PROPER PLACEMENT OF IRRIGATION WELLS

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The ground water beneath North Georgia exists in the clay and sand above rock and in openings or fractures within the solid rock. Location of irrigation wells for nurseries and for landscapes is critical to obtain the most water possible. The proper location of irrigation wells can be a low risk endeavor with positive benefits. This article explains the procedures followed to find ground water at the GardenSmith Nursery in Jefferson, Georgia. These procedures are applicable at most sites in North Georgia.

Prior to the geological study, the nursery had one bored well for home and office use, one bored well which produced approximately six gallons per minute (gpm) and one drilled well which produced nine gpm. The locations of these wells are shown on the drawing. The six and nine gpm wells were used to irrigate the nursery; a large hold tank was used to store water.

During the study the complete property was surveyed for rock outcrops and visible fractures. Rock was seen in the creek and on the hill north of the nursery area. This rock, which is termed granite gneiss, also contained lenses of white quartz rock. The quartz was most prevalent on the hill where the 980 ohm-feet value was obtained and in the creek where the 2,130 ohm-feet value was obtained. The significance of these values is explained below. The geological significance of the quartz is that the quartz aligned through the property as shown on the drawing. This alignment is termed a fracture trace. Fractures are commonly associated with quartz as is ground water. Fractures also exist in other types of rock. This observation led to the discovery of fractures below the ground surface.

In order to "see" into the earth the electrical resistivity method was used. This method, developed more than 50 years ago, conducts an electrical current into the earth and measures the earth's response to the current. Since ground water conducts electricity and is therefore less resistive to the flow of electricity, the survey is conducted to locate the place and depth where the electrical resistivity is lowest. This is where fractures exist and where ground water is moving through the rock.

The values obtained at the nursery are shown in the drawing. The values ranged from a high of 3,980 to a low of 980 ohm-feet. Note that the low values coincided with the observed quartz rock. The values were obtained at a depth of between 150 and 200 feet deep. Next, a vertical sounding to 300 feet deep was conducted to detail the depth at which the fractures existed. The fractures were identified at 120 and 230 feet deep. The driller reported that the fractures were encountered at the depth predicted by the resistivity survey. This correlation proves the success of the resistivity survey.

The total flow from the new well was 30 gpm, with 20 gpm at 250 feet deep. The driller and the owner decided to drill deeper to 600 feet to obtain more water.

The location of the new well, which doubled the combined flow of the existing two irrigation wells, is approximately 100 feet from the old wells. The placement of the old drilled well missed the critical geological fracture trace. The geological fracture trace with the quartz was the key factor in locating the new well properly and obtaining the most water possible. This well location performed by the electrical resistivity method and an experienced hydrogeologist now allows the nursery to expand with a sufficient ground-water supply.

The procedures explained above are normally applicable to most north Georgia sites. Although rock may not be visible at the ground surface, the method allows one to "see" into the earth to find the fractures. Groundwater, if present, can be found with the proper methods.

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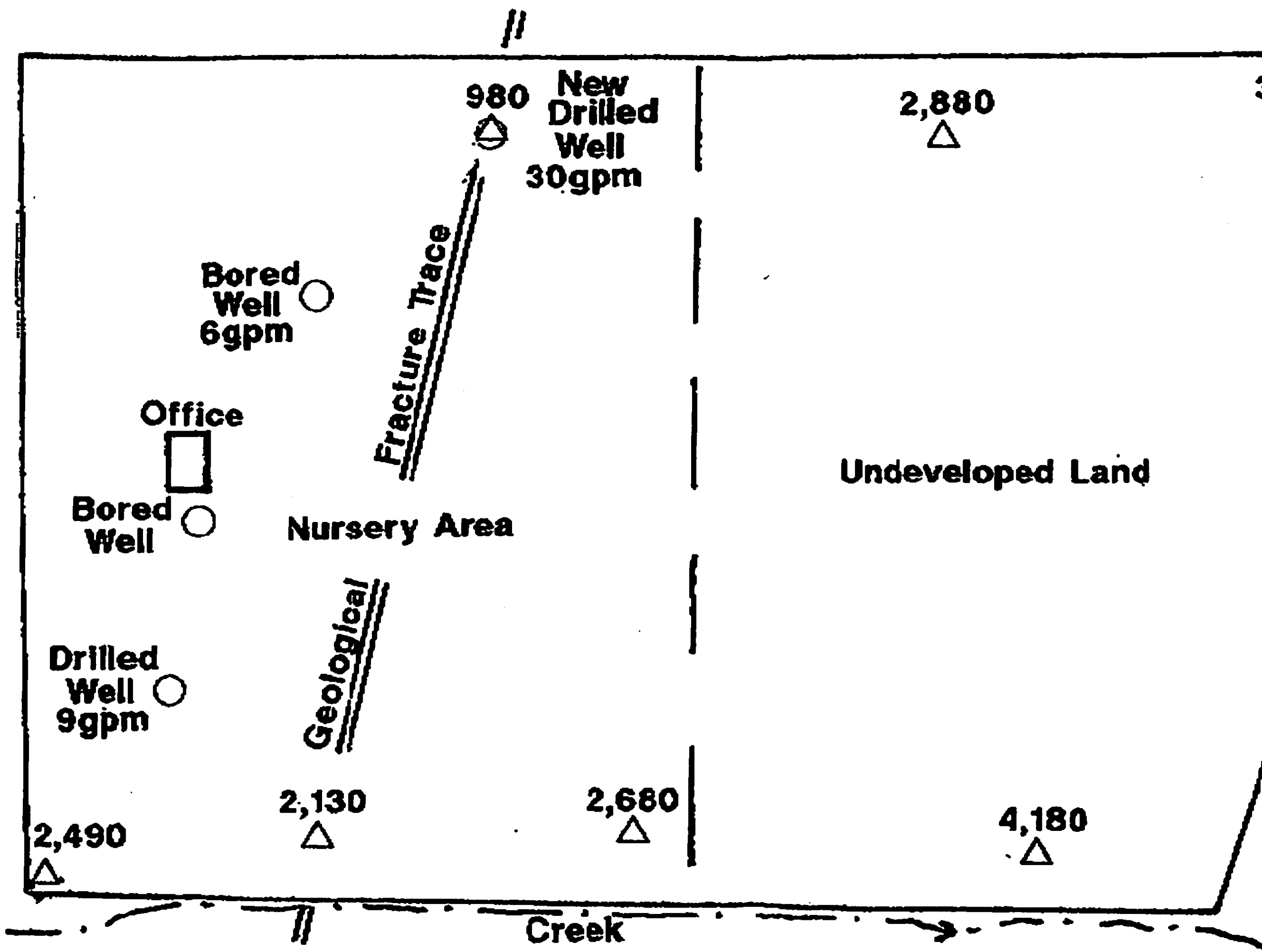
GARDEN SMITH NURSERY



△ Resistivity measurement in ohm-feet