

**ENGINEERING STUDY
for
SHADOW MOUNTAIN BIKE PARK
CONCEPT MASTER PLAN
WASTEWATER 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 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	Wastewater Facilities	6
3.10	Relationship to Neighboring Water and Wastewater Facility	7
Section 4	DEVELOPED CONDITIONS	9
4.1	Land Use	9
4.2	Population and Employment	10
4.3	Wastewater Demand	10
4.4	Wastewater Supply	12
4.5	Wastewater Quality	12
Section 5	WASTEWATER SYSTEM IMPROVEMENTS	13
5.1	General	13
5.2	Wastewater Treatment	13
5.3	Collection	13
5.4	Estimated Costs	13
5.5	Rates and Charges	13

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

Appendix A	100-Year Flood Plain Certification
Appendix B	Wastewater Improvements
Appendix C	Form 6001

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

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

Section 1 EXECUTIVE SUMMARY

This report presents the results of the engineering study for wastewater 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 wastewater facilities on site. Shadow Mountain Bike Park proposes construction of a On-site Wastewater Treatment System (OWTS) to provide wastewater treatment per Jefferson County requirements. The facility is anticipated to be a Septic System with a capacity of less than 4400 gpd.

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. Average day usage is estimated to be 5400 gpd or 3.75 gpm. This water will be provided by water wells as permitted by the Colorado State Engineers Office.

Wastewater is estimated to be 80% of water demand. The Shadow Mountain Bike Park wastewater treatment requirements is estimated to be 4320 gpd (5400 x 0.8). An OWTS constructed per Jefferson County requirements will be constructed to treat the wastewater prior to discharge through an anticipated leach field.

Section 2 INTRODUCTION

2.1 Purpose

The purpose of this report is to present wastewater 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 wastewater demands and treatment;
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 collection, treatment and potential 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 the 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.

Any water well constructed on site would be constructed at an elevation and distance from the OWTS as required by Jefferson County and the State Engineers Office.

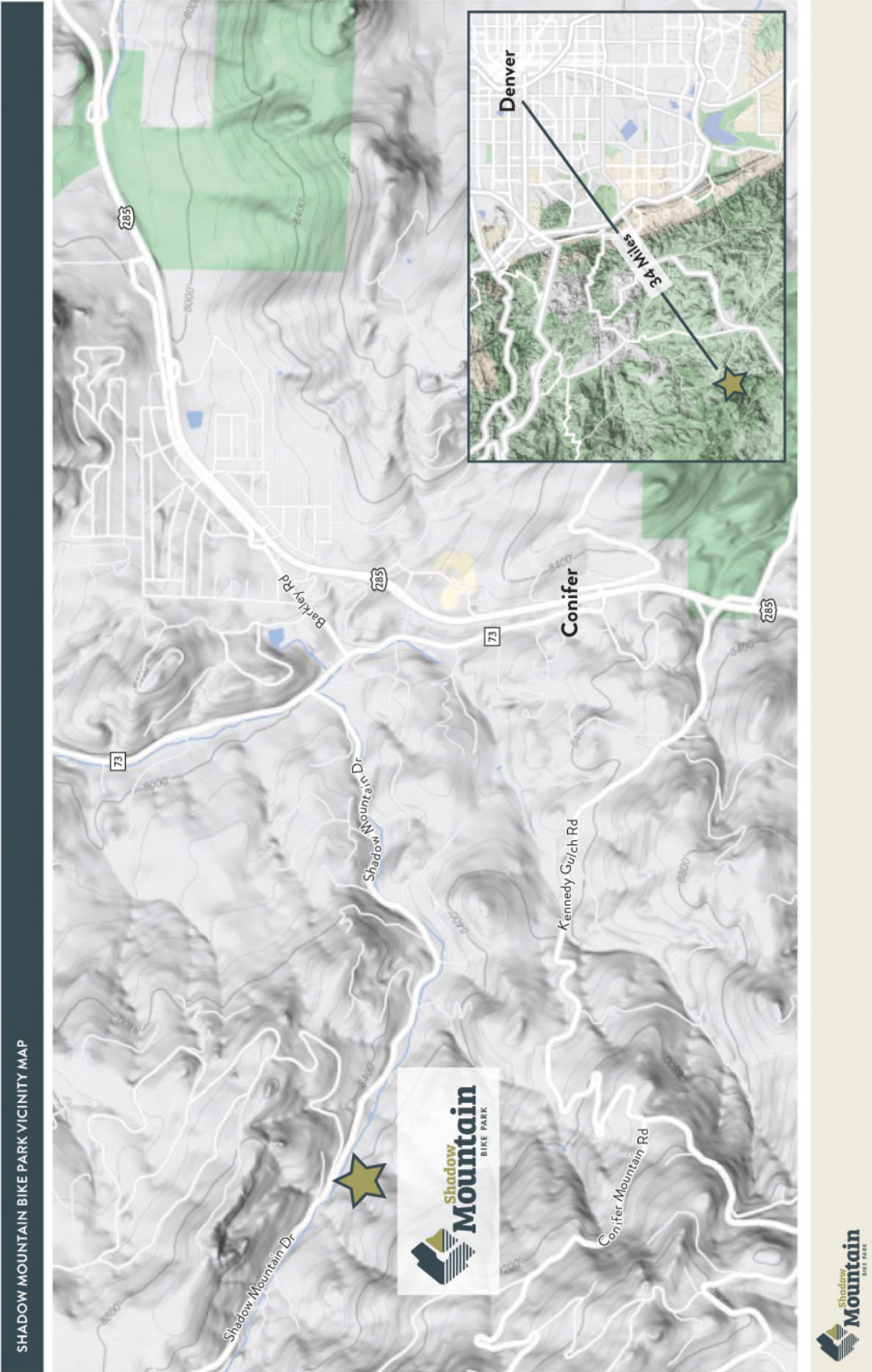


Figure 1: Vicinity Map

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 wastewater service would be from the Mountain Water and Sanitation District near Conifer, Colorado. The distance and topography to Conifer in general is cost prohibitive in terms of a wastewater servicer for the bike park.

The amount of wastewater produced at the facility and the distance to other providers makes an onsite OWTS the best for meeting on-site demands. The Mountain Shadow Bike Park will be the entity responsible to finance, construct and ensure the continuing operation and maintenance of improvements.

3.9 Wastewater Facilities

The proposed OWTS is anticipated to consist of a septic tank and leach field designed to treat in excess of 4320 gpd. Design and construction of the OWTS will be in accordance with Jefferson County OWTS requirements including site application and design approval (§25-8-702, C.R.S.) and the discharge permit requirements in the Water Quality Control Act (§25-8-501, et seq. C.R.S.).

3.10 Relationship to Neighboring Water and Wastewater Facilities

The Town of Conifer 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.

Section 4 DEVELOPED CONDITIONS

4.1 Land Use

Shadow Mountain 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 at all 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.

4.3 Wastewater Demand

Wastewater is estimated to be 80% of water demand. The Shadow Mountain Bike Park wastewater treatment requirements is estimated to be 4320 gpd (5400 x 0.8). An OWTS constructed per Jefferson County requirements will be constructed to treat the wastewater prior to discharge through an anticipated leach field.

4.4 Wastewater Discharge Permit

Wastewater Discharge will be permitted through Jefferson County and the associated OWTS design and construction process. And the State Discharge Permit process.

Section 5
WASTEWATER SYSTEM IMPROVEMENTS

5.1 General

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

5.3 Wastewater Treatment

The OWTS is anticipated to be a septic system with a leach field. The OWTS design is anticipated to be for a system capacity of 4320 gpd. The Wastewater Improvements drawing in Appendix B indicates the location of an existing water well on the adjacent property. The location of the proposed septic tank and leach field is indicated to be in excess of 200 ft away from the existing well. In addition, the septic tank and leach field are located at a lower elevation than the surface elevation of the water well.

5.4 Collection

The wastewater collection system will collect waste flow at the Base Lodge and convey it through a 6-inch main to a septic tank for treatment. After proper treatment through the septic system treated wastewater will be conveyed through pipes to a leach field for discharge. All pipe and appurtenances will be designed to meet or exceed Jefferson County standards.

5.5 Estimated Costs

Estimated Costs

Item	Units	Quantity	Unit Price	Extension
Shadow Mountain Bike Park Wastewater Interceptor	LF	600	\$20	\$1200
Septic Tank	LS	1	\$10,500	\$10,500
Leach Field	LS	1	\$8,000	\$8,000
Total Estimated Cost				\$19,700

The above system improvements are all constructed as part of Shadow Mountain Bike Park. The costs included above only include capital costs for wastewater system improvements required to serve the site and are estimated from best available data. These costs do not include other costs or gains that may be incurred in the acquisition of land, financing, investing, local distribution, the salvage value of equipment or other necessary infrastructure, among others, unless specifically noted.

5.6 Rates and Charges

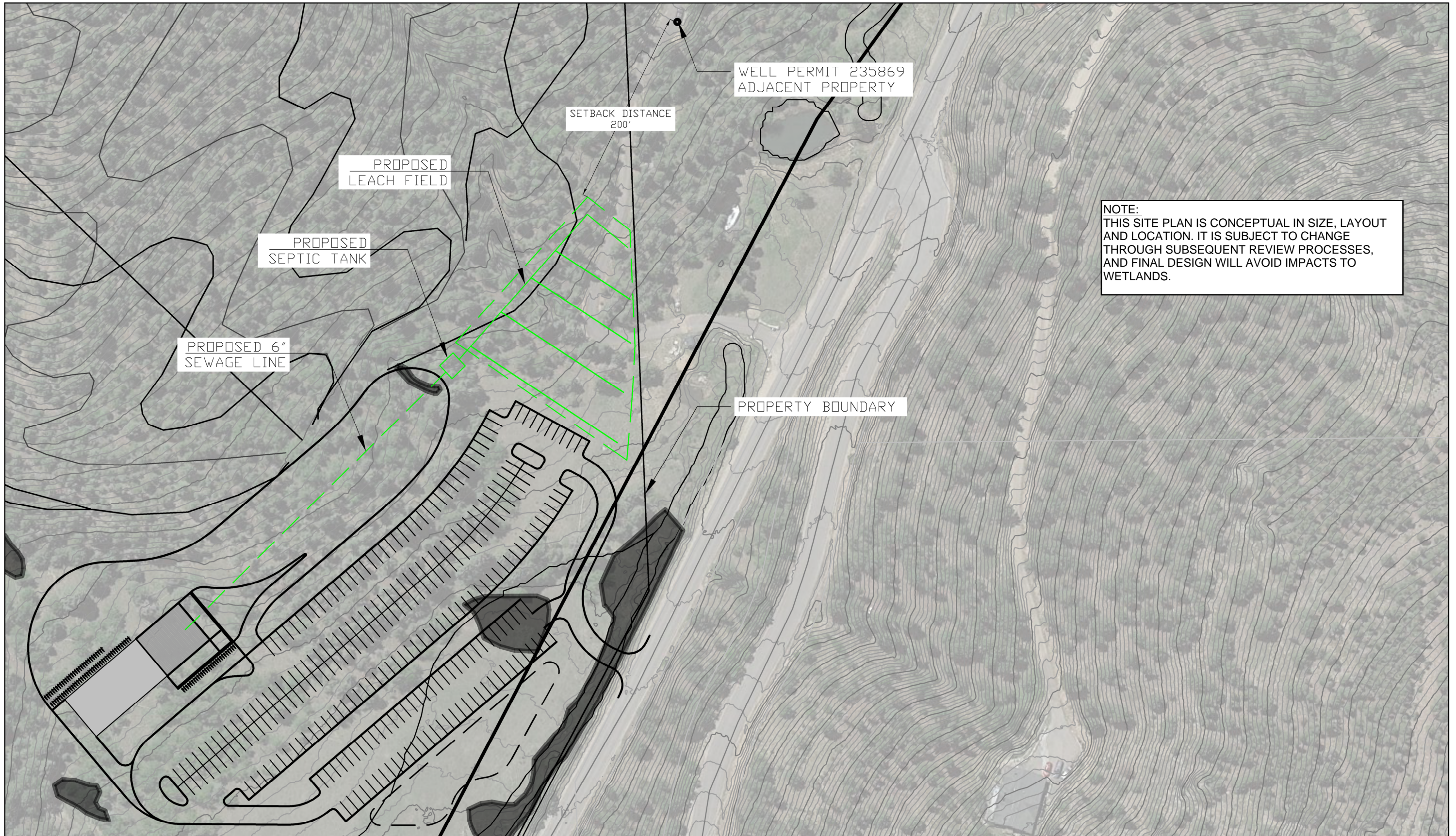
The wastewater system will be operated within the overall operation of the Shadow Mountain Bike Park through user fees charged to guests for the recreational facility.

Appendix A

100 Year Flood Plain Certification

Appendix B

Wastewater System Improvements

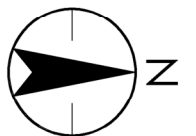


2000 S COLORADO BLVD
SUITE 300
DENVER, CO 80222

WASTEWATER SYSTEM SITE DRAWING

SHADOW MOUNTAIN BIKE PARK

SCALE: 1"=100'



Appendix C

Form 6001

FORM 6001 - ONSITE WASTEWATER REPORT

Revised: November 15, 2021

Pursuant to 22.B.1.(a) of the Wastewater Section of the Land Development Regulation, the applicant is required to complete FORM 6001 for all development proposals that rely on onsite wastewater treatment systems (OWTS).

READ ENTIRE DOCUMENT. FAILURE TO SUBMIT A COMPLETE REPORT WILL DELAY THE REVIEW PROCESS.

PURPOSE OF THE ONSITE WASTEWATER REPORT:

1. EXISTING OWTS: Evaluate the adequacy and capacity of existing OWTS to serve all proposed uses of the existing OWTS at maximum occupancy.
2. PROPOSED OWTS: Determine if there are any factors that would preclude the installation of a conforming OWTS. If there is a need for a variance, the applicant must contact the Jefferson County Public Health (JCPH) Board of Health case contacts listed below.

STANDARDS

1. Upon receipt of a Referral from Planning and Zoning (PZ), JCPH staff will:
 - a. Determine if FORM 6001 is required.
 - b. Conduct a search of JCPH OWTS Records for the project site.
 - c. Provide a summary of comments on the OWTS located on the project site.
2. PZ will provide FORM 6001 – Onsite Wastewater Report to the Applicant.
3. All designs, reports, and evaluations must be signed and stamped by a professional engineer.
4. The Applicant must submit the completed FORM 6001 to the PZ Case Manager.
5. Malfunctioning OWTS must be repaired to current Onsite Wastewater Regulations.
6. Unpermitted OWTS must be evaluated by the engineer and they must update the OWTS records (site plan drawing showing the type and size of the absorption system, the type, size, and number of compartments of the septic tank, and if possible the soil test information (such as percolation tests and / or gradation analysis)) as a condition of the development process.

FEE: There is no fee for processing this report.

PROCESSING TIME: JCPH will review the Onsite Wastewater Report and provide comments to the PZ Case Manager within the established referral timeframe. If your case requires Board of Health (BOH) approval, allow up to an additional twelve weeks for this process. Additional submittal requirements and a fee for the BOH Hearing will be required.

CONTACTS:

Tracy Volkman
303.271.7529

tvolkman@jeffco.us

Jon Vickery (BOH cases only)
303 271-5763

jvickery@jeffco.us

Mary Sloan (BOH cases only)
303.271.5764

mksloan@jeffco.us

ONSITE WASTEWATER REPORT FORM 6001

PAGE 1 OF 2

PAGES 1 AND 2 MUST BE COMPLETED

Name and License Number of Professional Engineer:	Charles K. Cothorn, P.E. 24997	
Name of Designer/Evaluator:		
P&Z Case Number:	23-102980RZ	
Project Name:	Shadow Mountain Bike Park	
Property Address:	Shadow Mountain Drive, Conifer, CO 80433	
Applicant Name:	FSBR, LLC	
Applicant Phone / Email:	603-660-6604 / Phil@shadowmountainbikepark.com	
Source of Water:	Public Water System: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Individual Water Well: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Public Water System Name:		
Proposed Development Acreage:	235 acres	
Number of Platted Lots:	N/A	
Date Lots were platted:	N/A	

List each lot for this development proposal and the structures on each lot that will be served by water and the estimated volume of wastewater in gallons per day in the table below using the current Jefferson County OWTS regulations. Write "Vacant" if the lot does not have a structure on it and enter the design flow projected for the lot.

Property Identifier such as the address or lot number	Size of each lot in Acres	List of all structures served by water on each lot. For example: single-family dwelling; barn; shed; accessory dwelling unit; accessory building; commercial / retail office; restaurant; etc.	Total number of bedrooms on each lot.	Design flow (gallons per day) for each lot.
	235 acres	Guest Facility to include ticketing, restrooms, changing facilities, day use lockers, and an additional separate maintenance building.	NA	4,320 gpd

Continue to page 2 of 2

ONSITE WASTEWATER REPORT FORM 6001

PAGE 2 OF 2

Circle Yes or No to each statement and provide a supporting evaluation and or report as applicable in the following certification. Designs, evaluations, reports, and certification must be signed and stamped by a professional engineer.

Engineer's Certification

I am familiar with the current Jefferson County Onsite Wastewater Regulation. I have reviewed and evaluated the wastewater flow, in terms of strength and volume, that the proposed development will generate, and I have determined the following:

1. Is there an existing OWTS on any of the lots in the development proposal?

Yes No

If Yes, continue to numbers 2 - 4.

If No, continue to number 4.

2. The existing OWTS is/are functioning as designed and in accordance with permit conditions.

Yes No

If No, system must be repaired to current OWTS standards.

3. The existing OWTS must be modified and/or expanded to accommodate the existing and proposed uses at full development buildout and occupancy.

Yes No

If Yes, submit an evaluation with this form specifying what additional design is required to the OWTS to accommodate all existing and proposed uses at full development buildout and maximum occupancy. Design must be signed and stamped by a professional engineer.

4. The project site can conceptually accommodate a conforming OWTS that can handle the wastewater flow and strength at full build-out and maximum occupancy for the proposed development.

Yes No

If No, submit a report with this form on the factors that would prevent the installation of a conforming OWTS in accordance with Jeffco OWTS regulations. This report must be signed and stamped by a professional engineer.

I Charles K. Cothorn, PE, certify that the I have reviewed this land development proposal and the above answers are true. All designs, evaluations, and reports per the above JCPH regarding existing and or proposed OWTS as applicable have been submitted with this form.

Charles K. Cothorn

Print Engineer Name

Charles K. Cothorn 4/15/24

Engineer Signature and Date

