Eric J. Harmon, P.E.
Hydrogeologist

March 5, 2022

Douglas County Commissioners
100 3rd Street
Castle Rock, CO 80104

Re: RWR Proposal- please reject

Dear Commissioners Laydon, Teal, and Thomas:

Thank you for spending the time and effort to understand and evaluate the RWR proposal. The Renewable Water Resources (RWR) proposal to Douglas County to use ARPA funds should be rejected in favor of less risky projects. RWR's project would place undue risks on San Luis Valley (SLV) water users and ratepayers (water customers) in Douglas County. Why? For that, we need to get down into the weeds on the SLV aquifers.

The SLV aquifer system includes a shallow unconfined aquifer, then, going deeper, a series of clay-rich layers often called the blue clay series. Below that there is a confined aquifer, from which RWR intends to pump. All of the layers are hydrologically connected with each other and also, at many points, the aquifer system is connected to surface streams. Thus when you pump the aquifer at one point, it can affect other locations many miles away.

Confined aquifer tests in the SLV by my testing team were done as part of Colorado's Rio Grande Decision Support System (RGDSS) in the early 2000's. Our tests showed repeatedly that pumping impacts move outward from a confined aquifer well very rapidly, often causing drawdown (water level decline) up to ½ mile away within one day of pump startup. At several locations, pumping a deep well caused measurable drawdown in layers much shallower than the pumping zone. This is how confined aquifers work: drawdown spreads out very far, very fast. The SLV confined aquifer is "leaky". The clay layers between the unconfined and confined aquifers are seldom continuous, and water finds pathways. Will drawdown by RWR's wells cause injury to neighboring wells? Maybe. Will it affect streams or wetlands? Maybe. Those questions would need to be answered by the RGDSS computer model of the SLV aquifers.

Another concern: land subsidence. Down to about 3,000 feet in the northern SLV, the sediments that make up the confined aquifer are not hard rock, as we have in the Denver Basin bedrock aquifers. The SLV sediments are unconsolidated sand, gravel, silt and clay. The lack of consolidation causes consequences when there is concentrated pumping of the confined aquifer. Over long term pumping the clay layers give up their water to the adjacent, more-permeable sand and gravel layers, and begin to "deflate" and become more compact. Clay compaction, if it is not reversible, causes the land surface to drop or "subside." Will this happen? Almost certainly yes: RWR's pumping will drop confined aquifer levels in their wellfield area below where they have ever been before. My RGDSS testing team directly measured compaction when we pump-tested SLV confined aquifer wells. Will clay compaction and resulting land subsidence be severe enough

to cause injury after decades of RWR pumping? I do not know. I believe RWR does not know, either. It is unknown, and this is important. We are on the ragged edge of our understanding about the behavior of the confined aquifer, and thus the risk of land subsidence is a real concern. The Water Court in Alamosa has previously recognized this concern.

Another concern: the quality of RWR's pumped water may become worse over time. In the San Joaquin Valley, California, geologically similar to the SLV, Arsenic in pumped water has been shown to increase during pumping. Does naturally occurring Arsenic exist in SLV aquifer water? Yes. Will injurious water quality changes occur due to RWR's project? I do not know. I believe RWR does not know, either. Thus it is a potential risk.

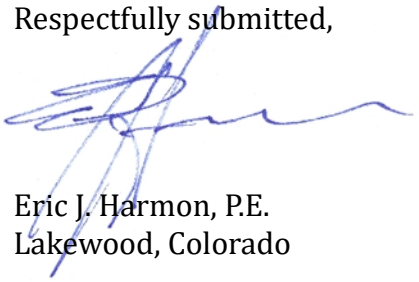
RWR pumping would be very long term. Once water is diverted for a town or a city's use, it never stops. It cannot stop. When Douglas County has a new water supply it will be used for decades, perhaps for generations. Potential long-term effects, poorly understood now due to the limitations of our scientific knowledge, may crop up as injury many years in the future.

If any of these unintended consequences eventually causes injury or increases costs, who bears the burden? Higher-than-planned pumping, treatment, storage, or conveyance costs would likely be borne by ratepayers in Douglas County. Other long-term impacts of RWR, such as land subsidence or excessive drawdown, would be borne by the SLV community.

RWR will argue that these risks are so small that they are inconsequential. This is not my first rodeo. It is not the SLV's first rodeo. We have heard it before. RWR will also argue that these down-in-the-weeds technical issues are exactly why Douglas County should partner with them and clear the way for RWR's application to be heard in Water Court. Not so. There are other proposed water projects seeking ARPA funding that do not place undue long-term risks on either the SLV community or Douglas County ratepayers. I strongly advise the Douglas County Commissioners to reject RWR's proposal and instead focus on less risky projects.

The opinions expressed in this letter are my own. I am retired, and represent no one except myself. The content of this letter was submitted to the Douglas County News Press as an Op-Ed.

Respectfully submitted,



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Eric Harmon was a founding member and for many years a Principal of HRS Water Consultants, Inc. of Lakewood, CO. He has extensive experience as a consulting hydrogeologist and water-resources engineer. He has over 40 years of project experience in the San Luis Valley, the Front Range, and elsewhere in Colorado and the Intermountain West. He has given expert testimony in the Division 3 Water Court (San Luis Valley) in the AWDI case (1991), the Confined Aquifer New Use Rules case (2006), the Great Sand Dunes In-Place Groundwater Right case (2008) and the Groundwater Rules case (2018). He was the leader of the groundwater

component of the RGDSS. He holds a Bachelor's in Geophysical Engineering and a Professional degree in Hydrogeology, both from the Colorado School of Mines. He is a registered Professional Engineer in Colorado. He is retired from active practice, and lives in Lakewood, Colorado.