



How to Size a Tank

By Dr. Larry Sunn

The question of how large of a water storage tank is needed is our second most frequent inquiry. This seemingly simple question leads to many variables. From a mathematical point of view, multiply your total roof catchment surface (the square feet of your roof area), times the number of inches of rain you receive annually (30 inches in the Bulverde Spring Branch area), multiplied by .6, equals the amount of rain in gallons you can harvest in a year. For example, my two guttered roof areas total about 8,000 sq ft; so $8,000 \times 30 \times .6 = 144,000$ gallons per year.

This number is the theoretical number of gallons of rain it is possible for me to capture annually. But this is not the answer to the question of how big a tank I should buy. It only answers how large a tank you would need if you harvested all the rain you get in a year without using any of it.

My actual tank size will be significantly smaller than this. For me, the answer to the tank size question is driven by other questions: How much water do I use? In case of a drought, how much of a water security buffer do I want? How much can I afford?

The first question is the easiest to answer. It is causally related to how I am going to use the rainwater I harvest. Is it exclusively outdoor landscape watering? Is it just toilet flushing? Is it irrigation and a backup water supply? Is it total indoor potable water use? Knowing your use, helps directly answer the question of how much you will need to harvest and store.

If you are served by a water purveyor, your water use can be determined by looking at your water bill—but don't just look at one month—average the whole year. Or, just call them and they'll happily tell you your annual usage. Irrigation specific use requires a little observation. Read your water meter; turn on your irrigation system and run it through an entire cycle; and note how many gallons the meter said you used. Multiply that by how frequently you water.

Indoors, the average person uses 40 to 50 gallons of water per day by:

1. Toilets, 1.6 gallons per flush averaging 5 flushes per day per person (8 gal/person/day)
2. An efficient dishwasher: 7 gallons per cycle (2 gal/person/day)
3. Hygiene (washing face, brushing teeth, etc.) (2.5 gal/person/day)
4. 8 glasses of 8 oz cups of water per day (1 gal/person/day)
5. Washing machine - 15 gallons per load (3 loads per person per week) = (7 gal/person/day)
6. 10 minute showers x 2 gallons per minute = 20 gal/person/day (my waiting-for-the-hot-water-to-get-there goes into a bucket to water the animals) Note: a full bathtub is about 36 gallons.

Therefore, for my fairly water-conscious family, we each use about 40 gallons per day for all non-landscaping activities, but I'm going to round that up to 50 gallons per day just to be safe. Now I multiply 50 gallons per person, times the number of people in the household, times the number of days in a month - $50 \times 3 \times 30 = 4,500$ gallons per month (you'll also need to add in the gallons for how many times your irrigation system runs in a month to get a general guesstimate of your total monthly water demand). Now you know approximately how much water you will use.

The next issue is a water security buffer. Our area is prone to periodic droughts, so I target having 9 months of reserves ($4,500 \times 9 = 40,500$ gallons) so, for me to be comfortable, I need at least a 40,000 gallon tank (I installed a 50,000 gallon tank). All of your CTGCD Directors with rainwater capturing systems have from 12,000 gallons for a two-person ultra-water conscious family to 30,000 gallons or more of tank storage. You might have noticed that I can capture much more rainwater each year than my family is likely to use (144,000 off of 8,000 sq ft of roofing

and our annual demand at 54,000 gallons per year). I also sprinkle about 25,000 gallons per year on the summer garden.

If you include gardening or landscaping in your water needs, will catchment be your only source of water? Is one-month of water backup enough or is six, or nine? If a larger water security buffer is critical, maybe there is a way to install a bigger tank now, or perhaps a series of smaller tanks linked together later. Thinking about how a water shortage could affect you and your willingness to tolerate a shortage should be part of your decision making process.

The last question is how much money you can afford. Bigger is always better, but it's also more expensive. For instance, an installed 50,000 gallon tank costs about \$21,000. Affordability typically reduces the optimal size of one's tank. So planning for future tank expansion may be a present day cost-saving approach.

Rainwater supply is the easy part of the equation. Tank size is a harder question to answer. The rationale for installing and using a rainwater harvesting system differs widely from family to family; consequently there is no one answer on how big your tank should be. Rarely is the answer all you can possibly capture; it is normally constrained by other factors. Arguably, given our declining Trinity aquifer water tables, harvesting rainwater is the right thing to do.

Feel free to send rainwater capture questions to us at the Comal Trinity Groundwater Conservation District by emailing Dr. Sunn at comaltrinitygcdsecretary@gmail.com; our water well and rain catchment consulting services are offered to the public without charge.