

Estimating Water Needs When Planning for a New Well

If you are building a new house in a rural area, having an adequate water supply from a private water well is critical to your plans. Planning should be done prior to having a well drilled to ensure an adequate supply of water will be available.

This article allows a homeowner or farmer to roughly estimate water needs and calculate how much water must be delivered from a private water supply to meet these needs. These planning assumptions are based on long-term averages for various water uses. Your actual water use may vary significantly from these averages.

In general, we use 50 to 100 gallons per person per day in our homes (200 to 400 gallons per day for a family of four). The household water use estimates given below (Table 1) can be used to calculate more specific daily water use values for your home.

For the purposes of planning a water system, the total daily water use is less important than the peak daily water use or the peak demand. In reality, most of the water used in the home occurs over a very short

Table 2: Suggested minimum flow rates for various numbers of bedrooms and bathrooms in a home

		Number of bathrooms in home			
		1	1.5	2	3
# of bedrooms in home	2	6 GPM	8 GPM	10 GPM	
	3	8 GPM	10 GPM	12 GPM	
	4	10 GPM	12 GPM	14 GPM	16 GPM
	5		13 GPM	15 GPM	17 GPM
	6			16 GPM	18 GPM

time period, usually in the morning or evening. As a result, for planning purposes it is recommended a water system be able to supply all of the day's projected water use in a 2-hour peak demand period. If you estimate your home water use will be 400 gallons per day, the water system should be sized to provide this much water in a 2-hour period.

So, how much water can be delivered from your well in a given period of time? This is referred to as the well yield. The yield for a well is considered the maximum rate in gallons per minute (GPM) a well can be pumped without lowering the water level in the borehole below the pump intake.

For most single-family homes, a minimum flow of 6 GPM is suggested from a well.

This flow would provide 360 gallons of water each hour, which would be sufficient to meet most home water peak demands. Higher flow rates may be necessary for larger homes with more fixtures, appliances and residents which may all be using water at the same time (Table 2).

Ideally, the yield from the well will exceed the recommended minimum flow rates. If not, you may need to rely on water storage to meet peak demand periods. For a drilled well, the borehole can provide a significant amount of water storage. A typical 6-inch-diameter well will store about 1.5 gallons of water for every foot of standing water in the borehole and a 10-inch well stores about 4 gallons of water per foot. Therefore, a 6-inch-

diameter well with about 100 feet of standing water in the borehole would contain about 150 gallons of stored water.

An approximate estimate of the amount of water needed before a well is developed can allow the professional contractor to utilize the combination of local knowledge, yield and storage to meet water demand. For wells that yield extremely low amounts of water, an intermediate storage system can be added.

Planning for water supply needs is generally much more important for farms because much larger amounts of water are often needed. Guidelines suggest farms using 2,000 gallons per day (GPD) will need a water source flow rate of 16 GPM, those using 6,000 GPD will need 36 GPM, and those using 10,000 GPD will need 48 GPM.

Using these estimates (Table 3), current and future daily water demands

on the farm can be estimated. The required water source flow rate does not necessarily need to equal the yield from the well. If water availability is projected to be insufficient for the calculated peak water demand, additional sources must be developed or additional storage must be used.

Table 3: Estimated daily water use in gallons for various farm animals

Animal Water Use	gallons per animal per day
Milking cows	35
Sprinkler cooling for animals	20
Dry cow, beef cattle, or steers	12
Calves	
1-month-old	1.5
2-month-old	2.0
3-month-old	2.5
4-month-old	3.5
5 to 14 months old	4.5
Heifers	
15 to 18 months old	7.0
18 to 24 months old	9.0
Swine	1.5
Horses or ponies	12
Sheep or goats	2
Chickens (per 100 head)	9
Turkeys (per 100 head)	15

Table 1: Typical water use for various appliances and fixtures in the home

Clothes washer (top-loading)	43 to 51 gallons per load
Clothes washer (front-loading)	27 gallons per load
Dishwasher (standard)	7 to 14 gallons per load
Dishwasher (efficient)	4.5 gallons per load
Garbage disposal	4 gallons per day
Kitchen sink	3 gallons per minute of use
Bathroom sink	2 gallons per minute of use
Shower or tub	5 gallons per minute of use
Toilet (low-flush)	1.6 gallons per flush
Toilet (standard)	5 gallons per flush
Outside hose (1/2-inch)	5 gallons per minute of use
Water softener regeneration	50 to 100 gallons per cycle

Private Well Management

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taking shorter showers, only washing full loads of dishes or laundry and collecting water from roof gutters for outside use.

When Wells Dry Up

There are a number of reasons why a well may quit producing water. The most frequent cause is a malfunctioning or worn-out submersible pump. Other electrical problems, such as a malfunctioning electrical switch at the pressure tank, may also cause a loss of water. Pressure tanks need to be replaced from time to time. Water quality problems, like iron bacteria and sediment, may also clog the well and severely restrict water flow. A well driller or competent plumber should be consulted to determine the exact cause of the problem.

Under persistent dry weather conditions, the water level in your well may drop below the submersible pump causing a loss of water. In some

cases, the water level may only temporarily drop below the pump when water is being frequently pumped from the well during showers or laundry. Under these conditions, you may be able to continue using the well by initiating emergency water conservation measures and using water only for essential purposes.

If the water level permanently drops below the submersible pump, it may be possible to lower the submersible pump within the existing well. In most cases this will only provide a short-term solution to the problem. More permanent solutions require either deepening of the existing well or drilling of a new well. Be aware that deepening an existing well may not increase the well yield and could produce water of different quality characteristics. You should consult with a local well-driller or a professional hydrogeologist to determine the best solution for your situation.

Penn State College of Agricultural Sciences, Water Resources Extension, "Managing Your Well During a Drought", by Bryan R. Swistock, Extension Associate, William E. Sharpe, Professor of Forest Hydrology, & Paul D. Robillard, Professor of Agricultural Engineering



University of Nebraska-Lincoln Extension presents a series of programs, entitled Acreage Insights-Rural Living Clinics, targeting acreage owners and specifically designed to provide knowledge and skills to better manage a rural living environment. The following clinics will be held in Lincoln at the Lancaster Extension Education Center, 444 Cherrycreek Road, from 7-9 p.m. For more information, contact Sarah Browning at (402) 727-2775.

CLINICS ARE \$10/PERSON ADVANCED REGISTRATION; \$15/PERSON AT THE DOOR

Preregistration deadline is 3 working days before the clinic.

Tuesday, Feb. 20

Landscape Design Basics

Quality acreage landscapes successfully integrate proper access and utility locations, comfortable attractive outdoor living spaces, natural area protection and enhancement, and sustainable plantings. This seminar will outline a basic design process/approach to help ensure quality acreage design as well as highlight what to look for when shopping for an acreage home site with high landscape quality potential.

Tuesday, March 20

Farming for Farmers Markets and Other Direct Markets

Farmers markets and direct marketing of locally grown produce is stretching the ability of the existing producers to meet the expanding needs. Additional producers are needed to meet this increased demand. Topics will include the selection of vegetable and fruit species, the growing of the produce and finally tips on marketing these products.

Tuesday, April 17

Management of Small Ponds

Is your pond turbid after a rain? Is your pond covered with a green slime in the summer months? Do rooted pond weeds and/or shoreline vegetation reduce angling access and recreation on the pond? If you answered yes to any of the questions or have questions pertaining to pond management then you will want to attend. This seminar is designed for those who have a 1/2 acre-sized pond or larger.

REGISTRATION FORM

PLEASE CHECK WHICH CLINIC(S) YOU ARE REGISTERING FOR

Landscape Design Basics
 Lincoln—Feb. 20

Farming for Direct Markets
 Lincoln—Mar. 20

Management of Small Ponds
 Lincoln—Apr. 17

Name(s) _____

Address _____

City _____ State _____ Zip _____

Phone _____

\$10/person advanced registration

Preregistration deadline:
3 working days before clinic.

Number attending _____

Amount enclosed \$ _____

Mail completed registration form and check (payable to UNL Extension) to:
UNL Extension in Dodge County
Acreage Insights
1206 W. 23rd St.
Fremont, NE 68025