# City of Salida
# Source Water Protection Plan

## Chaffee County, Colorado
## January 31, 2018

Written by: Colleen Williams
Source Water Specialist
Colorado Rural Water Association

For the Water Provider:
City of Salida: ID # CO0108700

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# TABLE OF CONTENTS

# ACRONYMS

| | |
|---|---|
| AST | Aboveground Storage Tanks |
| BLM | Bureau of Land Management |
| BMP | Best Management Practice |
| CCR | Consumer Confidence Report |
| CDPHE | Colorado Department of Public Health and Environment |
| CRWA | Colorado Rural Water Association |
| CSP | Colorado State Patrol |
| CWPP | Community Wildfire Protection Plan |
| DERA | Designated Emergency Response Authority |
| DOC | Dissolved Organic Carbon |
| DOLA | Department of Local Affairs |
| DWR | Division of Water Resources |
| EOC | Emergency Operations Center |
| EPA | Environmental Protection Agency |
| GIS | Geographic Information System |
| LEOP | Local Emergency Operations Plan |
| LUST | Leaking Underground Storage Tank |
| MOU | Memorandum of Understanding |
| MRDS | Minerals Resource Data System |
| NPDES | National Pollutant Discharge Elimination System |
| OEM | Office of Emergency Management |
| OWTS | Onsite Wastewater Treatment System |
| PSOC | Potential Source of Contamination |
| SWAA | Source Water Assessment Area |
| SWAP | Source Water Assessment and Protection |
| SWPA | Source Water Protection Area |
| SWPP | Source Water Protection Plan |
| USFS | United States Forest Service |
| UST | Underground Storage Tank |
| WQCC | Water Quality Control Commission |
| WFDSS | Wildfire Decision Support System |

# 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 implement to decrease 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 City of Salida values a clean, high quality drinking water supply and decided to work collaboratively with area stakeholders to develop a source water protection plan (SWPP). The planning meeting were held during the months of September 2017 to January 2018 in Salida, Colorado. During the development of this SWPP, a steering committee was formed to develop and implement this SWPP. The Colorado Rural Water Association was instrumental in this effort by providing technical assistance in the development of this SWPP.

The City of Salida obtains its drinking water supply from the South Arkansas River via the Harrington Ditch, groundwater infiltration galleries in the South Arkansas River alluvium, and Pasquale Springs. The source water protection area includes the South Arkansas River watershed and the drainage basin recharging Pasquale Springs. This SWPA is the area that City of Salida 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 SWPA that may impact the drinking water sources. The steering committee prioritized the list of issues of concern as high risk: spills on roads, wildland fires, storm water runoff, security and vandalism, flooding; and moderate risk: fuel storage tanks, agricultural chemicals storage and use, wastewater dischargers, ditch integrity, mining, septic systems, commercial facilities, sewerage system breaks, road sediment and maintenance.

The steering committee developed several best management practices (BMPs) that may help reduce the risks from the potential contaminant sources and other issues of concern. The BMPs are centered on the themes of building partnerships with community members 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.

At the completion of this plan, members of the steering committee will meet to develop an action plan of BMPs to implement during 2018. It is recommended that the SWPP be reviewed at a frequency of once every three years or if circumstances change resulting in the development of new water sources and source water protection areas, or if new risks are identified.

# OVERVIEW OF COLORADO'S SWAP PROGRAM

Source water assessment and protection came into existence in 1996 because of Congressional reauthorization and amendment of the Safe Drinking Water Act. The 1996 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. Colorado's SWAP program is a two-phased process designed to assist public water systems in preventing potential contamination of their untreated drinking water supplies.

## Source Water Assessment Phase

The Assessment Phase for all public water systems consists 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 public.

The Assessment Phase involves understanding where the City of Salida's source water comes from, what contaminant sources potentially threaten the water source, and how susceptible the water source is to potential contamination.

## Source Water Protection Phase

The Protection Phase is a voluntary, 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. 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 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.

# INTRODUCTION

The City of Salida operates a municipal supply water system that supplies drinking water to 5,300 residents of the city located in Chaffee County, Colorado. City of Salida obtains their drinking water from the South Arkansas River via the Harrington Ditch, groundwater infiltration galleries in the South Arkansas River alluvium, and Pasquale Springs. They recognize the potential for contamination of the source of their drinking water and realize that it is necessary to develop a protection plan to prevent the contamination of this valuable resource. Proactive planning and implementing contamination prevention strategies are essential to protect the long-term integrity of their water supply and to limit their costs and liabilities.[1]

Table 1. Primary Contact Information for the City of Salida

| PWSID | PWS Name | Name | Address | Phone |
|---|---|---|---|---|
| CO0108700 | City of Salida | David Lady | 340 West Highway 291<br>Salida, CO | 719-539-6257 |

## Purpose of the Source Water Protection Plan

The Source Water Protection Plan is a tool for the City of Salida to ensure clean and high-quality drinking water sources for current and future generations. This SWPP 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 community) will complement existing regulatory mandates implemented at the state and federal governmental levels by filling any gaps through local management strategies that are collaboratively developed.

[1] The information contained in this Plan is limited to that available from public records and the City of Salida 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.

## Protection Plan Development

The Colorado Rural Water Association's (CRWA) Source Water Protection Specialist, Colleen Williams, helped facilitate the source water protection planning process. The goal of the CRWA's Source Water Protection Program is to assist rural and small communities served by public water systems to reduce or eliminate the potential risks to drinking water supplies through the development of source water protection plans and provide assistance for the implementation of prevention measures.

The source water protection planning effort consisted of a series of public planning meetings and individual meetings (Table 2). Information discussed at the meetings helped the City of Salida develop an understanding of the issues affecting source water protection for the community. The steering committee then made recommendations for management approaches to be incorporated into the SWPP. In addition to the planning meetings, data and other information pertaining to the SWPA was gathered via public documents, internet research, phone calls, emails, and field trips to the SWPA. A summary of the meetings is represented below.

Table 2. Planning Meetings

| Date | Purpose of Meeting |
|---|---|
| April 11, 2016 | Provided a presentation to the City of Salida Board of Directors on Colorado Rural Water Association's Source Water Protection Program and developing a source water protection plan. |
| September 27, 2017 | First Planning Meeting – Presentation on the process of developing a source water protection plan for the City of Salida. Overview of Salida's water system; delineation of the source water protection area; and information sharing about the source waters and watershed. |
| October 25, 2017 | Second Planning Meeting – Identify potential contaminant sources and issues of concern. |
| November 29, 2017 | Third Planning Meeting – Prioritize risks to source waters and develop best management practices. |
| January 31, 2018 | Fourth Planning Meeting – Review draft source water protection plan. set date for the final edits and first plan implementation meeting. |

## Stakeholder Participation in the Planning Process

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. The City of Salida's source water protection planning process attracted interest and participation from 21 stakeholders including landowners, water operators, local and county governments, and agency representatives (Table 3). During the months of September 2017 – January 2018, four stakeholder meetings were held at the Monarch Room in the Riverside Annex, located at 220 West Sackett Avenue, Salida, Colorado to encourage local stakeholder participation in the planning process. Input from these participants was greatly appreciated.

Table 3. Table of Stakeholders Who Participated on the Steering Committee

| Stakeholder | Title | Affiliation |
|---|---|---|
| David Lady | Public Works Director | City of Salida |
| Lonnie Oversole | Water plant Manager | City of Salida |
| Aaron Oversole | Water Department | City of Salida |
| Justin Watts | Water Department | City of Salida |
| Kevin Nelson | Public Works Department | City of Salida |
| Jim LiVecchi | Mayor | City of Salida |
| Larry Lorentzen | Administrator | City of Salida |
| Cheryl Brown-Kovacic | City Council | City of Salida |
| Doug Bess | Fire Department Chief | City of Salida |
| Wano Urbonas | Environmental Health Manager | Chaffee County |
| Greg Felt | County Commissioner | Chaffee County |
| Jon Rooda | Planning Manager | Chaffee County |
| Phil Graham | Office of Emergency Management | Chaffee County |
| Brian Berger | Town Administrator | Town of Poncha Springs |
| Chris Naccarato | PCICC Mountain Zone FMO | USDA Forest Service |
| Jord Gertson | | Upper Arkansas Water Conservancy District |
| Chelsey Nutter | Project Manager | Upper Arkansas Water Conservancy District |
| John Smeins | Eastern CO, Resource Management Plan Project Manager | Bureau of Land Management |
| Craig Bissonnette | Inactive Mine Program | Division of Reclamation, Mining and Safety |
| Andrew Rice | | Providence Infrastructure Consultants |
| Colleen Williams | Senior Source Water Specialist | Colorado Rural Water Association |

# WATER SUPPLY SETTING

## Location and Description

The City of Salida is a rural community located in central Colorado in the Upper Arkansas River Valley (Fig. 1). U.S. Highway 50 runs along the southern edge of the city. Salida is located at Latitude 38°31'53"N, Longitude 105°59'46"W at an elevation of 7,083 feet. As an incorporated statutory city, its municipal affairs are governed by the Salida City Council. The city has a total area of 2.64 square miles (6.83 $km^2$) and 2,894 residential dwellings. According to the U.S. Census Bureau, the population of Salida in 2000 was 5,504 and in 2010 was 5,236, a decrease of 4.87% (DOLA, 2012). The current population is estimated to be 5,300 residents.

Salida is the county seat and most populous city of Chaffee County, which covers a total area of 1,015 square miles.

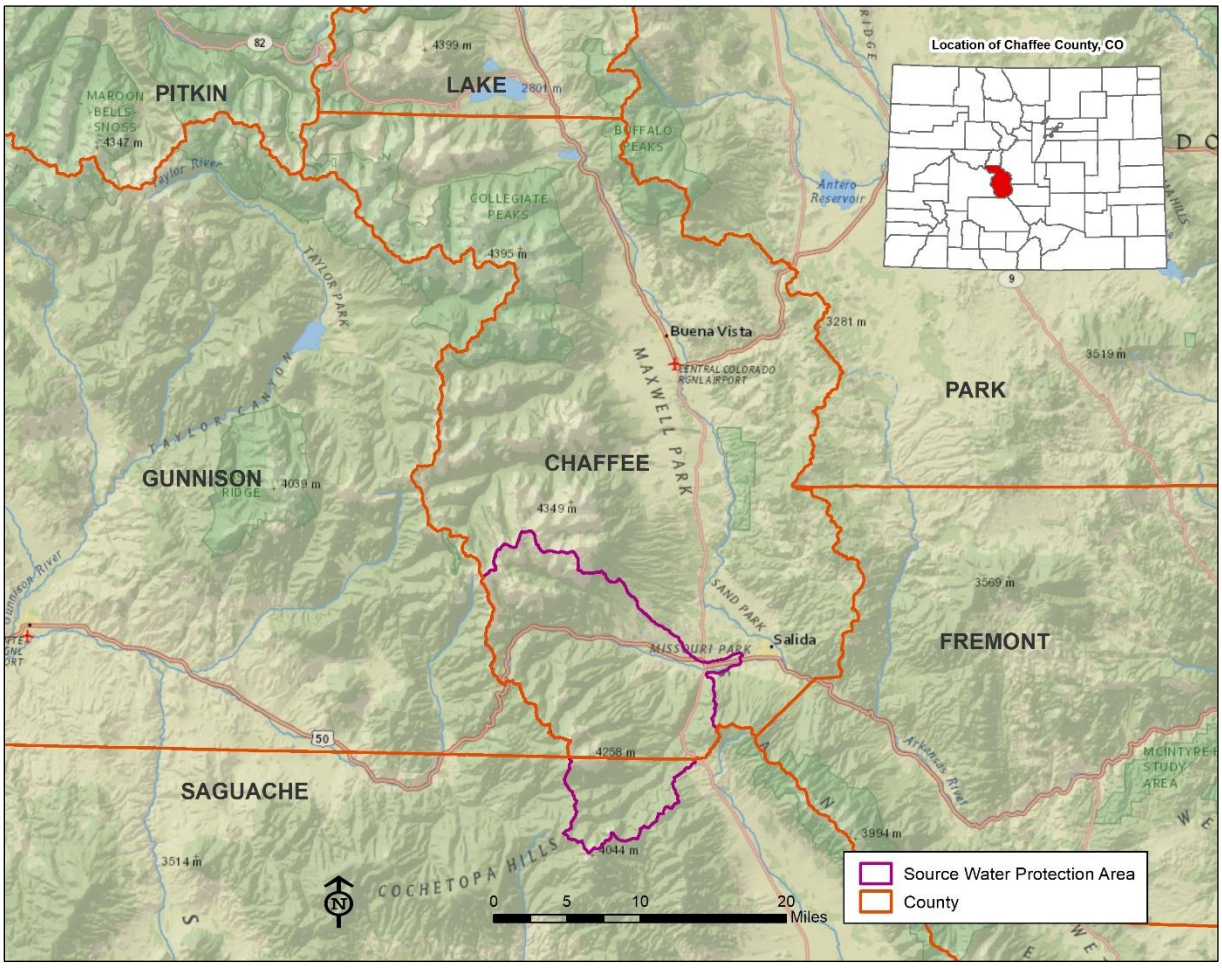



Figure 1. Regional setting map.

## Physical Characteristics

The City of Salida's source water protection area, the South Arkansas River watershed and Pasquale Springs, lie within Southern Rocky Mountains physiographic province area that encompasses the center of the state and runs its entire north-south length. The South Arkansas River is a headwater stream that begins at the Continental Divide on Monarch Pass (11,312 feet) in the Sawatch Range, flows generally west to east, and ends at the confluence with the main stem of the Arkansas River (7,040 feet). The South Arkansas River watershed is surrounded by high mountain peaks 11,500+ feet. The highest peak in the watershed is Mount Shavano (14,229 feet) (Fig. 2) (Goosman, 2014).

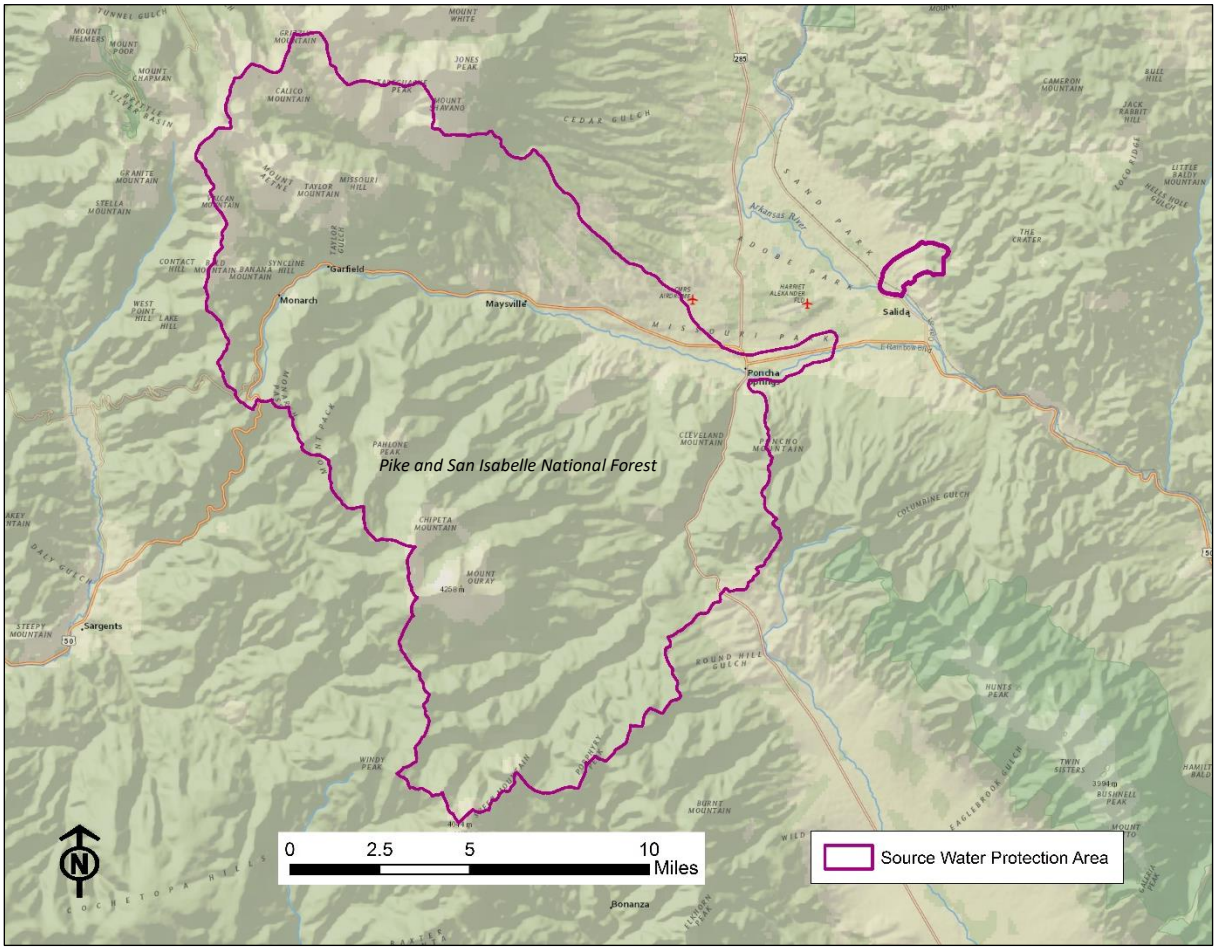
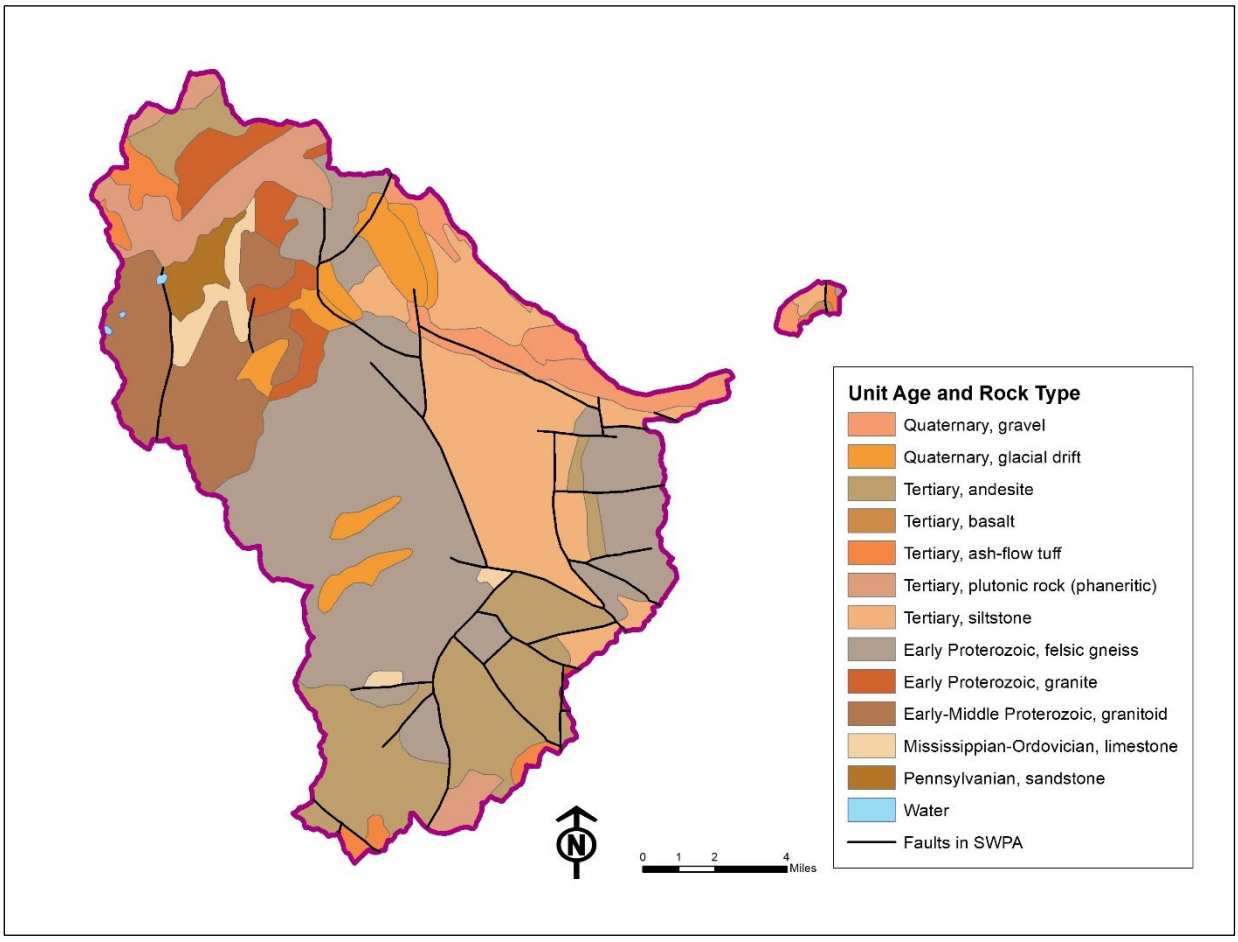



Figure 2. Topographic map of the Source Water Protection Area.

## Geology

The source water protection area lies within the Poncha Springs SE quadrangle. The geologic units mapped are Precambrian metamorphic and igneous rocks, Tertiary volcanic and semiconsolidated sedimentary rocks, and unconsolidated Pleistocene and Holocene deposits. The metamorphic rock consists of granite, gneiss, and schist. The Tertiary volcanic rock consists of ash-flow tuff and the sedimentary beds of clay, silt, sand and gravel also contain volcanic ash.

Structurally, the quadrangle is at the south end of the broad Arkansas Valley. The major structural features within the quadrangle are Precambrian folds and Tertiary faults (Fig. 3) (Van Alstine, 1974). A fault is a fracture in rock along which there has been an observable amount of displacement from extensive tectonic forces (Whitten, 1974).




SOURCE: U.S. GEOLOGICAL SURVEY

Figure 3. Geologic map of the Source Water Protection Area.

## Climate

The climate within the source water protection area is dependent on elevation and location, with precipitation increasing moderately with altitude. Average annual precipitation ranges from about 9 inches in the lowest reaches to 41 inches in the highest reaches (Fig. 4). Much of the precipitation in the higher elevations is in the form of snow during the winter and spring.

Most of the precipitation that falls on the land surface during spring and late summer storm events flows directly into drainages, streams, and rivers as runoff. Some of the water will infiltrate the soil and recharge the underlying aquifers. The average runoff for the watershed is 1.0 to 10.0 inch depending on elevation (Topper et al, 2003).

Temperatures also vary depending on elevations with average high temperatures during summer in the City of Salida around 85 degrees Fahrenheit and winter lows around 12 degree Fahrenheit. Salida receives an average of 262 days of sunshine per year.

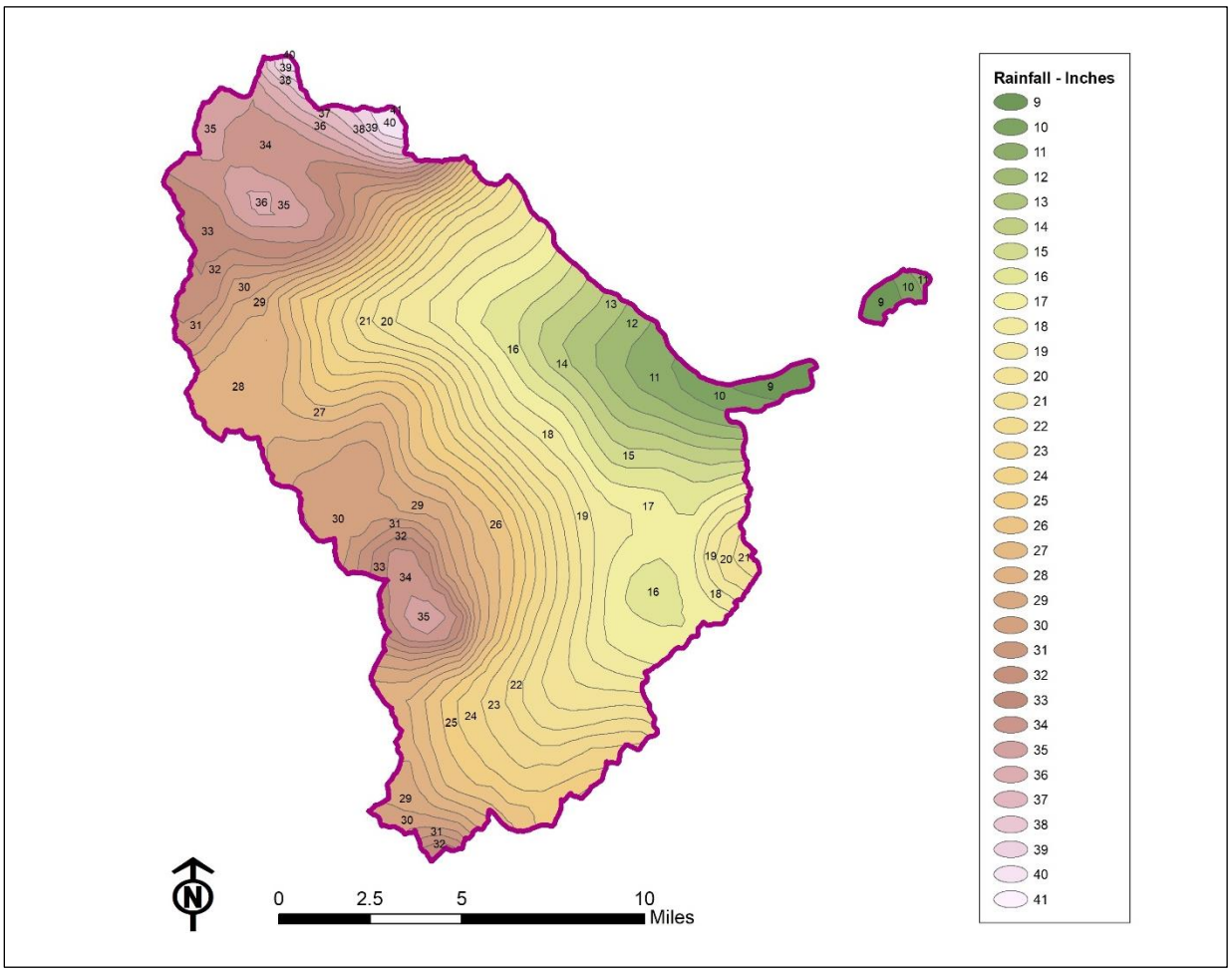



Figure 4. Average annual precipitation map of the Source Water Protection Area (1981-2010).

## Ecological Zones

The source water protection area lies within the Alpine, Subalpine, and Mid-Elevation, and Foothills Shrubland ecological life zones (Fig. 5). Life zones are determined by elevation, latitude, climate, and exposure to sunlight. Vegetation type and density (land cover) varies with altitude, topography, and slope aspect.

The Alpine Zone, the highest mountain zone above 11,000 feet, includes treeless meadows as well as steep, exposed rock and glaciated peaks. The Subalpine zone lies immediately below treeline, generally found between 9,000 and 11,000 feet. The subalpine forest is a transition zone from dense forest below to alpine tundra above treeline. A typical subalpine forest may consist mostly of subalpine fir, Engelmann spruce and Limber pine. The Montane zone or mid-elevation ecosystem ranges from 5,600 to 9,500 feet and is dominated by pines, Douglas fir and aspen. Ponderosa pine is more common on dry south-facing slopes. On north facing slopes Douglas fir may be the more dominant plant. Lodgepole pine and aspen are common at the upper elevation of the Montane (NPS, 2015). The Foothills Shrublands occur between 5,000 to 9,000 feet are characterized by dense-to-sparse deciduous shrubs.

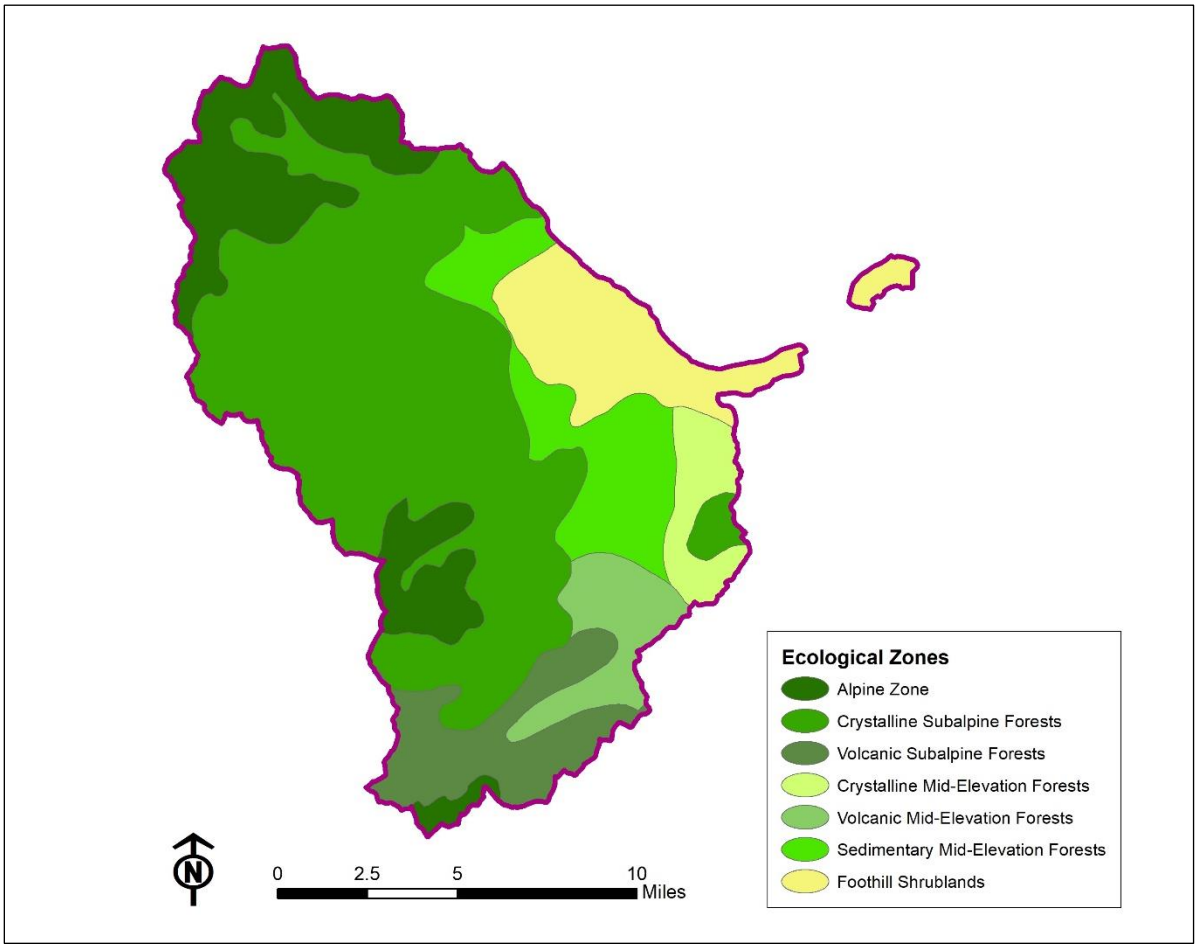



Figure 5. Ecological zones within the source water protection area.

## Land Owners and Mangers

Private Land

The Source Water Protection Area lies within both public and private lands (Fig. 6). The private land lies with the city of Salida, town of Poncha Springs and the unincorporated areas of Chaffee and Saguache County. Land use decisions on private land within Salida and Poncha Springs are made by the local government Boards. Land use decisions on private land within the unincorporated areas of Chaffee County are made by the Chaffee County Board of County Commissioners with recommendations from their Planning Commission. The Department of Planning and Zoning administers Chaffee County's land use regulatory system.

Current land use includes residential development, commercial, industrial, recreation, parks, water supply, hiking, tourism, hunting, fishing, camping, skiing, mountain biking and wildlife habitat.

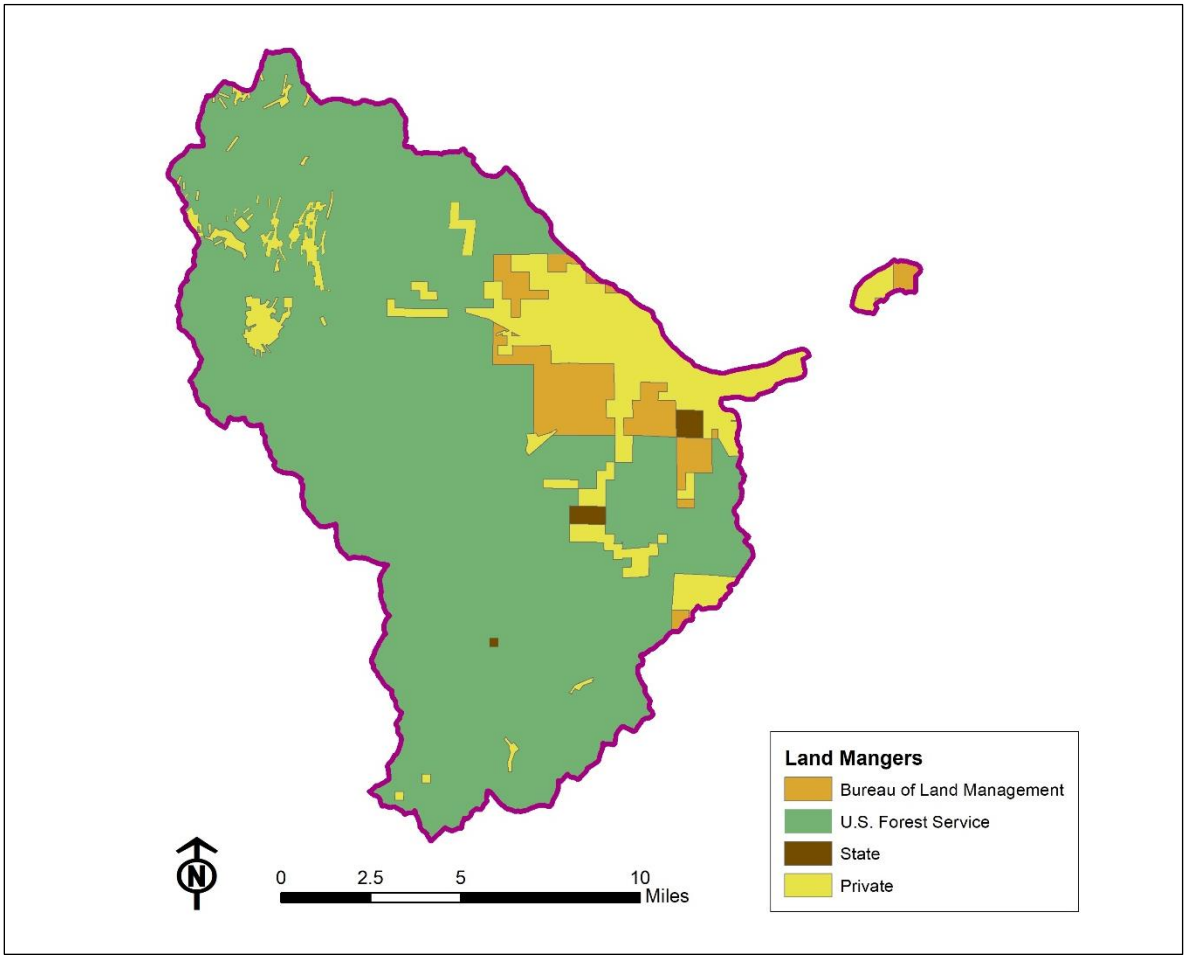



Figure 6. Land owners/managers in the Source Water Protection Area.

## Public Lands

The public lands in the source water protection area include land managed by the U.S. Department of Agriculture's Forest Service (USFS) and the U.S. Department of the Interior Bureau of Land Management (BLM). The Pike and San Isabelle National Forest land is managed by the Salida Ranger District whose office is in Salida, Colorado. The BLM land is managed by the Royal Gorge Field Office located in Canon City, Colorado.

A principal purpose for which the Forest Reserves (predecessor to the National Forest System) were established was to "secure favorable conditions of water flows" (Organic Act of 1897). Throughout its history, the U.S. Forest Service has had a very diverse and broad mission of multiple use management outlined by the Federal Land Policy and Management Act. The Act requires a balance of outdoor recreation and preservation of wildlife habitat, air and water, and other scenic and historical values with environmentally responsible commercial development of the land and its resources. The USFS mandate to manage lands for multiple-use requires balancing present and future resource use with domestic water supply needs as well as many other needs.

One of the long-term management goals of the Rocky Mountain Region is to manage the forest for water resources:

> *"Protect the resource. Maintain, and where opportunities exist, restore watershed and forest health to ensure full watershed function exhibiting high geomorphic, hydrologic, and biotic integrity. Ensure that forest management activities occur in a manner that will adequately protects the integrity of watersheds" (USFS, 2010).*

In October 2009, the Forest Service Rocky Mountain Region and the State of Colorado Department of Public Health and Environment (CDPHE) signed a Memorandum of Understanding (MOU) to establish a framework to work together on issues regarding the management and protection of water quality on state defined Source Water Assessment Areas on National Forest System lands in Colorado. Under this agreement, the Forest Service recognizes a CDPHE-delineated Source Water Area as a "Municipal Supply Watershed" per definition in USFS Manual 2542 (FSM, 2007). Municipal watersheds are to be managed under multiple use prescriptions as specified in the Land and Resource Management Plan (Forest Plan). The need to protect public water supplies is to be recognized when developing management area prescriptions. The MOU was updated in 2014 and included in the Appendices of this report (MOU, 2014).

## Management Plans

At the district level, the Salida Ranger District adheres to the management directives established under the 1984 Land and Resource Management Plan for the Pike and San Isabelle National Forest; Comanche and Cimarron National Grasslands. The BLM Royal Gorge Field Office adheres to the management directives under the 1996 Royal Gorge Resource Area Resource Management Plan.

## Emergency Management

Chaffee County is vulnerable to a wide variety of natural and man-made occurrences including droughts, blizzards, tornadoes, floods, wildfire, hail, severe thunderstorms, winter ice storms, as well as industrial and transportation accidents. The Chaffee County Office of Emergency Management (OEM) plans, coordinates and supports a wide-range of activities that help prepare for, respond to, and recover from disasters and large-scale emergencies, while also reducing vulnerabilities to hazards. In Chaffe County, the OEM also serves the local municipalities, and special districts throughout the county (CCEM, 2018).

The Chaffee County OEM operates under the guidelines of Chaffee County Local Emergency Operations Plan (LEOP) and the Chaffee County Hazard Mitigation Plan (CCHMG, 2016). The LEOP is the general plan for managing incidents and describes the framework and processes used during emergencies in Chaffee County (LEOP, 2016). Chaffee County operates an Emergency Operations Center (EOC), a command and control facility to provide emergency response, interagency communication, coordination and decision making.

Colorado law requires that each county and municipality designate an emergency response authority for responding to hazardous substance incidents. The Chaffee County OEM is the local county Designated Emergency Response Authority (DERA). The Colorado State Patrol (CPS) is the DERA on any federal, state, or county highway located outside of municipal city limits. Troop 8-C is the Hazardous Materials Section of the Colorado State Patrol. Their mission is to contribute to the safety of hazardous materials transportation in order to protect citizens and the environment. Twenty-eight troopers trained as Hazardous Materials Technicians are deployed throughout the state and function as the DERA and incident command on the scene (CDERA, 2017).

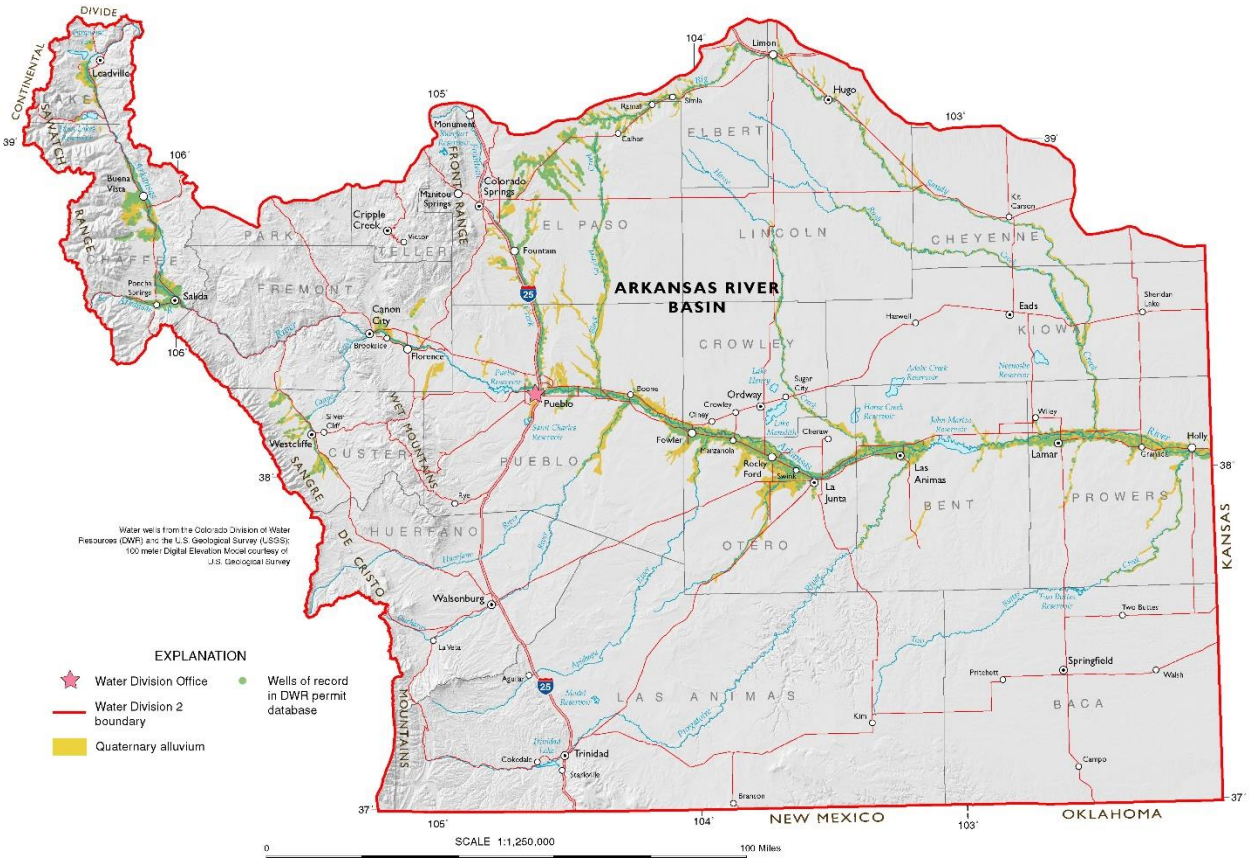
Local Hazardous Materials Response Teams (most often housed in local fire departments and fire protection districts) are the designated emergency response authority for hazardous substance incidents in all areas of Chaffee County except on highways, where the State Patrol has jurisdiction.

# WATER QUALITY

## Hydrologic Setting

The City of Salida obtains its drinking water supply from the South Arkansas River via the Harrington Ditch, a groundwater infiltration gallery in the South Arkansas River alluvium, and Pasquale Springs. The source water protection area lies within the South Arkansas River watershed (Hydrologic Unit Code 1102000107) which drains approximately 199 square miles.

The Arkansas River Basin is part of Colorado Water Division 2 with the office of the Division Engineer in Pueblo, Colorado. Division 2 administers all water resources in the Arkansas River Basin in southeast Colorado (DWR, 2016). The Arkansas River basin drains a 28,273 square mile area in the southeastern quarter of Colorado (Fig. 7).




SOURCE: GROUND WATER ATLAS OF COLORADO

Figure 7. Map of the Arkansas River Basin in Colorado.

## Surface Water Source: South Arkansas River

The South Arkansas River is a headwater stream that begins at the Continental Divide on Monarch Pass, flows generally west to east for 24.5 miles (39.4 km), and ends at the confluence with the main stem of the Arkansas River just south of Salida, Colorado. Numerous perennial streams and tributaries flow into the South Arkansas River (Fig. 8). The South Arkansas River watershed encompasses about 212 square miles, or less than one percent of the Upper Arkansas River in Colorado.

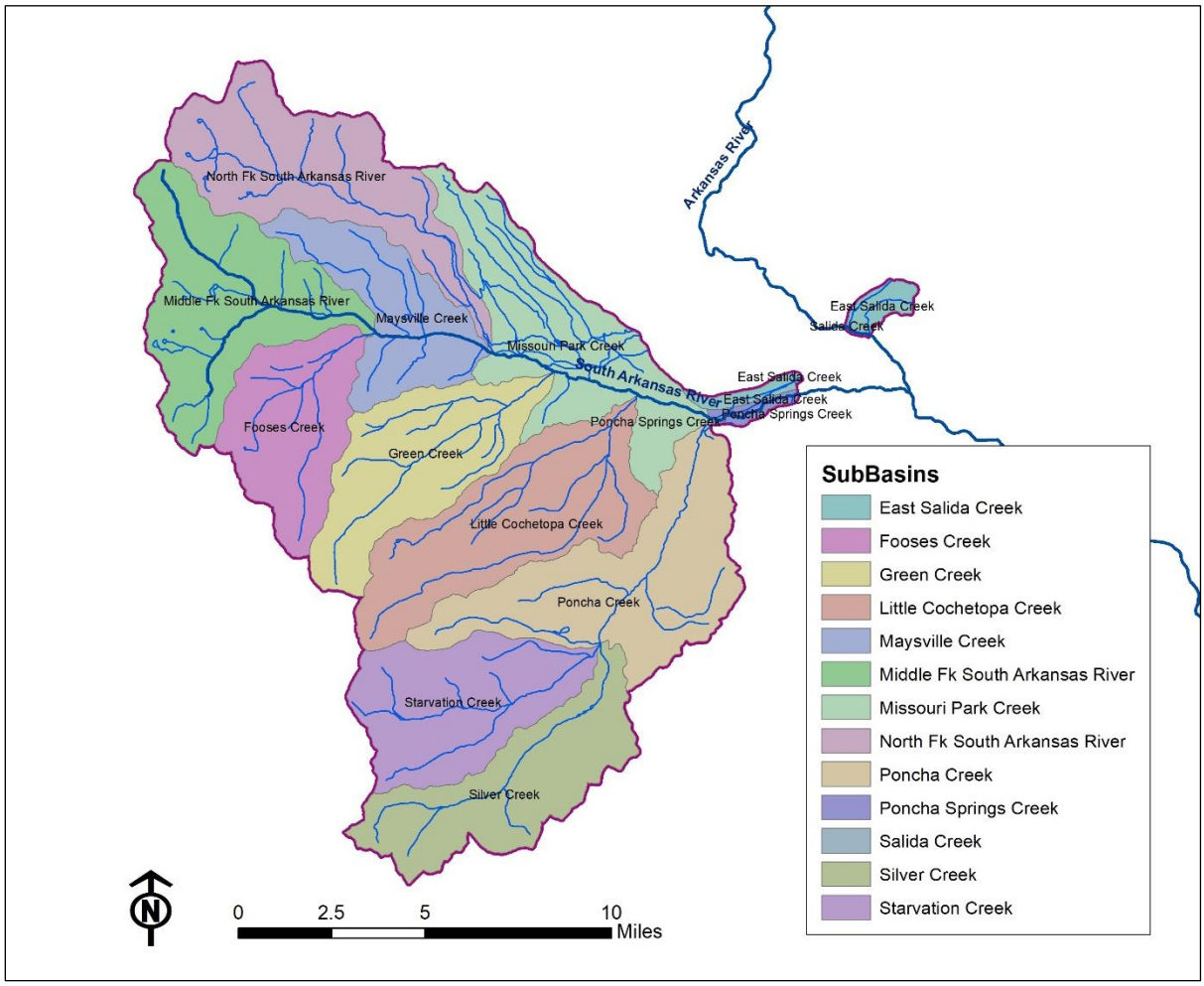


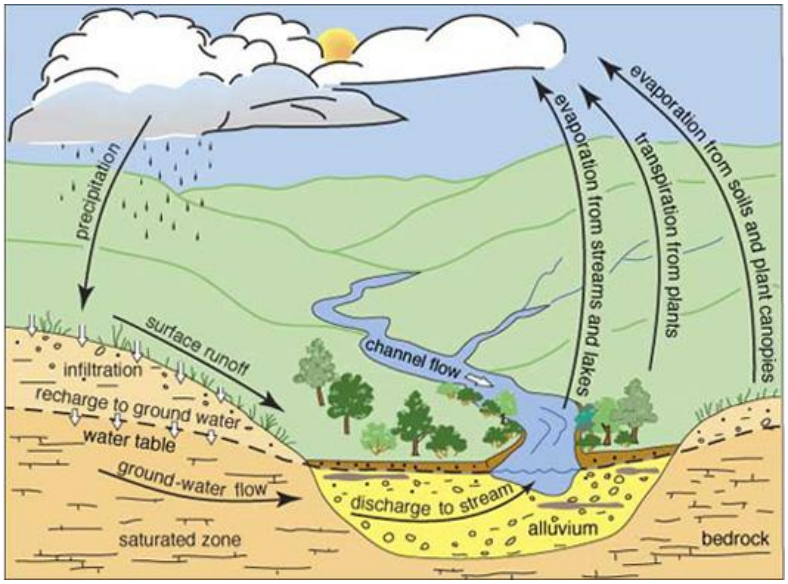

Figure 8. Stream segments and basins in the South Arkansas River watershed.

## Harrington Ditch

Surface water is diverted from the South Arkansas River by the Harrington Ditch at a point just east of Poncha Springs for 2.17 miles to the intake into Salida's Mesa Water Treatment Plant. Salida owns shares in the ditch company and uses the water for City treated drinking water, non-potable irrigation and augmentation (CWS, 2008).

## Ground Water Source: Infiltration Gallery

Ground water is collected via infiltration galleries in the South Arkansas River alluvium year around (Fig. 10). The infiltration galleries are Salida's primary groundwater source. The infiltration galleries collect sub-surface flow from the river alluvial aquifer and uses the natural geologic media (sand, gravel and cobbles) as a filter media. The alluvial aquifer is recharged from surface water runoff and snowmelt that infiltrates into the groundwater, streamflow of the South Arkansas River, and canal/ditch seepage (Fig. 9).




SOURCE: HEITMAN, 2016.

Figure 9. An alluvial aquifer is an aquifer with geologic materials deposited by a stream and that retains a hydrologic connection with the stream.

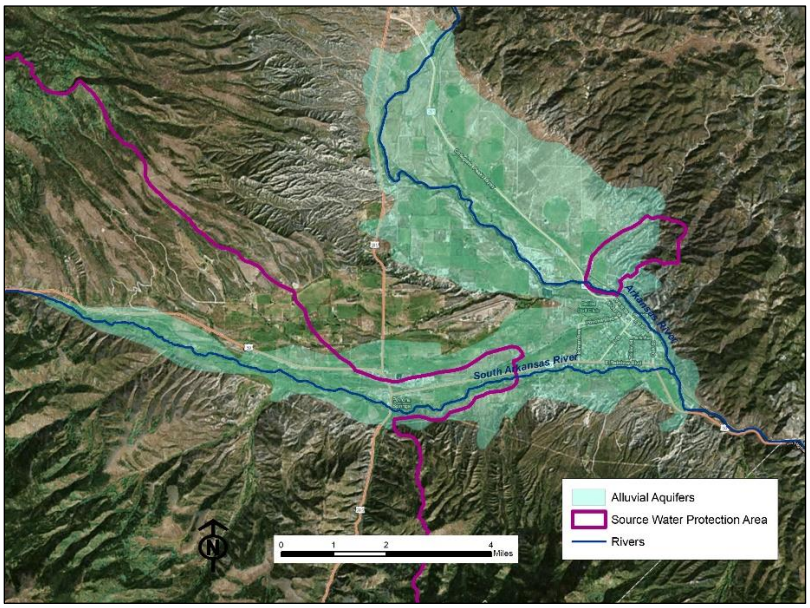



Figure 10. Map of the alluvial aquifer in the Source Water Protection Area.

## Groundwater Source: Pasquale Springs

Pasquale Springs was established as a source of water for the City in the early 1900's. The source for Pasquale springs originates from a groundwater aquifer north of the Arkansas River and can receive seepage water from the Arkansas River alluvium as well. Pasquale Spring water is only used during the summer irrigation season (CWS, 2008).

A spring is a water resource formed when the side of a hill, a valley bottom or other excavation intersects a flowing body of groundwater at or below the local water table (Fig. 11). A spring is the result of an aquifer being filled to the point that the water overflows onto the land surface. They range in size from intermittent seeps, which flow only after much rain, to huge pools flowing hundreds of millions of gallons daily. The amount of water that flows from springs depends on many factors, including the size of the caverns within the rocks, the water pressure in the aquifer, the size of the spring basin, and the amount of rainfall (USGS, 2015).

The aquifer, from which the springs originate, is a groundwater reservoir composed of soil and rock that are saturated with water and sufficiently permeable to yield water in a usable quantity to wells and springs. Aquifers provide two important functions: 1) they transmit ground water from areas of recharge to areas of discharge, and 2) they provide a storage medium for useable quantities of ground water.

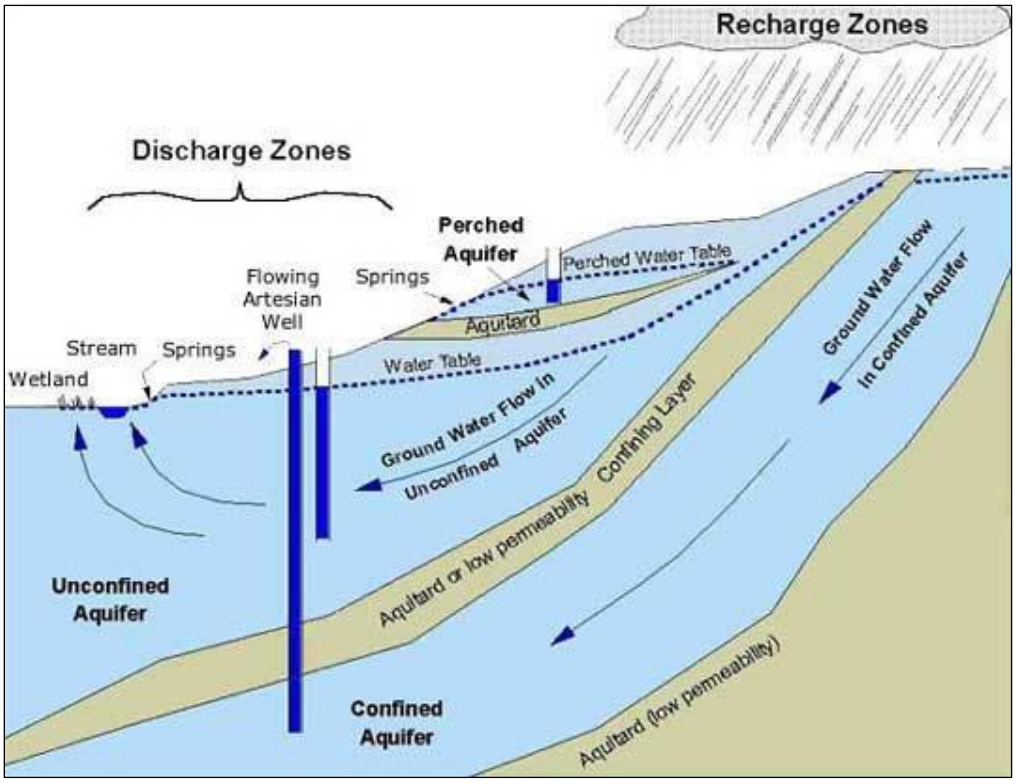



Figure 11. Diagram of groundwater sources.

## Water Quality Standards – Surface Water

Under the Clean Water Act, every state must adopt water quality standards to protect, maintain and improve the quality of the nation's surface waters. The State of Colorado's Water Quality Control Commission has established water quality standards that define the goals and limits for all waters within their jurisdictions. Colorado streams are divided into individual stream segments for classification and standards identification purposes (Table 4). Standards are designed to protect the associated classified uses of the streams (Designated Use).

Stream classifications can only be downgraded if it can be demonstrated that the existing use classification is not presently being attained and cannot be attained within a twenty year time period (Section 31.6(2)(b)). A Use Attainability Analysis must be performed to justify the downgrade. All water bodies within the source water protection area of the South Arkansas River watershed have fully attained their designated use and are not listed as impaired.

Table 4. Stream Segments within the Source Water Protection Area and Their Designated Use

| Segment WBID | Portion of Segment | Designated Use |
|---|---|---|
| COARUA13_A | Mainstem of Cottonwood Creek (Chaffee County), from the source to the confluence with the Arkansas River; South Fork of the Arkansas, including all tributaries and wetlands, from the National Forest boundary to the confluence with the Arkansas River. | Aquatic Life Cold 1<br>Water Supply<br>Agriculture<br>Recreation E |

SOURCE: WATER QUALITY CONTROL COMMISSION INTEGRATED WATER QUALITY MONITORING AND ASSESSMENT REPORT 2016 (WQCD, 2016)

### Definitions of Designated Uses

The following definitions are paraphrased from WQCC Regulation 31, January 31, 2013:

- Aquatic Life Cold 1: Refers to waters that are capable of sustaining a wide variety of cold water biota, including sensitive species, or could sustain such biota in correctable water quality conditions.

- Water Supply: These surface waters are suitable or intended to become suitable for potable water supplies. After receiving standard treatment (defined as coagulation, flocculation, sedimentation, filtration, and disinfection with chlorine or its equivalent), these waters will meet Colorado drinking water regulations and any revisions, amendments, or supplements.

- Agriculture: These surface waters are suitable or intended to become suitable for irrigation of crops usually grown in Colorado and which are not hazardous as drinking water for livestock.

- Recreation E: Class E - Existing Primary Contact Use. These surface waters are used for primary contact recreation or have been used for such activities since November 28, 1975. Primary Contact recreation refers to waters suitable for full-body contact and ingestion. Class E also includes a Water Quality Standard for E.coli not to exceed 126/100 ml (WQCC, 2013).

## Groundwater Protection

Groundwater protection is managed as two separate issues of quantity and quality in Colorado. Quantity issues are managed through the Colorado Division of Water Resources/Office of the State Engineer. The Division of Water Resources administers and enforces all surface and groundwater rights throughout the State of Colorado, issues water well permits, approves construction and repair of dams, and enforces interstate compacts. The Division of Water Resources is also the agency responsible for implementing and enforcing the statutes of the Groundwater Management Act passed by the Legislature as well as implementing applicable rules and policies adopted by the Colorado Groundwater Commission and the State Board of Examiners of Water Well Construction and Pump Installation Contractors.

Under the Clean Water Act, every state must adopt water quality standards to protect, maintain and improve the quality of the nation's surface waters. Water quality is protected under the Colorado Water Quality Control Act through several state agencies. The Colorado Department of Public Health and Environment is the lead agency. The Colorado Water Quality Control Commission is responsible for promulgating groundwater and surface water classifications and standards. Colorado's Water Quality Control Commission has established basic standards for groundwater regulations that apply a framework for groundwater classifications and water quality standards for all waters within their jurisdictions.

### Groundwater Contaminants

Many types of land uses have the potential to contaminate source waters: spills from tanks, trucks, and railcars; leaks from buried containers; failed septic systems; buried or injection of wastes underground; use of fertilizers, pesticides, and herbicides; road salting; as well as urban and agricultural runoff (Fig. 12). While catastrophic contaminant spills or releases can wipe out a water resource, groundwater degradation can result from a plethora of small releases of harmful substances. According to the U.S. EPA, nonpoint-source pollution (when water runoff moves over or into the ground picking up pollutants and carrying them into surface and groundwater) is the leading cause of water quality degradation (GWPC, 2008).

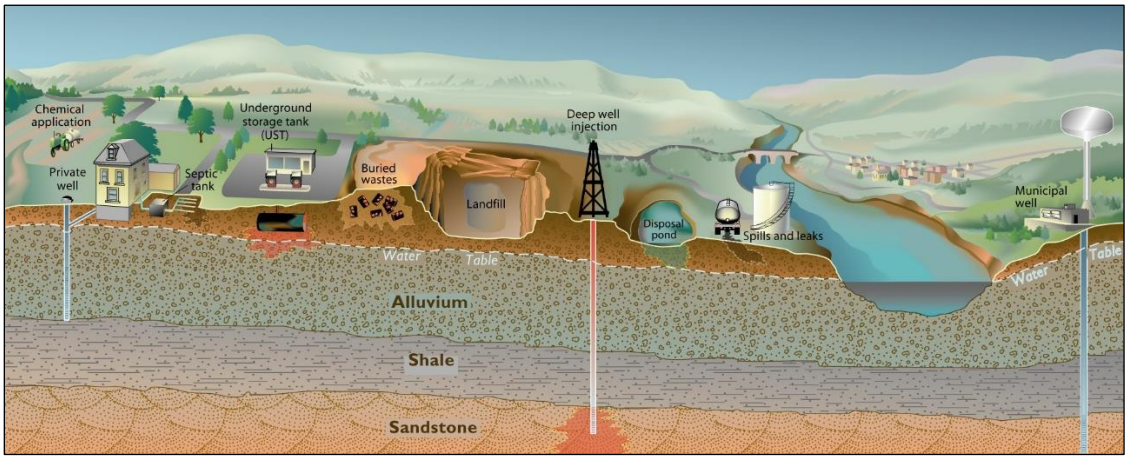



Figure 12. Schematic drawing of the potential source of contamination to surface and groundwater.

## Drinking Water Supply Operations

### Water System Information

The City of Salida operates a municipal water supply system that provides drinking water to the 5,300 residents, visitors, and commercial and industrial users of Salida, Colorado. The Town's water system consists of surface and groundwater sources, water treatment, pump stations, storage, and distribution facilities. The size of the service area is approximately 2.2 square miles.

Figure 13. Salida is a rural incorporated city established in 1880.

The City of Salida obtains its surface drinking water supply from the South Arkansas River via the Harrington Ditch; groundwater from the infiltration galleries in the South Arkansas River alluvium, and Pasquale Springs. The surface water from the South Arkansas River is delivered via the Harrington Ditch to an intake to the City's Water Treatment Plant (WTP). Raw water is treated through a process of sand filtration with UV and chlorine disinfection. The treatment plant has a production capacity of 4.0 MGD (Lady, 2018). After treatment, the filtered water is stored in the WTP Storage Tank (1.0 million gallons (MG) and High Zone Tank (1.0 MG) before being pumped to the distribution system in the high zone.

Groundwater from the infiltration galleries is treated with chlorination and stored onsite in the Reservoir Storage Tank (1.25 MG). Treated water is pumped via the Reservoir Pump Station into the distribution system for delivery to the low zone. Groundwater from Pasquale Springs is treated with chlorination and pumped via the Pasquale Springs Pump Station directly into the distribution system for delivery to the low zone. The total treated water storage capacity for Salida is 3.25 MG (CWS, 2008). The treated water is distributed via a network of approximately 42 miles of pipeline to 3,000 service connections or taps (Lady, 2018).

The City of Salida provides an Annual Drinking Water Quality Report to the public that provides information on the results of their water monitoring program. The Consumer Confidence Report for calendar year 2017 is available online at the City of Salida's Water Department site.

### Water Supply Demand Analysis

The City of Salida water system currently has the capacity to produce about 6.4 MGD. Water usage in 2017 was 1,100-acre feet, with an average daily demand of _____gallons per day. Peak use is during the summer with a highest of _____ gallons per day and lowest in winter with _____ gallons per day.

Details regarding the water system, water use and treatment is provided in the Salida Water Conservation Plan and the Raw Water Master Plan. These reports indicate that Salida has adequate water rights and water supply to meet demands through the 2033 projection.

The City of Salida has evaluated its ability to meet the average daily demand of its customers in the event the water supply, or its water source, becomes disabled for an extended period due to potential contamination. The City of Salida may not be able to meet the average daily demand of its customers if its water source became disabled for an extended period, depending on the water supply available as well as the amount of treated water in storage at the time a water source becomes disabled.

The City of Salida recognizes that potential contamination of its water sources could potentially result in having to significantly increase the treatment of the water and/or abandon the water source if treatment proves to be ineffective or too costly. The potential financial costs associated with such an accident could cost funds beyond what the town has at this time.

The potential financial and water supply risks related to the long-term disablement of the community's water source 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 City of Salida can help to reduce the risks posed by potential contamination of its water source. Additionally, the City of Salida will develop a 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

## Source Water Assessment Report Review

The City of Salida received their Source Water Assessment Report from the Colorado Department of Public Health and Environment in November 2004. During the Source Water Protection stakeholder meetings, the assessment report was reviewed and used as a starting point to guide the development of this Source Water Protection Plan. A copy of the Source Water Assessment Report for the City of Salida can be obtained by downloading a copy from the CDPHE's SWAP program website located at: http://www.colorado.gov/cs/Satellite/CDPHE-WQ/CBON/1251596793639.

## Defining the Source Water Protection Area

The State's Assessment Report included a delineated source water assessment area for the City of Salida's ground water sources. Delineation is the process used to identify and map the area around a pumping well that supplies water to the well or spring, or 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 delineated source water assessment area provides the basis for understanding where the community's source water and potential contaminant threats originate.

The steering committee reviewed the state's delineated source water assessment area for the City of Salida's surface and groundwater sources and decided to add an additional protection area around the infiltration galleries. The source water protection area includes the South Arkansas River watershed (199 square miles) and the drainage basin recharging Pasquale Springs (1.53 square miles). This protection area is where the community has chosen to implement its source water protection measures to decrease risk to their source water from potential contamination.

Source Water Protection Zones

The source water protection area includes the following protection zones (Fig. 14 and 15):

- **Zone 1 Surface Water** – This area includes 1,000 feet on either side of the surface water drainage network and ditch.

- **Zone 1 Ground Water -** This area includes a 500-foot radius around the Pasquale Springs groundwater source.

Zone 1 is the most sensitive and critical area to protect from potential sources of contamination.

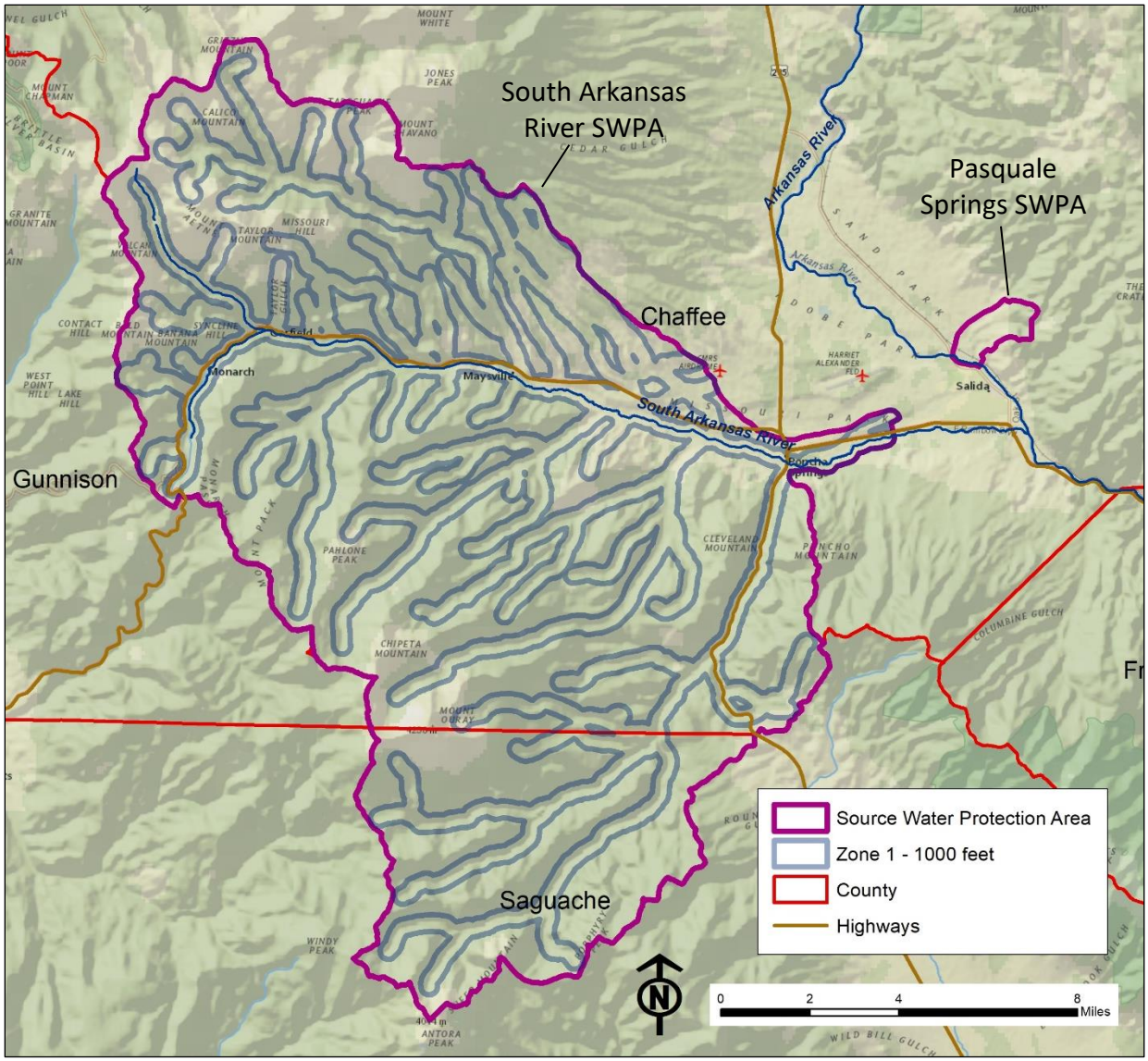



Figure 14. Map of the City of Salida's Source Water Protection Area.

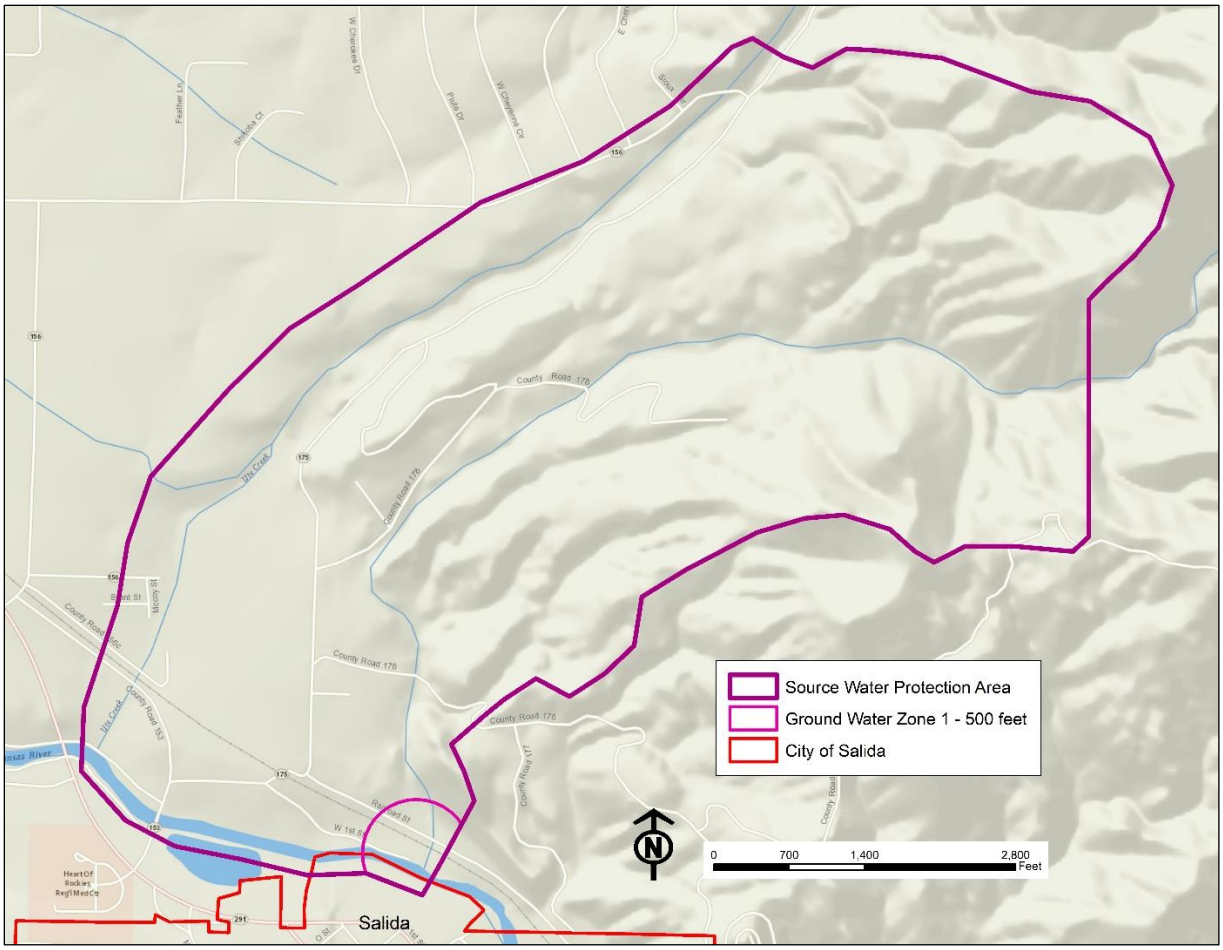



Figure 15. Map of the Pasquale Springs' Source Water Protection Area.

## Potential Contaminant Source Inventory

The State's Source Water Assessment Report identified potential sources of contamination (PSOCs) that might be present within the source water assessment area. The steering committee conducted a more accurate and current contaminant source inventory of the source water protection area. This report will only reflect the current inventory.

Discrete contaminant sources (point sources) were inventoried using selected state and federal regulatory databases including: mining and reclamation, oil and gas operations, above and underground petroleum tanks, Superfund sites, hazardous waste generators, solid waste disposal, industrial and domestic wastewater dischargers, solid waste sites, and water well permits. Dispersed contaminant sources (nonpoint sources) were inventoried using recent land use, land cover and transportation maps of Colorado. A table of Contaminants Associated with Common PSOCs is included in the Appendices of this report. The steering committee identified the following potential contaminant source that may impact the City of Salida's source waters: spills on roads, wildland fires, storm water runoff, security and vandalism, flooding, fuel storage tanks, agricultural chemicals storage and use, wastewater dischargers, ditch integrity, mines, septic systems, commercial facilities, sewerage system breaks, road sediment and maintenance, private water wells, weed abatement, and residential.

## Priority Strategy

The steering committee used the SWAP Risk Assessment Matrix developed by CRWA to prioritize the potential contaminant sources and issues of concern (Fig. 16).

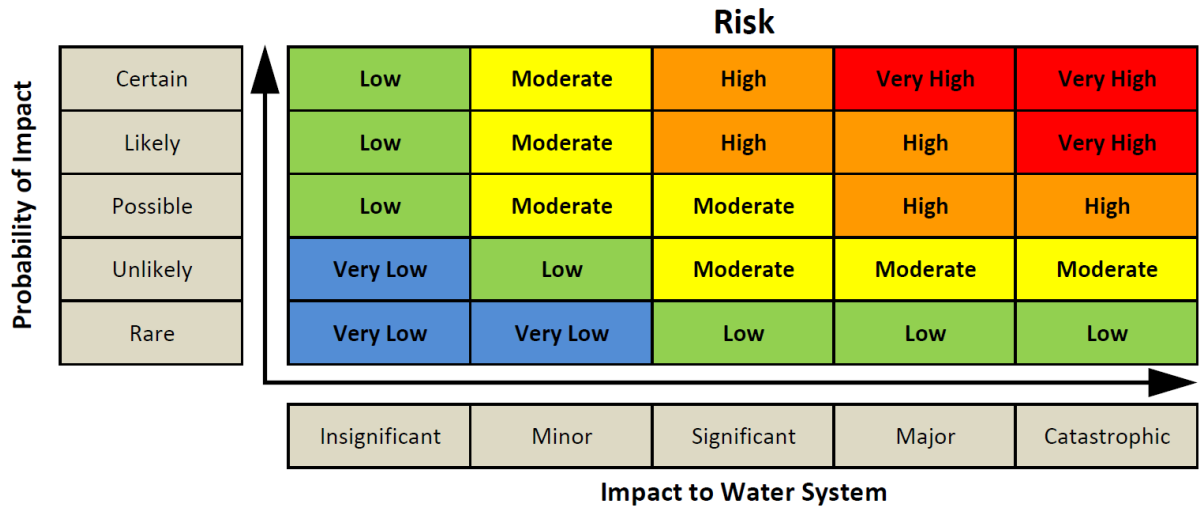



Figure 16. CRWA's SWAP Risk Assessment Matrix.

Using SWAP Risk Assessment Matrix, the steering committee considered the following criteria when estimating the risk of each issue of concern.

1. **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. 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 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 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.

2. **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

The steering committee determined that each issue of concern is located within the source water protection area of Zone 1. This determination of location in conjunction with the estimation of risk to the source water, helped guide the prioritization of the issues of concern in a way that best fits the needs and resources of the community.

## Priority Ranking

The Steering Committee ranked the potential contaminant source inventory and issues of concern in the following way (Table 5).

Table 5. Potential Contaminant Source Prioritization using SWAP Risk Assessment Matrix

| Potential Source of Contamination or Issue of Concern | Proximity (SWPA Zone) | Impact to Water System (Insignificant, Minor, Significant, Major, Catastrophic) | Probability of Impact (Rare, Unlikely, Possible, Likely, Certain) | Risk (Very Low, Low, Moderate, High, Very High) |
|---|---|---|---|---|
| Spills on roads | 1 | Major | Likely | High |
| Wildland fires | 1 | Major | Likely | High |
| Storm water runoff – (cattle in ditch) | 1 | Significant | Certain | High |
| Security and vandalism | 1 | Catastrophic | Possible | High |
| Flooding | 1 | Catastrophic | Possible | High |
| Fuel storage tanks | 1 | Significant | Possible | Moderate |
| Agricultural chemical storage and use | 1 | Significant | Possible | Moderate |
| Dischargers | 1 | Minor | Possible | Moderate |
| Ditch: integrity | 1 | Minor | Certain | Moderate |
| Mining | 1 | Significant | Unlikely | Moderate |
| Septic systems (OWTS) | 1 | Significant | Possible | Moderate |
| Commercial facilities | 1 | Minor | Possible | Moderate |
| Sewerage system breaks | 1 | Minor | Possible | Moderate |
| Roads – sediment, maintenance | 1 | Minor | Certain | Moderate |
| Private water wells | 1 | Minor | Unlikely | Low |
| Weed abatement | 1 | Insignificant | Unlikely | Very low |
| Residential | 1 | Insignificant | Unlikely | Very low |

# DISCUSSION OF POTENTIAL CONTAMINANTS AND ISSUES OF CONCERN

The following section provides a description of the potential contaminant sources or issues of concern that have been identified in this plan, describes the way in which they threaten the water sources and outlines best management practices. The purpose of this section is as a guidance document to understand the issues.

## Transportation on Roads

There are numerous County, Forest Service, and private roads and two U.S. Highways within the source water protection area used for residential, commercial, utility, tourism and recreational access. U.S. Highway 50 is a major east-west paved route in Colorado which passes over the Continental Divide at Monarch Pass before descending through the source water protection area into the City of Salida and connects to Interstate Highway 25 in Pueblo. US 50 parallels the South Arkansas River. U.S. Highway 285 is a major north-south route in Colorado which passes over Poncha Pass in the south and drops into the Arkansas River Valley in Poncha Springs crossing over the South Arkansas River on its way north toward Denver.

### Contaminants of Concern

The construction and maintenance of roads has been recognized as a potential source of contaminants in watersheds. Roads can change natural run-off patterns by increasing the amount of impervious surface in a watershed, intercepting overland flow, and routing this water directly into streams. Storm water runoff over these roads can deliver contaminants from the road surface into nearby surface waters including vehicular spills, leaks and sediment.

Hazardous materials are transported over many roadways throughout Chaffee County. U.S. Highway 50 and 285 are designated hazardous materials routes by the Colorado Department of Transportation. Vehicular spills may occur along the transportation routes within the protection area from trucks that transport fuels, waste and other chemicals that have a potential for contaminating the surface and groundwater. Accidental spills of small amounts of contaminants may not be detected or reported and are often diluted with rainwater or snowmelt, potentially washing the chemicals into the soil or nearby waterways.

A release of any chemical, oil, petroleum product, sewage, etc., which may enter waters of the state of Colorado (which include surface water, ground water and dry gullies and storm sewers leading to surface water) must be reported immediately to the Colorado Department of Public Health and Environment (CDPHE). The 24-hour spill reporting number is 1-877-518-5608.

Large spills (i.e. petroleum fuel spills exceeding 25 gallons) require immediate emergency response from the local fire department to ensure contaminants do not enter the source waters. Spills and incidents that have or may result in a spill along a highway must be reported to the nearest law enforcement agency immediately by calling 911 (CDPHE, 2009).

## Wildland Fire

The forests throughout Colorado are dense with fuel build-up from a century of fire suppression and thus more vulnerable to high-intensity fires than they were historically. The entire Rocky Mountain region has been plagued with wildfires in the past several years and has consistently ranked as the most severe problem facing the state's counties. The wildfire situation has been exacerbated by the onset of severe drought conditions for much of this decade throughout the western U.S.

There are three major factors that sustain wildfires and predict a given area's potential to burn. These factors are fuel, topography, and weather. Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree debris to live trees, brush and dried grasses. Topography, or an area's terrain and land slope, affects its susceptibility to wildfire spread. Both fire intensity and rate of fire spread increases as slope increases due to the convection of heat. Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out the fuels that feed the wildfire creating a situation where fuel will more readily ignite and burn more intensely (Saguache County, 2010).

### Community Wildfire Protection Plan

In 2009, the Chaffee County Community Wildfire Protection Plan (CWPP) was completed as the first step in the wildfire mitigation planning process. It provided a multi-jurisdictional approach to strategic planning to improve fire suppression and fuel treatment efficiencies on public and private lands. The CWPP identified wildfire hazards, prioritized hazards to public safety and community values, and developed objectives and activities to reduce wildfire risk in the highest priority areas (CWPP, 2009).

### Wildfire/Watershed Assessment

In 2011, the Upper Arkansas Wildfire/Watershed Assessment was completed which was designed to identify and prioritize sixth-level watersheds based upon their hazards of generating flooding, debris flows and increased sediment yields following wildfires that could have impacts on water supplies. It is intended to expand upon current wildfire hazard reduction efforts by including water supply watersheds as a community value.

The Assessment analysis resulted in a hazardous ranking of one through five, with five being the highest ranking of the existing forest conditions. The South Arkansas River watershed ranked 3 to 5 based on the wildfire hazard, flooding/debris flow, soil erodibility, and water supply sources to downstream public water systems. Pasquale Springs' SWPA was ranked 5.

The Assessment identified an important hazard for water supply related to transport of debris and sediment from upstream source water areas post-wildfire. The source water areas above

important surface water intakes, upstream diversion points and drinking water supply reservoirs have a higher potential for contributing significant sediment or debris. There areas, called Zones of Concern further define project areas for protection actions. The Harrington Ditch Zone of Concern was identified as important to the water supply for the City of Salida and Town of Poncha Springs. Information from this assessment could be used to identify areas to incorporate forest management treatments that could minimize adverse hydrologic responses following intense wildfires (Fig. 17) (JWA, 2011).

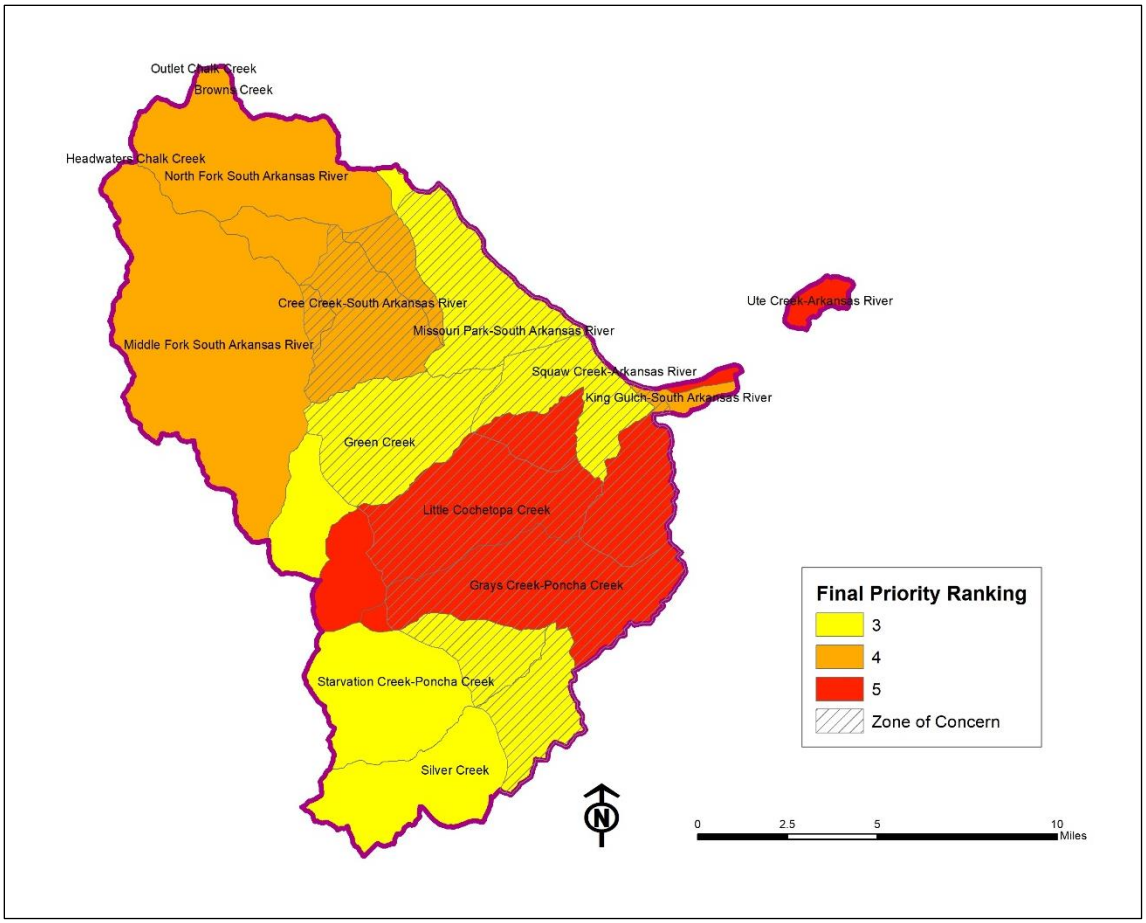



Figure 17. Map of Final Priority Hazard Ranking in the Source Water Protection Area.

## Wildfire Decision Support System

In 2017, the City of Salida Water Department and other local water providers in the Upper Arkansas River Watershed participated in a meeting hosted by the Arkansas River Watershed Coalition in Salida on the Wildfire Decision Support System (WFDSS). The purpose of the meeting is to develop the GIS database for the WFDSS that includes critical drinking water sources. Salida is currently providing GIS data and prioritizing water system infrastructure to be put into the WFDSS database. WFDSS assists fire managers and analysts in making strategic and tactical decisions for fire incidents. Having local water infrastructure data in the WFDSS database will help with protecting these valuable assets during and post wildfire events.

### Water Quality Effects from Fire

The degree to which wildfire degrades water quality and supply depends on wildfire extent and intensity, post-wildfire precipitation, watershed topography, and local ecology. Wildfires create hydrophobic soils, a hardening of the earth's surface that prevents rainfall from being absorbed into the ground.

Potential effects of wildfire on municipal water supplies include the following:

- Increase in runoff over devegetated slopes and reduced infiltration rates,
- Changes in magnitude and timing of groundwater recharge of the aquifer,
- Increased loading of nutrients (nitrogen and phosphorus), dissolved organic carbon (DOC), major ions, and metals,
- Post-fire erosion and transport of sediment and debris to water resources, and
- Changes in source-water chemistry that can alter drinking water quality (Writer & Murphy, 2012.

Post-fire impacts to water quality occurred during "first flush" storm events, snowmelt, and high intensity thunderstorms. Thunderstorms can transport substantial amounts of sediment and debris from hillslopes of the burned area into the source waters. Even though the City of Salida's drinking water source is from the alluvial aquifer, there may be a potential for impact to the shallow groundwater from a catastrophic wildland fire in the nearby watershed.

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).

## Security and Vandalism

The security of the City of Salida's intakes and well and potential for vandalism has been identified as a risk by the Steering Committee. Vandalism could endanger the water supply even though measures have been taken to protect the area. No incidents of this nature have ever occurred; however, it is a potential that should be considered.

Bioterrorism or chemical attacks could deliver widespread contamination with small amounts of microbiological agents or toxic chemicals and could endanger the public health. While some experts believe that risks to water systems are small, because it would be difficult to introduce sufficient quantities of agents to cause widespread harm, heightened awareness of the potential is a prudent source water protection practice. 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 (Copeland, 2010).

## Stormwater Runoff

Stormwater runoff into the Harrington Ditch has been identified as a high risk to the City of Salida's water source. The Harrington Ditch is an open channel that delivers water from the South Arkansas River headgate near Poncha Springs to the Salida Water Treatment Plant intake. Along the way, the Harrington Ditch crosses under Highway 50 and runs alongside County Road 120.

While the quality of water in the South Arkansas River where the ditch originates is high, the water quality can become significantly degraded along the length of the ditch as a result of stormwater runoff into the ditch. Stormwater runoff occurs when water from rain, snowmelt flows, or irrigation over the ground over streets, lawns, agricultural lands, construction and industrial sites enter the water source. Stormwater run-off has the potential to introduce untreated pollutants into the ditch during wet weather events. Stormwater runoff can pick up fertilizers, dirt, pesticides, oil and grease, pathogens from animal waste, and many other pollutants and flow into the ditch.

### Agricultural Operations

Agricultural lands lie within the 1000 foot Zone 1 protection area along the Harrington Ditch. Farmers and ranchers in this protection area use and store chemicals to fertilize their crop lands. The two main components of fertilizer that are of greatest concern to source water quality (water used as public drinking water supplies) are nitrogen and phosphorus. Excess fertilizer use and poor application method over irrigated crop lands can cause fertilizer movement into surface and ground waters. Stormwater runoff can deliver fertilizers and other herbicides into the ditch. Nitrogen-containing fertilizers can contribute to nitrates in drinking water. Consumption of nitrates can cause methemoglobinemia (blue baby syndrome) in infants, which reduces the ability of the blood to carry oxygen.

Livestock operations occur on the private land that the ditch runs through. Cattle frequent the ditch as a drinking water source. Cattle operations have a potential for adding contaminants into the ditch. The primary water quality and health concerns from animal waste are Giardia, E.coli, and Cryptosporidium contamination. Livestock operations along and in the ditch, have the potential to cause impacts to water resources from bank damage and erosion of the ditch. The integrity of the ditch has been identified as an issue of concern. During runoff events, sediment enters the ditch and results in increased turbidity levels of the raw water entering the Water Treatment Plant.

The ditch was not designed to handle the increased flows from runoff and the ongoing maintenance of the ditch is an additional cost to the City of Salida. The Steering Committee recommends developing a stormwater runoff study to define the physical characteristics of runoff in the SWPA and consider replacing the ditch with an underground pipe to convey water directly from the South Arkansas River to the water plant intake.

## Flooding

Flooding was identified by the steering committee to be a high risk for creating a major impact to the city of Salida's water system. The South Arkansas River is the greatest source of flood hazards in the source water protection area.

Flooding occurs when soils become saturated from prolonged rains and/or snowmelt runoff during spring months. If runoff or rain continues, water begins to accumulate faster than it can be absorbed or carried away in stream channels, stream levels begin to rise and eventually overflow the normal stream channel. A general flood event occurs over a minimum period of at least a few hours and can take days to reach flood crest height.

A flash flooding event is usually short in duration and can happen so fast that little warning can be given. Flash flooding can also occur from upstream dam failure. There are three dams in the source water protection area upstream from the City of Salida: 1) Boss Lake Reservoir, located on the Middle Fork of the South Arkansas River (high hazard); 2) North fork Reservoir, North Fork of the South Arkansas River (significant hazard); and 3) Droz Creek dam, located on Droz Creek (significant hazard). There are no reported dam failures in Chaffee County in the past 80 years. Therefore, the probability of a failure in the future is minimal for the county (CCHMP, 2016).

Localized flooding and debris-flow activity producing sediment-laden water can threaten or destroy bridges, culverts, and any other structures in the floodplain. Erosion from flood events can undercut and destroy structures that would otherwise receive little damage from inundation. Water and sewer systems can be affected by flooding. Floodwaters can back up drainage systems, causing localized flooding. Floodwaters can get into drinking water supplies, causing contamination. Sewer systems can be backed up, causing wastewater to spill into homes, neighborhoods, rivers, and streams (CCHMP, 2016)

The potential for flooding can change and increase through various land use changes (development in the floodplain) and changes to land surface (wildfires). Wildfires create hydrophobic soils, a hardening or "glazing" of the earth's surface that prevents rainfall from being absorbed into the ground, thereby increasing runoff, erosion, and downstream sedimentation of channels (MCMHMP, 2010). Climate-driven changes to the hydrological system may likely increase the frequency, magnitude, and cost of extreme weather events. More extreme precipitation is likely, increasing the risk of flooding (CCHMP, 2016).

## Fuel Storage Tanks

There are eight permitted active fuel storage tank sites within the source water protection area (Fig. 18, Table 6). Six of the active fuel storage tank sites are within 1.5 miles from the Harrington Ditch headgate and two are upstream over 6 to 12 miles. One of the sites is approximately 2,548 feet upstream from the Harrington Ditch headgate within Zone 1 (1000 feet) protection area. Information on the status of the Aboveground Storage Tanks (AST) and Underground Storage Tanks (UST) was obtained from the Colorado Department of Labor and Employment Division of Oil and Public Safety's database via their Colorado Storage Tank Information (COSTIS) website at http://costis.cdle.state.co.us.

Table 6. Active Storage Tank Site Information

| Tank Site | Facility ID | Information |
|---|---|---|
| McFarland Oil | 19919 | 7 tanks: 7 AST in use |
| Shavano Snack Mart (Shell Gas Station) | 11187 | 7 tanks: 2 AST in use, 4 UST closed, 1 LPG |
| Western Convenience Store #141 | 8564 | 6 tanks: 2 AST in use, 3 UST closed |
| High Valley Center | 1105 | 2 tanks: 2 UST in use |
| Continental Convenience Store | 9364 | 4 tanks: 3 UST temporarily closed |
| CDOT Poncha Springs | 7350 | 4 tanks: 1 AST in use, 3 closed tanks |

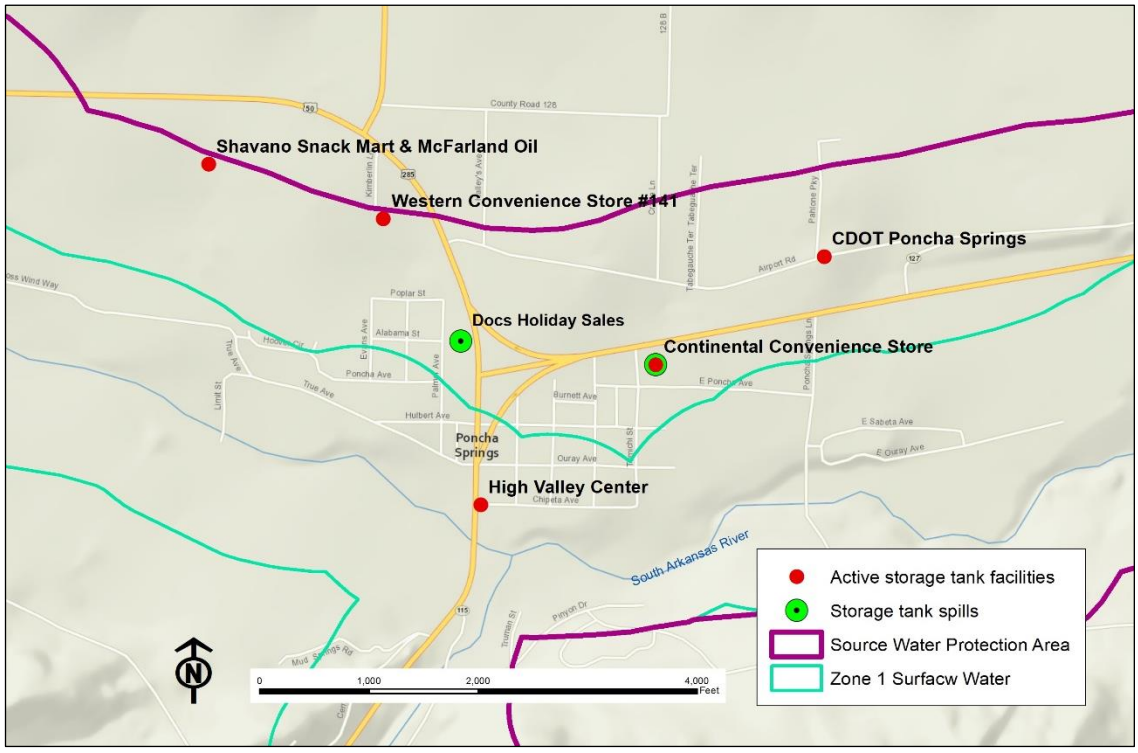


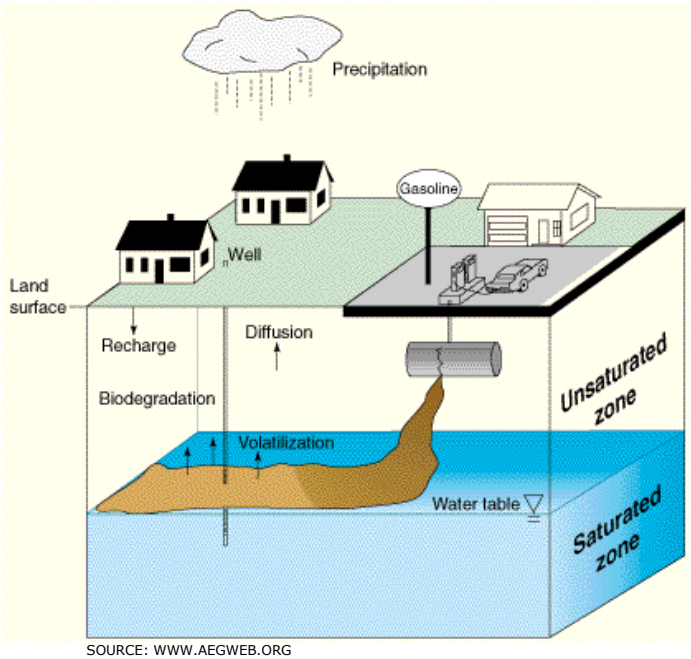

Figure 18. Map of the Active storage tank facilities and spills within 1.5 miles from the Harrington Ditch headgate.

## Storage Tank Spills

Five of the storage tank facilities within the source water protection area have had spill events, recorded as Confirmed Releases (CR) (Table 7). A release means any spilling, leaking, emitting, discharging, escaping, leaching, or disposing of a regulated substance from a storage tank into groundwater, surface water or soils. The owner/operator must report a suspected release within 24 hours and investigate suspected releases within seven days. After confirming a release and conducting the initial response and abatement, the owner/operator must continue further source investigation, site assessment, characterization and corrective actions. Four of the sites have been cleaned up, two by the State with federal funding through the Leaking Underground Storage Tank (LUST) Trust Fund financed by a 0.1 cent tax on each gallon of motor fuel sold nationwide (EPA, 2012).

Table 7. Storage Tank Spill Events Within the Source Water Protection Area

| Tank Site | Information |
|---|---|
| Docs Holiday Sales | CR 1990, Tank release under control & cleaned-up 1994 |
| Continental Convenience Store | CR 2016, Site report & source verified, **Open Case** |
| Monarch Aerial Tramway | CR 1992, REV clean-up completer 1994 |
| Monarch Ski Area | CR 1999, LUST clean-up completed 1999 |
| Monarch Ski Lodge | CR 1991, LUST clean-up completed 1991 |



SOURCE: WWW.AEGWEB.ORG

Figure 19. Schematic of a LUST spill site

The leaking underground storage tank (LUST) releases gasoline or "liquid phase hydrocarbon." The gasoline descends through the unsaturated soil zone to float on the water table (gasoline is lighter than water) (Fig. 19). The gasoline releases compounds like benzene, toluene, ethylbenzene, and xylenes (BTEX) and methyl tert-butyl ether (MTBE) to the groundwater and they are carried in the direction of groundwater flow. The extent of contamination is defined by the concentration of benzene (from 10 to 10,000 parts per billion) in the groundwater. The most hazardous compounds in groundwater (the BTEX compounds) are quite volatile and carcinogenic.

## Wastewater

The Steering Committee identified wastewater dischargers into South Arkansas River, sewerage system leaks and septic systems as issues of concern to the source waters.

### Wastewater Dischargers

There are two wastewater discharge sites within the source water protection area that discharges treated sewerage system effluent into the South Arkansas River (Fig. 20, Table 8). Both of these facilities are in Zone 1 (1000 feet) and are 12 and 14 miles upstream from the Harrington Ditch headgate. These facilities are permitted under the CDPHE National Pollutant Discharge Elimination System (NPDES) regulation. The Water Quality Control Division issues and administers discharge permits and other control mechanisms as provided by the Colorado Water Quality Control Act.

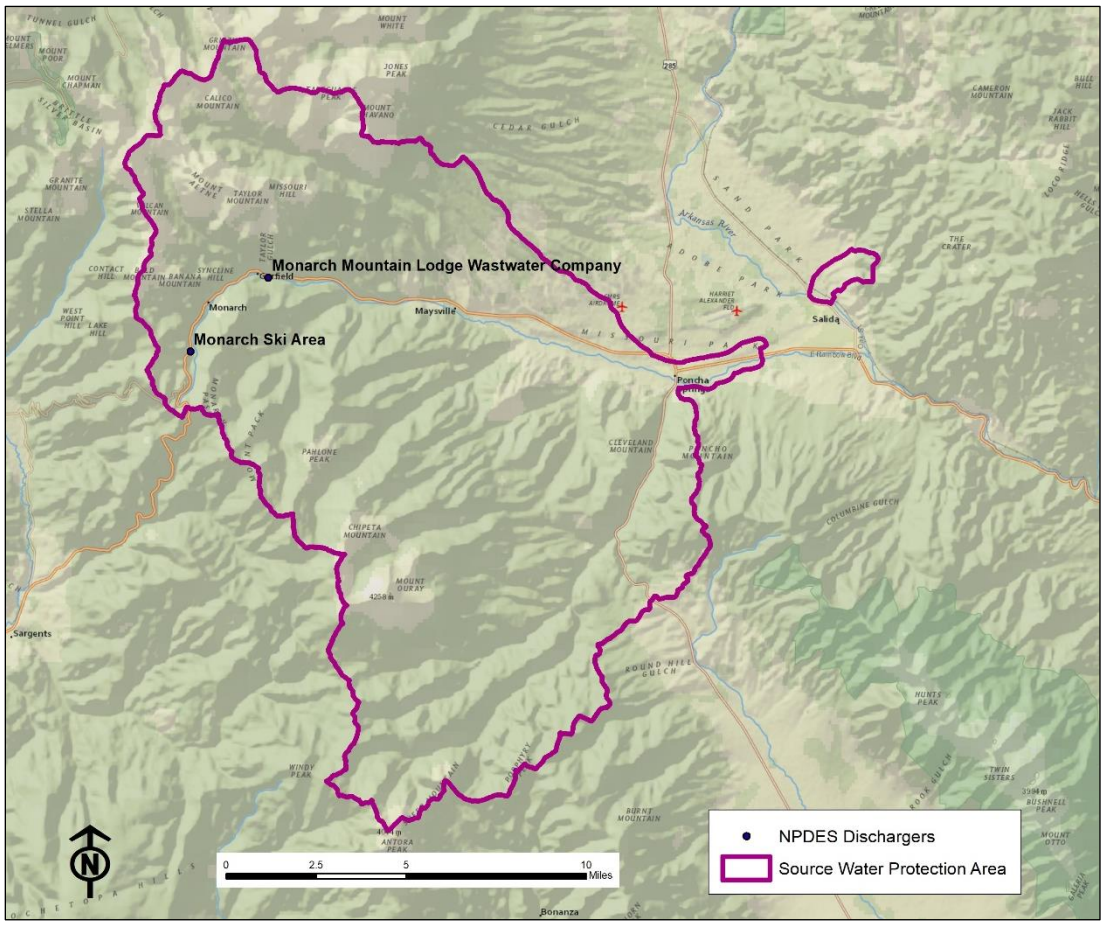



Figure 20. Map of the wastewater dischargers

## Wastewater Systems

There are also areas within the source water protection area that are served by sanitary sewerage systems (Monarch Lodge, Monarch Ski Area, and Town of Poncha Springs). Poncha Spring's sewerage system is in close proximity to the Harrington Ditch headgate. The wastewater treatment plant in Salida treats both Salida's and Poncha Springs' wastewater and discharges into the Arkansas River.

Sanitary sewer systems are designed to collect and transport to wastewater treatment facilities the municipal and industrial wastewaters from residences and commercial buildings. Over the years, many of these systems have experience major infrastructure deterioration due to inadequate preventative maintenance and replacement programs. These conditions have resulted in deteriorated pipes, manholes, and pump stations that allow sewage to exit the systems (exfiltration) and contaminate adjacent ground and surface waters (Fig. 21). Untreated sewage often contains high levels of suspended solids, pathogenic microorganisms, toxic pollutants, nutrients (nitrogen), oxygen-demanding organic compounds, oil and grease, and other pollutants (Amick and Burgess, 2000).

Sewer leaks can occur from tree root invasion, soil slippage, seismic activity, loss of foundation due to washout, flooding and sewage back up, among other events. High pressure systems will push leaks to the soil surface where they can be easily detected by sight or odor. Systematic inspection of sewer lines, exclusion of hazardous waste, and adherence to modern construction and maintenance specifications are necessary preventative measures for protection of groundwater sources from sewer leaks.

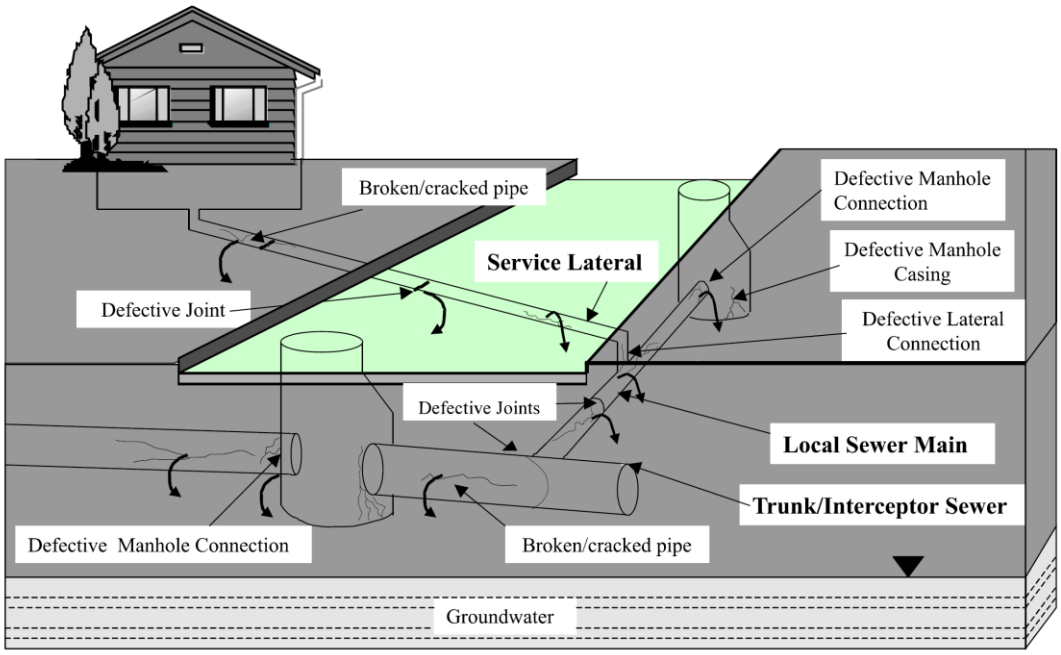



Figure 21. Sanitary sewer system components and exfiltration sources.

## Septic Systems

Within the source water protection areas there are properties that rely on septic systems to dispose of their sewage. A septic system is a type of Onsite Wastewater Treatment System (OWTS) consisting of a septic tank that collects all the sewage and a leach field that disperses the liquid effluent onto a leach field for final treatment by the soil (Fig. 22).

Some older properties may have cesspools, the forerunners to the modern septic system. "Cesspool" means an unlined or partially lined underground pit or underground perforated receptacle into which raw household wastewater is discharged and from which the liquid seeps into the surrounding soil. Cesspool does not include a septic tank (Jefferson County, 2014).

Septic systems are the second most frequently cited source of groundwater contamination in our country. Unapproved, aging, and failing septic systems have a significant 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, these residential septic systems can contribute excessive nutrients, bacteria, pathogenic organisms, and chemicals to the groundwater.

In Chaffee County, onsite wastewater treatment systems are permitted by their Building Department. The County administers and enforces the minimum standards, rules, and regulations outlined in the state of Colorado's Revised Statutes (CRS 25-10-105).

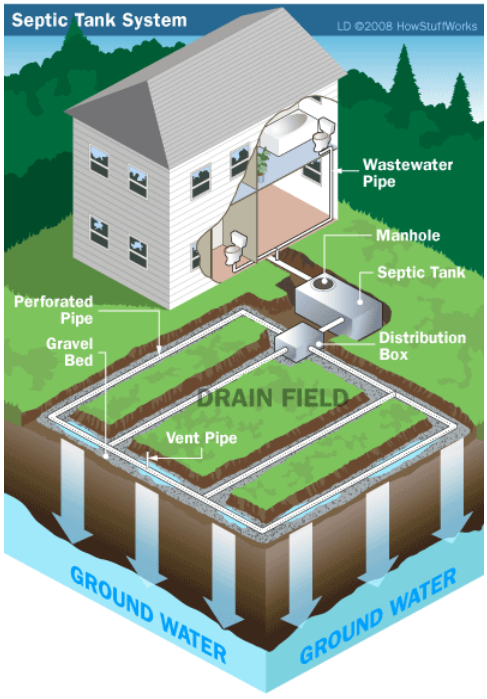



Figure 22. Septic system diagram.

## Mining

### Permitted Mines

Thousands of unpatented claims and small exploratory mining operations throughout Colorado exist, most of which were never recorded in state or local government offices. It was not until 1973 that the State of Colorado required mines to be permitted. Mining permit data obtained from the Colorado Division of Mines, Reclamation, and Safety showed there are 22 active permitted mines in the source water protection area (Fig. 23, Table 8). In Colorado, the BLM manages the surface of public land and the Forest Service manages the surface of National Forest System (NFS) land. The BLM is responsible for the subsurface on both public and NFS land and handles issuing permits including unpatented claims. There are 68 active mining claims in the source water protection area (Fig. 23)

Table 8. Active Permitted Mines in the Source Water Protection Area

| Operator | Mine | ID Number | Commodities Mined |
|---|---|---|---|
| Columbine Minerals | Manshien Mine | M1974013HR | Mica |
| Colorado Division of Highways | Harry Bender Pit | M1977161SG | Sand and Gravel |
| Colonna and Company | Lily Mine | M1977198 | Aggregate |
| CF & I Steel Corporation | Monarch Quarry | M1977377 | Limestone |
| Chaffee County | Pit No. 2 | M1977463 | Sand and Gravel |
| Colorado Department of Transportation | City of Salida Pit | M1980070 | Borrow |
| Avery Structures, Inc. | CPI No. 5 | M1983048 | Sand and Gravel |
| Chaffee County | Marshall Pass Pit | M1985136 | Sand and Gravel |
| Calco Inc. | Monarch Quarry | M1986082 | Limestone |
| Monarch Mountain Minerals & Aggregates, LLC | Lilly Mine | M1987028 | Marble |
| CG & I Steel Corporation | Monarch Quarry No. 2 | M1987093 | Limestone |
| Butala Construction Company | Butala Pit | M1987127 | Limestone |
| Colorado Lime Company | Monarch - Stockpile | M1996068 | Limestone |
| Colorado Lime Company | Monarch – Broken Stone | M1996069 | Limestone |
| Colorado Lime Company | Monarch - Limestone | M1996070 | Limestone |
| Colorado Lime Company | Monarch - Dolomite | M1996071 | Dolomite & Limestone |
| Colorado Lime Company | Monarch Quarry | M1997114 | Limestone |
| Colorado Lime Company | Monarch Quarry | M2000098 | Limestone & Dolomite |
| Tonto Apache Tribe | Tonto Apache Mine | M2002045 | Silica |
| ACA Products Inc. | Friend Ranch | M2002089 | Sand and Gravel |
| Pine Creek Homes, Inc. | Rodeo Park Drive | M2004075 | Sand and Gravel |
| ACA Products, Inc. | R.B. Pit | M2010011 | Sand and Gravel |

## Abandoned Mine Land

Mining practices during the early days allowed the mine owners to simply abandon their mines without consideration of the impact on streams, water quality, slope stability and safety. Many old mining properties contain abandoned mine workings, mine waste and/or mill tailings. Active and inactive mining operations have a potential to contaminate drinking water supplies from either point source discharges (i.e. mine drainage tunnels or flowing adits) or nonpoint source discharges from run-off over waste rock or tailing piles. Acidic, metal-laden water emanating from inactive mines and waste rock piles has a potential to impair the water quality of streams.

Mine data obtained from the U.S. Geological Survey's Mineral Resource Data System (MRDS) showed 122 abandoned mine sites within the source water protection area (Fig. 23). Currently, there is no metal loading from abandoned mines into the South Arkansas River and no draining adits identified as a risk to the source water protection area.

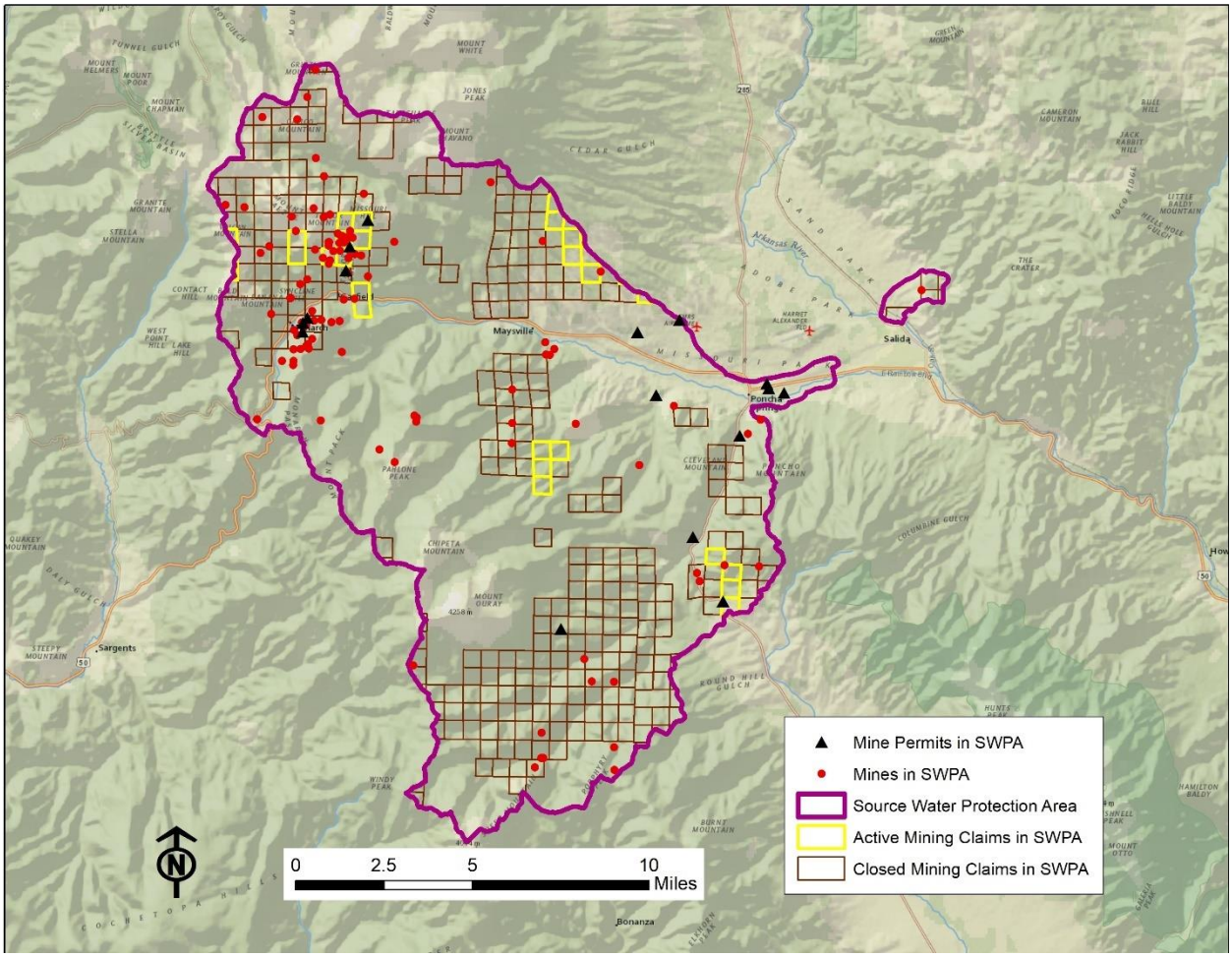



Figure 23. Abandoned mines within the source water protection area.

## Weed Abatement

Herbicides are used by Chaffee County, U.S, Forest Service and private landowners to control noxious weeds within the source water protection area. The Chaffee County Weed Department manages noxious/invasive weeds within the county according to the Colorado Weed Law and Chaffee County's Noxious Weed Management. Plan. The Chaffee County Weed Department consults with private landowners to help manage noxious/invasive weeds on their property, provides best management practices to control noxious weeds, and can make herbicide applications on private lands with landowner approval.

The County Weed Supervisor is responsible for implementing the County Noxious Weed Management Plan. This is consistent with the State mandate for managing noxious weeds. The Chaffee County Weed Department eradicates noxious weeds along county roads and rights-of-way and other county owner or controlled land. The Clear Creek County Weed Program uses integrated management methods to manage, control, and eradicate noxious weeds. This includes cultural, mechanical, biological and chemical control methods.

Certain noxious weeds in the County that are on the State's List A are required to be eradicated (destroyed). Noxious weeds in the County include all state A, B, and C list species. Specific terrestrial noxious weed threats in developed and residential areas include: Baby's Breath, Black Henbane, Bouncing Bet, Bull Thistle, Canada Thistle, Chinese Clematis, Common Tansy, Common Teasel, Dalmatian toadflax, Dames Rocket, Diffuse Knapweed, Hoary Cress, Houndstounge, Leafy Spurge, Musk Thistle, Oxeye Daisy, Perennial Pepperweed, Plumeless Thistle, Russian Knapweed, Russian Olive, Salt Cedar (tamarisk), Scentless Chamomile, Scotch Thistle, Spotted Knapweed, and Yellow Toadflax (CCNWMP, 2017).

All herbicide applicators are required to be certified with the Colorado Department of Agriculture under Pesticide Application. Application equipment is regularly calibrated to insure accurate delivery. Herbicide label information provides precautionary information relating to proximity to water, sensitive vegetation, re-entry intervals, etc. Product labels are referenced and present with applicators in the field.

Improper use of herbicides may lead to contamination of ground and surface water supplies for drinking water. These chemicals can enter the water source through direct application, runoff, and wind transport or drift. The goal is to prevent contamination of water supplies the using best management practices in the application and use of these chemicals.

## Private Water Wells

There are many water wells within the source water protection area, some of which are still in use and some abandoned (Division of Water Resources) (Fig. 24 and 25). Wells can be a direct route for contaminants to enter the groundwater if not properly cased and maintained. Contaminants that infiltrate from the surface are more likely to pollute old, shallow, uncased or abandoned wells.

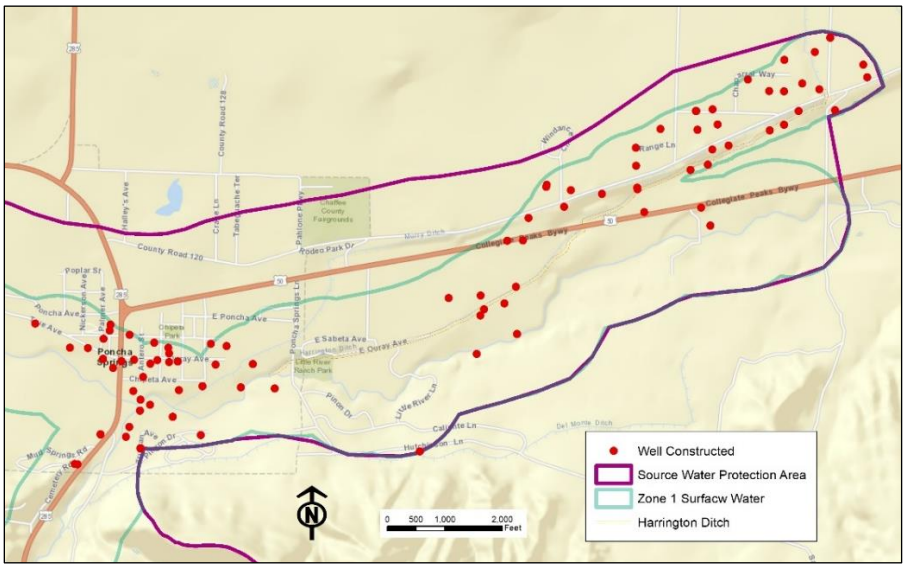



Figure 24. Wells constructed in Zone 1 around Harrington Ditch

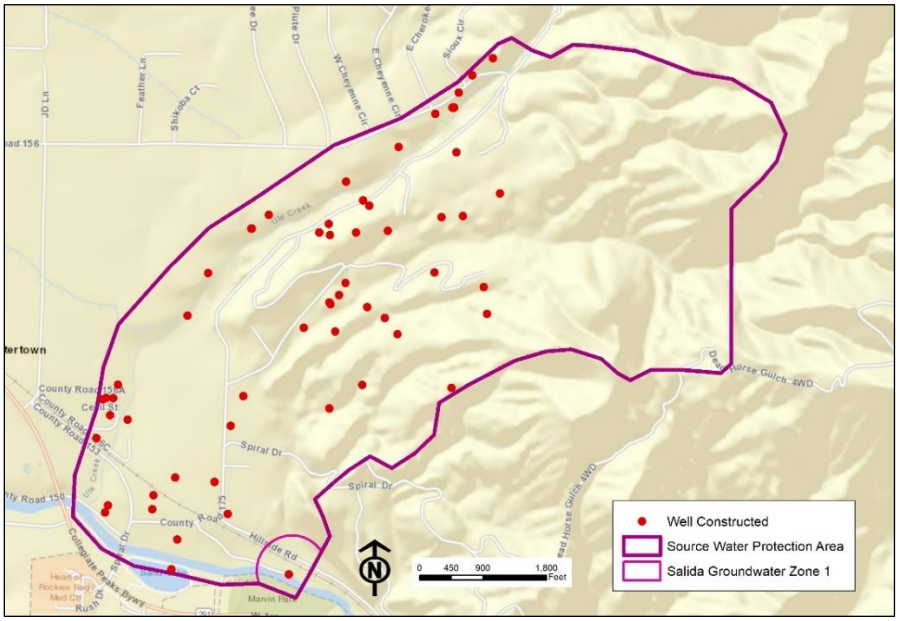
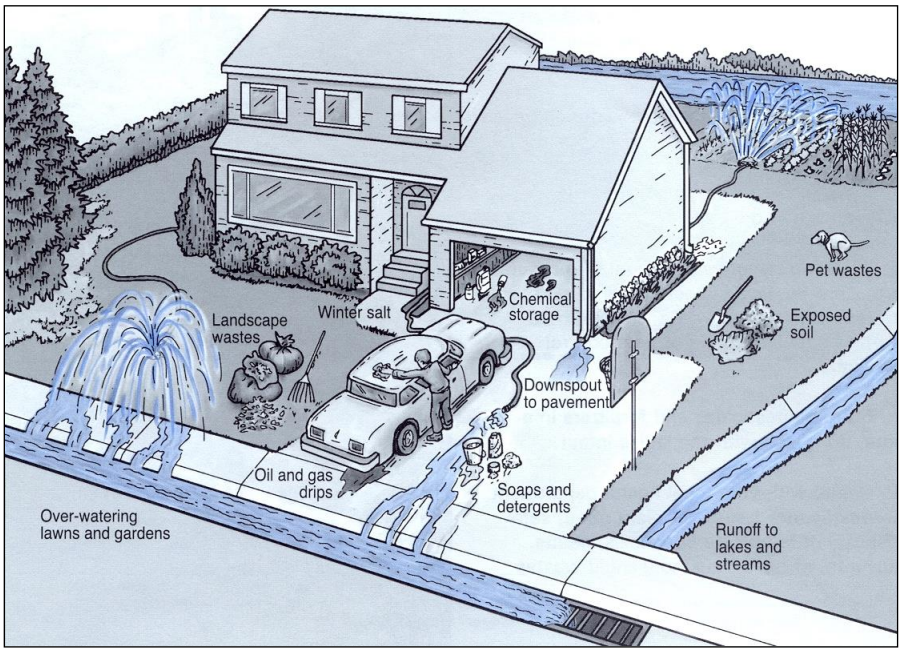



Figure 25. Wells constructed in the Pasquale Springs Source Water Protection Area.

## Residential and Commercial Properties

The City of Salida's source water protection area includes residential and commercial properties. Residential property owners frequently use and store chemicals on their properties. Common household practices may cause pollutants to runoff property and enter the surface or groundwater as indicated in the picture below (Fig. 26). Prevention of surface and groundwater contamination requires education, public involvement, and people motivated to help in the effort. Public education will help people understand the potential threats to their drinking water source and motivate them to participate as responsible citizens to protect their valued resources.

There are a number of commercial facilities located in the industrial area outside of the 1000 foot zone 1 protection area. Commercial properties within the source water protection may also use chemicals in their operations. Many communities have developed a "Keep It Clean" partnership with businesses to help prevent direct impacts from stormwater runoff from these facilities.




SOURCE: COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Figure 26. Common household practices may cause pollutants to runoff residential property and enter the surface or groundwater.

# SOURCE WATER PROTECTION MEASURES

## 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 focus was on selecting those protection measures that are most likely to work for the community. 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 Table 9, "Source Water Protection Best Management Practices" be considered for implementation by:

- City of Salida
- Chaffee County
- U.S. Forest Service Salida Ranger District
- Salida Fire Protection District
- Colorado Rural Water Association
- Visitors to the Source Water Protection Area

## Evaluating Effectiveness of Best Management Practices

The City of Salida is committed to evaluating the effectiveness of the various source water best management practices that have been implemented. The public will be informed by updates at community meetings on the outcomes of the various source water best management practices implemented. The Steering Committee recommends that this Plan be reviewed annually every summer when the Consumer Confidence Report is generated, or sooner if circumstances change (i.e. the development of new water sources and source water protection areas, or if new risks are identified).

Table 9. Source Water Protection Best Management Practices

| Issue | Management Approach | Partners |
|---|---|---|
| *Spills (roads, fuel storage tanks, mining, wastewater)* | 1. Public outreach to entities (Colorado State Highway Patrol; Chaffee County Transportation and Office of Emergency Management; Fire Department; Division of Reclamation, Mining and Safety; Monarch Ski Area; and Monarch Mountain Lodge) to ensure that any spill within the protection area can be effectively contained and cleaned up. Outreach will include:<br>• Copy of Source Water Protection Plan<br>• Map of the Source Water Protection Area<br>• Request to be notified when a hazardous spill occurs within the SWPA<br>2. Contact Chaffee County OEM to ensure that the City of Salida's on the emergency call down list for spills in their SWPA (roads, fuel storage tanks, mining, wastewater). | City of Salida<br><br>City of Salida<br>Chaffee County OEM |
| *Wildland Fires* | 1. Share maps, GIS shapefiles, and Emergency Notification Cards with the USFS, County and Fire Dept.<br>2. Continue to participate in the Wildfire Decision Support System (WFDSS) inventory of public water systems in the Arkansas River valley. | City of Salida<br><br>City of Salida<br>USFS |
| *Storm water runoff* | 1. Develop a stormwater runoff study to define the physical characteristics of runoff in SWPA and strategies for evaluating and improving runoff water quality.<br>2. Consider option of replacing ditch with underground pipe to convey water from South Arkansas River to water plant intake<br>. | City of Salida<br><br>City of Salida |
| *Flooding* | 1. Work with local fire department on flood preparedness to protect water infrastructure. | Fire Department |
| *Agricultural Land)* | 1. Identify and develop relationships with agricultural landowners within the SWPA to educate and encourage efforts at land stewardship to protect the quality of the ground and surface water. | City of Salida |

Table 9. Source Water Protection Best Management Practices

| Issue | Management Approach | Partners |
|---|---|---|
| *Wastewater* | 1. Educate property owners and new septic permittees within the SWPA on the source water protection plan, the proper use and maintenance of their septic system and how the source of their drinking water can be affected by an inadequate functioning or maintained septic system.<br><br>2. Ensure proper maintenance of wastewater treatment plant and sewerage system to prevent contamination to groundwater from leaking pipes. | Chaffee County Environmental Health<br><br>City of Salida<br>Monarch Ski Area<br>Monarch Mountain Lodge |
| *Industry/Commercial Facilities* | 1. Maintain a current inventory of industrial facilities within the Source Water Protection Area. Gather information about their emergency response plan for spills and stormwater management plan.<br><br>2. Build partnerships with industrial and commercial facilities within the protection area in order to encourage stewardship of their land and protect the quality of the surface and groundwater (i.e. Keep It Clean Partnership Program). | Chaffee County OEM<br><br>Chaffee County<br>City of Salida |
| *Security and vandalism* | 1. Ensure the security of the water facilities with fencing, signage, and camera.<br><br>2. Regularly monitor the infiltration galleries and water treatment facility and notify law enforcement officials of any wrongdoing. | City of Salida<br><br>City of Salida |
| *Land Use Planning* | 1. Provide Chaffee County with a copy of the Source Water Protection Plan and GIS mapping information of the SWP area and encourage them to overlay this area on their land use maps.<br><br>2. Request to be notified by Chaffee County officials of land use hearings or meetings regarding land within the SWPA and will have the opportunity to participate in the process.<br><br>3. Explore other opportunities to protect source waters at the local level (i.e. Watershed District Ordinance and MOU with Chaffee County). | City of Salida<br>Colorado Rural Water Association<br>City of Salida<br><br>City of Salida<br>Chaffee County |

Table 9. Source Water Protection Best Management Practices

| Issue | Management Approach | Partners |
|---|---|---|
| *Public Land Management* | 1. Keep informed and participate in public land management issues/activities at the district level including: Forest Plan Revisions, Fuels Reduction Plan, Timber Management Plan, Travel Management and other outreach opportunities. Provide written comments to public land managers on source water protection concerns. | City of Salida |
| | 2. Ensure that the "municipal supply watershed designation" is included in the revised USFS Forest Plan documents as indicated in the USFS Region 2 and CDPHE MOU. | City of Salida<br>USFS |
| *Water Utilities* | 1. Be knowledgeable of the emergency response plan or contingency plan and implementation measures in the event of a disruption in the water source. | City of Salida |
| | 2. Provide Information concerning the SWPP and implementation measures in the annual Consumer Confidence Report (CCR). | City of Salida |
| | 3. Conduct water quality monitoring according to a monitoring plan. | City of Salida |
| | 4. Maintain and routinely inspect and test generator (alternative power source in the event of a power outage). | City of Salida |
| | 5. Implement ditch integrity measures (willow and vegetation control). | City of Salida |

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# APPENDICES

A. Contingency Plan*

B. Contaminant Health Concerns

C. Additional Resource

*Notice: This public document will only include information that is not deemed sensitive to the safety and operation of the individual community's water plan operation. Appendices marked with a * are only included in the Public Utility's report or kept on file at their office. All other documents are included on the CD located in the back pocket of this report. All documents can be reprinted.*