Appendix C.2: Simplified Approach Sizing Calculations

BES staff conducted a technical process to determine facility designs and sizes that would be appropriate for small development sites. The process included a review of technical literature, review of BES monitoring data, calculations, and theoretical analysis. The sizing factors on the **Simplified Form** were developed as a simple site planning tool for small projects and to accelerate permit review and approval. Generalized assumptions were used and are documented in the Simplified Sizing requirements in **Section 2.3**. Facilities sized through this approach assume that there is an overflow to an approved discharge point. Facilities built to the standards of Simplified Sizing are assumed to meet pollution reduction and flow control requirements but not infiltration and discharge requirements. Applicants have the option to use the sizing factors provided on the Simplified Approach Form or to follow the Presumptive or Performance Approach and submit an alternative facility size, along with supporting engineering or PAC calculations for BES review and consideration.

The spreadsheet columns are described below:

Column (1)	Time in Minutes
Column (2)	Inflow (cfs) **Note: Contributing Impervious Area = 1 acre** **Note: 10-Year Storm Event (3.4”/24 hours)**
Column (3)	Inflow Volume (cf) = Inflow (cfs) x 60 (sec/min) x 10 (min)
Column (4)	Cumulative Volume (cf) = Inflow Volume(cf) + Cumulative Inflow (cf) of previous step
Column (5)	Infiltration (cfs) = If(Inflow < Max Infiltration, Inflow, Maximum Infiltration)
Column (6)	Maximum Infiltration (cfs) = Infiltration Area (sf) x Infiltration Rate (ft/s) **Note: Infiltration rate is assumed to be 2.0”/hr in this case.**
Column (7)	Incremental Storage (cf) = [Inflow (cfs) – Infiltration (cfs)] x 60 (sec/min) x 10 (min)
Column (8)	Cumulative Storage (cf)
Column (9)	Percent Storage Capacity = Cumulative Storage / Facility Storage x 100 Planter Facility Storage = Facility Bottom Area (sf) x Storage Depth (ft) For this example: Bottom Area = 2,825 sf Storage Depth = 1 ft **Note that the storage capacity does not exceed 100% which would result in an overflow condition. The maximum depth of 12 inches is not exceeded.** **Resulting planter square-footage is 2,825 sf, which when divided by the 43,560 square-foot impervious surface equals a 0.065 sizing factor.**

(1) Time (minutes)	(2) Inflow (cfs)	(3) Inflow Volume (cf)	(4) Cummulative Volume (cf)	(5) Infiltration (cfs)	(6) Max. Infiltration (cfs)	(7) Incremental Storage (cf)	(8) Cummulative Storage Volume (cf)	(9) % Storage Capacity (%)
0	0.0000	0.00	0.00	0.0000	0.1308	-78.47	0.00	0%
10	0.0000	0.00	0.00	0.0000	0.1308	-78.47	0.00	0%
20	0.0000	0.00	0.00	0.0000	0.1308	-78.47	0.00	0%
30	0.0000	0.00	0.00	0.0000	0.1308	-78.47	0.00	0%
40	0.0026	1.54	1.54	0.0026	0.1308	-76.93	0.00	0%
50	0.0097	5.80	7.34	0.0097	0.1308	-72.67	0.00	0%
60	0.0180	10.79	18.13	0.0180	0.1308	-67.68	0.00	0%
70	0.0249	14.97	33.10	0.0249	0.1308	-63.50	0.00	0%
80	0.0308	18.50	51.60	0.0308	0.1308	-59.97	0.00	0%
90	0.0359	21.52	73.12	0.0359	0.1308	-56.95	0.00	0%
100	0.0402	24.11	97.24	0.0402	0.1308	-54.36	0.00	0%
110	0.0499	29.94	127.17	0.0499	0.1308	-48.54	0.00	0%
120	0.0599	35.94	163.11	0.0599	0.1308	-42.53	0.00	0%
130	0.0642	38.51	201.62	0.0642	0.1308	-39.96	0.00	0%
140	0.0679	40.71	242.33	0.0679	0.1308	-37.76	0.00	0%
150	0.0710	42.61	284.95	0.0710	0.1308	-35.86	0.00	0%
160	0.0738	44.27	329.22	0.0738	0.1308	-34.20	0.00	0%
170	0.0841	50.43	379.65	0.0841	0.1308	-28.04	0.00	0%
180	0.0944	56.66	436.31	0.0944	0.1308	-21.81	0.00	0%
190	0.0971	58.24	494.55	0.0971	0.1308	-20.24	0.00	0%
200	0.0993	59.60	554.15	0.0993	0.1308	-18.87	0.00	0%
210	0.1013	60.80	614.95	0.1013	0.1308	-17.67	0.00	0%
220	0.1031	61.85	676.81	0.1031	0.1308	-16.62	0.00	0%
230	0.1135	68.10	744.90	0.1135	0.1308	-10.38	0.00	0%
240	0.1239	74.37	819.27	0.1239	0.1308	-4.11	0.00	0%
250	0.1256	75.35	894.62	0.1256	0.1308	-3.12	0.00	0%
260	0.1270	76.22	970.83	0.1270	0.1308	-2.26	0.00	0%
270	0.1283	76.99	1047.82	0.1283	0.1308	-1.49	0.00	0%
280	0.1294	77.67	1125.49	0.1294	0.1308	-0.80	0.00	0%
290	0.1417	85.04	1210.53	0.1308	0.1308	6.57	6.57	0%
300	0.1541	92.45	1302.98	0.1308	0.1308	13.98	20.55	1%
310	0.1552	93.11	1396.09	0.1308	0.1308	14.64	35.19	1%
320	0.1562	93.70	1489.79	0.1308	0.1308	15.23	50.42	2%
330	0.1571	94.23	1584.03	0.1308	0.1308	15.76	66.18	2%
340	0.1578	94.71	1678.73	0.1308	0.1308	16.23	82.41	3%
350	0.1712	102.71	1781.44	0.1308	0.1308	24.24	106.65	4%
360	0.1845	110.73	1892.17	0.1308	0.1308	32.26	138.90	5%
370	0.1853	111.19	2003.36	0.1308	0.1308	32.72	171.62	6%
380	0.1860	111.60	2114.96	0.1308	0.1308	33.13	204.75	7%
390	0.1866	111.98	2226.94	0.1308	0.1308	33.50	238.26	8%
400	0.1872	112.31	2339.25	0.1308	0.1308	33.84	272.10	10%
410	0.2263	135.80	2475.06	0.1308	0.1308	57.33	329.43	12%
420	0.2657	159.39	2634.45	0.1308	0.1308	80.92	410.35	15%
430	0.2664	159.87	2794.32	0.1308	0.1308	81.40	491.75	17%
440	0.3131	187.88	2982.20	0.1308	0.1308	109.41	601.16	21%
450	0.3600	215.98	3198.18	0.1308	0.1308	137.51	738.66	26%
460	0.5219	313.11	3511.29	0.1308	0.1308	234.64	973.31	34%
470	0.8866	531.96	4043.26	0.1308	0.1308	453.49	1426.80	51%
480	0.8183	491.00	4534.26	0.1308	0.1308	412.53	1839.32	65%

(1) Time (minutes)	(2) Inflow (cfs)	(3) Inflow Volume (cf)	(4) Cummulative Volume (cf)	(5) Infiltration (cfs)	(6) Max. Infiltration (cfs)	(7) Incremental Storage (cf)	(8) Cummulative Storage Volume (cf)	(9) % Storage Capacity (%)
490	0.4558	273.50	4807.76	0.1308	0.1308	195.03	2034.35	72%
500	0.3185	191.07	4998.83	0.1308	0.1308	112.60	2146.95	76%
510	0.2720	163.22	5162.05	0.1308	0.1308	84.75	2231.70	79%
520	0.2722	163.32	5325.38	0.1308	0.1308	84.85	2316.55	82%
530	0.2256	135.36	5460.73	0.1308	0.1308	56.89	2373.44	84%
540	0.1789	107.36	5568.10	0.1308	0.1308	28.89	2402.33	85%
550	0.1790	107.40	5675.50	0.1308	0.1308	28.93	2431.26	86%
560	0.1791	107.44	5782.94	0.1308	0.1308	28.97	2460.23	87%
570	0.1791	107.47	5890.41	0.1308	0.1308	29.00	2489.23	88%
580	0.1792	107.51	5997.92	0.1308	0.1308	29.03	2518.26	89%
590	0.1792	107.54	6105.46	0.1308	0.1308	29.07	2547.33	90%
600	0.1793	107.57	6213.02	0.1308	0.1308	29.10	2576.42	91%
610	0.1793	107.60	6320.62	0.1308	0.1308	29.13	2605.55	92%
620	0.1794	107.63	6428.25	0.1308	0.1308	29.15	2634.70	93%
630	0.1794	107.65	6535.90	0.1308	0.1308	29.18	2663.88	94%
640	0.1795	107.68	6643.58	0.1308	0.1308	29.21	2693.09	95%
650	0.1632	97.91	6741.49	0.1308	0.1308	19.44	2712.53	96%
660	0.1469	88.14	6829.63	0.1308	0.1308	9.66	2722.19	96%
670	0.1469	88.15	6917.78	0.1308	0.1308	9.68	2731.87	97%
680	0.1469	88.17	7005.95	0.1308	0.1308	9.70	2741.57	97%
690	0.1470	88.18	7094.13	0.1308	0.1308	9.71	2751.28	97%
700	0.1470	88.20	7182.33	0.1308	0.1308	9.72	2761.00	98%
710	0.1470	88.21	7270.54	0.1308	0.1308	9.74	2770.74	98%
720	0.1470	88.22	7358.76	0.1308	0.1308	9.75	2780.49	98%
730	0.1471	88.24	7446.99	0.1308	0.1308	9.76	2790.26	99%
740	0.1471	88.25	7535.24	0.1308	0.1308	9.78	2800.03	99%
750	0.1471	88.26	7623.50	0.1308	0.1308	9.79	2809.82	99%
760	0.1471	88.27	7711.77	0.1308	0.1308	9.80	2819.62	100%
770	0.1318	79.09	7790.86	0.1308	0.1308	0.61	2820.23	100%
780	0.1165	69.90	7860.76	0.1165	0.1308	-8.57	2811.66	100%
790	0.1165	69.90	7930.66	0.1165	0.1308	-8.57	2803.09	99%
800	0.1165	69.91	8000.57	0.1165	0.1308	-8.56	2794.53	99%
810	0.1165	69.92	8070.49	0.1165	0.1308	-8.55	2785.98	99%
820	0.1165	69.92	8140.42	0.1165	0.1308	-8.55	2777.43	98%
830	0.1166	69.93	8210.35	0.1166	0.1308	-8.54	2768.89	98%
840	0.1166	69.94	8280.28	0.1166	0.1308	-8.54	2760.35	98%
850	0.1166	69.94	8350.23	0.1166	0.1308	-8.53	2751.82	97%
860	0.1166	69.95	8420.17	0.1166	0.1308	-8.52	2743.30	97%
870	0.1166	69.95	8490.13	0.1166	0.1308	-8.52	2734.78	97%
880	0.1166	69.96	8560.09	0.1166	0.1308	-8.51	2726.27	97%
890	0.1094	65.67	8625.76	0.1094	0.1308	-12.80	2713.46	96%
900	0.1023	61.38	8687.13	0.1023	0.1308	-17.10	2696.37	95%
910	0.1023	61.38	8748.51	0.1023	0.1308	-17.09	2679.28	95%
920	0.1023	61.38	8809.90	0.1023	0.1308	-17.09	2662.19	94%
930	0.1023	61.39	8871.29	0.1023	0.1308	-17.08	2645.10	94%
940	0.1023	61.39	8932.68	0.1023	0.1308	-17.08	2628.03	93%
950	0.1023	61.40	8994.08	0.1023	0.1308	-17.08	2610.95	92%
960	0.1023	61.40	9055.48	0.1023	0.1308	-17.07	2593.88	92%
970	0.1023	61.40	9116.88	0.1023	0.1308	-17.07	2576.81	91%

(1) Time (minutes)	(2) Inflow (cfs)	(3) Inflow Volume (cf)	(4) Cummulative Volume (cf)	(5) Infiltration (cfs)	(6) Max. Infiltration (cfs)	(7) Incremental Storage (cf)	(8) Cummulative Storage Volume (cf)	(9) % Storage Capacity (%)
980	0.1023	61.41	9178.29	0.1023	0.1308	-17.06	2559.74	91%
990	0.1024	61.41	9239.70	0.1024	0.1308	-17.06	2542.68	90%
1000	0.1024	61.41	9301.11	0.1024	0.1308	-17.06	2525.62	89%
1010	0.0921	55.28	9356.39	0.0921	0.1308	-23.20	2502.43	89%
1020	0.0819	49.14	9405.53	0.0819	0.1308	-29.34	2473.09	88%
1030	0.0819	49.14	9454.66	0.0819	0.1308	-29.33	2443.76	87%
1040	0.0819	49.14	9503.80	0.0819	0.1308	-29.33	2414.43	85%
1050	0.0819	49.14	9552.95	0.0819	0.1308	-29.33	2385.10	84%
1060	0.0819	49.14	9602.09	0.0819	0.1308	-29.33	2355.77	83%
1070	0.0819	49.15	9651.24	0.0819	0.1308	-29.33	2326.44	82%
1080	0.0819	49.15	9700.39	0.0819	0.1308	-29.32	2297.12	81%
1090	0.0819	49.15	9749.54	0.0819	0.1308	-29.32	2267.80	80%
1100	0.0819	49.15	9798.69	0.0819	0.1308	-29.32	2238.48	79%
1110	0.0819	49.15	9847.84	0.0819	0.1308	-29.32	2209.16	78%
1120	0.0819	49.16	9897.00	0.0819	0.1308	-29.32	2179.84	77%
1130	0.0819	49.16	9946.16	0.0819	0.1308	-29.31	2150.53	76%
1140	0.0819	49.16	9995.32	0.0819	0.1308	-29.31	2121.22	75%
1150	0.0819	49.16	10044.48	0.0819	0.1308	-29.31	2091.91	74%
1160	0.0819	49.16	10093.64	0.0819	0.1308	-29.31	2062.60	73%
1170	0.0819	49.16	10142.81	0.0819	0.1308	-29.31	2033.29	72%
1180	0.0819	49.17	10191.97	0.0819	0.1308	-29.31	2003.98	71%
1190	0.0819	49.17	10241.14	0.0819	0.1308	-29.30	1974.68	70%
1200	0.0820	49.17	10290.31	0.0820	0.1308	-29.30	1945.38	69%
1210	0.0820	49.17	10339.48	0.0820	0.1308	-29.30	1916.08	68%
1220	0.0820	49.17	10388.66	0.0820	0.1308	-29.30	1886.78	67%
1230	0.0820	49.18	10437.83	0.0820	0.1308	-29.30	1857.48	66%
1240	0.0820	49.18	10487.01	0.0820	0.1308	-29.30	1828.19	65%
1250	0.0820	49.18	10536.19	0.0820	0.1308	-29.29	1798.89	64%
1260	0.0820	49.18	10585.37	0.0820	0.1308	-29.29	1769.60	63%
1270	0.0820	49.18	10634.55	0.0820	0.1308	-29.29	1740.31	62%
1280	0.0820	49.18	10683.73	0.0820	0.1308	-29.29	1711.02	61%
1290	0.0820	49.18	10732.91	0.0820	0.1308	-29.29	1681.73	60%
1300	0.0820	49.19	10782.10	0.0820	0.1308	-29.29	1652.44	58%
1310	0.0820	49.19	10831.29	0.0820	0.1308	-29.28	1623.16	57%
1320	0.0820	49.19	10880.48	0.0820	0.1308	-29.28	1593.88	56%
1330	0.0820	49.19	10929.67	0.0820	0.1308	-29.28	1564.59	55%
1340	0.0820	49.19	10978.86	0.0820	0.1308	-29.28	1535.31	54%
1350	0.0820	49.19	11028.05	0.0820	0.1308	-29.28	1506.03	53%
1360	0.0820	49.19	11077.24	0.0820	0.1308	-29.28	1476.76	52%
1370	0.0820	49.20	11126.44	0.0820	0.1308	-29.28	1447.48	51%
1380	0.0820	49.20	11175.64	0.0820	0.1308	-29.28	1418.20	50%
1390	0.0820	49.20	11224.84	0.0820	0.1308	-29.27	1388.93	49%
1400	0.0820	49.20	11274.04	0.0820	0.1308	-29.27	1359.66	48%
1410	0.0820	49.20	11323.24	0.0820	0.1308	-29.27	1330.39	47%
1420	0.0820	49.20	11372.44	0.0820	0.1308	-29.27	1301.12	46%
1430	0.0820	49.20	11421.64	0.0820	0.1308	-29.27	1271.85	45%
1440	0.0820	49.20	11470.85	0.0820	0.1308	-29.27	1242.58	44%
1450	0.0410	24.60	11495.45	0.0410	0.1308	-53.87	1188.71	42%