

Dylan Monke, Planner  
Jefferson County Planning & Zoning, suite 3550  
100 Jefferson County Parkway  
Golden CO 80419  
VIA EMAIL

May 4, 2023

To: Dylan Monke, Planner, Jefferson County Planning and Zoning Division  
Cc: Chris O'Keefe, Director; Russ Clark, Planning Supervisor; Pat O'Connell, Engineering Geologist; Nathan Seymour, Planning Engineer Jefferson County Planning and Zoning Division; Tracy Volkman, Environmental Health Specialist Jefferson County Public Health; Jacob Ware, Fire Chief Elk Creek FPD; Roger Parker, Fire Marshal Elk Creek FPD; Melissa Baker, Director Elk Creek FPD; Chuck Newby, Director Elk Creek FPD; Greg Pixley, Elk Creek FPD Director; Kent Wagner, Elk Creek FPD Director; Sharon Woods, Director Elk Creek FPD; Hal Gieb, Emergency Management Director, Jefferson County Sheriff's Office; Abel Montoya, Jefferson County Transportation and Development; Lawrence Oletski, CPT Colorado State Patrol; Randi Johnson-Hufford, Permits Section Manager CDPHE; Local Referral CDPHE; Joanna Williams, Chief of Water Supply; Sara Brucker, Water Resources Engineer, Tim Buckley, Water Commissioner, Division of Water Resources; Tim Reed, Jefferson County Public Schools, Executive Director Facilities & Construction Management; Louise Decker, President South Evergreen Water District; Ann English, President Evergreen Meadow HOA; Dave Hartvigsen, Board President The Timbers Estates Metropolitan District; Samantha Kepley, Board President Indian Hills Water District; Russell Clayshulte, Manager Bear Creek Watershed Association; and Nick Colglazier, Executive Director Colorado Corn Promotion Council. Mark Baisley, Colorado State Senate, District 4; Tammy Story, Colorado House of Representatives, 25th District; and EPA/COE.  
From: Neil Whitehead, III Ph.D. and C. F. (Chuck) Newby for the *Conifer & South Evergreen Community Committee*.  
Re: Impacts of Groundwater Use, Wastewater Treatment, and Storm Drainage Management in Case No. 23-102980RZ Application for Special Use Permit for the Shadow Mountain Bike Park.

**Proposed Shadow Mountain Bike Park  
Impacts of Groundwater Use, Wastewater Treatment, and Storm  
Drainage Management on the Shadow Mountain Drive Community:  
Comments During the 1st Referral Process**

This comment letter from the *Conifer & South Evergreen Community Committee* (the Committee) is in regard to certain impacts that the proposed Shadow Mountain Bike Park (SMBP or the Bike Park) - located in the upper reaches of North Turkey Creek, along Shadow Mountain Drive, a few miles west of Conifer, Jefferson County, Colorado - will have on the local as well as downstream communities.

**Executive Summary**

**Overview of Operations at SMBP:** The Figure 1 map illustrates that the location of proposed SMBP development within the sensitive Turkey Creek Watershed. The Applicant proposes to construct a chairlift-served, downhill mountain bike park facility that will include: a quad-chairlift apparatus extending ~2,000 ft that will transport riders from the base area to the top of Conifer Mountain, a two-story lodge building, maintenance buildings, a milling area, and a parking lot on a ~306 acre parcel managed by the Colorado State Land Board which will operate seasonally from March 1st to November 30th.

Grouped by riding season, Table 1 shows that once the proposed Bike Park becomes fully operational - we speculate that that may take two or possibly three seasons - the expected yearly unique visits by downhill mountain bike riders, spectators, and occasional visitors is 183,000.

**Impacts of SMBP Operations:** Operations at SMBP with 183,000 unique person visits per season will cause impacts with respect to water usage, wastewater treatment, and - due to vegetation removal along the proposed 16-mile trail system - stormwater run-off. Each of these impacts are described briefly as follows:

- **Water Usage** - For extended periods during the downhill riding season, the Bike Park will need to supply drinking water at a rate of 4,000 gpd, please see Tables 2 & 3; however, the Applicant admits to having no adjudicated water rights.
- **Water Supply & Treatment** - For extended periods during the downhill riding season, the Bike Park drinking water supply/treatment system must supply water at a rate of 6,000 gpd. In addition, the water supply system must supply water for a fire

hydrant system connected to a 180,000 gal tank/cistern with a flow rate that can supply fire suppression water; however, the Applicant has not recognized any of these requirements.<sup>1</sup>

- **Augmentation Water** - The Applicant will be required to purchase augmentation water to replace water used at the Bike Park at a consumptive use rate of 5% to 15%, as determined by the Colorado Division 1 Water Court; however, sources of augmentation water within the Turkey Creek Watershed are all fully subscribed
- **Wastewater Treatment & Effluent Discharge** - Referencing the water usage figures shown in Tables 2 & 3, the Bike Park will require a wastewater treatment system capable of handling influent of 6,000 gpd, treatment, and discharge of effluent to groundwater for an extended period. There is a high likelihood that discharged effluent will contaminate the water supply well and mix with the surface water thereby contaminating the waters of North Turkey Creek with increased TDS (Total Dissolved Solids).
- **Stormwater Run-off, Drainage, & Flooding** - The Applicant advertises 16 miles of downhill mountain bike trails for riders of all skill levels and, since each trail will require 30 ft of clearance width, the planned trails alone will create ~60 acres of unvegetated ground area subject to stormwater run-off. During periods of high stormwater run-off, the waters of North Turkey Creek will be contaminated with increased TDS and will be prone to flooding in the Base Area.

**Legal Proof of Sustainable Water Supply:** A water decree that has been adjudicated through Colorado Division 1 Water Court will be required to fulfill the 5% to 15% of water usage not returned to the groundwater/surface water legal requirement. The Committee finds it irresponsible for Planning & Zoning to accede to the Applicant request that this application be allowed to move forward without Proof of Water. We ask the Jefferson County Commissioners to stop this application on this basis alone.

**Water Treatment Plant Will be Required:** The drinking water supply facility proposed by the Applicant falls under the definition of a Public Water System (PWS) as defined in Colorado Regulation 11, Colorado Primary Drinking Water Regulations, as such, a PWS site license application must be made at the Water

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<sup>1</sup> It is standard in the industry for water supply/treatment systems to be designed with a 1.5 to 2.0 safety factor, thus, a system designed to supply treated water at a peak rate of 4,000 gpd will be design to supply a sustained 6,000 gpd.

Quality Control Division (WQCD) of CDPHE, which will establish appropriate MCLs for the PWS that are compliant with the CWA.

**Wastewater Treatment Plant Will be Required:** The wastewater treatment facility proposed by the Applicant will require a wastewater treatment system capable of handling influent of 6,000 gpd for an extended period; therefore, the wastewater treatment facility proposed by the Applicant will fall under the jurisdiction of Colorado Regulation 22, Site Location and Design Approval Regulations for Domestic Wastewater Treatment Works, as such, a Wastewater Treatment Plant (WTP) site license application must be made at the WQCD of CDPHE, which will establish appropriate MCLs for the WTP that are compliant with the CWA.

**Storm Drainage System Design is Inadequate:** Considering the 60 - 75 acres of unvegetated ground area that will be exposed during the proposed construction of this development and in light of the sensitive nature of the nearby pristine mountain meadow, federally mapped wetland, and Waters of the U.S. (WOTUS) jurisdiction held by the EPA/COE, a comprehensive Storm Drainage Management Plan must be submitted by the Applicant for review by the EPA/COE.

**Groundwater Monitoring System Will be Required:** No wells for monitoring water level and water quality sampling have been proposed by the Applicant - a monitoring well design must be included in a revision to the application as the network will need to be in place before construction (background) - stations need to be located upstream of the facility, within the facility, and downstream of the base area.

**Hydrogeologic Report Will be Required:** A study of the hydrogeological characteristics of the Base Area is required before proper siting of the water well, wastewater (effluent) discharge site and method, a design for capturing data from the water supply well pumping test, and the design of the monitoring well network - which will allow continuous monitoring of water level and quality during the life of the project - can be undertaken.

**Flood Hazard Report Will be Required:** Portions of the proposed Colorado State Land Board managed parcel lie within the Jefferson County Floodplain Overlay District "Flood Prone Area" through which North Turkey Creek flows. We believe that the Base Area Drainage and Basin Culvert Crossing engineered structure presents a clear flooding hazard for the lower Parking Lot, see Phase I Drainage Report, maps DDP-1 and DDP-2 submitted by the Applicant.

**Executive Summary Conclusion:** In view of the very significant impacts that SMBP will place on the Conifer area communities that surround the development site, it is clear that Planning & Zoning must require the Applicant address the critical deficiencies of this Special Use Permit Application. Before the present application can be allowed to advance to the Jefferson County Planning Commission, the Applicant must show proof of adjudicated water rights in sufficient quantity to supply the Bike Park in accordance with the stated vision for the facility. Planning & Zoning must not continue to accept the false notion that the application can advance for a land-use decision while the Applicant "makes a good faith effort to obtain an adjudicated water supply". The Committee asks the Planning & Zoning Division to stop this application at the 1st Referral phase, in fact, it is clear that this application should never have been deemed "sufficient", to continue would be a waste of the taxpayer dollars and the time of the community.

### **SMBP Application Overview**

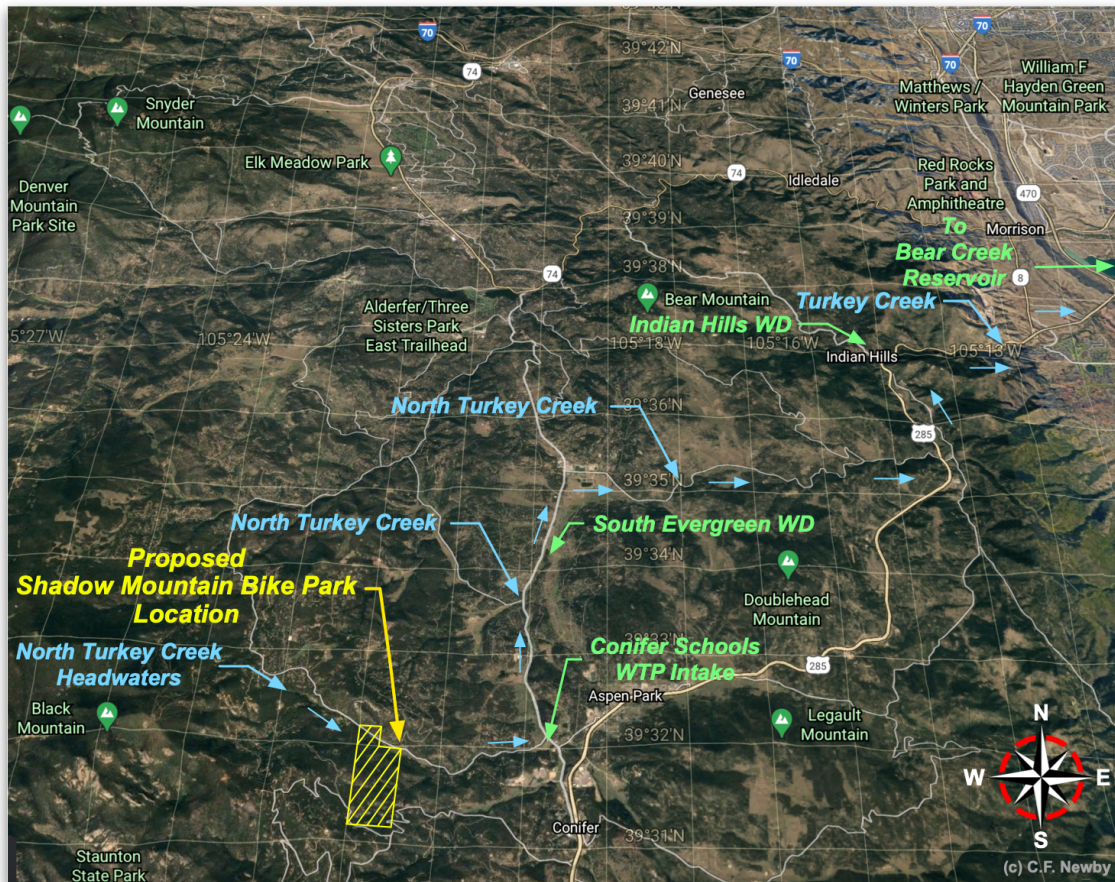
The chair-lift accessed mountain bike park is proposed on ~306 acres of State of Colorado land administered by the Colorado State Land Board. The map shown in Figure 1 places the Shadow Mountain Bike Park (SMBP, the Bike Park, or the Applicant) within the Turkey Creek Watershed at the headwaters of the North Turkey Creek. Additionally, drone video 15m:28s in length taken by *Conifer & South Evergreen Community Committee* (the Committee) shows the setting and superimposed design of the bike park here: [Save Our Mountain Meadow on Colorado State Land](#) The Jefferson County Planning & Zone Division (Planning & Zoning) case file webpages are here: [SMBP Case File Webpages](#)

Information gathered from the SMBP Application Narrative states that the Bike Park operating season will be from March 1 through November 30. Fat Tire mountain bikes will operate when trails are snow-covered and downhill mountain bikes will operate during snow-free conditions. SMBP will be open 7-days/week closing at sunset. The Bike Park will be served by a lodge and a 300-space, gravel-surfaced parking lot Planning & Zoning Planning will require the parking lot to be paved and has specified recycled asphalt as acceptable.

Information gathered from the SMBP website indicate that Bike Park will be initially marketed to the Denver Metropolitan Area (about 3,000,000 persons) and via "special events" (3 or 4-day games on the mountain bike riding "circuit"), the broader community of North American mountain bike riders to



make the Bike Park a continent-wide destination. This proposed Bike Park is not designed for the Conifer Community.



**Figure 1.** The Shadow Mountain Bike Park in Relation to the Turkey Creek Watershed.

### Impacts Due to SMBP Operations

Based on information that SMBP has presented at its Community Meetings, the Application Narrative, and its website, SMBP plans three distinct seasons for its yearly operations: an Spring Fat Tire (Snow) Season, the Main Season, and a Fall Fat Tire (Snow) Season. For reference, Table 1 lists the number of Bike Park unique visits by riding season expected once the facility has become fully operational (that is, the start of the second season) and, for clarity, each of the following sections will briefly describe the critical impacts that the proposed downhill mountain bike-riding activities will have on the ~306 acre parcel with respect to: water usage, wastewater treatment, and storm drainage management.

**Table 1.** SMBP Unique Visits by Riding Season at Full Operation.

| UNIQUE VISITS BY RIDING SEASON<br>RIDERS, SPECTATORS, DOGS, & EMPLOYEES |                       |
|---|-----------------------|
| <b>Spring Fat Tire Season: 3/1 - 4/30</b>                               |                       |
| 400 persons/day x 60 days   | 24,000 person visits  |
| <b>Main Season: 5/1 - 10/31</b>   |                       |
| 800 persons/day x 184 days  | 147,200 person visits |
| <b>Fall Fat Tire Season: 11/1 - 11/30</b>                               |                       |
| 400 persons/day x 30 days   | 12,000 person visits  |
| <b>Total Unique Visits Per Season:</b>                                  | 183,200 person visits |

**Water Usage:** While the Applicant estimates that each daily downhill mountain bike rider will utilize water at a rate of 4 gals/day, in the Jefferson County Public Health (JCPH) 1st Referral response letter, JCPH indicates that its regulations require that water usage be estimated at 5 gals/day per visitor; therefore, the Committee will use this figure for rider water utilization in our calculations. As of, this writing (May 4, 2023), the CDPHE has not responded to the 1st Referral. The Jefferson County Engineering Geologist will also weigh in with a gwpd/person value for use in the WAA (Water Availability Analysis), he is currently waiting on the Applicant to supply information regarding the square footage of the lodge and maintenance building in order to complete the WAA

The Applicant claims average of 300 riders per day, is the Applicant is being unrealistically conservative or are they possibly confusing their limited opening - with no adjudicated water supply - in order to justify a wastewater designed for a treatment load of less 2,000 gpd (gallons per day), above which the wastewater load that would trigger regulation by the Colorado Department of Public Health and Environment (CDPHE)? Indeed, previous public statements made by the Applicant<sup>2</sup> indicate that intended number of daily bike riders during main season at the Bike Park will be in the range of 550 to 650 riders per day. Moreover, it is clear to the Committee, visitors to the Bike Park will include a significant spectator crowd (and their beloved dogs who need water) some who come in the same vehicle as the bike riders

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<sup>2</sup> For example, in a December 16, 2020 Q&A communication with the Committee Phil Bouchard [the Applicant] states, "We're looking into a brand new and fully electric detachable quad, which would max out at serving around 700 visitors on a peak day."

or others simply to feel the energy and watch the at the action at the "jump park" to be located near the base of the lift. Additionally, some visitors will use the facility as a bathroom stop only. The estimated water consumption in units of gallons-of-water-per-day per person (gwpd/person) submitted by the Applicant has not accounted for these additional water uses.

As shown Table 1, we calculate that when the May through October "main season" of the Bike Park is considered, a much more realistic figure of 800 persons - riders, spectators (plus their beloved dogs), and 20 employees (who per JCPH utilize 15 gpd/person) - per day, 7 days-a-week for extended periods during the Main Season, will put water consumption at 4,000 gpd. Additionally, with the "special events" planned by the Applicant, it is prudent to design the Bike Park wastewater treatment system to handle at least 4,000 gpd x 1.5 design safety factor = 6,000 gpd. This level of water consumption will require that the Applicant obtain separate site permits from CDPHE for: raw water treatment, wastewater treatment, and effluent discharge to groundwater each of which will set MCLs (maximum contaminant levels) that are compliant with the Clean Water Act (CWA).

Tables 2 and 3 summarize the preliminary calculations made by the Committee regarding water consumption per visitor per day and the resulting wastewater treatment system design requirements.

**Table 2.** Preliminary Calculations for the Per Season Water Use and Effluent Discharged to Groundwater.

| PRELIMINARY WATER USE CALCULATIONS        |                       |
|---|-----------------------|
| <b>Spring Fat Tire Season: 3/1 - 4/30</b> | 24,000 person visits  |
| 400 persons/day x 5 gpd x 60 days         | 120,000 gals          |
| <b>Main Season: 5/1 - 10/31</b>           | 147,200 person visits |
| 800 persons/day x 5 gpd x 184 days        | 736,000 gals          |
| <b>Fall Fat Tire Season: 11/1 - 11/30</b> | 12,000 person visits  |
| 400 persons/day x 5 gpd x 30 days         | 60,000 gals           |
| <b>Per Season Water Use:</b>              | <b>916,000 gals</b>   |



**Table 3.** Summary of Preliminary Per Season Water Use and Effluent Discharged to Groundwater.

| SUMMARY OF PRELIMINARY WATER USE & CONSUMPTION CALCULATIONS |                        |
|---|------------------------|
| Riders, spectators, & staff at facility per season          | 183,200 person visits  |
| Water used per season                                       | 916,000 gals (2.8 a-f) |
| Water consumed per season (10%) <sup>1</sup>                | 91,600 gals (0.28 a-f) |
| Treated wastewater discharged to groundwater                | 824,400 gals (2.5 a-f) |

**Note 1:** Here the term "water consumed" accounts for water that has been evaporated away, spilled, or otherwise cannot be captured for return to the groundwater system, known as technically as "consumptive use".

**Water Augmentation:** A water decree that has been adjudicated through Colorado Division 1 Water Court will be required to fulfill the minimum of 5% not returned to the groundwater/surface water legal requirement. A STA recharge system may be charged with higher than 5% consumption. The general evaporative situation of intensive outdoor activity itself argues for a much higher than 5% consumptive use amount. Presumably, this adjudicated physical water would be placed in a downstream reach of Turkey Creek or Bear Creek far away from the withdrawal area along Shadow Mountain Drive. This far downstream replacement will result in a localized loss of combined surface/subsurface flow in North Turkey Creek immediately downstream of the facility and only "regained" at the point of addition to a tributary of the South Platte River.

Admitting that they have no adjudicated water rights, the Applicants propose to drill and utilize an "exempt commercial well" supplying 0.3 ac-ft/yr for use during construction and the initial operating phase of the project, while at some undefined time in the future, water rights for the site are located and then must be adjudicated through Division 1 Water Court. Apparently, the Jefferson County Planning & Zoning Division has acceded to this process, yet no legal proof of water was presented by the Applicant, just a good faith effort to obtain water augmentation at some later date. Moreover, from our investigations, we have been told by water policy professionals that, "There is no augmentation water available in the Turkey Creek watershed." We construe this statement to mean that all of the surface water in streams of the watershed has been spoken for as some of these water rights were not purchased but were filed first-in-time such that they are the most senior. Any entity searching for augmentation water will simply have to wait until existing water rights come onto the market.

It is clear that the Bike Park will require a water supply at a volume much larger than the proposed exempt commercial well at 1/3 ac-ft/yr (acre-feet per year) as proposed by the Applicant; therefore, adjudicated water rights in the form of a development-specific water use decree, which will include a water augmentation plan, must be issued for SMBP by the Colorado Division 1 Water Court. Planning & Zoning must not allow the present application to advance to the 2nd Referral until the Applicant has obtained adjudicated water rights from the Court.

The Committee finds it irresponsible for Planning & Zoning to accede to the Applicant request that this application be allowed to move forward without Proof of Water. We ask the Jefferson County Commissioners to stop this application on this basis alone.

**Water Supply and Raw Water Treatment:** When fully operational, SMBP will require a treated, monitored drinking water supply at the volumes outlined in Tables 2 and 3. Additionally, the Bike Park will be required to provide an approved fire protection water hydrant system at a flow-rate and with an available volume that meets the requirements of Section 507 of the International Fire Code (IFC). As stated the March 20, 2023 1st Referral response letter from Elk Creek FPD Fire Marshal Parker, "Based on the information available at this time the minimum fire protection water supply would be 180,000 gallons".

The drinking water supply facility proposed by the Applicant will fall under the definition of a Public Water System (PWS) as defined in Colorado Regulation 11, *Colorado Primary Drinking Water Regulations*, as such, a PWS site license application must be made at the Water Quality Control Division (WQCD) of CDPHE,<sup>3</sup> which will establish appropriate MCLs for the PWS that are compliant with the CWA.

**Wastewater Treatment and Effluent Discharge:** Referencing the "Water Usage" section as well as Tables 2 and 3, it is clear that the Bike Park will require a wastewater treatment system capable of handling influent of 6,000 gpd for an extended period; therefore, the wastewater treatment facility proposed by the Applicant will be fall under the jurisdiction of Colorado Regulation 22, *Site Location and Design Approval Regulations for Domestic Wastewater Treatment Works*, as such, a Wastewater Treatment Plant (WTP) site license application

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<sup>3</sup> As stated in the 1st Referral response letter from JCPH (Tracy Volkman) dated March 22, 2023, the drinking water supply facility proposed by the Applicant "...will be regulated by the CDPHE, Water Quality Control Division.", [emphasis added] please see statement by Ms. Volkman at page 2.

must be made at the WQCD of CDPHE, which will establish appropriate MCLs for the WTP that are compliant with the CWA.

The Applicant must also obtain a groundwater discharge permit from the WQCD of CDPHE, which will establish appropriate MCLs for the WTP effluent discharge to groundwater that are compliant with the CWA.

**Storm Drainage Management:** SMBP advertises 16 miles of downhill mountain bike trails for riders of all skill levels and, since each trail will require 30 ft of clearance width,<sup>4</sup> the planned trails alone will create ~60 acres of unvegetated ground area subject to stormwater run-off. As noted by Planning Engineer Nathan Seymour in his April 10, 2023 1st Referral Engineering Memorandum, trail "...run-off will be substantial." Considering the 60 - 75 acres of unvegetated ground area that will be exposed during the proposed construction of this development and in light of the sensitive nature of the nearby pristine mountain meadow, federally mapped wetland, and Waters of the U.S. (WOTUS) jurisdiction held by the EPA/COE, a comprehensive Storm Drainage Management Plan must be submitted by the Applicant for review by the EPA/COE. Planning & Zoning must not allow the present application to advance to the 2nd Referral until the Applicant has submitted the recommended Storm Drainage Management in those areas outside the Base Area Drainage Basin.

**Plan Base Area Stormwater Detention Pond:** Special scrutiny should be given to the detention pond design that collects storm water from the parking lot, milling area at the base of the lift, and the lodge area (some 6.75 acres). The parking lot area will contain motor vehicle oil, gasoline, diesel, grease, antifreeze, dog excrement, road salt in spring and fall from vehicles, and anything under the sun that attendees may think this is a good spot to pour a quart or gallon something from their vehicle onto the parking lot gravel to dispose of.

In the 1st Referral, the Jefferson County Planning Engineer has requested that the parking lot be paved (presumably for air quality dust control). Jefferson County will specifically allow recycled asphalt paving. This is an area of at least several acres. A number of peer-reviewed scientific papers have studied the leachate from recycled asphalt and found semi-volatile organic compounds including PAH (polyaromatic hydrocarbons) along with other high-molecular weight, and toxic hydrocarbons. These hydrocarbon

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<sup>4</sup> See the U.S. Forest Service forest trail management webpages here: [Trail Management, Construction, and Maintenance](#)

compounds will move directly via the detention pond discharge into the surface water of North Turkey Creek. The Bike Park plans make no mention of treatment capability for the detention pond. The applicants should be forced to explain how their design will capture toxic substances. Additionally, some of this hydrocarbon-bearing water will infiltrate into groundwater. Surface water and groundwater monitoring should be used to alert, this predictable slug of hydrocarbon pollutants is about to arrive at the Jefferson County Public Schools water well at the junction of Shadow Mountain Drive and CO HWY 73 soon after surface paving of the facility parking lots with recycled asphalt.

The detention pond cannot intersect the top of the groundwater. Colorado State Water Law does not allow mixing of surface water and groundwater. Using plastic liners to keep the waters separate is not going to be successful as the proposed detention pond lies near the Jefferson County-mapped "Flood Prone" area. The detention pond is placed on their maps in the meadow adjacent to the thalweg of North Turkey Creek. If the detention pond does intersect the top of groundwater it will become a permanent pond. How will the detention pond be designed to compensate for varying groundwater levels in the meadow for wet or dry years? The Committee recommends that, in order to resolve this issue, a series of monitoring wells must to be drilled and water levels measured to produce an adequate design.

The design of a detention pond placed in the meadow is just one of many impacts of the project upon the federally mapped wetlands contained within the facility parcel and immediately upstream and downstream of this parcel of Colorado State Land.

### **SMBP Water System Overview**

**Water Production:** Water will be sourced from a 600 ft well placed in the crystalline, fractured-bedrock aquifer located in the milling area southwest of the Lodge. The valley floor is a place of groundwater discharge from the surrounding hillsides and North Turkey Creek, a perennial stream, thus, there will be sufficient physical water for the facility. Importantly, the proposed Bike Park location is hydrologically down-gradient of the Soil Treatment Area (STA) or, more commonly known as, the "leach field" for the On-site Wastewater Treatment System (OWTS) proposed for the development.

A generalized geologic map of the Turkey Creek (*Hydrologic Conditions and Assessment of Water Resources in the Turkey Creek Watershed, Jefferson County, Colorado, 1998-2001*, Bossong, et al USGS) with the project outlined is shown on page 31 of the Phase I Drainage Report submitted by the

Applicant. Bedrock for the proposed water supply well and the STA is mapped as a "fault zone". In the most detailed map available ([Reconnaissance Geologic Map of the Conifer Quadrangle](#), Jefferson County, Colorado, Bryant, USGS MF597) the "fault zone" is described in more detail as "presence of numerous shears or fractures"<sup>5</sup> in the Precambrian age Silver Plume quartz monzonite.

In accordance with the Jefferson County Land Development Regulations (LDR), the proposed water supply well must undergo a long-duration monitored, recorded well test. The Committee recommends, and the EPA/COE may require, that a number of monitoring wells, each several hundred feet in depth, be constructed towards North Turkey Creek and the associated wetlands, in order to determine dewatering impacts the proposed water supply well will have on the wetland areas.

Due to the status of North Turkey Creek and its associated wetlands as WOTUS, jurisdiction is held by the EPA/COE; therefore, Planning & Zoning must ensure that, before the present application can advance to the 2nd Referral, the EPA/COE has conducted a review of this proposed development.

**Raw Water Treatment:** Raw groundwater from the water supply well will be treated by filtration and presumably a chlorine-based disinfection agent by a Water Treatment Plant (WTP) licensed by CDPHE. Treated water will then be pumped uphill to a 180,000 gal storage tank which, in addition to supplying potable water, will serve as a source water for fire suppression purposes.

**Wastewater Treatment and Effluent Returned to Groundwater:** In the design currently proposed by the Applicant, wastewater will be conveyed to a septic tank and after settling and an adequate amount of holding time for anaerobic digestion, the clarified liquid (effluent) will move into a STA with perforated pipe distribution galleries, seated at some unknown depth in the alluvial aquifer and some unknown distance above the crystalline, fractured-rock aquifer. As shown in Appendix B of *Engineering Study for Shadow Mountain Bike Park Concept Master Plan Wastewater System Improvements*, by Stantec, November 2022, the STA begins immediately upstream of the Parking Lot and extends west (upstream). There is an unstated assumption by the Applicant, that the effluent will make its way from the alluvial aquifer into the crystalline, fractured-rock aquifer in order to satisfy, on paper, the rule that treated

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<sup>5</sup> Shears are formed whenever two continuous rock bodies slide passed one another. These shears and fractures are presumably of Precambrian age; however, their reactivation could have been by in response to tectonic movement since the Precambrian or in the late stages of landscape development by erosion-caused unloading of lithostatic stresses.



wastewater must be returned to the fractured-bedrock aquifer from which the water was originally pumped; however, this hypothesis is not supported by data and is likely incorrect.

We believe that it is a geologic unknown as to whether effluent liquids discharged into the STA alluvium or top of the bedrock surface will move into the crystalline, fractured-bedrock aquifer - we expect that the fractured bedrock aquifer will be completely saturated - as a result, effluent liquids could flow laterally along the top of the bedrock into North Turkey Creek, the local expression of hydrologic base level.

The eastern most distribution arm of the STA is "buried" by the perimeter berm of the Base Area Drainage Basin (Phase I Drainage Report, DPP-2). The Wastewater System Report, "Wastewater System Site Drawing" shows that the eastern most distribution arm is close to the Parking Lot which, in this area, appears to contain 3 to 4 ft of compacted rock and dirt fill while the thin alluvium, through which the effluent is attempting to move, may also become compacted. This situation may create a subsurface "compaction dam". One solution to this difficulty may be to construct one or more injection wells into which effluent can be discharged, instead of an STA. This situation is complicated enough that shallow monitoring wells should be drilled that would detect migration of effluent to the east (down valley) and north directly towards North Turkey Creek.

Since the water supply well is downgradient of the STA and possible injection wells, we believe that there is significant hydraulic connection between North Turkey Creek, the thin alluvium of the valley floor, and the mapped fractured and sheared bedrock "fault zone" as mapped on the Conifer Quadrangle.

We suggest that there is significant risk of a hydraulic connection between effluent from the STA and/or injection wells and the proposed water supply well. One way to cure this is to locate the water supply well upgradient from the STA and injection wells.

**Monitoring Well Network Required of Applicant:** No wells for monitoring water level and water quality sampling have been proposed by the Applicant - a monitoring well design must be including in a revision to the application as the network will need to be in place before construction (background) - stations need to be located upstream of the facility, within the facility, and downstream of the base area.

In the opinion of the Committee, this monitoring should go on for the life of the project, especially critical, would be the downstream monitoring of the

advance of the newly induced treated wastewater plume. The monitor well network and upkeep will be expensive. Impacted household wells will probably be limited to within several hundred feet on both sides of North Turkey Creek.

**Hydrogeologic Report Required of Applicant:** A study of the hydrogeological characteristics of the Base Area is required before proper siting of the water well, wastewater (effluent) discharge site and method, a design for capturing data from the water supply well pumping test, and the design of the monitoring well network - which will allow continuous monitoring of water level and quality during the life of the project - can be undertaken. Planning & Zoning must require this Hydrological Study before the present application moves to the 2nd Referral.

**Flood Hazard Report Required of Applicant:** In his 1st Referral response letter, the Planning & Zoning Engineering Geologist states, "The site is not within a zoned or unzoned geologic hazard area and reports are not required with the rezoning process."

However, portions of this Colorado State Land Board managed parcel lie within the Jefferson County Floodplain Overlay District "Flood Prone Area" and the North Turkey Creek flows, please see Jefferson County jMap layers: Flood Prone Areas, FEMA 100-year Flood Plain, Parcels, Roads, and Hydrology. The upstream, arbitrary termination of the FEMA 100-year flood plain is about 2,400 ft from the proposed entrance of the Bike Park. Although we have never found it explicitly stated, the Jefferson County Flood Prone area is essentially a continuation of the FEMA 100-year Flood Plain which is not mapped into rural areas with few if any structures. The Phase I Drainage Report submitted by the Applicant was developed without any reference to Flood Prone Area along the northern boundary of the facility. Especially troubling was design specifics relating to sizing of the culvert for the North Turkey Creek entrance road crossing for the facility, please see the statement, "The culvert is to be designed to the minimum standard set by the criteria because the culvert lies outside the 100 year flood plain", page 8, Phase I Drainage Report. This design failure is enough to require that the Phase I Drainage Report be revised before advancing to the 2nd Referral.

We believe the Base Area Drainage Basin and Culvert Crossing engineered structures presents a clear catastrophic flooding hazard for the lower Parking Lot, see Phase I Drainage Report, please see maps DDP-1 and DDP-2 submitted by the Applicant.

In order to construct the Base Area Drainage Basin on the valley floor, which will be located between North Turkey Creek and the steep slopes of Conifer Mountain, the area of the 281-car Parking Lot will be filled with rock and dirt by as much as 4 ft on the upstream side and as much as 10 ft on the downstream side. This fill on the upstream side of the project of the project in effect forms a partial dam across the valley floor. On the north side, the fill constricts the mapped Jefferson County Flood Prone Area like a flood wall causing an additional elevation in the interior of the culvert designed for conveyance of a 100-year flood. Thus, even a well-designed culvert for a 100-year flood event might fail (be overtopped) by the design configuration of the Base Area Drainage Area berm.

Additionally, and most importantly, flood levels of significantly greater heights than predicted by 100-year floods are very probable by partial-to-complete debris blocking of the culvert openings. Here is our scenario for a major flood disaster, please have the Phase I Drainage Report and Map DPP-2 in front of you. It is a summer afternoon, the Parking Lot is full with 700 - 800 persons and their dogs are enjoying general Base Area activities especially at the Jump Park. Ominous clouds build up with lightening, the chair-lift stops accepting new riders, returning riders to the Base Area. Most go into the Lodge as it is early in the afternoon. Visitors wonder whether or not to call it a day or to wait 30 minutes until the gathering storm blows through. Some visitors wait in the automobiles, while the storm arrives and intensifies, people decide to ride out the storm in the Parking Lot rather than venture onto the road.

The rain comes in heavy, heavy causing several tall pines to come floating down North Turkey Creek with their big root footings and become lodged crossways or length-wise in the culvert opening along with several hundred cubic yards of willow bushes. With the culvert blocked, the water rapidly overflows the upstream side of the Base Area berm and down the lower Parking Lot that has 50 - 75 vehicles. Some visitors try to escape toward the Lodge on foot, other vehicles are swept downstream into the filled Detention Pond, or over the berm raised about 10 ft above the meadow. Chaos ensues. The entrance road is breached and emergency vehicles cannot cross.

**Require Phase I Drainage Report Requires Revision:** The Base Area of intense development (increased imperviousness) for the Bike Park is 6.75 acres. The drainage design seeks to capture run-off from the area through a set of perimeter berms and storm drains to convey the all discharge into a "full spectrum" detention pond so that discharge rates into North Turkey Creek can

mimic discharges that would occur naturally under undeveloped conditions, please see maps DPP-1 and DPP-2.

"There are flows that enter the site from the abutting properties to the west. **All offsite flows are to be redirected around the proposed developed areas to the creek and not collected by the new drainage facilities.**", please see Phase I Drainage Report at page 6 [emphasis added]. However, when map DPP-1 is examined, a SW to NE-trending drainage enters the Base Area watershed from the southwest corner near the Lodge. From the topographic contours, a watershed of approximately 10 acres with an ill-defined southwestern limit of NE-SW trending contours is shown. This area is forested and will presumably be additionally impacted by clearing for bike trails. The actual entrance of this drainage into the Base Area watershed is down a regolith or bedrock cut with a 2:1 slope. Regardless of the drainage report statement above, here is an off-site flow that emerges into an upslope position of the facility. There is a storm drain nearby that is presumable designed to capture some of this drainage; however, we do not find any evidence in the drainage report that this watershed, a minimum of 10 acres, is considered in the design capacity of the Detention Pond.

The Phase I Drainage Report must be revised: 1) to account for this newly identified on-site flow into the development area and 2) to account for the fact that the report was developed without any knowledge of the Jefferson County mapped Flood Prone Area along the northern boundary of the project, as mentioned above.

**Landscape-level "Rock and Dirt" Fill is an Unmitigable Impact:** This discussion would normally be included in our comments concerning Visual Resources, but we include them here as the design submitted by the Applicant calls for the complete destruction of the natural characteristics of this 6.75 acres.

From the maps DPP-1 and DPP-2 included in the Phase I Drainage Report, the 6.75-acre area is divided into a southwestern one-half portion which involves a cut into the hillside of Conifer Mountain. For the most part alluvial and regolith (weathered rock) is expected to be thin resulting in the need to drill shot-holes and then blasting to bedrock. The northeastern one-half of the 6.75-acre area upon the gently sloping valley floor (The Mountain Meadow) will be filled with "rock and dirt" from the cut area to the southwest. Depths of burial estimated from the topographic map DPP-2 range from 4 to 10 ft.

If developed, the Bike Park will have an end-of-life; therefore, a bond/surety posted with the Colorado State Land Board must ensure resources for the reclamation that will be required. Will it be more environmentally-friendly to

jack-hammer the concrete structures then scape off asphalt from the Parking Lot then let "Nature" try to restore the landscape to its original grade?

This development will require a major "cut and fill" engineering operation. The Applicant should be required to supply cross-sections that illustrate the configuration of the finished surface. In addition, the Applicant must provide information regarding, in cubic-yards, what is:

1. The amount of proposed cut.
2. The amount of proposed fill.

The Applicant must also provide a map of the filled area with depth data at selected points-of-depth (thickness) within the entire fill area. Other questions to be answered are: 1) Will any fill from off the parcel be transported to the site via truck?, 2) If so, what are the estimated cubic yards of fill to be trucked in? and 3) What will be the impact to local residents in terms of drilling, blasting, and hauling of the required fill material?

### **Impacts to Water Quality and Quantity**

Operations at SMBP will create significant impacts on the waters of North Turkey Creek in quality and quantity, impacts that must be studied by hydrogeologists, chemists, and health professionals. While we present a summary of the water quality impacts that the proposed Bike Park would have on the Turkey Creek watershed, we are not qualified to characterize many of the most serious of these impacts, for example, the impacts of TDS. Therefore Planning & Zoning must require that the Applicant submit a professional study characterizing the water quality and quantity impacts of Bike Park operations before allowing this application to advance to a 2nd Referral.

**The Nutrient Total Phosphorus:** The number one pollutant in the Bear Creek watershed is phosphorus. It is an "accelerant" for the growth of algae. [Bear Creek Watershed Control Regulation No. 74](#). This 14-page regulation deals exclusively with Total Phosphorous. "The total wasteload allocation for all wastewater treatment facilities in the Bear Creek Watershed is 5,255 pounds per year." The allocations are all filled except for two pounds. Essentially, the proposed bike park facility will have to "trade" with another wastewater treatment facility to get pounds of Phosphorous to discharge. This will drive the proposed facility to build a very advanced wastewater treatment plant, to limit the amount needed to "trade" or will the septic tank design, eliminate the requirement to deal with the Total Phosphorus discharge (under 2,000 gpd)?

**Water Heating:** Temperature is the pollutant is the increase of surface and groundwater temperatures in water discharged from the facility. [5 CCR](#)



[1002-93 Colorado's Section 303 \(D\) List of Impaired Waters and Monitoring and Evaluation List.](#)

Water temperature in North Turkey Creek is deemed "impaired". Why? Fish and other aquatic insects. An increase in water temperature lowers dissolved O<sub>2</sub> concentration and perhaps promotes algae growth. How will the facility operations affect water temperature? 1) Pump groundwater out and treat for drinking water and then put in storage tank before used. Water in tank is heated by sun. 2) Discharge water from storm water detention pond. Water is heated by sun in shallow pond. 3) Treated wastewater is heated in treatment process or is received into treatment plant already heated by visitor usage, for example, hot water heater, or the waste stream produced by humans at 98.6°F. 4) Rain falling on hot vehicles in parking lot which then flows to the detention pond.

**Elevated TDS (Total Dissolved Solids):** The treated wastewater will be discharged with high TDS (and high chlorides as a fraction of the TDS) (to promote understanding, these values should also be expressed for "ordinary" citizens in pounds per day) and pharmaceuticals. TDS and chloride concentrations are regulated by the WQCD (Water Quality Control Division) of the CDPHE. High TDS levels are **not mitigable** unless R/O treatment is used, see below "R/O Treatment of Wastewater".

Elevated TDS/Salinity (anions are primarily chloride (Cl)) are regulated under "Secondary Standards." Odor, color, and taste (aesthetic aspects) are the primary consideration, not human health. Aquatic insects and plants are affected negatively at higher concentrations as are irrigated crops. Household wells on both sides of North Turkey Creek within 150 feet of the creek will be susceptible to have rising levels of unmitigated TDS and pharmaceuticals from the bike park facility over a period of several years.

Human health impacts of high TDS are not usually a consideration of health agencies. Sodium (Na) although not believed to be a dominant element in high TDS water at this facility, is a well-known contributor to elevated blood pressure and heart problems.

**Household Impact of High TDS (Hard Water):** I presume, water from wells in the North Turkey Creek drainage are soft water (low TDS). Impacts of high TDS water are: 1) dingy clothes from soap scum, 2) spotting on glassware in dishwasher, 3) scale incrustation in pipes, 4) shortened life of water heaters and 5) heating elements in electric furnace boilers. Purchase of water softeners to alleviate the problem in some cases add NaCl to the backflushed water.

**Pharmaceuticals and Compounds of Emerging Concern (CEC):** These pollutants are found in small amounts in water and are sourced by from human excretion and are not removed/broken down in the wastewater treatment process. Unless removed by R/O, they are an unmitigated impact to residences via well water downstream of the facility to the junction of Shadow Mountain Drive and CO HWY 73. With very few exceptions, there are no regulatory safe/unsafe amounts. Therefore, it is hard to force an entity to test for these compounds if they are not regulated.

**Reverse Osmosis (R/O) Treatment of Wastewater:** The R/O process significantly lowers TDS, pharmaceuticals, and CEC's. R/O generates a lot of brine [highly saline water] which are well known for concentrating a high level of naturally occurring radionuclides. Thus, many brines are classified as hazardous, radioactive waste, making the brines very expensive to dispose. As R/O brine water creation is much more consumptive of water usage which is typically allowed at 5%. Consumption could increase easily up to 20-25%. That requires obtaining more adjudicated water which is very expensive. This expense of adjudicated water may impact the commercial viability of the project.

**Conifer Area Schools Water Supply System:** The raw water supply well (a horizontal infiltration gallery) for West Jefferson ES, West Jefferson MS, and Conifer HS draws water in part from the branch of North Turkey Creek approximately two miles downstream from the surface and groundwater discharges of the proposed facility. One arm of the well lies beneath the streambed. The pumphouse for the well is a small concrete building near the intersection of Shadow Mountain Drive and CO HWY 73. I believe in several years, if the bike park facility is constructed without R/O treatment of wastewater, high TDS water, waters rich in elevated CECs and pharmaceuticals plus compounds washed from the 300+ vehicle parking lot (via discharge to surface waters from the stormwater detention pond) will begin to make their way into the Conifer Schools water system.

CECs are found in very small quantities, but measurable and for the most part a result of ingestion and then excretion by humans. Impermissible concentrations have not been set, but pharmaceuticals have been studied only in adults. Children as young as three are enrolled at West Jefferson ES. Their impact on children and adolescents is unknown. Typically, children are much more sensitive to small doses.

**Base Area Storm Water Detention Pond:** Special scrutiny should be given to the detention pond design that collects storm water from the parking lot,

milling area at the base of the lift, and the lodge area (some 5 to 6 acres). The parking lot area will contain motor vehicle oil, gasoline, diesel, grease, antifreeze, dog excrement, road salt in spring and fall from vehicles, and anything under the sun that attendees may think this is a good spot to pour a quart or gallon something from their vehicle onto the parking lot gravel to dispose of.

In the 1st Referral, Jefferson County has requested that the parking lot be paved (presumably for air quality dust control). Jefferson County will specifically allow recycled asphalt paving. This is an area of at least several acres. A number of peer-reviewed scientific papers have studied the leachate from recycled asphalt and found semi-volatile organic compounds including PAH (polyaromatic hydrocarbons) along with other high-molecular weight, and more toxic PAHs. These organic compounds will move directly via the detention pond discharge into the surface water of North Turkey Creek. The Bike Park plans make no mention of treatment capability for the detention pond. The applicants should be forced to explain how their design will prevent this escape or else this will fall into their unmitigated ledger. Additionally, some of this hydrocarbon-bearing water will infiltrate into groundwater. Surface water and groundwater monitoring should be used to alert, this predictable slug of hydrocarbon pollutants is about to arrive at the Jefferson County Public Schools water well at the junction of Shadow Mountain Drive and CO HWY 73 soon after surface paving of the facility parking lots with recycled asphalt.

The detention pond cannot intersect the top of the groundwater. State law does not allow mixing of surface water and groundwater. Using plastic liners to keep the waters separate is not going to be successful as the proposed detention pond lies within the Jefferson County-mapped "Flood Prone" area. We expect this is the case as the detention pond is placed on their maps in the meadow adjacent to the thalweg of North Turkey Creek. If the detention pond does intersect the top of groundwater it will become a permanent pond. How will the detention pond be designed to compensate for varying groundwater levels in the meadow for wet or dry years? In our opinion, to resolve this issue, a series of monitoring wells need to be drilled and monitored to produce an adequate design.

The design of a detention pond placed in the meadow - is just one of many impacts of the project upon the federally mapped wetlands within the facility parcel and immediately upstream and downstream of the Colorado State Land parcel.

**Denver Water:** Denver Water has significant water rights within the Turkey Creek watershed. Water can be diverted from Conduits 14 and 15 into Marston Reservoir which supplies the Marston Water Treatment Plant, located on West Quincy Avenue between Wadsworth and Sheridan Boulevards. Water rights from Turkey Creek are of "lesser quality" water than water drawn from the South Platte River but Denver Water will have an interest in preventing any further degradation to their water rights in terms of either quantity or quality, please see Bear Creek/Turkey Creek Watershed Characterization, Technical Memorandum 1, Contract Number 13223A, January 20, 2011, by Hydro Consulting.

**Bear Creek Watershed Association (BCWA):** This group is primarily interested in protecting the waters of Bear Creek Reservoir. To do so, they have to lookout for pollution sources upstream on Bear Creek and Turkey Creek, see above, "The Nutrient Total Phosphorus". Jefferson County is a member of the BCWA Board of Directors (currently represented by the Planning & Zoning Engineering Geologist).

Recently, an increase in the storage capacity of the Bear Creek Reservoir has been proposed. In the [Bear Creek Reservoir Proposal](#), it is claimed the this "new" water will go to the City and County of Broomfield.

**South Platte River Drainage Basin Salinity Increase:** The TDS (in lbs/year) discharged by this proposed facility, unless treated by R/O, is unmitigable, and will move out of the Bear Creek Reservoir to the main stem of the South Platte River in solution to the crossing of the Colorado-Nebraska border. A downstream increase in TDS/salinity of the instream flow of the South Platte River severely impacts irrigated crops.

The source of the TDS/salinity are primarily: 1) high TDS discharges from wastewater treatment plants, 2) runoff from roads and parking lots and 3) return flow of irrigation waters to larger channels. Agricultural interest groups lead by the [Colorado Corn Promotion Council](#) have funded comprehensive studies of the problem ([South Platte River Salinity NEIRBO January 2020](#), and [Salt Transport in a Large Agro-Urban River Basin, August 2022](#)). Additional salinity studies are ongoing.

**Conclusion:** In view of the very significant impacts that SMBP will place on the Conifer area communities that surround the development site, it is clear that Planning & Zoning must require the Applicant address the critical deficiencies of this Special Use Permit Application. Before the present application can be allowed to advance, the Applicant must, before a Jefferson County Planning

Commission appearance, show proof of adjudicated water rights in sufficient quantity to supply the Bike Park in accordance with the stated vision for the facility. Planning & Zoning must not continue to accept the false notion that the application can advance for a land-use decision while the Applicant "makes a good faith effort to obtain an adjudicated water supply". The Committee asks the Planning & Zoning Division to stop this application at the 1st Referral phase, in fact, it is clear that this application should never have been deemed "sufficient", to continue would be a waste of the taxpayer dollars and the time of the community.

Sincerely,

Neil Whitehead, III Ph.D. [Geology], PG-WY (303) 618-6721 | [neil3@q.com](mailto:neil3@q.com)

C. F. (Chuck) Newby, Communication Systems Engineer (720) 260-9212

**For the *Conifer & South Evergreen Community Committee***