Town of Eagle
Source Water Protection Plan – Public Version

Eagle County, Colorado
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For the Community Water Provider:
Town of Eagle, PWSID# 119233

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Cover photo: Brush Creek, Eagle River Watershed Council

This Source Water Protection Plan is a planning document and there is no legal requirement to implement the recommendations herein. Actions on public lands will be subject to federal, state, and county policies and procedures. Action on private land may require compliance with county land use codes, building codes, local covenants, and permission from the landowner. This SWPP for the Town of Eagle was developed using version 16.09.09 of the Colorado Rural Water Association's Source Water Protection Plan Template

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COMMON ACRONYMS

ANS	Aquatic Nuisance Species
BMP	Best Management Practice
CDPHE	Colorado Department of Public Health and Environment
CWCQC	Colorado Water Quality Control Commission
CRWA	Colorado Rural Water Association
CWPP	Community Wildfire Protection Plan
FEMA	Federal Emergency Management Agency
GIS	Geographic Information Systems
MCL	Million Gallons per Day
OWTS	Onsite Wastewater Treatment Systems
PSOC	Potential Source of Contamination
RMGCSA	Rocky Mountain Golf Course Superintendents Association
SWAA	Source Water Assessment Area
SWAP	Source Water Assessment and Protection
SWPA	Source Water Protection Area
SWPP	Source Water Protection Plan

EXECUTIVE SUMMARY

There is a growing effort in Colorado to protect community drinking water sources from potential contamination. Many communities are taking a proactive approach to preventing the pollution of their drinking water sources by developing a Source Water Protection Plan (SWPP). A SWPP identifies a source water protection area, lists potential contaminant sources, and outlines Best Management Practices (BMP) to reduce risks to the water source. Implementation of a SWPP provides additional protection at the local level-beyond required drinking water regulations.

The Town of Eagle values a clean, high quality drinking water supply and has worked collaboratively with area stakeholders to develop a Source Water Protection Plan. Public meetings were held at Eagle Town Hall from April 2019 to April 2020. Local citizens and landowners, private business owners, water operators, local and state governments, and agency representatives were among the stakeholders who attended these meetings. Colorado Rural Water Association (CRWA) provided support and technical assistance in the development of this SWPP.

Town of Eagle obtains their drinking water from two surface water intakes in the Brush Creek watershed. The Town of Eagle Source Water Protection Areas are defined as:

Brush Creek Intakes
Zone 1: a 75-foot buffer on either side of Brush Creek extending 5-miles upstream
Zone 2: The Brush Creek Watershed

Eagle River Pump Location
Zone 1: a 75-foot buffer to the south of the Eagle River and an area to the north encompassing the I-70 corridor to the base of the valley floor, as little as 550 feet and as much as 2,500 feet in distance, both extending 5-miles upstream
Zone 1a: a 75-foot buffer on either side of the Eagle River and its tributaries extending 5-miles upstream
Zone 2: the sub-watersheds encompassing the Eagle River five-mile upstream reach

The Town of Eagle has chosen to focus its source water protection measures on these areas to reduce source water susceptibility to contamination. A Steering Committee was appointed to conduct an inventory of potential contaminant sources and identified other issues of concern within the Source Water Protection Area.

The Steering Committee developed several best management practices (BMPs) to reduce the risks from potential contaminant sources and other issues of concern. The BMPs are centered on building partnerships with community members, businesses, and local decision makers; raising awareness of the value of protecting community drinking water supplies; and empowering local communities to become stewards of their drinking water supplies by taking actions to protect their water sources.

The following list highlights the highest priority potential contaminant sources and/or issues of concern and their associated best management practices:

Wildfire

1. Provide a copy of the final Source Water Protection Plan to local Fire Protection Districts, USFS, CSFS, BLM and any other agencies/departments involved in wildfire and land management decision making during the planning of pre-and post-wildfire mitigation strategies.
    - Encourage Agencies to overlay the SWPA's on the Wildfire Susceptibility Analysis maps to identify high-risk areas and to determine recommended action items.
2. Convene Federal, State, County and local wildfire managers to:
    - Identify wildfire hazards and values at-risk within the watershed (e.g. intake facilities, pump stations, other infrastructure)
    - Determine post-fire hazards and impacts to water quality and values at-risk
    - Develop BMP's to mitigate pre-fire and post-fire hazards
3. Conduct forest/fuel treatments near infrastructure and other strategic locations.
4. Work with local fire managers to create an emergency response protocol for wildfire events.
5. Encourage local FPDs and Eagle County to continue to implement their fire prevention plan which includes public education programs like Fire Wise and Project Learning Tree.
6. Consider utilizing the Wildfire Decision Support System (WFDSS) for pre- wildfire planning.
7. Upgrade the upper basin intake to better protect it during post-wildfire debris flow events.
8. Conduct structure protection at the Fulford site.
9. Continue practice of prescribed burns or mechanical treatment in identified drainages.
10. Provide residents in the watershed with outreach material that highlights fire management and safety including creating defensible space around their homes.

Transportation and Roads

1. Investigate the existence of an Emergency Call Down System (ECDS) for Brush Creek and Eagle River. If there is not an ECDS, then develop an ECDS.
2. Provide copies of the SWPP and Emergency Response Notification Cards to the Colorado Department of Transportation and the Eagle County Offices of Emergency Management and Road and Bridge.
3. Utilize a spill time calculator to measure how long pollutants will take to travel to the intake.
4. Stay informed on road maintenance practices and schedules within the SWPA including: grading, the application of magnesium chloride and dust abatement activities along with the best management practices utilized during these activities.
5. Post Source Water Protection signage (7).
6. Educate the public on how to report spills or dumping in the SWPA on both public and private lands.
7. Tour the upper watershed with the USFS, BLM, Sylvan Lake SP, Eagle County and Eagle River Watershed Council (ERWC) to assess and list high priority areas for potential road and trail maintenance and improvement activities.

Security

1. Investigate the existence of an Emergency Call Down System (ECDS) for Brush Creek and the Eagle River. If there is not an ECDS, then develop an ECDS with local partners.
2. Install fencing and other security measures to safeguard water facility infrastructure.
3. Do not advertise specific water infrastructure locations.

Existing & Future Subdivisions

Existing Subdivisions:

1. Ensure that riparian areas are protected by maintaining minimum stream setbacks.
2. Identify, map and develop cost estimates for recommended stormwater control projects and evaluate each projects' anticipated effectiveness and feasibility.

3. Communicate with Eagle County Road and Bridge in order to prevent snow removal from being piled up adjacent to Brush Creek and the Eagle River.
4. Assess urban drainage impact risk and recommend site specific projects.
5. Provide educational material to construction companies and landscapers on how to utilize BMPs to prevent storm water runoff from entering the source waters.
6. Conduct education to restaurants highlighting waste disposal best management practices.
7. Partner with ERWC to conduct storm drain stenciling.

Future Subdivisions:
1. Ensure that riparian areas are protected during buildout by adhering to stormwater runoff controls and the creation of minimum stream setbacks.
2. Update the Town Municipal Code for adequate setbacks and up to date stormwater regulations for protection of the Brush Creek and Eagle River corridors.
3. Provide real estate and construction companies with educational material that highlights best management practices at construction sites including the following of stringent stormwater BMPs during build out.
4. Provide training and certification opportunities to site inspectors and other Town staff for temporary and permanent stormwater control measure design, installation and maintenance to limit sediment and/or nutrient impacts to Brush Creek.
5. Encourage Eagle County Community Development and Town of Eagle Community Development to utilize the SWPA GIS data when making future land use decisions or changes to zoning laws.
6. Provide real estate companies with education and outreach material that they can distribute to new home buyers that highlights homeowner best management practices.

<u>Noxious Weed and Aquatic Nuisance Species Control</u>
1. Collaborate with Eagle County, USFS, BLM, ERWC, and Eagle County Conservation District (ECCD) to identify specific noxious weed locations and target them for additional control measures.
2. Encourage all entities to continue to adhere to current regulations and best management practices that address the mitigation of noxious weeds.
3. Conduct educational seminars addressing noxious weed spraying to Town and County personnel, private property owners, golf course managers, etc.
4. Work with farm stores like WYLACO to distribute educational material to customers when they sell over the counter chemicals.
5. Provide Eagle County Vegetation Management and the ECCD a copy of the SWPP.
6. Conduct education and outreach to recreationists who use boats on Sylvan lake.
7. Provide area businesses that sell fishing licenses with CPW educational material to display and distribute to customers to inform them about strategies to prevent the spread of ANS.
8. Support ANS inspection programs for Sylvan Lake SP.

The Steering Committee recognizes that the usefulness of this Source Water Protection Plan lies in its implementation and will begin to execute these BMPs upon completion of this SWPP.

This SWPP is a living document. It should be updated to address changes that will inevitably come. The Steering Committee will review this Plan annually and with CRWA every ten years, or if circumstances change resulting in the development of new water sources and source water protection areas, or if new risks are identified.

INTRODUCTION

Source water protection is a proactive approach to preventing the pollution of lakes, rivers, streams, and groundwater that serve as sources of drinking water. For many generations, water quality was taken for granted. Many people still assume that their drinking water source is naturally protected; however, as water moves through and over the ground, contaminants can easily be carried into a drinking water supply.

While a single catastrophic event may wipe out an entire drinking water source, the cumulative impact of minor contaminant releases over time can also result in the degradation of a drinking water source. Contamination can occur via discrete (point source) and dispersed (nonpoint source) sources. A discrete source contaminant originates from a single point, while a dispersed source contaminant originates from diffuse sources over a broader area. According to the US Environmental Protection Agency, nonpoint source pollution is the leading cause of water quality degradation (GWPC, 2008).

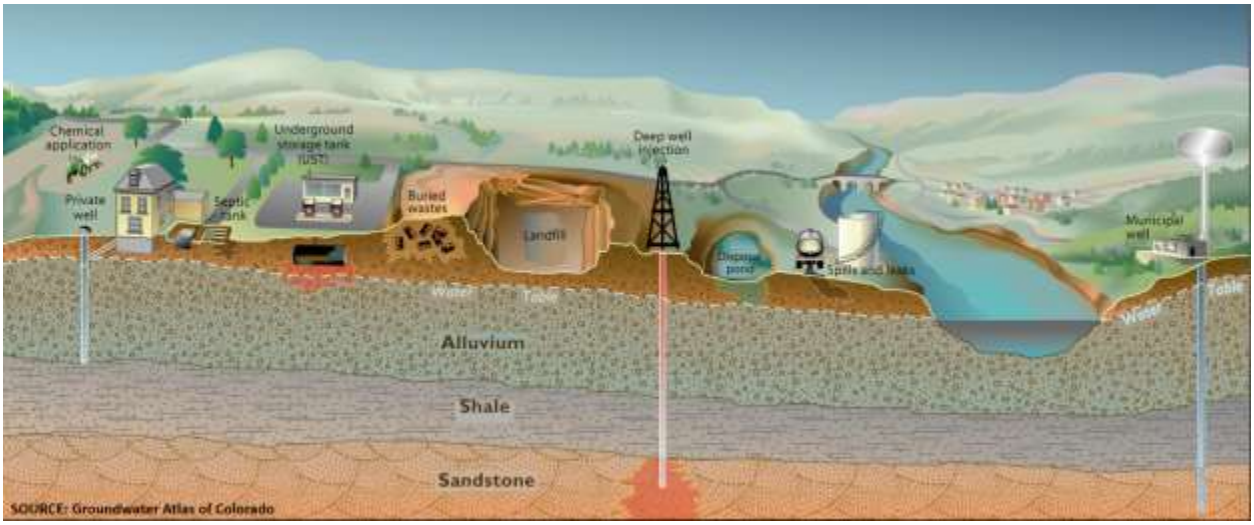

Figure 1: Schematic drawing of the potential source of contamination to surface and groundwater

The Town of Eagle recognizes the potential for contamination of their drinking water sources and realizes that the development of this SWPP is the next step in protecting this valuable resource. Proactive planning is not only essential to protecting the long-term integrity of the drinking water supply, but it can also limit costs and liabilities. Creating a SWPP demonstrates the Town of Eagle's commitment to reducing risks to their drinking water supply.

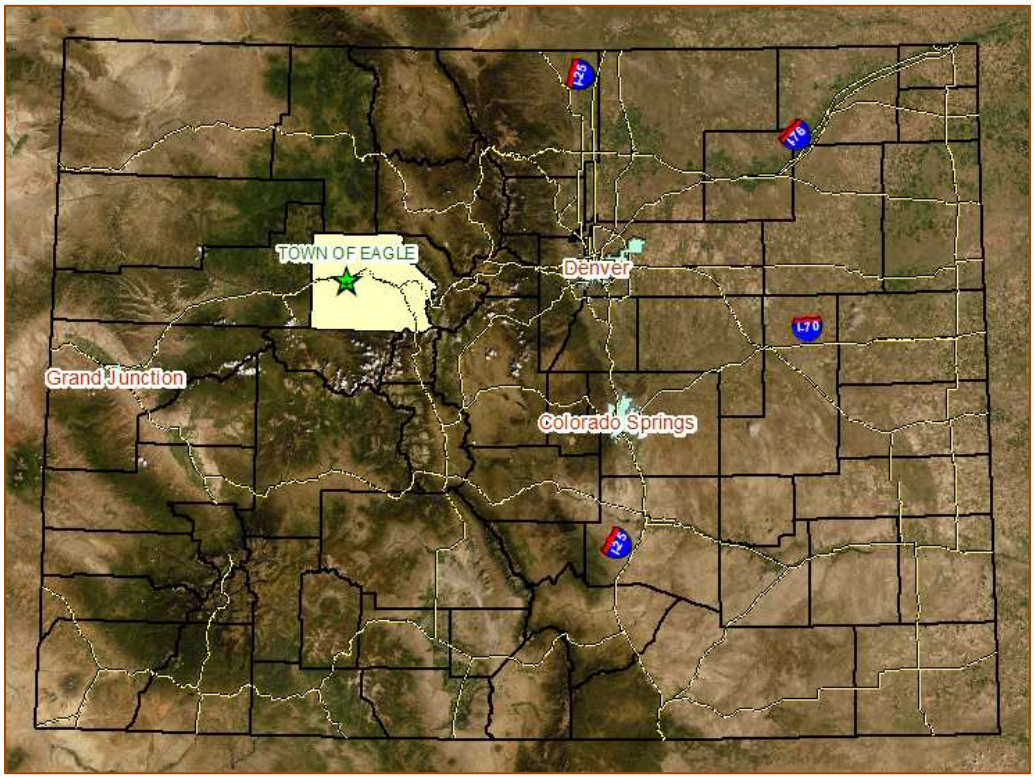

Figure 2: Town of Eagle within Eagle County, Colorado Source: CRWA

Purpose of the Source Water Protection Plan

The SWPP is a tool for the Town of Eagle to ensure clean and high-quality drinking water sources for current and future generations. This SWPP is designed to:

- Create an awareness of the community's drinking water sources and the potential risks to surface water and/or groundwater quality within the watershed
- Encourage education and voluntary solutions to alleviate pollution risks
- Promote management practices that protect and enhance the drinking water supply
- Provide a comprehensive action plan in case of an emergency that threatens or disrupts the community water supply

Developing and implementing source water protection measures at the local level (i.e. county and municipal) will complement existing regulatory protection measures implemented at the state and federal governmental levels by filling protection gaps that can only be addressed at the local level.

Background of Colorado's SWAP Program

Source water assessment and protection came into existence in 1996 as a result of Congressional reauthorization and amendment of the Safe Drinking Water Act. These amendments required each state to develop a Source Water Assessment and Protection (SWAP) program. The Water Quality Control Division (WQCD), an agency of the Colorado Department of Public Health and Environment (CDPHE),

assumed the responsibility of developing Colorado's SWAP program and integrated it with the Colorado Wellhead Protection Program.

Colorado's SWAP program is an iterative, two-phased process designed to assist public water systems in preventing potential contamination of their untreated drinking water supplies. The two phases include the Assessment Phase and the Protection Phase as depicted in the upper and lower portions of Figure 3, respectively.

Figure 3: Source Water Assessment and Protection Phases

Source Water Assessment Phase

The Assessment Phase for all public water systems was completed in 2004 and consisted of four primary elements:

1. Delineating the Source Water Assessment Area (SWAA) for each of the drinking water sources
2. Conducting a contaminant source inventory to identify potential sources of contamination (PSOC) within each of the SWAA
3. Conducting a susceptibility analysis to determine the potential susceptibility of each public drinking water source to the different sources of contamination
4. Reporting the results of the source water assessment to the public water systems and the general public

A Source Water Assessment Report (Appendices A and B) was provided to each public water system in Colorado in 2004 and outlines the results of this Assessment Phase.

Source Water Protection Phase

The Protection Phase is a non-regulatory, ongoing process in which all public water systems have been encouraged to voluntarily employ preventative measures to protect their water supply from the PSOC to which it may be most susceptible. The Protection Phase can be used to take action to avoid unnecessary treatment or replacement costs associated with potential contamination of the untreated water supply. Source water protection begins when local decision makers use the source water assessment results and other pertinent information as a starting point to develop a protection plan. As depicted in the lower portion of Figure 3, the source water protection phase for all public water systems consists of four primary elements:

1. Involve local stakeholders in the planning process
2. Develop a comprehensive protection plan for all of their drinking water sources
3. Implement the protection plan on a continuous basis to reduce the risk of potential contamination of the drinking water sources
4. Monitor the effectiveness of the protection plan and updating it accordingly as future assessment results indicate

The water system and the community recognize that the Safe Drinking Water Act grants no statutory authority to the CDPHE or to any other state or federal agency to force the adoption or implementation of source water protection measures. This authority rests solely with local communities and local governments.

The source water protection phase is an ongoing process as indicated in Figure 3. The evolution of the SWAP program is to incorporate any new assessment information provided by the public water supply systems and update the protection plan accordingly.

SOURCE WATER SETTING

Location and Description

Eagle is a statutory town that is the county seat of Eagle County, Colorado. Eagle is located west of the center of Eagle County in the valley of the Eagle River, a west-flowing tributary of the Colorado River. The town limits extend southward up the valley of Brush Creek. U.S. Route 6 passes through the center of town, and Interstate 70 passes through the northern side, with access from Exit 147. Vail is 30 miles (48 km) to the east, and Glenwood Springs is 31 miles (50 km) to the west. According to the U.S. Census Bureau the town has a total area of 4.6 square miles (Wikipedia).

Two ranching communities, Eagle and Gypsum, were first settled in 1882. The name "Eagle" became prominent in 1896 and was finally chosen in 1905 as the Towns name. In the late 1890s Eagle served as a supply center for the mining camp of Fulford to the south, but cattle ranching and farming, particularly of potatoes and lettuce, proved to be the mainstay of the local economy thereafter. Today the town is gaining recognition for its extensive trail system for mountain biking, hiking and trail running. Located just 30 miles (48 km) west of the resorts of Vail and Beaver Creek, the town of Eagle and its residents enjoy an abundance of year-round recreational opportunities (Town of Eagle).

The elevation of Eagle is 6601 feet above sea level. The climate of Eagle is characterized by cold winters, hot summers, and relatively little precipitation. Eagle has a warm-summer humid continental climate but it is borderline semi-arid due to low rainfall. As a consequence of the city's high elevation, temperatures drop sharply after sunset. Eagle receives 16 inches of rain, on average, per year and 53 inches of snow, on average, per year.

On average, there are 244 sunny days per year in Eagle. The US average is 205 sunny days.
Eagle gets some kind of precipitation, on average, 91 days per year. Precipitation is rain, snow, sleet, or hail that falls to the ground (Sperling's Best Places).

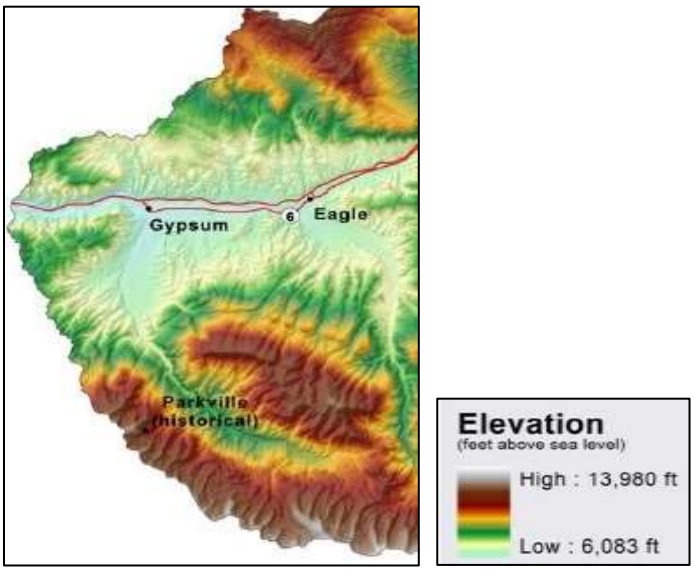

Figure 4: Elevation Surrounding Eagle, CO Source: NRCS Rapid Assessment

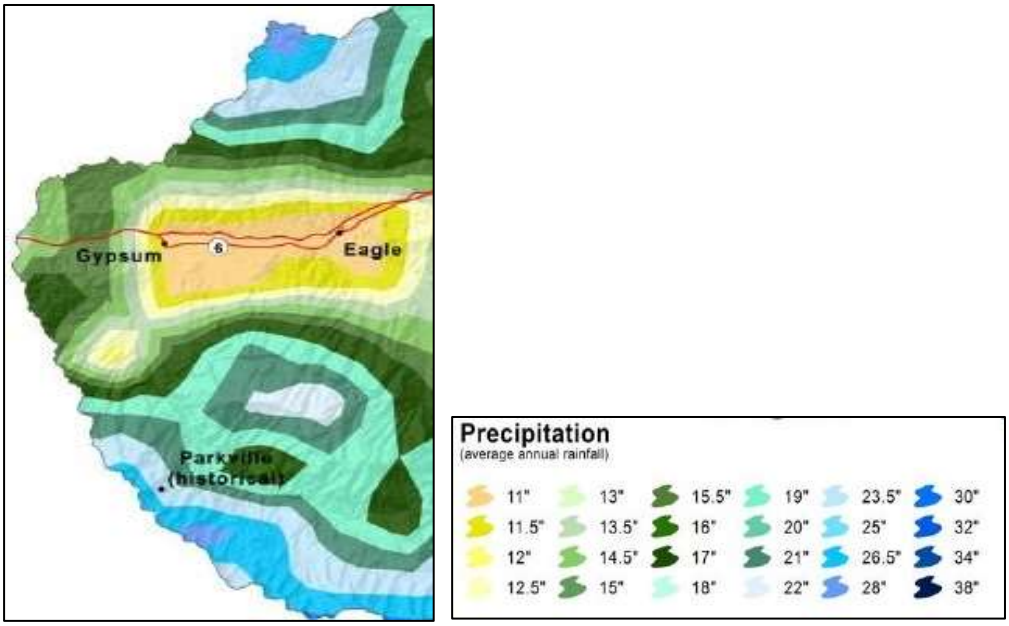

Figure 5: Precipitation near Eagle, CO *Source: NRCS Rapid Assessment*

Figure 6: Land ownership surrounding Eagle, CO *Source: NRCS Rapid Assessment*

Eagle Area Community Plan

The Eagle Area Community Plan, originally introduced in 1996, is unique in Eagle County as it is jointly adopted by both the Town of Eagle and Eagle County. It covers an extensive area including both the incorporated lands within the Town of Eagle and unincorporated lands surrounding the Town boundaries. The entire drainages of both Brush Creek and Eby Creek, which extend south and north of town, are included as are significant acreages along the Eagle River and Interstate 70 east and west of town. The Plan is intended to work as an extension of the Eagle County Comprehensive Master Plan,

providing planners, officials, landowners and developers with policies and strategies to help formulate land use plans and guide decision making over the course of the next 5 to 10 years. The Plan is a community-based plan that reflects the vision, concerns, ideas and desires of local residents as determined through a detailed public planning process. Major components of the Plan include:

Promoting Stewardship of Natural, Scenic, and Environmentally Sensitive Areas: The unincorporated rural lands that surround the Town of Eagle contribute significantly to the Town's identity and the lifestyles enjoyed by local residents and the experience of visitors to the area. As such, the quality and character of the Eagle River Corridor, the Brush Creek Valley, the agricultural lands east and west of Town, and the Eby Creek and Castle Peak areas north of Town should be preserved. The Town and County should work collaboratively to protect natural, scenic, and environmentally sensitive areas through a variety of means including public education, open space acquisition, the promotion of activities and events related to the area's agricultural heritage, the development of design guidelines for unincorporated areas, the monitoring of land use impacts, and the enforcement of applicable standards.

Protecting and Preserving Wildlife Habitat and Corridors: Maintaining the livability of the Eagle Planning Area involves the protection of wildlife habitat and corridors. Activities such as hunting, fishing and wildlife viewing enhance recreational opportunities and bring visitors to the area who contribute to the local economy. The Town and County should continue to work with the Colorado Division of Wildlife, the Bureau of Land Management, and the United States Forest Service to protect and preserve wildlife habitat and movement corridors by implementing necessary strategies and mitigations over time to ensure sustainable and healthy wildlife populations throughout the Planning Area.

Developing a Proactive Open Lands Program: The Town of Eagle and Eagle County should follow the recommendations of their respective open space plans. The Town and County should continue to be proactive in their approach to maintaining open lands, using a variety of techniques to preserve viable agricultural lands, river and stream corridors, critical wildlife habitats, steep slopes, ridgelines, areas of geologic hazard, and quality viewsheds as permanent open space.

In order to protect the scenic, open, and recreation-based character of the community and the quality of life for current and future generations, open lands and environmentally sensitive areas should be preserved to the greatest degree practicable within the planning area boundary. In particular, efforts should be made to avoid adverse impacts to the health and integrity of the Eagle River, Brush Creek, Eby Creek and other waterways, as well as critical habitat and movement corridors for the area's wildlife (Eagle Area Community Plan).

Hydrologic Setting

Town of Eagle obtains its drinking water from two surface water intakes on Brush Creek. Brush Creek is a tributary to the Eagle River and is part of the larger Colorado River Watershed. The headwaters of Brush Creek originate approximately 12 miles from the center of town.

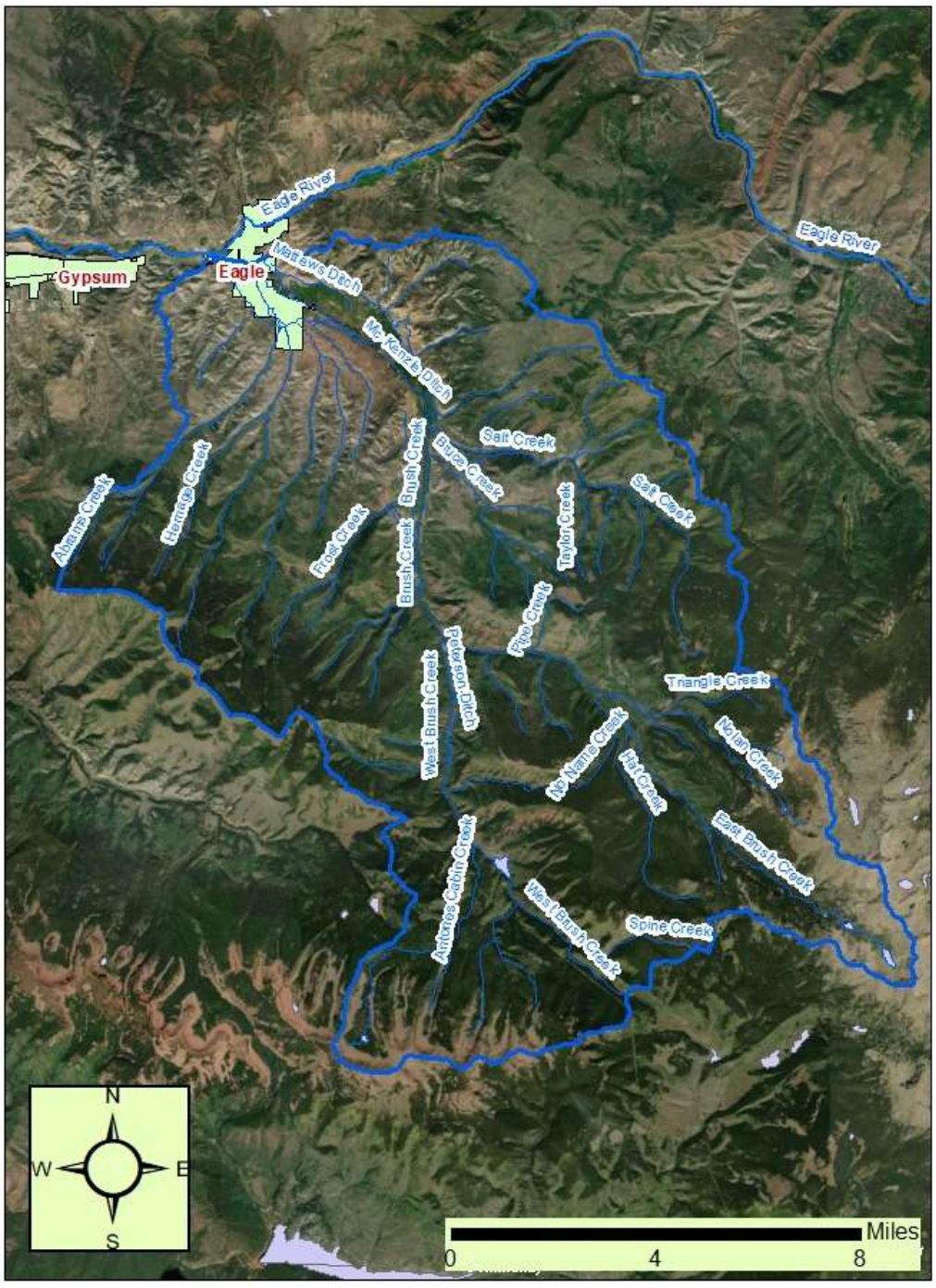

Figure 7: Brush Creek watershed *Source: CRWA*

DRINKING WATER SUPPLY OPERATIONS

Water Supply and Infrastructure

Town of Eagle obtains their drinking water from two surface water intakes in the Brush Creek watershed. The treatment system has the maximum capacity to treat 4,300,000 gallons of drinking water per day. Pretreatment of the raw water is coagulation and flocculation followed by sand filtration.

The lower basin intake and associated treatment system will have the maximum capacity to treat 2,500,000 gallons of drinking water per day. That number will increase to 5,000,000 gallons per day once the infrastructure is at final buildout.

Town of Eagle has the maximum capacity to store approximately 6,500,000 gallons of treated drinking water per day and the treated water is stored in nine storage tanks.

Table 1: Surface Water Supply Information

Water System Facility Name	Water System Facility Number	Surface Water Source	Constructed Date
Brush Creek Upper Basin Intake	CO0119233-002	Brush Creek	2017
Brush Creek Lower Basin Intake	TBD	Brush Creek	TBD

Figure Not included in Public Version of Document

Figure 8: Upper Basin Intake *Source: CRWA*

Figure Not included in Public Version of Document

Figure 9: Upper Basin Treatment Plant and Water Tank Source: CRWA

Figure Not included in Public Version of Document

Figure 10: Lower Basin Intake and Water Treatment Building Sites Source: CRWA

Figure Not included in Public Version of Document

Figure 11: Lower Basin Intake Source: CRWA

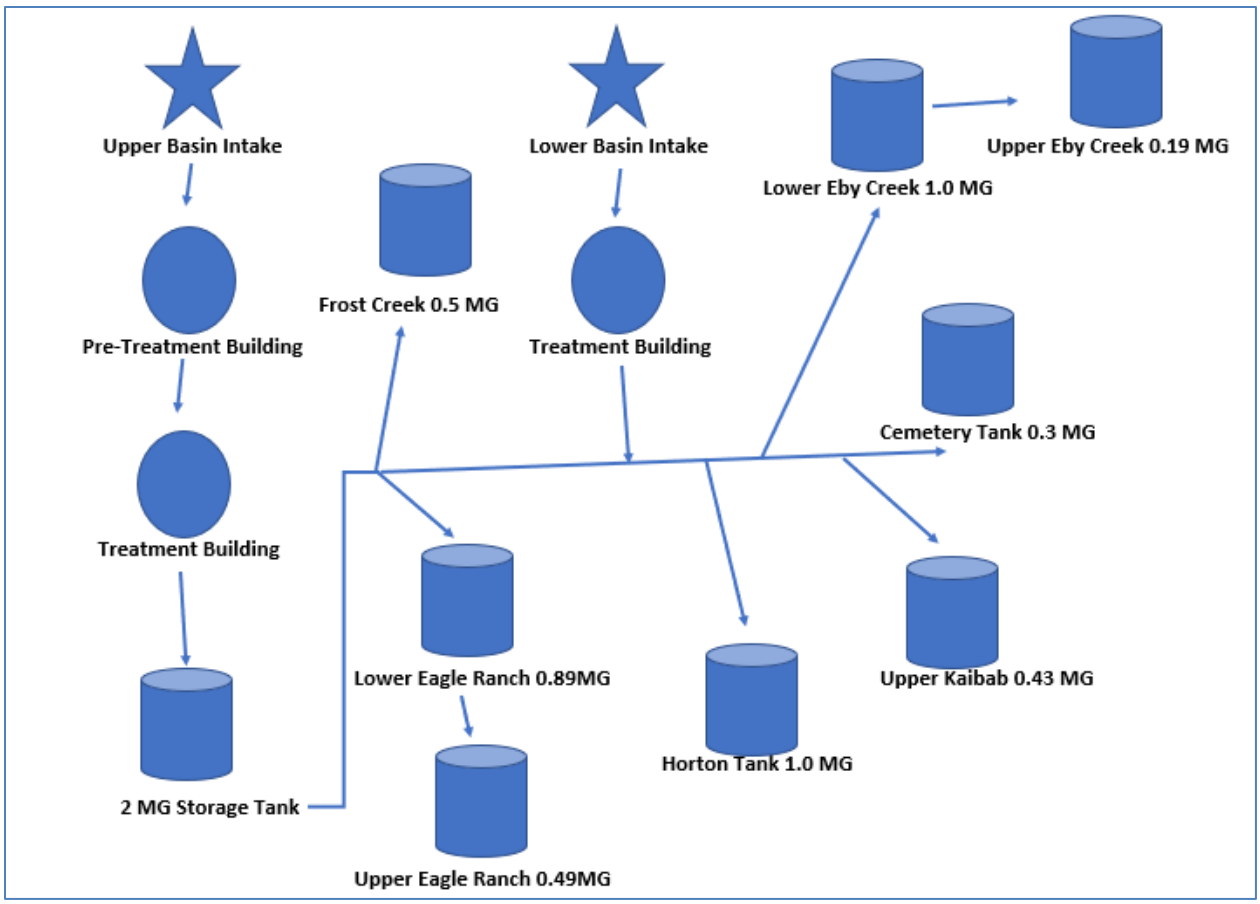

Figure 12: Water System Process Schematic Source: CRWA

Water Supply Demand Analysis

Town of Eagle serves an estimated 6,050 residents and other users in the service area. As mentioned above, the water system has the current capacity to produce 4,300,000 gallons per day. Current estimates indicate that the average daily demand is approximately 1,200,000 gallons per day, and that the average peak daily demand is approximately 3,200,000 gallons per day. Using these estimates, the water system has a surplus average daily demand capacity of 3,100,000 gallons per day and a surplus average peak daily demand capacity of 1,100,000 gallons per day.

Based on the estimates above, although Town of Eagle would be able to meet the average daily demand of its customers if both of its water sources were to become disabled for an extended period of time due to contamination, they would not be able to meet the average peak daily demand.

Town of Eagle recognizes that potential contamination of its surface water sources could result in having to abandon the water source if treatment proves to be ineffective or too costly. To understand the potential financial costs associated with such an event, Town of Eagle estimates that it could cost $30,000,000 in today's dollars to replace one of its water sources (i.e., replacement of the intake structure, treatment facilities, and the associated infrastructure). Treatment costs, which can vary depending on the type of contaminant(s) that need(s) to be treated, were not included in this estimate.

The potential financial and water supply risks related to the long-term disablement of one or more of the community's water sources are a concern to the Steering Committee. As a result, the Steering Committee believes the development and implementation of a SWPP for Town of Eagle can help to reduce the risks posed by potential contamination of its water sources.

SOURCE WATER PROTECTION PLAN DEVELOPMENT

The Colorado Rural Water Association's (CRWA) Source Water Protection Specialist, Paul Hempel, helped facilitate the source water protection planning process. The goal of CRWA's Source Water Protection Program is to assist public water systems in minimizing or eliminating potential risks to drinking water supplies through the development and implementation of SWPPs.

The source water protection planning effort consisted of a series of public planning meetings and individual meetings. Information discussed at the meetings helped Town of Eagle develop an understanding of the issues affecting source water protection for the community. The Steering Committee then made recommendations for best management practices (BMPs) to be incorporated into the SWPP. In addition to the planning meetings, data and other information pertaining to the SWPP was gathered via public documents, internet research, phone calls, emails, and field trips. A summary of the meetings is represented below.

Table 2: Planning Meetings

Date	Purpose of Meeting
May 1 , 2019	Stakeholder Meeting - Presentation on the process of developing a Source Water Protection Plan for the Town of Eagle. Review of the State's Source Water Assessment for Town of Eagle.
June 18, 2019	1st Planning Workshop – Discussion of potential contaminant sources throughout the Brush Creek watershed.
July 30, 2019	2nd Planning Workshop – Special presentations: Eagle Ranch Golf Club and wildlfire potential.
September 16, 2019	3rd Planning Workshop - Discuss and evaluate risk of potential contaminant sources in Brush Creek upper basin
November 13, 2019	4th Planning Workshop – Discuss and evaluate risk of potential contaminant sources in Brush Creek lower basin.
January 9, 2020	5th Planning Workshop – Discuss and evaluate risk of potential contaminant sources in Brush Creek lower basin and Eagle River corridor.
February 26, 2020	6th Planning Workshop – Discuss and select best management practices
April 7, 2020	7th Planning Workshop – Review and comment on draft SWPP

Stakeholder Participation in the Planning Process

Local stakeholder participation is vitally important to the overall success of Colorado's SWAP program. Source water protection was founded on the concept that informed citizens, equipped with fundamental knowledge about their drinking water source and the threats to it, will be the most effective advocates for protecting this valuable resource. Local support and acceptance of the SWPP is more likely when local stakeholders have actively participated in its development.

Town of Eagle's source water protection planning process attracted interest and participation from 27 stakeholders including local citizens and landowners, private businesses, water operators, local and state governments, and agency representatives. During the months of April 2019 through April 2020, eight planning meetings were held at the Eagle Town Hall Council Chambers.

A Steering Committee to help develop the source water protection plan was formed from the stakeholder group. The Steering Committee's role in the source water protection planning process was to advise Town of Eagle in the identification and prioritization of potential contaminant sources as well as management approaches that can be voluntarily implemented to reduce the risks of potential contamination of the untreated source water. All Steering Committee members attended at least one meeting and contributed to planning efforts from their areas of experience and expertise. Their representation provided diversity and led to a thorough SWPP. Town of Eagle and CRWA are very appreciative of the participation and expert input from the following participants.

Table 3: Stakeholders and Steering Committee Members

Stakeholder	Affiliation	Steering Committee Member
Deron Dircksen	Town of Eagle	X
Colton Berck	Town of Eagle	
Anne McKibbin	Town of Eagle	
Kyle Anderson	Town of Eagle	X
Karla Koch	Town of Eagle	X
Doug Riggins	Eagle County	
Peter Suneson	Eagle County	
Julie Pranger	Eagle County	X
Maureen Mulcahy	Eagle County	X
Eric Lovgren	Eagle County	X
Morgan Hill	Eagle County	X
Randy Cohen	Greater Eagle FPD	
Chris Tennant	Sylvan Lake State Park	X
Holly Loff	Eagle River Watershed Council	
Kate Isaacson	Eagle River Watershed Council	X
Scott Schlosser	Haymeadow/Brush Creek Ranch	X
Derek Rose	Eagle Ranch Golf Club	X
Kim Schaelpfer	Walking Mountain Science Center	X
Brad Piehl	JW Associates	
Ray Merry	Landowner	X
Shana Devins	Landowner	X
Rosie Shearwood	Landowner	
Erin Vega	Eagle Ranch HOA	
Justin Conrad	United States Forest Service	X
Ryan Hughes	United States Forest Service	X

Development and Implementation Grant

Town of Eagle has been awarded a $5,000 Development and Implementation Grant from the CDPHE. This funding is available to public water systems and representative stakeholders committed to developing and implementing a source water protection plan. A one to one financial match (cash or in-kind) is required. Town of Eagle was approved for this grant in December 2018 and it expires on December 20, 2020. Town of Eagle intends on utilizing 100% of their grant funds to BMPs that are identified in this Plan.

Source Water Assessment Report Review

Town of Eagle has reviewed the Source Water Assessment Report along with the Steering Committee. These Assessment results were used as a starting point to guide the development of appropriate BMPs to protect the source water of Town of Eagle from potential contamination. A copy of the Source Water Assessment Report for Town of Eagle can be obtained by contacting Town of Eagle or by downloading a copy from the CDPHE's SWAP program website located at:
https://www.colorado.gov/pacific/cdphe/source-water-assessment-and-protection-swap

Defining the Source Water Protection Area

A source water protection area is the surface and subsurface areas within which contaminants are reasonably likely to reach a drinking water source. The purpose of delineating a source water protection area is to determine the recharge area that supplies water to a public water source. Delineation is the process used to identify and map the area around a pumping well that supplies water to the well or spring or to identify and map the drainage basin that supplies water to a surface water intake. The size and shape of the area depends on the characteristics of the aquifer and the well, or the watershed. The SWAA that was delineated as part of Town of Eagle's Source Water Assessment Report provides the basis for understanding where the community's source water and potential contaminant threats originate, and where the community has chosen to implement its source water protection measures in an attempt to manage the susceptibility of their source water to potential contamination.

After carefully reviewing their Source Water Assessment Report and the CDPHE's delineation of the SWAA for each of Town of Eagle's sources, the Steering Committee chose to modify it before accepting it as their Source Water Protection Area (SWPA) for this SWPP. The SWPAs include a five-mile upstream reach of the Eagle River and its tributaries to recognize the fact that the Town can withdraw water from the Eagle River in an emergency. Town of Eagle's SWPAs are defined as:

Brush Creek Intakes

Zone 1: 75-foot buffer on either side of Brush Creek extending 5-miles upstream

Zone 2: Brush Creek Watershed

Eagle River Pump Location

Zone 1: 75-foot buffer to the south of the Eagle River and an area to the north encompassing the I-70 corridor to the base of the valley floor, as little as 550 feet and as much as 2500 feet in distance, both extending 5-miles upstream

Zone 1a: 75-foot buffer on either side of the Eagle River and its tributaries extending 5-miles upstream

Zone 2: sub-watersheds encompassing the Eagle River five-mile upstream reach

The Source Water Protection Areas are illustrated in the following maps:

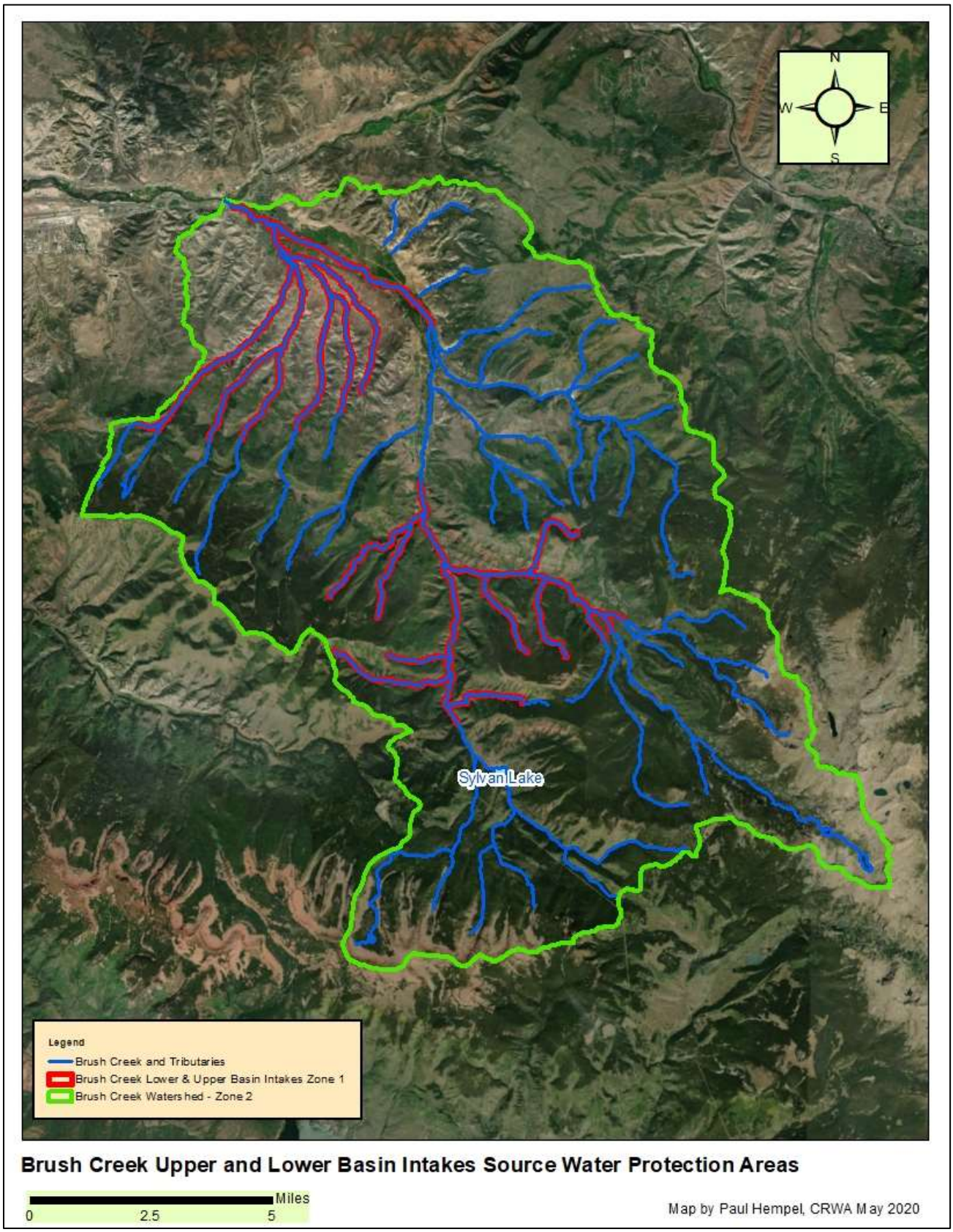

Figure 13: Brush Creek Upper and Lower Basin Intakes Source Water Protection Areas *Source: CRWA*

Figure Not included in Public Version of Document

Figure 14: Brush Creek Upper Basin Intake Zone 1 *Source: CRWA*

Figure Not included in Public Version of Document

Figure 15: Brush Creek Lower Basin Intake Zone 1 *Source: CRWA*

Figure 16: Brush Creek Lower Basin Intake Zone 1 at Eagle Ranch *Source: CRWA*

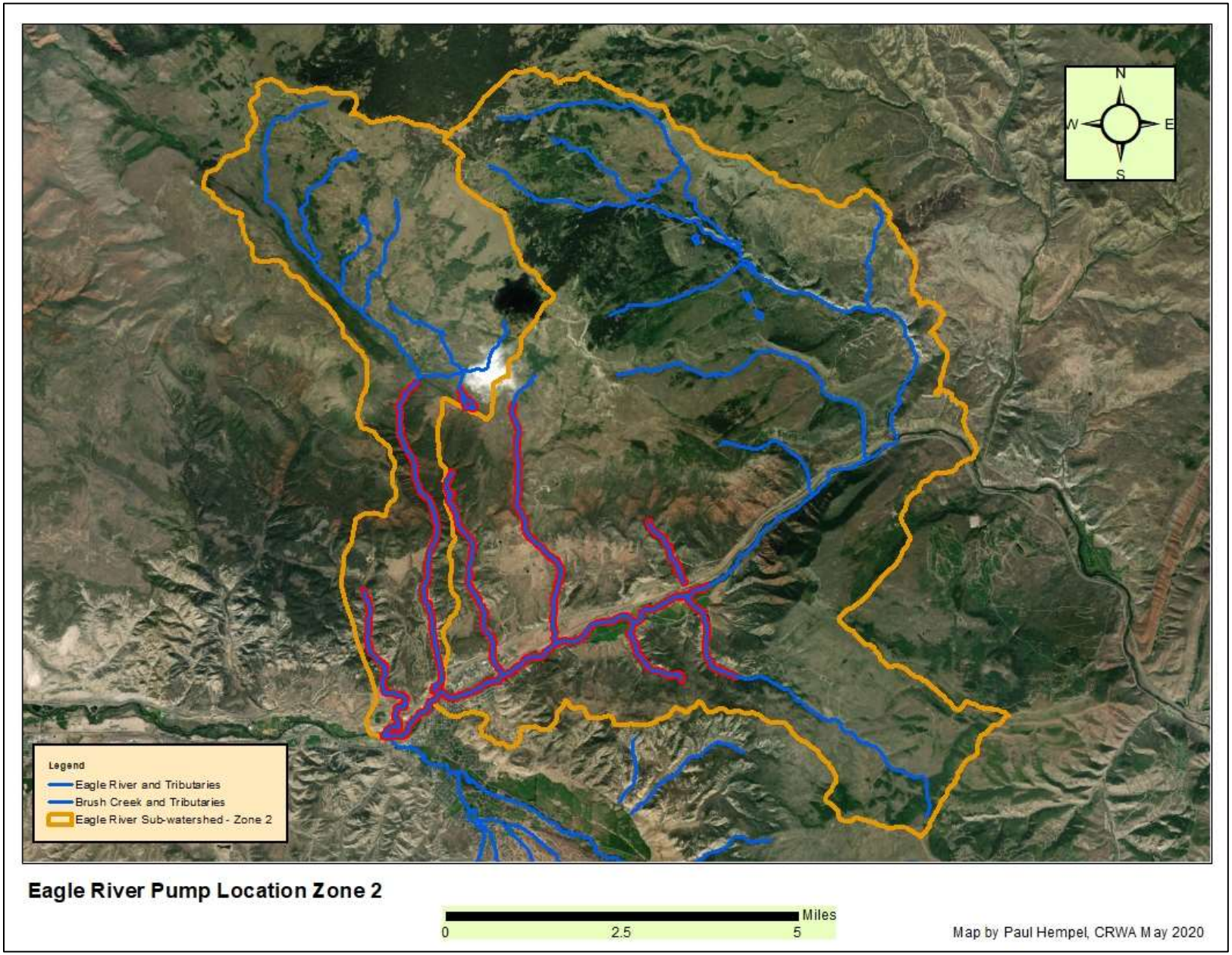

Figure 17: Eagle River Pump Location Zone 2 *Source: CRWA*

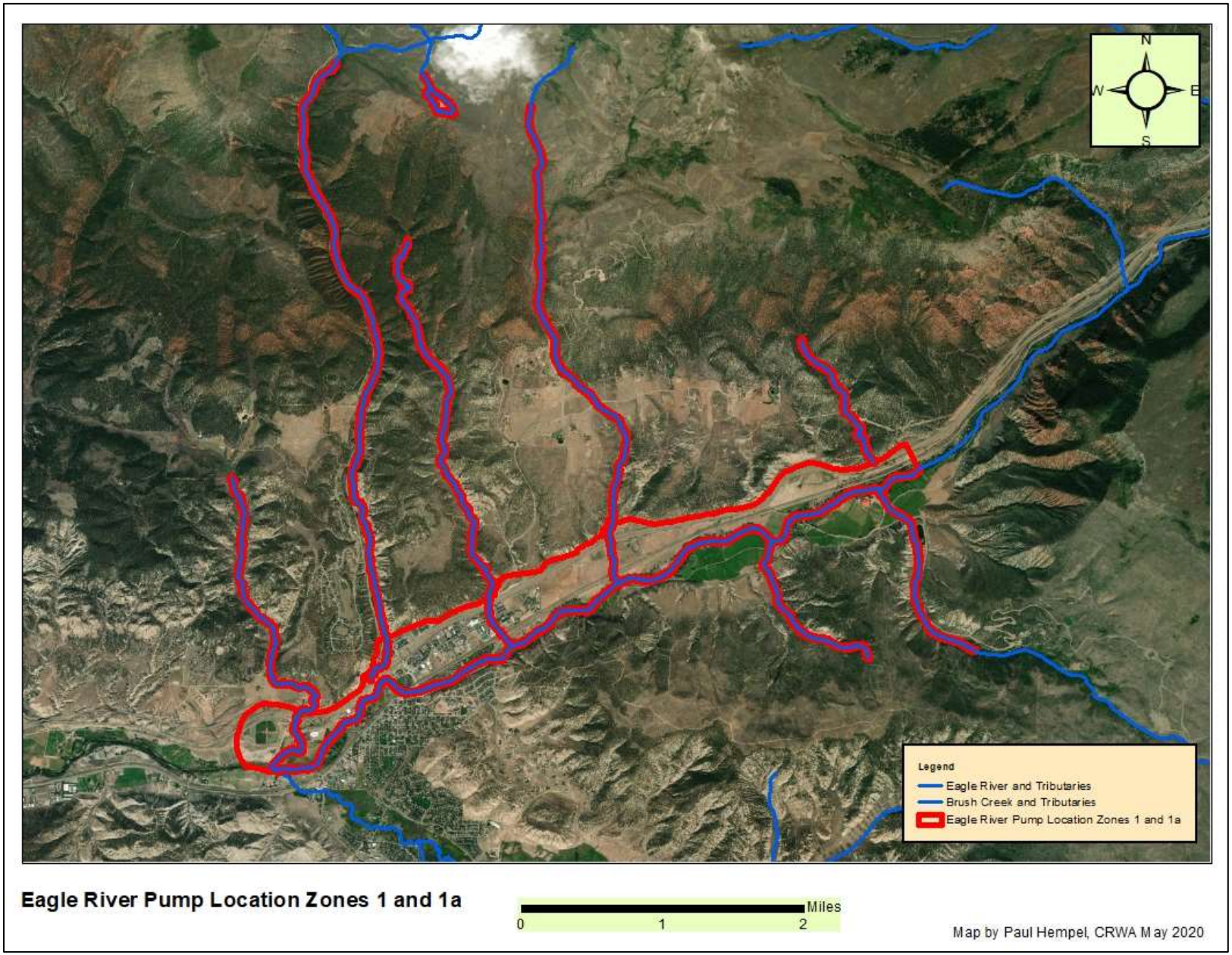

Figure 18a: Eagle River Pump Location Zones 1 and 1a *Source: CRWA*

Figure Not included in Public Version of Document

Figure 18b: Eagle River Pump Location Zones 1 and 1a *Source: CRWA*

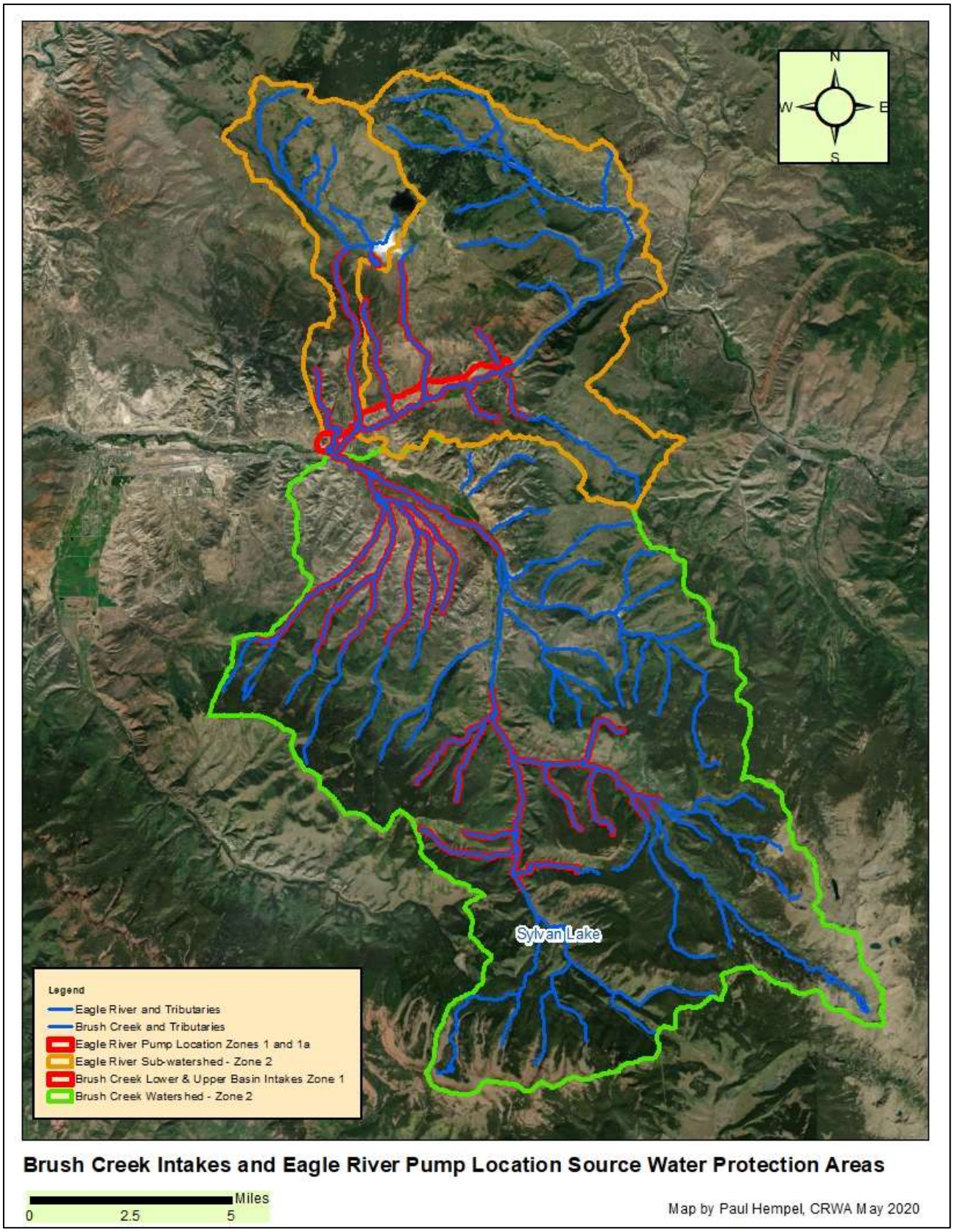

Figure 19: Brush Creek Intakes and Eagle River Pump Location Source Water Protection Areas
Source: CRWA

Inventory of Potential Contaminant Sources and Other Issues of Concern

In 2001–2002, as part of the Source Water Assessment Report, a contaminant source inventory was conducted by the CDPHE to identify selected potential sources of contamination that might be present within the SWAA. Discrete and dispersed contaminant sources were inventoried using selected state and federal regulatory databases, land use / land cover and transportation maps of Colorado. The contaminant inventory was completed by mapping the potential contaminant sources with the aid of a Geographic Information System (GIS).

Town of Eagle was asked by CDPHE to review the inventory information, field-verify selected information about existing and new contaminant sources and provide feedback regarding the accuracy of the inventory. Through this SWPP, Town of Eagle is reporting its findings to the CDPHE.

After much consideration, discussion, and input from local stakeholders, Town of Eagle and the Steering Committee have developed a more accurate and current inventory of contaminant sources located within the SWPA and other issues of concern that may impact Town of Eagle's drinking water sources.[1] In addition to the discrete and dispersed contaminant sources identified in the contaminant source inventory, the Steering Committee has also identified other issues of concern that may impact Town of Eagle's drinking water sources (see Table 4: Potential Sources of Contamination and Issues of Concern Prioritization Table). Upon completion of this contaminant source inventory, Town of Eagle has decided to adopt it in place of the original contaminant source inventory provided by the CDPHE.

Priority Strategy of Potential Contaminant Sources and Other Issues of Concern

After developing a contaminant source inventory and list of issues of concern that is more accurate, complete, and current, Town of Eagle prioritized each item to guide the implementation of BMPs. The prioritization ranking of each potential contaminant source or other issue of concern factored in the following criteria (as described below): the level of risk, the water system control, and the BMPs associated with each item.

1. **Risk** – The level of risk for each contaminant source is a measure of the water source's potential exposure to contamination. When prioritizing, a water system may assign a higher priority ranking to a potential contaminant source that has a higher risk level than one of lower risk level. Town of Eagle utilized CRWA's *SWAP Risk Assessment Matrix* which calculates the level of risk by estimating the following:

    - **Probability of Impact** – The risk to the source waters increases as the relative probability of damage or loss increases. The probability of impact is determined by evaluating the number of contaminant sources, the migration potential or proximity to the water source, and the historical data. The following descriptions provide a framework to estimate the relative probability that damage or loss would occur within one to ten years:
        - **Certain**: >95% probability of impact
        - **Likely**: >70% to <95% probability of impact
        - **Possible**: >30% to <70% probability of impact
        - **Unlikely**: >5% to <30% probability of impact
        - **Rare**: <5% probability of impact

[1] The information contained in this Plan is limited to that available from public records and the Town of Eagle at the time that the Plan was written. Other potential contaminant sites or threats to the water supply may exist in the Source Water Protection Area that are not identified in this Plan. Furthermore, identification of a site as a "potential contaminant site" should not be interpreted as one that will necessarily cause contamination of the water supply.

- **Impact to the Public Water System** – The risk to the source waters increases as the impact to the water system increases. The impact is determined by evaluating the human health concerns and potential volume of the contaminant source. CDPHE developed information tables to assist with this evaluation (Appendices C - F). The following descriptions provide a framework to estimate the impact to the public water system.
    - **Catastrophic** - irreversible damage to the water source(s). This could include the need for new treatment technologies and/or the replacement of existing water source(s).
    - **Major** - substantial damage to the water source(s). This could include a loss of use for an extended period of time and/or the need for new treatment technologies.
    - **Significant** - moderate damage to the water source(s). This could include a loss of use for an extended period of time and/or the need for increased monitoring and/or maintenance activities.
    - **Minor** - minor damage resulting in minimal, recoverable, or localized efforts. This could include temporarily shutting off an intake or well and/or the issuance of a boil order.
    - **Insignificant** - damage that may be too small or unimportant to be worth consideration but may need to be observed for worsening conditions. This could include the development of administrative procedures to maintain awareness of changing conditions.

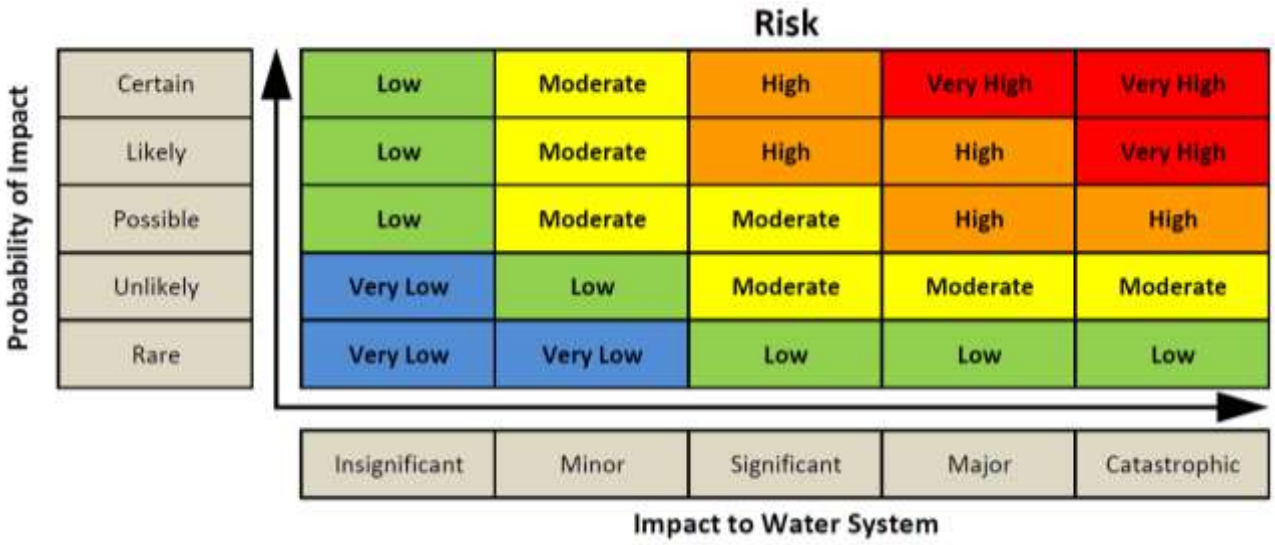

Figure 20: CRWA's SWAP Risk Assessment Matrix

2. **Control** – The level of water system control describes the ability of the water system to take measures to prevent contamination or minimize impact. A potential contaminant source that falls within a water system's jurisdiction (i.e. direct control), may be of higher priority since they can take direct measures to prevent contamination or minimize the impact.
    - **Direct Control** – The water system can take direct measures to prevent.
    - **Indirect Control** – The water system cannot directly control the issue but can work with another person or entity to take measures to prevent.
    - **No Control** – The PSOC or issue of concern is outside the control of the public water system and other entities.

3. **Best Management Practices** – BMPs are the actions that can be taken within the Source Water Protection Area to help reduce the potential risks of contamination to the community's source waters.

The prioritization of the potential contaminant sources or issues of concern may be affected by the feasibility of implementing the BMPs that Town of Eagle developed (Table 6: Source Water Protection Best Management Practices).

Town of Eagle and the Steering Committee ranked the potential contaminant source inventory and issues of concern in the following way:

Table 4: Potential Contaminant Sources and Issues of Concern Prioritization Table

Potential Contaminant Source or Issue of Concern	Proximity (SWPA Zone)	Probability of Impact (Rare, Unlikely, Possible, Likely, Certain)	Impact to Water System (Insignificant, Minor, Significant, Major, Catastrophic)	Risk (Very Low, Low, Intermediate, High, Very High)	Control (Direct, Indirect, No)	Priority Ranking
Upper Basin						
Wildfire	1 & 2	Possible	Major	High	Indirect	1
Transportation/Roads	1 & 2	Possible	Major	High	Indirect	1
Security	1	Possible	Major	High	Direct	1
OWTS	1 & 2	Unlikely	Significant	Moderate	Indirect	2
Flooding	1	Possible	Minor	Moderate	Indirect	1
Backcountry Recreation	1 & 2	Unlikely	Minor	Low	Indirect	3
Riparian Areas and Instream Habitat	1	Unlikely	Minor	Low	Indirect	1
Noxious Weed and ANS Control	1	Unlikely	Minor	Low	Indirect	2
Residential Practices	1 & 2	Rare	Insignificant	Very low	Indirect	2
Agricultural Practices	1 & 2	Rare	Insignificant	Very Low	Indirect	2
Mining	1 & 2	Rare	Minor	Very Low	Indirect	3
Lower Basin						
Residential Practices	1 & 2	Certain	Major	Very High	Indirect	2
Existing Subdivisions	1 & 2	Certain	Significant	High	Direct	1
Future Subdivisions	1 & 2	Likely	Significant	High	Direct	1
Mobile Home Park	1 & 2	Certain	Significant	High	Indirect	2
Noxious Weed and ANS Control	1	Likely	Significant	High	Indirect	2
Wildfire	1 & 2	Possible	Minor	High	Indirect	1
OWTS	1 & 2	Possible	Significant	Moderate	Indirect	2
Transportation/Roads	1 & 2	Possible	Significant	Moderate	Indirect	1
Agricultural Practices	1 & 2	Possible	Significant	Moderate	Indirect	2
Riparian Areas and Instream Habitat	1	Possible	Significant	Moderate	Indirect	1
Golf Courses	1 & 2	Possible	Significant	Moderate	Indirect	2

Flooding	1	Possible	Minor	Moderate	Indirect	1
Security	1	Unlikely	Major	Moderate	Direct	1
Former Salvage Yard	1	Unlikely	Minor	Low	Indirect	3
Mining	2	Unlikely	Minor	Low	Indirect	3
Airport	2	Unlikely	Minor	Low	Indirect	3
Train Derailment	1 & 2	Rare	Insignificant	Very Low	Indirect	3
Eagle River Corridor						
Transportation/Roads	1 & 2	Likely	Major	High	Indirect	1
Stormwater Runoff	1 & 2	Likely	Major	High	Direct	1
Residential Practices	1 & 2	Likely	Major	High	Indirect	2
Riparian Areas and Instream Habitat	1	Possible	Significant	Moderate	Indirect	1
Agricultural Practices	1 & 2	Unlikely	Significant	Moderate	Indirect	2
OWTS	1 & 2	Unlikely	Significant	Moderate	Indirect	2
Future Development	2	Possible	Significant	Moderate	Direct	1

DISCUSSION OF POTENTIAL CONTAMINANT SOURCES AND ISSUES OF CONCERN

The following section provides a brief description of potential contaminant sources and issues of concern that have been identified in this plan, describes the way in which they threaten the water source(s) and outlines best management practices.

1. Wildfire

Most of Colorado's wildfires are caused by people. Lightning strikes from the many thunderstorms that pass through the state on a regular basis during the summer months are also a contributor. Lightning strikes sometimes create hotspots which can spread into full-fledged fires under the right conditions.

Much of the attention paid to wildfire and its impacts on the hydrologic cycle focuses on increased danger from flooding and mudslides during the immediate post-fire period. While threats to human health and safety posed by floods, debris flows, and mudslides certainly cause the greatest concern, water quality impacts and their associated risks are nonetheless critical for water utilities and regulatory agencies to address. The potential of a watershed to deliver sediments to surface waters after a wildfire depends on forest and soil conditions, the physical condition of the watersheds, and the sequence and magnitude of rain fall on the burned area. In cases of a high-severity fire, normal runoff and erosion processes can be dramatically altered and magnified.

Large post-fire sediment fluxes impact drinking water systems two ways. First and perhaps foremost is the danger that reservoirs, infiltration basins, and treatment works will be filled, damaged, or otherwise disrupted by sediment. Second, high sediment load is likely to increase pre-treatment processing needs (and costs) for suspended sediment removal. These impacts are highest in areas immediately adjacent to fires (Meixner and Wohlgmuth).

In terms of aquatic habitat, large quantities of post-fire sediment can overwhelm the biological habitat available for aquatic organisms such as fish, as well as organisms that depend on water for some life stage, such as amphibians and insects.

The chemicals used in fire retardants can also be a source of contamination should they migrate through runoff into drinking water supplies. The degree of contamination is controlled by the size of the burned area, distance to surface water, remaining vegetation cover, terrain, soil erosion potential, and subsequent precipitation and intensity (Walsh Environmental, 2012).

Wildfires are an annual occurrence throughout Eagle County. It is not a matter of if, but when, the next fire will impact the community. While many fire effects are beneficial and, often, necessary for natural ecosystem health, some wildfires have the potential to catastrophically impact mountain communities.

Eagle County adopted wildfire regulations in January 2003 to provide standards to reduce or minimize impacts of wildfire hazards on properties, the occupants of properties and the occupants of adjacent properties, as well as to facilitate access to buildings by firefighters in the event of a wildfire. These regulations apply to all new development, new construction, and all additions to existing construction. The county also adopted a Community Wildfire Protection Plan (CWPP) in 2005, and a comprehensive revision in 2011. The purpose of the plan is to unite agencies having jurisdiction in Eagle County, including the towns of Vail, Avon, Basalt, Eagle, Gypsum, Minturn, Red Cliff, and the county's five fire

protection districts under a single plan. Since its creation in 2005, the CWPP has been the guiding document behind many wildfire mitigation efforts in Eagle County.

Eagle County facilitates an informal wildfire council. The group meets regularly to review aspects of assessing current wildfire risk and mitigation strategies; funding opportunities to complement private and public land projects; CWPP updates and associated projects; as well as interagency training opportunities. The council consists of agency representatives and stakeholders from throughout Eagle County, including: the USFS/BLM; the Colorado State Forest Service; Eagle County OEM; Basalt FPD; Gypsum FPD; Greater Eagle FPD; Eagle River FPD; Vail Fire and Emergency Services; Rock Creek Volunteer Fire Department; Vail Resorts; Cordillera Metro District; Eagle-Vail Metro District; Eagle River Water and Sanitation District; the Bellyache Ridge HOA, the Colorow HOA, the Pilgrim Downs HOA, the West Lake Creek Company, the Eagle County Watershed Council, the Beaver Creek Resort Company and Beaver Creek Public Safety (Eagle County).

Eagle County Wildfire Hazard Map

The designation of wildfire hazard is an attempt to quantify the severity of negative wildfire outcomes on values at risk within a given community. In 2014, a highly detailed and customized wildfire hazard model was created for Eagle County. Known as the National Hazard and Risk Model (or No-HARM), this state-of-the-art GIS based wildfire hazard model offers citizens, developers, local fire districts, and other stakeholders the most accurate information available to define wildfire threats in Eagle County.

No-HARM utilizes advanced fire behavior modelling coupled with local information about fuels, weather and topography to generate predictions of fire risk and hazard on a landscape scale. Factors such as parcel density, road system complexity, distance to fire stations, and other anthropogenic elements are also incorporated into wildfire hazard ratings. In addition, No-HARM evaluates areas that are susceptible to embers and smoke, in combination with traditional flame exposure. Modeling is used as a tool for implementing wildfire regulations, and to help identify priority areas for wildfire mitigation projects.

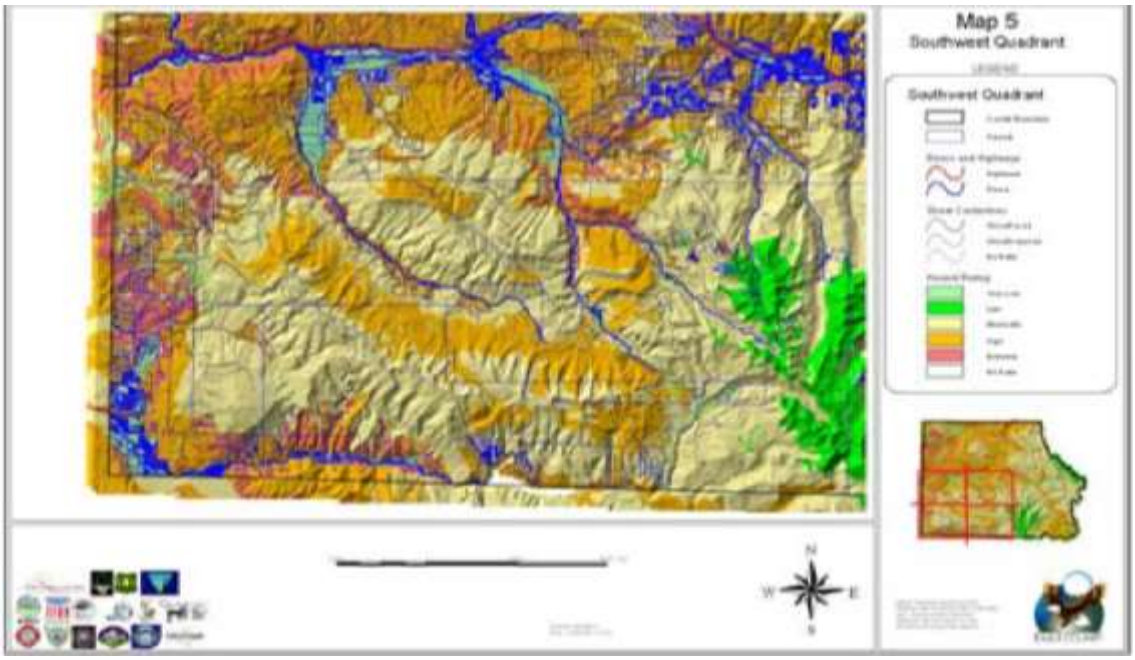

Figure 21: Eagle County Wildfire Hazard Map, Southwest Quadrant *Source: Eagle County CWPP*

Throughout the western United States, communities are entering the era of mega fires where wildfires are now longer in duration with increased temperatures. There is an increasing number of high elevation fires in beetle kill areas and most of the fires in the region are on the land surface and in tree crowns, where a fire torches the crowns of trees or a group of trees, ignited by the passing front of the fire. Alternately, diverse forests in watersheds that contain aspen & cottonwood are more likely to bounce back from catastrophic fires.

Wildfire managers believe that while fire is a recognized threat to the Town of Eagle's water system, it would have to be a high severity fire to see damaging and detrimental impacts to the Town's water infrastructure. In the upper Brush Creek basin, a thick understory along with the proliferation of Cheatgrass (*Bromus tectorum*) and other surface woody debris contributes to a massive amount of fuels in the Brush Creek watershed. In the Frost Creek drainage along Hardscrabble Road beetle kill and Lodgepole Pine are abundant and a fire there could migrate into the drainages. Post fire impacts in these areas would contribute sediment and debris while firefighting efforts, especially those that require aerial retardant, could persist for the long term.

Fortunately, local fire management agencies including Greater Eagle FPD, Eagle County and White River National Forest, have taken proactive approaches when it comes to managing wildfire risk in their jurisdiction including conducting annual controlled burns and the creation of defensible space around most of the Towns water infrastructure. Sylvan Lake would also act as a natural post-fire deterrent or buffer in protecting the upper West Brush Creek basin intake because the lake, along with beaver ponds and wetlands, would capture debris and potentially slow the movement of flow.

With that being said, the Town believes that some pre-wildfire mitigation could be beneficial. Things to consider when planning mitigation include an understanding of what and where to clear to provide the most effective protection by slowing the spread, intensity and duration of a fire. These practices are accomplished by reducing fuels and protecting soils that can become impermeable as a result of fire.

<u>Wildfire Best Management Practices:</u>

1. Provide a copy of the final Source Water Protection Plan to local Fire Protection Districts, USFS, CSFS, BLM and any other agencies/departments involved in wildfire and land management decision making during the planning of pre-and post-wildfire mitigation strategies.
    - Encourage Agencies to overlay the SWPA's on the Wildfire Susceptibility Analysis maps to identify high-risk areas and to determine recommended action items.
        - ✓ Follow-up with agencies via email and/or phone to encourage them to do so
2. Convene Federal, State, County and local wildfire managers to:
    - Identify wildfire hazards and values at-risk within the watershed (e.g. intake facilities, pump stations, other infrastructure)
    - Determine post-fire hazards and impacts to water quality and values at-risk
    - Develop BMP's to mitigate pre-fire and post-fire hazards
3. Conduct forest/fuel treatments near infrastructure and other strategic locations.
    - Assess lands within the Brush Creek and Eagle River Watersheds for wildlfire priority area designation and identify opportunities for fuel treatment that have not been identified or conducted.
4. Work with local fire managers to create an emergency response protocol for wildfire events.
    - Schedule a series of meetings to do so
5. Encourage local FPDs and Eagle County to continue to implement their fire prevention plan which

includes public education programs like Fire Wise and Project Learning Tree.
- Collaborate with these entities in organizing and participating in two programs per year

6. Consider utilizing the Wildfire Decision Support System (WFDSS) for pre- wildfire planning.
   - Work with CRWA in coordinating WFDSS data acquisition
7. Upgrade the upper basin intake to better protect it during post-wildfire debris flow events.
   - This may include the installation of jersey barriers or rock structures to divert debris flows
8. Conduct structure protection at the Fulford site.
   - Evaluate the current condition of these structures in regard to existing fireproof materials
   - Fortify the buildings with fireproof roofs, sidings, windows and doors
9. Continue practice of prescribed burns or mechanical treatment in identified drainages.
10. Provide residents in the watershed with outreach material that highlights fire management and safety including creating defensible space around their homes.
    - Provide material for review on the Town of Eagle website
    - Have hard copy materials available at Town Hall and at Town sponsored events

2. Transportation and Roads

Motor vehicles, roads and parking facilities are a major source of water pollution to both surface and groundwater. An estimated 46% of vehicles in the United States of America leak hazardous fluids, including crankcase oil, transmission, hydraulic, and brake fluid, and antifreeze, as indicated by oil spots on roads and parking lots, and rainbow sheens of oil in puddles and roadside drainage ditches. An estimated 30-40% of the 1.4 billion gallons of lubricating oils used in automobiles are either burned in the engine or lost in drips and leaks, and another 180 million gallons are disposed of improperly onto the ground or into sewers. Runoff from roads and parking lots has a high concentration of toxic metals, suspended solids, and hydrocarbons, which originate largely from automobiles (Gowler and Sage, 2006). Storm water runoff over these roads can deliver contaminants from the road surface into the nearby groundwater or streams.

Vehicular spills may occur along the transportation route within the SWPA's from trucks that transport fuels, waste, and other chemicals that have a potential for contaminating the groundwater or streams. Chemicals from accidental spills are often diluted with water, potentially washing the chemicals into the soil and infiltrating into the groundwater or streams. Roadways are also frequently used for illegal dumping of hazardous or other potentially harmful wastes.

Outside of visitors to Sylvan Lake State Park (SP) there isn't a lot of heavy transportation in the upper watershed. Brush Creek Road traverses and crosses Brush Creek at several locations but most of the bridge crossings, including those leading to private property, are fortified with guardrails. If there was one area that might need to be investigated, it would be at the curve in the road where the former water tank was located. A vehicle spill or accident along this road has the potential to migrate through the soils into Brush Creek and into the treatment system but Town of Eagle could still supply water to its customers for up to 24 hours before impacts would cause a disruption in service.

Figure 22: Guardrail on Brush Creek Road

Figure 23: Guardrail at a Brush Creek crossing

Transportation Best Management Practices:

1. Investigate the existence of an Emergency Call Down System (ECDS) for Brush Creek and Eagle River. If there is not an ECDS, then develop an ECDS.
    - Contact Eagle County OEM and CDOT to find out if an ECDS exists and if not schedule meetings with them to begin the process of creating one
2. Provide copies of the SWPP and Emergency Response Notification Cards to the Colorado Department of Transportation and the Eagle County Offices of Emergency Management and Road and Bridge.
3. Utilize a spill time calculator to measure how long pollutants will take to travel to the intake.
4. Stay informed on road maintenance practices and schedules within the SWPA including: grading, the application of magnesium chloride and dust abatement activities along with the best management practices utilized during these activities.

- Meet with Eagle County Road and Bridge to discuss and evaluate their standard operating procedures

5. Post Source Water Protection signage (7).
6. Educate the public on how to report spills or dumping in the SWPA on both public and private lands.
   - Provide material for review on the Town of Eagle website
   - Have hard copy materials available at Town Hall and at Town sponsored events
7. Tour the upper watershed with the USFS, BLM, Sylvan Lake SP, Eagle County and Eagle River Watershed Council (ERWC) to assess and list high priority areas for potential road and trail maintenance and improvement activities.

3. Security

A fairly small number of large drinking water and wastewater utilities located primarily in urban areas (about 15% of the systems) provide water services to more than 75% of the U.S. population. Arguably, these systems represent the greatest targets of opportunity for terrorist attacks, while the larger number of small systems that each serve fewer than 10,000 persons are less likely to be perceived as key targets by terrorists who might seek to disrupt water infrastructure systems.

Attacks resulting in physical destruction to any of these systems could include disruption of operating or distribution system components, power or telecommunications systems, electronic control systems, and actual damage to reservoirs and pumping stations. A loss of flow and pressure would cause problems for customers and would hinder firefighting efforts. Further, destruction of a large dam could result in catastrophic flooding and loss of life. Bioterrorism or chemical attacks could deliver widespread contamination with small amounts of microbiological agents or toxic chemicals and could endanger the public health of thousands. While some experts believe that risks to water systems actually are small, because it would be difficult to introduce sufficient quantities of agents to cause widespread harm, concern and heightened awareness of potential problems are apparent. Factors that are relevant to a biological agent's potential as a weapon include its stability in a drinking water system, virulence in the quantity required, and resistance to detection and treatment. Cyber-attacks on computer operations can affect an entire infrastructure network and hacking in water utility systems could result in theft or corruption of information, or denial and disruption of service (Congressional Research Service).

Overall, security at town water facilities including offices, intakes, and water treatment is getting better. Currently, Town offices are locked and/or fenced. Additional security measures are being investigated and installed, including fencing at town water facilities.

<u>Security Best Management Practices:</u>

1. Investigate the existence of an Emergency Call Down System (ECDS) for Brush Creek and the Eagle River. If there is not an ECDS, then develop an ECDS with local partners.
   - Contact Eagle County OEM and CDOT to find out if an ECDS exists and if not schedule meetings with them to begin the process
2. Install fencing and other security measures to safeguard water facility infrastructure.
3. Do not advertise specific water infrastructure locations.

4. Existing and Future Subdivisions

Protecting drinking water sources through better land use management requires strong collaboration among state agencies and between all levels of government and concerned stakeholders. Collaboration

maximizes the effectiveness of initiatives led by land use planners, water utilities, watershed associations, government officials, conservationists, farmers and foresters (Trust for Public Lands, 2008).

As populations increase and land uses change, effective land use planning and watershed management to protect water resources is imperative. Effective watershed management includes developing a watershed management plan as well as implementing the recommendations within the plan. The plan recommendations should include a variety of measures – ranging from changes to local zoning, development regulations and programs, to installation of best management practices at specific priority locations – to protect sensitive watershed resources and restore resources that have already been degraded by agriculture or urbanization. Highly urban watersheds with little remaining undeveloped land will likely focus more on restoration versus a rural watershed with many sensitive pristine areas, but most watershed plans include a combination of both protection and restoration measures. Although protecting natural resources from degradation is generally more successful and cost-effective than trying to restore them after the fact, unfortunately, efforts to protect watersheds are frequently only begun after significant impacts have already occurred. (Center for Watershed Planning, 2015)

Beginning at the headwaters both East and West Brush Creek travel approximately 10.5 and 9.5 miles respectively before their confluence just upstream from the Sylvan Lake SP headquarters. From there moving downstream and through the mouth of the canyon there exists approximately six residential lots, the Frost Creek Golf Course and the Town's water treatment plant and water tank. It is in this stretch where both Salt and Bruce Creeks confluence with Brush Creek.

Heading downstream for the next 1.5-mile stretch, Brush Creek is bordered to the south by Eagle Ranch Golf Course. Single family homes are situated between the golf course and the creek. The east side of the creek is also bordered by single family homes with Brush Creek Road being the main thoroughfare. The Haymeadow development east of Brush Creek Road started construction in 2019 bringing with it roads, cars, houses and people.

Figure 24: Upper Basin Water Treatment Plant, Storage Tank and southern edge of Frost Creek Golf Club
Source: CRWA

Further downstream for approximately 1.5 miles and adjacent to the east side of the creek, there is considerable open space and preserved wetland habitat. On the west of Brush Creek along that stretch lies the Eagle Ranch development. Eagle Ranch consists of mixed use residential and commercial with a small downtown area.

Figure25: Residential property along Brush Creek and Eagle Ranch Development
Source: CRWA

The Towns downtown core is situated to the northeast of Brush Creek. Just upstream from the confluence lies the Green Acres Mobile Home Park. Minimum setbacks are in place for structures there, but improvements could be made to the riparian area. Also, a new development, Eagle Landing, is going in on the north side of the creek and the Hockett Gulch development is slated to be built to the south of Green Acres MHP. Within the SWPAs, Red Mountain Ranch subdivision is currently going through the town's annexation and development process located on the north side of the Eagle River and south of Highway 6, and Eagle River Station is earmarked for development on the north side of Highway 6 and south of Interstate 70 which is close to the Eagle River.

Figure 26: Lower Basin Intake and wetland open space *Source: CRWA*

Both the Town of Eagle and Eagle County have done a good job in planning for growth in the Brush Creek watershed. Measures include planning for the increased traffic, land use changes and stormwater management programs. For example, the Town can have site inspectors certified in Erosion and Sediment Control review and inspection and/or permanent BMP Design Review and Inspection through the Colorado Stormwater Center. This helps reduce potential sediment loading to the system. Additionally, both the Frost Creek and Eagle Ranch Golf Course subdivisions conduct water quality testing and the Eagle Ranch subdivision conducts irrigation workshops.

<u>Existing and Future Subdivisions Best Management Practices:</u>

Existing Subdivisions:

1. Ensure that riparian areas are protected by maintaining minimum stream setbacks.
2. Identify, map and develop cost estimates for recommended stormwater control projects and evaluate each projects' anticipated effectiveness and feasibility.
3. Communicate with Eagle County Road and Bridge in order to prevent snow removal from being piled up adjacent to Brush Creek and the Eagle River.
    - Schedule a meeting with them to do so
4. Assess urban drainage impact risk and recommend site specific projects.
5. Provide educational material to construction companies and landscapers on how to utilize BMPs to prevent storm water runoff from entering the source waters.
    - Post material on Town's website
    - Develop a mailing list and send hard copy material via mail
6. Conduct education to restaurants highlighting waste disposal best management practices.
    - Post material on Town's website
    - Develop a mailing list and send hard copy material via mail
7. Partner with ERWC to conduct storm drain stenciling.

Future Subdivisions:

1. Ensure that riparian areas are protected during buildout by adhering to stormwater runoff controls and the creation of minimum stream setbacks.
2. Update the Town Municipal Code for adequate setbacks and up to date stormwater regulations for protection of the Brush Creek and Eagle River corridors.
3. Provide real estate and construction companies with educational material that highlights best management practices at construction sites including the following of stringent stormwater BMPs during build out.
    - Coordinate meetings with area Real Estate Companies to outline objectives
    - Identify outreach material and provide it to them in both hard copy and electronic formats
4. Provide training and certification opportunities to site inspectors and other Town staff for temporary and permanent stormwater control measure design, installation and maintenance to limit sediment and/or nutrient impacts to Brush Creek.
5. Encourage Eagle County Community Development and Town of Eagle Community Development to utilize the SWPA GIS data when making future land use decisions or changes to zoning laws.
    - Provide Community Development departments with copies of the SWPP and GIS Shapefiles
6. Provide real estate companies with education and outreach material that they can distribute to new home buyers that highlights homeowner best management practices.
    - Coordinate meetings with area Real Estate Companies to outline objectives
    - Identify outreach material and provide it to them in both hard copy and electronic formats

5. Residential Practices

It's a fact of modern life - many of our activities have altered the natural cycles of water movement and purification that give us clean water. And while our individual homes may contribute only small amounts of pollutants, they add up to bigger problems down- stream.

The watershed in which you live probably consists of houses, businesses and undeveloped land. The water from this area drains to a creek or river. As cities develop and streets are paved, the loss of natural vegetation results in much more rapid water runoff. This runoff carries contaminants to our lakes and streams. Cleaning up this polluted water is difficult and can cost taxpayers a lot of money. Keeping our water clean in the first place is much easier and cheaper.

The typical home contains an amazing assortment of cleaning products, paints, solvents, oils, fertilizers and pest control products. If used according to their labels, they can make our lives easier. But many of these products fall within the Environmental Protection Agency's definition of hazardous substances because they can catch fire, explode, corrode or because they are toxic. No matter how beneficial these products are, improper disposal of them can cause serious environmental problems.

A garage, driveway or sidewalk also can be a conduit for water pollution. Anything that drips from your car - oil, gas, antifreeze — can wash off concrete or asphalt into storm drains and end up in our streams and reservoirs. Pet wastes, de-icing salts, pet flea shampoos, water softener chemicals, even car washing detergents can be harmful to aquatic life (CSU Extension, 2002).

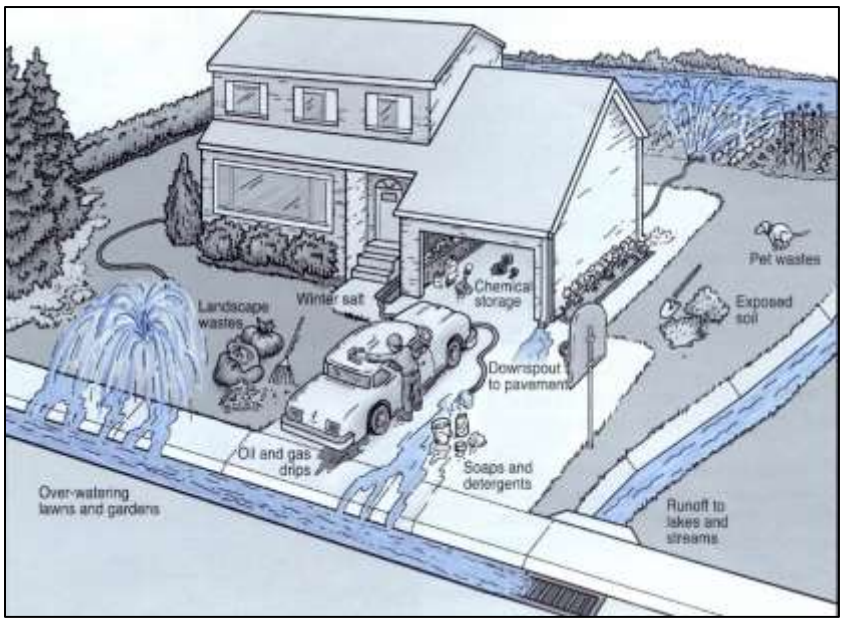

Figure 27: Residential Practices *Source: CSU Extension*

Overall, the greater Eagle community appears to be environmentally aware and knowledgeable about protecting the Towns drinking water. The steering committee did believe, however, that an additional layer of messaging was needed to help drive home the point of source water protection especially because of the potential impacts to the new water treatment plant from upstream residential practices.

Residential Practices Best Management Practices:

1. Conduct education and outreach to property owners.
    - Post educational material on the Towns website/social media and distribute in utility bills
    - Continue participation in the Keep It Clean West Slope Partnership
    - Encourage voluntary measures to protect the riparian corridor
    - Integrate messaging into local Adventure Maps
2. Conduct a household hazardous waste clean-up event during the Town Clean-up day.
3. Continue to support the Eagle County prescription drug take back program.
4. Partner with entities to organize a community-wide, Brush Creek celebration and educational event.
    - Schedule a series of meetings to do so
    - Combine celebration with ERWC river clean-up
    - Conduct homeowner best management practices education at event
5. Partner with ERWC and other entities in educating local students about source water protection and the importance of protecting their drinking water.
    - Explore the opportunity to produce a Children's Water Festival
    - Accompany ERWC when they provide educational opportunities at elementary and high schools
6. Utilize the Towns "extraterritorial water service agreement" with property owners to help promote sustainable residential practice ideas for riparian area protection, OWTS maintenance, etc.
7. Submit articles to the "Vail Daily" and "Enterprise" newspapers promoting source water protection.
    - Request to create an article highlighting the Town's SWPP
    - Submit monthly articles highlighting specific source water protection planning activities for homeowners and businesses
8. Have educational materials available at Sylvan Lake State Park and at USFS kiosks.
    - Schedule a meeting to do so
9. Work directly with the property owner of Green Acres MHP to enact BMPs that might include:
    - riparian area enhancement
    - installation of a fence along the back-property line
    - education to residents about the proper amounts and timing of fertilizer application and disposal of hazardous waste
    - parking restrictions within a to be identified stream setback
    - removal of the road within the stream setback

6. Onsite Wastewater Treatment Systems

Onsite Wastewater Treatment Systems (OWTS) are the second most frequently cited source of groundwater contamination in our country. Unapproved, aging, and failing OWTS have a large impact on the quality and safety of the water supply. The failure to pump solids that accumulate in the septic tank will also eventually clog the lines and cause untreated wastewater to back up into the home, to surface on the ground, or to seep into groundwater. If managed improperly, OWTS can contribute excessive nutrients, bacteria, pathogenic organisms, and chemicals to the groundwater. If the storage tank overflows or the leach fields become saturated, runoff to surface waters can also result (Amick and Burgess, 2000).

Properly installed and maintained systems can be a viable method of sewage waste treatment and disposal. Waste materials flow into the septic tank where heavier solids settle out and fatty substances rise to the surface. Bacteria slowly digest the waste and then convert it into simple chemical compounds. Sludge and scum are retained in the septic tank as effluent flows out and into the leach field. Digestion of organic pollutants by bacteria continues in the leach field, where in the presence of oxygen, protozoa

prey on the bacteria and keep the soil pores open. With the soil pores open, the effluent filters down through the unsaturated soil with the removal of bacteria occurring in the first few feet.

Given the applicability of the Colorado Water Quality Control Commission (CWQCC) standards and pollutants typically associated with septic tank/leach field effluent, the primary pollutant of regulatory concern expected to be associated with septic tank/leach field effluent is nitrate. Nitrate was selected as the limiting pollutant from the regulatory perspective for several reasons including: (1) pollutants associated with septic tank/leach field contamination are commonly known to be nitrate and viral/bacterial contaminants (Canter and Knox 1985); (2) nitrate is known to be highly mobile in subsurface environments, while viral/bacterial contaminants are more easily adsorbed onto soils (particularly clayey soils, such as those at the site) (Canter and Knox 1985); (3) the regulatory limit for nitrate is low relative to typical nitrate loadings in septic system effluent; and (4) nitrate concentrations are quite low in undeveloped and uncontaminated stream systems.

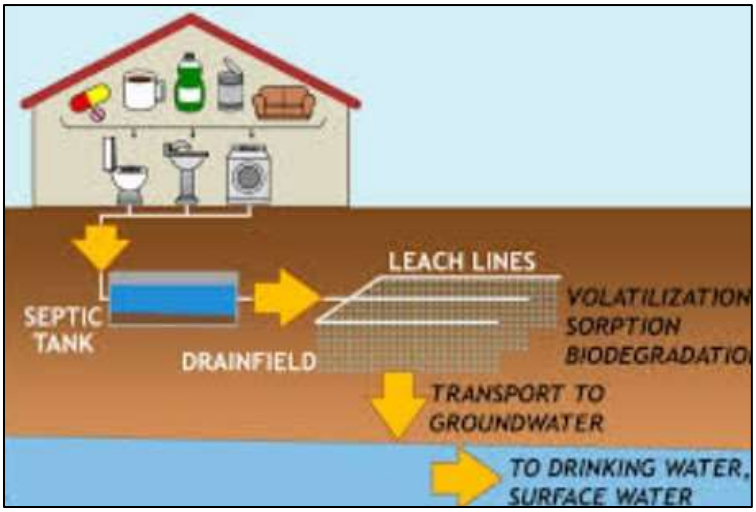

Figure 28: OWTS contaminant pathway to drinking water Source: Silent Spring Institute

The CWQCC interim narrative standards for nitrate correspond to the maximum contaminant levels (MCLs) under the primary drinking water regulations established by the Safe Drinking Water Act the Colorado Public Drinking Water Act and the CWQCC stream water quality standards. The CWQCC interim narrative basic groundwater standard for nitrate is 10 milligrams per liter including for drinking water supplies (Wright Water Engineers, 1996).

In Eagle County, OWTS are permitted by the Environmental Health Department. The County administers and enforces the minimum standards, rules, and regulations outlined in the state of Colorado's Revised Statutes CRS 25-10-103 (12), the CWQQCs Regulation 43 and the Eagle County Public Health Agency OWTS Regulations.

Section 43.2 of the regulations states that "In order to preserve the environment and protect the public health and water quality; to eliminate and control causes of disease, infection, and aerosol contamination; and to reduce and control the pollution of the air, land and water, it is declared to be in the public interest to establish minimum standards and regulations for OWTS in Eagle County and to provide the authority for the administration and enforcement of such minimum standards and regulations."

The purpose of the regulation is to establish minimum standards for the location, design, construction, performance, installation, alteration and use of OWTS with a capacity less than or equal to 2,000 gallons per day within Eagle County, and establish the minimum requirements for regulations adopted by Board of Health including but not limited to permit application requirements; requirements for issuing permits; the inspection, testing, and supervision of installed systems; the maintenance and cleaning of systems; the disposal of waste material and the issuance of cease and desist orders.

Under the regulations any system that will discharge into surface waters must be designed by a professional engineer. The discharge permit application must be submitted for preliminary approval to the Board of Health. Once approved by the Board of Health, the application must be submitted to the Colorado Water Quality Control Division for review and final approval.

The regulation also establishes minimum distances between components of an OWTS and physical features. Horizontal distances from the various components of a system to pertinent terrain features, including streams, lakes, water courses, springs, wetlands, wells, subsurface drains, cisterns, water lines, suction lines, dry gulches, cut banks, dwellings, other occupied buildings and property lines, must be in accordance with setback requirements.

The setback requirements are applicable for minimum system performance and treatment levels with specific modifications allowed for higher levels of treatment. Acceptable methods of analyzing horizontal separation distances with higher treatment levels include but are not limited to analyzing the intended uses of impacted surface and/or ground waters (Eagle County Public Health Agency).

Eagle County setback requirements are reflected in Table 5, below. The full Eagle County Public Health Agency OWTS Regulations can be found in Appendix G.

Table 5: Minimal horizontal distances in feet between components of an OWTS installed after November 15, 1973 and water, physical and health impact features Source: Eagle County

	Spring, Well,[1] Suction Line, Potable Water Supply Cistern[4]	Potable Water Supply Line [2]	Structure w/basement, crawl space or footing drains	Structure without basement, crawl space or footing drains	Property Lines, Piped or Lined Irrigation Ditch, upslope curtain drain	Subsurface Drain, Intermittent Irrigation Lateral, Drywell, Stormwater Structure	Lake, Water Course, Irrigation Ditch, Stream, Wetland	Dry Gulch, Cut Bank, Fill Area (from Crest)	Septic Tank, Higher level treatment Unit, Dosing Tank, Vault or Privy
Septic Tank, Higher Level Treatment Unit, Dosing Tank, Vault or Vault Privy	50 [2]	10 [2]	5	5	10	10	50	10	--
Building Sewer or Effluent Lines	50 [2]	5 [6]	0	0	10 [2]	10 [2]	50 [2]	10 [2]	--
STA Trench, STA Bed, Unlined Sand Filter, Sub-surface Dispersal System, Seepage Pit	100 [3]	25 [2]	20	10	10	25	50 [3]	25	5
Lined Sand Filter	60	10 [2]	15	10	10	10	25	10	5
Lined Evapo-transpiration Field or Outside of Berm of Lined Wastewater Pond	60	10 [2]	15	15	10	10	25	10	5
Unlined Sand Filter in Soil With a	100	25 [2]	15	15	10	25	25	15	10

Eagle County has been very proactive with their OWTS regulations. Although there are unknown or no records for some lots before permitting regulations were in place, the County has required advanced treatment for new and replacement OWTS near sensitive aquatic resources.

There are several properties developed over 25 years ago served by conventional OWTS that accomplish the lowest level of wastewater treatment, and with unknown maintenance frequency. Roughly 20 additional conventional OWTS, several of which are mounded designs, serve other residential properties. Mounded OWTS produce a higher quality effluent compared to conventional OWTS. The subsurface geology of the area consisting primarily of alluvial sands and gravel that groundwater connected with Brush Creek flows through, require mounded OWTS due to the higher water table. A mounded OWTS is a drainfield that is raised above the natural soil surface in a specific sand fill material. Within the sand fill is a gravel-filled bed with a network of small diameter pipes. Septic tank effluent is pumped through the pipes in controlled doses to insure uniform distribution throughout the bed. The effluent leaves the pipes under low pressure through small diameter holes, and trickles downward through the gravel and into the sand. Treatment of the effluent occurs as it moves through the sand and into the natural soil (Humboldt County Department of Human Services).

Extending along the Eagle River for several miles upstream from the pump location there are several more conventional OWTS installed above the Eagle River alluvial fill. Regular maintenance of OWTS is currently the responsibility of individual homeowners which typically occurs when there is a problem with the OWTS. In order to avoid expensive replacement costs and to protect the environment routine maintenance should be formalized.

The Town's current wastewater system collects and treats wastewater from all the homes and businesses located within Town boundaries. However, wastewater is also collected from a few areas located outside of the Town boundaries such as from Eby Creek Mesa which consists of approximately 200 homes. As of the writing of this document, the Town is researching the possibility of expanding the existing wastewater collection system to serve other areas outside the Town boundaries, thus eliminating OWTS in critical source water areas.

<u>OWTS Best Management Practices:</u>

1. Encourage Eagle County to develop a Transfer of Sale and Use Permit program which could incorporate the improvement of OWTS wastewater quality.
2. Utilize the SWPA as a zoning overlay to require additional protection measures to protect the source water.
3. Utilize the Towns "extraterritorial water service agreement" to improve OWTS maintenance and require treatment level upgrades in the event of needed repair or replacement. Also require wastewater connection within a certain timeframe after wastewater collection system is expanded adjacent to the property.
4. Require feasibility assessments for properties with extraterritorial water service agreements to connect to the Town's wastewater collection system when new homes are proposed or when existing OWTS need repair, alteration or replacement.
5. Encourage a schedule of OWTS inspections every three years or sooner depending upon the systems location to the intakes.
6. Distribute OWTS maintenance outreach material to selected homeowners in the SWPA.
   * This may include the video produced by CRWA that highlights OWTS regulations, installation and maintenance. https://www.epa.gov/septic/more-resources-homeowners-septic-systems
   * This may include the Montana State University CD entitled "Taking Care of Groundwater: A

homeowner's guide to well and septic systems". This video connects septic system failure with the maintenance of private wells. https://www.youtube.com/watch?v=F5rnHSZCYHA

7. Display OWTS maintenance material/video on the Towns website. This may include a link to the above-mentioned videos.
8. Purchase a sludge monitoring device (sludge judge) for shared use by homeowners so they can evaluate the scum levels in their septic tanks.
9. Work with Eagle County to conduct a study/inventory of OWTS in the Brush Creek and Eagle River watersheds to identify potential problem areas and risks.
    - Schedule a meeting to do so
10. Work with Eagle County to conduct a septic system maintenance demonstration for homeowners.
    - Schedule a series of meetings to do so

7. Noxious Weed and Aquatic Nuisance Species Control

Noxious Weeds

Noxious weeds are non-native invasive plants that displace desirable vegetation and degrade natural and agricultural lands. They threaten our drinking water supply, agricultural crops, pasture lands and native habitats.

Noxious weeds are spread by animals, humans, water, and wind. Noxious weeds can easily be introduced as seeds in soil, ornamental planting mixes, nursery stock, or hitch-hike on vehicles. Prime locations for noxious weeds to become established are on disturbed sites such as roadsides, land cleared for construction, range that is overused by animals or humans, wetlands, along riparian corridors and in lakes and streams. Additionally, noxious weeds are displacing native plants at an alarming rate. When the native plants that wildlife uses for food, shelter, or nesting are gone, wildlife will leave the area.

One common noxious weed found in Colorado's lakes and reservoirs is Eurasian watermilfoil *(Myriophyllum spicatum).* Eurasian watermilfoil is an aquatic plant with feathery underwater foliage that is native to Northern Europe and Asia. Eurasian watermilfoil spreads most commonly by stem fragmentation and runners. The plant roots on the water bottom but survives and is spread as free-floating plants waiting to take root. Eurasian watermilfoil also spreads by seeds. Eurasian watermilfoil starts spring growth before other native aquatic plants giving it competitive advantage over other species. The plant forms very dense mats of vegetation on the surface of the water that interferes with power generation and irrigation by clogging water intakes. These mats also interfere with recreational activities (e.g. swimming, fishing, skiing, boating, etc.), create mosquito habitat, and reduce native vegetation.

Since it was discovered in North America in the 1940s, Eurasian watermilfoil has invaded nearly every U.S. state and at least three Canadian provinces. Milfoil spreads when plant pieces break off and float on water currents. It can cross land to new waters by clinging to sailboats, personal watercraft, powerboats, motors, trailers, and fishing gear. Eradicating established infestations is nearly impossible (Sea Grant Minnesota).

Eurasian watermilfoil is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be eradicated; some populations may be contained or suppressed depending on State regulations (Colorado Department of Agriculture).

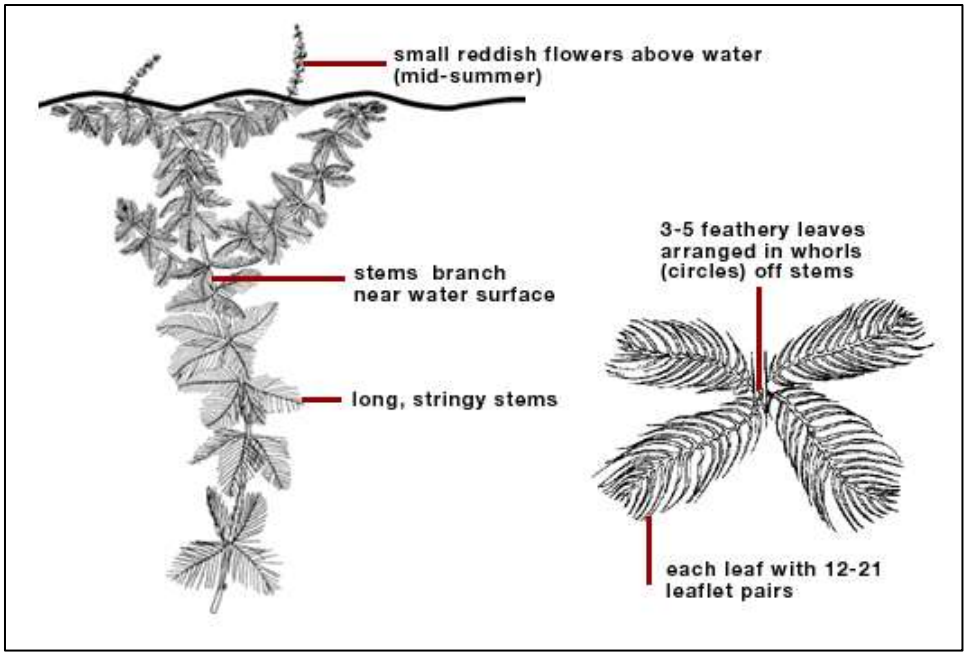

Figure 29: Eurasian watermilfoil *Source: USGS*

Figures 30 and 31: Tamarisk and Russian Olive *Sources: honeybeesweet.com and discoverelife.org*

The Colorado Noxious Weed Act:

Since 1990 the state's natural and agricultural resources have been protected by the Colorado Noxious Weed Act (35-5.5 CRS). More recent revisions to the Act enable county and city governments to implement management programs aimed at noxious weeds in order to reclaim infested acres and protect weed-free land. These changes included prioritizing the State's noxious weed list into three separate lists, A, B and C.

- List A: plants are designated for elimination on all County, State, Federal and private lands.
- List B: includes plants whose continued spread should be stopped.
- List C: plants are selected for recommended control methods.

In fall 2011 the State added a list of plants known to be invasive in areas near Colorado but are not known to occur here or whose distribution is not yet fully understood.

Colorado's Noxious Weed Act (35-5.5 CRS) establishes a noxious weed list with prioritized management goals for the weeds on the A, B and C Lists. Each noxious weed is required to be eradicated, contained or controlled.

Eradication - The elimination of all plant parts within the current growing season. When populations of noxious weeds that are not normally found in Colorado, or are only found in small areas, are discovered, they are required to be eradicated. By eliminating a noxious weed when its population is small, you save time, money, and much effort in the long run.

Control - If a noxious weed is found in substantial numbers in some parts of the state but not others, a "line in the sand" will be drawn to establish management areas. It may be feasible to eradicate small outlier populations however, in areas of higher density; the management goal may be suppression.

Containment - Some weeds are found in such large numbers that it is no longer realistic to think we will be able to rid the entire state of their presence. Instead we will aim to stop their spread.

Management Methods - Noxious weeds can be managed by using a combination of control methods including mechanical, cultural, biological, preventive and chemical. Different species of noxious weeds grow or spread differently so not all methods will be effective on all weeds. Colorado's Noxious Weed Act requires that certain methods of control be used depending on the level of control that is mandated.

- Mechanical control involves cutting, mowing, disking.
- Cultural controls use materials or techniques that reduce noxious weed populations. Examples include mulching, rotational grazing, and establishing good vegetation cover.
- Biological control uses organisms (insects, mites, diseases and grazing animals) which feed only on specific noxious weeds.
- Since we are dealing with living things, a variety of circumstances come into play that impact the success of the establishment of the biocontrol and ultimately the control of the noxious weed you are targeting. For example, an organism that works well in the plains may not work in the mountains. Although there has been some success on some noxious weeds, bio-control agents are not available for all species and are not allowed for use on species designated for eradication.
- Prevention includes planting weed free seed, mulching with weed free material, cleaning machinery before moving between sites and controlling weeds prior to their setting seed.
- Chemical control involves the use of herbicides

Above all, proper noxious weed identification, monitoring and consistent, diverse control methods are the most important steps to reducing or eradicating infestations. Remember, not all techniques will work in all situations. Refer to the Colorado Department of Agriculture for required controls. Consult with your local weed manager or Licensed Commercial/Professional Applicator for specific recommendations (Colorado Weed Management Association).

Aquatic Nuisance Species

The introduction and spread of the invasive Aquatic Nuisance Species (ANS) Zebra mussel (*Dreissena polymorpha*) and Quagga mussel (*Dreissena rostriformis burgensis*) into the waters of Colorado is a concern for drinking water suppliers. The Zebra and Quagga mussels are invasive non-native freshwater bivalve mollusks. They can be differentiated by morphological differences of their shell. The Zebra mussel is more triangular in shape, usually have a striped pattern on their shells and average one inch in

length. The Quagga mussel has a rounded carina, slightly larger than the Zebra mussel and paler toward the hinge.

Both species of mussels were originally native to the lakes of southeast Russia and were accidentally introduced into other countries from ocean-going ships. The mussels were first discovered in the United States in the Great Lakes in 1988 and spread to a large number of waterways throughout the country.

Zebra and Quagga mussels likely made their way to the Western USA on trailered watercraft. The first discovery west of the 100th meridian was in Lake Mead in 2007. Given their ability to attach to hard surfaces and survive out of water for up to 30 days, many infestations have occurred by adult mussels hitching rides on watercraft.

Both species of mussels are prolific breeders, thus contributing to their spread and abundance. A fully mature female mussel is capable of producing up to one million eggs per season. Their larvae are microscopic. These invasive mussels smother other aquatic organisms and compete with native species for food and habitat. Their massive colonies can clog water intake structures, such as pipes and screens, therefore reducing pumping capabilities for power and water treatment plants, costing industries, companies, and communities. Recreation-based industries and activities have also been impacted; docks, breakwalls, buoys, boats, and beaches have all been heavily colonized (USGS, 2009).

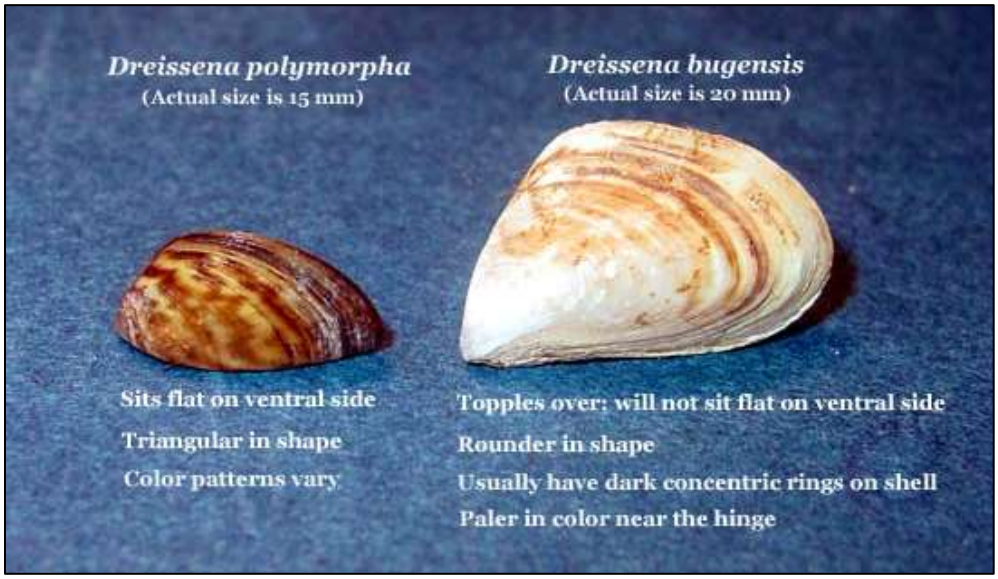

Figure 32: Zebra and Quagga Mussels Source: USGS

At this time, there are no Zebra or Quagga mussels present in any Colorado water bodies. All waters have been de-listed following five years of no detection per Western Regional Panel Standards (Colorado Parks and Wildlife).

There are stretches along Brush Creek where pesticide application to eliminate noxious weeds occurs from both County officials and private property owners. Yet both the Town and County have Noxious Weed Control Plans that among other things identifies control strategies for mitigation including mechanical or chemical treatment. Although the presence of Tamarisk is minimal in the Brush Creek corridor, Cheatgrass is expanding throughout watershed. Additionally, although many of Colorado's

State Parks have had issues with ANS, Sylvan Lake SP, located above the upper basin intake, to date has not identified any problems.

Noxious Weed and Aquatic Nuisance Species Control Best Management Practices:

1. Collaborate with Eagle County, USFS, BLM, ERWC, and Eagle County Conservation District (ECCD) to identify specific noxious weed locations and target them for additional control measures.
    - Schedule a series of meetings to do so
    - Outline steps to accomplish the tasks
2. Encourage all entities to continue to adhere to current regulations and best management practices that address the mitigation of noxious weeds.
3. Conduct educational seminars addressing noxious weed spraying to Town and County personnel, private property owners, golf course managers, etc.
    - Schedule a series of meetings to do so
4. Work with farm stores like WYLACO to distribute educational material to customers when they sell over the counter chemicals.
    - Have a meeting with WYLACO and others
5. Provide Eagle County Vegetation Management and the ECCD a copy of the SWPP.
6. Conduct education and outreach to recreationists who use boats on Sylvan lake.
    - Schedule a meeting with Sylvan Lake SP to discuss appropriate outreach methods
7. Provide area businesses that sell fishing licenses with CPW educational material to display and distribute to customers to inform them about strategies to prevent the spread of ANS.
    - Acquire appropriate outreach material
    - Contact businesses to see if they want to participate
8. Support ANS inspection programs for Sylvan Lake SP.

8. Riparian Areas and Instream Habitat

Riparian-area restoration is the ecological restoration of riparian-zone habitats of streams, rivers, springs, lakes, floodplains, and other hydrologic ecologies. A riparian zone or riparian area is the interface between land and a river or stream. Riparian zones are significant in ecology, environmental management, and civil engineering because of their role in soil conservation, their habitat biodiversity, and the influence they have on fauna and aquatic ecosystems, including grassland, woodland, wetland or sub-surface features such as water tables. In some regions the terms *riparian woodland*, *riparian forest*, *riparian buffer zone,* or *riparian strip* are used to characterize a riparian zone.
The need for Riparian-zone restoration has come about because riparian zones have been degraded throughout much of the world by the activities of mankind affecting natural geologic forces. The unique biodiversity of riparian ecosystems and the importance of riparian zones in preventing erosion, protecting water quality, providing habitat and wildlife corridors, and maintaining the health of in-stream biota (Aquatic organisms) has led to a surge of restoration activities aimed at riparian ecosystems in the last few decades. Restoration efforts are typically guided by an ecological understanding of riparian-zone processes and knowledge of the causes of degradation. They are often interdependent with stream restoration projects (Wikipedia).

There are no signs of extensive riparian area degradation throughout the upper watershed. Although there can be up to 300 head of cattle in the upper watershed during spring on Hardscrabble Road there is little impact to riparian areas from that activity. Cattle are fenced off from Sylvan Lake State Park, turbidity levels are low throughout the Park and organics and bacteria are not difficult to treat at the Towns upper basin treatment plant.

Overall riparian areas are in good shape in the lower watershed as well. Open space land riparian areas have been surveyed by the Eagle River Watershed Council (ERWC) and there is limited fishing access. The County has imposed setback regulations of 75 feet. The Town's Municipal Code setback regulation is currently at 50 feet, but they hope to adopt the 75-foot setback in the near future since this has been town's policy for many years. The Eagle County Fairgrounds on Eagle River show some riparian area degradation and there are a few other areas where enhancement might be beneficial including at the Eagle County Confluence Park.

Riparian Areas and Instream Habitat Best Management Practices:

1. Collaborate with ERWC to engage in a riparian area assessment of Brush Creek.
    - work with USFS, Eagle County and ECCD and livestock users to identify areas for riparian area enhancement.
    - Utilize National Fish and Wildlife Foundation grant funding and/or explore additional funding options.
2. Expand macroinvertebrate and water chemistry testing upstream and downstream of both intakes to identify changes in water quality.
    - conduct specific projects based on those findings to maximize overall aquatic health
3. Assess Brush Creek and Eagle River historic practices (such as irrigation diversions, etc.) to identify projects which will decrease bank erosion and restore proper stream and riparian area function.
    - Research appropriate documents and past restoration work
    - Schedule a meeting with appropriate agencies and landowners to identify specific projects

9. Agriculture/Small Acreage Farming

Agricultural land use has been a historical mainstay in Colorado for over a century. Even though land use changes have occurred over this time period with development of homes and businesses, agriculture will continue to be a presence in local communities and a key part of local heritage. "Right to Farm" laws and the preservation of private property rights are important to the landowners and will be respected when developing and implementing source water protection plans.

Agriculture is a limited use in the Brush Creek watershed. Cattle grazing and haying occurs primarily in the upper watershed and there are no large tilling operations. A Tilapia Farm is in operation adjacent to Brush Creek and is located below the upper intake and above the lower intake. There are several properties along the Brush Creek corridor to Sylvan Lake SP that do partake in small acreage farming including chickens, cows, sheep, goats and horses but density is very low and the private property owners have historically been good stewards of Brush Creek and its riparian corridor. Along the Eagle River corridor and drainages north of I-70 on Rule Road there are two ranch holdings in the upper drainage along with BLM lands.

Agriculture/Small Acreage Farming Best Management Practices:

1. Continue partnership between Town, Eagle County and others to purchase existing ranches for open space in the Brush Creek and Eagle River valleys.
2. Investigate the establishment of grazing leases as a way to enact education and land management related to source water protection.
3. When opportunities arise, continue to purchase existing ranches for open space and where applicable, allow those ranches to continue their operations.
4. Provide the local NRCS Field Office and ECCD with a copy of the SWPP.

5. Conduct a presentation to the ECCD on Source Water Protection.
6. Partner with Eagle County, ECCD and other appropriate entities in conducting educational events highlighting subjects including grazing management, manure management, irrigation practices, chemical application, animal rendering and chemical use and storage.
    - Create and distribute a brochure to COOP's, ranch stores and other agricultural related businesses highlighting source water protection

10. Golf Courses

The relationship between golf courses, forced ecosystems and the environment is extremely complex and needs to be established carefully because of the social pressures and implications of these types of facilities. The main environmental aspects of golf courses, the way the golf structures exert an influence on the environment, the management practices and the use of pesticides are the main features to be considered. The soil— plant—atmosphere continuum is at the core of the golf course and must be managed in an integrated way to reduce environmental impacts of the whole facility. Many golf courses are located in natural areas which have an influence on the course and vice versa. There is also the need to define the relationships between a course and its surrounding environments (Salgot and Taplas).

Although golf courses are typically large properties ranging in size from 60 to 200 acres, they are just one link in a stormwater management chain. Generally, a quantity of stormwater enters the golf course area, supplemented by what falls on the golf course proper, and then the stormwater leaves the golf course. Therefore, golf courses are realistically capable of having only a small impact on major stormwater flow. That impact should be to add only small increments of water over a given period of time. Engineers call this function "detention."

When the golf course is properly designed, rain and runoff captured in water hazards and stormwater ponds may provide most or all of the supplemental water necessary under normal conditions, though backup sources may be needed during drought conditions. Capture systems should be considered part of the overall treatment and stormwater capture is desirable where the lowest quality of water is needed to conserve potable water, maintain hydrologic balance, and improve water treatment. This practice uses natural systems to cleanse and improve water treatment

According to the Rocky Mountain Golf Course Superintendents Association (RMGCSA), maintaining water quality in and around the golf courses is essential and they have adopted guiding principles for golf course managers which includes but is not limited to:

- The creation of a Management Plan that includes a water quality monitoring plan to evaluate the state of the environment and the effects the golf course may have on the environment
- Conducting water quality monitoring to determine whether outside events are changing the water quality entering the golf course, or whether the golf course is having a positive, neutral or negative effect on water quality.
    - ✓ Sampling parameters should be determined based on golf course operation and any watershed specific parameters of concern
    - ✓ Monitoring during pre-construction should occur to develop a baseline
    - ✓ Monitoring post-construction should begin with the installation and maintenance of golf course turf and landscaping and samples should be taken at least three times per year
    - ✓ Ongoing, routine water sampling provides meaningful trends over time

The RMGCSA has also come up with numerous BMPs for stormwater management and water quality protection including but not limited to:

- Identifying surface water flow patterns that indicate stormwater flow as well as existing and potential holding capacity
- Identifying major drainages and catch basins that connect to local surface water bodies
- Accommodating natural lake processes in the construction of lakes and ponds
- Using Integrated Pest Management principles to limit excess use of pesticides and fertilizers
- Using appropriate aquatic herbicides to prevent turfgrass injury and to protect water quality and wildlife habitat
- Ensuring that irrigation water should not directly strike or runoff to waterbodies, and no-fertilization buffers should be maintained along water edges (RMGCSA).

The Town of Eagle and the community members that live in the Brush Creek watershed are fortunate in that both golf courses there, Eagle Ranch and Frost Creek, have adopted extensive BMPs to protect water quality.

The Eagle Ranch Golf Club is listed as a “Audubon Cooperative Sanctuary”. The Audubon Cooperative Sanctuary Program is an education and certification program that helps organizations and businesses protect the environment while enhancing their bottom line. The "plan-do- check-act" approach of the program offers information and guidance to implement an environmental management plan that improves efficiency, conserves resources, and promotes conservation efforts. Audubon International awards certification to publicly recognize and reward the environmental achievements and leadership of program members (Audubon International). In order to maintain their certification Eagle Ranch Golf Club has:

- Conducted wildlife habitat management for mammals and birds, particularly for Kestrels.
  - ✓ Fish barrier located on 12th hole to restrict non-native fish introduction
- Conducted water quality monitoring on Brush and Abrams Creeks three times a year.
  - ✓ Test water before and after it enters golf course (Brush Creek)
  - ✓ Nitrites, nitrates, phosphorus and ammonia are filtered as they travel through ponds and wetlands on golf course
  - ✓ 10-foot vegetative buffer zones have been created adjacent to aquatic resources
- Focused chemical use on reduction and safety.
  - ✓ Weeds close to waterways do not get sprayed with herbicides
  - ✓ Slow release fertilizers with biodegradable polymers used in May and September
  - ✓ Utilize hybrid mowers and constantly maintain course equipment
- Engaged in water conservation:
  - ✓ State of the art irrigation system utilizing 2,000 sprinkler heads that are computer controlled
  - ✓ Watered greens as little as possible. As dry spots arise, that specific spot is watered by an employee by hand. Once the entire green is dry, overhead irrigation is used to saturate the root zone.
  - ✓ Monitored soil moisture levels
  - ✓ Shut down the Brush Creek headgate during drought years to satisfy other aquatic resource needs

Figure 33: Location of Frost Creek Golf Club adjacent to Brush Creek Source: CRWA
Figure 34: Frost Creek Golf Club Healthy Riparian Areas along Brush Creek Source: CRWA

Frost Creek Golf Course is not an Audubon Cooperative Sanctuary, but they are conducting extensive water quality testing and macroinvertebrate sampling. As part of the land use approval for the Adam's Rib PUD and subsequent PUD amendment, Frost Creek Golf Course is required to maintain and implement many environmental protection strategies and BMPs, one of which is an on-going Water Quality Monitoring and Mitigation Plan designed to detect and correct adversarial trends in groundwater and surface water quality as well as riparian and macroinvertebrate health.

Figure 35: Eagle Ranch Golf Course Location Source: CRWA

<u>Golf Courses Best Management Practices:</u>

1. Promote the work that Frost Creek Golf Club and Eagle Ranch Golf Course has accomplished as a benefit to Brush Creek.
    - Co-author an article in the Vail Daily and Enterprise newspapers
    - Highlight the work of the Frost Creek Golf Club and Eagle Ranch Golf Course work on the Town's website
2. Share SWPP with golf course managers.
3. Encourage Frost Creek Golf Club to provide secondary containment for maintenance yard storage tanks.

- Contact the Golf Club to let them know the benefits of doing so to protect the Town's drinking water supply

4. Encourage golf courses to either maintain or acquire their Audubon Certification.
5. Encourage golf courses to partner with Town and Eagle County to expand both macroinvertebrate and water chemistry testing to identify overall aquatic health of Brush Creek and the Eagle River.
    - Schedule a series of meetings to do so

11. Flooding

Floods are the most common and widespread of all-natural disasters, except fire, according to the Federal Emergency Management Agency (FEMA). Most communities have experienced some degree of flooding following heavy rain or spring and winter thaws.

Floods pose a particular threat to drinking water systems because floodwaters often carry biological and chemical contaminants that can make consumers sick. Contaminants may include bacteria, viruses, protozoa or petroleum products from fuel spills in nearby areas. If source water or any part of the water distribution system flood, these contaminants can end up at consumer taps.

Increased water flow during a flood often makes rivers and streams murky. Elevated turbidity in source water could make it impossible for a water system's treatment plant to treat water. If that occurs, the water system may have to rely on emergency storage capacity or an emergency water source. Even if the water system can overcome high turbidity, the change in disinfection levels may cause taste or odor problems in the treated water (Washington State Department of Health).

Debris from floods is caused by structural inundation and high-velocity water flow. As soon as flood waters recede, people begin to dispose of flood-damaged household items. Mud, sediment, sandbags, and other reinforcing materials also add to the volume of debris needing management, as do materials from demolished and dismantled houses. Surface water intakes run the risk of becoming damaged or blocked because of debris flows.

While wildfires leave less debris than other types of disasters, they still generate much waste. For example, demolished houses contribute noncombustible debris. Burned out cars and other metal objects, as well as ash and charred wood waste, also must be managed. In addition, large-scale loss of plants serving as ground cover can lead to mud slides, adding debris to the waste stream (US EPA).

In September 2013, the front range and plains of eastern Colorado suffered through a catastrophic flooding event. The historic flooding impacted more than 24 counties and more than 2,000 square miles. The floods took 10 lives, and forced the evacuation of more than 18,000 residents, while causing an estimated $3 billion in damage, including $1.7 billion to the state's infrastructure, $623 million to housing and $555 billion to the state's economy (State of Colorado).

According to FEMA, Brush Creek is susceptible to flooding. Although the upper basin intake is fortified with rock structures it can be inundated with debris during spring flows thus clogging the intake screens. The upper basin water treatment plant and water tank sit 30 feet above the creek so that infrastructure is protected against floods.

Floods could also affect the lower basin intake. A flood would affect the Eagle Ranch Golf Course and after moving through the mouth of the canyon several private properties all the way downstream to the Frost Creek Golf Course. Bridge crossings, both on Brush Creek Road and individual homeowner points

of entry, would be impacted along with homes and structures. Although adequate, Eagle County's 75-foot buffer may not be enough to protect structures during a massive flood event. Irrigation and other diversion structures could also be affected. Fortunately, directly upstream of the intake for approximately 1.5 miles the Town has proactively maintained a healthy wetland area, as much as 4 tenths of a mile wide. This area would help to dissipate flood waters including debris flows dispersion.

Figure 36: Flood potential along Brush Creek in area adjacent to Eagle Ranch Golf Course Source: FEMA

Figure 37: Flood potential in open space wetlands leading to intake Source: FEMA

<u>Flooding Best Management Practices:</u>

1. Utilize the CWCB hazard mapping protocol for Eagle River and apply that to Brush Creek.
2. Explore funding opportunities to upgrade and/or fortify the upper basin intake.
3. Construct levees or other barriers that divert flood waters away from the intake.
4. Create an Emergency Response Protocol for the Brush Creek corridor.
    - Schedule a series of meetings with appropriate agencies to do so

5. Examine the 100-year floodplain and FEMA maps to determine areas that are susceptible to damage.
6. During the update of the Eagle County Land Use regulations evaluate current effectiveness of stream setbacks within the floodplain.
7. Purchase a pump to provide raw water to the water plant in case of an emergency.

SOURCE WATER BEST MANAGEMENT PRACTICES

The Steering Committee reviewed and discussed several possible best management practices that could be implemented within the Source Water Protection Area to help reduce the potential risks of contamination to the community's source water. The Steering Committee established a "common sense" approach in identifying and selecting the most feasible source water management activities to implement locally. The best management practices were obtained from multiple sources including: Environmental Protection Agency, Colorado Department of Public Health and Environment, Natural Resources Conservation Service, and other source water protection plans.

The Steering Committee recommends the best management practices listed in the following table be considered for implementation.

Table 6: Source Water Protection Best Management Practices

Issues	Town of Eagle Best Management Practices	Partners
Wildfire *Risk* *UB: High* *LB: High* *Priority Ranking: 1*	1. Provide a copy of the final Source Water Protection Plan to local Fire Protection Districts, USFS, CSFS, BLM and any other agencies/departments involved in wildfire and land management decision making during the planning of pre-and post-wildfire mitigation strategies. • Encourage Agencies to overlay the SWPA's on the Wildfire Susceptibility Analysis maps to identify high-risk areas and to determine recommended action items. 2. Convene Federal, State, County and local wildfire managers to: • Identify wildfire hazards and values at-risk within the watershed (e.g. intake facilities, pump stations, other infrastructure) • Determine post-fire hazards and impacts to water quality and values at-risk • Develop BMP's to mitigate pre-fire and post-fire hazards 3. Conduct forest/fuel treatments near infrastructure and other strategic locations in the watershed. • Assess lands within the Brush Creek and Eagle River Watersheds for wildlfire priority area designation and identify opportunities for fuel treatment that have not been identified or conducted 4. Work with local fire managers to create an emergency response protocol for wildfire and post wildfire events. • Schedule a series of meetings to do so 5. Encourage local FPDs and Eagle County to continue to implement their fire prevention plan which includes public education programs like Fire Wise and Project Learning Tree. • Collaborate with these entities in organizing and participating in two programs per year 6. Consider utilizing the Wildfire Decision Support System (WFDSS) for pre-wildfire planning. • Work with CRWA in coordinating WFDSS data acquisition	Town of Eagle Town of Eagle, Eagle County, USFS, BLM, CSFS, Gypsum FPD, Greater Eagle FPD

	7. Upgrade the upper basin intake to better protect it during post-wildfire debris flow events. • This may include the installation of Jersey barriers or rock structures to divert debris flows 8. Conduct structure protection at the Fulford site. • Evaluate the current condition of these structures in regard to existing fireproof materials • Fortify the buildings with fireproof roofs, sidings, windows and doors 9. Continue practice of prescribed burns or mechanical treatment in identified drainages. 10. Provide residents in the watershed with outreach material that highlights fire management and safety including creating defensible space around their homes. • Provide material for review on the Town of Eagle website • Have hard copy materials available at Town Hall and at Town sponsored events	Town of Eagle
Transportation/Roads *Risk* *UB: High* *LB: Moderate* *ER: High* *Priority Ranking: 1*	1. Investigate the existence of an Emergency Call Down System (ECDS) for Brush Creek and Eagle River. If there is not an ECDS, then develop an ECDS. • Contact Eagle County OEM and CDOT to find out if an ECDS exists and if not schedule meetings with them to begin the process of creating one 2. Provide copies of the SWPP and Emergency Response Notification Cards to the Colorado Department of Transportation and the Eagle County Offices of Emergency Management and Road and Bridge. 3. Utilize a spill time calculator to measure how long pollutants will take to travel to the intake. 4. Stay informed on road maintenance practices and schedules within the SWPA including: grading, the application of magnesium chloride and dust abatement activities along with the best management practices utilized during these activities. • Meet with Eagle County Road and Bridge to discuss and evaluate their standard operating procedures 5. Post Source Water Protection signage (7). 6. Educate the public on how to report spills or dumping in the SWPA on both public and private lands. • Provide material for review on the Town of Eagle website • Have hard copy materials available at Town Hall and at Town sponsored events 7. Tour the upper watershed with the USFS, BLM, Sylvan Lake SP, Eagle County and Eagle River Watershed Council (ERWC) to assess and list high priority areas for potential road and trail maintenance and improvement activities.	Town of Eagle Town of Eagle, Eagle County, USFS, BLM, Sylvan Lake SP, ERWC
Security *Risk* *UB: High* *LB: Moderate*	1. Investigate the existence of an Emergency Call Down System (ECDS) for Brush Creek and the Eagle River. If there is not an ECDS, then develop an ECDS with local partners.	Town of Eagle

Priority Ranking: 1	• Contact Eagle County OEM and CDOT to find out if an ECDS exists and if not schedule meetings with them to begin the process 2. Install fencing and other security measures to safeguard water facility infrastructure. 3. Do not advertise specific water infrastructure locations.	
Existing Subdivisions *<u>Risk</u>* *LB: High* *Priority Ranking: 1*	1. Ensure that riparian areas are protected by maintaining minimum stream setbacks. 2. Identify, map and develop cost estimates for recommended stormwater control projects and evaluate each projects' anticipated effectiveness and feasibility. 3. Communicate with Eagle County Road and Bridge in order to prevent snow removal from being piled up adjacent to Brush Creek and the Eagle River. • Schedule a meeting with them to do so 4. Assess urban drainage impact risk and recommend site specific projects 5. Provide educational material to construction companies and landscapers on how to utilize BMPs to prevent storm water runoff from entering the source waters. • Post material on the Town's website • Develop a mailing list and send hard copy material vis mail 6. Conduct education to restaurants highlighting waste disposal best management practices. • Post material on Town's website • Develop a mailing list and send hard copy material via mail 7. Partner with ERWC to conduct storm drain stenciling.	Town of Eagle Town of Eagle, ERWC
Future Subdivisions *<u>Risk</u>* *LB: High* *ER: Moderate* *Priority Ranking: 1*	1. Ensure that riparian areas are protected during buildout by adhering to stormwater runoff controls and the creation of minimum setbacks. 1. Update the Town Municipal Code for adequate stream setbacks and up to date stormwater regulations for protection of the Brush Creek and Eagle River corridors. 2. Provide real estate and construction companies with educational material that highlights best management practices at construction sites including the following of stringent stormwater BMPs during build out. • Coordinate meetings with area Real Estate Companies to outline objectives • Identify outreach material and provide it to them in both hard copy and electronic formats 4. Provide training and certification opportunities to site inspectors and other Town staff for temporary and permanent stormwater control measure design, installation and maintenance to limit sediment and/or nutrient impacts to Brush Creek. 5. Encourage Eagle County Community Development and Town of Eagle Community Development to utilize the SWPA GIS data when making future land use decisions or changes to zoning laws. • Provide Community Development departments with copies of the SWPP and GIS Shapefiles	Town of Eagle

	6. Provide real estate companies with education and outreach material that they can distribute to new home buyers that highlights homeowner best management practices. • Coordinate meetings with area Real Estate Companies to outline objectives • Identify outreach material and provide it to them in both hard copy and electronic formats	
Residential Practices *Risk* *UB: Very Low* *LB: Very High* *ER: High* *Priority Ranking: 2*	1. Conduct education and outreach to property owners. • Post educational material on the Towns website/social media and distribute material in utility bills • Continue participation in the Keep It Clean West Slope Partnership • Encourage voluntary measures to protect the riparian corridor • Integrate messaging into local Adventure Maps 2. Conduct a household hazardous waste clean-up event during the Town Clean-up day. 3. Continue to support the Eagle County prescription drug take back program. 4. Partner with entities to organize a community-wide, Brush Creek celebration and educational event • Schedule a series of meetings to do so • Combine celebration with ERWC river clean-up • Conduct homeowners best management practices education at event 5. Partner with ERWC and other entities in educating local students about source water protection and the importance of protecting their drinking water. • Explore the opportunity to produce a Children's Water Festival • Accompany ERWC when they provide educational opportunities at elementary and high schools 6. Utilize the Towns "extraterritorial water service agreement" with property owners to help promote sustainable residential practice ideas for riparian area protection, OWTS maintenance, etc. 7. Submit articles to the "Vail Daily" and "Enterprise" newspapers promoting source water protection. • Request to create an article highlighting the Town's SWPP • Submit monthly articles highlighting specific source water protection planning activities for homeowners and businesses 8. Have educational materials available at Sylvan Lake State Park and at USFS kiosks. • Request to create an article highlighting the Town's SWPP • Submit monthly articles highlighting specific source water protection planning activities for homeowners and businesses 9. Work directly with the property owner of Green Acres MHP to enact BMPs that might include: • riparian area enhancement	Town of Eagle Town of Eagle, ERWC Town of Eagle Town of Eagle, Sylvan Lake SP, USFS

	• installation of a fence along the back-property line • education to residents about the proper amounts and timing of fertilizer application and disposal of hazardous waste • parking restrictions within a to be identified stream setback • removal of the road within the stream setback	Town of Eagle, Green Acres MHP
OWTS *Risk* *UB: Moderate* *LB: Moderate* *ER: Moderate* *Priority Ranking: 2*	1. Encourage Eagle County to develop a Transfer of Sale and Use Permit program which could incorporate the improvement of OWTS wastewater quality. 2. Utilize the SWPA as a zoning overlay to require additional protection measures to protect the source water. 3. Utilize the Towns "extraterritorial water service agreement" to improve OWTS maintenance and require treatment level upgrades in the event of needed repair or replacement. Also require wastewater connection within a certain timeframe after wastewater collection system is expanded adjacent to the property. 4. Require feasibility assessments for properties with extraterritorial water service agreements to connect to the Town's wastewater collection system when new homes are proposed or when existing OWTS need repair, alteration or replacement. 5. Encourage a schedule of OWTS inspections every three years or sooner depending upon the systems location to the intakes. 6. Distribute OWTS maintenance outreach material to selected homeowners in the SWPA. * This may include the video produced by CRWA that highlights OWTS regulations, installation and maintenance. https://www.epa.gov/septic/more-resources-homeowners-septic-systems * This may include the Montana State University CD entitled "Taking Care of Groundwater: A homeowner's guide to well and septic systems". This video connects septic system failure with the maintenance of private wells. https://www.youtube.com/watch?v=F5rnHSZCYHA 7. Display OWTS maintenance material/video on the Towns website. This may include a link to the above-mentioned videos. 8. Purchase a sludge monitoring device (sludge judge) for shared use by homeowners so they can evaluate the scum levels in their septic tanks. 9. Work with Eagle County to conduct a study/inventory of OWTS in the Brush Creek and Eagle River watersheds to identify potential problem areas and risks. • Schedule a meeting to do so 10. Work with Eagle County to conduct a septic system maintenance demonstration for homeowner. • Schedule a series of meetings to do so	Town of Eagle Town of Eagle, Eagle County
Noxious Weed and ANS Control *Risk* *UB: Low* *LB: High*	1. Collaborate with Eagle County, USFS, BLM, ERWC, and Eagle County Conservation District (ECCD) to identify specific noxious weed locations and target them for additional control measures. • Schedule a series of meetings to do so • Outline steps to accomplish the tasks	Town of Eagle, Eagle County, USFS, BLM, ERWC, ECCD

Priority Ranking: 2	2. Encourage all entities to continue to adhere to current regulations and best management practices that address the mitigation of noxious weeds. 3. Conduct educational seminars addressing noxious weed spraying to Town and County personnel, private property owners, golf course managers, etc. • Schedule a series of meetings to do so 4. Work with farm stores like WYLACO to distribute educational material to customers when they sell over the counter chemicals. • Have a meeting with WYLACO and others 5. Provide Eagle County Vegetation Management and the ECCD a copy of the SWPP. 6. Conduct education and outreach to recreationists who use boats on Sylvan lake. • Schedule a meeting with Sylvan Lake SP to discuss appropriate outreach methods 7. Provide area businesses that sell fishing licenses with CPW educational material to display and distribute to customers to inform them about strategies to prevent the spread of ANS. • Acquire appropriate outreach material • Contact businesses to see if they want to participate 8. Support ANS inspection programs for Sylvan Lake SP.	Town of Eagle
Riparian Areas and Instream Habitat *<u>Risk</u>* *UB: Low* *LB: Moderate* *ER: Moderate* *Priority Ranking: 1*	1. Collaborate with ERWC to engage in a riparian area assessment of Brush Creek. • work with USFS, Eagle County and ECCD and livestock users to identify areas for riparian area enhancement. • Utilize National Fish and Wildlife Foundation grant funding and/or explore additional funding options. 2. Expand macroinvertebrate and water chemistry testing upstream and downstream of both intakes to identify changes in water quality. • conduct specific projects based on those findings to maximize overall aquatic health 3. Assess Brush Creek and Eagle River historic practices (such as irrigation diversions, etc.) to identify projects which will decrease bank erosion and restore proper stream and riparian area function. • Research appropriate documents and past restoration work • Schedule a meeting with appropriate agencies and landowners to identify specific projects	Town of Eagle, Eagle County, ERWC, USFS, ECCD Town of Eagle
Agricultural/Small Acreage Farming *<u>Risk</u>* *UB: Very Low* *LB: Moderate* *ER: Moderate* *Priority Ranking: 2*	1. Continue partnership between Town, Eagle County and others to purchase existing ranches for open space in the Brush Creek and Eagle River valleys. 2. Investigate the establishment of grazing leases as a way to enact education and land management related to source water protection. 3. When opportunities arise, continue to purchase existing ranches for open space and where applicable, allow those ranches to continue their operations. 4. Provide the local NRCS Field Office and ECCD with a copy of the SWPP. 5. Conduct a presentation to the ECCD on Source Water Protection.	Town of Eagle

	6. Partner with Eagle County, ECCD and other appropriate entities in conducting educational events highlighting subjects including grazing management, manure management, irrigation practices, chemical application, animal rendering and chemical use and storage. • Create and distribute a brochure to COOP's, ranch stores and other agricultural related businesses highlighting source water protection	Town of Eagle, Eagle County, ERWC, ECCD
Golf Courses *Risk* *LB: Moderate* *Priority Ranking: 2*	1. Promote the work that both Frost Creek Golf Club and Eagle Ranch Golf Course have accomplished as a benefit to Brush Creek. • Co-author an article in the Vail Daily and Enterprise newspapers • Highlight the work of the Frost Creek Golf Club and Eagle Ranch Golf Course work on the Town's website 2. Share SWPP with golf course managers. 3. Encourage Frost Creek Golf Club to provide secondary containment for maintenance yard storage tanks. • Contact the Golf Club to let them know the benefits of doing so to protect the Town's drinking water supply 4. Encourage golf courses to either maintain or acquire their Audubon Certification. 5. Encourage golf courses to partner with Town of Eagle, Eagle County and other entities to expand both macroinvertebrate and water chemistry testing to identify overall aquatic health of Brush Creek and the Eagle River. • Schedule a series of meetings with appropriate agencies	Town of Eagle Town of Eagle, Eagle County
Flooding *Risk* *UB: Moderate* *LB: Moderate* *Priority Ranking: 1*	1. Utilize the CWCB hazard mapping protocol for Eagle River and apply that to Brush Creek. 2. Explore funding opportunities to upgrade and/or fortify the upper basin intake. 3. Construct levees or other barriers that divert flood waters away from the intake. 4. Create an Emergency Response Protocol for Brush Creek corridor. • Schedule a series of meetings with appropriate agencies 5. Examine the 100-year floodplain and FEMA mapping to determine areas that are susceptible to damage. 6. During the update of the Eagle County Land Use regulations evaluate current effectiveness of stream setbacks within the floodplain 7. Purchase a pump to provide raw water to the water plant in case of an emergency.	Town of Eagle
Backcountry Recreation *Risk* *UB: Low* *Priority Ranking: 3*	1. Post Source Water Protection signage and sub-signs that highlights cleaning up garbage and pet and human waste. 2. Create and distribute a custom brochure and/or fact sheet highlighting source water protection at outdoor recreation stores (aka mountain biking, camping, hiking, AT vehicles). * reference language from Center for Outdoor Ethics web site, "Leave No Trace, Dispose of Waste Properly" found at https://lnt.org/learn/principle-3	Town of Eagle
Mining	1. Actively participate in the review process for mining activity permits at the State and County level and in mine land reclamation activities.	

Risk *UB: Very Low* *LB: Low* *Priority Ranking: 3*	2. Provide the Division of Reclamation, Mining and Safety a copy of the final Source Water Protection Plan, GIS shapefiles and maps of the source water protection areas. 3. Research mines that may be vulnerable to wildfire and that may drain heavy metals into surface waters during post-wildfire runoff.	Town of Eagle
Former Salvage Yard *Risk* *LB: Low* *Priority Ranking: 3*	1. No actions needed; Eagle County has verified that the site has been cleaned up. Mediation performed by HG Geotech with final notice August 31, 2011.	Town of Eagle
Airport *Risk* *LB: Low* *Priority Ranking: 3*	1. Investigate the existence of an Emergency Call Down System (ECDS) for Brush Creek and Eagle River. If there is not an ECDS, then develop an ECDS.	Town of Eagle
Train Derailment *Risk* *LB: Very Low* *Priority Ranking: 3*	1. Be informed of any changes in railway usage.	Town of Eagle

EVALUATING EFFECTIVENESS OF SOURCE WATER PROTECTION PLAN

Town of Eagle is committed to evaluating the effectiveness of the various source water best management practices that have been implemented. The purpose of evaluating the effectiveness is to determine if the various source water best management practices are being achieved, and if not, what adjustments to the Source Water Protection Plan will be taken in order to achieve the intended outcomes. It is further recommended that Plan annually and with CRWA every ten years or if circumstances change resulting in the development of new water sources and source water protection areas, or if new risks are identified.

Town of Eagle is committed to a mutually beneficial partnership with the Colorado Department of Public Health and Environment in making future refinements to their source water assessment and to revise the Source Water Protection Plan accordingly based on any major refinements.

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APPENDICES[2]

A. Source Water Assessment Report

B. Source Water Assessment Report Appendices

C. Table A-1 Discrete Contaminant Types

D. Table A-2 Discrete Contaminant Types (SIC Related)

E. Table B-1 Dispersed Contaminant Types

F. Table C-1 Contaminants Associated with Common PSOC's

G. Eagle County Public Health Agency OWTS Regulations

[2] All appendices are located on the CD version of this SWPP.