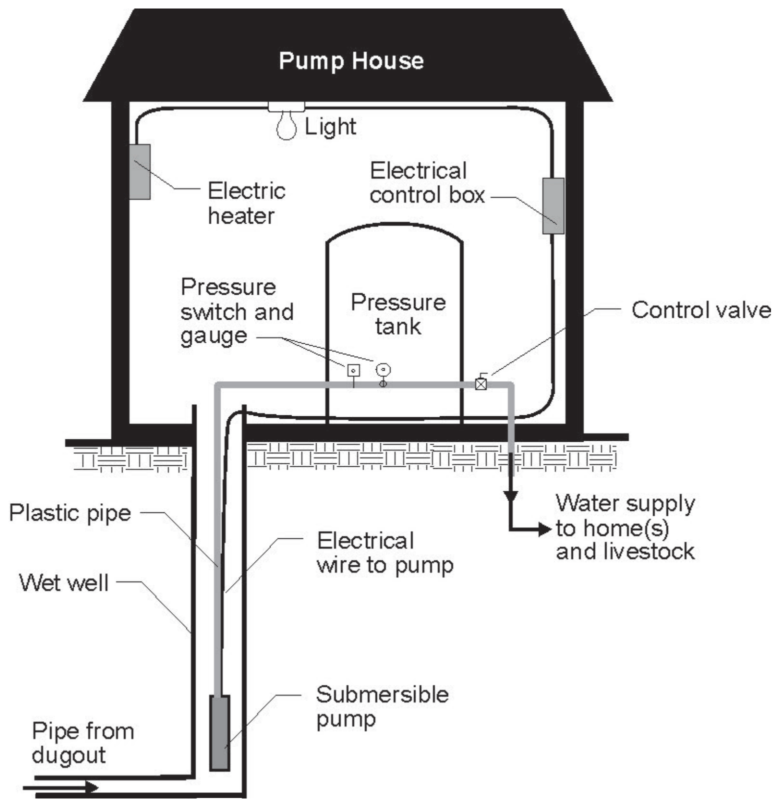
Water System Sizing Worksheet



Water System Sizing Worksheet

This worksheet can be used to determine the size of pump, pressure tank, and water pipe required for a farm water system. Dugouts, unlike most water wells, have a huge reservoir of water, and can be pumped at much higher flow rates. Therefore, it is important to properly size dugout pumps and pipelines to take full advantage of the dugout.

Enter all information calculated step by step in the recording section below as follows:

Step 1	**Water System Fixtures**			
Step 2	**Required Pump Flow Rate**	____________	gallons per minute	
Step 3	**Conversion to U.S. Gallons**	____________	U.S. gallons per minute	
Step 4	**Pump Selection**			
	Lift	____________	feet	
	Pressure needed	____________	psi	
	Pump horsepower required	____________	hp	other specifications ____________________________
Step 5	**Pressure Tank Size**	____________	U.S. gallons	other specifications____________________________
Step 6	**Length of Supply Pipeline**	____________	feet	
Step 7	**Pipe Size**	____________	inches	other specifications ____________________________

STEPS TO SIZING YOUR WATER SYSTEM

Step 1 Calculate the peak water use rates in gallons per minute (gpm) for all of the existing and proposed water system fixtures.

Water System Fixtures	No. of Fixtures		Peak Use Rate		Totals
Automatic Cattle Waterers (100 head size)	_______	x	5 gpm	=	____________ gpm
Hog Nipple Waterers	_______	x	1 gpm	=	____________ gpm
Poultry Fountain	_______	x	1 gpm	=	____________ gpm
Yard Hydrants	_______	x	5 gpm	=	____________ gpm
Household (number of households)	_______	x	5-10 gpm	=	____________ gpm
Fire Hydrant	_______	x	10 gpm	=	____________ gpm
Other ________________________________	_______	x	_____ gpm	=	____________ gpm
Other ________________________________	_______	x	_____ gpm	=	____________ gpm

Step 2 To determine the Required Pump Flow Rate you need to consider which water uses, listed in **Step 1,** will likely occur at the same time and total those together. **Note:** The minimum design flow rate of the system must exceed the peak use rate of the fixture(s) that use the largest amount of water.

Required Pump Flow Rate = _________ gpm

Step 3 Convert the Required Pump Flow Rate from **Step 2** into U.S. gallons because practically all pumps available in Canada are rated in U.S. gpm.

Conversion to U.S. Gallons
Required Pump Flow rate _________ gpm x 1.2 = _________ U.S. gpm

Step 4 To select a pump you need to determine the lift and pressure. It is recommended that you take this information plus the Converted Pump Flow Rate from **Step 3**, to a reputable pump dealer or a water specialist for correct pump selection. They will recommend the required pump horsepower and other specifications.

Pump Selection

Lift	Depth of dugout ______ feet + Farmyard elevation above dugout ______ feet =	_______ lift in feet
Pressure needed		_______ psi
Pump horsepower required		_______ HP

Step 5 Sizing a pressure tank is based on the Converted Pump Flow Rate and the amount of useable water volume or drawdown. The drawdown is the amount of water that can be withdrawn from the pressure tank between high and low pressure settings. For dugouts, the sealed diaphragm or bladder type tanks are the best choice. In these types of tanks only 1/3 of the volume of the tank is available as drawdown. Therefore, the Pressure Tank Size must be 3 times the drawdown and match the gpm rating (flow rate) of the pump. For example, a 10 gpm pump requires 10 gallons of drawdown or a 30 gallon tank size.

Pressure Tank Size = 3 x Pressure tank drawdown _________ U.S. gallons = _________ U.S. gallon capacity or larger

Step 6 Measure the distance from the dugout to the center of the distributing system.

Length of Supply Pipeline = _________ feet

Step 7 To determine the Required Pipe Size match the pump flow rate from **Step 3**, in the left column of the adjacent table with the length of the supply line from **Step 6.**

Required Pipe Size = _________ inches

Note: The minimum pipe size recommended for farmyard water distribution systems is 1¼ inches. This will reduce friction losses in the pipe and allow for future expansion that was unforeseen.

Pipe Diameter (inches)

Flow Rate (U.S. gpm)	Length of Pipe 200 ft	400 ft	600 ft	800 ft	1000 ft
2	1	1	1	1	1
4	1	1	1	1	1
6	1	1	1¼	1¼	1¼
8	1	1¼	1¼	1¼	1¼
10	1¼	1¼	1¼	1½	1½
12	1¼	1¼	1½	1½	1½
14	1¼	1½	1½	1½	2
16	1½	1½	1½	2	2
18	1½	1½	2	2	2
20	1½	1½	2	2	2
25	1½	2	2	2	2
30	2	2	2	2	2½
35	2	2	2½	2½	2½
40	2	2½	2½	2½	2½

Note: In sizing the above lines, no allowance has been made for elevation differences. For more specific information contact a water specialist in your area.