



April 17, 2023

Jefferson County – Planning and Zoning
100 Jefferson County Parkway, Suite 3550
Golden, CO 80419
Attn: Dylan Monke, Planner

Re: Application for Special Use - 23-102980 RZ, Additional Water Supply Information

Dear Mr. Monke:

We are in receipt of the Second Referral Response Letter from the Jefferson County Engineering Geologist seeking additional information in regard to the Water Supply Information Summary, included as part of the Applicant's Special Use Application, Case No. 23-102980 RZ (the "**Application**"). This letter has been prepared to fulfill the Water Supply Information Summary requirement of our application and includes an updated well water permit application and engineer's report. The proposed bike park (the "**Project**") will require water use for daily operations, specifically in the proposed Day Lodge and in the Maintenance Building.

The following documents are provided in response to the comments received and are attached to this letter:

- Updated GW-45 General Purpose Water Well Permit Application, included as Attachment A, with updated legal description and withdrawal amount
- Updated Engineering Study for Water System Improvements, included as Attachment B, which incorporates and addresses the comments listed below.

Additionally, the following comments were received. Our responses to comments are included below. Additionally,

Comment 1. The site is not within a zoned or unzoned geologic hazard area and reports are not required with the rezoning process.

Response: Comment noted.

Comment 2. The property is located within the Mountain Ground Water Overlay District. Based the uses (bike park, lodge, maintenance building) on 306 acres, it appears the water requirement will not exceed the 0.28 acre feet per acre per year threshold as described in Section 21 of the LDR. If the water requirement exceeds 0.28 acre feet per acre per year, an Aquifer Test in accordance with Section 21 of the LDR is required with the rezoning application. If the water requirement exceeds 0.10 acre feet per acre per year, an Aquifer Test in accordance with Section 21 of the LDR is required with the SDP application.

Response: Comment noted. The Project is anticipated to remain well below the 0.28 acre feet per acre per year threshold. From initial calculations in the WAA spreadsheet provided

by the County, it is estimated that the Project would remain below 0.05 acre feet per acre per year (refer to Appendix C of Attachment B).

Comment 3. The applicant had previously submitted a plan that describes the process to obtain legal rights to the water supply, however, the number of guests has been updated (1200 max) and the plan should be updated with the revised values. Adequate legal water rights will be required with the SDP process.

Response: We have updated both engineer reports for the Water Supply Information Summary and the Onsite Wastewater Treatment System items based on this maximum guest use and the sources provided below. These are both included in this second referral resubmittal package and the water report is attached to this letter.

Comment 4. The Water Availability Analysis (WAA) has been completed based on water demand requirements listed in the Jefferson County OWTS regulations. The use is unique and a bike park is not listed, therefore, County staff referenced a “camps, day, no meals served” value in the WAA. The value utilized is 15 gallons per day (gpd) per guest (1200 guests based on revised ODP). The value utilized in Stantec’s October 23, 2023 Engineering Study was 4 gpd, however, no source data was provided. I discussed this with the applicant’s representative. Based on the values and ODP, the estimated consumptive use is ~2.6 af/yr.

Response: We followed up with Patrick O’Connell on this comment and had several conversations surrounding water uses, the Water Availability Analysis, and data sources. We have reached out to other similar facilities and have two data sources that support approximately 4 gallons per day (gpd) per guest. The first source is Staunton State Park; they provided visitation and water use data for their 2021 through 2023 winter and summer seasons for their visitor center, which has four toilets, four sinks, one drinking fountain, and no restaurant use. They have this one facility at their one entry portal and offer recreation opportunities such as hiking, mountain biking, and picnicking, all of which resemble what is proposed at SMBP. In the data shared by Staunton State Park, water use per guest ranged from 1.0 – 4.4 gpd in this time period; however, this was at the same time that the park had a leak in their water pipe as well. After the leak was fixed, visitation and water use data indicated an average use per guest of 0.3 gpd. Because 4.4 gpd is the maximum in this dataset, even with the leak, we believe this fully supports a guest use of 4 gpd as a high estimate for a similar use in a nearby area.

Additionally, Mr. O’Connell obtained a week’s data of water use and visitation at the Valley restaurant at Loveland Ski Area in Colorado. This ski area is a similar distance from a metropolitan area (approx. one hour from Denver) and offers a developed recreation opportunity for this population. Additionally, the Valley facility offers guest services such as restrooms and a ski school children’s center as well as a bar, restaurant, and cafeteria (for a total of two kitchens in the facility). Water use from this data was estimated at 7-8 gpd per guest including restaurant use. The EPA estimates that approximately 31-45% of water use in restaurants, office buildings, and educational facilities is attributed to domestic/restrooms (which is the only use for SMBP guests), which supports the estimate of about 4 gpd per guest for SMBP’s type of use.

With these data sources, we feel confident in our estimate of approximately 4 gallons per day per guest and have provided an updated WAA to Mr. O'Connell with this estimate. Our estimate assumes guest use of 275 days per year (given the seasonal closure described in our Special Use Plan) and employee use of 365 days per year. Consumptive use would be approximately 0.76 af/yr with these assumptions.

Comment 5. The Engineering Study should be updated with data/references for the 4 gpd value. The applicant should review the WAA (xls format) and provide data/references for alternative values as appropriate.

Response: See response above.

1. Grading within the Jefferson County Floodplain Overlay District (flood prone area) will require a separate Floodplain Development Permit.

Response: Comment noted.

In addition to the comments above, we have spoken with our case manager and Mr. O'Connell about our approach to obtaining water rights and have agreed to outline it here. We intend to construct a well for water use during normal operations. Normal operations include bike park operations in April through December outside of Special Events, as well as occasional employee use for maintenance from January through April. Well water will be used for toilets, sinks, and water fountains. We will pursue a nonexempt commercial well permit and water augmentation plan for normal operations and understands that this would need to be obtained prior to Site Development Plan approval. The water augmentation plan will supply the facility with approximately 4.72 acre-feet per year (afy) of water, as anticipated based on the assumptions described herein and as described in the attached engineer's report for water supply. We anticipate that pursuing a nonexempt well permit and water augmentation plan for up to 4.72 afy will be a long process and therefore plan to pursue an exempt commercial well permit, limited by a maximum annual withdrawal of 108,600 gallons per year (approximately 0.33 afy), for uses during construction and the start of operations. This would be a temporary use and water use would be highly monitored so as to not exceed the maximum annual withdrawal under the duration of this permit. This and other supplemental alternatives such as hauling water have also been discussed with the Colorado Division of Water Resources (DWR) and could contribute towards guest water use; as such, the DWR understands our intention for next steps.

We are committed to the assumptions included herein and understand the sensitivity around additional water use for this type of development. We also would like to reiterate that other uses, such as the recommended residential use for the Property, would allow water use of up to 298 gpd for one single family home according to the Conifer/285-Corridor Area Plan, and up to 25 homes on the Property. This would amount to approximately 7,500 gpd for the property (approx. 1 afy of consumptive use), as opposed to a maximum use of 5,400 gpd (approx. 0.75 afy of consumptive use) as estimated for this Project. That being said, we are also committed to limiting our water use where possible by installing water efficient toilets and sinks, monitoring visitation, and addressing leaks or other errors in the system as soon as they're discovered. We hope that this response will help your understanding of this project and address your concerns.

Sincerely,

A handwritten signature in black ink, appearing to read 'Phil Bouchard', written in a cursive style.

Phil Bouchard
Shadow Mountain Bike Park

A handwritten signature in black ink, appearing to read 'Jason Evans', written in a cursive style.

Jason Evans
Shadow Mountain Bike Park

Attachment A

GENERAL PURPOSE

Water Well Permit Application

Review instructions on reverse side prior to completing form.
 The form must be computer generated, typed or in black or blue ink.

1. Applicant Information

Name of applicant _____

Mailing address _____

City _____ State _____ Zip code _____

Telephone # (area code & number) _____ E-mail (online filing required) _____

2. Type Of Application (check applicable boxes)

Construct new well Use existing well

Replace existing well Change or increase use

Change source (aquifer) Reapplication (expired permit)

COGCC Well Other: _____

3. Refer To (if applicable)

Well permit # _____ Water Court case # _____

Designated Basin Determination # _____ Well name or # _____

4. Location Of Proposed Well

County _____

Section _____ Township _____ N or S Range _____ E or W Principal Meridian _____

Distance of well from section lines (section lines are typically not property lines)
 Ft. from N S Ft. from E W

For replacement wells only – distance and direction from old well to new well
 _____ feet _____ direction

Well location address (Include City, State, Zip) Check if well address is same as in Item 1.

Optional: GPS well location information in UTM format You must check GPS unit for required settings as follows:

Format must be UTM
 Zone 12 or Zone 13
 Units must be Meters
Datum must be NAD83
 Unit must be set to true north
 Was GPS unit checked for above? YES NO

Easting _____
 Northing _____

Remember to set Datum to NAD83

5. Parcel On Which Well Will Be Located (PLEASE ATTACH A CURRENT DEED FOR THE SUBJECT PARCEL)

A. Legal Description (may be provided as an attachment):

B. # of acres in parcel _____ C. Owner _____

D. Will this be the only well on this parcel? YES NO (if no list other wells)

E. State Parcel ID# (optional): _____

6. Use Of Well (check applicable boxes)

Attach a detailed description of uses applied for.

Industrial Dewatering System

Municipal Geothermal (production or reinjection)

Irrigation Other (describe): _____

Commercial

7. Well Data (proposed)

Maximum pumping rate _____ gpm Annual amount to be withdrawn _____ acre-feet

Total depth _____ feet Aquifer _____

8. Land On Which Ground Water Will Be Used

Legal Description of Land (may be provided as an attachment):

(If used for crop irrigation, attach a scaled map that shows irrigated area.)

A. # Acres _____ B. Owner _____

C. List any other wells or water rights used on this land:

9. Proposed Well Driller License #(optional):

10. Sign or Entered Name Of Applicant(s) Or Authorized Agent

The making of false statements herein constitutes perjury in the second degree, which is punishable as a class 1 misdemeanor pursuant to C.R.S. 24-4-104 (13)(a). I have read the statements herein, know the contents thereof and state that they are true to my knowledge.

Sign or enter name(s) of person(s) submitting application _____ Date (mm/dd/yyyy) _____

If signing print name and title _____

Office Use Only

USGS map name _____ DWR map no. _____ Surface elev. _____

Receipt area only

AQUAMAP
 WE
 WR
 CWCB
 TOPO
 MYLAR
 SB5

DIV _____ WD _____ BA _____ MD _____

GENERAL PURPOSE WELL PERMIT APPLICATION INSTRUCTIONS

Applications must be computer generated on-line, typewritten or printed in BLACK or BLUE INK. ALL ITEMS in the application must be completed. Incomplete applications may be returned to the applicant for more information. Applications are evaluated in chronological order. Please allow approximately six weeks for processing. This form may be reproduced by photocopying or computer generation. Reproductions must retain margins and print quality of the original form. If filing online see online filing instructions! You may also save, print, scan and email the completed form to: dwrpermitsonline@state.co.us For further information please visit dwr.colorado.gov

FEES: This application requires a nonrefundable \$100.00 filing fee. Please visit [DWR's Online Form Submittal](#) web page for acceptable payment information or contact DWR at (303) 866-3581.

USES: This form (GWS-45) is to be used to apply for commercial, industrial, municipal, irrigation, feed lot, geothermal (see Geothermal Rules for fee requirements), recovery wells, and other uses not otherwise noted in the following list:

RESIDENTIAL use wells – Use of form GWS-44 is required
LIVESTOCK watering on a farm, ranch, range or pasture (not feedlots) – Use form GWS-44
MONITORING/OBSERVATION wells – Use form GWS-46
GRAVEL PITS – Use form GWS-27
REGISTRATION of an existing well – Use form GWS-12 (must have been in use prior to May 8, 1972)
GEOEXCHANGE SYSTEM LOOP FIELDS – Use form GWS-72
REPLACEMENTS OF WELLS FOR THE ABOVE USES

ITEM INSTRUCTIONS: (numbers correspond with those on the front of this form)

1. The applicant is the entity for whom the permit is to be issued. Provide the applicant name and the mailing address where all correspondence will be sent.
2. Check all boxes that apply.
3. Complete all boxes that apply. If the permit is to be issued pursuant to a water court decree or a Designated Basin determination of water right, the case number or determination number must be indicated. If applying to replace or change the use of an existing well, the permit number of the existing well must be indicated.
4. The county, ¼ of the ¼ section designation, section #, township, range, principal meridian, and distances from section lines for the proposed well must be provided. (An option to providing distances from section lines and the ¼ of the ¼ section designation is to provide an accurate GPS location in UTM format. The required GPS unit settings must be as indicated on this form.) Colorado contains two (2) UTM zones. Zone 13 covers most of Colorado. The boundary between Zone 12 and Zone 13 is the 108th Meridian (longitude). West of the 108th Meridian is UTM Zone 12 and east of the 108th Meridian is UTM Zone 13. The 108th Meridian is approximately 57 miles east of the Colorado-Utah state line. On most GPS units, the UTM zone is given as part of the Easting measurement, e.g. 12T0123456. Check the appropriate box for the zone. Provide the property address of the well location if one exists. If it is the same as the mailing address, check the box next to the well location address.
5. **Please attach a current deed for the subject parcel.** Complete all boxes and provide a complete legal description of the parcel of land on which the well will be located. **If filing online please see online filing instructions for how to submit deed and or legal description attachments.**
6. Check all boxes that apply and attach a detailed description of the uses applied for.
7. Complete all boxes.
8. Complete all boxes and provide a legal description of the land areas on which ground water from the proposed well will be used. If agricultural irrigation is a proposed use, provide a map of the land area with proposed irrigated areas accurately drawn, including section numbers and section lines. A list of all other wells or water rights used on the described land must be provided.
9. The well must be constructed by a Colorado licensed well driller, an authorized individual in accordance with the Water Well Construction Rules, 2 CCR 402-2, or under the "private driller" provision as defined in CRS 37-91-102(12). A listing of licensed well drillers/pump installers is available [here](#).
10. The individual signing the application or entering their name and title must be the applicant or an officer of the corporation/company/agency identified as the applicant or their attorney. An authorized agent may also sign the application, if a letter signed by the applicant or their attorney is submitted with the application authorizing that agent to sign or enter their name on the applicant's behalf. If you filled the form out on-line you may save or print, sign, scan and email the form to the Division of Water Resources. Payment must be received via phone, fax or mail prior to processing the application.

IF YOU HAVE ANY QUESTIONS regarding any item on the application form, please call the Division of Water Resources Ground Water Information Desk (303-866-3587), or the nearest Division of Water Resources Field Office located in Greeley (970-352-8712), Pueblo (719-542-3368), Alamosa (719-589-6683), Montrose (970-249-6622), Glenwood Springs (970-945-5665), Steamboat Springs (970-879-0272), or Durango (970-247-1845), or refer to our web site at dwr.colorado.gov for general information, additional forms, and access to state rules or statutes.

Case No. 23-102980RZ

Legal Description

Street Location of Property Shadow Mountain Drive

Is there an existing structure at this address?

Yes _____ No X

Type the legal description and address below.

Parcel ID 61-163-00-001 is more particularly described by the metes and bounds of the said 306 acres, it is owned by the Colorado State Land Board. The corner quarter coordinates S 43° 07'29" E and N 00°19'28" W and is a locally preserved 70 acre quarter corner of the used 235 acre parcel #61-00-001. This 70 acre parcel corner sits S of Shadow Mtn Drive Road with road frontage facing the southeast quarter of Shadow Mountain Drive Road containing a R.O.W. of 60'. This quarter corner commences at the S2NW, SE and quarter corner of the NWNW said section 16, Township 6 South Range 71 West of 6th principal Meridian.

Section 16 Township 6 S. Range 71 W.

Calculated Acreage 235.316 Acres

Address Assigned (or verified) (Vacant Land) Shadow Mountain Drive

Attachment B

**ENGINEERING STUDY
for
SHADOW MOUNTAIN BIKE PARK
CONCEPT MASTER PLAN
WATER SYSTEM IMPROVEMENTS**

Prepared For:

**Colorado State Land Board
Shadow Mountain Bike Park
SE Group
Frisco, Colorado
PO Box 2729
323 West Main Street, Suite 202
Frisco, CO 80443-2729**

Prepared By:

Stantec

5725 Mark Dabling Blvd. Suite 190
Colorado Springs CO 80919

**November 2022
Revised October 2023
Revised April 2024
Project No. 181711248**

***** CONTENTS *****

Section 1	EXECUTIVE SUMMARY	1
Section 2	INTRODUCTION	2
2.1	Purpose	2
2.2	Scope	2
Section 3	EXISTING CONDITIONS	3
3.1	Description of Service Area	3
3.2	Land Use	3
3.3	Topography and Floodplains	3
3.4	Geology	3
3.5	Groundwater	3
3.6	Climate	6
3.7	Natural Hazards Analysis	6
3.8	Organizational Context	6
3.9	Water Facilities	6
3.10	Relationship to Neighboring Water and Wastewater Facility	7
3.11	Water Demand	7
Section 4	DEVELOPED CONDITIONS	9
4.1	Land Use	9
4.2	Population and Employment	10
4.3	Water Demand	10
4.4	Water Supply	12
4.5	Water Quality	12
4.6	Fire Flow Requirements	12
Section 5	WATER SYSTEM IMPROVEMENTS	13
5.1	General	13
5.2	Groundwater Wells	13
5.3	Treatment	13
5.4	Storage	13
5.5	Distribution	13
5.6	Estimated Costs	14
5.7	Rates and Charges	14

******* APPENDICES *******

Appendix A	100-Year Flood Plain Certification
Appendix B	Water System Improvement
Appendix C	Water Usage Data

******* LIST OF FIGURES *******

Figure 1	Vicinity Map
----------	--------------

Section 1 EXECUTIVE SUMMARY

This report presents the results of the engineering study for water system improvements serving Shadow Mountain Bike Park proposed on State Land Board Shadow Mountain parcels in Jefferson County, Colorado. Shadow Mountain Bike Park is proposed on undeveloped property with a designated address of 29611 Shadow Mountain Drive, Conifer, Colorado 80433.

The proposed parcel currently has no water facilities on site. Shadow Mountain Bike Park proposes construction of a minimum of one water well to provide potable water to the site facilities through a private water system.

Shadow Mountain Bike Park facilities will consist of a Base Lodge operating as a Class III Recreation facility to welcome guests and provide basic needs such as welcoming center including drinking water and restrooms as well as a maintenance facility for storage and employee use, including water and additional restroom.

The average annual water demand for Shadow Mountain Bike Park is estimated to be 4.72 acre-feet of water per year. Maximum day usage during operations between April 1st and December 31st is estimated to be approximately 5400 gpd or 3.75 gpm. This water will be provided by water wells as permitted by the Colorado State Engineers Office.

To meet Drinking Water Standards water will be filtered (if required) and disinfected prior to storage and will meet Colorado Department of Health and Environment Drinking Water Standards.

Fire Protection is provided by the Elk Creek Fire Protection District. Discussions with District Representatives indicate that they will require on-site fire protection that can provide 1500 gpm for 2 hours. To meet this requirement onsite Fire Storage will need to be 180,000 gallons exclusive of storage required for domestic use. This storage will be provided in a separate Fire Storage only ground storage tank; fire flow will be conveyed to the site through a fire flow distribution system to on-site fire hydrants.

Section 2 INTRODUCTION

2.1 Purpose

The purpose of this report is to present water system improvements recommended to serve Shadow Mountain Bike Park; a proposed recreational development project located in Jefferson County. It is also intended to serve as a guideline for the ensuing design of recommended improvements.

2.2 Scope

The scope of this report includes:

1. The definition of the service areas as well as identification of significant physical and environmental characteristics and constraints.
2. An analysis of available data to determine existing and to project future water supplies, demands and quality.
3. A description of legal, institutional and managerial arrangements that ensure adequate control of the proposed improvements; and,
4. A preliminary recommendation for a selected supply, treatment, pumping and transmission alternatives.

Section 3 EXISTING CONDITIONS

3.1 Description of the Service Area

Shadow Mountain Bike Park consists of approximately 235 acres of Base Lodge (10 acres +/-) and open space uses and is located northwest of Conifer, Colorado, within Township 6 South, Range 71 West, Section 16.

3.2 Land Use

Shadow Mountain Bike Park is in Jefferson County northwest of Conifer, Colorado and about 35 miles southwest of the Denver Metroplex. Surrounding areas are primarily large tract residential properties and large undeveloped tracts.

3.3 Topography and Floodplains

The topography of the service area is typical of a Colorado Front Range Mountain parcel with elevations ranging from 8400 ft. to 9250 ft. above sea level. Existing slopes range from 5% at base camp to 25% or greater in some areas. Vegetation is typical Colorado mountain woodlands with a mix of Ponderosa Pine, Spruce, Fir and ground cover plants and grasses. The area drains generally northeast to North Turkey Creek.

There is no Federal Emergency Management Agency (FEMA 08059CO365F) established floodplain within the boundaries of Shadow Mountain Bike Park. See Appendix A.

3.4 Geology

The site is comprised of several different soil types. From the NRCS Soil Survey of Jefferson County, the site falls into the following soil types:

1. "67" Kittredge-Earcree, 9 to 20 percent slopes; Type A Soil
2. "76" Legault-Hiwan stony loamy sands, 15 to 30 percent slopes; Type D Soil
3. "77" Legault-Hiwan-Rock outcrop complex, 30 to 50 percent slopes; Type D Soil
4. "138" Rock outcrop, igneous and metamorphic; Type D Soil
5. "141" Rogert, very stony-Herbman-Rock outcrop complex, 30 to 70 percent slopes; Type D Soil

Note: "#" indicates Soil Conservation Survey soil classification number.

3.5 Groundwater

The proposed water supply for the Shadow Mountain Bike Park is an onsite water well. The applicant has been in discussion with the State Engineers Office concerning a well permit for the site including the type of permit and the uses permitted to ensure proper permitting. There are numerous wells in the area and discussions with the State indicate issuance of a permit could be made based on water rights associated with the property without injury to adjacent water rights.

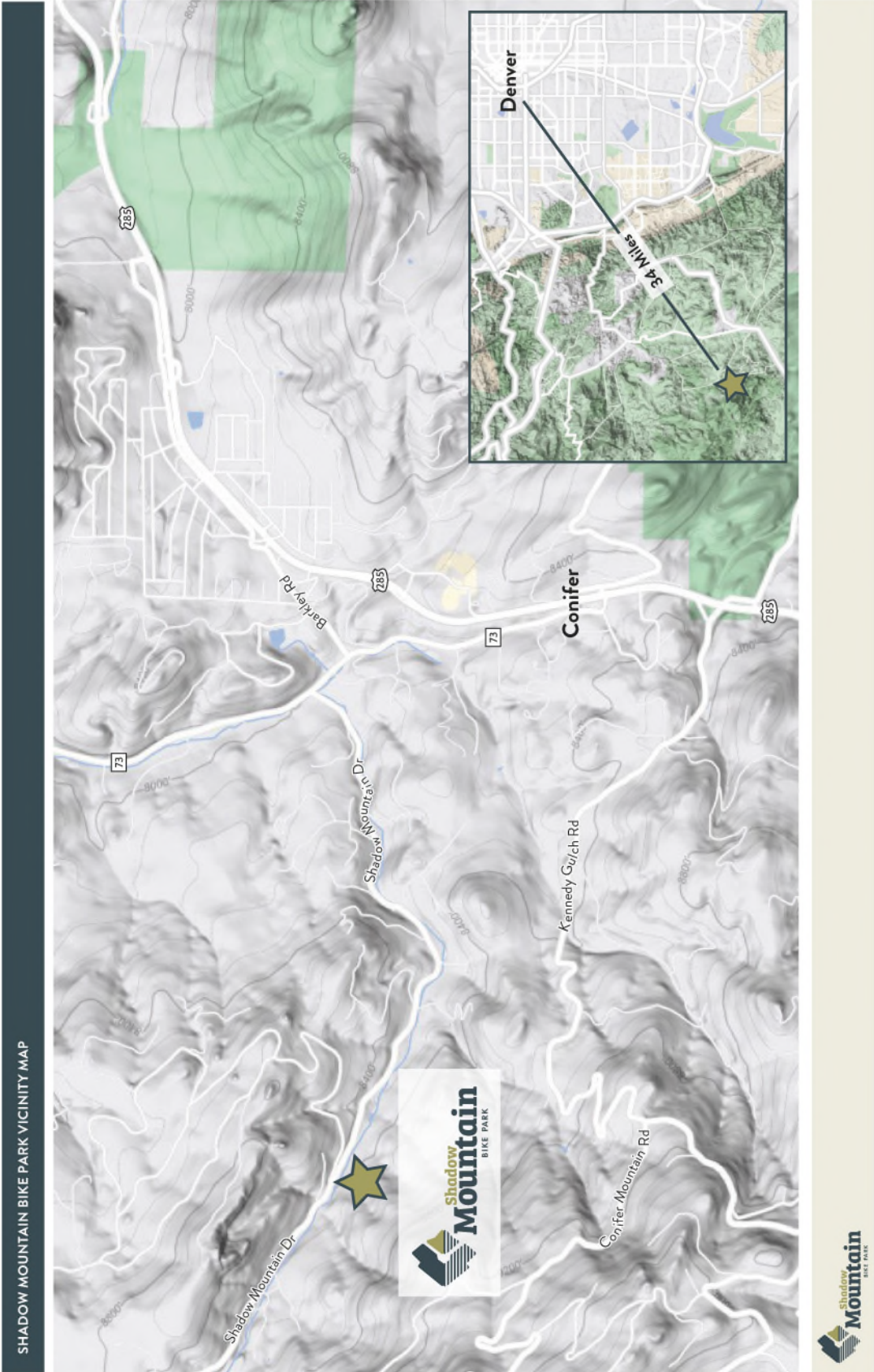


Figure 1: Vicinity Map

3.6 Climate

The climate of the study area is characterized by mild summers and moderately severe winters, moderate precipitation, high evaporation, and moderately high wind velocities.

The average annual monthly temperature is 43.5 F with an average monthly low of 10.3 F in the winter and an average monthly high of 76.1 F in the summer.

Precipitation averages 17.3 inches annually, with 50% of this falling as snow. August is the wettest month and January is the driest. The average annual Class A pan evaporation is 45 inches.

3.7 Natural Hazards Analysis

Natural hazards analysis indicates that no unusual surface or subsurface hazards are located in the service area. However, because the soils are cohesionless, sloughing of steep banks during drilling and/or excavation could occur. By siting improvements in a manner that provides an opportunity to lay the banks of excavations back at a 1:1 slope during construction, the problems associated with sloughing soils can be minimized.

3.8 Organizational Context

Shadow Mountain Bike Park is situated within the North Turkey Creek basin of Jefferson County. The closest public water supplier would be Mountain Water and Sanitation District in Conifer, Colorado. The distance and topography to Conifer in general is cost prohibitive in terms of a water supplier for the bike park.

The amount of water required for the facility and the distance to other providers makes an onsite private water system the best for meeting on-site demands. The Mountain Shadow Bike Park will be the entity responsible for financing, construct and ensure the continuing operation and maintenance of improvements.

3.9 Water Facilities

The proposed water system will consist of a minimum of one water well onsite and water treatment and disinfection based on source water conditions and Colorado Department of Health and Environment requirements. In addition, there will be a 6-inch water transmission line from the water well to the storage tank. Water will be stored to provide peak hour demand and fire sprinkler water for the onsite Base Lodge.

3.10 Relationship to Neighboring Water and Wastewater Facilities

Mountain Water and Sanitation District near Conifer, Colorado is the closest potential provider of water and wastewater facilities. The distance and topography between the site and the town make any connection cost prohibitive.

3.11 Water Demand

The Shadow Mountain Bike Park recreational development will be serviced by a private water system constructed by the developer of the bike park. The projected water demand for the facility is calculated in Section 4.3 Water Demand based on uses recorded at other Bike Park facilities.

Section 4
DEVELOPED CONDITIONS

4.1 Land Use

Mountain Shadow Bike Park consists of approximately 235 acres of State Land Board undeveloped property. Most of the site will be left undeveloped except for the addition of Bike Trails, a bike lift and development of approximately 10 acres for a base lodge including one building for welcoming, ticketing, water facilities and restrooms and one additional building for maintenance and employees with an additional restroom.

Assumptions: Employees water usage is estimated to be 20 gallons per day (gpd)
Guest Water Usage is estimated to be 4 gpd
Irrigation will be minimal or not required with xeriscape or extensions of the natural surroundings.

4.2 Population and Employment

The applicant estimates that there will be up to 30 onsite employees in a given day. The maximum day guest population is estimated to be 1200 as indicated in the applicant's special use plan. Guest and employee populations are estimated to be much lower on average; however, this report has been prepared to estimate maximum uses for water system design.

4.3 Water Demand

Water demand is estimated to be as follows:

Employees	30 x 20 gpd =	600 gpd
Guests	1200 x 4 gpd =	<u>4800 gpd</u>
	Total =	5400 gpd

These calculations indicate that during a maximum occupancy day the water system would need to be capable of delivering 5400 gpd. Yearly acre-feet requirements assume 275 operating days with guests and that the facility will be staffed year-round with employees. Estimated yearly acre-feet demand is as follows:

Employees	600 gpd x 365 days =	21,900 gallons = 0.67 ac-ft
Guests	4800 gpd x 275 days =	1,320,000 gallons = <u>4.05 ac-ft</u>

= 4.72 ac-ft yearly demand

Unit water demands for guests (4 gpd) are based on water usage data from Staunton State Park and Loveland Ski Area (See appendix C). Guest use is planned for 275 days between April and December, outside of the seasonal closure (January 1 through April 1) as defined in the applicant's special use permit. Unit water demands for employees are based on the EPA's Clean Water Toolkit for Sanitary Water Usage based on employees on site 365 days per year.

Water demand is calculated in acre-feet per year (AFY) to determine water supply needs. The maximum guest day is used to determine the average daily demand (ADD) in gallons per minute (gpm), which is used to project maximum day and peak hour demands. Maximum day demand (MDD) and peak hour demand (PHD) have been determined by applying accepted peaking factors of 2.5 and 4.0 to the ADD, respectively. The MDD is used to determine storage needs and the PHD is used for modeling system delivery pressures and to size distribution piping.

Demand

Gallons/day=	5400
ADD gpm=	3.75
MDD gpm=	7.5
PHD gpm=	15.0

Estimated Building Sprinkler demand is 20 gpm for 2 hours or 2400 gallons.

4.4 Water Supply

The proposed water supply for the Shadow Mountain Bike Park is an onsite water well. The applicant has been in discussion with the State Engineers Office concerning a well permit for the site including the type of permit and the uses permitted to ensure proper permitting. There are numerous wells in the area and discussions with the State indicate issuance of a permit could be made based on water rights associated with the property without injury to adjacent water rights. Most of the wells in the area range between 350 ft to over 600 ft. in depth. The nearby wells all indicate access to an “unnamed” aquifer and are all located in a “non-designated” basin.

Based on information from adjacent properties we would anticipate construction and completion of a water well between 500 and 600 ft. in depth in an unnamed aquifer.

The water well permit should be for a well capable of producing at a minimum the anticipated Average Day Demand and overall, yearly withdraw limits should not exceed 4.72 ac-ft annually.

4.5 Water Quality

The water quality and any mitigation required will be determined after construction of the well based on the permit obtained from the State Engineers Office. Mitigation anticipated may include filtering and disinfection. Anticipated treatments expected would be easily obtained with standard readily available locally provided treatment and disinfection equipment.

4.5 Fire Flow

Fire Protection is provided by the Elk Creek Fire Protection District. Discussions with District Representatives indicate that they will require on-site fire protection that can provide 1500 gpm for 2 hours. To meet this requirement onsite Fire Storage will need to be 180,000 gallons exclusive of storage required for domestic use.

In most domestic water systems, the Fire Storage component is 20 to 30% of the overall storage requirement. In this case the Fire Storage component is 94%. Storing water for long periods of time can lead to water quality issues primarily related to taste. Because of this concern, the domestic storage and the fire storage will likely need to be separated.

Fire Storage can be addressed in one of two ways and evaluation of the best alternative will need to continue through the Design Phase to determine the most economical and efficient system.

Ground Storage or Cistern with a Fire Pump

This system would require a 180,000-gallon storage tank approximately 30 feet in diameter and approximately 30 feet tall. Or alternatively a below grade 180,000 gallon cistern approximately 50 feet x 50 feet x 10 feet deep. Along with the storage there would be a requirement to install a 1500 gpm fire pump to deliver water at 20 psi. This type of fire pump would require a 25 HP motor. Included with the design would be a backup generator and fuel storage to provide electricity to the pump if the power failed during a fire.

Ground storage/elevated Fire Storage.

This system would require a 180,000-gallon storage tank approximately 30 feet in diameter and 30 feet tall located at an elevation approximately 50 feet higher than the facility. No fire pump or backup generator would be required, but approximately 2100 feet of transmission pipe would be required to convey water from the site to the tank.

In both cases some pipe would need to be located around the site to distribute to fire hydrant locations (2 maximum).

It would take a 10 gpm well approximately 12.5 days to fill the fire storage tank.

Some type of disinfection and/or aeration may be required in either system to prevent growth of bacteria that could interfere with the distribution of fire flow.

Evaluation of the two potential fire storage options will continue with final design. However, in order to avoid the expense of a large fire pump and backup generator and to use the advantage of gravity flow this report will assume the use of the second option, a ground storage elevated tank.

Section 5
WATER SYSTEM IMPROVEMENTS

5.1 General

The water system would be operated by the Shadow Mountain Bike Park and would be classified as a private water system and would be operated to meet the applicable requirements of the Colorado Department of Public Health and Environment (CDPHE). The system may be operated by a third party contracted by Shadow Mountain Bike Park and licensed by the State of Colorado.

Filtration and disinfection facilities provide treatment of the raw water sources to ensure good water quality. In addition, storage facilities and distribution piping will be provided to ensure that residual pressure requirements are achieved both during peak hour demands and during maximum day demands. The system will also be designed to deliver the required fire sprinkler water to the onsite building.

5.2 Groundwater Wells

The proposed water supply for the Shadow Mountain Bike Park is an onsite water well. As mentioned previously, the applicant has been in contact with the State Engineers Office concerning the parameters of a permit.

The water well permit should be for a well capable of producing at a minimum the anticipated Peak Hour Demand and overall, yearly withdraw limit should exceed 2 ac-ft annually.

The well will be equipped with a submersible well pump capable of delivering in excess of the Average Day Demand of 7.5 gpm. The well pump would be designed to deliver water to the domestic storage tank and fire tank. Final design characteristics will be based on the hydraulic characteristics of the well and the final configuration of the domestic and fire distribution systems.

5.3 Water Treatment

Treating and filtering of the water sources will meet CDPHE Drinking Water Standards.

In addition, CDPHE standards require that the water supply be disinfected and that the supply receives minimum chlorine contact time of 30 minutes before first use.

5.4 Storage

Storage reservoirs will be ground mounted and elevated steel tanks designed in accordance with CDPHE and AWWA Standards.

Potable Water Storage is sized to provide a minimum of 30% of maximum day demand. Required storage is calculated as follows:

Maximum Day Demand is 7.5 gpm. $7.5 \times 60 \times 24 = 10,800$ gallons

Estimated Storage Requirement = 10,800 gallons say 11,000 gallons

Tank size could be doubled to allow for special events (22,000 gallons). Normal operation would be between 8,000 and 12,000 gallons. Actual storage requirements and operational characteristics will be

addressed as final design proceeds.

Fire Demand Storage will be 180,000 gallons as stated in section **4.5 Fire Flow**. Water stored for fire flow will not be considered potable due to disinfection required to maintain functional fire flow storage for long periods of time without use.

5.5 Distribution

The water distribution system provides water at a maximum static pressure of 45 psi during periods of low use and at a minimum residual pressure of 40 psi during peak hour demand. The storage tank will be located at an elevation sufficient to meet these pressure requirements along with associated distribution and conveyance piping. Anticipated transmission and distribution piping is 6-inch.

Fire flow will be conveyed in its own distribution system to 2 fire hydrants located with the fire district input around the site near the building during final design. Each fire hydrant will be capable of conveying 1500 gpm at a minimum pressure of 20 psi. The anticipated fire system piping will be 6-inch minimum diameter.

5.6 Estimated Costs

Estimated Costs

Item	Units	Quantity	Unit Price	Extension
Shadow Mountain Bike Park				
Water Well	LS	1	\$50,000	\$50,000
Well Pump and Controls	LS	1	\$15,000	\$15,000
Potable Water Transmission	LF	5,800	\$35	\$203,000
Potable Storage	Gallons	22,000	\$3	\$66,000
Fire Storage Transmission	LF	2,500	\$35	\$87,500
Fire Storage	Gallons	180,000	\$2	\$360,000
Treatment	LS	1	\$40,000	\$40,000
Total Estimated Cost				<i>\$821,500</i>

The above system improvements are all constructed as part of Shadow Mountain Bike Park. These costs do not include other costs or gains that may be incurred in the acquisition of land, financing, investment, local distribution, the salvage value of equipment or other necessary infrastructure, among others, unless specifically noted. The above costs are estimated, actual costs may differ depending upon numerous factors including supply chain and cost increases at time of bidding.

5.7 Rates and Charges

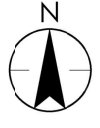
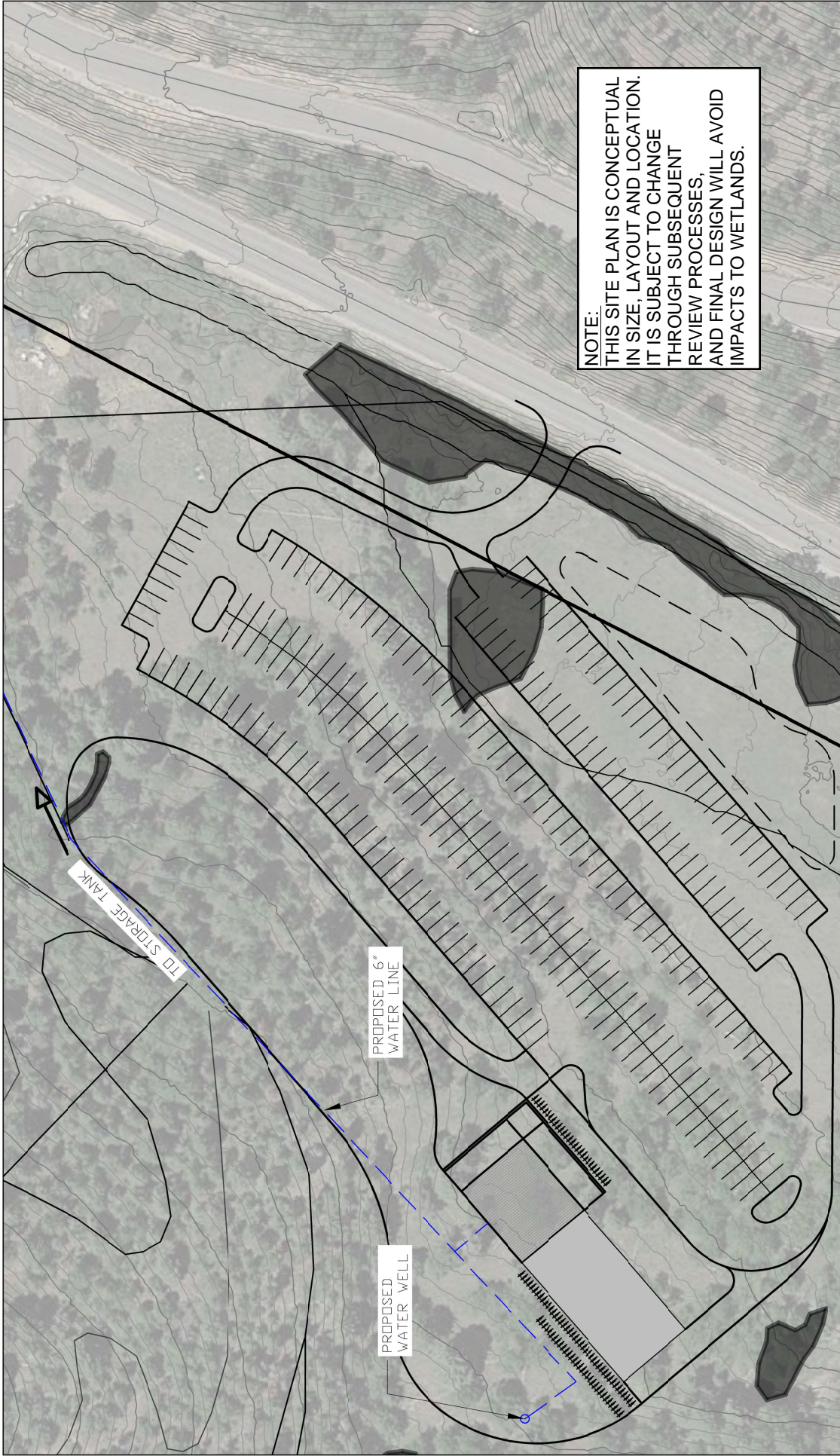
The waters system will be operated within the overall operation of the Shadow Mountain Bike Park through user fees charged to guests for the recreational facility.

Appendix A

100 Year Flood Plain Certification

Appendix B

Water System Improvements



WATER SYSTEM SITE DRAWING (A)
 SHADOW MOUNTAIN BIKE PARK
 SCALE: 1"=60'

2000 S COLORADO BLVD
 SUITE 300
 DENVER, CO 80222





NOTE:
 THIS SITE PLAN IS
 CONCEPTUAL IN SIZE,
 LAYOUT AND LOCATION. IT
 IS SUBJECT TO CHANGE
 THROUGH SUBSEQUENT
 REVIEW PROCESSES,
 AND FINAL DESIGN WILL
 AVOID IMPACTS TO
 WETLANDS.

PROPOSED 22,000
 GALLON TANK

ACCESS ROAD

PROPOSED 6"
 WATER LINE

PROPOSED
 WATER WELL



WATER SYSTEM SITE DRAWING (B)

SHADOW MOUNTAIN BIKE PARK

SCALE: 1"=300'

2000 S COLORADO BLVD
 SUITE 300
 DENVER, CO 80222



Appendix C
Water Usage Data

**Jefferson County - Planning and Zoning Division
Water Requirement Report Worksheet**

Case Number	23-102980RZ
Property Address	-
ODP/Subdivision Name	Shadow Mountain Bike Park
Within MGWOD	Yes
Complies with MGWOD	

1) Calculate Water Withdrawal and Consumptive Water Use of Proposed Development

Type of Proposed Use	Description of Unit	FIXED FIELDS			INPUT	CALCULATED FIELDS			INPUT	Notes
		Annual Withdrawal per Unit (ac-ft per year)	Daily Withdrawal Per Unit (gpd)	Percent Consumptive Use	Number of Units	Total Annual Withdrawal (ac-ft per year)	Total Annual Consumptive Use of Water (ac-ft per year)	Average Water Withdrawal (gpd)	Occupancy Factor Per Year (days)	
Bike Park Guests (weekend)	People	0.00	4	16%	1200	4.05	0.65	4800	275	Seasonal closure Jan 1 to April 1
Bike Park Staff	People	0.02	20	16%	30	0.67	0.11	600	365	
Total						4.72	0.76	5400		

2) Calculate water requirement in terms of acre-feet per acre per year.

$$\frac{5400 \text{ gallons}}{1 \text{ day}} \times \frac{365 \text{ days}}{1 \text{ year}} \times \frac{1 \text{ acre foot}}{325851 \text{ gallons}} \times \frac{1 \text{ project}}{306.0 \text{ acres}} = 0.02 \text{ acre-feet per acre per year}$$

3) Based on water requirements and Section 21 of the LDR, is an Aquifer Test required?

- Since the water requirement does not exceed 0.28 af/a/y, an Aquifer Test is not required with the rezoning application
- Since the water requirement is less than 0.10 af/a/y, an Aquifer Test is not required with the plat or SDP application

4) Aquifer Test Data

WELL DATA		AQUIFER TEST DATA				RECOVERY DATA			
Well Permit Number	Total Depth of Well (ft)	Static Water Level (ft)	Production Rate (gpm)	Extrapolated Production Rate (gpd)	Total Hours Pumped	Water Level When Pumping Stopped (ft)	Recovery-Hours After Pumping (hr)	Recovery-Water Level (ft)	Percent Recovered
Total									

5) Comments

- *Well Permit information not provided by applicant
- *1200 guests maximum based on revised ODP provided by applicant
- *80 bike park staff based on ratio in October 23, 2023 report (300 guest parking & 20 employee parking)
- *Daily guest withdrawal (4 gpd) based on 2021-2023 Staunton State Park water use data (applicant can provide data to County) and Loveland water use data (provided by County)
- *Daily employee withdrawal (20 gpd) based on EPA Lean Water Toolkit for commercial day use facilities without restaurant use (see References sheet)
- *Weekday/weekend visitation ratio from Bogus Basin bike park data for 2023 season (applicant can provide data to County)

Type of Proposed Use	Description of Unit	Annual Withdrawal per Unit (ac-ft per year)	Daily Withdrawal Per Unit (gpd)	Number of Units	Sources	Sq Feet	Description
Bike Park Guests	people		4		Staunton State Park Water Use and Visitation 2021-2023		Maximum use between 2021-2023 was up to 4.4 gallons per guest per day in November-December 2021; this was while Staunton State Park had a leak in their water line. Water use after the leak was fixed, water use was closer to 0.5 gallons per guest per day. Data is from Staunton's visitor center, which has 4 toilets, 4 sinks, and 1 drinking fountain. Thus, the Applicant references 4 gpd per guest as a conservative estimate of water use at a similar facility (parking lot and lodge), which would have a similar number of toilets and has a similar use (outdoor recreation).
Bike Park Employees	people		20		EPA Lean Water Toolkit		

https://dnrc.mt.gov/_docs/water/Water-Rights-Forms/615.pdf

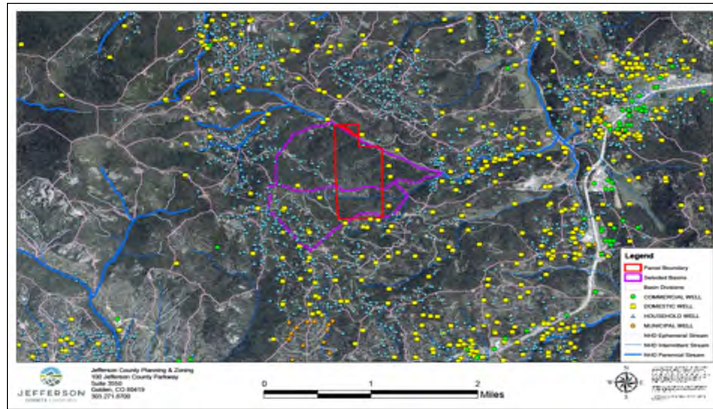
<https://www.jeffco.us/DocumentCenter/View/12324/Jefferson-County-Comprehensive-Master-Plan?bidId=>

<https://www.jeffco.us/DocumentCenter/View/1673/2018-Onsite-Wastewater-Treatment-System-Regulations-PDF?bidId=>

10–25 gallons per person per shift in industrial settings
The lower value is used where there are just toilets.
A higher value is used where there are toilets, showers, and full kitchen services (that is, food preparation and dish washing) **[the lower value is referenced here based on the proposed facility]**
20-35 gallons per employee per day for domestic demands (not including kitchens) in commercial/industrial settings
Savings of 25-35 percent in this domestic usage are readily achievable

[Lean & Water Toolkit: Appendix C | US EPA](#)

Water Availability Analysis of the Proposed Development on the Basin Groundwater Resources



Case Name: Shadow Mountain Bike Park
 Case Number: 23-102980RZ
 Date Prepared: 3.20.24

GIS Calculated
 Parameters
 Auto Calculated

Table 1: Estimate of Available Groundwater Resources in the Basin

Description	Variable or Equation	Value	Units
Basin area	A	753	acres
Average depth to groundwater in the basin (based on well permit data)	B	158	feet
Average depth of wells (based on well permit data)	C	371	feet
Saturated thickness of aquifer exposed to wells	D=C-B	213	feet
Estimated average porosity of aquifer	E	2.0%	
Basin Aquifer Group - alluvium		0%	% of basin
Basin Aquifer Group - highly fractured		1%	% of basin
Basin Aquifer Group - intrusive		63%	% of basin
Basin Aquifer Class - pikes peak		0%	% of basin
Basin Aquifer Group - metamorphic		36%	% of basin
Estimated amount of groundwater in storage	F=A*D*E	3211	acre feet
Effective yield of groundwater to wells	G	50%	
Estimate of groundwater in storage available to wells that are less or equal to the average depth	H=F*G	1605	acre feet
Estimate of groundwater stored in the basin aquifer per foot of saturated thickness	I=A*E*1-foot thick	15.06	acre feet per foot

Table 2: Analysis of Groundwater Withdrawal, Recharge, and Consumptive Use from Existing Wells in Basin

Equation or Variable	J	K	L=J*K	M	N=L*M	O _c =L-N
Type of Wells in Basin	Number of wells in Basin	Estimated amount of groundwater withdrawal in acre feet per year	Estimated amount of groundwater withdrawal in acre feet per year	Estimated percent returned to recharge groundwater	Estimated amount of groundwater recharge in acre feet per year	Estimated Consumptive Use of Water in acre feet per year
Domestic - household use portion	12	0.3	3.6	84%	3.0	0.6
Domestic - livestock watering (4 animals*10 gpd*365 days)		0.04	0.5	0%	0.0	0.5
Domestic - irrigation portion (1-acre*28 inches of water per year)		0.66	7.9	10%	0.8	7.1
Domestic (household use, irrigation, domestic livestock)	12	1	12.0	32%	3.8	8.2
Household Use	57	0.3	17.1	84%	14.4	2.7
Unaccounted HU wells based on existing structures (non vacant lots)	30	0.3	9.0	84%	7.6	1.4
Commercial	0	0.3	0.0	84%	0.0	0.0
Municipal (see comments for well at breakdown)	0	4.60	0.0	84%	0.0	0.0
Totals	99		38.1		25.7	12.4

*Wells may be associated with augmentation plan that allow for a lower withdrawal

Table 3: Estimate of Annual Groundwater Recharge to the Basin from Precipitation

Description	Variable or Equation	Value	Units
Basin area	A	753	acres
Mean annual precipitation based on NWS RFS data	P	19	inches
Average annual precipitation	Q=(P/12)*A	1209	acre feet
Estimated percent of annual precipitation that goes into groundwater recharge	R	3.5%	
Estimate of annual groundwater recharge to the basin from precipitation	S=Q*R	42.3	acre feet

Table 4: Ground Water Resource Impact of Proposed Development

Equation or Variable	J	K	L=J*K	M	N=L*M	O _p =L-N
Well Type Associated With Proposed Development	Number of Proposed Wells	Estimated amount of groundwater withdrawal in acre feet per year	Estimated amount of groundwater withdrawal in acre feet per year	Estimated percent returned to recharge groundwater	Estimated amount of groundwater recharge in acre feet per year	Estimated Consumptive Use of Water in acre feet per year
Domestic (household use, irrigation, domestic livestock)	0	1	0.0	32%	0.00	0.00
Household Use	0	0.30	0.0	84%	0.00	0.00
Commercial	1	4.72	4.7	84%	3.97	0.76
Municipal	0	0.00	0.0	84%	0.00	0.00
Totals	1		4.7		3.97	0.76

*Wells may be associated with augmentation plan that allow for a lower withdrawal than typical well type

Table 5a: Water Availability Analysis on the Basin Based on Existing and Proposed Development

Description	Variable or Equation	Value	Units
Consumptive use impact of existing development (e)	O _e	12.4	acre feet per year
Consumptive use impact of proposed development (p)	O _p	0.76	acre feet per year
Consumptive use impact of existing and proposed development (t)	O _t	13.1	acre feet per year
Estimate of groundwater recharge to the basin from precipitation	S	42.3	acre feet per year
Groundwater Budget=Groundwater Recharge-Total Consumptive Use	T=S-O _t	29.2	acre feet per year

*If groundwater budget value (T) is positive then the water supply appears to be adequate

*If groundwater budget value (T) is negative then the depth to water level will increase over time

Table 5b: Impact on the Basin Based on Existing and Proposed Development With 0 Recharge From Precipitation

Description	Variable or Equation	Value	Units
Estimated percent of aquifer depletion based on consumptive use of proposed development	U=O _p /H	0.05%	
Theoretical "annual average basin wide" drop in water level due to consumptive use of proposed development with 0 recharge from precipitation	V=O _p /I	0.05	feet
Theoretical time it would take to drain the saturated thickness of the basin by the consumptive use of the existing and proposed development with 0 recharge from precipitation	W=D/((O _t)/I)	245	years

Table 5c: Impact on the Basin Based on Existing and Proposed Development Including Estimated Recharge From Precipitation

Description	Variable or Equation	Value	Units
Theoretical time it would take to drain the saturated thickness of the basin by the consumptive use of the existing and proposed development with estimated precipitation recharge	X=D/((T)/I)	NA, since recharge exceeds consumptive use	years

Table 6a: Water Availability Analysis on the Basin Based Existing, on Build out of Platted Lots and Proposed Development

Description	Variable or Equation	Value	Units
Number of lots in basin	Y	116	lots
Number of vacant lots in basin	Z	17	lots
Number of wells associated with proposed development	J	1	wells
Consumptive use impact of build out of vacant lots	AA=Z*K(1-M)	0.82	acre feet per year

Table 6b: Impact on the Basin Based on Build out of Platted Lots and Proposed Development Including 0 Recharge From Precipitation

Description	Variable or Equation	Value	Units
Theoretical "annual average basin wide" drop in water level due to consumptive use at full build out based on platted lots and proposed development with 0 recharge from precipitation	AB=(O _t +AA)/I	0.9	feet
Theoretical time it would take to drain the saturated thickness of the basin by the consumptive use at full build out based on platted lots, existing, and proposed development with 0 recharge from precipitation	AC=D/((O _t +AA)/I)	230	years

Table 6c: Impact on the Basin Based on Build out of Platted Lots and Proposed Development Including Estimated Recharge From Precipitation

Description	Variable or Equation	Value	Units
Theoretical time it would take to drain the saturated thickness of the basin by the consumptive use at full build out based on platted lots, existing, and proposed development with estimated precipitation recharge	AD=D/(((T)+AA)/I)	NA, since recharge exceeds consumptive use	years

Table 7a: Water Availability Analysis on the Basin Based on Build out of Platted Lots, Additional Lots Allowed by Zoning and Proposed Development

Description	Variable or Equation	Value	Units
Number of lots in basin	Y	116	lots
Number of vacant lots in basin	Z	17	lots
Number of wells associated with proposed development	J	1	wells
Estimated number of additional lots allowed based on zoning	AE	53	lots
Consumptive use impact of existing development	O _e	12.4	acre feet per year
Consumptive use impact of build out of vacant lots	AA	0.82	acre feet per year
Consumptive use impact of build out of lots allowed by zoning	AF=AE*K(1-M)	2.54	acre feet per year
Consumptive use impact of proposed development	O _p	0.76	acre feet per year

Table 7b: Impact on the Basin Based on Build out of Platted Lots, Additional Lots Allowed by Zoning and Proposed Development With 0 Recharge From Precipitation

Description	Variable or Equation	Value	Units
-------------	----------------------	-------	-------

Theoretical "annual average basin wide" drop in water level due to consumptive use at full build out based on platted lots, allowed by zoning, and proposed development	$AG=(O_i+AA+AF)/I$	1.1	feet
Theoretical time it would take to drain the saturated thickness of the basin by the consumptive use at full build out based on platted lots, allowed by zoning, existing, and proposed development with 0 precipitation recharge	$AH=D/((O_i+AA+AF)/I)$	195	years

Table 7c: Impact on the Basin Based on Build out of Platted Lots, Additional Lots Allowed by Zoning and Proposed Development With Estimated Recharge From Precipitation

Description	Variable or Equation	Value	Units
Theoretical time it would take to drain the saturated thickness of the basin by the consumptive use at full build out based platted lots, allowed by zoning, existing, and proposed development with estimated precipitation recharge	$AI=D/((IT+AA+AG)/I)$	NA, since recharge exceeds consumptive use	years

Comments:
 *Inserted Row 50 to account for HU wells for existing structures (99)
 *water budget is positive which indicates an adequate water supply

Misc:

- Standard values to use for the WAA were based on data from the [USGS's 2003 Hydrologic Conditions and Assessment of Water Resources in the Turkey Creek Watershed](#) and [CDM's 2011 Upper Mountain Counties Aquifer Sustainability Project Report](#)
[Link to 2003 USGS Report](#)
[Link to 2011 CDM Report](#)

Data Value Sources & References for the Water Availability Analysis (WAA):

- Basin Area – Defined basins are generated from ArcGIS based on USGS 10 Meter Digital Elevation Model (DEM) with each basin having a minimum area of 5 acres.
- Annual Precipitation – Based on the mean data (2005-2013) from the National Weather Service precipitation estimates from their River Forecast Centers (RFCs) which are on 4 by 4 kilometer grid system. The RFCs information is based on both radar and rain gauge data. The annual observed precipitation data from the closest RFC to the development project will be utilized in the WAA.
<http://water.weather.gov/precip/about.php>
- Estimated Recharge from Precipitation – Based on USGS's 2003 Hydrologic Conditions and Assessment of Water Resources in the Turkey Creek Watershed (2%) and the CDM 2011 Upper Mountain Counties Aquifer Sustainability Project (references USGS study), the estimated recharge from precipitation is 2.0%.
- Estimated Recharge from Wastewater Returns – Based on several sources including the DNRs 1974 Consumptive Use of Water by Homes Utilizing Leach Fields for Sewage Disposal (88%), the Water Center of CSU 2007 Consumptive Loss from an ISDS in a Semi-Arid Mountain Environment (84%), the Journal of Hydrology 2010 Consumptive Use and Resulting Leach-field Drainage from a Mountain Residence (80%), and the CDM 2011 Upper Mountain Counties Aquifer Sustainability Project (references each study) the estimated recharge from wastewater returns is 84%.
- Well Data – ArcGIS data is provided by the Colorado Division of Water Resources. The well data will include the number of wells in the basin and the Use (Household, Domestic, Commercial, etc) to determine the volume of water permitted to be removed from the basin. Mean depth of the well and depth to water in the basin will be calculated from the attribute data. Certain uses (Commercial, Municipal, other) will require staff to review the well permit to determine the permitted withdrawal.
- Aquifer Groups – The (Metamorphic, Intrusive, Pike's Peak, Highly Fractured, and Alluvial) may be used to allow for a range for the Estimated Recharge from Precipitation based on Aquifer Group. Aquifer Group data is based on the CDM 2011 Upper Mountain Counties Aquifer Sustainability Project.