

## When Citizens in Georgia Need a Water Well

The Georgia Association of Groundwater Professionals (GaGWP) is a nonprofit organization that has been a principal custodian of Georgia's ground water since 1967. The GaGWP is a member of the American Ground Water Trust. Georgia Association of Groundwater Professionals American Ground Water Trust

The Association's members consist of water well drilling and pump contractors, geologists, hydrologists, engineers, state and local government employees, and ground water industry suppliers and manufacturers. Beyond maintaining high standards in the ground water industry, the GaGWP is devoted to providing continuing education to its members and furnishing accurate information to the public regarding the quantity, quality and availability of Georgia's ground water resources. The GaGWP works with government agencies, communities, land owners and industries to identify and solve problems associated with ground water use. PURPOSE OF THIS INFORMATION

The American Ground Water Trust and the Georgia Association of Groundwater Professionals, Inc. have prepared this consumer information to help people in Georgia make good economic and environmental decisions about water wells. Securing a safe reliable water supply for a home is an important responsibility for home owners. There are many water supply specialists who provide water supply products and services; this pamphlet will assist you to obtain the professional help that you need. GROUND WATER BASICS What is Ground Water?

Ground water is water below the land surface that fills the spaces between grains of sediment and rocks, or fills cracks and fractures in the rock. Saturated zones in sediment such as sand and gravel, and in fractured rock formations, that receive, store, and transmit water to wells and springs are called aquifers.

Clean and plentiful ground water is a vital resource for personal and economic health everywhere in the United States. Each day, over 130 million Americans get their drinking water from ground water. In Georgia, ground water is the source of supply for many towns and for most rural and suburban homes. The Hydrologic Cycle

Water in aquifers comes from rain and melted snow that filters through the soil. As the water moves down, plants consume a portion, some is evaporated, and some is retained by the soil. The rest seeps downwards, usually very slowly, to add water to the aquifer. This process is part of the hydrologic cycle. The amount and quality of ground water varies from place to place in Georgia because geology, climate, and land use are different. The quality of water from wells can be influenced by:

- natural factors, such as the type of rock, gravel, sand or soil
- or by pollution from poorly managed agriculture, individual septic systems or community waste disposal

Public education about contamination, and community involvement in protecting aquifers, can help ensure safe drinking water in Georgia. Potential Threats to Ground Water

Most well water is good quality because of the filtering process in the soil and the long travel time underground between the water occurring as rain and reaching a well. However, in addition to possible pollution from agriculture, industry and transportation, even contamination sources in our homes can pose threats to ground water.

Incorrect disposal of common household chemicals (polish, thinners, paints, etc.) excess use of lawn and garden chemicals, faulty or overloaded septic tanks, or an accidental spill during an automobile driveway oil change, can wreck havoc with drinking water safety. The more informed that residents are, the better are the prospects for protecting Georgia's ground water. GROUND WATER PROTECTION A Consumer Guide Summary

With your help, the professional work of ground water specialist and the regulation and technical work of government agencies can ensure safe drinking water. What you know, and what you do about contamination risks is important for the safety of water in homes and communities throughout Georgia.

What people should know:

- Where their drinking water comes from
- How contamination occur
- What they can do to prevent problems

What every person should do:

- Handle domestic chemicals responsibly
- Protect water and earth from automotive fluids
- Maintain septic systems properly
- Use lawn and garden fertilizers and pesticides sparingly
- Safeguard the area around wells
- Always use licensed contractors for water wells

What communities should have

- Land-use policies, such as zoning
- Agricultural best management practices (BMP)
- Water resource management plans
- Programs protecting aquifers and wells
- Ground water education

## HOW DO WE GET GROUND WATER?

Some ground water occurs at the surface as springs, but in most cases, a water well is needed to reach the aquifer where ground water is found. These days, most wells are made by drilling into the rock layers. Water well contractors use drilling machines (rigs) to access water deep beneath the surface. In most cases, electric pumps are used to raise the water to the surface.

The creation of a water well (a specifically engineered hole in the ground) consists of several elements. After selecting the site to drill the well (local codes and set-back requirements may limit choice!), the process usually includes drilling, development, testing and equipment installation. Drilling

The actual hole for most home wells is usually drilled at a diameter of between six to twelve inches. The drilling method that the contractor decides as most appropriate will depend on the geologic formations, the required water yield and the type of drilling equipment available.

Drill rigs are expensive (up to \$500,000) and the use of the equipment, often hundred of feet beneath the surface, requires considerable skill. All wells require casing to protect the well from possible contaminants at or near the ground surface. Casing may not be needed for the full depth of the well in solid rock. Wells in alluvial sands and gravels will need casing to prevent cave-in, and some will require a well screen, designed to keep sand out, but let water into the well. Well screens can be expensive, but they may be needed for efficient long term well use. Well Development

The drilling process often needs specially formulated drilling mud to help carry the drilled pieces to the surface. Most drilling also creates finely ground rock material. All fine particles need to be removed from a well in order that it may efficiently produce water.

The process of removing fine particles is called well development. Drillers usually do this by using compressed air or a bailer to agitate and remove water in the well until it runs clear. Yield Tests

For most homes it is not necessary to undertake extensive testing. Experienced drillers will have a good idea of the well's performance from the drilling and development process. The yield potential is important for selecting the right pump and knowing the well's limitations. Ideally, water will flow into the well at the same rate that it is removed by the pump. There are three important pieces of information needed for designing an efficient water system: the static water level, the water level after pumping a known volume of water, and the time it takes for the well water level to recover after pumping. Low-Yield Wells

In some areas of Georgia, wells are not capable of producing the amount of water normally expected for domestic supply (4-10 gallons per minute.) However, with an adequate storage tank, a well producing as little as one g.p.m. can be sufficient for domestic needs. For every foot of depth below water level in a 6 inch diameter well, there are 1 ½ gallons of water. A 6 inch diameter well drilled to 250 feet, with a water level 50 feet below the surface, already has 300 gallons of water stored in the well!

Hydrofrac techniques are often used to improve the yield of wells. The process involves down-hole equipment that creates great pressure in selected parts of the well to create and open up fractures.

When properly designed and managed, low-yield water wells can provide a viable supply for a home. There are 1440

minutes in every day. If a well produces one gallon a minute in one day, 1440 gallons of water could be pumped into a storage tank. Assume a family of four, with each family member using 75 gallons of water a day. Total consumption for the entire family would be 300 gallons; less than 21 percent of the water stored in the tank. The well would be required to produce water for a total of only five hours a day in order to replenish all the water used. Most of Georgia's domestic wells have reliable yields, higher than the minimum yields discussed above, and are capable of reliably supplying all home and garden needs. HOW MUCH WATER - HOW MUCH MONEY? How Much Water Do You Need?

If you plan wisely, a good, dependable water well can supply you with all the water you need now and in the future. A rule of thumb is to allow for between 75 and 150 gallons per person per day. You need to take into account the peak demand, for example, when there may be extra guests at holiday week-ends. Outside use of water can pose much greater demands. You need to calculate the required well yield if your well is needed for additional water uses such as: \*Swimming pool \*Lawn and garden irrigation \*Horse paddock \*Fire protection. For agricultural needs, dairy, irrigation etc., refer to a farm expert. Where Should the Well Be Located?

There are four important considerations for sitting a home water well:

- Where there is ground water (!)
- Away from sources of contamination
- Convenient for power supply and close to the home
- Accessible for drilling and pump installation equipment (most wells will have to be serviced from time to time.)

In large property lots, it may be necessary to obtain advice from a hydrogeologist. In most cases, the driller's local experience will enable a site to be chosen. Local setback codes must be obeyed. If possible, always locate the well at a higher elevation than any waste water septic system or other drainage systems. Local rules will specify minimum acceptable distances between wells and other structures. County health offices, sanitarians and ground water contractors can give you advice on well location.

Correct water well design and casing installation is important to protect against contamination risks. Old and abandoned wells can pose particular risks and such wells must always be decommissioned and sealed by a licensed well driller.

#### Pump Selection

There are many different water pumps on the market. Most ground water contractors will, install and service pumps. Before you and your contractor can decide on the appropriate pump, you need to know the following:§ The well's yield potential

- § Diameter of well at pumping level (the well diameter at this depth may be smaller than at ground level.)
- § Water level drawdown at given pumping rates
- § How much water will be needed at peak demand
- § Depth of ground water below the surface (in some geologic conditions water levels will drop in drought conditions and the pump will therefore need to be placed deep in the well. § Distance and elevation of the home above the well.

Most home-well pumps, unless used to irrigate gardens or paddocks, will only be used for a few minutes at a time or perhaps an hour or two each day.

These days, many contractors can provide a complete well-to-faucet water system. There are often consumer advantages in purchasing a system from a single contractor. When you buy a complete installation, you are in effect giving the contractor the responsibility for your home water supply. Most contractors willingly accept this responsibility. If there is ever a problem, you just need to make one phone call.

If your drilling contractor does not sell or install pumps, he may arrange to sub-contract the work to a dependable pump installation specialist. All technical water well installation work, including wiring and plumbing, should be performed by licensed contractors who will guarantee their work and render quick service when needed. If you need to save money, do such work as trenching yourself, but don't sacrifice quality and efficiency. For example, using an oversized or undersized pump, however cheaply you were able to buy it, will not be as efficient in water production, energy costs or reliability, as installing the correct pump for the job. Testing Water Quality for Health and Safety

All new wells should be tested for bacteria and nitrate. In deciding whether or not water conditioning equipment is needed; tests should be made for acidity (pH), hardness and iron. Many laboratories offer a home-owner package-deal for water analyses. For example, some garden plants have specific water quality tolerances. How Much Will a Well Cost?

Some contractors may offer a fixed price. Others will charge according to the depth drilled and the materials used. Wells of the same size in the same locality usually do not vary much in cost. You can obtain a rough estimate of drilling costs in your area by consulting neighboring well owners or local contractors. The total cost of installing a well and water system is often itemized in estimates as follows:

- Cost of permits
- Drilling: cost per foot (will vary with diameter, some drilling costs may increase with increased depth)
- Casing: cost per foot (depends on type used)
- Cost of other materials (such as screens, seals, etc.)
- Grouting, cementing (often included in drilling cost)
- Developing (usually based on a per hour charge)
- Test pumping (required by some towns)
- Pumping equipment, pipes, etc. (bringing electric power to the well head is usually the homeowner's responsibility)
- Water quality laboratory analysis
- Water treatment and conditioning equipment, such as a softener (this part of the water system is often quoted separately, after the water quality has been analyzed.)

No ground water contractor wants to drill a "dry" hole, but when dealing with subsurface geology, it is difficult to guarantee finding water or to predict its quantity and quality. **DO I NEED A CONTRACT? Be Aware of Unlicensed Contractors!**

It is a legal requirement that all water well drilling contractors be licensed. In the past, too many home owners have paid dearly for using amateurs or part-time, non-specialists. Check that your contractor is licensed, insured and experienced. Beware of high pressure or scare tactics, and "bonus offers" to get your business.

Home and building owners can become involved in litigation involving uninsured contractors. If an employee of an uninsured contractor is injured on the premises of your home or building, you may be responsible for his injuries or disabilities. In addition, you probably have no protection in the event of damage to your property or the property of others by the driller or pump installer during the course of the work. Professional Contractor Check List

Is Your Contractor: **• A GaGwP MEMBER.** A good basis to select a contractor is to choose one that has declared his commitment to the mission and ideals of the state drillers association and/or the National Ground Water Association. **• LICENSED.** The State of Georgia has adopted standards for the licensing of drilling contractors. Only those who meet the standards of testing qualify for a state license **• WELL-ESTABLISHED.** A professional drilling and pump contractor will have a permanent place of business, a telephone number, a tax ID number and, where appropriate, a business license.

**• EXPERIENCED and KNOWLEDGEABLE.** Drilling or water system installation skills cannot be learned overnight. A professional drilling, pump, or water conditioning contractor is familiar with all kinds of ground water situations. The contractor you select you should be able to provide a list of customer references.

**• INSURED and COMMITTED TO SAFETY.** There are inherent dangers in drilling a well or installing a water system. The contractor who carries both worker's compensation insurance and liability insurance has protected you in the event of damage to your property and injury to his workers while work is being performed on your property.

Water Well Contract Check List

Does the Contract Contain:  The Contractor's business address and State License number

A written proposal that details

§ responsibility for obtaining all necessary permits

§ what work is to be done

§ materials to be used (casing type, drilling muds, etc.)

§ the charge for the drilling (cost per foot)

§ type of equipment to be installed

§ the terms of any contractor or manufacturer guarantee on the well and well equipment

§ the expected date for starting and completing the work

§ payment schedule

§ details of client and contractor responsibility for site access and site clean-up

Proof of the contractor's liability insurance while working on your job, to protect against:

§ personal injury to you or other § damage to your property

§ damage to the property of others

Proof of worker's compensation insurance to protect the contractor's employees or sub-contractors while working on your job.

Be careful not to base your selection of contractor on price alone. The well system you purchase is permanent, and future changes may be much more expensive in the long run. Make sure that the bids and estimates are for comparable materials, services and guarantee. A low bid is not necessarily the best bargain. The contractor may not have included all the work quoted by the competitors. **If Problems Occur**

Sometimes problems will occur. If this happens, first contact your contractor. Usually, problems can be solved and corrections will be made willingly. If you don't resolve the problem, contact the Georgia Drillers Association, Inc. for advice about what to do.  
 If the contractor's work is not in compliance with the state codes, contact the Water Well Standards Advisory Council at (404) 656-3214.  
 Your Well Record

Well ID # \_\_\_\_\_

Date Drilled \_\_\_\_\_

Drilling Company \_\_\_\_\_

Depth Drilled \_\_\_\_\_

Standing (static) water level \_\_\_\_\_

Pumping level in feet \_\_\_\_\_ @ \_\_\_\_\_ gallons/minute

Pump installation company \_\_\_\_\_

Pump make and model \_\_\_\_\_

Pump voltage \_\_\_\_\_

Pump set at \_\_\_\_\_ feet below ground level

Tank / Equipment installation company \_\_\_\_\_

Tank &ndash; make and model \_\_\_\_\_

Conditioning equipment &ndash; make and model \_\_\_\_\_

Service work on system, date and details

\_\_\_\_\_

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**AMERICAN GROUND WATER TRUST** Independent Authority on Ground Water

The American Ground Water Trust is a 510(c)(3) non-profit membership organization. The mission of the Trust is to protect America's ground water, promote public awareness of the environmental and economic importance of ground water and provide accurate information to assist public participation in water resources decisions.

To learn more about how you can protect your ground water: § Call the Trust's consumer information line, (800) 423-7748.

- § Join the American Ground Water Trust. [Well owners are important Trust members.]
- § Contact the Trust about ground water issues and concerns in your town, region or state. The Trust will respond to your questions and recommend a course of action.
- § Volunteer to help with educational programs and special events in your area.
- § Request a list of Trust Educational Products.

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