

# Wisconsin AES Design Worksheet

Project: \_\_\_\_\_

**Step #1:** \_\_\_\_\_ bedrooms x 100 GPD = \_\_\_\_\_ GPD x 1.5 = \_\_\_\_\_ GPD design wastewater flow (DWF).

**Step #2:** \_\_\_\_\_ GPD DWF ÷ \_\_\_\_\_ GPD/sq. ft. Application Rate (Table A) = \_\_\_\_\_ sq. ft. system sand bed area (SSBA) minimum.

**4.0 Table A: Soil Application Rate by Soil Characteristics** (from Wisconsin Table SPS 383.44-2)

Soil Characteristics			Soil Application Rate (GPD/sq. ft.)	
Texture	Structure			
	Shape	Grade		
Coarse Sand, Sand, Loamy Coarse Sand, Loamy Sand	-	Structureless	1.6 <sup>a</sup>	0.5 <sup>b</sup>
Fine Sand, Loamy Fine Sand	-	Structureless	1.0	
Very Fine Sand, Loamy Very Fine Sand	-	Structureless	0.6	
Coarse Sandy Loam, Sandy Loam	-	Structureless, Massive	0.6	
	Platy	Weak	0.6	
		Moderate, Strong	0.2*	
	Prismatic, Blocky, Granular	Weak	0.7	
Moderate, Strong		1.0		
Fine Sandy Loam, Very Fine Sandy Loam	-	Structureless, Massive	0.5	
	Platy	Moderate, Strong	0.2*	
	Platy, Prismatic, Blocky, Granular		Weak	
	Prismatic, Blocky, Granular		Moderate, Strong	
Loam	-	Structureless, Massive	0.5	
	Platy	Moderate, Strong	0.2*	
	Platy, Prismatic, Blocky, Granular		Weak	
	Prismatic, Blocky, Granular		Moderate, Strong	
Silt Loam	-	Structureless, Massive	0.2*	
	Platy	Moderate, Strong	0.2*	
	Platy, Prismatic, Blocky, Granular		Weak	
	Prismatic, Blocky, Granular		Moderate, Strong	
Silt	-	-	0.0	
Sandy Clay Loam, Clay Loam, Silty Clay Loam	-	Structureless, Massive	0.0	
	Platy	Weak, Moderate, Strong	0.2*	
	Prismatic, Blocky, Granular	Weak	0.3	
		Moderate, Strong	0.6	
Sandy Clay, Clay, Silty Clay	-	Structureless, Massive	0.0	
	Platy	Weak, Moderate, Strong	0.0	
	Prismatic, Blocky, Granular	Weak	0.0	
		Moderate, Strong	0.3	

**a = with ≤60% rock fragments and b = with >60% to <90% rock fragments**

**\*Applications rates less than 0.3 GPD/sf. may not have a linear loading greater than 4.5 GPD/ft.**

Note: Soil application rates shown above assume residential strength effluent (see para. 8.7, pg. 9 for definition of residential strength). Contact Presby Environmental for technical assistance with high strength wastewater.

**Step #3:** Residential: \_\_\_\_\_ Bedrooms x 70 = \_\_\_\_\_ ft. of AES pipe minimum, or Commercial: \_\_\_\_\_ GPD DWF ÷ 2.14 GPD/ft. = \_\_\_\_\_ ft. of AES pipe minimum (assumes residential strength).

**Step #4:** \_\_\_\_\_ GPD DWF ÷ 750 GPD/section = \_\_\_\_\_ sections required. Notes: round fractions up to whole number. This step does not apply to parallel distribution systems.

**Step #5:** \_\_\_\_\_ ft. AES pipe (Step #3) ÷ \_\_\_\_\_ ft. row length = \_\_\_\_\_ number of rows. Notes: number of rows must be evenly divided by number of serial sections from Step #4, add rows if necessary (does not apply to parallel distribution systems). Longer rows preferred to shorter length rows.

**Step #6:** \_\_\_\_\_ ft. Pipe Layout Width (PLW) from Table C (or calculated manually for larger row spacing).

**6.0 Table C: Row Length and Pipe Layout Width (PLW)**

		Total Linear Feet of AES Pipe														
Row Length (ft)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	
	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	
	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	
	35	70	105	140	175	210	245	280	315	350	385	420	455	490	525	
	40	80	120	160	200	240	280	320	360	400	440	480	520	560	600	
	45	90	135	180	225	270	315	360	405	450	495	540	585	630	675	
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	
	55	110	165	220	275	330	385	440	495	550	605	660	715	770	825	
	60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	
	65	130	195	260	325	390	455	520	585	650	715	780	845	910	975	
	70	140	210	280	350	420	490	560	630	700	770	840	910	980	1,050	
	75	150	225	300	375	450	525	600	675	750	825	900	975	1,050	1,125	
	80	160	240	320	400	480	560	640	720	800	880	960	1,040	1,120	1,200	
	85	170	255	340	425	510	595	680	765	850	935	1,020	1,105	1,190	1,275	
	90	180	270	360	450	540	630	720	810	900	990	1,080	1,170	1,260	1,350	
	95	190	285	380	475	570	665	760	855	950	1,045	1,140	1,235	1,330	1,425	
100	200	300	400	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500		
# of Rows	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
1.50' C/L	2.50	4.00	5.50	7.00	8.50	10.00	11.50	13.00	14.50	16.00	17.50	19.00	20.50	22.00		

\*Pipe Layout Width (ft.) = Outermost edge of first row to outermost edge of last row

\*Formula for Pipe Layout Width (PLW) = [Row Spacing x (# of Rows - 1)] + 1. Row spacing is 1.5 ft. minimum; larger row spacing is allowed and at the discretion of the designer. To use Table C: select a row length and move right until the minimum amount of pipe is found (more is allowed). Then move down to find the number of rows required. Continue downward in the same column until adjacent to the row spacing and find the pipe layout width.

**Step #7:** \_\_\_\_\_ % system slope (cannot exceed Table B allowances).

**5.0 Table B: Slope Requirements**

Soil Application Rate (GPD/sq. ft.)	Maximum System Slope (%)	Maximum Site Slope (%)
1.6 – 0.6	25	33
0.5	15	20
0.3 – 0.2	5	5

**Step #8:** Calculate System Sand bed width (SSBW)–

*Beds sloping 10% or less, use the larger of (a) or (b) below:*

a) \_\_\_\_\_ sq. ft. sand bed area (Step #2) ÷ (\_\_\_\_\_ ft. row length + 1 ft.) = \_\_\_\_\_ ft. sand bed width minimum Note: 1 ft. is added to row length to allow 6 in. of sand beyond the ends of each row.

b) \_\_\_\_\_ ft. PLW (Step #6) + 1 ft. = \_\_\_\_\_ ft. sand bed width minimum.

*Beds sloping over 10%, use the larger of (c) or (d) below:*

c) \_\_\_\_\_ sq. ft. SSBA (Step #2) ÷ (\_\_\_\_\_ ft. row length + 1 ft.) = \_\_\_\_\_ ft. sand bed width minimum.

d) \_\_\_\_\_ ft. PLW (Step #5) + 4.5 ft. = \_\_\_\_\_ ft. sand bed width minimum Note: 4.5 ft. is added to the PLW to allow 6 in. of sand above the first row and 3.5 ft. beyond the edge of the lower row.

**Step #9:** Calculate System Sand Extension(s) choose (a) or (b) below:

*Level beds (System Sand Extensions (SSE) are placed on each side of AES pipes):*

a) (\_\_\_\_\_ ft. SSBW (Step #8) – \_\_\_\_\_ ft. PLW Step #5 + 1) ÷ 2 = \_\_\_\_\_ ft.

*Sloping beds: SSE placed entirely on the down slope side of the bed.*

b) \_\_\_\_\_ ft. SSBW (Step #8) – \_\_\_\_\_ ft. PLW (Step #5) + 1 = \_\_\_\_\_ ft.

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

System Illustration (optional):