

**HW Problem 12:****SOLUTION****2005**

Estimate the area required for a 20 year landfill for Dusseau's Folly, for Scenarios A, B, and C. The current population is 95000, and grows at 1% per year. Assume that current per capita collection rates apply for the entire period. The landfill will be a flat topped pyramid with 3:1 slopes. All cover soil comes from landfill excavation, and all excavated material is returned to the landfill. In place MSW density is 1200 lb/cu-yd.

MSW collected per capita in the design year is:

Scen A	5.5	lb/person/day
Scen B	4.9	lb/person/day
Scen C	4.6	lb/person/day

The landfill can be 100 ft high.

Scenario A:

- a. estimate population, and mass and volume of MSW landfilled, for each year and the total period. Give answers in tons and cu-yd.

Year	Population	Mass tons	Volume cu-yd
1	95,000	95409.6	159016
2	95,950	96363.7	160606.2
3	96,910	97327.33	162212.2
4	97,879	98300.61	163834.3
5	98,857	99283.61	165472.7
6	99,846	100276.4	167127.4
7	100,844	101279.2	168798.7
8	101,853	102292	170486.7
9	102,871	103314.9	172191.5
10	103,900	104348.1	173913.5
11	104,939	105391.6	175652.6
12	105,988	106445.5	177409.1
13	107,048	107509.9	179183.2
14	108,119	108585	180975
15	109,200	109670.9	182784.8
16	110,292	110767.6	184612.6
17	111,395	111875.3	186458.8
18	112,509	112994	188323.4
19	113,634	114124	190206.6
20	114,770	115265.2	192108.7
<b>TOTAL</b>		<b>2100824</b>	<b>3501374</b>

- b. Estimate the landfill area in acres.

The length of one side (assuming the landfill is square in plan) is  
= 1257 ft

The area is 36 acres

Scenario B:

- a. estimate population, and mass and volume of MSW landfilled, for each year and the total period.  
Give answers in tons and cu-yd.

Year	Population	Mass tons	Volume cu-yd
1	95,000	85386.82	142311.4
2	95,950	86240.69	143734.5
3	96,910	87103.1	145171.8
4	97,879	87974.13	146623.5
5	98,857	88853.87	148089.8
6	99,846	89742.41	149570.7
7	100,844	90639.83	151066.4
8	101,853	91546.23	152577
9	102,871	92461.69	154102.8
10	103,900	93386.31	155643.8
11	104,939	94320.17	157200.3
12	105,988	95263.37	158772.3
13	107,048	96216.01	160360
14	108,119	97178.17	161963.6
15	109,200	98149.95	163583.2
16	110,292	99131.45	165219.1
17	111,395	100122.8	166871.3
18	112,509	101124	168540
19	113,634	102135.2	170225.4
20	114,770	103156.6	171927.6
<b>TOTAL</b>		<b>1880133</b>	<b>3133555</b>

- b. Estimate the landfill area in acres.

The length of one side (assuming the landfill is square in plan) is  
= 1203 ft

The area is 33 acres

Scenario C:

- a. estimate population, and mass and volume of MSW landfilled, for each year and the total period.  
Give answers in tons and cu-yd.

Year	Population	Mass tons	Volume cu-yd
1	95,000	80070.25	133450.4
2	95,950	80870.95	134784.9
3	96,910	81679.66	136132.8
4	97,879	82496.45	137494.1
5	98,857	83321.42	138869
6	99,846	84154.63	140257.7
7	100,844	84996.18	141660.3
8	101,853	85846.14	143076.9
9	102,871	86704.6	144507.7
10	103,900	87571.65	145952.7
11	104,939	88447.36	147412.3
12	105,988	89331.84	148886.4
13	107,048	90225.16	150375.3
14	108,119	91127.41	151879
15	109,200	92038.68	153397.8
16	110,292	92959.07	154931.8
17	111,395	93888.66	156481.1
18	112,509	94827.55	158045.9
19	113,634	95775.82	159626.4
20	114,770	96733.58	161222.6
TOTAL		1763067	2938445

- b. Estimate the landfill area in acres.

The length of one side (assuming the landfill is square in plan) is  
= 1174 ft

The area is 32 acres