

# Homestead Water Company Source Water Protection Plan – PUBLIC VERSION

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Jefferson County, Colorado  
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For the Community Water Provider:  
Homestead WC, PWSID CO0130187

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Cover photo: Welcome sign to the Homestead subdivision in Jefferson County, Colorado.

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 Homestead WC 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

BMP	Best Management Practice
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CRWA	Colorado Rural Water Association
GIS	Geographic Information System
MGD	Million Gallons per Day
OWTS	Onsite Wastewater Treatment System
PSOC	Potential Source of Contamination
RCRA	Resource Conservation and Recovery Act
SWAA	Source Water Assessment Area
SWAP	Source Water Assessment and Protection
SWPA	Source Water Protection Area
SWPP	Source Water Protection Plan
TOT	Time of Travel
USFS	United States Forest Service
WWTF	Wastewater Treatment Facility

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## 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. A source water protection plan identifies a source water protection area, lists potential contaminant sources and outlines best management practices to reduce risks to the water source. Implementation of a source water protection plan provides an additional layer of protection at the local level beyond drinking water regulations.

The Homestead WC values a clean, high quality drinking water supply and decided to work collaboratively with area stakeholders to develop a Source Water Protection Plan. The source water protection planning effort consisted of public planning meetings with stakeholders including local citizens and landowners, and agency representatives during the months of October 2015 through October 2017, in Evergreen, Colorado. Colorado Rural Water Association was instrumental in this effort by providing technical assistance in the development of this Source Water Protection Plan.

The Homestead WC obtains its drinking water from four active groundwater wells and two surface water intakes within the Turkey Creek Sub-watershed. The Source Water Protection Areas includes a 500-foot buffer zone around each drinking water intake and includes the drainages of the surface water intakes. This Source Water Protection Area is the area that the Homestead WC has chosen to focus its source water protection measures to reduce source water susceptibility to contamination. The Steering Committee conducted 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 to reduce the risks from the potential contaminant sources and other issues of concern. The best management practices are centered on the themes of 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**
  - Provide a copy of the final Source Water Protection Plan along with GIS shapefiles of the source water protection area to US Forest Service, Colorado State Forest Service, Colorado Division of Fire Prevention & Control, Evergreen Fire Protection District, and the Jefferson County Office of Emergency Management for consideration when planning and implementing wildfire mitigation projects.
  - Continue to implement the Community Wildfire Protection Plan
  - Educate homeowners about the importance of maintaining proper defensible space, fuel break thinning, etc.
  
- **Commercial Operations**
  - Meet with various commercial operations within the SWPA to raise awareness about source water protection and to distribute Emergency Response Cards.



- **Roads**

- Develop an Emergency Notification card that contains current contact information for the public water system and map of drinking water intakes and the SWPA. Share with Emergency Responders (Colorado State Patrol, Colorado Department of Transportation, Jefferson County Road & Bridge Department, Jefferson County Office of Emergency Management, Inter-Canyon Fire Protection District, etc.) and other transit companies to ensure that Homestead is notified of spills quickly enough to shut off the wells to minimize impact from the spill.
- Maintain current water system contact information, on an annual basis, with Emergency Responders to improve notification of spill response activities.
- Install Drinking Water Protection Area signs at strategic locations throughout source water protection area.
- Consider adding a berm near the wells to direct any spills away from wellheads
- Share copy of SWPP with Colorado Department of Transportation & Jefferson County Road & Bridge
- Present SWPP to Local Emergency Planning Commission

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

This Plan is a living document that is meant to be updated to address any changes that will inevitably come. The Steering Committee will review this Plan at a frequency of once every three to five 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 generations water quality was taken for granted, and still today many people assume that their water is naturally protected. However, as water moves through and over the ground, contaminants may be picked up and carried to a drinking water supply.

While a single catastrophic event may wipe out a 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 (Ground Water Protection Council, 2007).

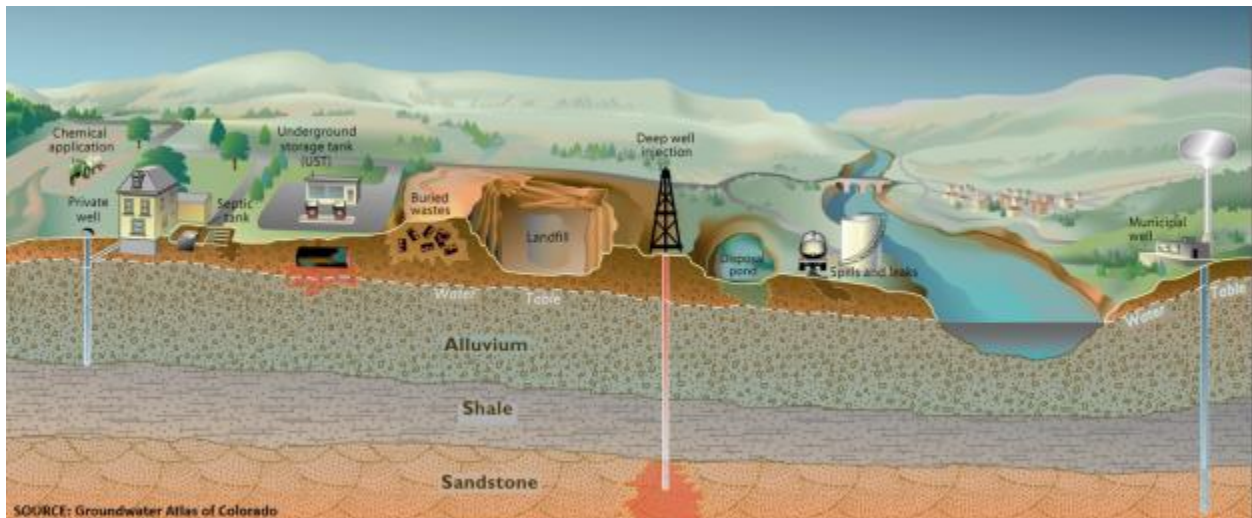


Figure 1: Schematic drawing of the potential source of contamination to surface and groundwater

The Homestead WC recognizes the potential for contamination of their drinking water sources, and realizes that the development of this Source Water Protection Plan is the first step in protecting this valuable resource. Proactive planning is essential to protect the long-term integrity of the drinking water supply and to limit costs and liabilities. This SWPP demonstrates the Homestead WC's commitment to reducing risks to their drinking water supply.

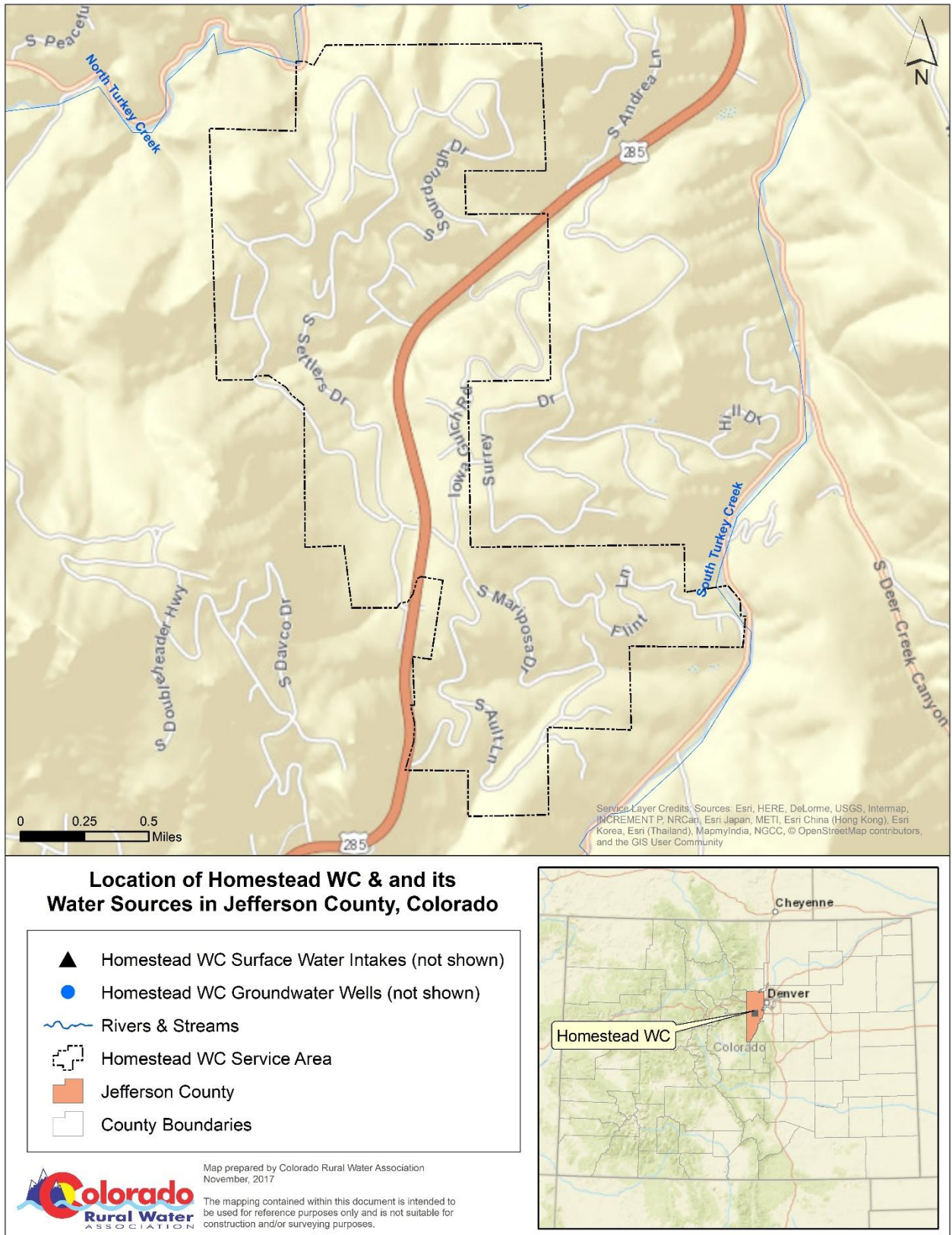


Figure 2: Location of Homestead WC & its water sources in Jefferson County, Colorado

## **Purpose of the Source Water Protection Plan**

The Source Water Protection Plan (SWPP) is a tool for the Homestead WC to ensure clean and high-quality drinking water sources for current and future generations. This Source Water Protection Plan 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 to protect and enhance the drinking water supply;
- Provide for 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, 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.





Source: CDPHE - WQCD

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 for each of the drinking water sources;
2. Conducting a contaminant source inventory to identify potential sources of contamination within each of the source water assessment areas;
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 (Appendix A – B) was provided to each public water system in Colorado in 2004 that 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 potential sources of contamination 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. Involving local stakeholders in the planning process;
2. Developing a comprehensive protection plan for all of their drinking water sources;
3. Implementing the protection plan on a continuous basis to reduce the risk of potential contamination of the drinking water sources; and
4. Monitoring 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 Colorado Department of Public Health and Environment 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

Homestead Water Company provides utilities to the Homestead subdivision in Jefferson County approximately six miles northeast of Conifer, Colorado. Primary access to the subdivision is via Colorado State Highway 285. The majority of Homestead WC's source waters lie within private lands within unincorporated areas of Jefferson County and consists of rural residential development.

The topography of the area is mountainous, with elevations ranging from 7,150 to 7,690 feet above sea level. The area lies in the "South Rocky Mountains – High Mountains and Valleys" Common Resource Areas. This area is best characterized by steep, high mountain ranges and associated mountain valleys. The temperature regimes are mostly frigid and cryic; moisture regimes are mainly ustic and udic. Vegetation is sagebrush-grass at low elevations, and with increasing elevation ranges from coniferous forest to alpine tundra.

The land surrounding Homestead WC's source waters receives an estimated average annual precipitation of 21 inches. Rainfall typically occurs as frontal storms in the spring and early summer, and as high intensity, convective thunderstorms in late summer. Maximum precipitation is from mid spring through late autumn, with precipitation falling as snow in winter. The average annual temperature is from 37 to 66 degrees F. The frost-free period averages 154 days but ranges from 111 to 180 days (USDA Natural Resources Conservation Service, February 2010 ).

### Hydrologic Setting

The Homestead WC has two surface water intakes within the Turkey Creek Sub-watershed and seven groundwater wells, three of which are currently inactive. The groundwater wells range from 700-950 feet deep. The Turkey Creek sub-watershed drains approximately 37.80 square miles (24,197 acres) and is part of the Trout/West Creeks watershed within the Upper South Platte basin (Hydrologic Unit Code (HUC) 10190002). The headwaters of Turkey Creek originate on private lands and receives flows from high altitude snowmelt. Turkey Creek flows into Bear Creek, which eventually flows into the South Platte River. The EPA Watershed Quality Assessment Report for the Upper South Platte Watershed Basin does not list Turkey Creek as impaired, and the overall status of this waterbody is Good (United States Environmental Protection Agency, 2017)

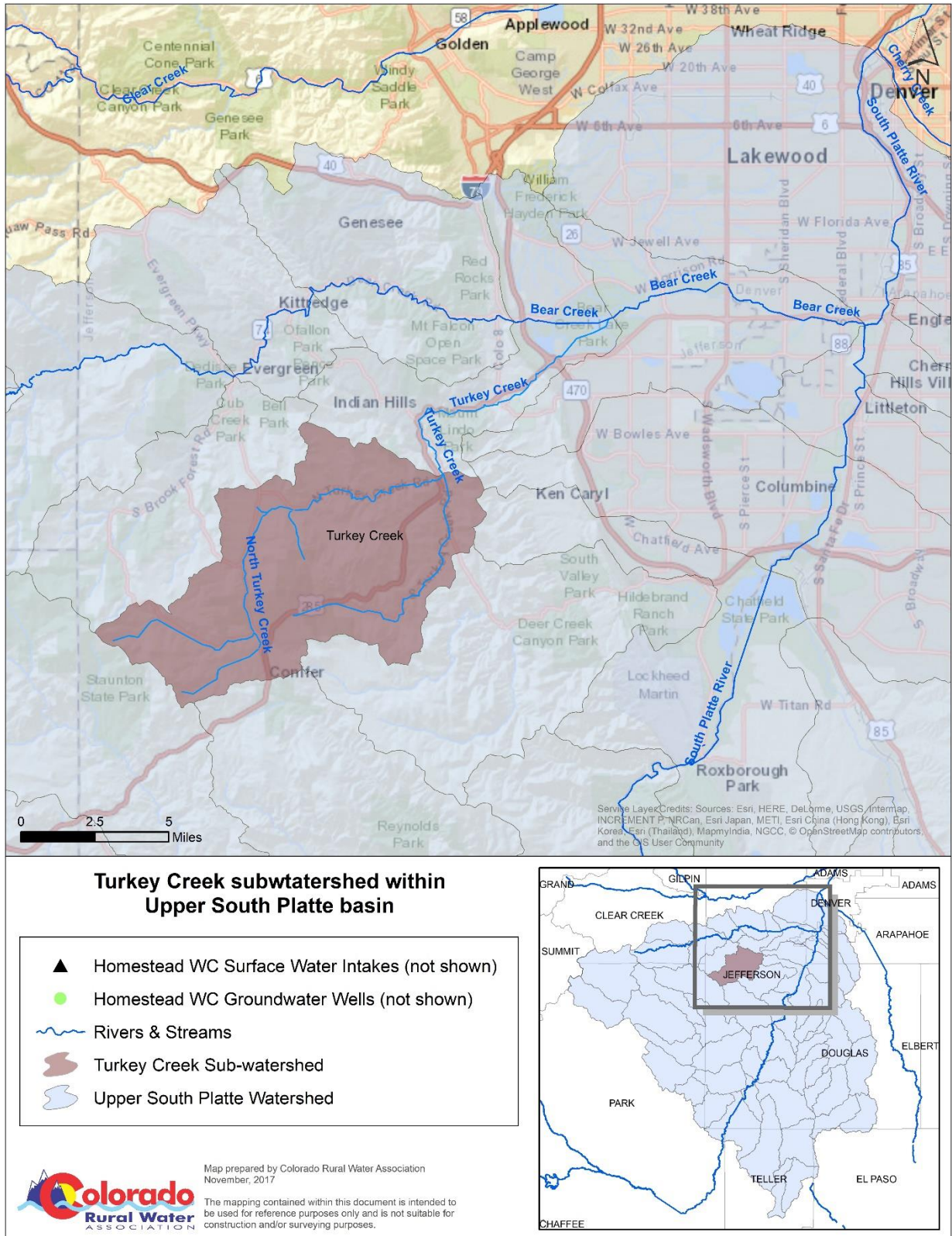


Figure 4: Turkey Creek sub-watershed within the Upper South Platte basin



## DRINKING WATER SUPPLY OPERATIONS

### Water Supply and Infrastructure

The Homestead WC operates a community water supply system that supplies drinking water to 875 residents located within Jefferson County, Colorado. The Homestead WC obtains their drinking water from four wells in fractured granite and two Ground Water Under the Influence of Surface Water intakes in the Turkey Creek watershed.

Homestead WC produces finished water for three treatment plants:

1. The Ault Lane TP combines the water of the Ault Lane Deep Well and the Ault Lane Gallery. The gallery well is filtered to 1.0 micron while the deep well is filtered to 20 microns. The waters of both sources are combined and both chlorine and a corrosion inhibitor (Carus 8500) are added before entering the distribution system along Ault Ln.
2. The Settlers Drive TP combines the water of the Settlers Drive Deep Well and the Settlers Drive Gallery. The gallery well is filtered to 1.0 micron while the deep well is filtered to 20 microns. The waters of both sources are combined and both chlorine and a corrosion inhibitor (Carus 8500) are added before entering the distribution system along Settlers Drive.
3. The Wagon Rim Trail TP combines the water of the Sanger Way Deep Well and the Wagon Rim Deep Well. The water from both sources are filtered to 20 microns, combined and both chlorine and a corrosion inhibitor (Carus 8500) are added before the water enters the Wagon Rim Storage Tank.

Homestead WC stores its water in two above ground tanks:

1. The Wagon Rim Storage Tank (125,000 gallons) sits adjacent to the Wagon Rim TP and receives water from both the Wagon Rim TP and the Settlers Drive TP. This tank provides the pressure and supply for the West/North portion of Homestead and can deliver water to the South/East portion of Homestead. This tank was constructed in 1999 and is an epoxy coated, bolt-together steel tank.
2. The Iowa Gulch Tank (17,000 gallons) sits along the upper portion of Iowa Gulch and receives water from the Ault Lane TP and from the West/North side of Homestead as needed.

Homestead WC has over 15 miles of PVC and HDPE plastic mains ranging in size from 10" to 2" delivering water from the Treatment Plant and Storage Tanks to the homes within the Homestead. Homestead WC also maintains over 27 fire hydrants and more than 60 buried valves.

Table 1: Groundwater Supply Information

Water System Facility Name	Water System Facility Number WDID	Total Depth of Well (ft)	Depth of Plain Casing (ft)	Depth of Perforation (ft)	Yield (gpm)	Year Drilled
Ault Ln. Deep Well	██████	851	40	411-791	10.5	2004
Settlers Dr. Deep Well	██████	802	40	62-802	7	2003
Sanger Way Well	██████	700	540	240-250, 360-385, 540-560	7	1992
Wagon Rim Well	██████	950	40	570-610, 730-750, 890-930	15	2005

Table 2: Surface Water Supply Information

Ault	Water System Facility Number WDID	Surface Water Source	Constructed Date
Ault Ln Gallery	██████	Unnamed Gulch	1980
Settlers Dr. Gallery	██████	Iowa Gulch	2008

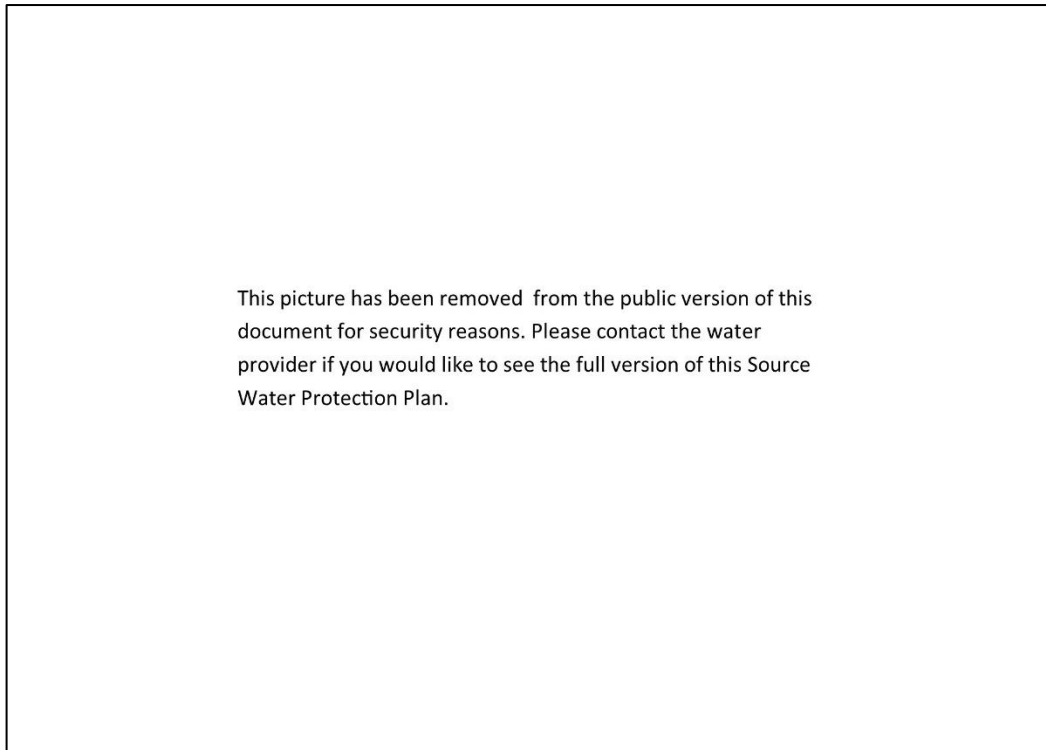


Figure 5: Ault Lane Well, gallery and pit.

This picture has been removed from the public version of this document for security reasons. Please contact the water provider if you would like to see the full version of this Source Water Protection Plan.

*Figure 6: Settlers Treatment Plant*

This picture has been removed from the public version of this document for security reasons. Please contact the water provider if you would like to see the full version of this Source Water Protection Plan.

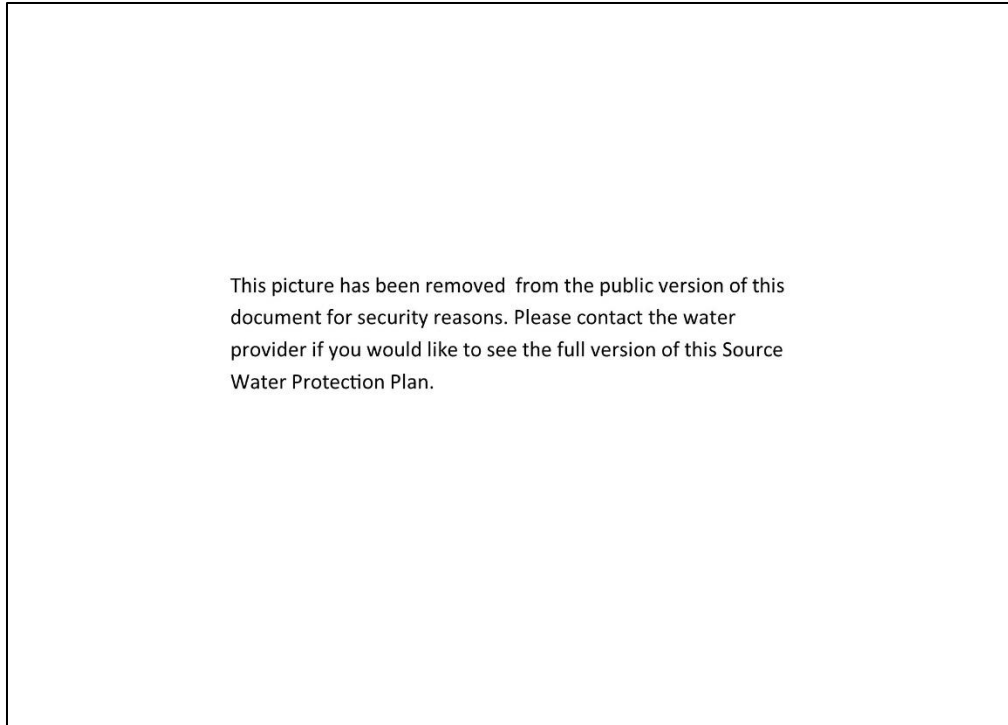
*Figure 7: Settlers Well*

This picture has been removed from the public version of this document for security reasons. Please contact the water provider if you would like to see the full version of this Source Water Protection Plan.

*Figure 8: Wagon Rim Treatment Plant and tank.*

This picture has been removed from the public version of this document for security reasons. Please contact the water provider if you would like to see the full version of this Source Water Protection Plan.

*Figure 9: Wagon Rim Well*



*Figure 10: Sanger Well and Pit*

## **Water Supply Demand Analysis**

The Homestead WC serves an estimated 320 connections and approximately 875 residents and other users in the service area annually. The water system has the current capacity to produce 65,000 gallons per day. Current estimates indicate that the average daily demand is approximately 50,000 gallons per day, and that the average peak daily demand is approximately 60,000 gallons per day. Using these estimates, the water system has a surplus average daily demand capacity of 5,000 gallons per day and a surplus average peak daily demand capacity of 5,000 gallons per day.

Based on the estimates above, the Homestead WC has determined that if two of its water sources were to become disabled for an extended period of time due to contamination, the Homestead WC may not be able to meet the average daily demand of its customers. And in the event that one of its water sources would become disabled for an extended period of time, the Homestead WC may not be able to meet the average peak daily demand of its customers.

The ability of Homestead WC to meet either of these demands for an extended period of time is also affected by the amount of treated water the water system has in storage at the time a water source(s) becomes disabled.

Homestead WC recognizes that potential contamination of its groundwater source(s) could result in having to treat the groundwater and/or abandon the water source if treatment proves to be ineffective or too costly. To understand the potential financial costs associated with such an accident, the Homestead WC estimates that it could cost \$50,000 - \$75,000 in today's dollars to replace one of its water sources (i.e., replacement of the intake structure 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 source water protection plan for Homestead WC and the Homestead Subdivision can help to reduce the risks posed by potential contamination of its water source(s). Additionally, the Homestead WC has developed an emergency response plan or contingency plan to coordinate rapid and effective response to any emergency incident that threatens or disrupts the community water supply.

## SOURCE WATER PROTECTION PLAN DEVELOPMENT

The Colorado Rural Water Association’s (CRWA) Source Water Protection Specialists, Kimberly Mihelich and Dylan Trujillo, 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 Source Water Protection Plans.

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

*Table 3: Planning Meetings*

Date	Purpose of Meeting
October 5, 2015	<u>Planning Meeting w/ Homestead WC &amp; CRWA</u> : Review of the State’s Source Water Assessment for Homestead WC; Develop preliminary list of potential sources of contamination.
January 25, 2016	<u>Planning Meeting w/ Homestead WC &amp; CRWA</u> : Identify stakeholders to invite to SWPP meetings; Set SWPP Workshop dates and agendas
March 15, 2016	<u>First Stakeholders Meeting</u> : Presentation on the process of developing a Source Water Protection Plan for the Homestead WC. Review of the State’s Source Water Assessment for Homestead WC.
March 9, 2017	<u>Planning Meeting w/ Homestead WC &amp; CRWA</u> : Re-delineate of source water protection areas
April 21, 2017	<u>Planning Meeting w/ Homestead WC &amp; CRWA</u> : Re-delineate of source water protection areas
May 16, 2017	<u>Second Stakeholders Meeting</u> : Identify and discuss potential sources of contamination
July 20, 2017	<u>Planning Meeting w/ Homestead WC &amp; CRWA</u> : Review planning process and delineation of source water protection areas; Identify other stakeholders to invite to SWPP meetings
October 17, 2017	<u>Third Stakeholders Meeting</u> : Develop best management practices. Prioritize potential sources of contamination

### Stakeholder Participation in the Planning Process

Local stakeholder participation is vitally important to the overall success of Colorado’s Source Water Assessment and Protection (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 Source Water Protection Plan is more likely when local stakeholders have actively participated in its development.

The Homestead WC’s source water protection planning process attracted interest and participation from 17 stakeholders including local citizens and landowners, and agency representatives. During the months of October 2015 through October 2017, planning meetings were held in Evergreen, Colorado to encourage local stakeholder participation in the planning process. Stakeholders were notified of meetings via letters, emails, phone calls, and social media postings.

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 the Homestead WC 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 Source Water Protection Plan. The Homestead WC and the Colorado Rural Water Association are very appreciative of the participation and expert input from the following participants.

*Table 4: Stakeholders and Steering Committee Members*

Stakeholder	Title	Affiliation	Steering Committee Member
Norm Lewis	President/General Manager	Homestead & Homestead Water Company	X
Henry Thresher		Golden Meadows Homeowners Association	X
Frank Dearborn	Fire Marshall	Evergreen Fire Rescue	X
Randy Rudloff	Board Member	Inter-Canyon Fire Protection	X
Gary Burch	Resident	Homestead WC/Homestead WC	X
Mark Hasseman	Board Member	Homestead Water Company	X
Patricia VanInwagen	Resident	Cragmont Subdivision	X
Chris VanInwagen	Resident	Cragmont Subdivision	X
Tom Roan	Resident	Homestead WC/Homestead WC	X
Keith Sargent	Board Member	Homestead Water Company	X
Matt Taber	Board Member	Homestead Water Company	X
Joe Musca	Engineer	Homestead Water Company	X
Matt Taber	Homeowner	Cragmont Subdivision	X
Matt Schultz	Homeowner	Homestead Subdivision	X
Dick Mayo	Homeowner	Cragmont Subdivision	X
Craig Choun	Homeowner	Homestead Subdivision	X
Linda Choun	Homeowner	Homestead Subdivision	X



## Development and Implementation Grant

The Homestead WC has been awarded a \$5,000 Development and Implementation Grant from the Colorado Department of Public Health and Environment (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. The Homestead WC was approved for this grant in February 2015, and it expires on February 26, 2019. Homestead WC intends to use the funds to implement management approaches that are identified in this Plan.

## Source Water Assessment Report Review

Homestead WC 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 management approaches to protect the source waters of Homestead WC from potential contamination. A copy of the Source Water Assessment Report for Homestead WC can be obtained by contacting the Homestead WC or by downloading a copy from the CDPHE's SWAP program website located at: <https://www.colorado.gov/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 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 source water assessment area that was delineated as part of the Homestead WC'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 Source Water Assessment Area for each of the Homestead WC's sources, the Steering Committee chose to modify it before accepting it as their Source Water Protection Area for this Source Water Protection Plan.

The SWPA is divided into three zones, which helped guide the potential contaminant source inventory and risk assessment determination during development of this Plan. The theory behind this is that the closer the potential contaminant is to a drinking water intake, the quicker it can reach the intake, thus causing impairments and disruptions to the water system. The zones will also help to guide the implementation of best management practices upon completion of this Plan. Homestead WC's Source Water Protection Areas are defined as:

1. **Zone 1** is defined as a 500-foot radius around each groundwater wellhead and surface water intake.

2. **Zone 2** encompasses the direct drainages to the two surface water intakes.
3. **Zone 3** is made up by a portion of the South Turkey Creek Watershed boundary upstream of the surface water diversions.

The Source Water Protection Area is illustrated in the following map.

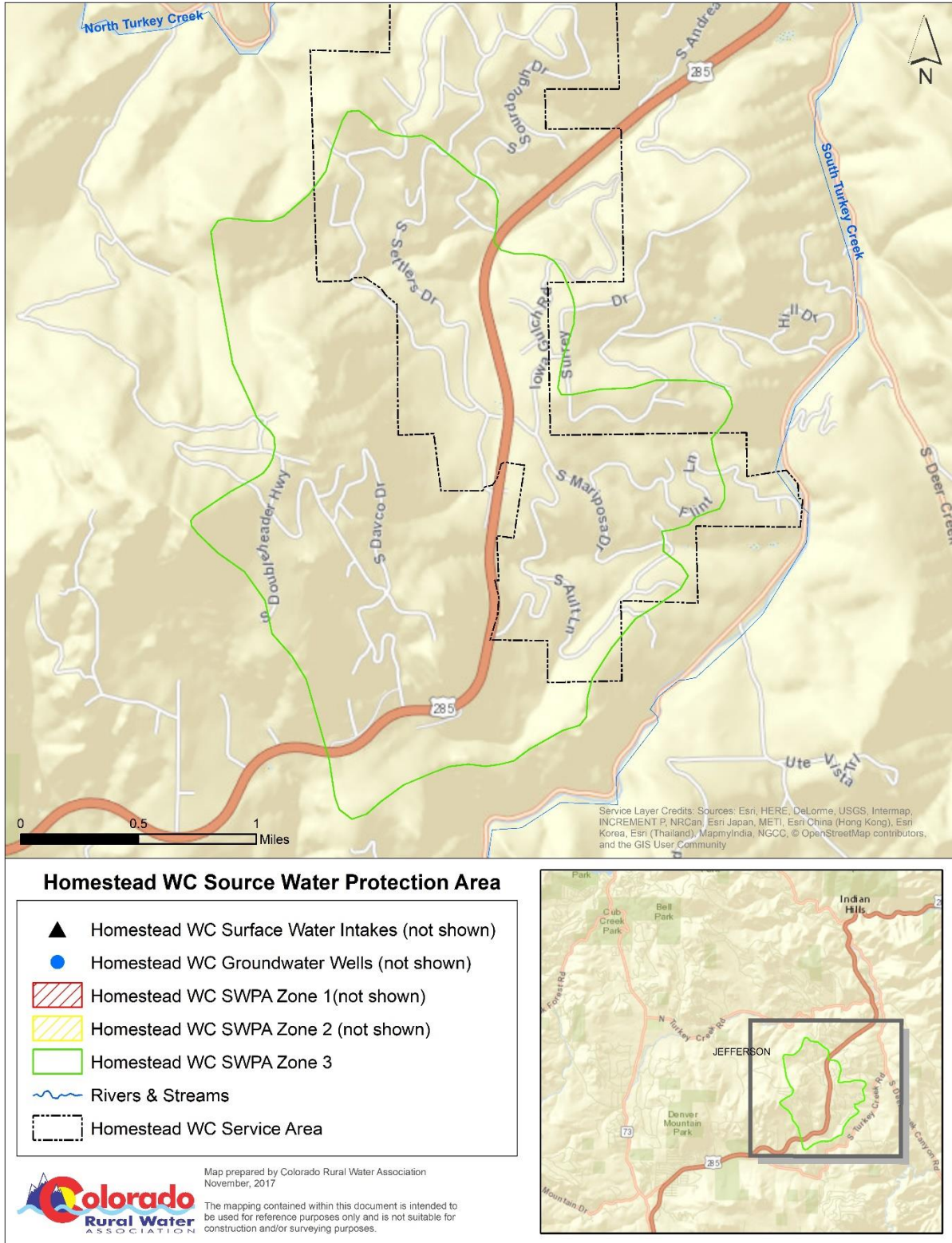


Figure 11: Homestead WC Source Water Protection Area

## 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 Colorado Department of Public Health and Environment to identify selected potential sources of contamination that might be present within the source water assessment areas. 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).

The Homestead WC was asked, by CDPHE, to review the inventory information, field-verify selected information about existing and new contaminant sources, and provide feedback on the accuracy of the inventory. Through this Source Water Protection Plan, the Homestead WC is reporting its findings to the CDPHE.

After much consideration, discussion, and input from local stakeholders, the Homestead WC and the Steering Committee have developed a more accurate and current inventory of contaminant sources located within the Source Water Protection Area and other issues of concern that may impact the Homestead WC's drinking water sources.<sup>1</sup> 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 the Homestead WC's drinking water sources (see Table 5: Potential Sources of Contamination and Issues of Concern Prioritization Table). Upon completion of this contaminant source inventory, the Homestead WC 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, the Homestead WC prioritized each item to guide the implementation of the best management practices outlined in this Source Water Protection Plan (see Table 6: Source Water Protection Best Management Practices). 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 best management practices 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. The Homestead WC utilized CRWA's *SWAP Risk Assessment Matrix* (Appendix C), 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

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<sup>1</sup> The information contained in this Plan is limited to that available from public records and the Homestead WC 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.

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
- **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 D-G). 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.

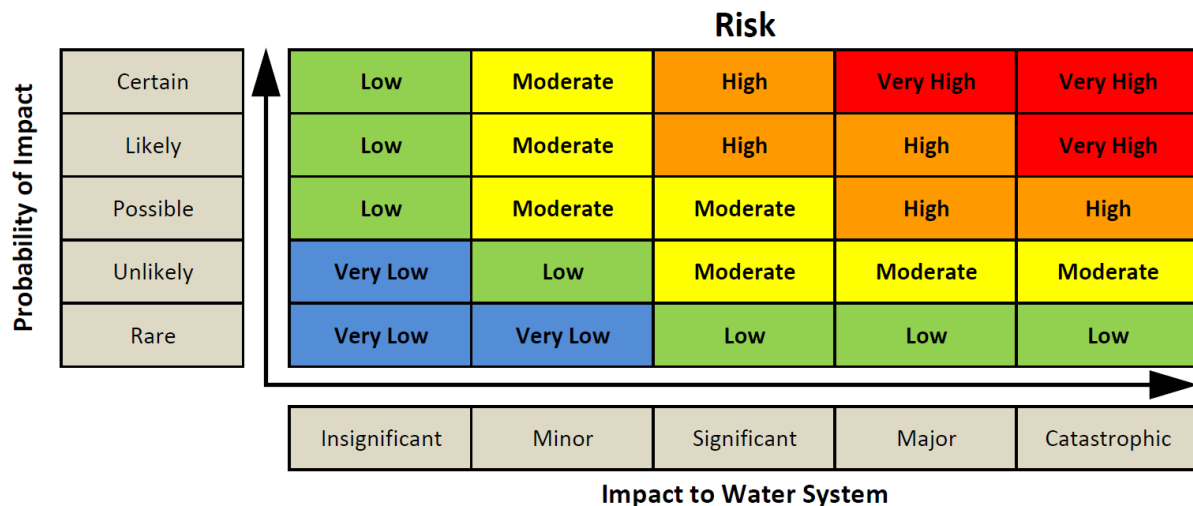


Figure 12: CRWA’s SWAP Risk Assessment Matrix

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 the Homestead WC developed (Table 6: Source Water Protection Best Management Practices).

The Homestead WC and Steering Committee ranked the potential contaminant source inventory and issues of concern in the following way:

Table 5: Potential Contaminant Sources and Issues of Concern Prioritization Table

Potential Contaminant Source or Issue of Concern	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)	BMPs <sup>2</sup>	Priority Ranking
Wildfire	Rare	Minor	Very Low	No		1
Commercial Operations	Unlikely	Major	Moderate	Indirect		1
Roads	Likely	Significant	High	Indirect		1
Residential Practices	Rare	Minor	Very Low	Indirect		2
Onsite Wastewater Treatment Systems	Likely	Minor	Moderate	Indirect		2
Chemical De-Icers / Weed Abatement	Possible	Insignificant	Low	Indirect		2
Security/Vandalism	Unlikely	Major	Moderate	Indirect		3

<sup>2</sup> The prioritization of the potential contaminant sources or issues of concern may be affected by the feasibility of implementing the BMPs that were developed. See Table 6: Source Water Protection Best Management Practices for details.



## 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.

### Wildfire

Homestead WC's SWPA contains heavily forested lands and wildfires are a high priority concern to the Steering Committee. Homestead WC has not seen any effects to their drinking water sources due to wildfires, however if a major wildfire were to occur in the SWPA and surrounding lands, it could have an impact on the source waters by altering land cover and watershed hydrology. This can result in soil erosion and sediment and ash pollution in source water supplies, which present challenges to water treatment operations. Large rain events can produce mudslides, and debris flows capable of destroying water infrastructure and impacting water quality.

Chemicals used in fire retardants may also have a negative impact on drinking water sources. Fire retardants made up of ammonium based compounds containing phosphate or sulfate, are usually red in color due to a small percentage of iron oxide (Figure 1). Generally considered harmless to humans and land animals, fire retardants do have some level of toxicity to aquatic organisms. The most toxic component of a retardant product is the corrosion inhibitor. If a fire retardant was used near a wellhead, it could possibly seep into the well over time, particularly if the wellhead was damaged, or if it is located in an area where storm water drains. In these situations, monitoring ammonia and nitrate concentrations for a period of several months is recommended. (Waskom, Kallenberger, Grotz, & Bauder, 2014)



*Figure 13: Fire retardant seen on trees two months after the High Park Fire in 2012 (Waskom, Kallenberger, Grotz, & Bauder, 2014)*

On December 31, 2011, the US Forest Service signed a new direction to approve the use of aerially applied fire retardant and implement an adaptive management approach that protects resources and improves the documentation of retardant effects through reporting, monitoring and application coordination on US Forest Service lands. Aerial retardant drops are not allowed in mapped avoidance areas for certain threatened, endangered, proposed, candidate, or sensitive (TEPCS) species or waterways. All waterways were given at least a 300-foot buffer avoidance area. A waterway is defined as a body of water including lakes, rivers, streams and ponds whether or not they contain aquatic life (U.S. Department of Agriculture Forest Service, June 2015).

#### Wildfire Best Management Practices Recommendations:

- Provide a copy of the final Source Water Protection Plan along with GIS shapefiles of the source water protection area to US Forest Service, Colorado State Forest Service, Colorado Division of Fire Prevention & Control, Evergreen Fire Protection District, and the Jefferson County Office of



Emergency Management for consideration when planning and implementing wildfire mitigation projects.

- Continue to implement the Community Wildfire Protection Plan
- Educate homeowners about the importance of maintaining proper defensible space, fuel break thinning, etc.

## Commercial Operations

There are several businesses in Homestead WC's SWPA including a restaurant, gas station, industrial equipment storage yard, and a fire station who use chemicals and produce chemical waste to carry out their business functions. Improper storage and disposal of chemicals from these users can reach ground or surface water through a number of pathways. If substances from these businesses are accidentally or intentionally discharged into sewers, contamination of ground and surface waters can occur (US Environmental Protection Agency, 2001).

The Resource Conservation and Recovery Act (RCRA), which was passed in 1976, was established to set up a framework for the proper management of hazardous waste. Hazardous waste is regulated under Subtitle C of RCRA. EPA has developed a comprehensive program to ensure that hazardous waste is managed safely from the moment it is generated to its final disposal (cradle-to-grave). Under Subtitle C, EPA may authorize states to implement key provisions of hazardous waste requirements in lieu of the federal government (US Environmental Protection Agency, 2017). In Colorado, the CDPHE is responsible for regulating and enforcing compliance with RCRA. Businesses that generate hazardous waste, as it is defined under RCRA, must comply with the Colorado Hazardous Waste Act for managing and disposing of hazardous wastes (CDPHE Hazardous Materials and Waste Management Division, 2008).

### Commercial Operations Best Management Practices Recommendations:

- Meet with various commercial operations within the SWPA to raise awareness about source water protection and to distribute Emergency Response Cards.

## Roads

Homestead WC's SWPA is served by a large network of roads and lie within state and county jurisdictions. These include US Highway 285 which is maintained by the Colorado Department of Transportation (CDOT); and county roads which are maintained by the Jefferson County Road & Bridge Department. The Steering Committee is concerned with impacts from these roadways affecting Homestead WC's drinking water sources.

Motor vehicles, roads, and parking facilities are a major source of water pollution to both surface and groundwater. An estimated 46% of US vehicles 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 & Sage, 2006). Storm water runoff over these roads can deliver contaminants from the road surface into the nearby groundwater.

Vehicular spills may occur along the transportation route within the SWPAs from trucks that transport fuels, waste, and other chemicals that have a potential for contaminating the groundwater. Chemicals from accidental spills are often diluted with water, potentially washing the chemicals into the soil and infiltrating into the groundwater. Roadways are also frequently used for illegal dumping of hazardous or other potentially harmful wastes. While Homestead WC has not seen any impacts to their drinking water sources due to accidents on roadways, this a concern to them as impact to their system could be significant.

Accidents on Roadways Best Management Practices Recommendations:

- Develop an Emergency Notification card that contains current contact information for the public water system and map of drinking water intakes and the SWPA. Share with Emergency Responders (Colorado State Patrol, Colorado Department of Transportation, Jefferson County Road & Bridge Department, Jefferson County Office of Emergency Management, Inter-Canyon Fire Department, etc.) and other transit companies to ensure that Homestead is notified of spills quickly enough to shut off the wells to minimize impact from the spill.
- Maintain current water system contact information, on an annual basis, with Emergency Responders to improve notification of spill response activities.
- Install Drinking Water Protection Area signs at strategic locations throughout source water protection area.
- Share copy of SWPP with Colorado Department of Transportation & Jefferson County Road & Bridge
- Present SWPP to Local Emergency Planning Commission

## Residential Practices

Homestead WC’s SWPA includes many residential properties. Common household practices including washing vehicles, lawn fertilization and pet wastes can allow chemicals and biologic pollutants to runoff residential property and enter the surface or ground water as indicated in Figure 14.

The Steering Committee believes that educating community members and decision-makers about source water protection efforts is essential to the prevention of drinking water contamination. Public education can help community members understand the potential threats to their drinking water sources and motivate them to participate as responsible citizens to protect their valued resources.

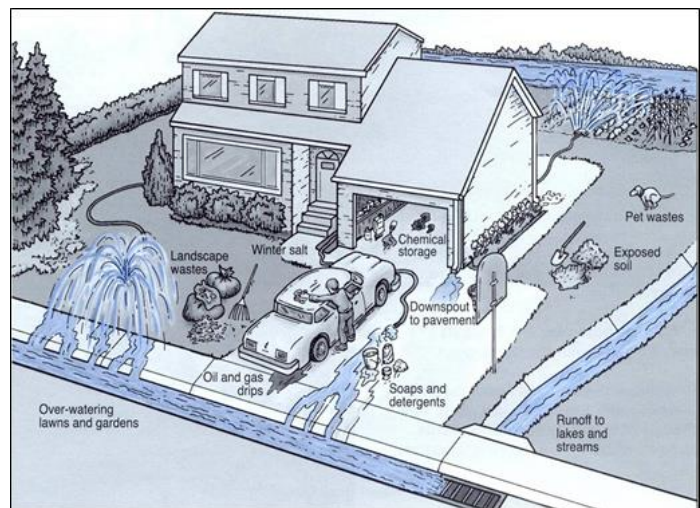


Figure 14: Residential Practices (Colorado State University Extension/NRCS, 2017)

Residential Practices Best Management Practices Recommendations:

- Collaborate with the Jefferson County Public Health Department to conduct public education and outreach programs for landowners and residents in the source water protection area to report issues and to encourage practices that will protect their drinking water source from potential contamination. This could include mailing educational water bill inserts, public presentations, website links, school presentations, etc.
- Promote Jefferson County Drug Take-Back Days and consider hosting an event
- Create a new homeowner packet for new residents to educate them on proper BMPs to protect source waters
- Continue to remain active on social media platforms such as NextDoor and Facebook

**Onsite Wastewater Treatment Systems**

There are areas within Homestead WC's SWPA that include properties that rely on onsite wastewater treatment systems (OWTS) to dispose of their sewage. An OWTS, commonly known as a septic system, consists of a septic tank that collects all the wastewater and a soil treatment area that disperses the liquid effluent onto a leach field for final treatment by the soil.

Unapproved, aging, and failing septic systems have a large impact on the quality and safety of the water supply. The failure of property owners to pump solids that accumulate in the septic tank may lead to premature failure of the soil treatment area. This in turn can cause untreated wastewater to back up into the home or to surface on the ground. If managed improperly, these residential septic systems can contribute excessive nutrients, bacteria, pathogenic organisms, and chemicals to the groundwater. While OWTSs are the second most frequently cited source of groundwater contamination in our country, the Homestead has not seen any impacts to their drinking water due to improper maintenance or failure of OWTSs.

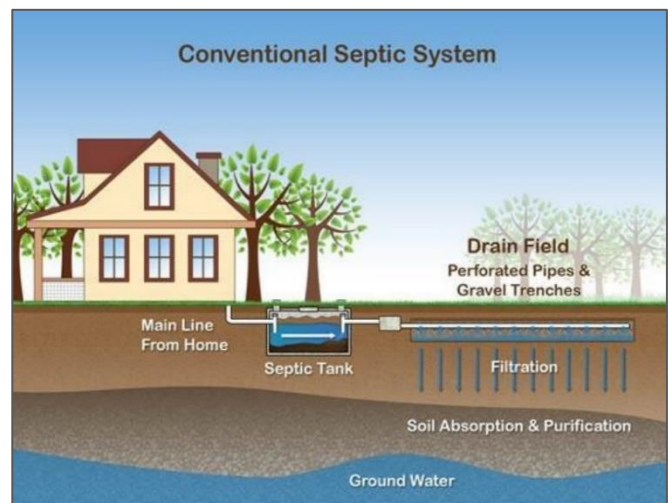


Figure 15: Conventional Septic System (Tri-County Health Department, 2016)

In Jefferson County, individual sewage disposal systems are permitted by the Jefferson County Public Health Department. The Jefferson County Public Health Department administers and enforces the minimum standards, rules, and regulations under the authority of the On-Site Wastewater Treatment Act under Colorado State Statute 25-10-101. It is unknown at this time the number of septic systems within Jefferson County, the number of unapproved systems currently in use and the age of all septic systems in the county. The absence of effective monitoring and education increases the risk of excessive contaminants from OTWS entering the groundwater.

Unmaintained OWTS Best Management Practices Recommendations:

- Collaborate with the Jefferson County Building Department to locate and map all the active (and potentially inactive) OTWS within Zone 1 of the SWPA.

- Collaborate with the Jefferson County Public Health Department to provide OWTS owners within the source water protection area with educational material on the proper use and maintenance of their OWTS.
- Promote Jefferson County Drug Take-Back Days and consider hosting an event

## **Chemical De-Icers & Weed Abatement on Roadways**

### Chemical De-Icers

During the winter season, CDOT may apply a salt-sand mixture and de-icer (magnesium chloride, M1000, or Ice Slicer), and Jefferson County Road & Bridge may apply a salt to routes within the SWPA. Surface and groundwater quality problems resulting from the use of road de-icers can cause concern among federal, state, and local governments.

Salt contributes to increased chloride levels in groundwater through infiltration of runoff from roadways. Unlike other contaminants, such as heavy metals or hydrocarbons, chloride is not naturally removed from water as it travels through soil and sediments and moves towards the water table. Once in the groundwater, it may remain for a long time if groundwater velocity is slow and it is not flushed away. Chloride may also be discharged from groundwater into surface water and can account for elevated levels of chloride throughout the year, not just in winter. Thus, regardless of the path that the runoff takes, salt poses a water quality problem.

### Dust Abatement on Roads

Dust abatement containing magnesium chloride may be applied to unpaved county roads within the Source Water Protection Area. Dust suppressants abate dust by changing the physical properties of the road surface by creating a hard, compact surface that resists potholing, rutting, and loss of aggregate. The use of chemical dust suppressants prevents road particulates from becoming airborne.

Magnesium chloride, used in dust abatement, is highly soluble in water and has the potential to move through the soil with water. The movement is dependent on the rate and frequency of rainfall, the drainage characteristics, and soil type. If the soil surface is not bound together well or if the rain event is extreme, dust suppressant treated soil particles can be carried by overland flow into streams, rivers, and ditches. Potential water quality impacts include elevated chloride concentrations in streams downstream of application areas and shallow groundwater contamination (US Environmental Protection Agency, 2002).

### Weed Abatement

The Jefferson County Road and Bridge Department is responsible for roadside noxious weed control within Homestead WC's SWPA, and the Jefferson County Invasive Species Management program helps the public by developing integrated management plans to control mountain pine beetle and noxious weeds. Homeowners are responsible for weed abatement on private property.

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.
- 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 (Colorado Weed Management Association, 2016)

Homestead WC tests for herbicides annually and has not seen any impact to their drinking water sources from herbicides or other methods of weed abatement. However, there have been testing holes set up in the areas surrounding the SWPA and there are indications of herbicides moving through the groundwater.

#### Chemical De-Icers & Weed Abatement Best Management Practices Recommendations:

- Develop an Emergency Notification card that contains current contact information for the public water system and map of drinking water intakes and the SWPA. Share with Jefferson County, Colorado Department of Transportation and the US Forest Service in an effort to facilitate contact in the event of a spill as well as enlist their support in the protection of the source water intakes.
- Educate homeowners on the proper use of pesticides/herbicides

## **Security/Vandalism**

Although there have been no major acts of vandalism to Homestead WC's water supplies, this is still a concern for the Steering Committee. While the probability for these acts to occur is rare, this remains a concern, as the impacts could be major. Water infrastructure could be targeted directly, or water can be contaminated through the introduction of poisonous chemicals or disease-causing biological agents (Gleick, 2006). The Steering Committee recommends replacing or installing new signage, fencing, and security gates to the area as well as placing security cameras or motion lighting and alarms at or near intakes.

#### Security Best Management Practices Recommendations:

- Work to improve security on all wellheads and critical equipment. This could include fencing and intrusion alarms or surveillance system.
- Remain vigilant to recognize if/when vandalism/tampering occurs.
- Install Drinking Water Protection Area signs at strategic locations throughout source water protection area.
- Share Source Water Protection Plan and maps with area law enforcement.
- Empower residents to expand neighborhood watch program

## **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	Priority Ranking	Best Management Practices
<b>Wildfire</b>	1	<ul style="list-style-type: none"> <li>• Provide a copy of the final Source Water Protection Plan along with GIS shapefiles of the source water protection area to US Forest Service, Colorado State Forest Service, Colorado Division of Fire Prevention &amp; Control, Inter-Canyon Fire Department, and the Jefferson County Office of Emergency Management for consideration when planning and implementing wildfire mitigation projects.</li> <li>• Continue to implement the Community Wildfire Protection Plan</li> <li>• Educate homeowners about the importance of maintaining proper defensible space, fuel break thinning, etc.</li> </ul>
<b>Commercial Operations</b>	1	<ul style="list-style-type: none"> <li>• Meet with various commercial operations within the SWPA to raise awareness about source water protection and to distribute Emergency Response Cards.</li> </ul>
<b>Roads</b>	1	<ul style="list-style-type: none"> <li>• Develop an Emergency Notification card that contains current contact information for the public water system and map of drinking water intakes and the SWPA. Share with Emergency Responders (Colorado State Patrol, Colorado Department of Transportation, Jefferson County Road &amp; Bridge Department, Jefferson County Office of Emergency Management, Evergreen Metro Fire Department, etc.) and other transit companies to ensure that Homestead is notified of spills quickly enough to shut off the wells to minimize impact from the spill.</li> <li>• Maintain current water system contact information, on an annual basis, with Emergency Responders to improve notification of spill response activities.</li> <li>• Install Drinking Water Protection Area signs at strategic locations throughout source water protection area.</li> <li>• Consider adding a berm near the wells to direct any spills away from wellheads</li> <li>• Share copy of SWPP with Colorado Department of Transportation &amp; Jefferson County Road &amp; Bridge</li> <li>• Present SWPP to Local Emergency Planning Commission</li> </ul>
<b>Residential Practices</b>	2	<ul style="list-style-type: none"> <li>• Collaborate with the Jefferson County Public Health Department to conduct public education and outreach programs for landowners and residents in the source water protection area to report issues and to encourage practices that will protect their drinking water source from potential contamination. This could include mailing educational water bill inserts, public presentations, website links, school presentations, etc.</li> <li>• Promote Jefferson County Drug Take-Back Days and consider hosting an event</li> </ul>



Issues	Priority Ranking	Best Management Practices
		<ul style="list-style-type: none"> <li>• Create a new homeowner packet for new residents to educate them on proper BMPs to protect source waters</li> <li>• Continue to remain active on social media platforms such as NextDoor and Facebook</li> </ul>
<b>Onsite Wastewater Treatment Systems</b>	2	<ul style="list-style-type: none"> <li>• Collaborate with the Jefferson County Building Department to locate and map all the active (and potentially inactive) OTWS within Zone 1 of the SWPA.</li> <li>• Collaborate with the Jefferson County Public Health Department to provide OWTS owners within the source water protection area with educational material on the proper use and maintenance of their OWTS.</li> <li>• Promote Jefferson County Drug Take-Back Days and consider hosting an event</li> </ul>
<b>Chemical De-Icers / Weed Abatement</b>	2	<ul style="list-style-type: none"> <li>• Develop an Emergency Notification card that contains current contact information for the public water system and map of drinking water intakes and the SWPA. Share with Jefferson County, Colorado Department of Transportation and the US Forest Service in an effort to facilitate contact in the event of a spill as well as enlist their support in the protection of the source water intakes.</li> <li>• Educate homeowners on the proper use of pesticides/herbicides</li> </ul>
<b>Security/Vandalism</b>	3	<ul style="list-style-type: none"> <li>• Work to improve security on all wellheads and critical equipment. This could include fencing and intrusion alarms or surveillance system.</li> <li>• Remain vigilant to recognize if/when vandalism/tampering occurs.</li> <li>• Install Drinking Water Protection Area signs at strategic locations throughout source water protection area.</li> <li>• Share Source Water Protection Plan and maps with area law enforcement.</li> <li>• Empower residents to expand neighborhood watch program</li> </ul>



## **EVALUATING EFFECTIVENESS OF SOURCE WATER PROTECTION PLAN**

The Homestead WC 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 this Plan be reviewed at a frequency of once every three to five years or if circumstances change resulting in the development of new water sources and source water protection areas, or if new risks are identified.

The Homestead WC 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<sup>3</sup>**

- A. Source Water Assessment Report
- B. Source Water Assessment Report Appendices
- C. CRWA's SWAP Risk Assessment Matrix
- D. Table A-1 Discrete Contaminant Types
- E. Table A-2 Discrete Contaminant Types (SIC Related)
- F. Table B-1 Dispersed Contaminant Types
- G. Table C-1 Contaminants Associated with Common PSOC's
- H. MOU Between CDPHE and U.S. Forest Service Rocky Mountain Region

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<sup>3</sup> All appendices are located on the CD version of this SWPP.