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November 25, 2009
Revised: June 17, 2010

Mr. Tom Daly
TKB Properties, LLC
6364 Mighty Flotilla Ave.
Las Vegas, NV 89139

Re: Ground Water Consultation, 40-Acre, Mountain's Edge Property, El Paso County, Colorado.
Job No. 6671

Dear Tom:

At the request of your planner, Jim Byers with LDC, Inc., I have prepared this report on your 40-acre, proposed Mountain's Edge development. This property is located in the Southwest Quarter, Section 13, Township 12 South, Range 63 West, as approximately outlined on Figure-1. I understand you may be developing the property for five single family homes. As proposed the five future homeowners will be supplied water pumped wells tapping the Arapahoe aquifer. Individual wells may be the water supply or shared wells may make some economic sense. According to State Engineer's records, there is a Denver aquifer well on this property that bears Permit No. 225983. When the property is final platted this well will be plugged and abandoned. Engineered, evaporative septic systems will be the method of wastewater disposal.

Throughout this document I cross reference report information with requirements of the water supply report section of County Code No. 8.4.7(3). Code numbers and sections are in red italic inserts to illustrate where the report discusses specific requirements of the Code.

For this investigation I have reviewed my files and those of the State Engineer for geologic, ground water and well information in this area. Subsurface geohydrologic information was obtained from the findings of the Colorado Ground Water Commission in Determination of Water Rights Nos. 1483, 1484 and 1485-BD. These determinations were issued to TKB Properties, LLC who is the applicant for this subdivision *[(3)(c)(i)]*. From this investigation I conclude that (1) a sufficient supply of ground water is contained in the Arapahoe aquifer beneath the property to meet the 300-year water needs of this planned development, (2) the quality of the ground water in this aquifer should be adequate for domestic purposes and (3) the Arapahoe aquifer Determination of Water Rights will allow well permits to be

obtained for this project.

GENERAL COMMENTS

The subject property, at a surface elevation of 6,500 feet above sea level, is located in the Black Squirrel Creek drainage basin. The grass-covered land surface slopes to the south and the parcel is drained by Brackett Creek which is a Black Squirrel Creek tributary.

There are three of the four Denver Basin aquifers beneath this land and in descending stratigraphic order they are the Denver, Arapahoe and Laramie Fox Hills formations. The base of these respective aquifers should be at depths of 600, 1,100 and 1,700 feet below the ground surface. In this region all of these aquifers produce ground water and typical well yields for the three respective aquifers should be 15, 50 and 100 gallons per minute. Normally a domestic well yielding 10 gallons per minute is adequate for a single family home.

Ground water availability in each aquifer is computed by multiplying the area of the property by the formation saturated sand thickness, thence by specific yield (drainable porosity). Based on the findings of the Commission, I list on the table below estimates of ground water storage in each aquifer as determined by the staff of the Commission *[(3)(b)(ii), (3)(c)(i) and (3)(c)(iv)]*.

Aquifer		Sand Thickness (ft.)	Aquifer Storage (af)
Denver	NNT	255	1734
Arapahoe	NT	195	1326
Laramie Fox Hills	NT	260	1560

The quality of the water produced from Arapahoe wells is normally adequate for drinking purposes. The mineral constituents in the water are all generally below drinking water standards. Iron is, however, commonly present in this ground water at concentrations slightly higher than the drinking standard, thus prospective home buyers should be advised iron treatment may be necessary. Prior to final platting the project the County normally will require a quality analysis of water obtained from an on-site well. Since there is not likely to be an Arapahoe well within the ½-mile of the project as a requirement of the County, I suggest that you ask for a waiver of the water quality requirement for this aquifer until an on-site well can be drilled.

WATER SUPPLY DEVELOPMENT

Ground water in all of the above described aquifers receives very little surface water recharge hence the water resource has been identified as “non-renewable.” The El Paso County Commissioners, in the late 1980's, declared that developments using this water must demonstrate a 300-year supply in order to establish water supply sufficiency.

For this development the five homeowners will be served by either individual or cluster Arapahoe aquifer wells and the water use would be limited to 0.5 acre feet per year per home. This is the guideline rate set by the Upper Black Squirrel Designated Ground Water Management District and this would satisfy the in-house need of 0.3 acre feet per year. The remaining water would be sufficient for the irrigation of 3,000 square feet of lawn or garden plus the watering of two horses, if desired [(3)(b)(i)]. If the five homeowners each used 0.5 acre feet per year, the total water pumped over 300 years would be 750 acre feet or far less than the ground water stored in the Arapahoe aquifer [(3)(b)(iii)]. A copy of the Arapahoe aquifer Determination of Water Rights is attached.

This Determination of Water Rights allows any number of Arapahoe aquifer wells to be drilled on the property. The only well permit condition required by the Commission would be that two percent of the water pumped from the Arapahoe wells be relinquished to shallow soils beneath the property. If there any lawn/garden irrigation in the project this condition can be easily meet.

On the following table I summarize the needed water supply for this proposed development.

	No. of Units	Gallons per Day	Acre Feet per Year
Homes	5	1342	1.5
Irrigation	15000 sq-ft	769	0.86
Livestock	10 head	125	0.14
Total		2236	2.5

A 1,100-foot deep Arapahoe well would cost about \$16,500 plus pumping equipment. If at all possible individual Arapahoe wells are preferable. Shared wells are permitted by the Commission, thus the number of wells servicing the development is a business decision. As indicated Arapahoe wells in this area should yield at least 10 gallons per minute or nearly 30 times the average daily home water demand of 500± gallons [(3)(c)(IV)].

RECOMMENDATIONS

- (1) The existing Denver aquifer well, No. 225983, needs to be plugged and abandon upon final platting the property.
- (2) In platting the property care should be exercised to make sure individual wells can be spaced 400± feet apart to avoid mutual well interference.

This report does not cover Code requirements 3(b)(v), 3(c)(ii), 3(c)(iii), 3(c)(v) nor 3(c)(vi). These sections are either not applicable to this development or are beyond my field of expertise. Professional judgments have been expressed in this report. They are based on my understanding of the

project requirements and my experience with the aquifers in this area. Well construction and testing will be necessary to verify my preliminary conclusions on well yield and water quality.

I trust this information satisfies your immediate needs. If you have questions, please call.

Very truly yours,

Wm. Curtis Wells & Co.

A handwritten signature in blue ink, appearing to read "Wm. Curtis Wells", written over a horizontal line.

Wm. Curtis Wells, CPG
Consulting Ground Water Geologist

Cc: Jim Byers (via e-mail)