White's Pond Preserve

Sewer Computations

1 Flow generation

Single family residence		14	
EDU		250	
Average Daily flow		3500 gpd	
Design Flow Peak 1 hr factor		4	14000 gpd

2 Wetwell sizing and pump selection

Wet well design /Sizing and pump selection
Per typical PS guidelines

Design flow equals peak 1 hr flow		14000 gpd	
		9.72 gpm	

duplex E-one pump suitable
pump no. 2 as backup

Per E-one guidelines

Ave Daily Flow		3500 gpd	
Peak flow	3500/4Hrs/60 min	14.58gpm	
effective peak factor 24/4			6

E-one pump rate per analysis of system curve	21.40 ft TDH	13.9 gpm	

select duplex pumps DH272-168 Tank

invert elevation based on ground elevation of 13.15 ft.	1.87 ft	

3 Pump Cycle

E one floats factory set

wetwell volume per E-one	pump on	132	gal
	pump off	94	gal
cycle vol		38	gal
Average inflow		2.43	gpm
Pump Rate from system curve		13.9	gpm
Cycle time based on preset floats and sytem curve, ave inflow		15.64	min
Fill Time Pump Off (min)		12.91	min
Cycle pump run time (min)		2.73	min

4 Force Main Analysis

Use equivalent length method to analyse FM losses

	L		d	
1.5 " HDPE SDR 11 FM	738	ft	1.533	inch

	equiv. Lng per each	1.5" pipe # units	Equiv. Length
Straight pipe	1	738	738
B 90 deg	11.1	0	0
B45 deg	5.1	2	10.2
B22.5 deg	2.7	0	0
Tee	30.3	1	30.3
Reducer	14	1	14
Valve	2.7	2	5.4
Check Valve	33.6	1	33.6
ARV /cleanout	7.9	0	0
Flow meter	3.9	1	3.9
Total Length			835

5 System Curve

est ground elv at pump 13.1 ft	13.1

depth tank/ shaft 168.4 in	6 inch exposed	14.0	13.6
tank bottom			-0.4
pump off 15 inch from bottom tank			0.85
high point 4 ft below ground at pump			9.1
Static head: PS pump off to high point in FM		9.10-0.85	8.25
d int. dia.			1.533 in
C factor			150
Length			835 ft
velocity			2.46 fps

Flow gpm	Static Head	Friction loss 1.5 " HDPE	TDH
0	8.25	0	8.25
5	8.25	2.02	10.27
10	8.25	7.3	15.55
15	8.25	15.5	23.75
20	8.25	26.4	34.65
25	8.25	39.9	48.15
30	8.25	55.9	64.15

6 Pump Curves

Curves as provided by E-one

Pump	Progressive Cavity Design
Motor	1 HP 120/230 V

Pump curves		1 pump on	2 pump on
	Head ft)	Flow [gpm]	Flow (gpm)
	50	12.72	25.44
	40	13.09	26.18
	30	13.45	26.9
	20	13.81	27.62
	10	14.18	28.36
	0	14.63	29.26

Duty point 13.9 Ft at 21.4 Ft TDH

7 Emergency Storage

Storage available without any over flow to the collection system .
Volume for ease of analysis is composed of 3 elements. Wetwell , manholes and pipe. All laterals are ignored.
Pipe volumes MH 94 gal/ft Pipe 2.64 gal/ft ave inflow 2.43 gpm
Storage available per elevation and time based on ave inflow tank botom elev - 0.4
Max elev: 1 ft below lowest MH rim lowest mh rim elev 9.43

Stored Water Elevation	Cumulated wetwell storage 376 g/ft	impacted MH	Cum # MH	MH volume 94 gal	Cum MH Vol	pipe length submerged	vol pipe subm. at diff elv.	accumulat pipe vol gal	Total stored Volume C+H+M	elapsed time hrs
2	0	0	0	0	0	0	0	0	0	0
3	0	2	2	188	188	109	288	288	476	3.3
4	0	3	5	470	658	522	1378	1666	2324	15.9
5	0	4	9	846	1504	113	298	1964	3468	23.8
6	0	0	9	846	2350	0	0	1964	4314	29.6
7	0	0	9	846	3196	0	0	1964	5160	35.4
8	0	0	9	846	4042	0	0	1964	6001	41.1
9	0	0	9	846	4888	0	0	1964	6852	47.0

48 hrs of emergency storage availanble with no overflow occuring.

8 Wetwell Bouyancy Computation

Assumptions and data
Assume groundwater at surface .
Ignore soil friction in computation
Saturated soil ballast
Equipment and tank weight provided by E one 385 lb
Wetwell considered entirely dry
Minimum Reqd FOS 1.5

Wetwell Dia		58.7	in
Bureal depth		14	ft
Tank weight		486	lb
Tank volume 105. 67		134.7	cf
Total uplift	62 lb/cf	8351	lb
Net bouyant force		7865	lb

Concrete ballast ring	8 in x 12in deep	130 lb/cf	1508	lb

Soil ballst tank	5 ft	58 lb/cf	3364	lb
Soil ballast shaft	7.5 ft	58 lb/cf	11362	lb
Total resistance to uplift.			16234	lb
FOS		16234/7865	2.06	

8 inch wide concrete ballast ring meets the required FOS of 1.5