

A top-down view of several blue plastic water jugs. The jugs are arranged in a grid-like pattern, with some showing red caps and others showing white caps. The text "How to Store and Secure Your Water Reserve" is overlaid in the center in a bold, white font with a black outline. One jug in the lower-left quadrant has the number "7638086" printed on it.

# How to Store and Secure Your Water Reserve

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## HOW TO CALCULATE YOUR WATER NEEDS

This is one of the questions that we get most often – “How much water should I store?”

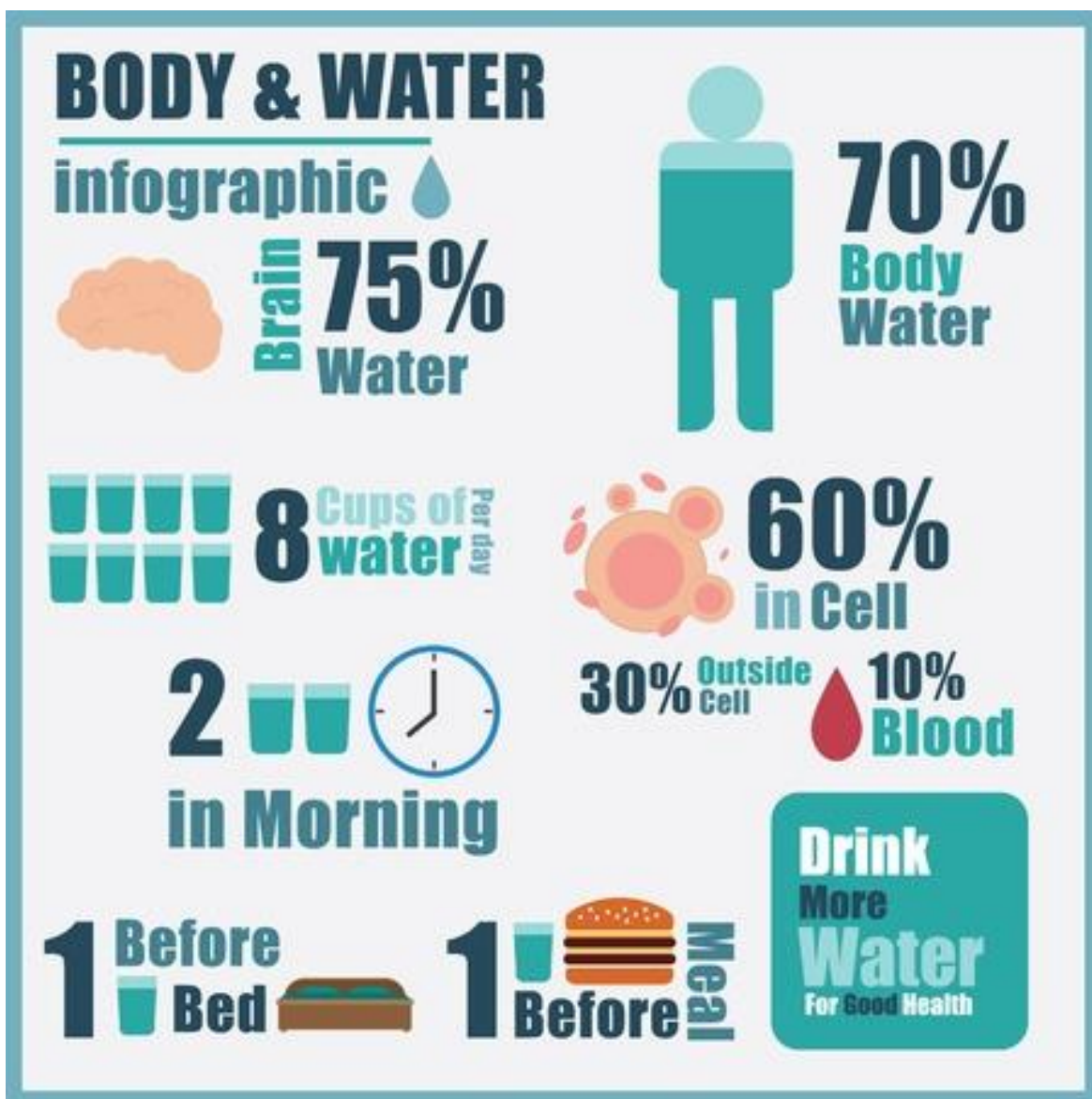
Well the question doesn't have one set answer, but today we're going to try to give you some calculations and numbers that will help you determine how much water you'll need in order to survive.

For the record, the Red Cross recommends storing 1 gallon per person, per day but we're not entirely satisfied with that answer.

Calculating your water needs depends upon several different factors: How active are you? What is the weather? How old are you? Are you pregnant or nursing? Do you want to store enough for hygiene, or just for drinking? How long are you prepping for? We're

going to try to give you calculations for account for each scenario so that you'll know how much water to store regardless of your situation. Read more about water needs on [World Health Organization website](#).

First, though, realize that water goes bad just like every other food. Well, it doesn't go BAD exactly but it will start to taste funny. You should rotate it just like you do the rest of your stockpile. You can revive "flat" water by pouring it back and forth between containers to re-oxygenate it.



### Why Stockpile Water?

You can only survive for 3 days without water and you'll start to feel the ill effects of dehydration way sooner than that.

Your skin will become dry, your brain will slow down, your thoughts will become muddled and your critical thinking skills will be impaired. Then of course, you die. That's something we try to avoid at all costs. Better to store water!

You're going to need two types of water: Potable, or drinkable, and non-potable that you can use for bathing, washing dishes and laundry, and performing other non-drinking tasks.

Of course, you can always store potable water and just use it for everything if you find that easier. Many people choose to use rain barrels for collecting non-potable water and have even hooked up filtration systems to them to make the water safe to drink.

### Weather Factors Affect Water Needs

Many people think that you would need more water in hot weather than you do in cold but that's actually not the case.

If you're working outside in extreme temperatures, you really do need much more water than if you're sedentary in moderate temperatures. If you're a relatively sedentary adult living in moderate temperatures, here's a good rule of thumb: divide your body weight in half and that's how many ounces of water per day you should be drinking, assuming you're not lactating.

If you're sweating profusely for long periods of time, you need at least 1.3 gallons of water per day. That same rule applies regardless of whether you're sweating in the sun or sweating while you're at the gym or shoveling snow.



Another reason that you should drink plenty of water in winter is that your body isn't absorbing as much water from the air as it does in the humid months of summer. Shivering also utilizes a ton of energy and you need plenty of water to support the production of that energy.

Since it's cold, many people don't drink enough in the winter but in a survival situation, a decline in cognitive or motor skills caused by mild dehydration could be the difference between living and dying.

## Special Needs of Water for Different Categories

### Lactating Women

If you're nursing a baby, chances are good that you're going to need more water. A simple way to calculate how much you'll need is to simply figure  $2/3$  of your body weight and drink that in ounces per day.

That's not a hard and fast rule, but it's a good place to start. If you feel thirsty, drink more.

In other words, it may be a good idea to store your full body weight in ounces per day for as long as you'll be breastfeeding during the emergency.

### Infants

Babies need much more water than adults do. As a matter of fact, they need 3x more than we do.

Of course, if the baby is being breastfed, he can get all that he needs from mom, assuming that she's drinking enough.

If he's on formula, he'll need to drink more.



The formula will count for some of his needs so figure about 1/3 of his bodyweight in ounces of extra water and don't forget to account for growth during the duration that you're stockpiling for.

### Children

Again, we're going by weight, not age because it's more accurate. Because kids are growing and are also typically more active than adults, they need much more water than we do.

Remember that drinks such as milk count toward their water needs but in total, figure that they need about 1.33 ounces of fluids per pound of body weight per day.

### The Elderly

Older people don't necessarily need more water than the average adult but they do need some reminders to drink it in order to stay healthy.

Mild dehydration is a much bigger deal for an older person than for a younger adult because kidneys don't function as well and the body's sense of thirst often diminishes with age.

Also, swallowing capacity, mobility and comprehension is affected more quickly with dehydration in older people.

Remind them to drink even if they're not thirsty because thirst is the first stage of dehydration!



### Elevation

People who live at higher elevations need more water than those who live closer to sea level. If you live above 5000 feet above sea level, this applies to you. If you're over

11,500 feet, your water needs increase even more because there is very little humidity and reduced oxygen. It takes more water to breathe because you breathe faster in order to get enough oxygen. You also urinate more often and may not feel as thirsty.

According to the Institute for Altitude Medicine, you should drink an addition 1-1.5 liters per day if you're over 5000 feet and if you're at altitudes over 10k feet, you need to increase your carbohydrate intake by about 300 grams too, so drink sports drinks or other sugary drinks as 3-4 liters of your fluid intake.

Now that you know how much water each person in your family needs to drink each day, add at least another half-gallon per person for hygiene. Then simply multiply the total number by how many days you are prepping for and you now know how to calculate your water needs.

If you're planning for a long-term event, you may wish to consider stockpiling water purification tabs and finding alternate ways to capture water such as water barrels or irrigation systems.

This is a good idea for a number of reasons. You'll need water for your garden and storing large quantities of water isn't exactly feasible for most people, especially if you have a large family.

Regardless of how you decide to store your water, good luck and happy prepping.



# HOW TO STORE YOUR DRINKING WATER RESERVE

People can go on for weeks without food, but not without water. During hot conditions like drought, dehydration can set within hours, and hot conditions may pose certain hazards to health. Heat stroke, heat cramps, heat rashes, etc. are some heat-related illnesses.

Anyone who has physically exceeded under the heat without replenishing can actually die in a period of several hours.

The same is true with anyone who is locked inside a hot car for long hours. We need water to live, period. But when shit hits the fan, no one is on the easy street.





Having a steady supply of clean water is perhaps the most important aspect of off the grid living, and an essential factor in maintaining good hygiene. Before you finalize any plans for going off grid, be sure you have water sorted, and plan for more than one source.

Start by having a plan to store clean water for immediate needs during a crisis. This could mean stocking up on bottled water and collecting water in your bathtub or your pool.

Further, you can build a storage system for your water, using buckets, drums, or else. Storing more than a couple 55 gallon drums of water is a space issue for most people, so you could build [a wall unit that will hold seven drums](#) efficiently.

The toughest part is cutting the wood to the right lengths and the biggest expense is the wood, assuming you already have the drums. If you're a bit handy or want to take the time to figure out the numbers to scale this project up or down, you can modify this to suit your need for more or less storage space or smaller barrels.

## What Type of Container to Use for Water Storage?

The best option is to store water in ceramic, glass, metal or treated plastic containers.

### Plastic Containers

Plastic is made out of petroleum, so you'll need to use treated plastic to protect your health. Toxic substances from the plastic such as BPA – aka Bisphenol A – may

contaminate your water supply especially if the plastic bottles are exposed to sunlight or hot environments.

### **Metal Containers**

Aluminum is toxic too, so you should avoid it. Some metals, as stainless steel, can be used for water storage, as long as you don't treat your water prior to storing because the chlorine will attack the most metals.

### **Glass Bottles & Ceramic Containers**

Emergency water storage using glass bottles is often disregarded in the prepping community because plastic is easier to come by and lighter to tote.

Usually people prefer to use plastic bottles for storing water, but glass bottles are the best option around. In case you did not know, water is best kept in glass containers (the best tasting beer is in bottles, not in cans) as opposed to metal or plastic ones.

Glass bottles are cheap and abundant and make for the best receptacle when it comes to storing potable water for extended periods of time.

In many cultures, clay pots are preferred for water storage due to their properties that allow the water to evaporate through the clay while the water inside is cooled.

### **A Few Safety Rules to Remember**

Whatever you choose for water storage, keep in mind a few easy rules about your containers:

- In order to preserve the quality of the water, these containers should have a small opening or a spigot to get water out. This way, you won't insert your hand in the water and avoid contamination. For the same reason, you should use the tap instead of dipping the glass into the drinking water.

## How to Store and Secure Your Water Reserve

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- Avoid any container previously used for transport or storage of toxic substances as pesticides, petroleum products, and other chemicals.
- Clean your water containers properly, using soap and clean brushes, or dilute chlorine solution. This treatment should be developed on regular basis in order to keep your water clean and safe.

When building your emergency water supply, keep in mind that the average person will require half a gallon of water per day just for drinking (and sometimes even double that amount in harsh, environments) while nursing mothers and children require as much as a gallon and a half per day. This estimate only accounts for drinking water, not water for hygiene.

To play it on the safe side, store at least one gallon per family member per day for at least a two week-week period. Also keep in mind that if your water supply runs low, NEVER ration water for drinking below the recommended daily amount; try to find or produce more instead.

Also, you should rotate your water supply every 6 months and you may want to consider buying a high-quality water filter.



## HOW DO YOU STORE YOUR RAINWATER?

Rainwater is an excellent source of free water, or so you'd think, right? Apparently not, though.

For example, some Western states including Utah, Washington and Colorado outlawed home owners from collecting rain water on their own properties. According to the good ol' government, the water that falls from the skies belongs to someone else and you're essentially stealing if you collect it.

So check your laws before moving forward, and find out if harvesting rainwater is allowed in your state on [National Conference of State Legislatures website](#).



Now, if you choose a dedicated rainwater collecting system, which is very easy and straight forward to build, you can DIY from readily available materials. Its advantages, besides providing you with a good quality water source, are its simplicity of construction, the ease of maintenance and its convenience.

Though it may sound simple, harvesting rain water is not as simple as putting a bucket under your gutters; things are actually a bit more complicated than that. To begin with, contrary to popular belief, rain water is not as pure as an angel's tears.

The air is filled with pollutants nowadays, not to mention the filth that lies on your roof (you'll harvest the rainwater from your roof, generally speaking) : dead bugs, birds feces, dust, arsenic, lead, and a variety of other not-so-delicious toxins accumulate up there and will run right into your bucket along with the rainwater.

### **Filter It First!**

Depending on the type of the roof you have, you must filter the rain water thoroughly. Only if you have a steel/glazed tile roof, you can collect rain water without filtering it.

A roof made of asphalt shingles, concrete tiles or galvanized metals will require you to filter the water before storing it in order to remove debris. We recommend filtering it regardless of what type of roof you have.

Aside from the rainwater collecting system, you should also consider investing in a high quality water filtration system.

If you already decided to collect rain water directly from the roof, remember to let the rain to wash your roof for 10 minutes before starting to collect it; that way you will prevent larger debris and at least a layer of contaminants from getting into your water supply.

You should use a screen to capture the larger particles from the water, like leaves and bugs. In the next step, if necessary, you will use a dedicated water filtration system before storing it.

In a SHTF situation, it would be a good idea to hide your rain barrel from your neighbors or passersby using trees or plants.

## How to Use Rainwater?

The decision of using rainwater is a matter of choice which may be attributed to the initial outlay and necessity.

Installing rainwater tanks may or may not require large one off installation expenditures as it would entirely depend on water practices of each household and the location of the dwelling.

These two factors generally influence the design and type of maintenance required for the tanks.

For those whose budget is in consideration, going off the grid with rainwater at a minimum cost is also possible with other tank substitute, i.e. food storage barrel and big garbage bins.



Think out of the box, there could be something else that could possibly be customized into a rainwater tank or can be purchased at a lower price from bulk stores nearby.

Besides, sustainable alleviation during emergencies should be cost effective at the same time causing minimal adverse impact in the environment.

If you're requirements would necessitate you to pull extra amount out of your pocket as you would generally be using the rainwater as a main source of water at home,

consulting professionals for variations and proper installation would be the best thing to do.

You should also check the government guidelines for specific requirements and possible rebates and subsidy.

### **Types of Rainwater Tanks**

#### **Underground Water Tank**

This is ideal for those who have limited space and want to keep their barrel out of sight. This type of water tank hence expected to sit underground should be placed in a light traffic areas where heavy loads and vehicles are not regularly driven.

This is also perfect for those who have large storage requirements i.e. school, agricultural and manufacturing business, etc.

To avoid structure failure, maximum groundwater level, structural integrity of the ground, drainage capability of the soil as well as the types of load which may occur (if installed underneath a drive way or regularly driven area) must be checked prior to installation.

Since installing these types of tanks generally involves excavation, the price is relatively high compared to the aboveground tanks. In any circumstances these tanks must be well ballasted otherwise, it would pop out of the ground when empty.

Less commonly, rainwater that is collected in underground tanks can be subject to microorganisms associated with animal and human faeces which may contaminate the water if not fully enclosed.

That is why most rainwater from underground tanks is not recommended for personal hygiene and drinking where sufficient main water supply is available, unless properly treated and maintained.

### Aboveground Water Tank

When it comes to installation, this does not require much of work as this can be erected anywhere above ground. This should be sufficiently elevated to provide adequate pressure to appliances.

Unlike underground water tank, this type of tank is more susceptible to microbial contaminants i.e. bacteria, protozoa, etc. which are acquired from faeces of birds, reptiles and amphibians that have free access to roof or tanks.

Rainwater may also accumulate contaminants from dust washed off the roof surface.

Other contaminants may also generate from leaf litter, lichen, moss, roofing materials. As such, this type of tank should be filtered and treated properly to eliminate the presence of bacterial contaminants. Gutter guards or mesh filters are recommended to be installed.



### Readiness Checklist

#### Purpose

You have to decide what you will use the rainwater for. Would you be using it for food preparation, flushing the toilet and drinking? For rainwater used as the main source of water, additional mandatory equipment is required like taps, filtration and pumping system.

For rainwater tank to be used for outdoor purposes like gardening and washing vehicles, smaller tanks of 1,000 L with taps are just fine. In addition to determining the purpose of the tank, you also need to consider how it should be connected to the storm water pipes and downpipes to identify possible extra cost.



### **Users**

Water consumption will largely depend on the number of individuals using rainwater for different purpose. So, aside from considering the reason of the installation, identifying the number of people within the household will also help determine the capacity of the tank to be purchased.

### **Area**

Different areas has different regulations which are based upon the location of the dwelling, accessibility to centralized water system and precipitation frequency.

Since rainfall pattern varies year on year everywhere, this should be considered before investing in rainwater system. The length of stay in the area, if rented should also be considered as moving the tank from one place to another can be a hassle.

### **Space**

The design of the house should be factored in before purchasing a tank. Small, slim line lightweight polyethylene and underground tanks are ideal for those who have limited space at home and wanted to keep the barrel hidden from view.

### **Roof Catchment Suitability**



Roofing materials should be checked prior to installation.

Gutters should have sufficient and continuous water flow to downpipes to prevent pooling of water that could increase accumulation of various contaminants.

Paints and coatings may not be suitable for roofs to collect rainfall too due to possible hazardous content.

Asbestos fibers on the other hand are no longer used in new houses as it has proved to cause danger to health when inhaled in sufficient quantities. Maximizing the roof catchment means maximized water savings.

### **Approval**

Before purchasing a rainwater tank, the local community and regulatory authorities should be contacted to determine specific requirements like planning, installation permit, operation approval and other guidelines needed to be accomplished prior to and after the installation.

Depending on local conditions, policies for using rainwater may be emphasized within the food security or the environmental protection policy context.

Standalone tanks that are not connected to downpipes do not generally need approval, except if you are under the roof of a government that completely restricts the use of rain barrels.

### **Cost**

Tanks can cost as little as few hundreds to thousands of dollars, depending on the size, design, color and material of the tank. Extra cost may also be incurred during the installation for additional materials (level indicator, first flush device, etc.), delivery and setup charges.

### **Design**

Rainwater tanks comes in a wide variety of designs (shapes, sizes, materials and color). Slimline type has become the most preferred due to its compact and sleek style.

As internal and external hydrostatic pressure of the tank affects the water's flow and volume the size of the tank should be highly regarded. The wider the tank the better.

Standalone lightweight empty barrels that are not connected to downpipes can be easily blown by the wind during gusty season, placing a clean rock in the bottom of the tank may prevent this.

### **Location**

Rainwater tank can be installed underground or aboveground. In designing rainwater system, the location should be first investigated especially if excavation is required as structural integrity and materials are regulated through building codes and standards in some areas of jurisdiction.

When installing aboveground rain barrel, the ground should be level and full packed to provide a solid foundation.

### **Installation and Maintenance**

Ground rainwater service pipes must be clearly labelled “rainwater” continuously along their length. Tank, covers and plumbing pipes and fittings should be light proof to reduce daylight penetration and potential growth of algae.

When connecting numerous barrels it is vital to make sure the connected pipe is large enough to provide smooth and quick flow between the barrels.

In any circumstances, the choice of using rainwater is at the risk and responsibility of the owner therefore it should be in compliance with the regulations of the responsible authorities.

Irrespective of how it is being utilized proper maintenance is recommended to keep the quality of the water and efficiency of the tanks.

### **Cleaning and Maintenance**

Cleaning and maintenance of the rainwater tanks can be achieved by these few tips.

- Check the sides and the bottom of the tank for accumulated sludge
- Keeping roof catchments free from animal and insect faeces
- Regular cleaning of gutter and tank inlet for any build ups
- Cut back trees and branches that extends beyond the roof
- Test the water periodically to determine appropriate and adequate treatment

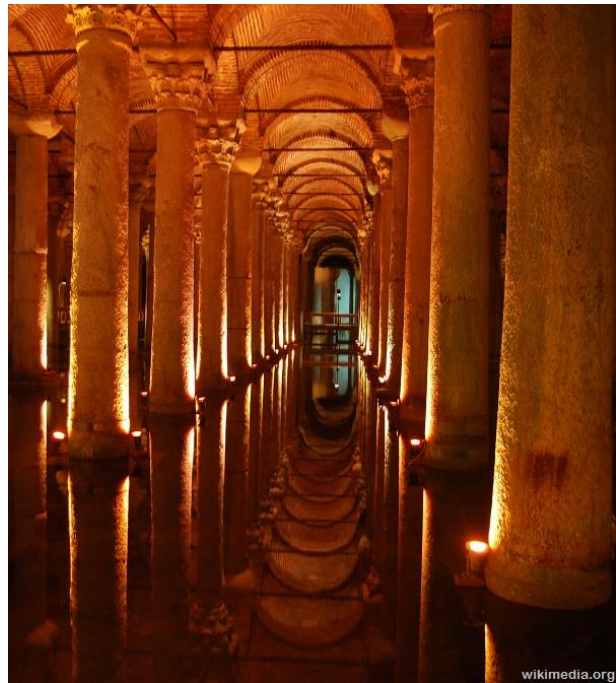
- If pumping system is attached, inspect that it is in good functional condition
- Replace roofing and other material as needed
- If adequate access to the tank is impossible, contact the tank cleaning company
- Regularly check and clean the tank's inlet and overflow screens

## Rainwater Tanks and Water Diversion around the World

Basilica Cistern in Istanbul (Turkey) is a structure built around 3rd or 4th century during the Early Roman Age and was converted into a cistern in the 6th century.

According to historical claims 7,000 slaves were involved in the construction of the structure which can hold up to 100,000 tons of water.

Underground Parthenon in Kasukabe (Saitama, Japan) is a subterranean 213 foot silos and 83 foot pillared main tank for water runoffs that lies under a football field.



This is a part of the G-can (water way) project of the Japanese government built in 1992 and was finally completed after 17 years of construction. This underground flood diversion and water storage can pump 200 tons of water per second.

The use of rainwater tank is entirely reliant on the water practices of each individual within the household and the location of the dwelling.

Weather-related issues in any country that includes earthquakes, floods, cyclones, landslides, severe storms, tsunami, and decreased rainfall can threaten lives,



jeopardize yield quantity of crops and induce extensive damages to assets as well as disruption in facilities like power, communication, transportation and most importantly water.

These weather abnormalities that occur year on year is something everyone should be prepared for.

Although there are different sectors in the regime that can aid in our survival during these times, disconnecting our dependency from government and private facilities through off the grid solution with rainwater tanks is by far the best solution.



## **DON'T IGNORE THE WATER FROM YOUR PIPES**

While some people are busy claiming that the planet is heating up, many of us are facing record cold winters.

If you have never dealt with frozen pipes and other difficulties in a routine setting, it will be even harder for you to maintain a supply of running water in winter months during a crisis.

### **What You Need to Know When Preparing Pipes**

There are many reliable methods available for storing and preparing your water pumps and pipes for cold weather regardless of where you live and the situation at hand.

You just need a little preparation, and also some tools at hand.

- Propane torch – can be used to defrost copper and metallic pipes. It can also be used to defrost pump switches on older models that do not have plastic or other flammable parts.
- Hair dryer – can be used to melt ice in pump switches, as well as in plastic, metal, and other pipes.
- Incandescent lamps or heat lamps to generate steady heat without fire
- You also need some freezing preventative equipment and materials:
- Fiberglass insulation (without paper backing) – use insulation and a wooden box around the pump and pipes leading into the house.
- Heat tapes – wrap these tapes around pipes, especially near the pump and any area where the pipe may be exposed to freezing temperatures.
- Prepare also some alternatives to electric water pumps:
- Cast Iron Hand Pumps – These “old fashioned” pumps can retrieve water up to 300 feet below the surface. They can be installed along with electric pumps and used when needed. Never touch a cast iron pump handle in cold weather with bare hands, as it can rip the skin and flesh from your hands.
- Ram Pumps – This is another “old fashioned” pump design that requires no electricity. As long as you build it from metal parts, it will be easier to manage freeze ups. Just be sure to have some non-frozen water on hand for priming as needed.

It is very important to keep in mind that water is one of the few substances that expands when converted from the liquid to solid state (ice). Even though water may move freely through pipes without damage, ice will break them apart because of the expansion.

Therefore, when preparing pipes for winter, it is always best to err on the side of safety and insulate them as much as possible.

### 3 Tips to Prevent Freezing

#### Insulate, Insulate, Insulate

You can use insulation around the pipes, and also heat tape for added warmth. Depending on the area, you may also need to move pipes into the home where they will not be exposed to freezing temperatures under the house. Needless to say, you will also need to take special care to insulate pipes coming out of the pump.



#### Keep Water Running on Freezing Days

In many cases, if you can manage to keep water running through pipes, it will not freeze up. On cold nights, let warm water drip through faucets so that the lines remain ice free.

You may also want to hook up a smaller water storage tank, and switch over to that so the pump goes on more often. That said, if temperatures fall quickly, you may wind up with a frozen system if the pump freezes up with water still in the lines.

If you need to thaw pipes out, start off by turning on at least one water faucet. This will help draw water through ice patches as soon as they begin to melt.

Depending on the pipe material and surrounding materials, you can use either a propane torch or a hair dryer. As long as there is nothing flammable in the area, the torch will work faster and better.

### Take Care of Your Water Pump

As with water pipes, it is very important to insulate pumps and keep them in temperatures above freezing. You can use fiberglass insulation around the pump, and also heating tape to provide extra warmth.

Unfortunately, some areas of the pump, such as the switch are difficult to insulate. You can try keeping an incandescent lamp shining on it, or provide some other heat source to prevent freezing.

### When Your Water Pipes Freeze...

No matter how hard you try, there are bound to be times when the pump or pipes will freeze. That would be the moment when you would need these gallons of water that you keep on hand for your hygiene.

Oddly enough, you may also want to keep some blocks of ice stored in sawdust. Even though the ice will need to be melted back into water, hauling in a chunk of ice may be easier and faster than dealing with extensive pipe or pump repairs.

Needless to say, if there happens to be snow on the ground, you can also melt that down for water.