Year of 2015 Chapter 94 Annual Report
Buckingham Township
Mill Creek WWTP
Bucks County

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Mill Creek Wastewater treatment Plant
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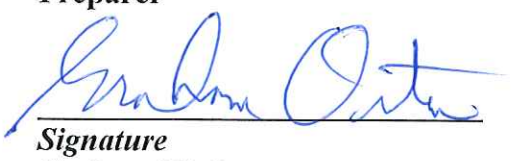
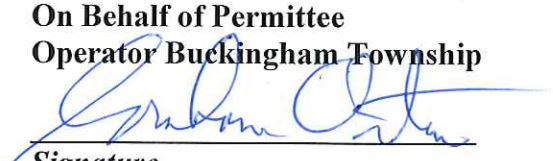
Preparer



Signature
Graham W. Orton
Buckingham Township

On Behalf of Permittee
Operator Buckingham Township



Signature
Graham W. Orton
Buckingham Township

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INTRODUCTION

The Millcreek WWTP serves the Mill Creek Ridge Development owned by Toll Brothers, Inc. The service area is all in Buckingham Township and the Township is the operator under contract with Toll Brothers Homebuilders. The plant was approved for influent flow and loading in April of 2014 and the first flow to the plant was in June of 2014. At the end of 2015, 29 homes were approved for occupancy and at least partly occupied.

The Millcreek Plant was constructed in 2013-14. The plant consists of 2 sequential treatment lagoons, an aerated storage lagoon and two adjacent sprayfields.

HYDRAULIC AND ORGANIC LOADINGS

Line graphs showing 2014-2015 and projected Hydraulic and Organic loading are inserted between pages 9 and 10.

The permitted capacities of the Millcreek WWTP:

Annual Average (AA) Capacity = 19,163 gpd
Hydraulic Design Capacity is more than permitted = 23,000 gpd
Organic Design Capacity = 49.1 lb/day (inf. BOD_5 of 300 mg/l)

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. No CAP or CMP is required

d. A High Flow Maintenance Plan (HFMP) has not been prepared for the Millcreek WWTP. This is a lagoon treatment plant which is not affected by short duration rain events. Very wet and cold winters could cause the plant to enter the freeboard storage designed and constructed as a safety feature. The plant has never entered freeboard.

e. Table 1 below, in the DEP recommended format, provides tabular data. We are now showing the SERO-method plot on the graphs along with the Township's slightly modified original method – both give significantly different results – with the SERO method being perhaps too high. This is probably related to a higher than actual peak 3-month multiplier which, in turn, is caused by the effect of water plant backwashing on a WWTP with so few homes attached. We expect the multiplier to drop to about 1.1 over time.

Table 1						
Hydraulic Loading (MGD)						Rainfall (inches)
Month	**2011**	**2012**	**2013**	**2014**	**2015**	**2015**
January					0.002685	4.99
February					0.002622	2.68
March					0.004936	3.50
April					0.003001	2.19
May					0.002935	1.42
June				0.00244	0.003298	4.89
July				0.00067	0.004056	4.99
August				0.00139	0.004415	3.25
September				0.00127	0.004423	3.33
October				0.00205	0.004730	3.71
November				0.00174	0.004587	1.63
December				0.00290	0.004612	4.38
Annual Average (AA)				**0.00178**	**0.003858**	
3 Month Max. Average				**0.00233**	**0.004643**	
Ratio (3 Month Max to AA ratio)				**1.31**	**1.20**	
5-Year Average Hydraulic Ratio = n/a use 1.26						

Organic loading of the Millcreek WWTP:

f. Organic loadings at the Millcreek WWTP are derived from two grab samples per month. The loading is coming from 100% domestic connections and the water treatment plant which is hydraulically equal to about 2-3 EDUs but organically much less than one EDU. Over a statistically significant (no less than three) number of samples, the loading average should not vary by more than 20 to 30%. Because the plant and pump stations are visited on 3-5 days per week, 2014-5 organic loading data are calculated using the daily average flow between visit dates. Sampling ports were not installed until September, 2014 which coincided with the seventh home's occupancy.

g. A minimum of three consecutive month grab samples are likely to generate statistically significant values but a single grab sample will not. The single peak month has not exceeded the WWTP's design organic loading.

h. Grabbed samples are usually taken during expected peak BOD_5 concentration hours. A lagoon treatment plant works on the principal of very long retention times and very low MLSS concentrations. It is, therefore, able to assimilate and treat wide organic loading variations that might occur. We sample twice per month to improve the probability that anomalous peaks and valleys are evened out.

i. There is no existing organic overload condition. Predicted loading, regardless of the methodology indicates a 1-month peak over the permitted limit but the peak/average multiplier is probably higher than it will end up being – only long-term data can confirm this expectation.

A discussion of the influent organic sampling protocol that details:

j. Sampling frequency, recommended as follows:

Recommended Sampling Frequency for Influent BOD_5	
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 – two per month – grab samples tested for BOD_5.

l. The influent BOD_5 sample is taken from the PS # 19 forcemain only. PS #18 will eventually serve phase 2 of the development but currently contributes flow only from the water treatment building which has essentially zero organic loading. PS 19 takes the flow from all of the connections in phase 1 and lot 43's grinder pump (original Pfeifer residence). Eventually the remaining 4 outparcel EDUs (Smith farmstead) will have grinder pumps discharging to the PS 18 forcemain. The developer has been instructed to install a combined pump station sample port in addition to the individual sample ports so the township can more accurately measure organic loading once phase 2 is on line.

m. There is no hauled in septage to this plant

n. Influent loadings are calculated using the daily average flow between visit dates. Table 2 below, shows the calendar year's organic loading sampling data:

Table 2				
Organic Loading Sampling Data				
	A	B	C = A x B x 8.34	
Date of sample	**BOD5 (mg/l)**	**Flow (MGD) on the sample day**	**Daily BOD5 (lbs/day)**	**Monthly Average (lbs/day)**
1/8/15	214	0.00239	4.3	
1/15/15	178	0.00371	5.5	**4.9**
2/5/15	110	0.00212	1.9	
2/12/15	195	0.00248	4.0	**3.0**
3/5/15	50	0.00248	1.0	
3/12/15	18	0.00569	0.9	**1.0**
4/2/15	115	0.00265	2.5	
4/16/15	243	0.00253	5.1	**3.8**
5/7/15	200	0.00237	4.0	
5/21/15	329	0.00287	7.9	**6.0**
6/4/15	440	0.00238	8.7	
6/11/15	229	0.00255	4.9	**6.8**
7/9/15	379	0.00370	11.7	
7/23/15	233	0.00343	6.7	**9.2**
8/6/15	166	0.00399	5.5	
8/13/15	249	0.00392	8.1	**6.8**
9/3/15	127	0.00406	4.3	
9/17/15	195	0.00381	6.2	**5.3**
10/1/15	146	0.00518	6.3	
10/8/15	222	0.00481	8.9	**7.6**
11/5/15	61	0.00350	1.8	
11/12/15	96	0.00392	3.1	**2.5**
12/03/15	160	0.00501	6.7	
12/10/15	246	0.00425	8.7	**7.7**
Year 2015	**192**			**5.4**

Table 3 below shows the Millcreek WWTP's historic 5-year organic loading data:

Table 3 Organic Loading (corrected data through 7-31-2010) (lbs/day)					
Month	**2011**	**2012**	**2013**	**2014**	**2015**
January					4.9
February					3.0
March					1.0
April					3.8
May					6.0
June					6.8
July					9.2
August					6.8
September				0.9	5.3
October				2.4	7.6
November				2.9	2.5
December				2.2	7.7
Annual Average				**2.1**	**5.4**
Ratio (Max Month to Annual Average Ratio)*				**1.38**	**1.70**
5-Year Average Organic Ratio = n/a use 1.54					

*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.

5-YEAR HYDRAULIC AND ORGANIC LOADING PROJECTIONS

The Millcreek WWTP influent flow is the sum of the individual PS 18 & 19 flow meters – there is no gravity flow to the Millcreek WWTP:

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. The guidance provided in the SERO template may not be valid for the Millcreek WWTP at this early stage since the peak ratio is calculated on a significantly growing system.

c. 5-year average annual organic loading can not yet be calculated as DEP requests so we used our original method and compared it to the SERO method.

The SERO method predicts a lower peak one-month load than our original modified method – both above the average design load. Neither method predicts an annual average overload.

d. To project organic loading, we use 0.17 pounds of BOD_5 per person per day and use 4 people per new EDU which is higher than the census data of 2.7 people per EDU. Our modification is to multiply the current years additional load by the peak to average ration – in this case 1.545

e. Neither a 5-year hydraulic nor average organic loading exceedance is projected at the Millcreek WWTP. 1-month peak multipliers will, apparently, be artificially high in new systems that are rapidly growing. It would probably be best, in a lagoon system, to use 3-month peaks for planning loading.

f. Table 4 lists the organic projections we calculated using both the Township's original and the SERO-recommended method.

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	19.7	30.3
2017	33.3	51.3
2018	35.3	54.4
2019	35.3	54.4
2020	35.3	54.4

[1]AA projections = (Current report year's AA loadings) + (loadings from proposed EDUs)
[2] Max Month projections = (AA projection) x (5-year Average Organic Ratio)

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

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

Table 5

Year	# of EDUs connected	gpd/EDU	New Flow (MGD)
2011			
2012			
2013			
2014	10	250	0.00250
2015	19	250	0.00475

B. adjust 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 (provide flows approved in planning modules or exemptions in MGD—include any connected projects that did not require planning)**					**Adjusted AA Flow**
		2011	2012	2013	2014	2015	
2011							
2012							
2013							
2014	.001779					.00475	0.006529
2015	.003858						0.003858
Total	**0.005637**	**2014 saw the first residential connection**				**Total**	**0.010387**
5 Yr Avg	**n/a**	**in June but flows are complicated by the water plant hydraulic discharge**				**5 Yr Adj Avg**	**n/a use 0.005194**

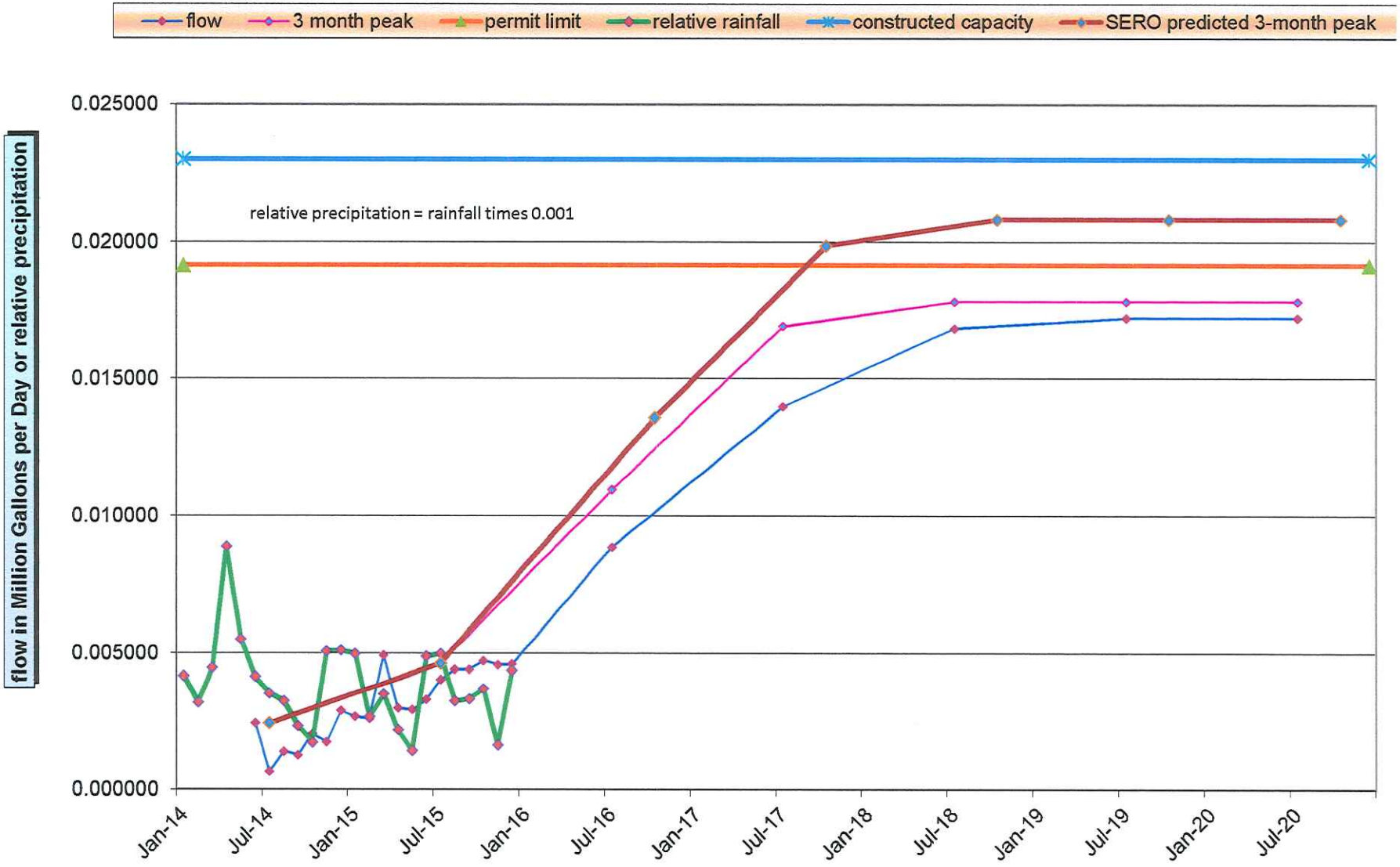
C. Due to 2014 being the initial year of operation, the base may or may not be useful

Table 7 – using the SERO method and 250 gpd/EDU					
Year	Previous Year's Annual Average Flow[1]	New EDUs	Increased Flow[2] (MGD)	Projected Annual Average Flow[3] (MGD)	Projected Max Month Flow[4] (MGD)
2016	0.005194	21	0.005250	0.01077	0.01357
2017	0.01077	20	0.00500	0.01577	0.01987
2018	0.01577	3	0.00075	0.01652	0.02082
2019	0.01652	0	0.0000	0.01652	0.02082
2020	0.01652	0	0.0000	0.01652	0.02082

[1] The first year's projection (2016 in this example) was calculated in table 6 using 2 year's data.
[2] Increased Flow = (New EDUs x 250 gpd/EDU)/1,000,000
[3] Projected Annual Average Flow = Previous Year's AA Flow + Increased flow
[4] Projected Max Month = Projected Annual Avg. Flow x 2-year average hydraulic ratio.

D. Considerations on projection figures:

Millcreek WWTP Hydraulic Loading Graph



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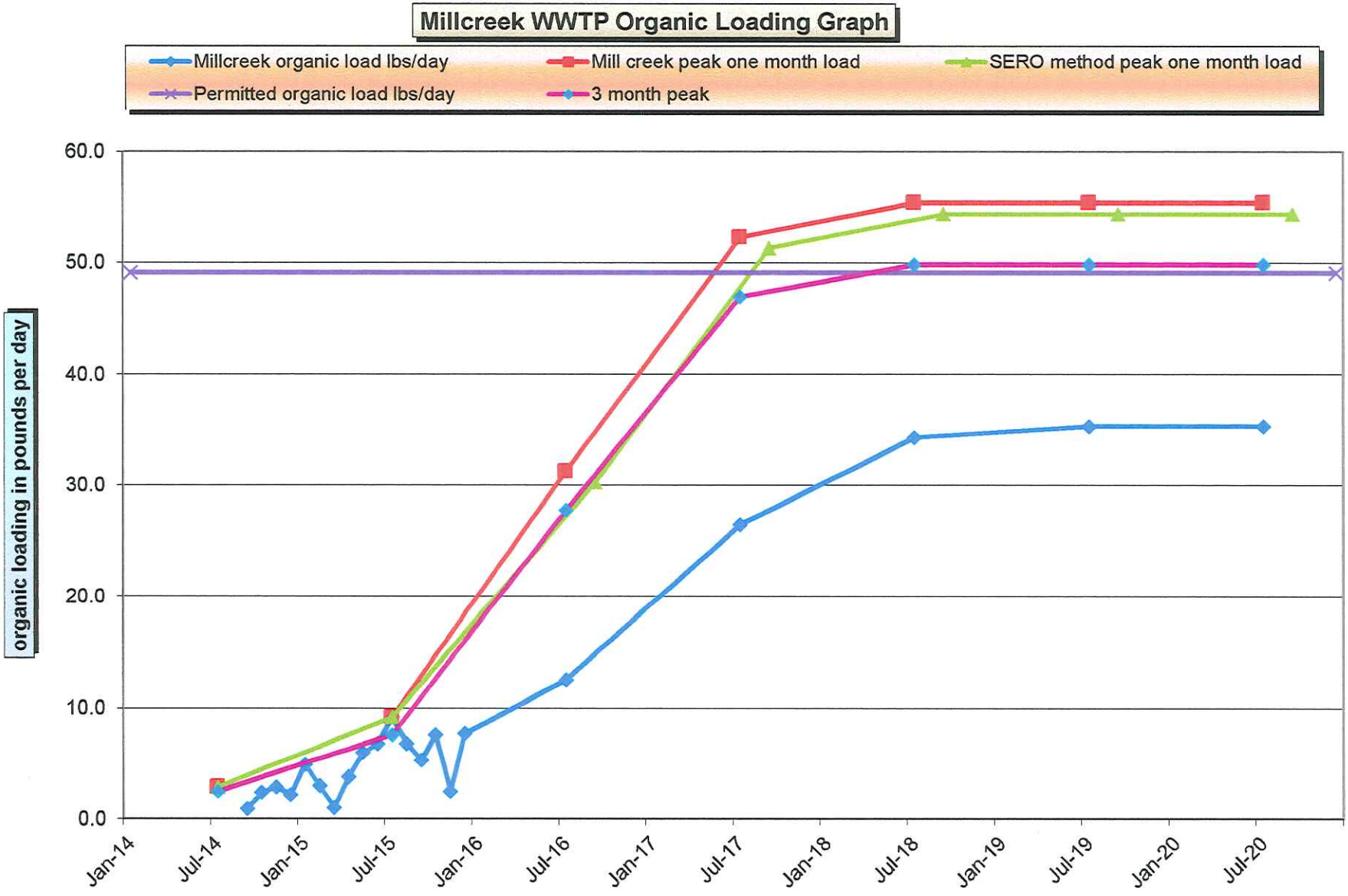
Millcreek WWTP Hydraulic Loading

month	flow MGD	ave flow MGD	3 month peak flow MGD	3 month peak SERO method	flow limit MGD	flow limit constructed	furlong precip. in/month	relative precip.	Comments	connected EDUs	Remaining 250 gpd EDUs
									Stonymead orig agr. 27 lots 2002		
Jan-14					0.019163	0.023	4.19	0.004		0	73.0
Feb-14							3.20	0.003			
Mar-14							4.48	0.004	3-mo peak to ave ratio		
Apr-14							8.87	0.009	1.372		
May-14							5.54	0.006			
Jun-14	0.002442						4.16	0.004			
Jul-14	0.000668	0.001779	0.002442	0.002442			3.53	0.004	connected 10 Millcreek homes		
Aug-14	0.001394						3.26	0.003			
Sep-14	0.001270						2.34	0.002			
Oct-14	0.002045						1.72	0.002	*2014 3-month peak EDU gpd*		
Nov-14	0.001735						5.08	0.005	*244*		
Dec-14	0.002901						5.11	0.005	10 homes connected - end of 2014	10	63.0
Jan-15	0.002685						4.99	0.005			
Feb-15	0.002622						2.68	0.003			
Mar-15	0.004936						3.50	0.004			
Apr-15	0.003001						2.19	0.002			
May-15	0.002935						1.42	0.001			
Jun-15	0.003298						4.89	0.005			
Jul-15	0.004056	0.003858	0.004643	0.004643			4.99	0.005	connected 19 new homes		
Aug-15	0.004415						3.25	0.003	*added peak EDU are 1.2 x ave EDU*		
Sep-15	0.004423						3.33	0.003			
Oct-15	0.004730						3.71	0.004			
Nov-15	0.004587						1.63	0.002			
Dec-15	0.004612						4.38	0.004	29 homes connected - end of 2014	29	44.0
Jan-16											
Feb-16											
Mar-16											
Apr-16											
May-16											
Jun-16											
Jul-16	0.008858	0.008858	0.010943						connect 21 new homes home		
Aug-16									*added peak EDU are 1.2 x ave EDU*		
Sep-16											
Oct-16				0.013570					offsetting sero data to display		
Nov-16											
Dec-16									50 homes connected - end of 2016	50	23.0
Jan-17											
Feb-17											
Mar-17											
Apr-17											
May-17											
Jun-17											
Jul-17	0.013983	0.013983	0.016943						connect 20 new homes home		
Aug-17									*added peak EDU are 1.2 x ave EDU*		
Sep-17											
Oct-17				0.019870							
Nov-17											
Dec-17									70 homes connected - end of 2017	70	3.0
Jan-18											
Feb-18											
Mar-18											
Apr-18											
May-18											
Jun-18											
Jul-18	0.016858	0.016858	0.017843						connect 3 new homes home		
Aug-18									*added peak EDU are 1.2 x ave EDU*		
Sep-18											
Oct-18				0.020820							
Nov-18											
Dec-18									73 homes connected - end of 2018	73	0.0
Jan-19									fully occupied		
Feb-19											
Mar-19											
Apr-19											
May-19											
Jun-19											
Jul-19	0.017233	0.017233	0.017843								
Aug-19											
Sep-19											
Oct-19				0.020820							
Nov-19											
Dec-19									fully occupied	73	0.0
Jan-20											
Feb-20											
Mar-20											
Apr-20											
May-20											
Jun-20											
Jul-20	0.017233	0.017233	0.017843								
Aug-20											
Sep-20											
Oct-20				0.020820							
Nov-20											
Dec-20					0.019163	0.023			fully occupied	73	0.0



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Millcreek WWTP Organic Loading

Table IA-2							
month	organic load	ann. Ave	1 month peak	1 month peak	3 month peak	organic limit	Comments
	# BOD/day	# BOD/day	# BOD/day	SERO method	# BOD/day	# BOD/day	
Jan-14						49.1	
Feb-14							
Mar-14							
Apr-14							
May-14							1.381
Jun-14							Twp peak multiplier is 1.381 - 4 month ave
Jul-14		2.1	2.9	2.9	2.5		connected 10 homes
Aug-14							3-month peak
Sep-14	0.9						
Oct-14	2.4						
Nov-14	2.9						
Dec-14	2.2						10 homes connected - end of 2014
Jan-15	4.9						
Feb-15	3.0						
Mar-15	1.0						3-month peak ratio
Apr-15	3.8						1.412
May-15	6.0						1.709
Jun-15	6.8						Twp peak multiplier would be 1.545 - 16 month ave
Jul-15	9.2	5.4	9.2	9.2	7.6		connected 19 homes
Aug-15	6.8						instead add actual peak lbs to prior year ave peak
Sep-15	5.3						added EDUs are 4 x .17 x 1.545 each
Oct-15	7.6						
Nov-15	2.5						
Dec-15	7.7						29 homes connected - end of 2015
Jan-16							
Feb-16							
Mar-16							
Apr-16							
May-16							result using 1.545 - 16 month ave
Jun-16							19.3
Jul-16	12.5	12.5	31.3		27.8		connect 21 homes
Aug-16							
Sep-16				30.3			offsetting sero data to display
Oct-16							
Nov-16							
Dec-16							50 homes connected - end of 2016
Jan-17							
Feb-17							
Mar-17							
Apr-17							
May-17							result using 1.545 - 16 month ave
Jun-17							40.9
Jul-17	26.5	26.5	52.3		47.0		connect 20 homes
Aug-17							added EDUs are 4 x .17 x 1.545 each
Sep-17				51.3			
Oct-17							
Nov-17							
Dec-17							70 homes connected - end of 2017
Jan-18							
Feb-18							
Mar-18							
Apr-18							
May-18							result using 1.545 - 16 month ave
Jun-18							53.0
Jul-18	34.3	34.3	55.4		49.8		connect 3 homes
Aug-18							
Sep-18				54.4			
Oct-18							
Nov-18							
Dec-18							73 homes connected - end of 2018
Jan-19							fully occupied
Feb-19							
Mar-19							
Apr-19							
May-19							result using 1.545 - 16 month ave
Jun-19							54.5
Jul-19	35.3	35.3	55.4		49.8		fully occupied
Aug-19							
Sep-19				54.4			
Oct-19							
Nov-19							
Dec-19							
Jan-20							
Feb-20							
Mar-20							
Apr-20							
May-20							result using 1.545 - 16 month ave
Jun-20							54.5
Jul-20	35.3	35.3	55.4		49.8		fully occupied
Aug-20							
Sep-20				54.4			
Oct-20							
Nov-20							
Dec-20						49.1	

Since there are no future connections foreseen after 2018, the Millcreek WWTP will "flat line" after 2018. I & I does not seem to be a problem in this system. The 3-month peak multiplier of 1.26 is probably not an indicator of actual conditions because that ratio represents testing and break-in activities and fine-tuning the output from the water plant. The water plant seems to be equivalent to about two hydraulic EDU's at this writing.

SEWER EXTENSIONS

a. The entire phase 1 sewer system, and part of phase 2 was constructed in 2014. The remainder of phase 2 was installed in 2015.
b. There were no non-development 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. There are no known proposed projects in the Millcreek WWTP drainage area that require public sewers but are in the preliminary planning stages.

PROGRAM FOR SANITARY SEWER MONITORING, MAINTENANCE, AND REPAIR

a. Monitoring – none except manholes are spot checked
b. Maintenance -none
c. Repair - none
d. Rehabilitation - none
e. Routine and special activities - none
f. Personnel and equipment used – two certified wastewater operators inspect
g. Sampling frequency - none
h. Quality assurance - none
i. Data analyses – none except at pump stations
j. Infiltration/inflow (I/I) monitoring - none
k. Maintenance and control of combined sewer regulators during the past year: not applicable

The sewer system is new – I & I is not a problem and an inspection program is not warranted at this time.

CONDITION OF THE SEWER SYSTEM

l. Bypassing - none
m. Combined sewer overflows – not applicable
n. Sanitary sewer overflows - none
o. Excessive infiltration - none
p. Other system problems - none

<u>Discussion of available existing and future capacity</u>.

q. The age of the sewer system is 1½ 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

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

u. There is no system surcharging
v. There were no SSO's during the report year
w. Dry weather flows are monitored at the two pumping stations which convey 100% of the flow to the Millcreek WWTP. Both pump stations are metered. This data is entered onto a spreadsheet and graphed against rainfall in each monitoring period (graphs are attached).
x. Wet weather capacity analysis consists of looking at the same graph mentioned above. All sewers were designed with very high peak-conveyance capacity and we feel confident that there is very little I & I in this system.

SEWAGE PUMPING STATIONS

y. "Maximum pump rate" is the permitted hydraulic design capacity of the station, which excludes the capacity of the backup pump.

z. "Present maximum flows" are metered - peak instantaneous flow data is not available for each pump station. The stations were designed to handle peaks as dictated by DEP design criteria with only one pump in service. The second pump is redundant but may also operate in tandem ("lag") with the lead pump if the lead pump is partly blocked or in extreme high flow conditions. Because of the desire to keep the 2-hour fill time for the station, the lag pump is set to start at a point far below where it would need to come on to pump extra in order to keep the station from potentially overflowing. Partly blocked pumps evidence themselves when pumping hours are analyzed and are immediately serviced. If both pumps at a pump station fail, the station is designed to hold at least two hours of flow with no pumping. A phone alarm notifies the operators of high wet well level – set a few inches above the station's normal HWL. If both pumps at a pump station fail, the Township's pump stations are all listed with Sanders Power Equipment who can supply the correct temporary pump within an hour or two from notification of the need. Gary's Septic and Norbill Disposal are on-call to provide transient emergency pumping and hauling if the station is completely out of service. Response time in other systems has been adequate to avoid station overflows in nearly every imaginable situation.

Table 8						
Pump Stations						
Pump Station Name	Number of Pumps	Permitted Capacities		Present Flows (2014)		Projected Flows
		AA Permitted Capacity (gpd)	Hydraulic Design Capacity (*w/o backup pump*) (gpm)	Annual Average Flows (gpd)	Peak 2015 2 or 3-Day Flow (gpd)	5-Year Projected Maximum[1] Flow (gpd)
PS No. 18	2	6,600	73	376	4,430	6,600
PS No. 19	2	10,500	72	3,603 *	8,393 *	10,500

[1] PS 18 had only the water plant connected in 2015. PS 19 has phase 1 of the development with 29 homes at the end of the year. * Peak flows at PS 18 are from water plant filter backwash. Peak flows at PS 19 occurred March 6 to 20, 2015 and are a mystery but believed not to be related to I & I.

INDUSTRIAL WASTES

There are no industrial wastes or significant users

CORRECTIVE ACTION PLAN

A Corrective Action Plan is not needed.

CALIBRATION REPORTS

Calibration of the Millcreek meters was completed in November of 2015 and the reports are attached after page 11

TRIBUTARY MUNICIPALITY REPORTS

Not applicable

ATTACHMENTS

Meter Calibration report

Pump station flow graphs

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

FIELD SERVICE REPO

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 Pump Station #18.

Flow Meter Millcreek Influent #1

1. Endress & Hauser Model 50W1H
2. SN# J200A416000
3. K-Factor 1.642

Calibration 0 -300 gpm. Primary Element 4" TubeForward - Normal, 0 Return Off, System dampening 5 seconds, Integration 16.7 MS, Low cutoff 10 gpm, Empty pipe detection Off, Failsafe Low.

Unit checked and calibrated at the following:

As found settings:	Adjusted settings:
0% in - out = 4.01 Madc	None
50% in - out = 12.02 Madc	None
100% in - out = 20.01 Madc	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 influent flow meter located at Pump Station #19.

Flow Meter Millcreek Influent #2

1. Endress & Hauser Model 50W1H
2. SN# J200A316000
3. K-Factor 1.642

Calibration 0 -300 gpm. Primary Element 4" TubeForward - Normal, 0 Return Off, System dampening 5 seconds, Integration 16.7 MS, Low cutoff 10 gpm, Empty pipe detection Off, Failsafe Low.

Unit checked and calibrated at the following:

As found settings:	Adjusted settings:
0% in - out = 4.01 Madc	None
50% in - out = 12.02 Madc	None
100% in - out = 20.01 Madc	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

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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 Millcreek

1. Micrometer model NW506 w/ FC100-02 Dusplay; Serial No. 14-00859.
    a. Calibration 0 - 1200 gpm. Primary Element 6" Tube.
    b. Total X100

Unit checked and calibrated at the following:

As found settings:	Adjusted settings:
0% in - out = 4.02 Madc	None
50% in - out = 12.01 Madc	None
100% in - out = 20.02 Madc	None

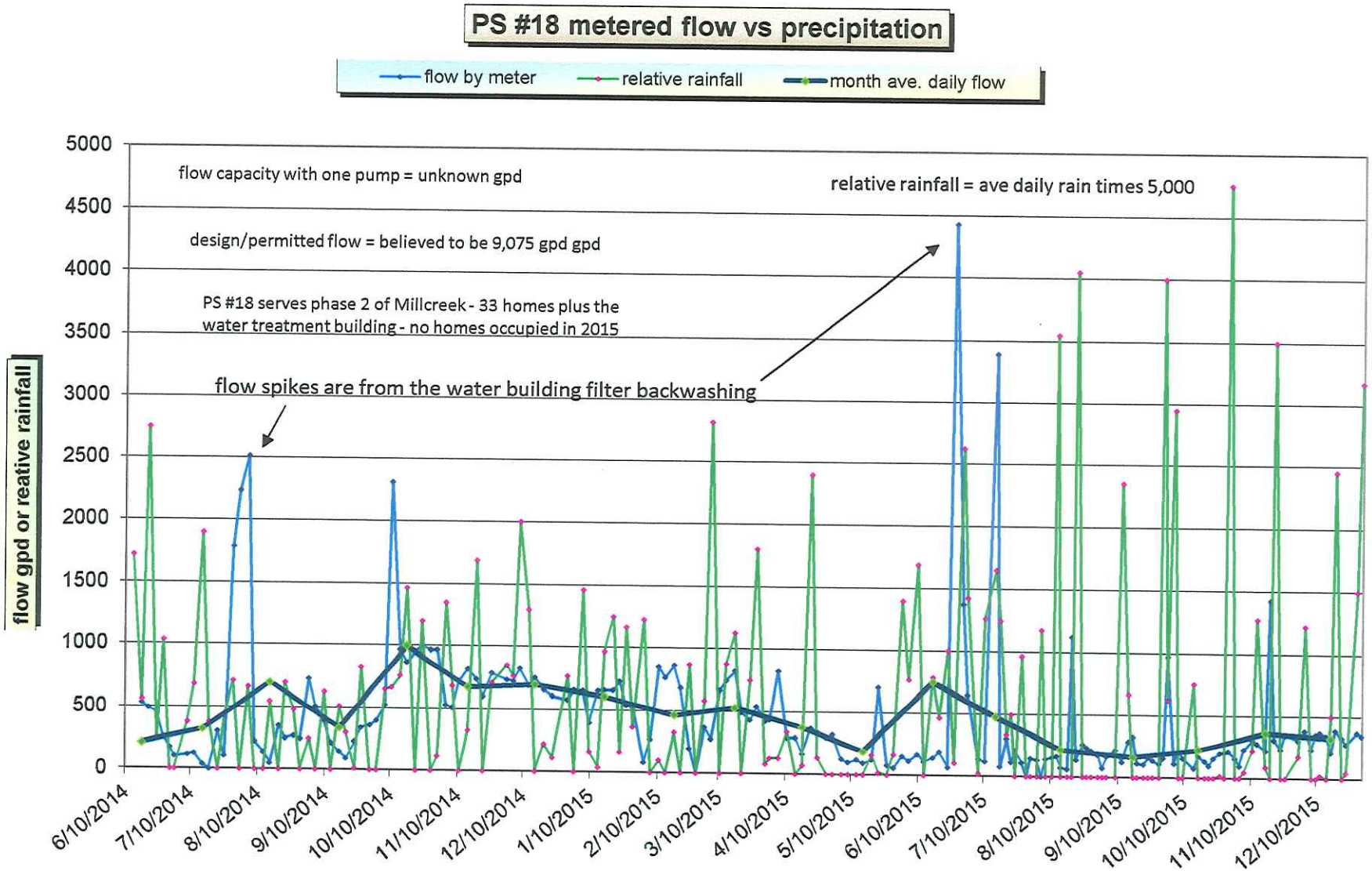
Note: All units checked and calibrated in accordance with manufacturers' specifications as set forth in their instruction manuals.

Next calibration due December, 2016.

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

ESSEX SERVICE CORPORATION

William K. Weissman


PS #18 metered flow vs precipitation
flow by meter
relative rainfall
month ave. daily flow
flow capacity with one pump = unknown gpd
design/permitted flow = believed to be 9,075 gpd gpd
PS #18 serves phase 2 of Millcreek - 33 homes plus the water treatment building - no homes occupied in 2015
flow spikes are from the water building filter backwashing
relative rainfall = ave daily rain times 5,000
flow gpd or reative rainfall
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
6/10/2014
7/10/2014
8/10/2014
9/10/2014
10/10/2014
11/10/2014
12/10/2014
1/10/2015
2/10/2015
3/10/2015
4/10/2015
5/10/2015
6/10/2015
7/10/2015
8/10/2015
9/10/2015
10/10/2015
11/10/2015
12/10/2015

PS #19 metered flow vs precipitation