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**Via Email**

**April 21, 2021**

**To:** Pat O'Connell, Engineering Geologist; Nick Nelson, Senior Planner

**Cc:** Chris O'Keefe, Director; Heather Gutherless, Long Range Planner; Tim Buckley, Water Commissioner; PPNA board

**From:** John Wallack, Pleasant Park Neighborhood Association (PPNA)

**Subject:** Conifer Center Case No. 20-111200RZ Impact on Conifer Ground Water

Would the proposed Conifer Center Development of 188 DUs on a 47-acre parcel have a significant impact on Conifer's ground water resources? Is the 37,600 gallons per day (GPD) average demand sustainable? This proposal is out of character for Conifer and there has been no hydrologic evidence submitted showing that the ground water use is sustainable. Attached are three Water Availability Analyses (WAAs), based on 10-year averages, that raise doubts as to the sustainability of this proposal. If unfamiliar with a WAA, see Addendum A What is a WAA?

**Impact?**

The Conifer Activity Center currently has 355 dwelling units. The 188 DU represents a 53% increase in DUs. The Conifer Activity Center currently has a density of 0.25 DU/ac. The 4 DU/ac density is 16 times the current density. To evaluate sustainability, we must look at the trends of the community over several years and project the significant ground water demands based on centralized system performance.

Conifer is well-based; we do not have surface water sources (i.e. rivers/lakes). Recharge of the fractured rock aquifer is crucial to the sustainability of the ground water resources. Within the Activity Center we already have 377 wells. There are currently 3 centralized water systems along US285 Conifer Water Association (CWA), Conifer Metro District (CMD) and Aspen Park Metro District (APMD). The total production in 2020 for all 3 systems was 32,900 GPD (36.9 Acre Feet/Year). The 36,700 GPD (42.1 AF/Year) for this proposal alone would increase the demand 115% of this total – all concentrated next to CMD (Safeway Center). See Figure 1. This proposal would have a significant impact on Conifer's ground water resources and on the character of the community.

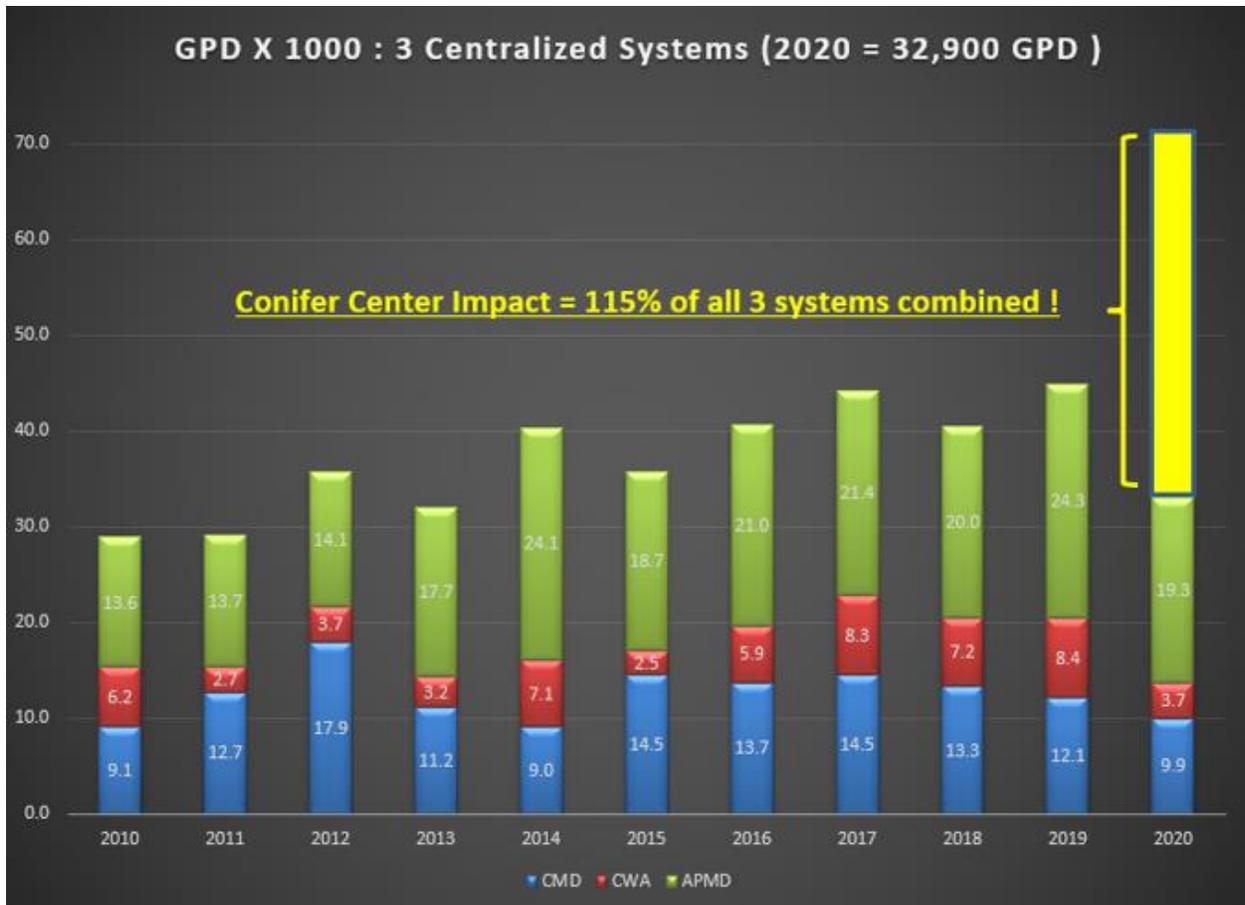


Figure 1. Centralized Systems in Conifer (CMD: WDID 0902542, APMD: WDID 0902710, CWA: WDID 0902519)

Based on the DWR meter data using total water recharged divided by total water pumped, the trend for the past ten years has been a decrease in recharge and a corresponding increase in “Release to Surface”.

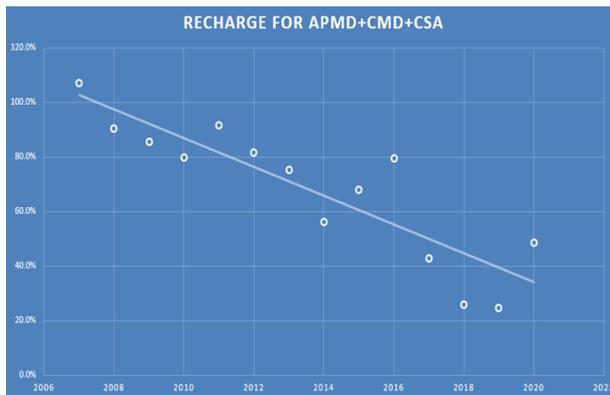


Figure 2. Combined Recharge

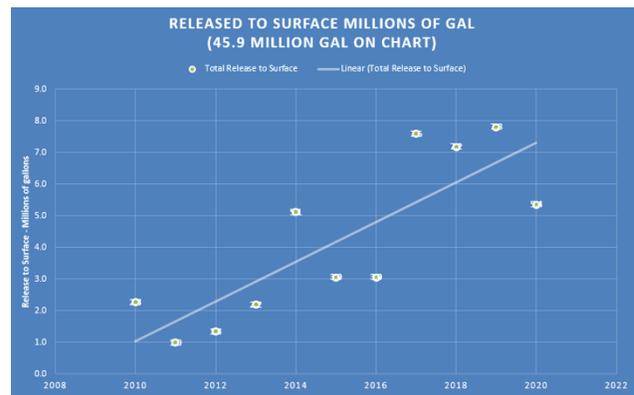


Figure 3. Combined Release to Surface

The groundwater “budget” relies on precipitation as input and is depleted by consumptive use. The timing, rate and form of precipitation all affect the penetration into the fractured rock aquifer. Only about 2 – 6% of the precipitation recharges the aquifer.<sup>1</sup> Jeffco uses 3.5% penetration (P) in its WAA. Water is pumped, used for various reasons, then most of the water is returned to the aquifer through septic systems, or for centralized systems through exfiltration galleries. The amount that is not returned is called consumptive use (CU). Virtually all water pumped and then released to surface represents CU to the ground water aquifer. For sustainability, it is necessary to balance recharge and CU. If ground water is over-allocated, the aquifer can be depleted over time. Jeffco Planning and Zoning have developed the WAA to analyze how much ground water has been allocated for a given area of interest. I have used this spreadsheet tool to evaluate the Conifer Center proposal. Three WAAs are attached.

The first WAA is an isolated look at the 47 acre parcel in a single sub-basin (magenta line on Fig.4). The sub-basin selection was recommended by Jeffco and using this single basin enabled matching the well listings.

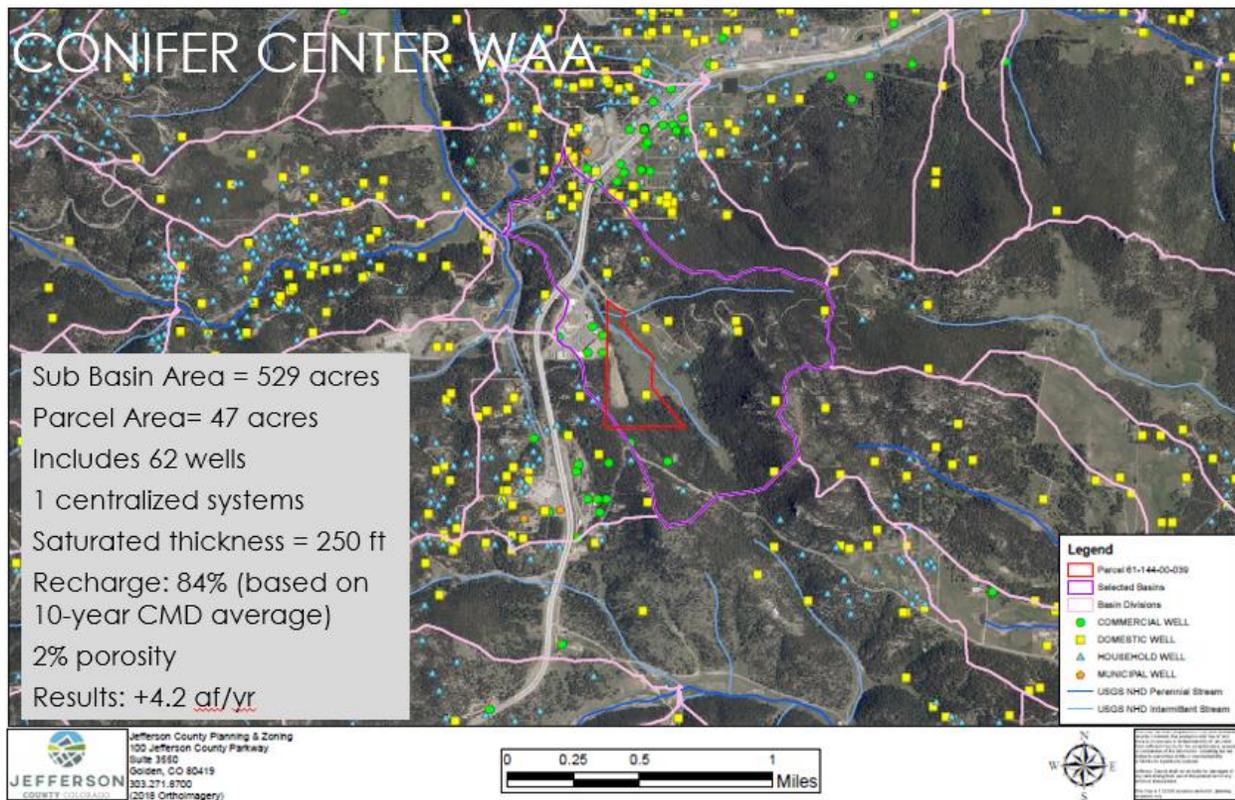


Figure 4. Single Sub-basin WAA of Conifer Center

<sup>1</sup> Upper Mountain Counties Aquifer Sustainability Project – Final Report  
Prepared for: Upper Mountain Counties Water Need Consortium: Clear Creek County, Gilpin County, Jefferson County, Park County. February 17, 2011 see 3.2.1.2 Fate of Precipitation in UMC Study Area ([https://www.clearcreekcounty.us/DocumentCenter/View/45/UMC\\_Aquifer\\_Sustainability\\_Study\\_Final\\_2011-02-17?bidId=](https://www.clearcreekcounty.us/DocumentCenter/View/45/UMC_Aquifer_Sustainability_Study_Final_2011-02-17?bidId=))

The result is positive for this single basin view of the development and would not indicate a problem with allocation of only 62 wells in this sub-basin. Six of the wells are monitoring wells, so 56 wells are taken into account over the 529-acre sub-basin. The recharge values are based on a 10-year average (83.6%) for CMD and the 10 water-year summaries are included in the WAA.

The second WAA was performed on the Conifer Activity Center. By widening the aperture, the affects of all three centralized systems and “release to surface” are considered. The Activity Center is 1399 acres and there are 9 sub-basins that intersect it. Sub-basin 3108 (South of the Activity Center) was not included because it is on the south side of a watershed boundary where the flow is out from Activity Center into Kennedy Gulch and would not provide catchment. The sub-basin area is 3601 acres, including 655 wells and 3 centralized systems. The water year 2020 values for total production and recharge (all 3 systems combined) were used: 36.9 AF and 48.6%.

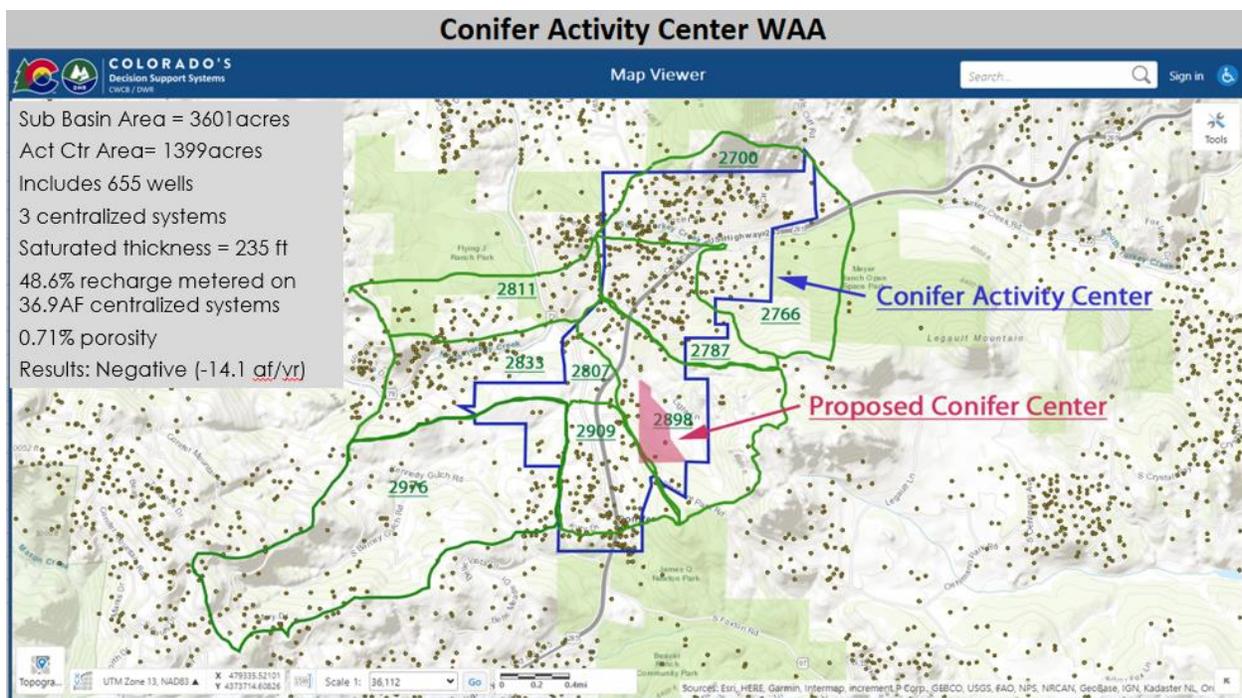


Figure 5. WAA of Conifer Activity Center

During the Turkey Creek study, fracture network orientation data from nine localities were collected along natural outcrops in the Turkey Creek watershed.<sup>2</sup> Porosities of rock types were modeled. Table 23 of the study lists mean porosities for the basic rock types in the area. The Bryant geologic map was used to calculate the porosity by rock type and this is included in the WAA.<sup>3</sup> The WAA result was negative (-14.1 af/yr) indicating that ground water may be over-allocated for the Activity Center.

<sup>2</sup> Hydrologic Conditions and Assessment of Water Resources in the Turkey Creek Watershed, Jefferson County, Colorado, 1998–2001, By Clifford R. Bossong, et.al. See (<https://www.jeffco.us/DocumentCenter/View/13162/USGS-Turkey-Creek-Watershed-Report-PDF?bidId=>)

<sup>3</sup> Reconnaissance geologic map of the Conifer quadrangle, Jefferson County, Colorado. Bryant, Bruce 1974



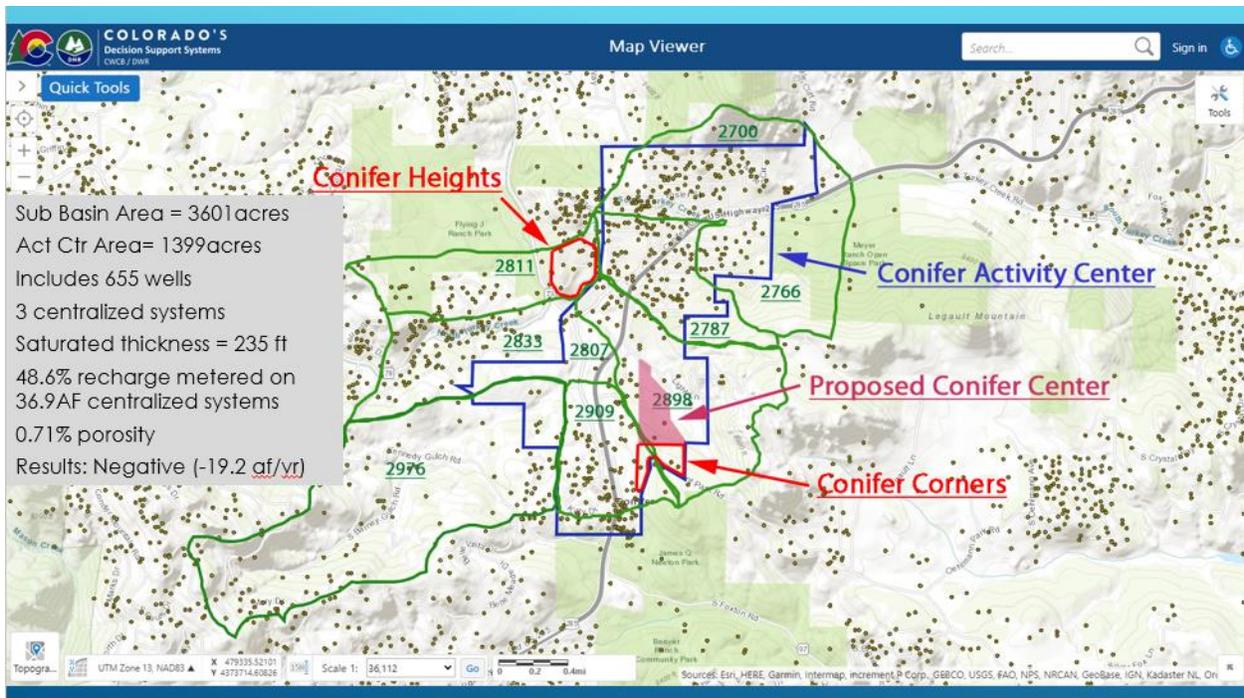


Figure 7. WAA of Conifer Activity Center including adjacent approved Planned Developments.

Considering what has already been approved, the total number of dwelling units is 328 for all three developments. The results of this WAA are negative (-19.2 af/yr) again, indicating that ground water may be over-allocated for the Activity Center.

**Summary:**

The Jefferson County Zoning Resolution established the Mountain Ground Water Overlay District in 2007. The Intent and Purpose is:

“to promote the public health, safety and general welfare of the citizens of Jefferson County by regulating land uses in order to maintain ground water resources. This District was established to address water resources in the fractured rock environment. “

Quoting again from the Rezoning paragraph:

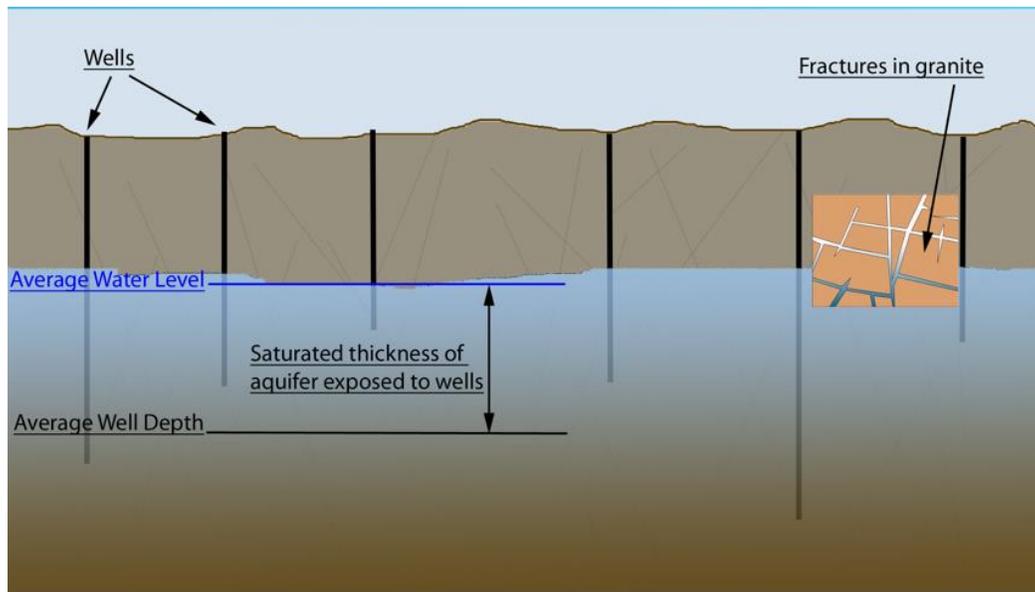
Demonstrate compliance with the Intent and Purpose of this District by providing well water supply information in accordance with the Water Supply Section of the Land Development Regulation. If an alternative water source is proposed, detailed plans shall be submitted for review. The Plans shall contain the information necessary to determine if the proposed source is a viable sustainable water source.

Although technically Conifer Corners and Conifer Heights have not violated Jeffco procedures, the Case Numbers are 16 and 12 years ago. Planning Commissioners and County Commissioners are forced to make Land Use decisions without addressing the viability or sustainability of the water

sources. There are no details of well locations, test results, or exfiltration gallery designs on these two adjacent high-density planned developments. There are no details for the Conifer Center proposal. The developer and/or CMD management have provided no detailed analysis. The WAA tool indicates that ground water has been over-allocated. I urge Planning Commissioners and County Commissioners not to approve a third high density development, which is larger than the two predecessors combined.

## Addendum A: What is a WAA?

A Water Availability Analysis (WAA) is an analysis tool that estimates: 1) the volume of water in an aquifer, 2) the recharge due to expected precipitation, and 3) total consumptive use (CU) depleting the aquifer. The WAA contains a groundwater budget which calculates precipitation inflow and consumptive use outflow over time. If the ground water resource is over-allocated, the CU will exceed the recharge. Well permit data is used as a basis. The WAA can also be described as a Well Allocation Analysis, as most of the wells are exempt from metering. The legal water allocation is used based on well type. For example a household use only well is allocated 1/3 acre-foot per year.



FigureA1. Saturated thickness diagram

Each well has a “depth to water” value and a “well depth” value. These are averaged and the difference between them is defined as the Saturated Thickness of the aquifer exposed to wells.

The Area of Interest will contain some number of household us only wells, domestic wells, commercial wells, etc. This area is projected down and define a volume of fractured rock aquifer. The porosity of the rock type X the volume of the aquifer will give an estimate of the volume of water in the aquifer.

The total CU is the number of each well type X allocation.

The recharge amount is the average precipitation (feet) X area (acres) X % penetration. For example, Jeffco uses 3.5% penetration factor. This is how much of the precipitation actually makes it down to the fractured rock.

Water Availability Analysis

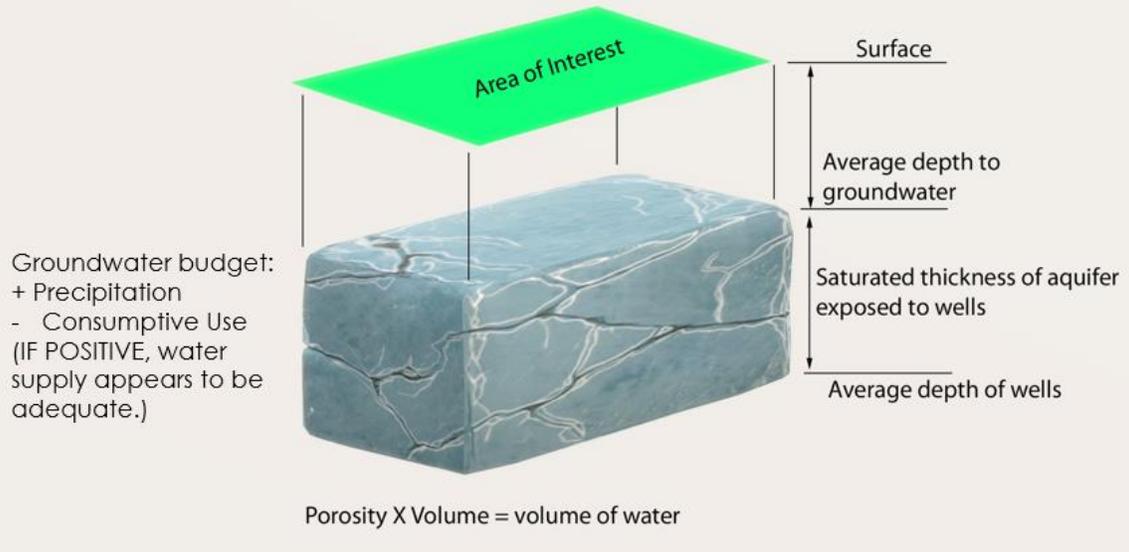


Figure A2. Volume of Aquifer