

STEAMBOAT SPONSOR, LLC PROPOSED STAGECOACH MOUNTAIN RANCH ROUTT COUNTY, COLORADO

NUTRIENT LOADING REPORT FOR STAGECOACH MOUNTAIN RANCH

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EXECUTIVE SUMMARY

This document is a Nutrient Loading Report prepared by P.W. Grosser Consulting, Inc. (PWGC) for Steamboat Sponsor, LLC (applicant) to evaluate the potential impacts of nutrients, specifically Phosphorous and Nitrogen, associated with the proposed action, which consists of development of land in Routt County, Colorado. The proposed action would be known as Stagecoach Mountain Ranch (SMR) and include single- and multi-family residential housing, commercial and amenity spaces, a ski resort and open spaces. Specifically, the applicant is proposing the development of 613 residential homes and 137 employee/workforce housing units on a portion of 6,058± acres of land. This includes the Cat Creek future development area, located on the southern portion of the subject property. Additionally, extensive recreational amenities operated by a Homeowners Association would be offered to the residents of the proposed SMR, including public amenities and services, a public neighborhood commercial center, recreational trails and parks, as well as upgrades to roads and infrastructure.

The proposed action includes a connection to the existing Morrison Creek Wastewater Treatment Plant (WWTP) as a portion of the subject property is within the Morrison Creek Metropolitan Water and Sanitation District. The Morrison Creek WWTP currently treats approximately 100,000 gallons per day (gpd) of wastewater, which includes 50,000 gpd of sanitary flow and 50,000 gpd of inflow. Based on provided lab data, the treated wastewater contributes approximately 4 lbs./day of Phosphorus and 12.5 lbs./day of Nitrogen to Stagecoach Reservoir. In order to reduce the point discharge of Phosphorus and Nitrogen to Stagecoach Reservoir, SMR, in coordination with the Morrison Creek Metropolitan Water and Sanitation District, will seek Colorado State approvals to utilize treated wastewater to produce manmade snow for the ski slopes during the ski season. This will reduce the quantity of nutrients going to the reservoir and distribute the remaining nutrients over a wider area making for greater dilution of nutrients entering Stagecoach Reservoir, resulting in reduced potential for harmful algal blooms (HABs) in the area of Morrison Creek.

Regarding public water supply, the indoor potable water demand serviced by the District would be approximately 307 acre-feet per year. The total water in storage in the bedrock aquifer that is used by the District is estimated to be more than sufficient volume to provide for the proposed SMR. Additionally, water is also available from the Stagecoach Reservoir and the water rights allocated to the SMR property.

The primary nutrients of concern for this report are Phosphorous and Nitrogen, sources of which can include runoff from agriculture or urban settings and are in wastewater. Excess of these nutrients in surface waters cause eutrophication, which can result in HABs. A current point source of nutrients to Stagecoach Reservoir is the discharge from the Morrison Creek WWTP that discharges directly into Morrison Creek, which flows into the reservoir.

The total phosphorus loads due to wastewater and stormwater were calculated. Without nutrient removal methodology and while utilizing a ratio between the existing and proposed sanitary flow from the Morrison Creek WWTP, the proposed SMR would discharge approximately 9.84 lbs./day of phosphorus to Stagecoach Reservoir from wastewater. The phosphorus loading from stormwater has been estimated using two (2) methods: (1) a United States Environmental Protection Agency (USEPA) generated phosphorus yield for Colorado; and (2) the watershed area of Stagecoach Reservoir between the upstream and



downstream sampling points generated by the United States Geological Survey (USGS). The first method produced a value of approximately 2.59 lbs./day of Phosphorous, and the second method yielded approximately 1.84 lbs./day, with 0.66± lbs./day contributing directly to Stagecoach Reservoir and other downstream surface waterbodies. Additionally, the Nitrogen loading for the proposed SMR was calculated to be approximately 68 lbs./day. However, utilizing Nutrient removal techniques (i.e., snowmaking with treated wastewater), the Phosphorous and Nitrogen loads to Stagecoach Reservoir due to the proposed SMR can be maintained at or below levels seen in the first six months of 2024. The recent upgrade to the WWTP that includes Nitrogen treatment will reduce Nitrogen levels to below those experienced in the first six months of 2024 even with the SMR development.

The Morrison Creek WWTP in the past discharged approximately 30 mg/L of Nitrogen. However, the District has recently upgraded the WWTP to a Sequenced Batch Reactor (SBR) process. This includes a denitrification step which when the system is fully operational is expected to reduce the total Nitrogen in the effluent to less than 10 mg/L.

Upon implementation of the proposed action, stormwater would be accommodated via a comprehensive stormwater management system, which would include rain gardens and retention/detention basins. Additionally, a Stormwater Management Plan will be developed and will recommend best management practices to be utilized, which can effectively minimize the transport of Phosphorous and Nitrogen from reaching nearby ground and surface waters. These practices are detailed in the site design report being prepared by Kimley-Horn.

Overall, through the use of nutrient removal methodology, as well as proper stormwater management, Phosphorous and Nitrogen loads to the Reservoir due to the proposed SMR are anticipated to be mitigated to manageable levels.

PWGC recommends the following:

- 1) Upgrade the Morrison Creek WWTP treatment process to include Phosphorus treatment to further reduce the effluent concentration of Phosphorus.
- 2) Utilize treated wastewater for snowmaking during the six-month snowmaking season.
- 3) Utilize best stormwater management practices to reduce the levels of Phosphorus and Nitrogen entering Stagecoach Reservoir.
- 4) Monitor surface and groundwater to determine the efficiency of the program to reduce nutrient levels in Morrison Creek and Stagecoach Reservoir.

1.0 INTRODUCTION

This Nutrient Loading Report has been prepared for Steamboat Sponsor, LLC for the evaluation of environmental impacts of the proposed Stagecoach Mountain Ranch (SMR) with respect to nutrient loading (i.e., Phosphorus and Nitrogen) on Stagecoach Reservoir. The goal is to reduce the impact of nutrients on the Stagecoach Reservoir since this has caused harmful algae blooms (HABs) in the past. This report discusses the sources of nutrients and their potential for leaching and runoff to ground and surface waters, as well as recommendations for the stormwater and wastewater management system design of the proposed development.

1.1. Project Description

Steamboat Sponsor, LLC is proposing the development of approximately 750 residential homes on a portion of 6,058± acres of land in Routt County, Colorado, which would include 137 units of employee/workforce housing. This includes the Cat Creek future development area, located on the southern portion of the subject property. The proposed SMR would be developed on the following two (2) properties in the Stagecoach area: (1) the ski mountain property, generally referred to as the Stagecoach Ski Area, which includes 5,150± acres on the northwest end of Green Ridge; and (2) the Stetson Ranch property, which includes 892± acres of ranching land fronting County Route 14 and is situated along 2.1± miles of the Yampa River. The proposed action would include approximately 3,285 acres of open space.

The residential development for the proposed SMR would include large single-family lots and smaller single-family lots and duplex units, as well as multifamily residential units (i.e., townhomes and condominiums). It is noted that the entirety of the Stagecoach Ski Area would be served by the Morrison Creek Wastewater Treatment Plant (WWTP). A breakdown of the residential units for each development area is shown below in Table 1.

Table 1 – Residential Units Breakdown

Development Area	Units
Ski Mountain Area	
Base Mountain	189
Mid Mountain	124
Flat Tops	233
Mountain Land Preservation Subdivision	60
Stetson Land Preservation Subdivision*	7
Total Residential Units	613
Total Residential Units within Morrison Creek WWTP	606
Employee/Workforce Housing	137
Total Units Serviced by Morrison Creek WWTP	743

*Stetson units will not be serviced by the Morrison Creek Wastewater Treatment Plant.

Additionally, extensive recreational amenities operated by a Homeowners Association (HOA) would be offered to the residents of the proposed SMR. The expansion of the existing ski mountain is the primary recreational feature requiring significant infrastructure and investment. Additionally, public amenities and services would be

developed and would include a public neighborhood commercial center, recreational trails and parks, as well as upgrades to roads and infrastructure.

The proposed SMR development seeks to create a forward-thinking model for residential and recreational development with a focus on sustainability, conservation, wildlife protection, fire mitigation best management practices, and protection of sky lines and night skies.

1.2. Site Description

The subject property is located south and southwest of the Stagecoach Reservoir in Routt County, Colorado (see Figure 1 in Appendix A). The site is in the vicinity of County Road 14, County Road 16 and County Road 212 and extends west towards State Route 131. Currently, the subject property is partially developed and is currently utilized as a private ski mountain, consisting of the remains of two (2) chair lifts, base area, several temporary structures and associated access roads to the subject property, including the recently renovated mountain top lodge. The remaining undeveloped areas of the site consist of forested areas, mountainous terrain and brushlands. The topography of the project area southwest of County Road 16 ranges from approximately 7,400 feet above mean sea level (AMSL) in the northwest portion to approximately 9,400 feet AMSL at the top of the mountain, and 8,600 feet AMSL along the southern boundary of the project area. Northeast of County Road 16 and south of Stagecoach Reservoir, the topography of the project area is between 7250± feet AMSL and 7380± feet AMSL.

1.3. Project Benefits

Implementation of the proposed SMR is expected to be a major contributor to the economic development of southern Routt County. It would replace lost property tax base and jobs as the area transitions from the coal-based economy that has been the primary economic driver for the past 100 years. The proposed SMR respects and incorporates land uses and directives of the Stagecoach 2017 Community Plan and Routt County 2022 Master Plan. Additionally, the development would provide an economically viable framework for the Stagecoach community to become a Tier 2 growth area within Routt County. Furthermore, property taxes from the proposed action would generate significant revenue for Routt County and other agencies providing larger budgets and a higher level of service.

2.0 WASTEWATER MANAGEMENT

The area of the old base lodge on the subject property is currently serviced by the existing sanitary collection system, although approximately 1,460 acres of the northern portion of the property is within the Morrison Creek Metropolitan Water and Sanitation District. Upon implementation of the proposed action, the volume of sanitary waste generated would increase significantly. As such, the proposed SMR would connect to the existing Morrison Creek WWTP (see Figure 1 in Appendix A). Per consultations with Geovanny Romero, the District Manager of the Morrison Creek Metropolitan Water and Sanitation District (District), the Morrison Creek WWTP currently treats approximately 100,000 gallons per day (gpd) of water, which includes 50,000 gpd of sanitary flow and 50,000 gpd of inflow. The treated wastewater contributes approximately 4 lbs./day of Phosphorus and 12.5 lbs./day of Nitrogen to Stagecoach Reservoir. It is noted that the Morrison Creek WWTP has recently undergone an upgrade to its treatment system. Recent laboratory data has been

obtained, although it is anticipated that the Phosphorous and Nitrogen concentrations would be even lower as the treatment system stabilizes and becomes operationally more efficient.

Additionally, the proposed SMR would utilize treated wastewater to produce manmade snow to ski on, which would be both safe for the residents and beneficial to the environment. The Yellowstone Club, a ski resort located in Big Sky, Montana, has become the first ski area in Montana to turn wastewater into snow. Additionally, 12 ski areas in eight (8) states, as well as several in Canada, Switzerland and Australia, have used this methodology. Richard Chandler, Vice President of environmental operations for the Yellowstone Club, indicated that using recycled water to make snow treats the wastewater even more than it normally would be before being released into a body of water. Specifically, the wastewater is treated again when it is sent through the snowmaking equipment, as well as when it melts in the spring and enters the ground. Furthermore, Chandler indicated that the compacted snow on the slopes lasts longer into spring and summer, which adds water to the aquifer at a critical time and helps stream flow later in the season, creating a public benefit. As a result, groups such as the Gallatin River Task Force, Trout Unlimited, American Rivers, Great Yellowstone Coalition and the Association of Gallatin Agricultural Irrigators have supported this methodology.¹

The Morrison Creek WWTP currently contributes approximately 4 lbs./day of Phosphorus and 12.5 lbs./day of Nitrogen to Stagecoach Reservoir. As discussed further in Sections 4.2.3 and 4.3.1 of this report, upon implementation of the proposed action while utilizing snowmaking and denitrification, the Nitrogen loading is anticipated to be greatly diluted. Additionally, PWGC recommends that the Morrison Creek WWTP treatment process be upgraded to include Phosphorus treatment to reduce the effluent concentration of Phosphorus.

3.0 PUBLIC WATER SUPPLY

As indicated in the Stagecoach Mountain Ranch Water and Sanitary Sewer Demand Analysis, prepared by Kimley-Horn and Associates, Inc., the indoor potable water demand serviced by the District would be approximately 307 acre-feet per year (afy). According to the Water Supply Master Plan for the District, the total water in storage in the bedrock aquifer that is used by the District is estimated to be between 225,000 acre-feet and 1,000,000 acre-feet beneath the District south of Stagecoach Reservoir. As such, there is a more than sufficient volume in storage to provide for District needs far into the future, even if the only source of water were storage in the aquifer. Additionally, the high volume of ground water storage and the sufficiency of the natural precipitation recharge indicate a sustainable yield for the projected groundwater development within the District.² Additional water is also available from the Stagecoach Reservoir and the water rights allocated to the SMR property.

¹ <https://montanafreepress.org/2024/01/18/yellowstone-club-becomes-first-ski-resort-in-montana-to-turn-wastewater-into-snow/>

² HRS Water Consultants, Inc. and McLaughlin Water Engineers, Ltd. *Water Supply Master Plan Morrison Creek Metropolitan Water & Sanitation District*. December 2009.

4.0 NUTRIENTS OF CONCERN

4.1. Sources of Nutrients (Phosphorus and Nitrogen)

Phosphorus and Nitrogen cycles are affected primarily by urban and agricultural development, which has resulted in non-point source pollution. Sources can include runoff from agriculture, urban settings, construction sites, septic tank leachate and logging. The nutrients can wash into bodies of water and its tributaries through stormwater, primarily as snowmelt, and can also leach through the soil and into groundwater over time.³ Excess of these nutrients in ground and surface waters cause what is known as eutrophication, which can result in a variety of water quality problems when algal production accelerates, including HABs. A current point source of nutrients to Stagecoach Reservoir is the discharge from the Morrison Creek WWTP that discharges directly into Morrison Creek which flows into the reservoir.

4.2. Estimated Total Phosphorus Loads

4.2.1. Phosphorus Load in Wastewater

As indicated in Section 2.0, the existing sanitary flow rate for the Morrison Creek WWTP is approximately 50,000 gpd, which discharges a conservative 2 lbs./day of Phosphorus to the Stagecoach Reservoir (this is based upon values provided in the Discharge Monitoring Report on the United States Environmental Protection Agency [USEPA] web site). Pursuant to the Stagecoach Mountain Ranch Water and Sanitary Sewer Demand Analysis, the projected total daily sanitary sewer flow at full buildout for the proposed SMR would be 246,123± gpd. It is noted that this projection is a conservative value used for planning for projected flows to the WWTP and assumes an annual occupancy rate of 50% for the proposed SMR. As the proposed SMR homes are anticipated to be seasonally occupied, a more accurate occupancy rate would be approximately 35%. Using a ratio of the sanitary flow of the Morrison Creek WWTP to the projected sanitary flow of the proposed SMR, which is illustrated below, the proposed SMR would discharge approximately 9.84 lbs./day of Phosphorus to Stagecoach Reservoir from wastewater. A smaller occupancy rate would effectively decrease the sanitary sewer flow and subsequently the ratio identified below.

$$\frac{\text{Existing}}{\text{Proposed}} = \frac{50,000 \text{ gpd}}{246,123 \text{ gpd}} = \frac{2 \text{ lbs./day}}{x \text{ lbs./day}}$$

The United States Geological Survey (USGS) estimated monthly loads and annual yields based on normalized hydrographs of suspended sediment, Kjeldahl Nitrogen and total Phosphorus for several monitoring sites in the Upper Yampa River Basin for water years 2010–2018⁴. The annual total Phosphorus load at the “Yampa River above Stagecoach Reservoir” site is approximately 5.9 tons per year (32 lbs./day) and

³ <https://www.epa.gov/nutrientpollution/sources-and-solutions-agriculture#:~:text=This%20excess%20nitrogen%20and%20phosphorus,cause%20eutrophication%20of%20water%20bodies.>

⁴ <https://pubs.usgs.gov/publication/sir20215016>



the annual total Phosphorus load at the “Yampa River below Oak Creek near Steamboat Springs” site, which is located downstream of the aforementioned site, is approximately 17 tons per year (93 lbs./day).⁵ As such, the increase in Phosphorus across Stagecoach Reservoir is currently approximately 61 lbs./day (i.e., 93 minus 32). As the projected Phosphorus load upon implementation of the proposed action would be 9.84± lbs./day, the total reservoir load would increase by approximately 16 percent. In total, the 2± lbs./day of Phosphorus from the Morrison Creek WWTP and the 9.84± lbs./day from the proposed development would result in approximately 11.84 lbs./day of Phosphorus discharging to the Stagecoach Reservoir upon implementation of the SMR. It is noted that the recently upgraded Morrison Creek WWTP is anticipated to reduce this value. It is further noted that the above analysis is without using treated wastewater to make snow.

4.2.2. Phosphorus Load in Stormwater

The Phosphorus loading from stormwater has been estimated using two (2) different methods: one (1) based upon an estimate of Phosphorus in stormwater per square kilometer in the State of Colorado generated by the USEPA and the other based upon the watershed area of Stagecoach Reservoir between the upstream and downstream sampling points generated by the USGS.

4.2.2.1. USEPA

In order to calculate the proposed Phosphorus load from stormwater, the total Phosphorus yield for Colorado was used. According to the USEPA, the estimated total Phosphorus, aggregated yield, for Colorado is 17.51 kg/km², as predicted by the 2012 regional USGS Spatially Referenced Regression On Watershed Attributes (SPARROW) models.⁶ As indicated above in Section 1.1, the subject property consists of approximately 6,058 acres, or 24.5 km².

$$\begin{aligned} 17.51 \text{ kg/km}^2/\text{yr.} \cdot 24.5 \text{ km}^2 &= 429 \text{ kg/yr.} \\ 429 \text{ kg/yr.} \cdot 2.2 \text{ lbs./kg} &= 944 \text{ lbs./yr.} \\ 944 \text{ lbs./yr.} / 365 \text{ days} &= \mathbf{2.59 \text{ lbs./day}} \end{aligned}$$

The preliminary Phosphorous load in stormwater resulting from the proposed SMR is approximately 2.59 lbs./day, which is calculated above.

4.2.2.2. Watershed Analysis

As the USEPA Phosphorus estimation is based upon an average for the entire state of Colorado, the sampling points generated by the USGS discussed above in Section 4.2.1 were utilized to obtain a more accurate calculation. The contributing watershed area between the two (2) USGS sampling points is approximately 194,156± acres (see Figure 2 in Appendix A). As indicated above, the increase in Phosphorus across the Stagecoach Reservoir is approximately 61 lbs./day. As the Morrison Creek WWTP discharges 2 lbs./day of Phosphorus to the Stagecoach Reservoir from wastewater, 59± lbs./day is assumed to be from

⁵ <https://pubs.usgs.gov/sir/2021/5016/sir20215016.pdf>

⁶ <https://www.epa.gov/nutrientpollution/estimated-total-nitrogen-and-total-phosphorus-loads-and-yields-generated-within>

runoff. Utilizing these values, the preliminary stormwater Phosphorus load from the proposed SMR can be calculated.

Development within the Watershed Area

Approximately 2,184 acres of the proposed SMR would be developed within this watershed area. As such, the preliminary Phosphorus loading from stormwater calculated below (i.e., 0.66 lbs./day) would contribute to surface waterbodies downstream of the Yampa River Above Stagecoach Reservoir sampling point.

$$\frac{59 \text{ lbs. lbs./day}}{194,156 \text{ acres}} = 0.0003 \text{ lbs./day/acre}$$

$$(0.0003 \text{ lbs./day}) * (2,184 \text{ acres}) = \mathbf{0.66 \text{ lbs./day}}$$

Development outside the Watershed Area

Assuming the same Phosphorus loading rate within the watershed area, the 0.0003 lbs./day/acre value indicated above can be used to calculate Phosphorus loading for development outside of the watershed area, which includes approximately 3,873 acres of the proposed SMR. As such, the preliminary Phosphorus loading from stormwater calculated below (i.e., 1.18 lbs./day) would contribute to surface waterbodies upstream of the Yampa River Above Stagecoach Reservoir sampling point.

$$(0.0003 \text{ lbs./day/acre}) * (3,873 \text{ acres}) = \mathbf{1.18 \text{ lbs./day}}$$

Based on the above calculations, the total preliminary Phosphorus load from stormwater for the proposed SMR would be approximately 1.84 lbs./day, with 0.66± lbs./day contributing directly to Stagecoach Reservoir and other downstream surface waterbodies. This is without the implementation of best management practices (BMPs).

4.2.3. Phosphorous Load with Nutrient Removal Methodology

As indicated in Section 2.0, the Morrison Creek WWTP currently treats approximately 100,000 gpd. Provided laboratory data indicates that the WWTP discharges approximately 4.85 mg/L of Phosphorous, which is equivalent to 4± lbs./day. As the proposed SMR would likely include a 35% occupancy rate, the below calculations assume a sanitary flow of approximately 172,286 gpd rather than the 246,123 gpd indicated in previous analyses. The Phosphorous loading for the proposed SMR would be approximately 6.9 lbs./day, which is calculated as follows:

$$\frac{172,286 \text{ gpd (35\% occupancy)}}{100,000 \text{ gpd (existing WWTP flow)}} = 1.72$$

$$1.72 * 4 \text{ lbs./day} = \mathbf{6.9 \text{ lbs./day}}$$

The Total Phosphorus Load from the STP would then be 6.9 + 4 lbs./day or 10.9 lbs./day. The use of wastewater for snowmaking can reduce the Phosphorus loading and move the point discharge from the Morrison Creek WWTP and distribute it over

a wider area making for greater dilution of nutrients entering Stagecoach Reservoir during the snow making season. This mitigation measure may eliminate the Phosphorus loading during the ski season and reduce it to 5.5 lbs./day averaged over the entire year. This reduces the potential for HABs in the area of Morrison Creek. In order to reduce the Phosphorus loading to the existing 4 lbs./day, Phosphorus reduction technology must be implemented at the WWTP.

4.3. Estimated Nitrogen Loads

4.3.1. Nitrogen Load with Nutrient Removal Methodology

As indicated previously, the Morrison Creek WWTP currently treats approximately 100,000 gpd. Provided laboratory data indicates that the WWTP discharges approximately 30 mg/L of Nitrogen, which is equivalent to 24.9± lbs./day. Similar to the Phosphorous analysis, the below calculations assume a sanitary flow of 172,286 gpd for the proposed SMR to reflect a 35% occupancy rate. The Nitrogen loading for the proposed SMR would be approximately 42.8 lbs./day, which is calculated as follows:

$$\frac{172,286 \text{ gpd (35\% occupancy)}}{100,000 \text{ gpd (existing WWTP flow)}} = 1.72$$

$$1.72 * 24.9 \text{ lbs./day} = \mathbf{42.8 \text{ lbs./day}}$$

The Total Nitrogen loading from the WWTP will then be 24.9 plus 42.8 lbs./day or 67.7± lbs./day.

As indicated above, the use of wastewater for snowmaking can reduce the point discharge from the Morrison Creek WWTP and distribute it over a wider area making for greater dilution of nutrients entering Stagecoach Reservoir. Additionally, by moving the Nitrogen discharge from the Morrison Creek outfall to groundwater inflow along the shoreline, the impact of Nitrogen on the reservoir will be greatly diluted.

The District has recently upgraded the WWTP to a Sequenced Batch Reactor (SBR) process. Preliminary results from the upgraded plant have shown a total Nitrogen effluent of 30 mg/L. At the time that the preliminary results for Nitrogen were compiled the plant had not been completely stabilized. According to the District Manager, the Morrison Creek WWTP is anticipated to have an effluent of 10 mg/L once the treatment system is stabilized. With the improvement of the plant operation for denitrification reducing the effluent concentration to 10 mg/L, the effluent Nitrogen loading from the plant will be reduced from 67.7 lbs./day to 22.3 lbs./day. This is even lower than the existing discharge (i.e., 24.9 lbs./day) without snowmaking. The use of wastewater for snowmaking can reduce this by an additional 50% to 11.2 lbs./day averaged over the entire year. Overall, no adverse impacts due to Nitrogen pollution are expected due to the proposed action.

5.0 STORMWATER MANAGEMENT

Upon implementation of the proposed action, stormwater would be accommodated via a comprehensive stormwater management system. In accordance with the Colorado



Discharge Permit System (CDPS) and the CDPHE Water Quality Control Division, a Stormwater Management Plan (SMP) will be prepared and would incorporate good engineering, hydrologic and pollution control practices. The SMP will contain the following nine (9) required components:⁷

- Qualified Stormwater Manager
- Spill Prevention and Response Plan
- Materials Handling
- Potential Sources of Pollution
- Implementation of Control Measures
- Site Description
- Site Map
- Final Stabilization and Long Term Stormwater Management
- Inspection Reports

The main source of phosphorus to Stagecoach Reservoir is from stormwater runoff, primarily snowmelt, bringing sediments that are naturally high in phosphorus into the Reservoir⁸. Rain gardens and retention/detention basins would be utilized for the containment and recharge of stormwater, although fully completed site plans have not yet been prepared. Stormwater ponds are widely assumed to have median total Phosphorous removal efficiencies of 50%.⁹

The Mile High Flood District published three (3) volumes of the *Urban Storm Drainage Criteria Manual*, the third (3) of which focuses on stormwater quality.¹⁰ The following was recommended for volume reduction and better integration of water quality facilities:

- Consider stormwater quality needs early in the development process.
- Take advantage of the entire site when planning for stormwater quality treatment.
- Place stormwater in contact with the landscape and soil.
- Minimize unnecessary imperviousness, while maintaining functionality and safety.
- Select treatment areas that promote greater infiltration.

The proposed SMR will incorporate the above five (5) recommendations, which were adapted from the Denver Water Quality Management Plan. The implementation of these recommendations is detailed in the site design report developed by Kimley-Horn.

By implementing BMPs, Phosphorous and Nitrogen inputs are anticipated to be mitigated to manageable levels upon implementation of the proposed action.

⁷ <https://cdphe.colorado.gov/cor400000-stormwater-discharge>

⁸ <https://pubs.usgs.gov/sir/2021/5016/sir20215016.pdf>

⁹ <https://aslopubs.onlinelibrary.wiley.com/doi/full/10.1002/lol2.10155>

¹⁰ <https://mhfd.org/resources/criteria-manual>

6.0 SUMMARY AND CONCLUSIONS

This Nutrient Loading Report has evaluated potential environmental impacts of the proposed SMR with respect to nutrient loading (i.e., Phosphorus and Nitrogen) on Stagecoach Reservoir. The proposed development would include approximately 613 residential units, private ski area and other on-site amenities associated with the resort on a portion of 6,058± acres of land in Routt County, Colorado.

Excess Phosphorus and Nitrogen, as well as other nutrients, in waterbodies can result in excessive growth of algae, causing harmful impacts to the ecosystem. The total Phosphorus loads in wastewater and stormwater were calculated. Specifically, using the existing total Phosphorus load for the Morrison Creek WWTP (i.e., 4 lbs./day), as well as a ratio of the existing sanitary flow for Morrison Creek WWTP (i.e., 100,000 gpd) to the projected sanitary flow for the proposed SMR (i.e., 246,123± gpd), the proposed SMR would discharge approximately 9.84 lbs./day of Phosphorus in wastewater to Stagecoach Reservoir without the use of nutrient removal methodology.

Regarding stormwater, utilizing the USEPA estimated total Phosphorus, aggregated yield, for Colorado (i.e., 17.51 kg/km²) and the proposed acreage of the SMR (i.e., 6,058± acres), the estimated Phosphorous load in stormwater resulting from the proposed SMR is approximately 2.59 lbs./yr. As the USEPA value is a broad estimate with the potential for limitations, a portion of the Phosphorus load in stormwater was also calculated by utilizing the contributing watershed area for the Stagecoach Reservoir and contributing areas upstream of the reservoir. Specifically, the preliminary Phosphorus load from stormwater would be approximately 1.84 lbs./day, with 0.66± lbs./day contributing to the Stagecoach Reservoir. The proposed SMR would incorporate BMPs and an SMP to accommodate stormwater on-site.

Upon implementation of the proposed action, the subject property would utilize nutrient removal methodology to reduce the discharge concentrations of Phosphorus and Nitrogen. Specifically, treated wastewater would be used to produce snow to ski on.

As mentioned throughout this report, the Morrison Creek WWTP has recently upgraded its treatment process, which is anticipated to reduce its daily Phosphorus and Nitrogen loading. There are also opportunities for the applicant to potentially guide additional nutrient removal techniques for the Morrison Creek WWTP SBR process with the removal of Phosphorus.

Overall, through the use of nutrient removal methodology, as well as proper stormwater management, Nitrogen loads to the Reservoir due to the proposed SMR can be maintained at or below current levels. Phosphorus levels can be reduced to below current levels with the addition of Phosphorus removal technologies at the WWTP.

We recommend:

- 1) Upgrade the Morrison Creek WWTP treatment process to include Phosphorus treatment to further reduce the effluent concentration of Phosphorus.
- 2) Utilize treated wastewater for snowmaking during the six-month snowmaking season.



- 3) Utilize best stormwater management practices to reduce the levels of Phosphorus and Nitrogen entering Stagecoach Reservoir.
- 4) Monitor surface and groundwater to determine the efficiency of the program to reduce nutrient levels in Morrison Creek and Stagecoach Reservoir.



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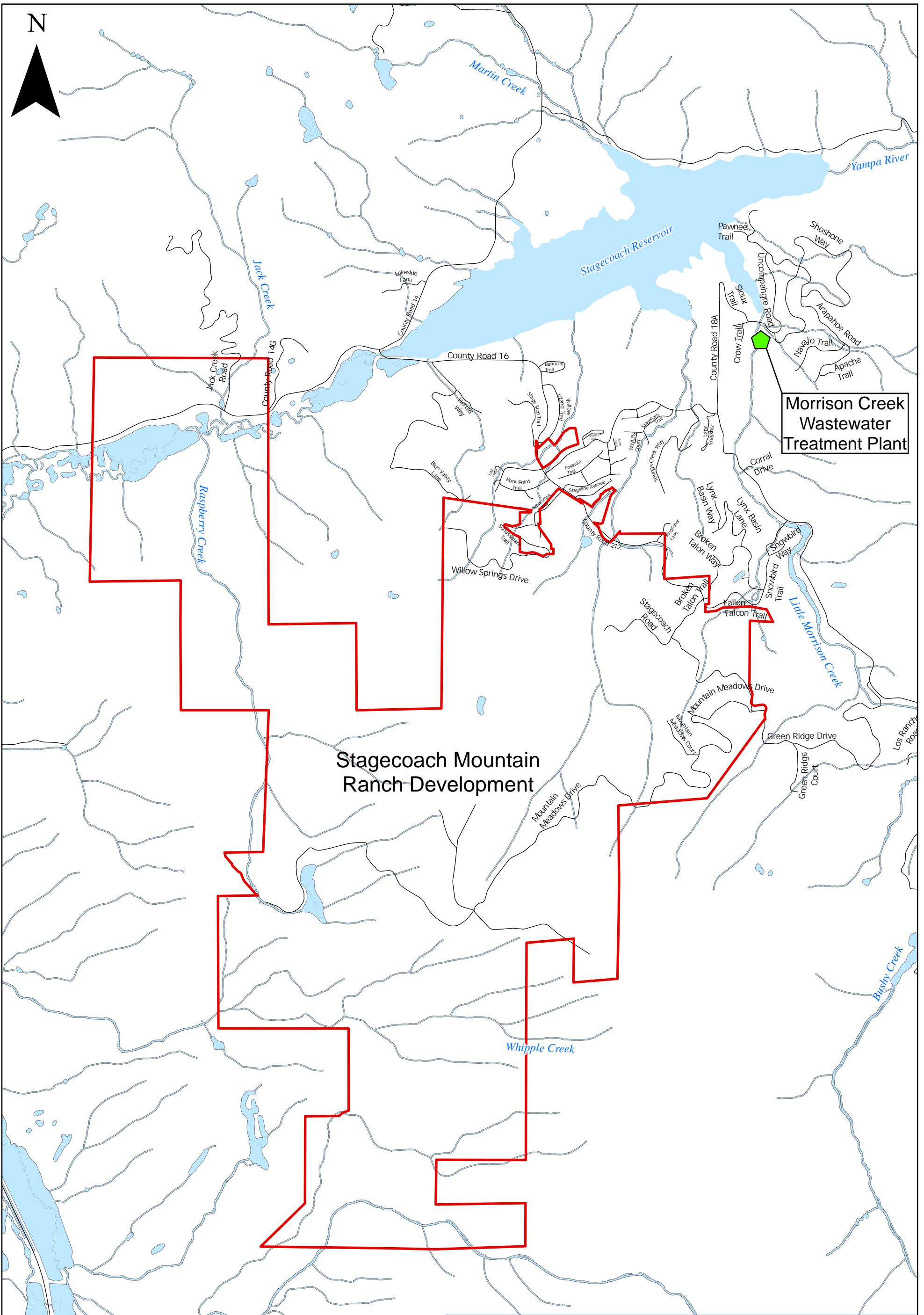
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APPENDIX A

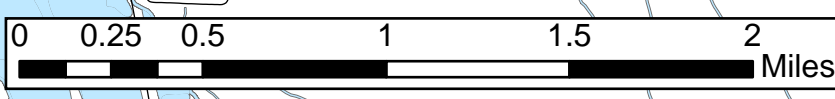
Figures



**Morrison Creek
Wastewater
Treatment Plant**

**Stagecoach Mountain
Ranch Development**

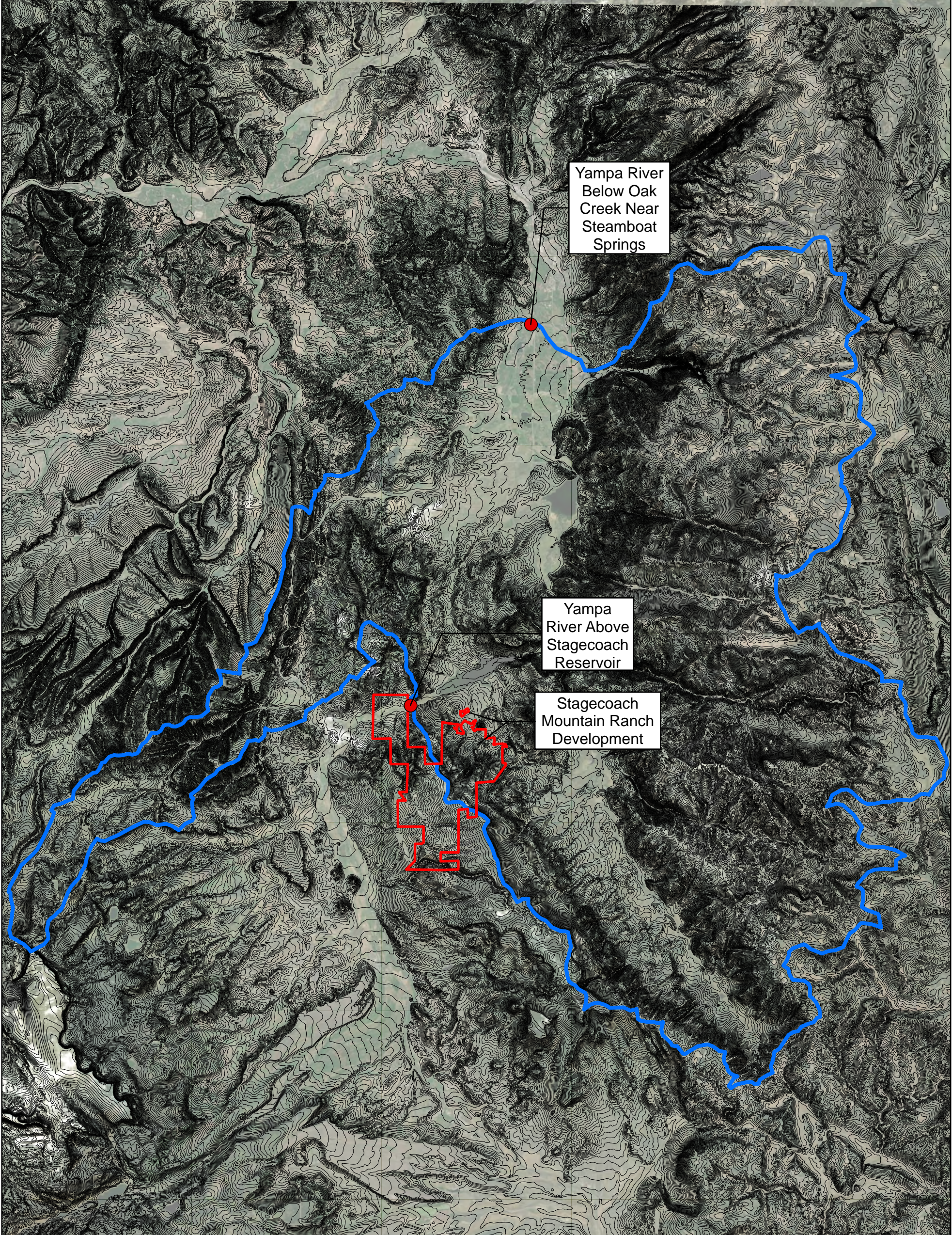
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- Stagecoach Mountain Ranch Development Boundary



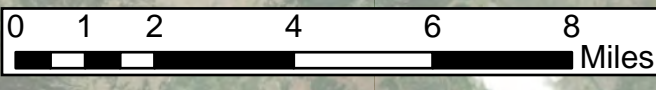

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Stagecoach Mountain Ranch			
Site Address	Project: DLC2301	Drawn by: KM	
Stagecoach, Colorado	Date: 11/26/2024	Approved by: HS	
	Coord. Sys: NAD83 StatePlane CO - North		
Client: Steamboat Sponsor, LLC 14605 N 73rd Street Scottsdale, AZ 85260	Figure No:		1

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- 10' Contours
- Monitoring Locations
- Watershed
- Site Boundary




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Stagecoach Mountain Ranch - Watershed

Site Address	Project: DLC2301	Drawn by: KM
Stagecoach, Colorado	Date: 11/26/2024	Approved by: HS
	Coord. Sys: NAD83 StatePlane CO - North	
Client: Steamboat Sponsor, LLC 14605 N 73rd Street Scottsdale, AZ 85260	Figure No:	2