MINTURN NORTH PUD CONSUMPTIVE USE ANALYSIS

Prepared for:

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Wright Water Engineers, Inc.

August 2023
Job No. 191-092.050

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TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

2.0 BACKGROUND AND ASSUMPTIONS 2
- 2.1 Town of Minturn's Town Code 2
- 2.2 Estimated Augmentation Requirements – 2019 CIP Growth Scenarios 2
- 2.3 Residential Water Calculations per SFE 3
- 2.4 Existing Uses 4
- 2.5 Minturn North Design Guidelines 4
- 2.6 Minturn North 4

3.0 PROPOSED DEVELOPMENT AND WATER USES 4
- 3.1 Residences 4
- 3.2 Common Areas 5

4.0 CONSUMPTIVE USE ESTIMATE 6

5.0 ASSUMPTIONS AND EXCLUSIONS FROM EVALUATION 7

6.0 REFERENCES 8

TABLES

Table 1. Development Summary 2
Table 2. Town of Minturn Residential Water Calculations per SFE 3
Table 3. Number of Developable Residential Lots and SFE Count 5
Table 4. Number of Developable Residential Lots and Irrigated Areas 5
Table 5. Consumptive Use Estimate 6
Table 6. Stream Depletion 7

FIGURES

1 Location and Vicinity Map
2 Minturn North PUD – Preliminary Plan Revisions

APPENDICES

Appendix A Comments from Town and Its Consultants and Responses

1.0 INTRODUCTION

Wright Water Engineers, Inc. (WWE) has prepared this report summarizing an evaluation to estimate the potable water demands and an associated consumptive use estimate for the Minturn North PUD (Project or Development). The Project is located on the north side of Minturn between Taylor Street and Minturn Road and is planned to provide developable lots available for purchase by private entities. See attached Figure 1 – Location and Vicinity Map for more information. WWE was retained by Rick Hermes of Minturn Crossing, LLC (Developer) to perform this evaluation. The Minturn North PUD Guide includes documentation addressing assumptions made in this report and are included by reference and being submitted under a different cover. WWE has coordinated with the Town of Minturn (Town) and its consultants to verify acceptance of these assumptions. See attached Figure 2 – Minturn North PUD - Preliminary Plan Revisions for more information.

This report is an update to previously completed consumptive use reports for the Project. Since previous versions, the proposed development has been revised. Information in this report is based on feedback from Holland and Hart and Martin and Wood during previous report reviews. Feedback from Holland and Hart is included in the appendices for additional information. Due to the changes for the overall development this report has been re-developed based on the new development information. Most importantly the development types of housing have been reduced to 33 market rate single family homes and 6 market rate deed restricted locals' homes with an SFE count of 60 (54 new SFEs and 6 existing SFEs), which includes 2,000 square feet of common area space to be irrigated. All homes are allowed a maximum of 2,000 square feet of irrigation. Of the new 54 SFEs, one SFE will be allocated to permanent irrigation of the common area. The remaining 53 SFEs will be allocated to lots 1-33 based on development and purchase of the lots (i.e. some lots will be allowed 1 SFE, while others will be allowed 2 SFEs, not to exceed 53 SFEs total). The 6 existing SFEs will be allocated to the 6 market rate deed restricted homes. Temporary irrigation will be allowed to irrigate a maximum area of 50,000 square feet for a 2-year growing cycle, at which time temporary irrigation will cease. The irrigation system for the development will be a common system that is monitored and controlled by the Property Owners Association. Total permanent irrigation within the PUD will be limited to 80,000 square feet; 78,000 square feet allocated to the lots and 2,000 square feet to the common area space.

This report has been updated based on revised Project guidelines and comments provided by the Town and their consultants. A comment response letter has been included in Appendix A for more information.

Table 1. Development Summary

Lots	Lot Type	Maximum Building Area (sf/lot)	Maximum Irrigated Area (sf/lot)	SFEs Per Lot	Subtotal SFEs
34-39	Deed Restricted	3,000	2,000	1	6
1-33	Single Family	6,000	2,000	1 or 2	53
---	Common Areas	---	2,000	---	1
				Total	**60**

2.0 BACKGROUND AND ASSUMPTIONS

To estimate Project water demands and develop a potential consumptive use estimate, WWE reviewed and relied upon existing documentation associated with readily available water system master plans, codes, and regulations in and around the Project area, including the following: Town of Minturn's Town Code (Minturn 2019) and Town of Minturn Water System Capital Improvement Plan (CIP) (SGM 2019). The following sections provide excerpts and relevant information used as the basis for WWE's evaluation. The actual development plans, types, and numbers of lots were provided by the Developer. As mentioned, inputs on overall water use have been coordinated and adjusted based on conversations with the Town's water consultants.

2.1 Town of Minturn's Town Code

The Town of Minturn's Town Code was used to understand the Town's definition of a Single-Family Equivalent (SFE):

> "SFE (Single Family Equivalent) means the basic unit for determination of water charges and usage. One (1) SFE shall be equal to the water required to serve up to three thousand (3,000) square feet of building area as measured from the exterior dimensions of development and two thousand (2,000) square feet of outside irrigated area" (Minturn, 2019).

2.2 Estimated Augmentation Requirements – 2019 CIP Growth Scenarios

Martin and Wood Water Consultants, Inc. developed a memorandum with the subject of Estimated Augmentation Requirements – 2019 CIP Growth Scenarios dated October 4, 2019, by

Cristy Radabaugh (Martin and Wood 2019). The memorandum presented results of augmentation modeling for the Town of Minturn. Included in that memorandum are assumptions carried forth in this analysis and presented below.

1. Water Demands: An average outdoor watering rate of 17 inches per year (10.6 gal/sq-ft), consistent with the Town's 2019 CIP, was used.

2. System Loss: System loss was assumed to be 20% based on the Town Council's commitment to reduce system loss throughout Town to that level and return flows from system loss was assumed to be 10% of diversions. The difference between the system loss (as a percent of diversions) and the associated return flows (as a percent of diversions) is necessary to account for the way Minturn calculates the return flow credit based on the previous year's average system loss, instead of utilizing the actual system loss each month to calculate the credit, consistent with terms of Minturn's augmentation plan decree in Case No. 07CW225.

2.3 Residential Water Calculations per SFE

Table 2 was provided from the Holland & Hart. It is understood these values provided are based on average annual unit productions values from the Town's 2019 CIP of 259 gallons per day per SFE. The information in the table below was used to calculate consumptive use as an average annual volume for the project.

Table 2. Town of Minturn Residential Water Calculations per SFE

Diversions		
Diversions for Indoor Use per SFE	0.20	af/yr water diversion
Diversions for Outdoor Use per SFE	0.09	af/yr water diversion
Total Diversions	0.29	af/yr water diversion
Deliveries		
Indoor Delivery per SFE	0.16	af/yr water delivery
Outdoor Delivery per SFE	0.07	af/yr water delivery
Total Deliveries	0.23	af/yr water delivery
Consumptive Use (after wastewater return flows reach the Eagle River)		
Indoor CU per SFE	0.01	af/yr water consumption
Outdoor CU Per SFE	0.06	af/yr water consumption
Total Consumptive Use	0.07	af/yr water consumption

*af/yr = Acre-Feet per Year

**Based on reduction of irrigable space for the residences the acre-feet per year values include the subdivision open spaces.

***Total Diversions, Deliveries and Consumptive use acre-feet per year amounts do not accurately represent the calculations since outdoor use is now calculated with a reduced SFE count.

2.4 Existing Uses

There are currently six mobile home residences residing on the lots to be developed for the PUD. Each one of these mobile homes will be considered one SFE. These residences will be acquired as part of the development and will be utilized to offset additional demand by the Project for the deed restricted lots.

2.5 Minturn North Design Guidelines

As part of the development process, design guidelines will be established that direct development and construction of individual lots. The initial Project itself will include developing lots and homes to be sold. It is understood from the Developer that there will be design guidelines to reduce water usage.

2.6 Minturn North

The Minturn North PUD - Preliminary Plan Revision and development guidelines are currently being reviewed by the Town's Planning and Zoning Commission. The current PUD is planned to provide developable lots available for purchase by private entities. The lots will be sold to allow individual buyers to procure residential building plans that will have to be approved by the Town of Minturn. Therefore, actual building dimensions and site layouts are unknown.

3.0 PROPOSED DEVELOPMENT AND WATER USES

The following subsections provide information on the various water uses associated with the Minturn North.

3.1 Residences

There are two types of residences being proposed as part of the Project. There are a total of 39 lots planned for the Development. Of those lots, Lots 1-33 will be allocated either 1 or 2 SFEs. Lots 34-39 will be allocated 1 SFEs. All lots will be limited to 2,000 square feet of irrigation.

There is a total of 60 SFEs for the proposed Project residences, but only 54 new SFEs for the residences need to be evaluated as part of this analysis due to the offset from the existing six SFEs associated with the existing mobile homes. Table 3 outlines the number and type of lots throughout the proposed development and SFEs associated with each lot type.

Table 3. Number of Developable Residential Lots and SFE Count

Lots	Lot Type	Number of Lots	Maximum SFE Per Lot Type	Subtotal SFE
33-39	Deed Restricted	6	1	6
1-33	Single Family	33	1 or 2	53
Total		**39**	**---**	**59**

With an existing six SFEs offset already being utilized onsite by the mobile homes, the development will only require an additional 53 SFEs for the residences themselves. An additional SFE will be required for the common area irrigation to be discussed later.

The design guidelines for the Project will be written to limit the irrigated pervious area of the various lot types based on Table 4. The design guidelines will also include information about types of plants and grasses that can be used to reduce overall water demand of the Project.

Table 4. Number of Developable Residential Lots and Irrigated Areas

Lot Type	Number of Lots	Irrigated Acreage Per Lot	Total Irrigated Acreage
Deed Restricted	6	2,000	12,000
Single Family	33	2,000	66,000
Total	**39**	**---**	**78,000**

3.2 Common Areas

Included with the Development is a common area space that will require irrigation that will be limited to a maximum of 2,000 square feet that will require irrigation. Based on comments received from Holland and Hart the consumptive use associated with common area space will require 1 SFE.

4.0 CONSUMPTIVE USE ESTIMATE

It is assumed there is a 5% consumptive use from indoor household use and 95% is returned via the wastewater treatment plant in Avon, CO.

As part of these calculations a 20% system loss is assumed between the point of diversion and place of water delivery. It is assumed that 10% of the system losses for outdoor irrigation are returned to the Eagle River as part of return flows.

An outdoor consumptive use assumption of 85% of water deliveries was used with remaining 15% returning to the stream as irrigation return flows.

Consumptive use estimates for the Minturn North development are compiled below based on Table 2. Irrigation associated with 1 SFE for the common areas has been included in the Outdoor Use calculation part of Table 5. Table 5 provides consumptive use estimates for the Project.

Table 5. Consumptive Use Estimate

SFE*	At Point of Diversion			At Point of Delivery			Consumptive Use		
	Indoor Use	Outdoor Use	Total	Indoor Use	Outdoor Use	Total	Indoor Use	Outdoor Use	Total
	(acre-feet/year)								
53	10.60	4.86	15.46	8.48	3.78	12.26	0.53	3.24	3.77

*SFE count shown for residences only. Outdoor Use calculation includes 1 additional SFE due to Common Area irrigation.

Feedback on previous consumptive use reports from Holland & Hart requested that we evaluate stream depletions at three locations on the stream system: at the diversion, at the Project, and below the Avon wastewater treatment plant (WWTP). This evaluation focused on the initial stream diversions and then identified where key return flows would reach the stream. At the Project location, it was assumed that one-half of the system losses and all of the irrigation return flows would reach the stream. The in-house wastewater return flows would not reach the stream until below the WWTP outfall in Avon.

Table 6 provides a summary of the stream depletions at three different locations for each phase.

Table 6. Stream Depletion

Stream Depletion at Diversion	Stream Depletion at Project			Stream Depletions at Avon Waste Water Treatment Plan	
Total Amount of Diverted Water	10% Return Flow from 20% System Losses	15% of Outdoor Use	**Total Stream Depletion at Project**	95% of Indoor Use at Point of Delivery	**Total Stream Depletions**
(acre-feet/year)					
15.46	1.55	0.57	**13.35**	8.06	**5.29**

5.0 ASSUMPTIONS AND EXCLUSIONS FROM EVALUATION

This evaluation was based on information provided by the Developer in May and August of 2023. Five previous draft submittals were provided to the Town for their review based on earlier development documents. Comments were received from Holland & Hart and Martin and Wood on the draft submittals. All comments received from Holland & Hart and Martin and Wood were accepted and adopted in the update of this report. WWE reserves the right to update this report as the Project progresses and information changes.

6.0 REFERENCES

Eagle River Water and Sanitation District (ERWSD). Rules and Regulations for Water and Wastewater Service. March 2019.

Minturn Crossing, LLC. Minturn North – Preliminary Plan Revisions. July 2022

SGM. Town of Minturn Water System Capital Improvement Plan. September 30, 2019.

Town of Minturn. Town of Minturn's Town Code. November 5, 2019.

Martin and Wood. Estimated Augmentation Requirements – 2019 CIP Growth Scenarios. October 4, 2019.

Holland & Hart and Martin and Wood Water Consultants. Comments on North Minturn PUD Consumptive Use Analysis 34284.0014. January 31, 2021.

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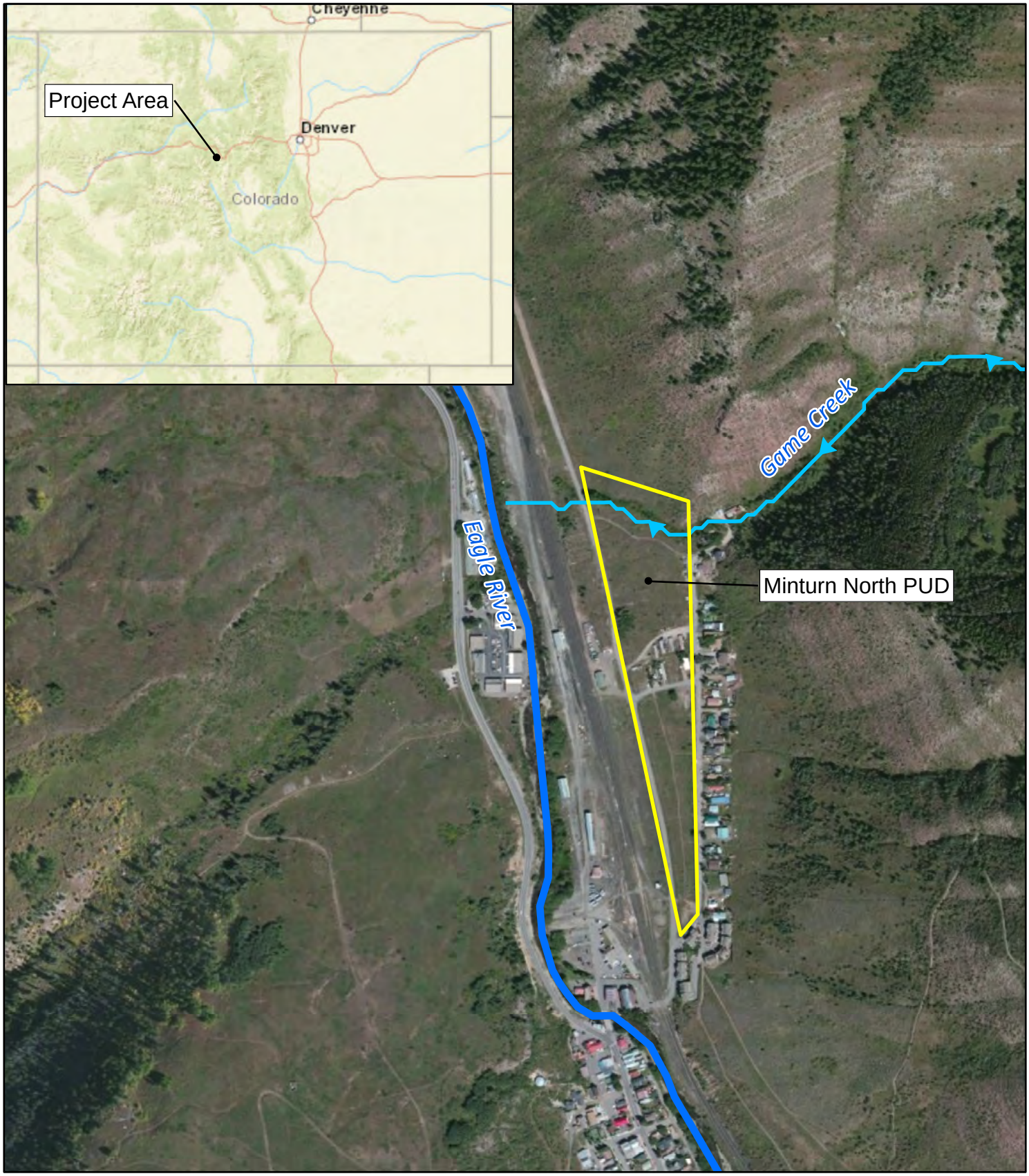
FIGURES

Figure 1

Location and Vicinity Map



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WRIGHT WATER ENGINEERS, INC.

MINTURN, CO

LOCATION AND VICINITY MAP

MINTURN NORTH PUD

N W E S

0 330 Feet

FIGURE 1

Figure 2

Minturn North PUD – Preliminary Plan Revisions

Disclaimer: All plans, renderings, specifications and marketing materials are subject to revisions and modifications at Developers sole discretion due to site specific grading conditions, availability of materials, availability of labor, manufacturer supply shortages, and Governmental Agency changes. All plans and specifications are subject to revisions and conditions of approval by the Minturn North Design Review Board, Town of Minturn City Council, Town of Minturn Design Review Board, Town of Minturn Building Permit Department and all other applicable regulatory agencies. Artist renderings have been provided for illustrative and marketing purposes only and should not be relied upon as a basis for purchasing. Color, materials and design elements are subject to refinement and revision without notice at Developers sole discretion.

APPENDICES

Appendix A

Comments from Town and Its Consultants and Responses

MEMORANDUM

To: Madison Harris, Planner 1 (Town of Minturn)
Scot Hunn, Planning Director
Hayley Siltanen, Esq (Holland & Hart LLP)
Cristy Radabaugh, P.E. (Martin and Wood Water Consultants, Inc.)

From: Wright Water Engineers, Inc.
Scott Schreiber, P.E., CFM

Date: August 17, 2023

Re: Response to Comments on Minturn North PUD Consumptive Use Analysis

This memorandum is to document responses to comments by Holland & Hart and Martin and Wood Water Consultants, Inc (Reviewers) on the Minturn North PUD (Project or Development) Consumptive Use Analysis (Report). Comments from the Reviewers were dated February 9, 2023, and May 2023. WWE was retained by Rick Hermes of Minturn Crossing, LLC (Developer) to perform this evaluation.

The overall plan for the Development as it relates to Single Family Equivalents (SFEs) has been modified since the initial submittal.

February 9, 2023, Comments and Responses

- Application – Sec 3.4 and Appendix D: Additional Water Rights Summary. The water rights to be conveyed to the Town must be specifically described.
    - Response to be provided under separate cover by others.
- Application – Sec. 8.1 and Appendix X: Consumptive Use Analysis. The Application states that Applicant will limit temporary irrigation to a 2-year growth cycle, after which temporary irrigation must be removed unless approved otherwise by the Town Engineer. Information must be provided regarding the scope of temporary irrigation proposed, including the size and location of the temporary irrigation area.
    - The scope of the temporary irrigation is currently unknown since the Developer is unsure which lots will be purchased and developed at various times. As previously discussed, the 38,000 square feet for remaining irrigated area will be used to satisfy temporary irrigation.
- Application – Appendix M: Water System Analysis. Section 3.0 of the Water System Analysis states that the project includes 4 SFEs to account for irrigation of up to 10,000 square feet of common area. Information must be provided regarding how the water demands associated with the 10,000 square feet of irrigated common areas equate to 4 SFEs.

- The Water System Analysis report has been updated to remove the relationship of SFEs to common area irrigation. The Development has included 10,000 square feet of irrigation of common space as part of its 82,000 square feet of allowable irrigation as previously discussed.

- Application – Appendix X: Consumptive Use Analysis. Section 3.2 of the Consumptive Use Analysis states that consumptive use associated with common areas is included in the SFEs for residential lots. This is inconsistent with Section 3.0 of the Water System Analysis, which states that 4 SFEs will account for irrigation of up to 10,000 square feet of common area. This assumption appears to be based on a prior project design, which reduced residential lawn and garden size below the allowed 2,000 square feet of irrigated area per SFE. The current Application contemplates that residential lots may establish the maximum allowed irrigated area per SFE: Lots 1-33 are allocated 2 SFEs per lot and may have up to 4,000 square feet of irrigation; and Lots 34-39 are allocated 1 SFE per lot and may have up to 2,000 square feet of irrigation. Accordingly, information must be provided regarding consumptive use of the 10,000 square feet of irrigated area within the 5.13 acres of open space and common recreation space.

  - The Water System Analysis report has been updated to remove the relationship of SFEs to common area irrigation. The Project guidelines have been updated so that Lots 1-33 will only be allowed 2,000 square feet of irrigation and Lots 34-39 will only be allowed 1,000 square feet of irrigation. The Development has included 10,000 square feet of irrigation of common space as part of its 82,000 square feet of allowable irrigation as previously discussed.

May 2023 Comments and Responses

- Section 1.0. Introduction. The description of the proposed development and the SFE count should be revised to be consistent with the Application.

Lots	Lot Type	Maximum Building Area (sf/lot)	Maximum Irrigated Area (sf/lot)	SFEs Per Lot	Subtotal SFEs
34-39	Deed Restricted	3,000	2,000	1	6
1-33	Single Family	6,000	4,000	2	66
---	Common Areas	---	2,000	---	1
Total					**73**

  - Tables, report and supporting calculations have been updated based on the table above.

- Section 3.1. Residences. This section, including Tables 2 and 3, should be revised to be consistent with the Application, as summarized in the table above.

  - The tables have been updated.

- Section 3.2. Common Areas. This section should be revised to be consistent with the Application, which states that irrigated common areas will not exceed 2,000 square feet and will require 1 SFE.
    - Section and applicable tables have been updated. 1 SFE has also be included in the outdoor use stream depletion tables.
- Section 4.0. Consumptive Use Estimate. This section should be revised to be consistent with the proposed development and SFE count described in the Application, and consumptive use calculations should be updated based on the same.
    - Tables, report and supporting calculations have been updated.
- Figure 2. Minturn North PUD - Preliminary Plan Revisions. This figure should be revised to be consistent with the Application.
    - The figure has been updated.

August 2023 Comments

WWE received the following list of comments from the development team based on conversations with the Town's water consultants.

- All homes are allowed a maximum of 2,000 square feet of irrigation.
- Of the new 54 SFEs, one SFE will be allocated to permanent irrigation of the common area. The remaining 53 SFEs will be allocated to lots 1-33 based on development and purchase of the lots. The 6 existing SFEs will be allocated to the 6 market rate deed restricted homes.
- Temporary irrigation will be allowed to irrigate a maximum area of 50,000 square feet for a 2-year growing cycle, at which time temporary irrigation will cease.
- The irrigation system for the development will be a common system that is monitored and controlled by the Property Owners Association.
- Total permanent irrigation within the PUD will be limited to 80,000 square feet.

We appreciate your thorough and thoughtful comments on the draft submitted for review. Please let us know if you have any comments not addressed or need additional information.