development wastewater systems (<100 EDU's) are susceptible to influences that are not an issue in larger systems. We have suggested a special, higher volume, planning EDU for these systems but no changes to Act 537 have been made to acknowledge this.

SEWER EXTENSIONS

- a. There were no sewer extensions in 2015.

- b. There were no sewer extensions approved or exempted in the past year in accordance with the PA Sewage Facilities Act (35 P.S. §§ 750.1—750.20) and Chapter 71 (relating to administration of the sewage facilities program), but not yet constructed;
- c. The extension to the Bittersweet area adjacent to Stonymead has been agreed to by the developer and may have been accepted by DEP during the planning stages. The Township required reservations for 7 (1 more than originally thought was found in 2013) offsite EDU's which are shown as connecting in 2019-20.
- d. There are no known proposed projects in the Stonymead WWTP drainage area that require public sewers but are in the preliminary planning stages.

PROGRAM FOR SANITARY SEWER MONITORING, MAINTENANCE, AND REPAIR

- a. Monitoring – inspecting the low pressure forcemain access easements
- b. Maintenance – none – developer agreed to provide a stabilized access bed over the forcemain in easements but has not. There may not be enough money in the escrow to install this.
- c. Repair – one – see 5683 Kingfisher La. SSO report
- d. Rehabilitation - none
- e. Routine and special activities – none – after Township accepts ownership, we plan to make enough modifications to allow an annual forcemain flush
- f. Personnel and equipment used – three certified wastewater operators inspect
- g. Sampling frequency – none – developer agreed to install water meters on wells and pump event timers on each residential grinder station within Stonymead but that is now on the uncompleted items punchlist.
- h. Quality assurance – all facilities were pressure tested and passed
- i. Data analyses – yes as part of reports to developer and preliminary CAP
- j. Infiltration/inflow (I/I) monitoring – none – developer agreed to work with Township to inspect individual homes' connections and grinder pump stations but did not – that activity will now be transferred to the Township.
- k. Maintenance and control of combined sewer regulators during the past year: not applicable

The sewer system is relatively new – all constructed from 2003 to 2004.

CONDITION OF THE SEWER SYSTEM

- l. Bypassing - none
- m. Combined sewer overflows – not applicable
- n. Sanitary sewer overflows – one confined to the excavation – see Kingfisher La. SSO. The vacuum/air release valve was installed so back-siphonage of the lagoon is rendered extremely unlikely.
- o. Excessive infiltration – high flow may be related to I & I coming from the homes up to their grinder pump stations, or sump pumps. Correlation to rainfall exists but not as close a correlation as we would expect. We have tried to link it to groundwater elevations but the data available from the

spray site didn't help. It may be that these large homes just use a lot more water than average.

- p. Other system problems - none

Discussion of available existing and future capacity.

- q. The age of the sewer system is 12 years
- r. 100% PVC pipe is used
- s. All sewer capacities were analyzed for peaking during the design and permitting stages.
- t. No repairs or rehabilitations are needed except possibly to the homeowners on-lot facilities. This will be determined on inspection and metering.

Discuss any portions of the sewer system in which surcharging occurs:

- u. There is no system surcharging
- v. There was one SSO during the report year not related to capacity
- w. All flows are monitored at the Stonymead WWTP. This data is entered onto a spreadsheet and graphed against rainfall in each monitoring period.
- x. Wet weather capacity analysis consists of looking at the same graph mentioned above. All sewers were designed to convey the DEP approved high peak-conveyance flows. After the nearly 30 inches of rain in late August and early September of 2011, the lagoons captured too much water and we were allowed to make up irrigation flow in late September and through October that was permitted, but not discharged, in prior months.

SEWAGE PUMPING STATIONS

There are no sewage pump stations. This is a low-pressure forced sewer system so each connection has or will have a small grinder pump station.

INDUSTRIAL WASTES

There are no industrial wastes or significant users

CORRECTIVE ACTION PLAN

A Corrective Action Plan was submitted in preliminary form. Although the 2010 through 2012 hydraulic loadings indicated that a CAP might be unnecessary, we now have seen much higher flows per EDU since May of 2013 which may be just higher use per very large home or I & I. The residential water meters and pump station timers will be the first step toward determining the source. If there is a problem or flow exceedance prior to plant re-rating, the Township can limit building and/or occupancy permits. Act 537 planning and plant re-design/re-rating is underway. Funding for some of this work has been obtained from the developer's escrow.

CALIBRATION REPORTS

Calibration of the Influent meter was completed in November of 2015 and the report is attached after page 12.

TRIBUTARY MUNICIPALITY REPORTS

Not applicable

ATTACHMENTS

Meter Calibration reports

SSO report from 9-17-2015 – 5683 Kingfisher Lane

ESSEX SERVICE CORPORATION
82 DOE RUN DRIVE
HOLLAND, PA 18966
T/A TREATMENT INSTRUMENTATION SPECIALIST

FIELD SERVICE REPORT

November 24-25,28 2015

Township of Buckingham
P.O. Box 413
Buckingham, PA 18912

Attention: Graham Orton

Trip required for verification of calibration of influent flow meter located at Stonymeade WWTP.

Influent Flow Meter

1. Endress Hauser model ProMag P; Serial No. 5701CE16000.
 - a. Calibration 0 - 200 gpm. Primary Element 4" Mag Meter.

The following parameters are programmed as follows:

Forward - Normal, 0 Return Off, System dampening 7 seconds, Integration 16.7 MS, Low cutoff 15 gpm, Empty pipe detection ON, Failsafe Low, K Factor .9501.

Unit checked and calibrated at the following:

As found settings:

0% in - out = 4.01 Madc

50% in - out = 12.01 Madc

100% in - out = 20.01 Madc

Adjusted settings:

None

None

None

Note: All units checked and calibrated in accordance with manufacturers' specifications as set forth in their instruction manuals.

Next calibration due December 2016.

If you have any questions or comments please feel free to call.

ESSEX SERVICE CORPORATION



William K. Weissman

ESSEX SERVICE CORPORATION
82 DOE RUN DRIVE
HOLLAND, PA 18966
T/A TREATMENT INSTRUMENTATION SPECIALIST

FIELD SERVICE REPORT

November 24-25,28 2015

Township of Buckingham
P.O. Box 413
Buckingham, PA 18912

Attention: Graham Orton

Trip required for verification of calibration of effluent flow meter located at Stonymeade WWTP.

Effluent Flow Meter

1. Sensus Mechanical Width Act-Pak Serial No. 50317 (Act-Pak 1104A-S-105071B.)
 - a. Calibration 0 - 300 gpm.
 - b. Act-Pak Hz @49.10 @300 gpm.

Unit checked and calibrated at the following:

As found settings:

0% in - out = 4.01 Madc

50% in - out = 12.01 Madc

100% in - out = 20.01 Madc

Adjusted settings:

None

None

None

Note: All units checked and calibrated in accordance with manufacturers' specifications as set forth in their instruction manuals.

Next calibration due December 2016.

If you have any questions or comments please feel free to call.

ESSEX SERVICE CORPORATION



William K. Weissman

Sanitary Sewer Overflow (SSO) Report to PADEP - Clean Water Program		DEP fax: 484-250-5971	
484-250-5900		stephanie took call	
Please check the appropriate box		<input checked="" type="checkbox"/> Dry Weather Overflow	<input type="checkbox"/> Wet Weather Overflow
1. Date, Name, Phone # of person completing this report	9/17/15 Graham Orton 215-768-6834, 215-794-8834		
2. Your organization name and address ?	Name: Buckingham Township County: Bucks Address: PO Box 413 Buckingham PA 18912 Township/Municipality: Buckingham Township		
Sewer system owner and permit number	Buckingham Township Stonymead System discharging to Stonymead WWTP Permit #WQM 0901401		
3. Date found and <u>specific</u> location of SSO. Including Municipality/County (if different from #2) ?	Date: 9/17/15 Municipality: Buckingham Township Location(Street & #): 5683 Kingfisher Lane County: Bucks		
4. How was SSO discovered? By whom ?	Contractor making lot 5 tie-in discovered sewage in pit and called Operator Bill van Horn who responded and called graham at 1:41 pm		
5. Start and end time of SSO (actual or estimate?)	Start time is not known for sure - leak had not surfaced, Bill Van Horn called by contractor at 1:30 pm. All flow stopped at about 5pm.		
6. Date, time and name of person who called PADEP originally to notify of SSO ?	Date : 9/17/15 Time : 1:55 pm Name : Graham Orton		
7. Description and actual or estimated volume of SSO	sewage was discovered leaking into the excavation pit. Contractor exposed leaking joint and Operator Bill Van Horn investigated the reason for the large quantity of water. Found that lagoon #1 was back-siphoning 60 gpm into the low pressure sewer. Bill used valves to switch forcemain into lagoon #2 and stop the backflow from lagoon #1. Volume total was about 6,000 gallons (2 truckloads). None went onto surface - all stayed in the excavated pit.		
8. Where, <u>precisely</u> , did SSO go ? (land, roadway, basement, swale, storm sewer, creek, etc.) Please include creek name or street location.	nowhere - all stayed in the excavated pit		
9. What caused SSO ? How was it stopped ?	Poor construction - coupling was not properly glued, poor design. It was stopped when the leaking coupling was repaired		
10. Describe extent of contamination and how it was cleaned up	none - excavation was pumped into a disposal truck and moved to the primary lagoon at this plant		
11. What actions will be taken to prevent a re-occurrence ? When ?	very little can be done about faulty construction - all installations are inspected by competent engineering RPR's and the installer was a well known company specializing in this type of work. Our engineer will investigat and probably design in and install vacuum/air release valve with developer's captured escrow. This will stop any back-siphonage in future situations.		
12. Other comments ?	None		
13 Downstream notifications made: (All downstream users such as public water supplies must be notified)	None were necessary		