

Wastewater Stabilization Pond Formula Sheet

Acronyms

A	area	gpd	gallons per day
ac	acre	gpm	gallons per minute
avg	average	in	inches
BOD	B iological O xygen D emand	lbs	pounds
DO	D issolved O xygen	MG	million gallons
cu ft	cubic feet	MGD	million gallons per day
ft	feet	mg	milligrams
ft ²	square feet	L	liters
ft ³	cubic feet	sq ft	square
gal	gallons	V	volume

Formulas

$$\text{Pond Area, sq ft} = (\text{Length, ft}) \times (\text{Width, ft})$$

$$\text{Pond Area, ac} = \frac{(\text{Length, ft}) \times (\text{Width, ft})}{43,560 \text{ sq ft/ac}}$$

$$\text{Average Area, sq ft} = \frac{(\text{area of surface, ft}) + (\text{area of bottom, ft})}{2}$$

$$\text{Pond Volume, cu ft} = (\text{Avg Length, ft}) \times (\text{Avg Width, ft}) \times (\text{Depth, ft})$$

$$\text{Pond Volume, cu ft} = (\text{Avg Area, sq ft}) \times (\text{Depth, ft})$$

$$\text{Pond Volume, gal} = (\text{Average Length, ft}) \times (\text{Average Width, ft}) \times (\text{Depth, ft}) \times \left(7.48 \frac{\text{gal}}{\text{cu ft}}\right)$$

$$\text{Pond Volume, gal} = (\text{Avg Area, sq ft}) \times (\text{Depth, ft}) \times \left(7.48 \frac{\text{gal}}{\text{cu ft}}\right)$$

$$\text{Detention Time (in days)} = \frac{\text{Pond Volume, gal}}{(\text{Influent Flow Rate, gpm}) \times (1,440 \text{ minutes per day})}$$

$$\text{Detention Time (in days)} = \frac{\text{Pond Volume, MG}}{\text{Influent Flow Rate, MGD}}$$

$$\text{Population Loading, Persons per Acre} = \frac{\text{Population Served, persons}}{\text{Surface Area of Pond, ac}}$$

$$\text{Inflow, ac-in per day} = (\text{Inflow, MGD}) \times (36.8)$$

$$\text{Hydraulic Loading, inches/day} = \frac{\text{Depth of Pond, inches}}{\text{Detention Time, days}}$$

$$\text{Hydraulic Loading, gallons per day/square feet} = \frac{\text{Inflow Rate, gpd}}{\text{Area, sq ft}}$$

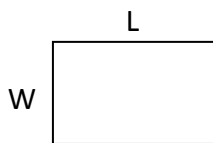
$$\text{Organic Loading, lbs BOD/day/ac} = \frac{(\text{BOD, mg/L}) \times (\text{Flow, MGD}) \times (8.34 \text{ lbs/gal})}{\text{Pond Area, ac}}$$

$$\text{Removal Efficiency, \%} = \frac{(\text{Influent} - \text{Effluent}) \times (100\%)}{\text{Influent}}$$

Area

Square or Rectangle

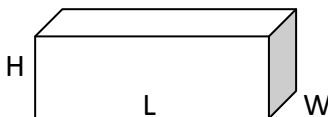
$$A = \text{Length } (L) \times \text{Width } (W)$$



Volume

Cube

$$V = \text{Length } (L) \times \text{Width } (W) \times \text{Height } (H)$$



Conversion Factors

1 acre = 43,560 sq ft

1 acre foot = 326,000 gallons

1 cubic foot = 7.48 gallons

1 MGD = 3.0689 ac-ft/day = 36.8 ac-in/day = 694.4 gpm

1 cu ft = 7.48 gal