

Conifer Heights Rezoning Application

A De facto Potable Reuse is Apparently Intended for Development

at

Conifer Heights

Executive Summary: The important points described herein for the Jefferson County Board of County Commissioners are as follows:

Unique Development Environment Presents Serious Risks to the Community — High-density development along the Conifer / US 285 Corridor risks accelerating the already critical depletion and contamination of the scarce groundwater resources contained within the distinctive geology and topography of the fractured crystalline bedrock aquifers in the area. The currently allowable density for Planned Developments within the Conifer Activity Center of four dwelling units per acre has proven not to be viable.

Conifer Metropolitan District Operations Pose a Health Risk to the Community — As currently designed and constructed, treatment processes utilize treated wastewater containing significant levels of contaminants to recharge the aquifer beneath Conifer Town Center whereupon that same water is once again pumped to become the new drinking water supply, thus creating a serious health risk for the community.

Conifer Heights Intended Water System Will Pose a Health Risk to the Community — The applicant apparently intends to design and construct an onsite community drinking water system that emulates the described model at Conifer Town Center — such a system will create a serious health risk for the community.

County Commissioners Must Not Ignore the Real Concerns of the Community — During the 2004 - 2005 site application process for the Conifer Metropolitan District and the rezoning application for Conifer Town Center, many community members and groups raised the same concerns we describe in our comments; however, their well-reasoned letters of concern and hearing testimony were essentially ignored. The Jefferson County Board of County Commissioners must not let that happen in this case.

Introduction: With respect to the Conifer Heights rezoning application for material modifications to the current Planned Development (PD) at 10250 County Highway 73, Conifer CO: The proposed Official Development Plan (ODP) submitted by the applicant does not address the siting of the considerable facilities that are required for the delivery of safe drinking water to the proposed buildout of 101 Dwelling Units (DUs); therefore, we must make certain reasonable assumptions in this regard.

First, we define two general types of potable reuse systems, the requirements for their construction, how they are intended to be operated, and the necessary public

engagement steps that must be completed before potable reuse systems using reclaimed water (also known as recycled water) can be considered for approval as a public water distribution system.¹

Next, we examine the operational history of Conifer Metropolitan District, a *de facto* potable reuse system that has been in operation at the Conifer Town Center in Conifer, CO since 2005 until the present, with mixed success.

Finally, we describe the possible impacts to the public health in the applicant is permitted to install a *de facto* potable reuse drinking water treatment and distribution system at Conifer Heights when contaminant-bearing effluent is used to recharge the local aquifer.

Types of Reclaimed Water Systems: The United States Environment Protection Agency (EPA) published *2012 Guidelines to Water Reuse*, defines a number of terms used to describe both potable and non-potable reuse systems.

- **De facto Reuse:** A situation where reuse of treated wastewater is, in fact, practiced but is not officially recognized (e.g., a drinking water supply intake located downstream from a Waste Water Treatment Plant (WWTP) discharge point).
- **Indirect Potable Reuse (IPR):** Augmentation of a drinking water source (surface or groundwater) with reclaimed water followed by an environmental buffer that precedes drinking water treatment.
- **Direct Potable Reuse (DPR):** The introduction of reclaimed water (with or without retention in an engineered storage buffer) directly into a drinking water treatment plant, either collocated or remote from the advanced wastewater treatment system.
- **Potable Reuse:** Planned augmentation of a drinking water supply with reclaimed water.
- **Non-Potable Reuse:** All water reuse applications that do not involve potable reuse.

Whenever potable reuse system designs are considered as an element of a public drinking water system, best practice is that the local community must be involved at every step.

Conifer Metropolitan District Operations: The Conifer Metropolitan District (CMD)

¹ In those states that have considered potable reuse, reclaimed water is defined as water discharged from a wastewater treatment plant from incoming commercial and/or residential wastewater that has been treated by the plant to remove impurities such as human excreta, poisonous chemical compounds, and other harmful contaminants to a specified level of water quality. For states that have developed community health regulations for potable reuse systems, water quality levels are generally defined for each water reuse application. For example, water reused for agricultural irrigation will have a higher quality level than water intended for use as part of an industrial process where human exposure has been eliminated. For information regarding potable reuse systems, please see: [EPA Potable Reuse Webpage](#).

was approved for operation by the Colorado Department of Public Health and Environment (CDPHE) in 2005 to serve the more than 300,000 ft² business complex located at the 39-acre Conifer Town Center site.²

Drinking Water Treatment Operations — As shown in Figure 1, in accordance with the water decree issued by the Colorado Water Court in Case Number 01CW161, CMD operates up to 5 groundwater wells which may withdraw up to 20.48 acre-feet of water per year from the fractured crystalline bedrock aquifer beneath Conifer Town Center with the provision that 95% of the water withdrawn is used to recharge the aquifer — the remaining 5% is allotted to so-called consumptive use, that is, it is considered to be depleted from the aquifer.

The groundwater withdrawn by (up to) 5 pumping wells is treated by the Drinking Water Treatment Plant, to potable quality levels using processes that must be approved by CDPHE ensure compliance with state water quality standards, and then the finished water is distributed to CMD customers onsite. As shown in Figure 1, the 5 pumping wells draw down the pre-development watertable creating a cone of depression. Importantly, aquifer groundwater is mixed with the non-potable, contaminant-bearing treated wastewater (effluent) that is discharged from the CMD WWTP.

² The CMD Drinking Water Treatment system is regulated as a non-community water distribution system by the EPA under the Safe Drinking Water Act and the CDPHE under the Safe Drinking Water Act of Colorado pursuant to Regulation 11.

Conifer Metropolitan District Operations

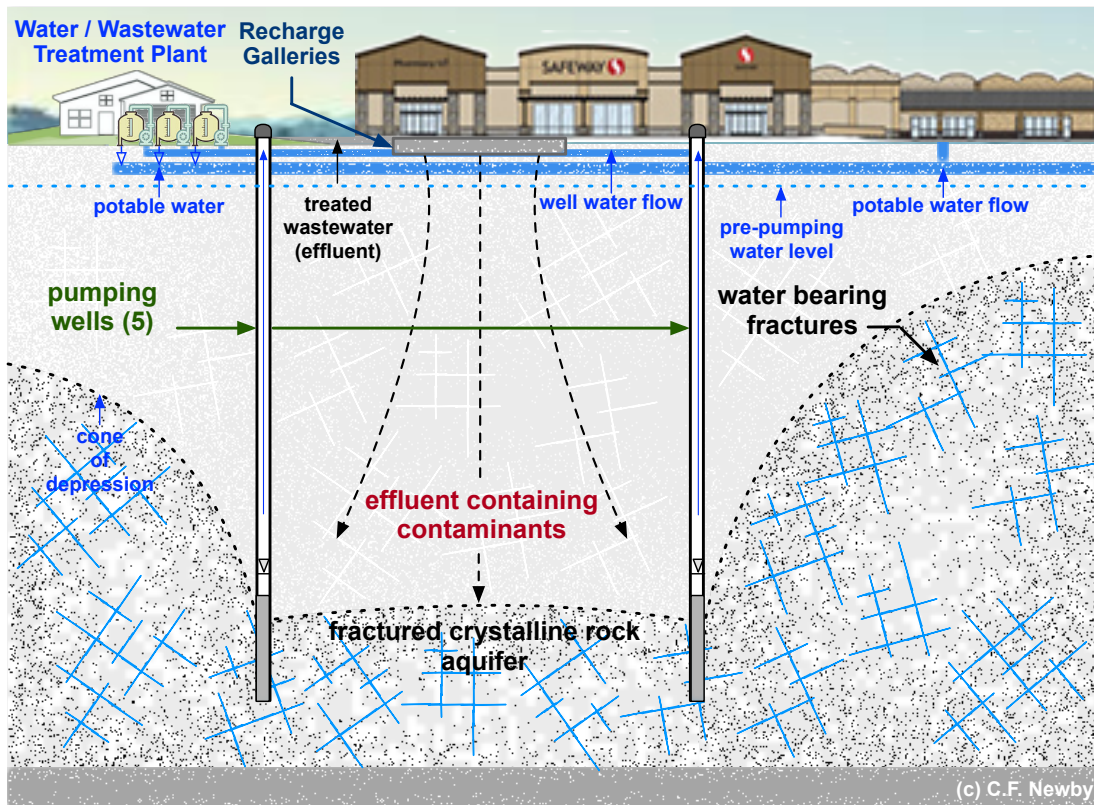


Figure 1: Operation of the Conifer Metropolitan District's *De Facto* Potable Reuse Drinking Water and Wastewater Treatment Systems at Conifer Town Center.

Such mixing of aquifer groundwater with contaminant-bearing effluent within the fractured bedrock over horizontal distances of 100 ft or less, creates a smaller volume of increasingly contaminated groundwater from which the 5 pumping wells must withdraw new, unfinished water for treatment by the CMD Drinking Water Treatment Plant. Since the groundwater now contains Contaminants of Concern (COC) including: trihalomethanes³ (THM) along with haloacetic acids³ (HAA5) due to over-chlorination, bacteria, pharmaceuticals, endocrine disruptors, unregistered chemical compounds from personal care products, and viruses, given the level of treatment specified in its current utility plan, the operation of CMD as a *de facto* potable reuse system poses a health risk to the community it was designed to

³ Trihalomethanes at high levels over many years have been shown to increase the risk of developing bladder, rectal, and colon cancer as well as adverse developmental and reproductive effects for women during pregnancy – the health effects due to haloacetic acids are similar to those of trihalomethanes.

serve.⁴ Critically, community members with immature or compromised immune systems, including newborns and the elderly, as well as smokers, diabetics, and people with autoimmune disorders, are most at risk.

In order to protect public health, it is imperative that all potable reuse drinking water systems are intentionally designed in accordance accepted standards.

In accordance with Table 4-4 of EPA 2012 *Guidelines for Water Reuse*, the following prerequisite wastewater treatment steps are required for Indirect Potable Reuse drinking water systems:

1. Secondary treatment should produce effluent in which both the Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) do not exceed 30 mg/L.
2. Filtration by passing wastewater through natural undisturbed soils, filter media such as sand, and/or membrane processes.
3. Disinfection through the inactivation of pathogen by chlorination, UV, or membrane processes.
4. Advanced wastewater treatment processes may include carbon adsorption, reverse osmosis and other membrane processes but must be to potable levels. *CMD does not meet this requirement since treatment is not to potable levels.*
5. Distance to nearest potable water extraction well that provides a minimum of 2 months retention time in the underground. *CMD does not meet this requirement since water can move in a fractured rock system up to hundreds of feet per day.*

The CMD *de facto* IPR drinking water system does not meet requirements 4 or 5; therefore, the system is not properly protective of public health.

Compliance History — Between 2005 and 2019, the CMD Drinking Water Treatment Plant has frequently been out of compliance Colorado Water Quality Control Act in one or more of the following areas:

- Total Trihalomethanes (TTHM) - Exceeded Maximum Contaminant Level (MCL)
- Haloacetic Acids (HAA5) - Exceeded Maximum Contaminant Level (MCL)
- Volatile Organics - Failure to Monitor and Report

Wastewater Treatment Operations — Wastewater produced at Conifer Town Center as well as at Conifer Sanitation Association, a CMD external customer, are both currently treated by the CMD WWTP using the following processes: 1) primary treatment; 2) secondary treatment using the Zenon filtration system; 3) UV light attenuation of bacteria and viruses; and 4) a lift station that pumps the effluent to the recharge galleries.

Since the CMD Wastewater Treatment Plant effluent is pumped to the four recharge galleries beneath the Safeway parking lot for recharge of the fractured bedrock aquifer, the groundwater beneath will be, in addition to the described COC, laden with Total Dissolved Solids (TDS) levels exceeding the maximum contaminant level.

⁴ While the health risks associated with the listed contaminants has been well established for some time, the level of risk to the community served by CMD is unknown due to the fact that, except for bacteria and THM, neither the EPA, CDPHE, nor Jefferson County Public Health have ever required testing for the other Contaminants of Concern listed. Additionally, unknown levels of protozoa and fungi may exist from time-to-time in the groundwater reclaimed from an aquifer of this type.

Compliance History — Between 2005 and 2019, the CMD Wastewater Treatment Plant has frequently been out of compliance Colorado Water Quality Control Act in one or more of the following areas:

- Total Dissolved Solids (TDS) - Exceeded Maximum Contaminant Level (MCL)
- Five-day BOD (BOD5) - Failure to Monitor and Report
- Spill Report 6-22-15 - Raw Wastewater Spilled into North Turkey Creek
- Spill Report 2-13-18 - Raw Wastewater Spilled into North Turkey Creek
- Numerous Citizen Reported Spills 2005 - 2018

Additionally, in May of 2018 the State Engineer Office (SEO) issued a Notice of Accounting Review wherein the SEO cited CMD with 12 major water account reporting violations, putting the facility in substantial material violation of its water decree, requiring the SEO to "red-tag" the Safeway Car Wash at Conifer Town Center.

Movement of Aquifer Groundwater — There has been considerable debate regarding the possible movement of the groundwater in the area, which includes the treated wastewater used for recharge, within the aquifer beneath Conifer Town Center. Figure 2 below shows the two possible cases predicted by expert hydrogeologists: 1) green arrows in the case where groundwater movements are 100 ft or less or 2) blue arrows in the case where groundwater is predicted to move beyond the property boundaries.

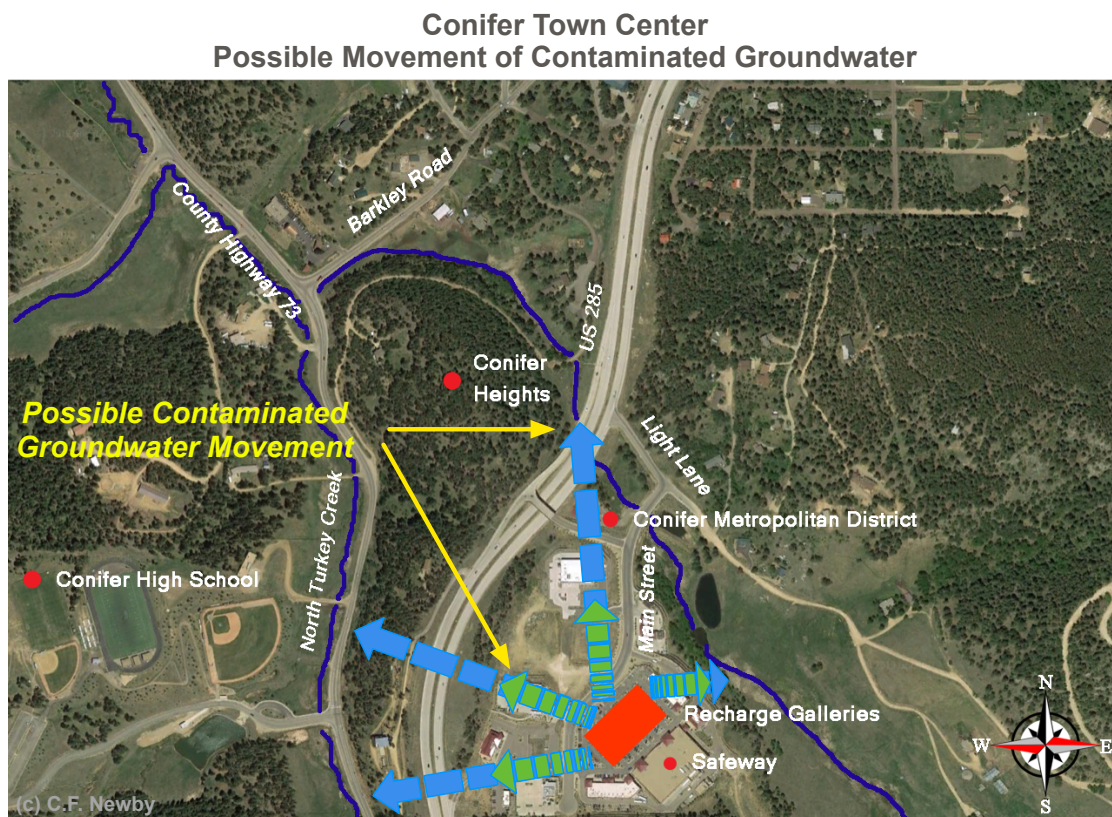


Figure 2: Possible Movement of Contaminated Groundwater: 1) Green Arrows, 100 ft or Less and 2) Blue Arrows, Beyond Property Boundaries.

During the trial in Colorado Water Court Case Number 01CW161, the two hydrogeologist who testified as expert witnesses came to differing opinions: the

hydrogeologist for the Applicant, James Jehn of Jehn Water Consultants, told the Court that the treated wastewater sent to the recharge galleries from the CMD WWTP would directly enter the fractured bedrock aquifer, be pulled by gravity downward, and then create a mound of water over the watertable directly below and would not move laterally. Thus in the opinion of Mr. Jehn, the CMD effluent contaminated with the previously described COC will tend to be concentrated in the aquifer, whereupon, it will mix with that contaminated groundwater already present for immediate withdrawal by the 5 wells pumping new groundwater to the Drinking Water Treatment Plant.⁵

Differing with Mr. Jehn, in the opinion of the hydrogeologist for the Opposers, Catherine Kraeger-Rovey, PhD, the CMD effluent would tend to follow fractures in the bedrock, both vertically and horizontally, eventually flowing into the aquifer and also into the groundwater that supports unprotected streams and wells beyond the property boundaries. Thus in the opinion of Ms. Kraeger-Rovey, the CMD effluent contaminated with the described COC will tend to, not only mix with the local groundwater, but also move away laterally, following local topographic contours.⁶

In the first case, the contaminated CMD effluent stays within the local aquifer to become ever more concentrated, while in the second case, contaminated effluent moves in the groundwater beyond Conifer Town Center property boundaries and into local unprotected streams and wells, risking public health within the community in either case.

With its designation as a non-community water system, it is intended that Conifer Town Center tenants, their employees, and customers will drink the water supplied by the CMD drinking water system somewhat less often; however, given the fact that the aquifer groundwater is being continuously contaminated with COC without effective environmental buffering and the possibility that contaminated groundwater may move beyond property boundaries, it is clear that, in order to

⁵ Mr. Jehn, for the Applicant, stated in the proceeding, "The infiltration galleries would infiltrate water into the granitic and metamorphic materials that they penetrate, and that water will go down into the water table. What will happen once that gets to the water table that [sic] will create a mound that I previously spoke about, mounding the water level some distant out from those infiltration galleries. ... It won't flow out the side like it was suggested. It's going to mound here."

NOTE – In the present case, the terms "infiltration galleries" and "infiltrate" are synonymous with the terms "recharge galleries" and "recharge", respectively.

⁶ In response to a question during examination, Ms. Kraeger-Rovey, for the Opposers, stated in the proceeding, "It's an illustration of how recharge affects an aquifer, and this is commonly known as groundwater mounding. You have recharge coming down. It raises the water table. When it reaches the water table, it builds it up, and then it creates a gradient and instead of staying right there, the water tends to move laterally and responds to the gradient that's been created. And lateral flow – the horizontal [component] compliment [sic] of this, you can see, it's not straight sidewise. The horizontal [component] compliment [sic] of that is lateral [f]low [sic]."

protect public health, Jefferson County Public Health must impose advanced wastewater treatment system requirements on CMD.

Financial Position — The construction of CMD facilities and initial operations were financed by two series of general obligation bonds totaling a face value of \$13M. FirstBank Holding Company (FirstBank) issued the CMD bonds; however, after initial claims of incompetent management at CMD filed with the Court in 2015, FirstBank found it necessary to activate a provision in their bond agreement such that in 2016 the Jefferson County District Court put CMD into receivership by appointing Ed Cordes of Cordes and Company facility receiver.

A short period of time after the Court placed CMD into receivership, FirstBank sold its entire bond holdings, at a deep discount, to Colorado BondShares; however, according to a 2018 audit of its balance sheet, CMD indebtedness is more than \$31M and increasing approximately \$500,000 per year due to an inability to pay down bond interest.

The poor financial position of CMD has been exacerbated by the fact that the occupancy at Conifer Town Center is now only a fraction of that originally projected. However, CMD hopes to recover financially by charging a \$9.5M (or more) in connection fees for the combined 450 DUs that are proposed for the Conifer Heights, Light Lane [now called Conifer Commons], and Conifer Corners developments.

De Facto Potable Reuse Intended for the Proposed Development at Conifer Heights: Inexplicably, the subject rezoning application Official Development Plan (ODP) for the proposed new development at Conifer Heights does not address the requirement to create a community drinking water and distribution system; however, apparently the applicant intends to install a *de facto* potable reuse Drinking Water Treatment Plant onsite. Importantly, as we have already seen in the case of the CMD *de facto* potable reuse system at Conifer Town Center, such a system will impose an unacceptable public health risk on the surrounding community.

Drinking Water Treatment Operations — As shown in Figure 3, in accordance with the water decree issued by the Colorado Water Court in Case Number 07CW88, a proposed development at Conifer Heights is permitted to operate up to 8 groundwater wells which may withdraw up to 16 acre-feet of water per year from the fractured crystalline rock aquifer beneath Conifer Heights with the provision that 95% of the water withdrawn is used to recharge the aquifer — the remaining

5% is allotted to consumptive use.^{7 8}

In this case, the groundwater withdrawn by 8 pumping wells is treated by the Drinking Water Treatment Plant to potable quality levels using processes approved by CDPHE to ensure treatment to potable levels and then distributed to 101 DUs onsite. However, as shown in Figure 3, aquifer groundwater is mixed with the non-potable, contaminant-bearing effluent that is returned from the CMD Wastewater Treatment Plant. Such mixing of aquifer groundwater with contaminant-bearing effluent within the fractured bedrock over horizontal distances of 100 ft or less, creates a smaller volume of increasingly contaminated groundwater from which the 8 pumping wells must withdraw new, unfinished water for treatment by the Drinking Water Treatment Plant.

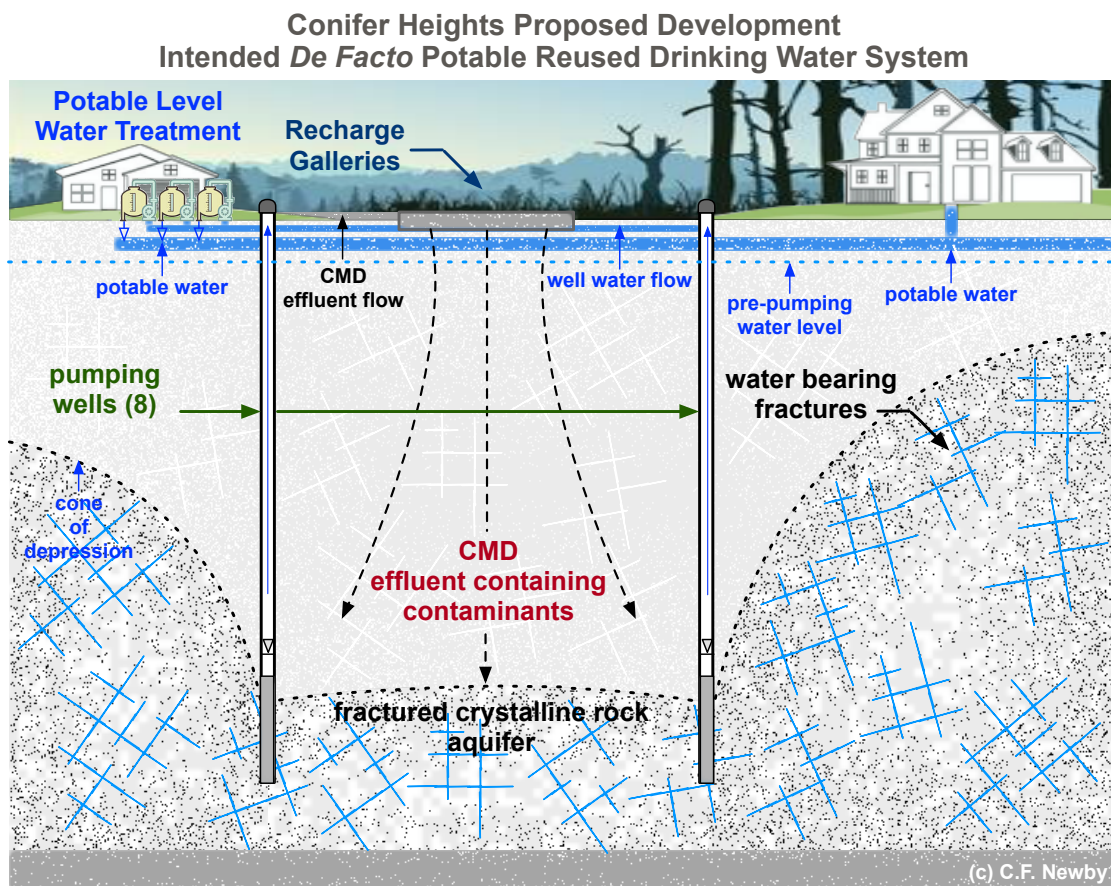


Figure 3: Operation of *De Facto* Potable Reuse System Intended for the Conifer Heights.

⁷ In this case, the applicant's water decree dictates that the CMD effluent created by processing wastewater from the proposed development must be recharged into the aquifer located beneath Conifer Town Center; however, the district is unable to do so and thus, the applicant must apply to the Court for a water decree modification.

⁸ A Drinking Water Treatment system for the proposed development at Conifer Heights would be regulated as a community water distribution system by the EPA under the Safe Drinking Water Act and the CDPHE under the Safe Drinking Water Act of Colorado pursuant to state Regulation 11.

Since the groundwater now contains the COC contained in CMD effluent; i.e., Total THM (TTHM) along with HAA5 due to over-chlorination, bacteria, pharmaceuticals, endocrine disruptors, unregistered chemical compounds from personal care products, and viruses, the operation of the Drinking Water Treatment Plant intended for Conifer Heights will be yet another *de facto* potable reuse system that poses an even greater, but yet unquantified, health risk to the community that it would serve. Again, community members with immature or compromised immune systems, including newborns and the elderly, as well as people with illnesses, will be put at most risk.

Importantly the *de facto* IPR drinking water system intended for Conifer Heights does not meet EPA 2012 *Guidelines for Water Reuse* requirements for advanced wastewater treatment to potable levels and sufficient environmental buffer; therefore, the system is not properly protective of public health.

Movement of Aquifer Groundwater — Figure 3 below shows the two possible cases predicted for groundwater movement: 1) green arrows in the case where groundwater movements are 100 ft or less or 2) blue arrows in the case where groundwater is predicted to move beyond the property boundaries.

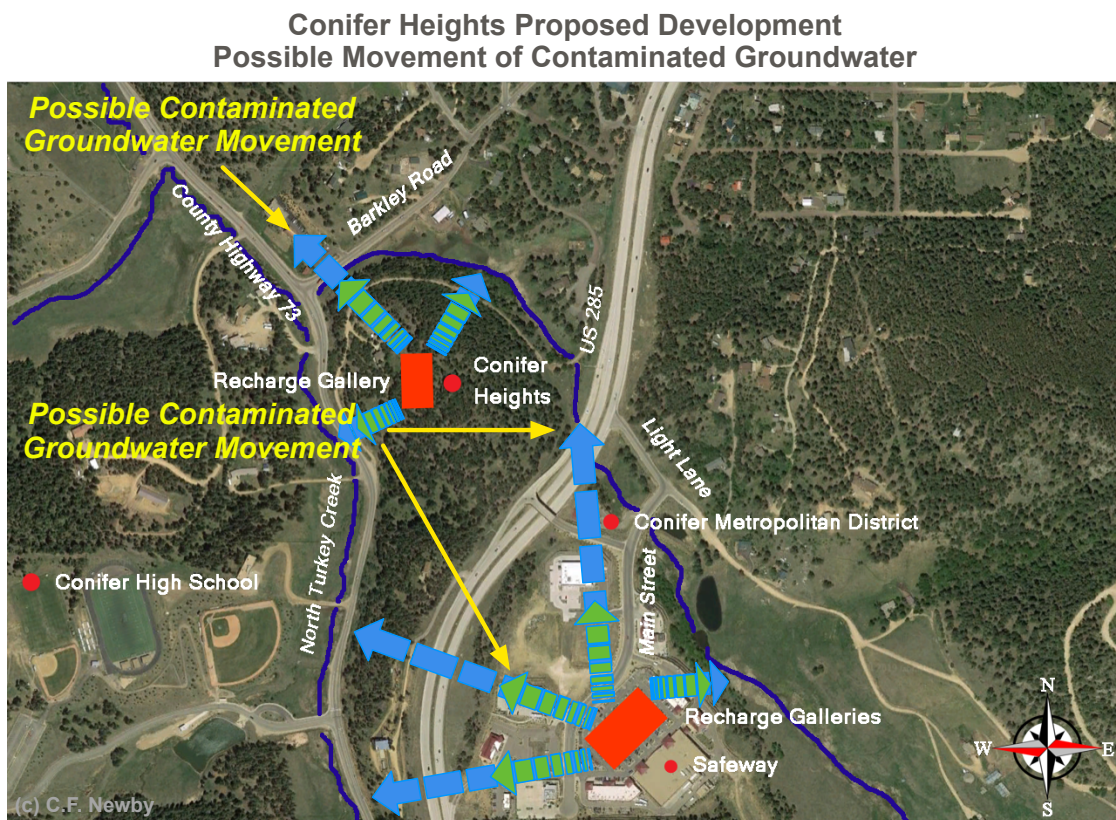


Figure 4: Possible Movement of Contaminated Groundwater: 1) Green Arrows, 100 ft or Less and 2) Blue Arrows, Beyond Property Boundaries.

Once again, in the first case, the contaminated effluent returned from CMD stays within the Conifer Heights aquifer to become ever more concentrated while, in the second case, contaminated effluent moves in the groundwater beyond the property

boundaries and into the unprotected stream and wells, risking public health within the community in either case.

In order for the *de facto* IPR Drinking Water Treatment Plant to produce uncontaminated potable water for the development at Conifer Heights, Jefferson County Planning & Zoning must require that the effluent returned from CMD undergo advanced wastewater treatment, for example, reverse osmosis for removal of COC.

Summary Conclusions and Requested Actions: In these comments we have addressed several of the important, unintended public health consequences that have occurred due to the lack of proper planning for the potable water supply at Conifer Town Center.

1. We have shown that the Drinking Water Plant at CMD was designed as a *de facto* IPR system that does not meet EPA design requirements in two critical respects:
 - i. CMD does not utilize advanced wastewater treatment technologies that can produce water at potable levels thus the plant produces effluents with significant levels of contaminants.
 - ii. While these effluents are then used to recharge the local aquifer; however the contaminants are not removed by an environmental buffer before being pumped again for use as new drinking water — this cycle creates a serious risk to public health. We have also shown that it is possible for these contaminants to move with the groundwater beyond the property boundaries. These facts necessitate that Jefferson County Public Health — in coordination with CDPHE — impose advanced wastewater treatment system requirements on CMD for the removal of contaminants. While the installation of advanced wastewater treatment technologies at CMD require some effort and expense, protection of the health and welfare of the Conifer community must be Jefferson County's highest priority.
2. Additionally, we have shown that the Drinking Water Plant intended for the development at Conifer Heights will be a *de facto* IPR system that , once again, does not meet EPA design requirements in the two critical respects previously described. In fact, the lack of an environmental buffer is even more acute in this case due to the smaller, 25-acre property footprint and the even closer proximity of nearby wells. Clearly, these facts necessitate that Jefferson County Public Health require that the applicant in this case, as well as others that may be contemplating utilization of wastewater treatment services at CMD, be required to incorporate advanced wastewater treatment technologies which will remove the previously described contaminants at CMD. In order to protect the health and welfare of current and future residents of Conifer, it is critical that Jefferson County take these recommended actions.
3. Finally, it is critically important to understand that high-density development along the Conifer / US 285 Corridor risks accelerating the already critical

depletion and contamination of the scarce groundwater resources contained in the distinctive geology and topography of the local fractured crystalline bedrock aquifers. The currently allowable density for Planned Developments within a so-called Activity Center of four dwelling units per acre has proven not to be viable.

Given the serious public health risks described in these comments, it is inconceivable that either Jefferson County Public Health or CDPHE would approve a potable reuse drinking water system for a high-density development that must rely upon a fractured crystalline bedrock system for its drinking water supply.

Still, it is very important to note here, that during the site application review and approval processes for the Conifer Town Center and CMD proposals, many community members wrote letters of concern to Jefferson County Public Health, to Planning & Zoning, and to the Board of County Commissioners; wrote letters of concern then called the appropriate staff at CDPHE; and, finally, they testified at the Jefferson County Planning Commission and Board of County Commissioners hearings regarding the very same issues we have raised here but, unfortunately, these concerned community members were essentially ignored.⁹

[Updated July 1, 2020]

⁹ For example, please see the March 20, 2005 letter of concern from Mr. Brewster Caesar to the CMD site application staff at CDPHE wherein he states, "In water court, James Jehn, water consultant for VEC [VEC was renamed to 'Conifer Town Center'] described how the project proposes to use its own effluent. The treated effluent will go straight into the fractured bedrock aquifer from which the development withdraws its drinking water and then will be pumped again for reuse by the development." Also, please see the February 6, 2003 letter from Ms. Claire Levy, Attorney at Law, representing Preserve Our Mountain Community, the Aspen Park Improvement Association, and Concerned Citizens of Conifer wherein she informs the Commissioners that community members continue to be very gravely concerned regarding the proposed use of CMD effluent to recharge the local aquifer. (Used with permission.)