SUGGESTED WELL LOCATIONS AT DOUBLE HORN CREEK

Evaluation by Brian A. Smith, Ph.D., P.G., March 27, 2026

Introduction

Recommendations are made for locations for drilling a test well within or near the Double Horn Creek subdivision with the greatest chance of encountering sufficient groundwater to serve as a water-supply well for Double Horn Creek Water Supply Corporation (DHCWSC). Based on the concept that greater aquifer permeability is associated with faults and fractures in the limestone and dolomite that makes up the Ellenberger-San Saba Aquifer, six potential drilling locations have been identified. These six locations are identified on Figure 1 which also shows faults, surface geology, and water wells.

Rationale for Drilling Locations

The best locations for drilling test wells in the Double Horn Creek development are in the vicinity of faults. Faulting and subsequent fracturing close to the faults have increased the permeability of the low porosity limestones and dolomites of the Ellenberger-San Saba Aquifer. Movement of water through these fractures has increased some of the fracture openings due to dissolution of the limestone and dolomite and has increased the permeability.

Good locations for drilling test wells would be about 50 to 100 feet from a fault on the downthrown block. This is because the fault is most likely to have a downward dip of about 80 to 85 degrees in the direction of the downthrown side and fracturing of the rock would likely be greater on the downthrown block. This would have the borehole intersect the fault at a depth of about 200 to 250 ft therefore maximizing the chance of encountering more fractures.

An optimum location for drilling a test well would be where two faults come together which should increase the number of fractures intersected by the borehole. Two productive DHCWSC wells, Wells 3 and 4, are located close to an intersection of faults. Two other locations with fault intersections are shown on Figure 1 (Locations 1 and 2). Numbering of the locations is based on better geologic conditions being indicated by lower numbers. However, distance from the DHCWSC treatment plant and site access are also considered in the ranking and are described in more detail below.

GIS Methodology

Figure 1 was created using lidar data which was interpreted with GIS (graphical information system) software (QGIS) to create the hillshade surface which provides more detail than a standard topographic map. Superimposed on this surface are faults and geologic contacts that were digitized from the Spicewood and Smithwick geologic quadrangles. Locations of wells with data from several databases were placed on the figure. A shapefile of property boundaries was obtained from Burnet County.

Explanation of Sites 1 through 6

There are two areas with fault intersections (Locations 1 and 2 on Figure 1) that have minimal extraction of groundwater nearby, yet because of the proximity to fault intersections, these two locations have the greatest potential for significant production. However, because of the distance from the DHCWSC treatment plant, the lack of willing landowners, and costs for pipeline installation, these two locations are not recommended.

Location 3 is along a fault and where there are no other production wells. The owner of Lot 33 has expressed a willingness to have a public supply well installed on the property. For the best chance for intersecting the fault and associated fractures with the borehole, the well should be drilled about 50 to 100 ft west of the fault. As shown on Figure 1, the geologic unit encountered at the surface is the Marble Falls which consists of limestone and dolomite, similar to the Ellenberger. Beneath the Marble Falls is what the maps shows as Mississippian-Devonian undivided (MD). These units are described in the Smithwick geologic quadrangle as “dark-colored, petroliferous shale with limestone and phosphate concretions” with thicknesses of less than 20 ft. Depth to the top of the Ellenberger is estimated to be about 50 ft.

Locations 4 and 5 are immediately east and west of Double Horn Creek, respectively. Significant fractures are seen in the bedrock where the fault crosses Double Horn Creek. There is potential for increased recharge to the aquifer through these fractures in the creek bed when there is flow in the creek. The northwest corner of Lot 17 (immediately east of Double Horn Creek) would be the best spot for drilling within Location 4 because it is situated over the downthrown block of the fault. It appears from aerial photos that there is a water well on this property. There is no record of a water well in the various well databases, but aerial photos from Google Earth show a structure about 150 ft southwest of the house that looks like a water tank. Well records show a very productive well (60 gpm) on the property west of lot 17 (Section 1, Lot 6). This well would need to be taken into consideration if Location 4 is selected. If this location is considered, there would need to be further investigation of the private wells on Lots 17 and 6, in addition to requesting permission from the owners of Lot 17 for installation of a well on their property.

Location 5 is on the downthrown side of the fault that runs parallel to Double Horn Creek. A well drilled near the center of Location 5 could potentially interfere with production from DHCWSC Well 1, but a site on the southern end of Location 5 should be at a sufficient distance from Well 1 that interference would be minimal.

Location 6 is immediately east of Double Horn Creek and east of the fault that runs just west of Double Horn Creek. This location is not situated on the downthrown side of the fault but because of its proximity to the creek and fault it will have an increased likelihood of encountering fractures that can yield an adequate amount of water for a water-supply well. This location is along structural strike with DHCWSC Well 1. Because Well 1 is productive, it is likely that a well installed in Location 6 would have good production. To minimize interference with Well 1, the well should be drilled as close to Hwy 71 as possible. Communication issues have prevented DHCWSC from inquiring with the property owners their willingness to have a water-supply well installed on the property. There are currently no structures built on this property.

Other Aquifers for Consideration

There is potential for adequate yields of groundwater in the underlying Welge and Hickory formations, but the quality of that water is uncertain and the costs of drilling and constructing a water-supply well at these greater depths is significant. Depth to the top of the Welge is estimated to be about 1,600 ft and 2,100 to the Hickory.

Summary

Location 33 best meets the criteria for drilling a test well. A site in the northeast quadrant of the property would place the well within the optimum distance from the fault and would be at some distance from the house and behind some trees. Figure 2 includes an inset from Figure 1 showing a close-up view of Lots 33 and 34 plus an image from Burnett County CAD with lot lines overlain on a Google Earth image. A specific spot for drilling a test well would have to be determined by a willing landowner and accessibility of a drill rig.

This evaluation is a ranking of locations based on general geologic principles, review of the literature, review of available well and GIS data, field observations, and discussions with retired geologists in Double Horn and other professionals with experience with the Ellenberger-San Saba Aquifer. An estimate of how much water a well could produce at one of these locations is not possible due to the considerable variability of aquifer permeability in the Ellenberger and the lack of detailed subsurface data for this area. A review of data from wells within the Double Horn development and on adjacent tracts indicates that wells near faults have a slightly higher chance of encountering geologic conditions that can provide adequate yield for domestic and low-volume public supply wells. However, there are wells on or near faults that have recorded zero or near zero production. And there are

wells at some distance from faults that have yields of around 30 gallons per minute (gpm) or greater.

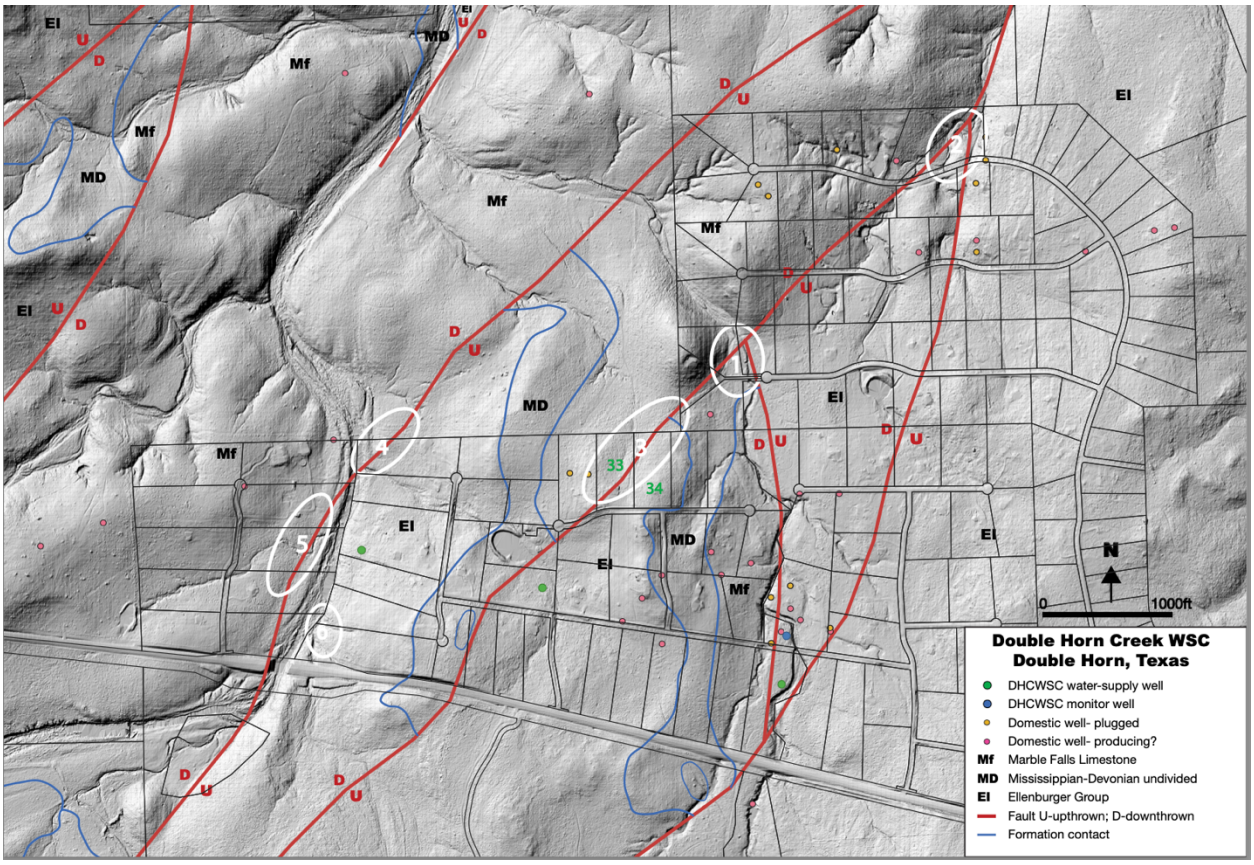

Figure1. Location map of the Double Horn Creek neighborhood.

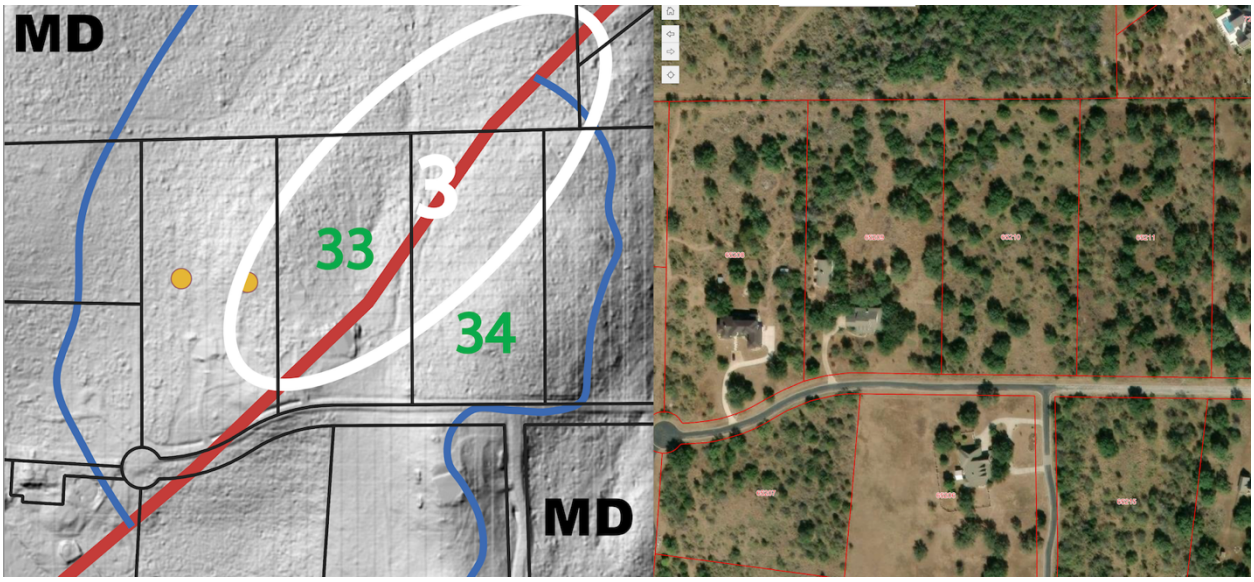

Figure 2. Inset from Figure 1 plus aerial photo with lot lines from Burnett County CAD.