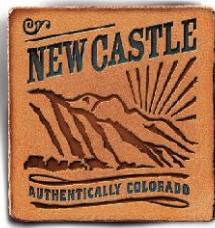


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Town of New Castle

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Agenda

New Castle Town Council Work Session

Tuesday, September 07, 2021, 6:30 PM

Virtual Meetings are subject to internet and technical capabilities.

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[a.](#) Discussion: Source Water Protection Plan

Source Water Protection for the Colorado River Partnership

Source Water Protection Plan



Garfield County, CO January 2013

Written by: Morgan Hill, Environmental Health Specialist
Garfield County Public Health

Coordinated by: Dylan Eiler, Source Water Specialist
Colorado Rural Water Association

For the community water providers:

Town of New Castle: ID# CO0123538

Talbott Enterprises: ID# CO0123734

Town of Silt: ID# CO0123710

City of Rifle: ID# CO0123676

Town of Parachute: ID# CO0123602



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LIST OF ABBREVIATIONS

SWPCRP- Source Water Protection for the Colorado River Partnership

SWAP- Source Water Assessment and Protection (A CDPHE Program)

SWPP- Source Water Protection Plan

CDPHE- Colorado Department of Public Health and Environment

DSWPA- Drinking Water Supply Protection Area

PSOC- Potential Source of Contamination

CRWA- Colorado Rural Water Association

COGCC- Colorado Oil and Gas Conservation Commission

BLM- Bureau of Land Management

GIS- Geographic Information System

TOT- Time of Travel

BMP- Best Management Practice

CDOT- Colorado Department of Transportation

WFSI- Wildfire Susceptibility Index

WUI- Wildland-Urban-Interface

EPA- United States Environmental Protection Agency

SDWA- Safe Drinking Water Act

GPD- Gallons per Day

MGD- Million Gallons per Day

EXECUTIVE SUMMARY

Source Water Protection for the Colorado River Partnership (SWPCRP) serves five community water systems: The Town of New Castle, Talbott Enterprises, the Town of Silt, the City of Rifle, and the Town of Parachute. Talbott Enterprises consists of two communities: Apple Tree Mobile Home Park and Mountain Shadows subdivision. Each community values a clean, high quality drinking water supply and decided to work collaboratively with area stakeholders and each other to develop a Source Water Protection Plan to protect their current water sources of the Colorado River, the tributaries of East Elk Creek and Beaver Creek, Talbott Enterprise's wells, and Parachute's springs. The drinking water system operators shared many goals related to their common use of the Colorado River for a drinking water supply. During the months of April 2011 to January 2013, three stakeholder meetings and eleven steering committee meetings were held in each of the municipalities, encouraging participation from local public representatives, water operators, government, and industry. This group comprised the Source Water Protection Steering Committee. The focus of the Source Water Protection Plan is primarily on education, outreach, and communication; not regulation. The ability to promote the Source Water Protection Plan (SWPP) rests solely with local communities and governments.

The Steering Committee initially reviewed the Source Water Assessment Completed by the Colorado Department of Public Health and Environment (CDPHE). This assessment included the delineation of the source water protection area, potential sources of contamination, and the potential of these contaminants to degrade the water source. The Steering Committee re-delineated the source water protection areas designated by the CDPHE to create protection zones that are manageable and meet their specific needs. These were designated as "Drinking Water Supply Protection Areas (DWSPAs)."

To identify and prioritize threats to their drinking water supplies, the Steering Committee developed a list of potential sources of contamination (PSOCs). Once an inventory of all PSOCs within the DWSPAs was compiled, the Steering Committee began to prioritize and rank the PSOCs as "Issues of Concern." The Steering Committee focused on the following issues of concern within their source water protection areas (in no particular order): Oil and gas operations, pipelines, transportation and roadways, agricultural practices, railroads, pesticide application, septic tanks, fires, landfills, aboveground and underground storage tanks, land use change, residential issues, campgrounds and recreation, timber harvesting, industrial and commercial areas, municipal and residential water resources, the Rulison Blast Site, uniform municipal water operations sampling and monitoring, and the unknown source of Town of Parachute's springs.

The Steering Committee reviewed and discussed management approaches for each Issue of Concern that could be implemented within the protection area to help reduce the risks of potential contamination to the source waters of each community. Many of these focused on collaboration with federal, state, and local governments, industry, and stakeholders on existing efforts and relying on the regulatory authority they already possess. Other approaches included topics like education and outreach as well as maintaining current inventories of priority contaminants.

The Colorado Rural Water Association's (CRWA) Source Water Protection Specialist, Dylan Eiler, helped facilitate the source water protection planning process. The plan was developed and written by Morgan Hill, beginning as an independent contractor and later in association with Garfield County Public Health.

The goal of the CRWA 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.

INTRODUCTION

The communities within Source Water Protection for the Colorado River Partnership (SWPCRP) serve five different water systems: The Town of New Castle, Talbott Enterprises, the Town of Silt, the City of Rifle, and the Town of Parachute. All are connected to the Colorado River as part of their water supply, although the Town of New Castle has not activated their intake on the river and currently intakes drinking water solely from East Elk Creek. The City of Rifle also gets a portion of their water from Beaver Creek south of the City and the Town of Parachute gets a large amount of their water from a number of springs southeast of town. The SWPCRP was established in March 2011 with the sole purpose of providing a framework for public water systems on the Middle Colorado River to identify threats to their drinking water supply and collaborate on the protection of their drinking water sources from potential sources of contamination. Proactive planning and prevention is essential to the long-term integrity of a water system as well as in limiting their costs and liabilities.

Table 1: SWPCRP Communities

PWSID	PWS Name	Operator	Address	Phone
123538	New Castle	Greg Colter	801 W. Main St., New Castle, CO 81647	(970) 984-0669
123734	Talbott Ent.	Russell Talbott	5175 County Rd. 335, #402, New Castle, CO 81647	(970) 984-2943
123710	Silt	Jack Castle	500 W. Frontage Rd., Silt, CO 81652	(970) 876-2353
123676	Rifle	Robert Burns	202 Railroad Ave., Rifle, CO 81650	(970) 665-6599
123602	Parachute	Dan Larue	P.O. Box 100 Parachute, CO 81635	(970) 285-7630

Purpose of the Source Water Protection Plan

The Source Water Protection Plan (SWPP) is a voluntary tool for the five communities participating in the SWPCRP to help ensure clean and of high quality drinking water sources for current and future generations. This Source Water Protection Plan is designed to:

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

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

Public Participation in the Planning Process

Public participation is vitally important to the overall success of Colorado's Source Water Assessment and Protection (SWAP) program. Source water protection was founded on the

concept that informed citizens, equipped with fundamental knowledge about their drinking water source and the potential threats to it, will be the most effective advocates for protecting this valuable resource. Local support and acceptance of the plan is more likely where local stakeholders have actively participated in the development of their protection plan.

During the months of April and May 2011, three stakeholder meetings were held at various locations between New Castle and Parachute to encourage local public participation in the planning process. Local stakeholders were sent letters of invitation to participate and email reminders of meeting dates. The source water protection planning process attracted interest and participation from 41 people including water operators, government, agency representatives, industry representatives, and local citizens. Input from these stakeholders throughout the plan process was invaluable. Stakeholders consisted of representatives from federal agencies such as the US Forest Service and the Bureau of Land Management (BLM), state agencies/organizations such as the Colorado Oil and Gas Conservation Commission (COGCC) and the Colorado Department of Transportation (CDOT), and CSU Extension. Local governments consisted of the five communities and their respective municipalities, as well as Garfield County. Industry representatives from Laramie Energy, EnCana Oil and Gas (USA) Inc., Williams Production and WPX Energy were also present. Non-profits such as the Sierra Club and Western Colorado Congress attended; as well as several local residents.

Steering Committee Members



After providing adequate opportunity for area representatives to become involved with the planning process, a steering committee was formed out of the stakeholder group that helped in the process of determining potential sources of contamination and developing Best Management Practices. All members attended at least one steering committee meeting and contributed to planning efforts from their areas of experience and expertise. Their representation provided diversity and led to a thorough protection plan (Table 2).

Figure 1: Members of the SWPCRP Steering Committee

Table 2: Steering Committee Members

Name	Company / Agency / Affiliation
Mark Austin	Parachute Town Engineer
Jerry Barker	Walsh Environmental
Chris Bornholdt	Garfield County Emergency Management
Robert Burns	City of Rifle
Lanny Carlson	Town of Silt
Jack Castle	Town of Silt

Greg Colter	Town of New Castle
Dick Deussen	City of Rifle
Charles Dye	Citizen
Dylan Eiler	Colorado Rural Water Association
Kathy Friesen	Encana Oil & Gas (USA) Inc.
Morgan Hill	Garfield County Environmental Health
Charles Jensen	Encana Oil & Gas (USA) Inc.
Shauna Kocman	BLM - Hydrologist
Mark King	Town of Parachute
Dan LaRue	Town of Parachute
Mike Markus	Olsson Associates
Gerry Pace	Town of Silt
Jim Rada	Garfield County Public Health
Mark Rogers	CDOT
Frank Smith	Western Colorado Congress
Charles Stevens	City of Rifle
Russell Talbott	Talbott Enterprises / Engineer
Denise Van Hoorelbeke	Town of Parachute
Paul Reaser	Garfield County Public Health
Kirby Wynn	Garfield County Oil and Gas Liaison

Protection Plan Development

The source water protection planning effort consisted of public Steering Committee meetings and individual meetings with water operators; as well as representatives from federal, state, and county governments; non-profits, and private industry. Information discussed at the meetings helped the Committee develop an understanding of the issues affecting source water protection for the SWPCRP. The Committee then made recommendations for management approaches to be incorporated into a protection plan. In addition to the Steering Committee meetings, data and other information pertaining to source water protection areas was gathered via public documents, internet research, phone calls, emails, and field trips to the protection area. A summary of the meetings is presented below (Table 3).

Table 3: Protection Plan Development Timeline

Date	Action
April 26, 2011	1st Stakeholder Meeting - presentation of the Source Water Protection Planning Process, briefly review State's delineation of Drinking Water Supply Protection Area (DWSPA), and establish Steering Committee
May 19, 2011	Landowners Meeting in New Castle - presentation of the Source Water Protection Planning Process, briefly review State's delineation of Drinking Water Supply Protection Area (DWSPA), and establish Steering Committee

May 25, 2011	2nd Stakeholder Meeting - review SWPP Process, input and discussion on delineation of DWSPA, potential sources of contamination (PSOC's), and establish Steering Committee
June, July, August 2011	Field assessments of each water system involved in SWPCRP. This helped in verifying coordinates of intakes and wells, and identifying PSOC's located within DWSPA.
September 1, 2011	1st Steering Committee Meeting - Review Plan process, discuss and agree upon Plan goals and objectives, discuss and agree on Plan outline. Determine delineation of Drinking Water Supply Protection Area
October 13, 2011	2nd Steering Committee Meeting - finalize DWSPA and begin PSOC Inventory
November 9, 2011	3rd Steering Committee Meeting - PCOC Inventory and Prioritization
December 7, 2011	4th Steering Committee Meeting - finalize PSOC Inventory and Prioritization and begin development of Best Management Practices (BMP)
January 18, 2012	5th Steering Committee Meeting - begin development of Best Management Practices (BMP)
February 29, 2012	6th Steering Committee Meeting - Review Garfield County Community Wildfire Protection Plan, continue to develop BMP's for PSOC's and develop plan to implement them
March 22, 2012	7th Steering Committee Meeting - continue to develop BMP's for PSOC's and develop plan to implement them
April 25, 2012	8th Steering Committee Meeting - finalize BMP's
June 27, 2012	Meeting to discuss and develop sampling and monitoring plan for SWPCRP
September 19 th , 2012	9th Steering Committee Meeting - discuss Draft SWPP
November 1, 2012	10th Steering Committee Meeting - Develop Action Plan for implementation of all BMP's identified in SWPP

WATER SUPPLY SETTING

Location

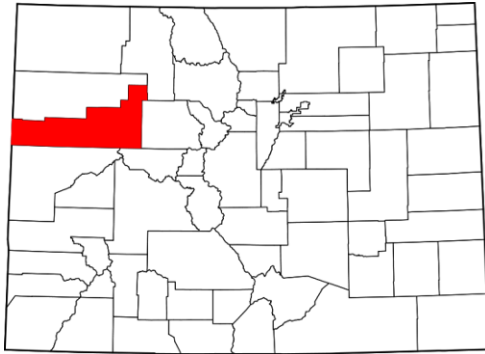


Figure 2: Garfield County

The Town of New Castle, Talbott Enterprises, Town of Silt, City of Rifle, and Town of Parachute are located in Garfield County, in the west central region of Colorado. Garfield County covers 2,958 square miles and has a population of 56,389 (U.S. Census Bureau, 2010). The County seat is located in the City of Glenwood Springs, which has traditionally served as a regional retail and services center for west central Colorado. All five municipalities included in this plan are located along Interstate 70, one of the most prevalent East-West thoroughfares in the State. (For a map of each town and their corresponding source water protection area, see

Figure 14.) The County is composed of approximately 60 percent public lands, which are managed by the Bureau of Land Management, the U.S. Forest Service, and the Bureau of Reclamation. Topographic features include the White River Plateau, the Flat Top mountains, and the Grand Hogback. The elevation in Garfield County ranges from 4,954 feet at the Western end to 12,336 feet on the Flat Top Mountains.



Figure 3: Regional Setting of Source Water Protection Area

Hydrology

The drinking water supply protection areas (DWSPAs) are located within the Colorado River basin, and all of the operations addressed in this plan utilize or have the potential to utilize the Colorado River or its alluvium for their drinking water supply. The River's flows are primarily snowmelt driven, with high flows during spring and early summer runoff. Low flows occur during the fall and early winter when the system is primarily fed by groundwater. The entire basin is managed by the Division 5 office of the Colorado Division of Water Resources. The Basin encompasses approximately 9,830 miles; with the largest cities including Grand Junction (pop. 45,669) and Glenwood Springs (pop. 8,301). The river begins at the Continental Divide in Rocky Mountain National Park at an elevation of greater than 13,000 ft. When it exits the State into Utah, the river's elevation is approx. 4,300 ft. The Basin's mountainous headwaters gradually give way to a series of canyons and gentler terrain. Much like that of the more-specific DWSPA, a substantial portion of the basin is composed of federally-owned land (Headwaters magazine, Summer 2011).

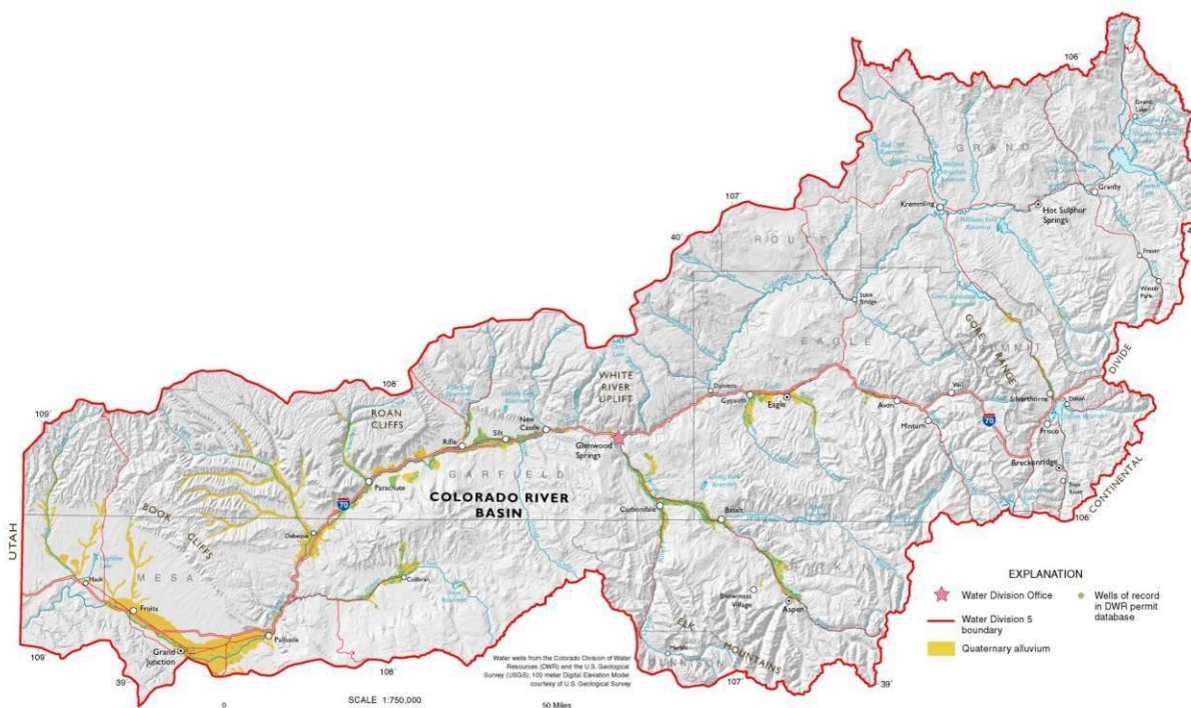
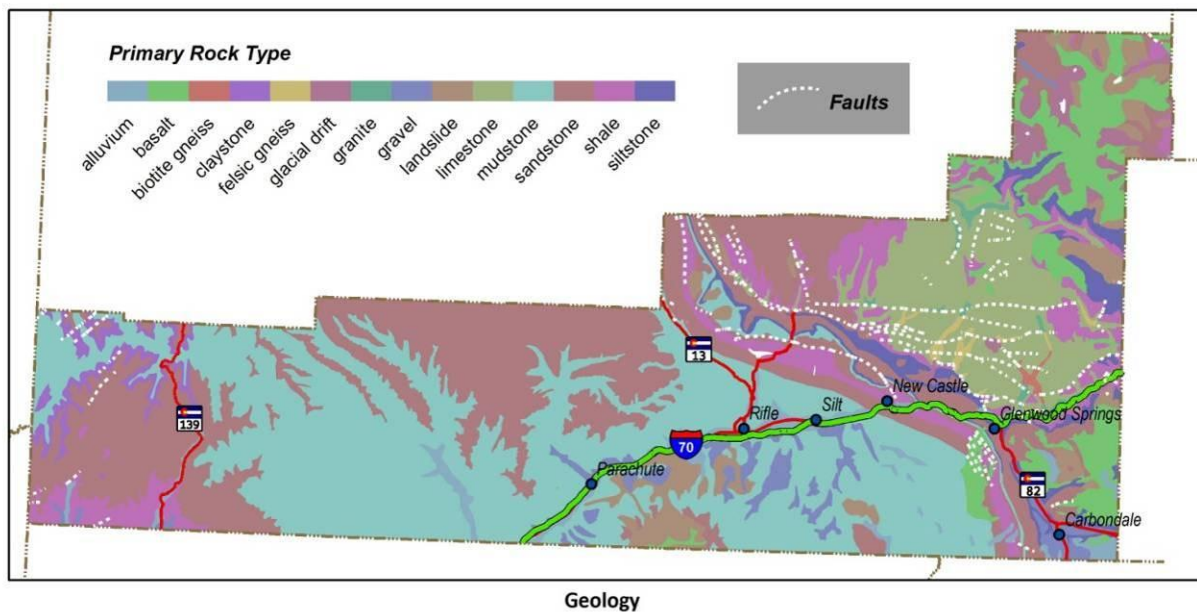


Figure 4: Colorado River Basin

Geology

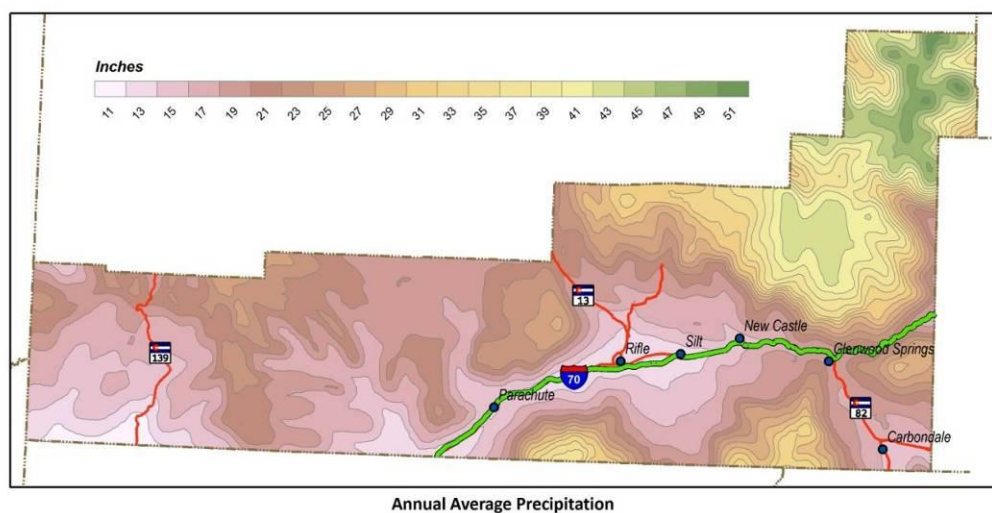
The protection area outlined by the SWPCRP lies within the greater Piceance Basin, a geologic region approximately 7,100 square miles in western Colorado. The Piceance basin sits within the Colorado Plateau physiographic province in addition to a small part of the Southern Rocky Mountains province at the basin's east end. This diverse area contains badlands, plateaus and mesas, sub-alpine and alpine peaks and highlands, as well as deep canyons and broad alluvial valleys. Much of the northeast side of the basin is marked by the Grand Hogback, one of Colorado's spectacular geographic features formed by an erosion-resistant sandstone formation. This formation runs through the Town of New Castle and down to Rifle. Formed

during the Late Cretaceous and Early Tertiary Laramide Orogeny, the Piceance Basin is a deep structural geological depression that preserves a thick sequence of sedimentary rocks. Map was generated by Garfield County GIS department.



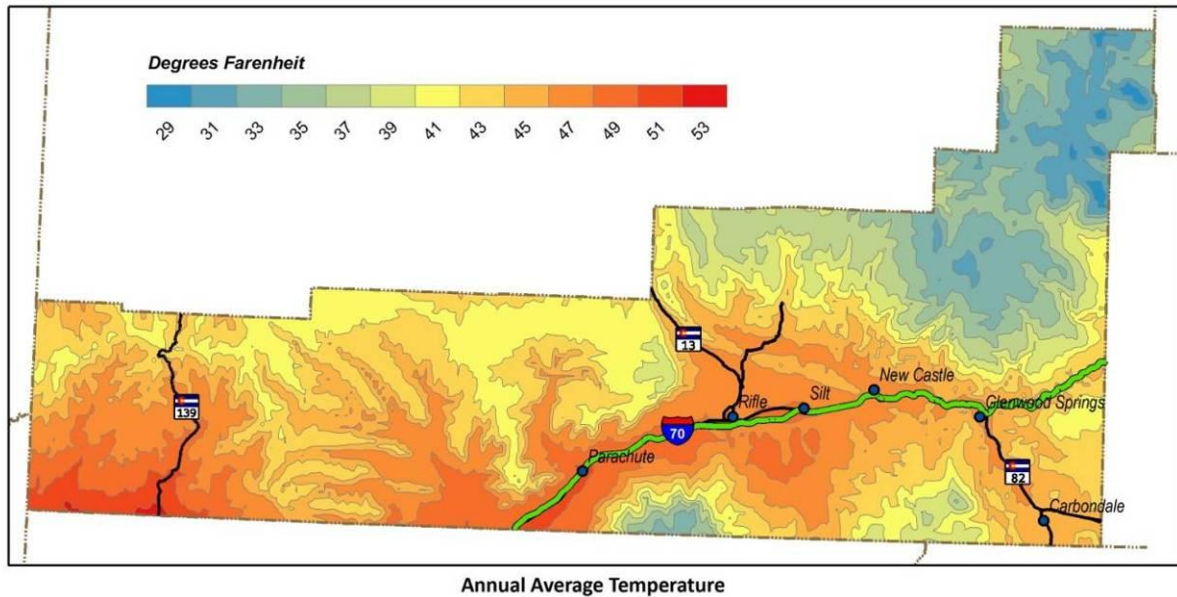
Since the structural development of the basin, the region has undergone uplift, erosion, and development of the Colorado stream system forming the landscape as we see it today. In the southern part of the basin, Mid-Tertiary basalt flows followed ancient river valleys, and these ancient basalts, being more resistant to erosion, now form the cap-rock of Battlement Mesa north of Parachute. Alluvial deposits of unconsolidated sand, gravel, and silt fill the deep alluvial valleys along the modern stream drainages. (Papadopoulos and Associates, 2008). These deposit sediment into the river and can make groundwater rather brackish.

Climate



The climate in the communities of the SWPCRP features mild snow in the winters and summers typical of the high desert, with frequent sunny days. High temperatures in the summer are around 90°F and lows in the winter averages 13°F. Average annual precipitation is 12 inches.

Vegetation is typical of piñon juniper woodlands; higher elevations to the north and south have aspen and other pine trees. Maps were generated by Garfield County GIS department. Data is derived from the Natural Resource Conservation Service's Parameter-elevation Regressions on Independent Slopes Model (PRISM).



Land Ownership and Use

Land ownership and use in Garfield County is categorized by the Garfield County Assessor's office, which collects and manages all property data and updates land use maps. Each land class is assigned a parcel ID. Based on these IDs, a total acreage and percentage for each category was determined. These were grouped together into more general categories. The land use percentages are estimated at:

- Public Lands: 60%
- Agricultural: 20%
- Commercial/Industrial/Residential: 10%
- Vacant/Other: 10%

Public Lands make up the majority of land use and ownership, and include both federal and state lands. Vacant lands include undeveloped parcels within residential or industrial areas; land uses described as "other" did not fall into any other categories or were not assigned a parcel ID number. Major examples of these areas are rights-of-way for major roads, the railroad, open spaces and river or lake shores.

Land Administration and Zoning Regulations

Most land use decisions for the unincorporated areas of Garfield County are made by the Board of County Commissioners. The Planning Commission and planning staff provide recommendations to the Board based on compliance with the adopted Unified Land Use Resolution of 2008 and general conformity with the County's Comprehensive Plan 2030. Staff administers the County land use regulations which provide regulations on the physical development of the land as well as provides a process for applying for certain types of land use

change permits. Dependant on the type of use being proposed, the code currently requires an applicant to address the impacts of proposed land use change on the potential water quality effects .

Economic Development, Growth and Population

The economy in Garfield County experienced consistent growth and expansion during the 1990s and throughout the early 2000's; corresponding with the natural gas boom that occurred during those years. Construction was also expanding during those times to meet the needs of a growing population throughout Western Colorado. The nationwide economic recession that began in 2008 substantially impacted the local economy. Garfield County's three primary industries, oil and gas, tourism, and construction are recovering slowly since the recession; however, growth of these industries has been observed in the last several years as of 2012.

In the last decade, Garfield County's population growth rate has been increasing at a rate faster than much of the rest of the State. As of 2009, there were 56,298 residents, an increase of 22% from the population in 2000. The recent decrease in the level of natural gas activity and associated industries has contributed to the recent decrease in growth rate and caused a decline in the population of some areas of Garfield County. Future projections, however, still indicate overall population growth of the county.

WATER QUALITY SETTING

Water Quality Standards

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. 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.

Water Conservancy Districts

Water quality and quantity are inherently related. Therefore, the representation of water quantity within the middle portion of the Colorado River and its tributaries is essential for determining water quality. There are several governmental entities responsible for managing this resource, the largest of which is the Colorado River District, a public water policy agency. Their mission statement is: "To lead in the protection, conservation, use and development of the water resources of the Colorado River basin for the welfare of the District, and to safeguard for Colorado all waters of the Colorado River to which the State is entitled." West Divide Water Conservancy District manages the more specific portions of Western Colorado. This organization was developed for the purposes of "conserving and developing land and water resources within its boundaries. The district includes portions of Garfield, Pitkin, and Mesa Counties in Western Colorado."

Drinking Water Supply Operation

The five communities included in this plan have varying but similar water supply operations. Each is described separately below, including a map of their Drinking Water Supply Protection Area that will be described in detail in a later section.

TOWN OF NEW CASTLE

Land Use and Growth

The Town of New Castle, like many others in the area, is relatively small. It is situated 12.5 miles west of Glenwood Springs and seven miles east of the Town of Silt on I-70, at an elevation of 5,597 feet.

New Castle for many years was primarily a coal mining town. Presently, the Town of New Castle's primary industries are tourism (hunting and fishing) and agriculture/ranching. The Town covers a land area of 2.5 square miles, which includes both the old Town on the north side of the Hogback (a geologic feature that dominates much of the region) and the much newer Castle

Valley Ranch. Castle Valley Ranch was annexed by the Town in 1980 and has since become a major subdivision, housing a majority of residents there. Between these two locations, the Town has a population of 3,430 people (est.). The Town Council serves as the governing body for the Town, setting town policies. The Town Administrator and other staff then carry out these policies.

Water Supply and Demand



Figure 5: East Elk Creek Intake

Presently, the Town of New Castle's sole source water supply comes from East Elk Creek. This has been an adequate water supply for the 1,604 taps and 3,400 people it services. The Town does have an intake on the Colorado River that was constructed in 1993 and is located at 39.56929 latitude and -107.538789 longitude. However, due to the higher cost associated with treating and transporting this water supply, water operators have decided to refrain from using it as a source unless demand or drought should necessitate it. The East Elk Creek intake is located on County Road 241, a quarter of a mile upstream of Elk Creek Campground at 39.601671 latitude and -107.55333 longitude.

The primary detention pond to store water East Elk Creek water before treatment is located adjacent to the intake. A 16" diameter raw water line flows 1.1 miles southeast and downhill to the water treatment plant, where three air release valves are in place to bleed the air from the line. The water is treated using three Siemens Microfloc filters. Each can be operated with a range of 150 gallons per minute (gpm) to 350 gpm. The plant also utilizes two Water Tech filters that produce 100 gpm to 200 gpm each. These filters have a small flocculent mixing tank that feeds into an up-flow clarifier, followed by a multi-media sand bed for final clarification. All filters use Stern Pac as a coagulant agent with alum as the reagent used to create the flocculent. Chlorine gas is used for disinfection and chlorine contact time (CT) is calculated each day to insure that regulations for disinfection are met.

From the treatment plant, water is piped to four different storage tanks. The Elk Tank services 900 customers located out of town limits and holds 200,000 gallons, constituting 5% of its water sales. The City Tank holds 1,000,000 gallons; and the Castle Valley Tank, which services the major subdivision north of the Hogback, holds 800,000 gallons. The Lakota golf course and subdivision also consumes a large portion of the water supply and has a 1,700,000 gallon storage tank, referred to as the Lakota Tank. Current system potable water storage capacity is 3.7 million gallons. Average daily demand in the winter is 346,500 gallons per day (gpd); in the summer the number increases drastically to 1,000,000 gpd. Peak demand is between May and June with a range of 1.5 million gallons per day (mgd) to 1.8 mgd.

TALBOTT ENTERPRISES

Land Use and Growth

Talbott Enterprises is an unincorporated residential community approximately 1.5 miles southwest of New Castle at an elevation of 5,570 feet. It is located south of I-70 on the south

bank of the Colorado River and is accessed by County Rd. 335. The residential area incorporates Apple Tree Mobile Home Park and the Mountain Shadows neighborhood. Together, they have a population of approximately 1150 people. This number has remained fairly static over the last decade, as most of the homes have sustained occupancy. However, with the addition of 9 new homes, the population has increased by about 50 residents. Unless new neighborhoods are developed, there is no real change expected in the population. Since the community is mostly residential, there is little industrial activity; however, there are several service-oriented businesses, one private school, one fire station, the community maintenance facilities, and several offices. There has been little decline or expansion of these services in recent years.

Water Supply and Demand

Apple Tree Mobile Home Park (“Apple Tree”) and Mountain Shadows neighborhood pull water from two shallow wells that draw from the Colorado River alluvium. During certain periods of the year, there is enough pressure for water to come to the surface on its own; however, pumping is typically required. The wells and associated pump stations are located within the residential community of Apple Tree Mobile Home Park. Well #2 is located at 39.565585 latitude and -107.544936 longitude and is 80 feet deep; Well #3 is located at 39.564364 latitude and -107.549157 longitude and is 73 feet deep. Well #4, pictured on the map on page 34, is a future location for a well that is not currently in use. The water is treated with liquid chlorination at the well head prior to being pumped into the single 100,000 gallon storage tank located east of the community.

There are 376 taps for the 1,150 people served by this water supply. Their average daily demand is around 90,000 gpd. Water operators estimate peak demand to be approximately 110,000 gpd in the summer months.

TOWN OF SILT

Land Use and Growth



Figure 6: Town of Silt Sign

The Town of Silt is located 14 miles west of Glenwood Springs and seven miles west of New Castle, and, like the other municipalities included in the SWPCRP, spans the I-70 corridor. Its elevation is 5,456 feet. The US Census Bureau reports the Town has a size of 2.8 square miles.

Silt was incorporated May 19, 1915 as a Statutory Town. The 2010 census revealed a population of 2,950, an increase of 41% from the year 2000. This growth can primarily be attributed to annexation and increased costs of living east of town up the Roaring Fork and Colorado River valleys. The Town's primary industries are tourism

(hunting, fishing, and visits to Harvey Gap Reservoir north of town), oil and gas, farming and ranching, and construction. While in some cases annexation can affect a rural town's farming and ranching heritage, residents of Silt believe this industry has not been negatively affected; however, most of the industries have been decreasing in recent years as a result of the economic downturn beginning in 2008. The entire community has been affected by the slump in

the housing market as this resulted in a loss of many construction jobs. Increased cost of materials and feed for animals has affected farmers and ranchers in the area, reducing the size of workable hay producing areas and size of livestock herds.

Water Supply and Demand

Silt's drinking water supply comes entirely from their single intake on the Colorado River. The intake is located slightly downstream from the primary downtown area and on the other side of Interstate 70; at GPS coordinates 39.542818, -107.668213. Raw water travels 400 feet from the intake to the treatment facility, where it goes directly into treatment. No storage reservoirs exist; however, a pond for backwash water sits adjacent to the water treatment facility. The water at the plant is treated with submerged membrane filtration and then housed in three storage tanks totaling 2.4 million gallons. This water supply services 800 taps and approximately 3,200 residents for the Town of Silt. In 2012, the Town constructed separate storage tanks for irrigation water, reducing their daily demand and allowing for more consistent production throughout the year. Their current capacity is 864,000 GPD, however, average daily demand is 275,000 GPD. These supplies are only at about 30% of the treatment plant's operating capacity; it was built to supply water for the Stillwater residential and urban development that was never constructed due to funding issues.



Figure 7: Town of Silt Colorado River Intake

The Town of Silt has plans to develop three shallow alluvial wells 100 feet from the Colorado river bank, with the goal of further reducing risk to contamination by creating extra filtration through the soil. Currently they have drilled one drinking water well and one monitoring well and are waiting for funding approval for the other two wells. The first well was drilled to a depth of 19 feet before bedrock was reached; it is expected that the other two will be similar.

CITY OF RIFLE

Land Use and Growth

Rifle is the largest community included in the SWPCRP and has the greatest amount of land zoned for industrial and commercial activity. With 9,250 residents as of the 2010 census, it occupies 4.29 square miles and is located at an elevation of 5,348 feet. The City's population has more than doubled from 4,000 in the 1990 census. These trends follow the general pattern of growth and expansion in Western Colorado, but can also be attributed to expansion of the natural gas industry in Garfield County in addition to greater



Figure 8: City of Rifle Sign

employment in nearby resort areas and communities. Currently, primary industries are health care, oil and gas, education, tourism, outdoor recreation, and agriculture. An economy that had previously relied almost entirely on agriculture and ranching (as well as hunting and fishing) has also become diversified. The goal of the City's managers is to sustain growth in the midst of boom and bust cycles from the natural gas industry. While economic and population growth have largely benefited the City of Rifle and allowed for greater access to amenities, it has put pressure on existing infrastructure and required new construction. Long term projections from the State indicate that the City may eventually expand to a population of 20,000 with a growth rate of about 3.4% per year (City of Rifle Water Master Plan, 2006).

Water Supply and Demand



Figure 9: City of Rifle Storage Pond

The City of Rifle has two sources for their drinking water supply: The Colorado River and Beaver Creek. The Colorado River supplies 91% of the total water supply. The Colorado River Intake is located just east of the City in the valley floor floodplain along US Highway 6 and Mile Pond Road at 39.530893 latitude and -107.752754 longitude. Water is transported approximately 50 feet through corrugated plastic into a holding pond with a 93 million gallon capacity. Water from the holding pond is transported to approximately 1.5 miles up to the Graham Mesa Water Treatment Plant, where it is treated using rapid sand filtration and chlorine.

The City of Rifle anticipates construction of a new water treatment facility for its Colorado River intake in early 2013. This facility will have an initial capacity of 6 MGD expandable to 8 MGD. The new facility will provide multi-barrier protection for all current and possible future regulations. Water will be treated with a flocculation/sedimentation process which will flow into ultrafiltration membranes. After ultrafiltration, the water will be split between granular activated carbon contractors and reverse osmosis to reduce the total dissolved solids and organic compounds that remain. This is expected to improve drinking water quality for the City.

Beaver Creek, located south of the City on County Road 317 at 39.479044 latitude and -107.832665 longitude, supplies an additional 9% of the City of Rifle's drinking water supply. Their intake comes from the creek into a concrete diversion structure where the water is transported approximately 3 miles by gravity down to the City's second water treatment plant that also lies along County Road 317. There it is stored in a holding pond on the plant site. Water from Beaver Creek is treated using a MicroFloc Package Plant, or "Conventional" Mixed Media.

Treated water from both sources is stored in five storage tanks with a total capacity of 6.2 million gallons. As the largest city in Garfield County, it supplies water for 3,500 taps and 9,500 citizens. Similar to water demand trends of other communities in the West, Rifle's demand increases dramatically during summer months when irrigation and lawn watering are prevalent. Their



Figure 10: Beaver Creek Intake

demand is an average of 650,000 gallons per day in the winter to 3 MGD in the summer. Peak use can be up to 4.5 MGD.

Hach Continuous Monitor

The City of Rifle utilizes a Hach Continuous Monitor for source water monitoring equipment at the Beaver Creek Intake. This equipment monitors for turbidity, pH, conductivity and oxidation reduction potential. It samples the source water and if water quality conditions stray from historical trends and operator determined thresholds, the monitor will close the intake and notify staff that possible contamination has occurred. This allows for increased protection of both upstream water users and Rifle's drinking water customers.

Beaver Creek Watershed Cumulative Impact Assessment

In October 2011, Resource Engineering, Inc. completed a Cumulative Impact Assessment of Beaver Creek water supply source for the City of Rifle. The purpose of this assessment was to evaluate the cumulative effects of past and present land use practices on the integrity and health of Beaver Creek above the City's water intake. The report depicts the current condition of Beaver Creek and its main tributaries as well as presents recommendations for improving the overall health of the Watershed. They found that despite the City's efforts to work with private landholders and resource development companies in Beaver Creek's watershed, stream channel surveys indicated that "the health of downstream reaches of Beaver Creek and its major tributaries is degraded." These findings were largely related to sediment loading resulting from the gravel road adjacent to the creek, increased surface disturbance from oil and gas development, and ranching activity. The City of Rifle is currently working with industry, private landowners, and Garfield County to correct the degradation.

City of Rifle Watershed Ordinance

The City of Rifle recognized that there was significant industrial activity within their watershed and developed a Watershed Ordinance to protect their waterworks from being damaged and the City's water supply from pollution. The City utilizes these regulations for the purpose of reviewing and permitting any activity within the District which creates a foreseeable risk of injury to their waterworks or water supply. These regulations control land use activities, and are for the purpose of reviewing and permitting any activity within the District which may pose a risk to drinking water supplies. Activities that may cause injury to water supplies within five miles upstream of both the Colorado and Beaver Creek intakes must go through review by the City. They can then approve the application and grant a permit. Examples of these activities are excavation and grading, timber harvesting, drilling operations, and spraying herbicides.

TOWN OF PARACHUTE

Land Use and Growth

Parachute's population has fluctuated dramatically in recent years as a result of the variability of natural gas activity in the region. Natural gas development is Parachute's primary industry, and; along with the adjacent Planned Unit Development of Battlement Mesa, Parachute supplies housing for many of the workers and their families. Parachute's growth rate was 28% from the year 2000 to 2009 with a population estimated at 1,288. The population as of 2010 was 1,085.

This decline can be attributed mostly to the decrease in the price of natural gas, which can also be attributed partly to the nation-wide economic recession. The Town is currently estimated to be at approximately 50% capacity, resulting in high foreclosure rates and further loss of jobs. Projections for future growth of the Town are also dependent on the industry.

Water Supply and Demand

The Town of Parachute's drinking water supply operation is unique in that it is the only drinking water system in the SWPCRP to rely at least partially on groundwater not associated with the Colorado River Alluvium. A portion of the Town's water comes from the Revelle Springs located on a hillside southeast of the town in a wooded and brush area at approximately 39.463667 latitude and -107.016502 longitude. Spring flows can cause some hillslope erosion and poses a threat to this water source as it reduces hydraulic head. Water diverted from the Revelle Springs is gravity fed approximately 5,000 feet through a 6 inch raw water feed to a storage facility. At the storage facility, there are two side-by-side reservoirs each at 43,500 gallons and totaling 87,000 gallons. Solids are settled out before the water is gravity-fed down to an Ultra-membrane filtration treatment plant. The Revelle Springs consistently produce 200,000 gpd each year on average. The geologic source of these springs is currently unknown; water operators for the Town of Parachute believe it would be highly beneficial to know the geologic sources of the groundwater and its migration through the formation.



Figure 11: Town of Parachute

The Colorado River also supplies a portion of the Town's water supply, particularly in the summer when water demand is greater. The Colorado River intake is located in the river bed, beneath a bridge that crosses between Parachute and Battlement Mesa, at 39.453332 latitude and -108.041496 longitude. Water from the intake is pumped approximately 200 feet and stored in a 153,000 gallon raw water tank. This tank is adjacent to the treatment facility, where water is then treated using microfiltration. Treated water from both the Revelle Springs and Colorado River facilities is then stored in one of three 100,000, 400,000 and 500,000 gallon tanks. Demand during the summer ranges from 100,000 – 200,000 gallons and in the winter is 20,000 – 50,000 gallons.



Figure 12: Revelle Springs

During summer, the average daily demand is 325,000 – 375,000 gallons per day. In winter, as in most cases in a rural community, the average demand is much less at 200,000 – 250,000 gallons per day. Parachute has approximately 255 taps connected to their systems; however, the economic downturn has reduced the population of the Town to the extent that many homes are vacant and thus not using water.

Town of Parachute Watershed Protection Ordinance

The Town of Parachute created a Watershed District, much like the City of Rifle, to protect their drinking water supply from pollution. Within this District, they utilize a Watershed Protection

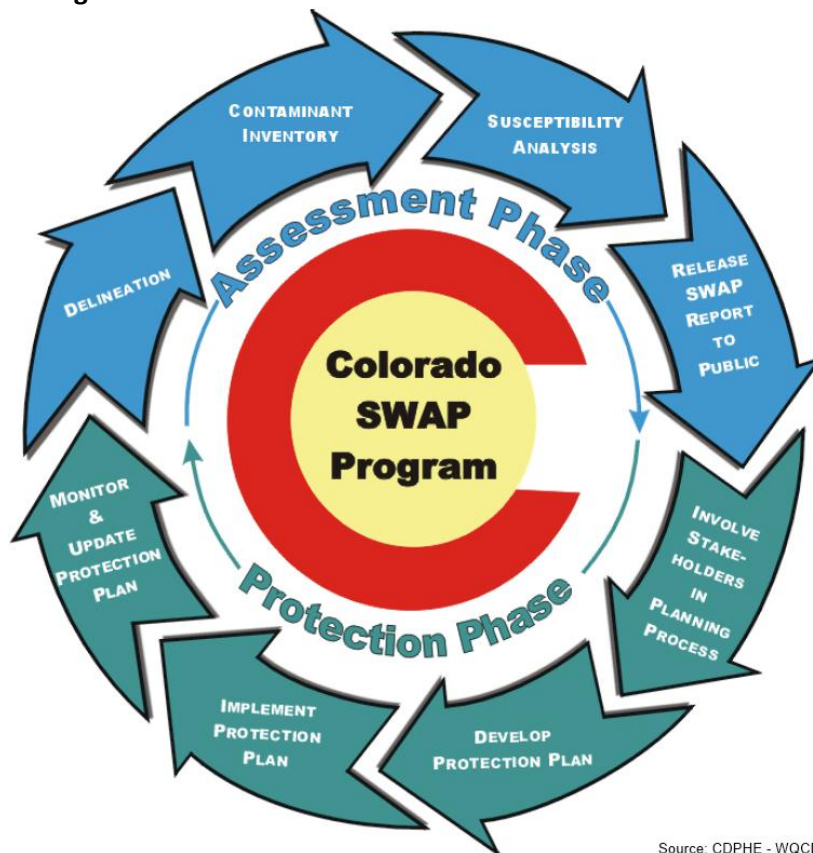
Ordinance for regulating industrial and other activities. The Town utilizes these regulations for the purpose of reviewing and permitting any activity within the District which creates a foreseeable risk of injury to their waterworks or water supply. The Town of Parachute's jurisdiction also extends five miles upstream of drinking water intakes on the Revelle Springs and the Colorado River, as well as all waterworks used by the Town. Activities that are permitted, rather than prohibited, are considered using various factors regarding the potential for contamination.

OVERVIEW OF COLORADO'S SWAP PROGRAM

Source Water Assessment and Protection came into existence in 1996 as a result of Congressional reauthorization and amendment of the Safe Drinking Water Act. The 1996 amendments required each state to develop a 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. The SWAP program protection plan is integrated with the Colorado Wellhead Protection Program that was established in amendments made to the federal Safe Drinking Water Act (SDWA, Section 1428) in 1986.

Colorado's SWAP program is an iterative, two-phased process designed to assist public water systems in preventing potential contamination of their untreated drinking water supplies. The two phases include the Assessment Phase conducted by the CDPHE and the Protection Phase as depicted in the upper and lower portions of Figure 13, respectively.

Figure 13: Source Water Assessment and Protection Process



Source Water Assessment Phase

The Assessment Phase conducted by CDPHE 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 general public.

The Assessment Phase involves understanding where the SWPCRP's source water comes from, what contaminant sources potentially threaten the water sources, and how susceptible each water source is to potential contamination. The susceptibility of an individual water source is analyzed by examining the properties of its physical setting and potential contaminant source threats. The resulting analysis calculations are used to report an estimate of how susceptible each 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. As depicted in the lower portion of Figure 11, the source water protection phase for all public water systems consists of four primary elements:

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

The water system and the community recognize that the Safe Drinking Water Act grants no statutory authority to the Colorado Department of Public Health and Environment or to any other state or federal agency to force the adoption or implementation of source water protection measures. This authority rests solely with local communities and local governments. The source water protection phase is an ongoing process as indicated in Figure 13. The evolution of the SWAP program is to incorporate any new assessment information provided by the public water supply systems and update the protection plan accordingly.

SOURCE WATER ASSESSMENT RESULTS AND RE-EVALUATION

The Colorado Department of Public Health and Environment assumed the lead role in conducting the source water assessments for public water systems in Colorado. The five communities in the SWPCRP received their source water assessment report in November 2004. A copy of the source water assessment summary report can be obtained by contacting the each of the communities in the SWPCRP or by downloading a copy from the Colorado Department of Public Health and Environment's SWAP program website located at: <http://www.colorado.gov/cs/Satellite/CDPHE-WQ/CBON/1251596793639>. This web page is subject to change.

After review of these assessment reports, the SWPCRP discovered that they contained incorrect information regarding the number and location of current drinking water supplies. In 2010, SWPCRP obtained accurate coordinates of their drinking water intakes and requested that the CDPHE re-delineate their source water protection areas based on this newly obtained information. The CDPHE re-delineated the Partnership's protection areas based on the updated information and provided this information to them. These re-delineated protection areas were used as a starting point to guide the development of appropriate management approaches to protect their source water from potential contamination.

Source Water Assessment Area Delineation

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

The SWPCRP includes communities with groundwater sources as well as surface water sources. The locations of potential contaminant sources in relation to the drinking water wells and intakes were evaluated using Geographic Information System (GIS) technology in combination with groundwater flow modeling technology, known as Wellhead Analytical Element Model (WhAEM), to determine their proximity to three zones of varying sensitivity. The three sensitivity zones for surface water systems are defined as:

1. **Zone 1** is defined as a 1,000 foot wide band on either side of the stream, lake or shallow alluvial aquifer or the 100 year flood plain.
2. **Zone 2** is defined as 1/4 mile beyond each side of the boundary of zone 1, or 2,320 feet from the stream.

3. **Zone 3** is made up by the remainder of the source water assessment area up to the watershed boundary or the state boundary.

The three sensitivity zones for groundwater systems are defined as:

1. **Zone 1** is defined as a 500 foot radius around the wellhead.
2. **Zone 2** is defined as the calculated distance from the wellhead through which a packet of water travels over a two year time period or 2 year time of travel (TOT).
3. **Zone 3** is defined by calculating the distance from the wellhead through which a parcel of water travels over a five year time period or 5 year TOT.

The State's original source water assessment area not only provided the basis for understanding the source of SWPCRP's drinking water and the location of potential contaminants, but it also provided the basis for establishing the Drinking Water Supply Protection Area under this source water protection plan.

Defining the Drinking Water Supply Protection Area

After carefully reviewing their Source Water Assessment Report and the CDPHE's delineation of the Source Water Protection Areas for each of the communities in this Plan, the SWPCRP and the Steering Committee decided to re-delineate these Source Water Protection Areas to reflect current local issues of concern, as well as to make them more manageable for the prevention of contamination. This re-delineation of the Source Water Protection Area by the SWPCRP is to be referred to Drinking Water Supply Protection Area (DWSPA), and is defined as:

1. **Primary Zone** – In surface water systems, the primary zone is the area within the boundaries of the Colorado River alluvium as determined by the USGS. For groundwater systems, the primary zones follow the 2 year TOT boundaries.
2. **Secondary Zone** – In surface water systems, the secondary zone is the area within a five mile buffer zone upstream of each intake, within each 12 digit Hydrologic Unit Code as determined by the USDA/NRCS National Cartography & Geospatial Center. In groundwater systems, the secondary zones follow the 5 year TOT boundaries.

After delineation of the basic primary and secondary zones, adjustments were made to extend the DWSPA boundaries to include specific potential contaminant sources that were of concern to the SWPCRP. These extended areas include:

- The primary zone for the Town of New Castle's East Elk Creek intake was determined by creating a five mile upstream buffer zone within the 12 digit watershed boundary for the East Elk Creek watershed. The Steering Committee believed this was necessary to account for the steep and narrow characteristics of the watershed.
- The secondary zone for the Town of New Castle was extended to incorporate two potential contaminant sources. The first is the South Canyon Landfill, as this operation receives and stores contaminants that could enter the water supply. The boundary was extended approximately two miles further upstream of the New Castle Colorado River

intake. Along with adding the landfill, the Canyon Creek subdivision was also included as there are a number of residences there that could pose a threat to New Castle's drinking water.

- The primary zone for Talbott Enterprises was expanded to include Apple Tree Mobile Home Park, Mountain Shadows subdivision, and Talbott Enterprises' wastewater treatment facility.
- The secondary zone for Talbott Enterprises was determined by creating a five mile upstream buffer zone within the 12 digit watershed boundary for the Alkali Creek watershed. The Steering Committee believed this was necessary because of the potential for contaminants introduced in the Alkali Creek to reach the zone of contribution for Talbott Enterprises' wells.
- The primary zone for the Town of Silt was extended upstream of the secondary zone along the Colorado River alluvium because of the Town of Silt's close proximity to the Town of New Castle and various commercial operations which pose a potential threat of contamination.
- The primary zone for the City of Rifle's Beaver Creek intake is delineated by creating a five mile upstream buffer zone around the 12 digit watershed boundary for the Beaver Creek watershed. The Steering Committee determined this was necessary to account for the steep and narrow characteristics of the watershed.
- The primary zones for New Castle, Silt, and Rifle were expanded to include US Highway 6 & 24 and the railroad tracks where they weren't already included. The Steering Committee determined that the highway and railroad were high priority issues of concern to protect their source waters and wanted to designate a greater level of emphasis on them.
- The primary zone for the Town of Parachute's springs was expanded to include several oil and gas well pads and segments of County Roads 301 and 309. The Steering Committee determined this was necessary due to the threat of contamination from vehicle accidents going to and from surface locations. In addition, the primary zone of Parachute's springs was truncated short of the 2 year time of travel delineations and redrawn just beyond County Road 301.

Garfield County

The reach of Colorado River between Rifle and Parachute, which remains outside the boundaries of any municipality's DWSPA, is under the jurisdiction of Garfield County among other agencies. However, rather than creating a list of the Issues of Concern included within the area, this plan will rely on the abundant programs and documents already implemented in county departments for oversight. These departments and programs, such as Building and Planning, Emergency Management, Environmental Health, and Vegetation Management will be incorporated into the Best Management Practices (BMPs) for the issues to which they apply.

Drinking Water Supply Protection Areas (DWSPAs) Maps

The following several pages will include maps of all of the DWSPAs developed in this plan. The first map is an aerial view with the DSWPAs for all five communities; the second shows the same DSWPAs with a shaded relief map. Following that are maps of each community individually for greater detail. For further information or different aspects of each map, contact Dylan Eiler at the Colorado Rural Water Association.

Figure 14: Aerial Map of All Drinking Water Supply Protection Areas



Figure 15: Shaded Relief Map of All Drinking Water Supply Protection Areas

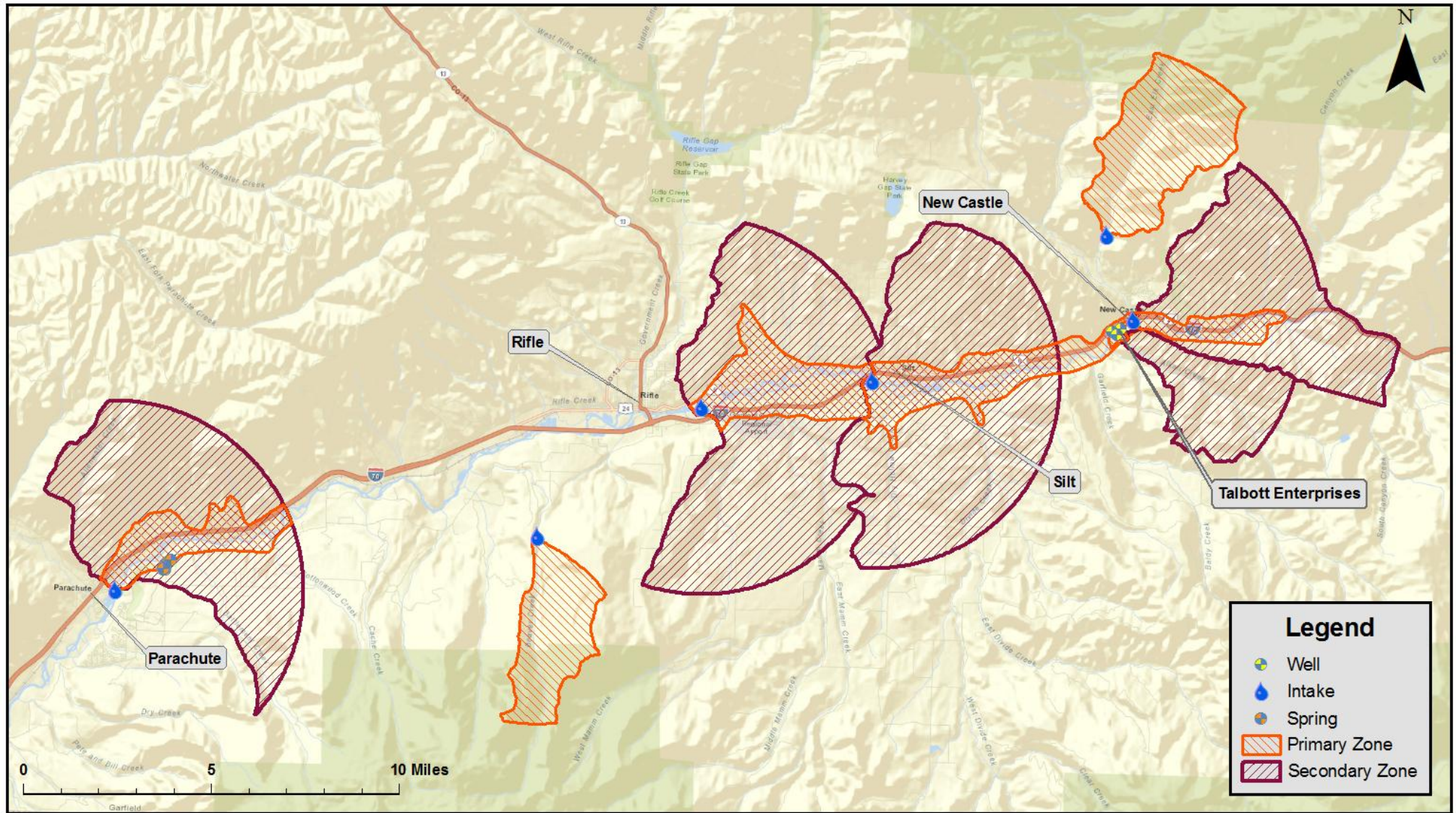


Figure 16: Aerial Map of Town of New Castle's Drinking Water Supply Protection Area

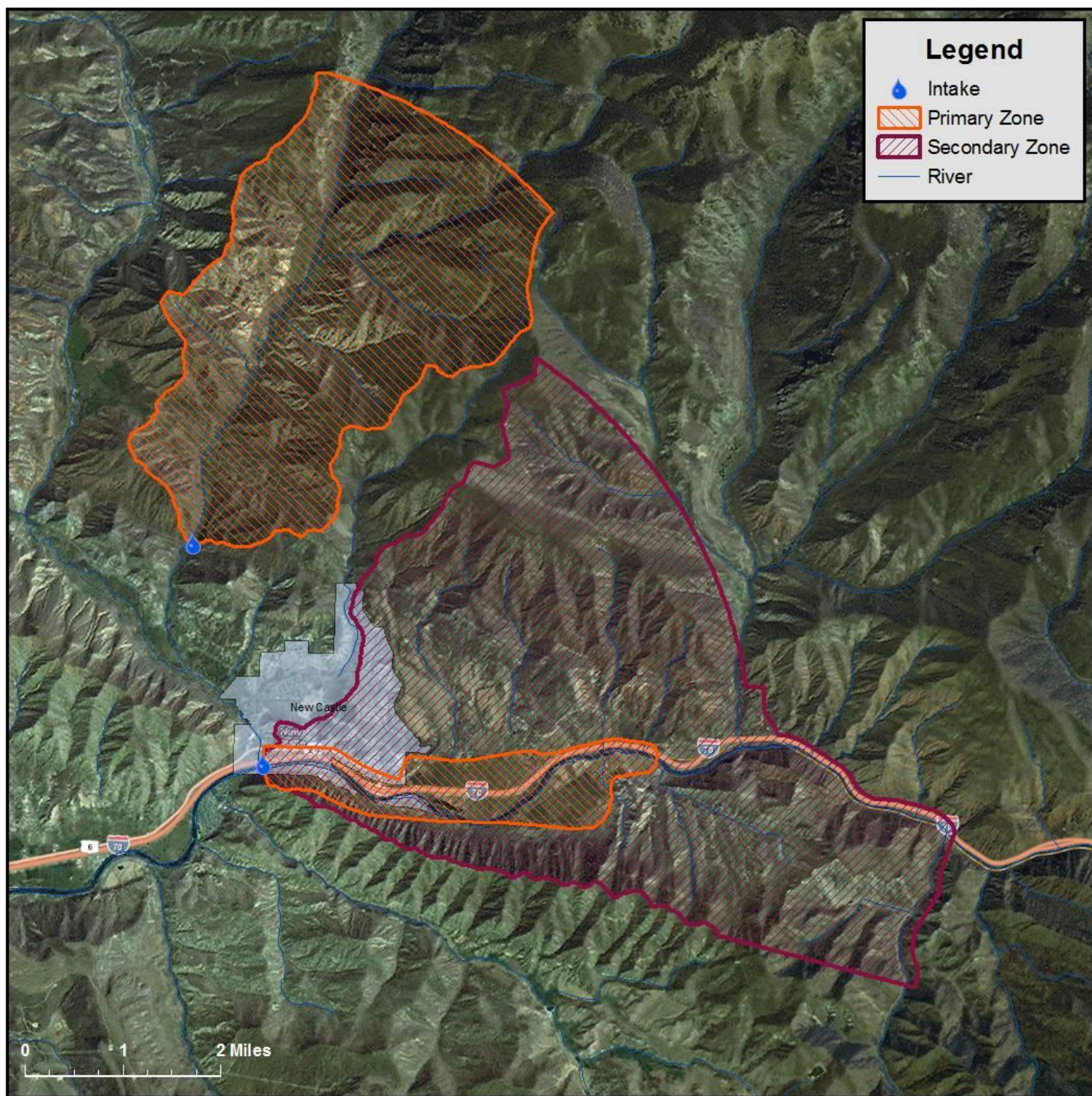


Figure 17: Aerial Map of Talbott Enterprises' Drinking Water Supply Protection Area

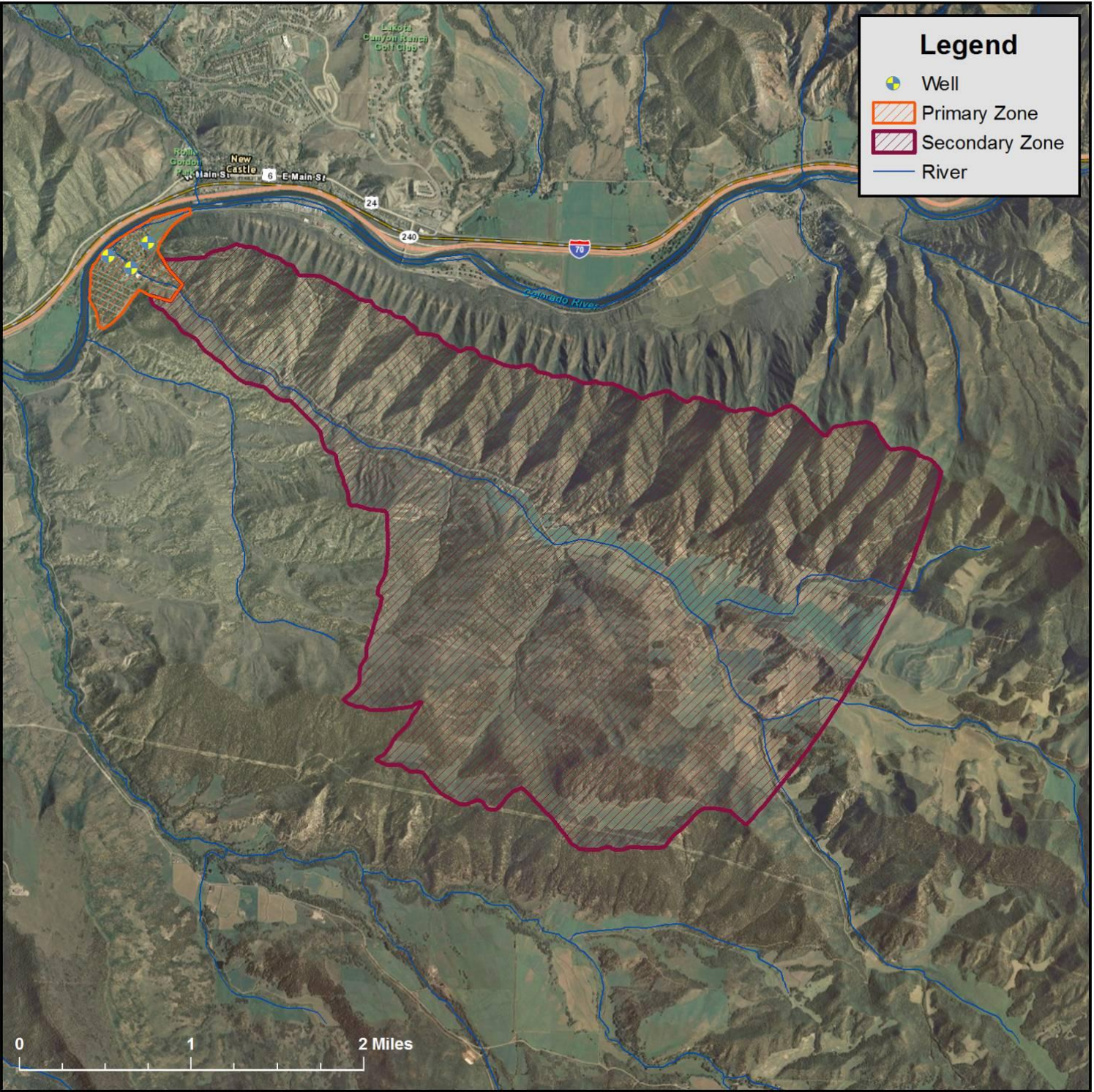


Figure 18: Aerial Map of Town of Silt's Drinking Water Supply Protection Areas

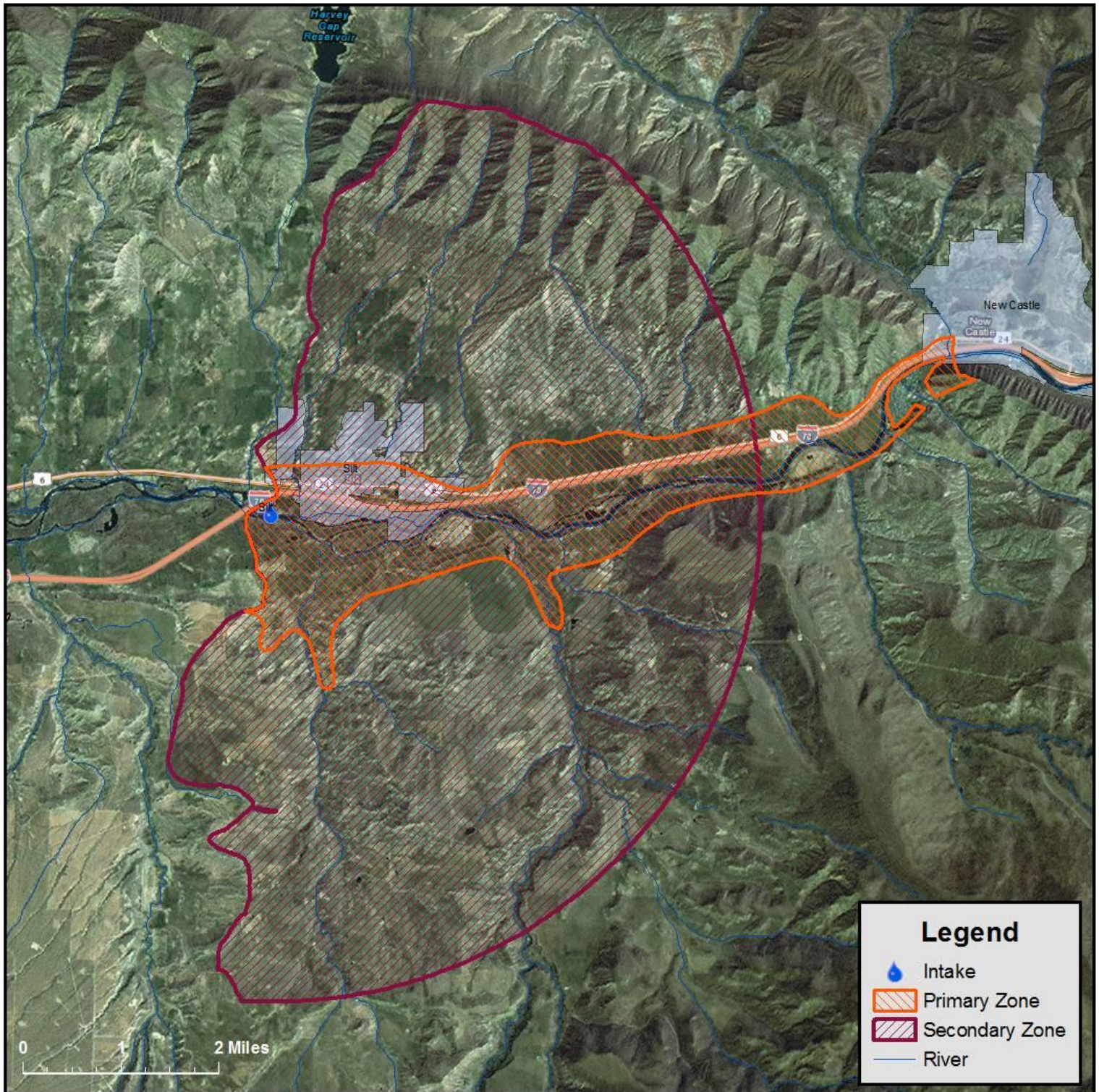


Figure 19: Aerial Map of City of Rifle's Drinking Water Supply Protection Areas

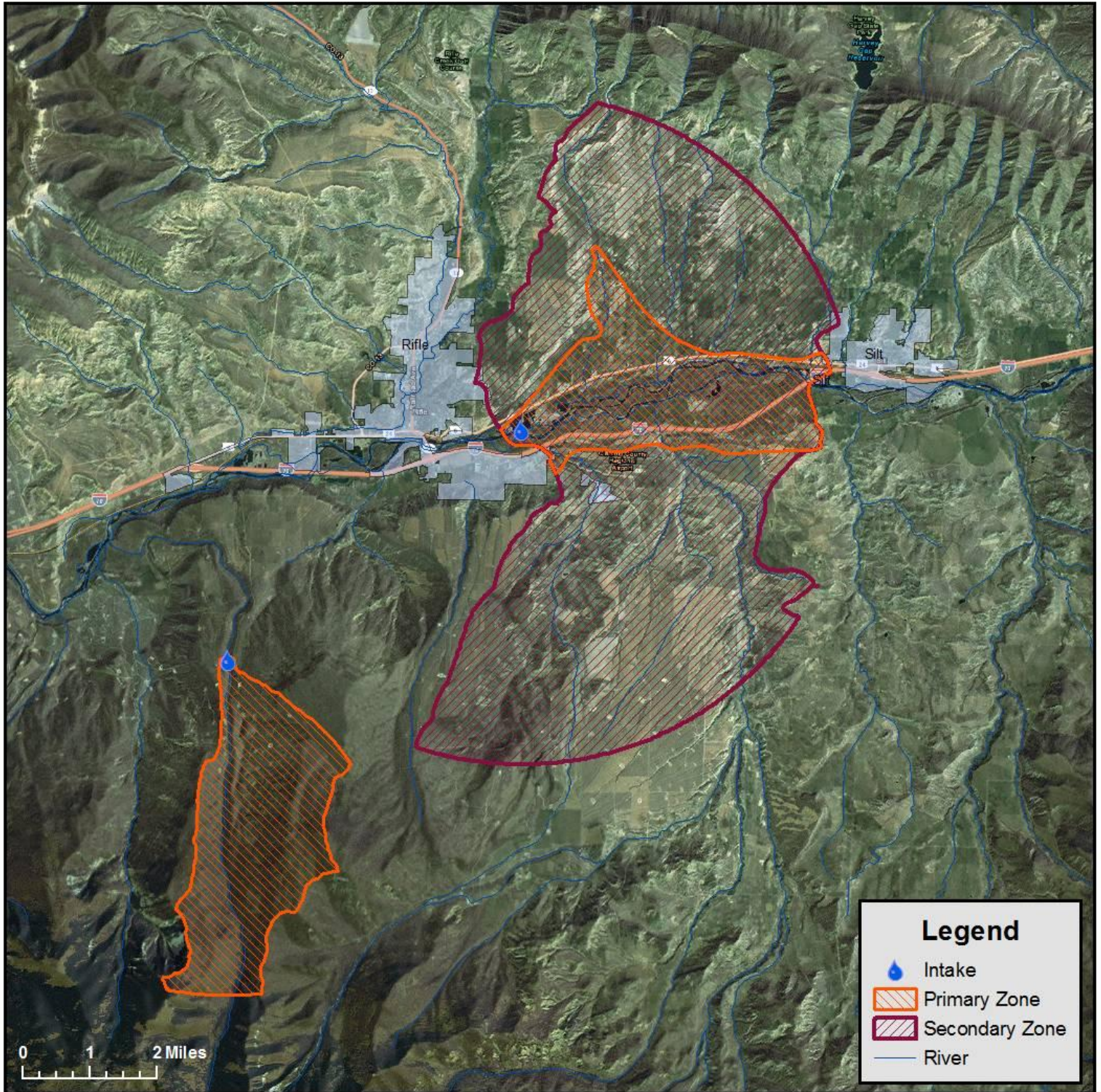


Figure 20: Aerial Map of Town of Parachute's Drinking Water Supply Protection Area

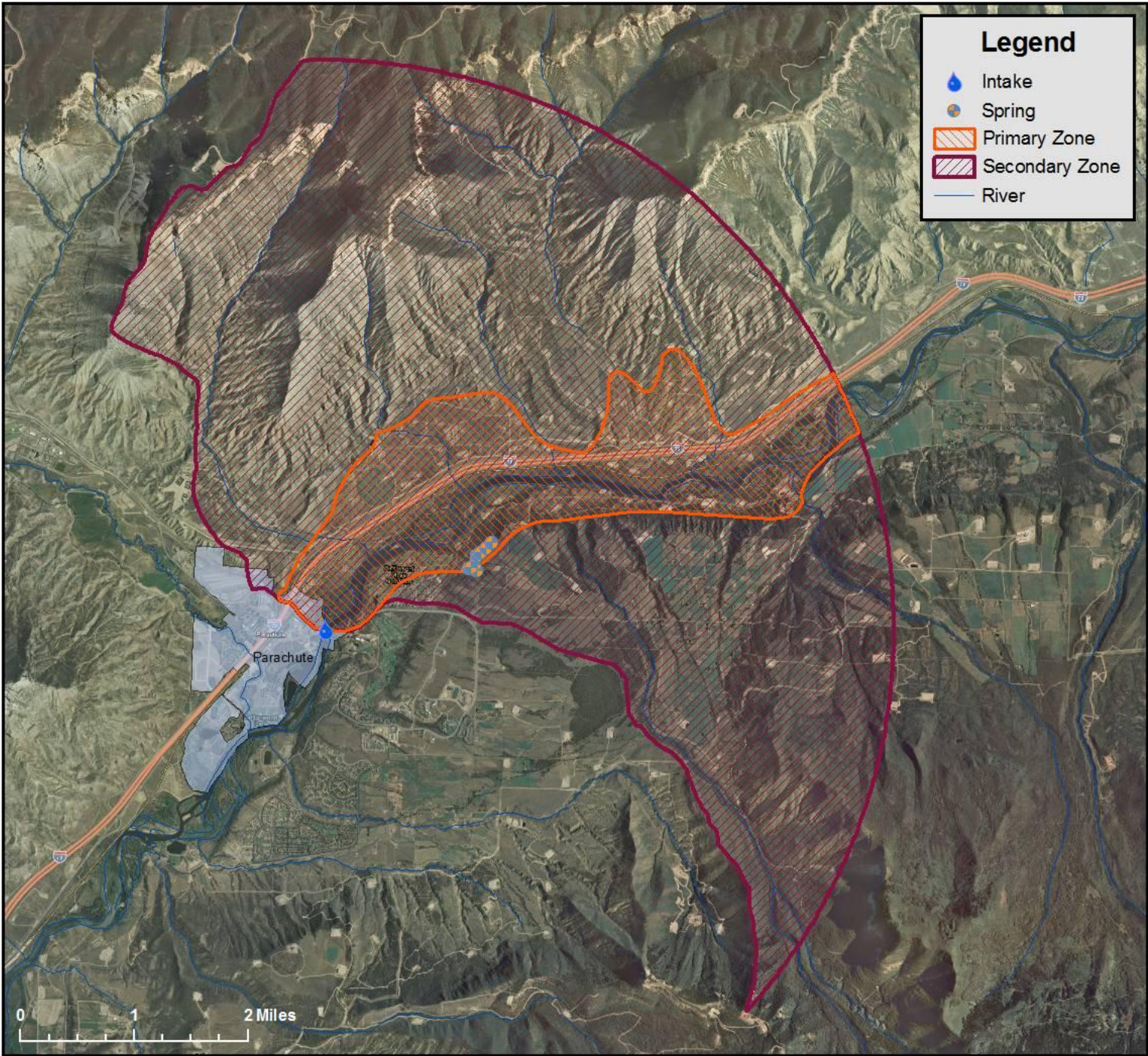
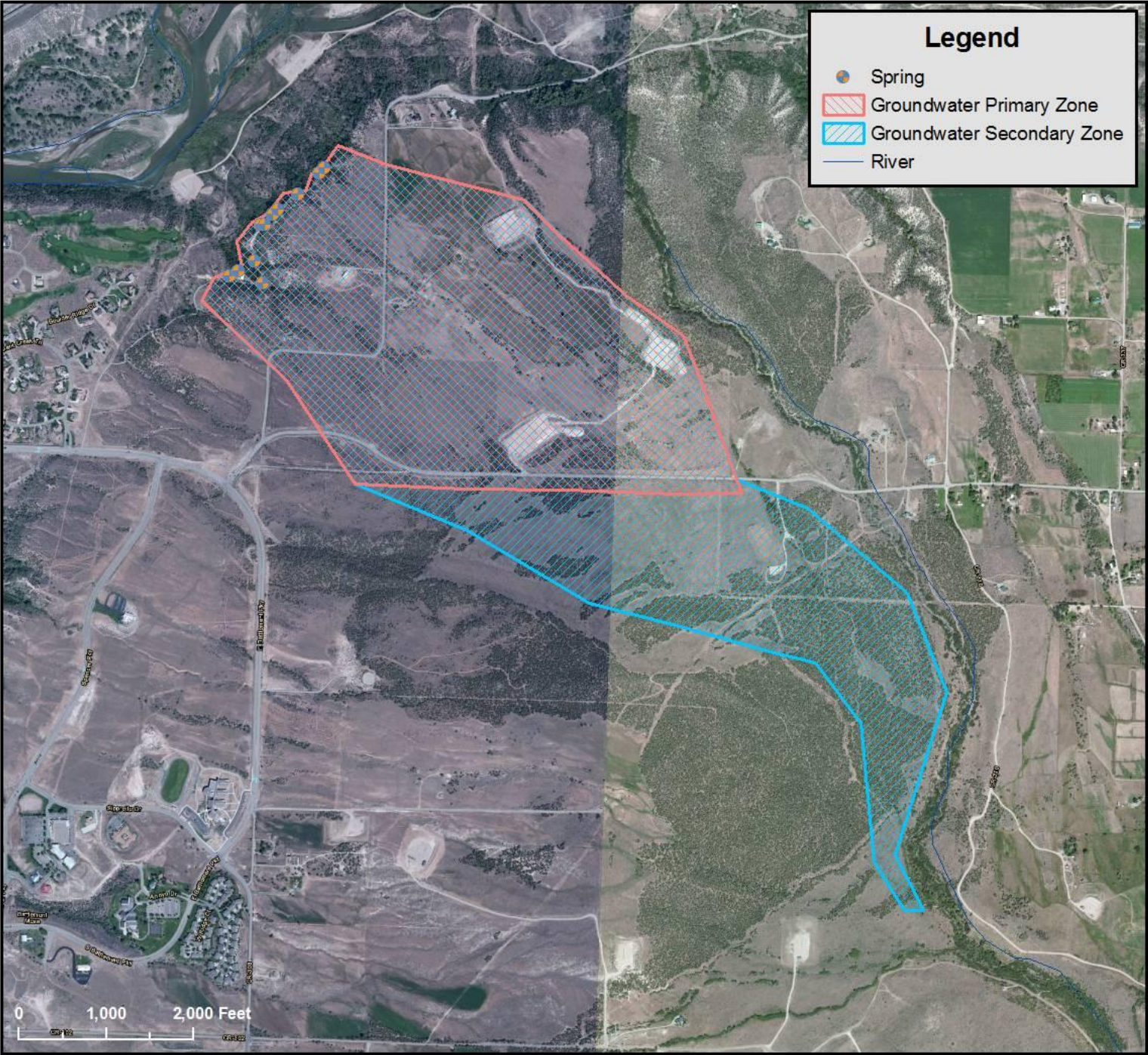


Figure 21: Aerial Map of Revelle Springs Drinking Water Supply Protection Area



CONTAMINANT SOURCE INVENTORY

The Contaminant Source inventory generated by the Colorado Department of Public Health and Environment in 2004 was incomplete and needed to be updated. Therefore, the plan developers and Steering Committee put together a new inventory derived from numerous databases. Below is a description of CDPHE's methods in developing its inventory, followed by the methods used by the Steering Committee.

Colorado Department of Public Health and Environment Contaminant Source Inventory

Notice

Information contained in this Plan is limited to publicly available records and information provided by participants in the planning process. Other "potential contaminant sources" or threats to the water supply may exist in the source water assessment areas that are not identified in this Plan. Identification of a source as a "potential contaminant source" should not be interpreted as one that will necessarily cause contamination of the water supply.

In 2001 – 2002, a contaminant source inventory was conducted by the Colorado Department of Public Health and Environment to identify selected potential sources of contamination that might be present within the source water assessment areas. Discrete¹ contaminant sources were inventoried using selected state and federal regulatory databases including: mining and reclamation, oil and gas production, above and underground petroleum tanks, Superfund sites, hazardous waste generators, solid waste disposal, industrial and domestic wastewater dischargers, and water well permits. Dispersed contaminant sources were inventoried using land use/land cover and transportation maps of Colorado, as well as selected state regulatory databases. The contaminant inventory was completed by mapping the potential contaminant sources with the aid of a Geographic Information System (GIS).

As a part of the source water assessment process, the CDPHE provided the drinking water system operators of SWPCRP with the results of this inventory. The inventory included draft maps, along with a summary of the discrete and dispersed contaminant sources inventoried within the source water assessment area. SWPCRP was asked to voluntarily review the inventory information, field-verify selected information about existing and new discrete contaminant sources, and provide feedback on the accuracy of the inventory. Through this Source Water Protection Plan, SWPCRP is reporting their findings to the CDPHE.

After much consideration, discussion, and input from local stakeholders, the drinking water system operators of the SWPCRP and the Steering Committee have developed a more accurate and current inventory of contaminant sources located within the Drinking Water Supply Protection Area (DWSPA). Upon completion of this contaminant inventory, the five communities in the SWPCRP have decided to adopt it in place of the contaminant inventory provided by the CDPHE.

¹ The WQCD's assessment process used the terms "discrete" and "dispersed" potential sources of contamination. A discrete source is a facility that can be mapped as a point, while a dispersed source covers a broader area such as a type of land use (crop land, forest, residential, etc.).

SWPCRP's Contaminant Source Inventory

In creating a comprehensive list of Potential Sources of Contamination (PSOCs) the Partnership utilized a number of GIS databases. Potential contaminant sources in these lists were “clipped” using GIS to incorporate only those sources that are within the Drinking Water Supply Protection Areas (DWSPAs). These sources of these GIS databases are listed below:

- *CDPHE's Assessment Plans*: The contaminant sources included in the Assessment Plans were considered in this plan, and those that were still in operation and sources of concern were included.
- *EPA EnviroMapper*: Several EPA databases that give information about activities that have the potential for environmental contamination, categorized as air, water, waste, land, or toxic substances. <<http://www.epa.gov/emefdata/em4ef.home>>
- *Colorado Storage Tank Information System (COSTIS)*: Includes information about aboveground, underground, and leaking storage tanks. Lists only addresses and not specific coordinates. <<http://costis.cdle.state.co.us/home.asp>>
- *Colorado Division of Mining Reclamation and Safety (DRMS)*: Database lists both terminated and active mine permits <<http://mining.state.co.us/GIS%20Data.htm>>
- *Colorado Oil and Gas Conservation Commission (COGCC)*: Lists all wells, other facilities, and permits in the state of Colorado <<http://cogcc.state.co.us/>>
- *CDPHE Hazardous Materials*: Mapping for groups of facilities regulated or remediated by the Hazardous Materials and Waste Management Division <<http://www.cdphe.state.co.us/hm/HMSiteCover.htm>>
- *Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS)*: Superfund sites in the State of Colorado. <<http://www.epa.gov/enviro/facts/cerclis/search.html>>

CERCLIS and DRMS were queried but yielded no results for the DWSPAs delineated in this plan. For example, while there have been Superfund sites near the City of Rifle in the past, they are not located within Rifle's DWSPA and therefore are outside the scope of this plan. They also have been remediated and are no longer issues of concern.

Priority Strategy

After developing a contaminant inventory for use in the SWPCRP Source Water Protection Plan, the Steering Committee began the task of prioritizing this inventory for the implementation of the Management Approaches outlined in this Source Water Protection Plan (see Table 10).

The prioritization strategy which the SWPCRP used is based on four criteria:

1. Migration Potential or Proximity to the Water Source - The migration potential generally has the greatest influence on whether a contaminant source could provide contaminants in amounts sufficient for the source water to become contaminated at

concentrations that may pose a health concern to drinking water users. Shorter migration paths and times of travel suggest less chance for dilution or degradation of the contaminant before it reaches water sources. The proximity of a potential contaminant source of contamination to municipal drinking water sources was considered relative to the two sensitivity zones in the Drinking Water Supply Protection Area (i.e. the Primary Zone and Secondary Zone).

2. Contaminant Hazard - The contaminant hazard is an indication of the potential human health danger posed by contaminants likely or known to be present at the contaminant source. Using the information tables provided by CDPHE (see Appendices 2), the SWPCRP and Steering Committee considered the following contaminant hazard concerns for each contaminant source:

- Acute Health Concerns - Contaminants with acute health concerns include individual contaminants and categories of constituents that pose the most serious immediate health concerns resulting from short-term exposure to the constituent. Many of these acute health concern contaminants are classified as potential cancer-causing (i.e. carcinogenic) constituents or have a maximum contaminant level goal (MCLG) set at zero (0).
- Chronic Health Concerns - Contaminants with chronic health concerns include categories of constituents that pose potentially serious health concerns due to long-term exposure to the constituent. Most of these chronic health concern contaminants include the remaining primary drinking water contaminants.
- Aesthetic Concerns - Aesthetic contaminants include the secondary drinking water contaminants, which do not pose serious health concerns, but cause aesthetic problems such as odor, taste or appearance

3. Potential Magnitude – The magnitude of contaminant occurrence at the contaminant source is important in evaluating whether the source water could become contaminated at concentrations that may pose a health concern to drinking water users in the event these contaminants are released to the source water. Large volumes of contaminants at a specific location pose a greater threat than small volumes.

4. Likelihood of Release - The more likely that a potential source of contamination is to release contaminants, the greater the contaminant threat posed. The regulatory compliance history for regulated facilities and operational practices for handling, storage, and use of contaminants were utilized to evaluate the likelihood of release.

Each of the above four criteria were taken into account, and then used to assign each of the contaminant sources a “High”, “Medium”, or “Low” priority ranking. This ranking allowed the SWPCRP and Steering Committee to recognize the contaminant sources that are of highest priority and concern as they developed and implemented Management Approaches for this Source Water Protection Plan. Table 4 lists the priority value which SWPCRP assigned to each of the potential contaminant sources. While there were a few differences in the threats to water supplies for each municipality, many concerns were shared for the same potential sources of contamination.

Issue of Concern	New Castle	Talbott Enterprises	Silt	Rifle- CO River	Rifle- Beaver Creek	Parachute
Oil and Gas Operations	L	M	H	M	M	M
Pipelines	---	---	L	M	M	L
Transportation and Roadways	H	M	H	H	H	H
Agricultural Practices	M	M	L	L	M	L
Railroads	L	---	H	M	---	M
Pesticide Application	L	L	L	L	---	L
Septic Tanks	L	L	M	L	L	M
Fires	H	L	M	L	M	---
Landfills	L	---	---	---	---	---
Storage Tanks (Aboveground and Underground)	L	H	M	L	L	L
Land Use Change	M	---	---	L	M	L
Residential Issues	M	M	---	L	L	M
Campgrounds and Recreation	M	---	---	---	L	---
Timber Harvesting	L	---	---	---	L	---
Industrial and Commercial Areas	---	M	M	M	---	L
Municipal and Residential Water Resources	L	M	L	L	L	L
Rulison Blast Site	---	---	---	---	---	L
Uniform Municipal Water Operations Sampling and Monitoring	M	M	M	M	M	M
Unknown Source of Town of Parachute's Springs	---	---	---	---	---	H

Table 4: Prioritized Potential Sources of Contamination

Susceptibility Analysis

Note: The susceptibility analysis provides a screening level evaluation of the likelihood that a potential contamination problem could occur rather than an indication that a potential contamination problem has or will occur. The analysis is NOT a reflection of the current quality of the untreated source water, nor is it a reflection of the quality of the treated drinking water that is supplied to the public.

The susceptibility analysis was conducted by the Colorado Department of Public Health and Environment to identify the level of susceptibility an untreated water source could have to contamination within the source water assessment area. The analysis looked at the susceptibility posed by individual potential contaminant sources and the collective or total susceptibility posed by all of the potential contaminant sources in the source water assessment area. The CDPHE developed a susceptibility analysis model for surface water sources and ground water sources under the influence of surface water, and another model for groundwater sources. Both models provided an objective analysis based on the best available information at the time of the analysis. The two main components of the CDPHE's susceptibility analysis are:

1. **Physical Setting Vulnerability Rating** – This rating is based on the ability of the surface water and groundwater flow to provide a sufficient buffering capacity to mitigate potential contaminant concentrations in the water source.
2. **Overall Susceptibility Rating** – This rating is based on two components: the physical setting vulnerability of the water source and the contaminant threat.

The Colorado Department of Public Health and Environment provided each municipality with a final source water assessment report and supporting analysis information. Upon review of the susceptibility analysis provided by the CDPHE, the SWPCRP determined the information used to determine the susceptibility of drinking water intakes was either based on an incorrect location or the intake did not yet exist. The SWPCRP and Steering Committee, upon refining and updating the original CDPHE source water assessments, determined that there were key updates to be made to several of their drinking water intakes.

Several changes to the susceptibility rating of water supplies have been made. The drinking water supply operators determined that either there was an increased threat to their supply from activities in the area, or they are changing the type of intake and determined that their susceptibility rating should go down. The updated list of is below.

Table 5: Susceptibility Ratings

Community	Source	Previous Susceptibility Rating	New or Unchanged Susceptibility Rating
Town of New Castle	East Elk Creek	Moderately Low	Moderately Low
Town of New Castle	Colorado River	N/A (Intake was not listed in Assessment Report)	Moderate
Talbott Enterprises	Shallow alluvial wells	High	High
Town of Silt	Colorado River	Moderately High	Moderately Low (When wells have been drilled in the alluvium of the river)

City of Rifle	Beaver Creek	Moderate	Moderately High
City of Rifle	Colorado River	Moderately High	Same
Town of Parachute	Revell Springs	Moderately Low	Same
Town of Parachute	Colorado River	Moderately High	Same

DISCUSSION OF ISSUES OF CONCERN

This section describes in-depth the identified issues of concern that the Steering Committee identified and are held in common with each community, and the management approaches for each. Management tables of each issue are featured at the end of the document that lists the issue of concern and describes the associated management approach or BMP.

As described in Table 4, the priority issues for the Steering Committee are (in no particular order):

- Oil and Gas Operations
- Pipelines
- Transportation and Roadways
- Agricultural Practices
- Railroads
- Pesticide Application
- Septic Tanks
- Fires
- Landfills
- Storage Tanks (Aboveground and Underground)
- Land Use Change
- Residential Issues
- Campgrounds and Recreation
- Timber Harvesting
- Industrial and Commercial Areas
- Municipal and Residential Water Resources
- Rulison Blast Site
- Uniform Municipal Water Operations Sampling and Monitoring
- Unknown Source of Town of Parachute's Springs

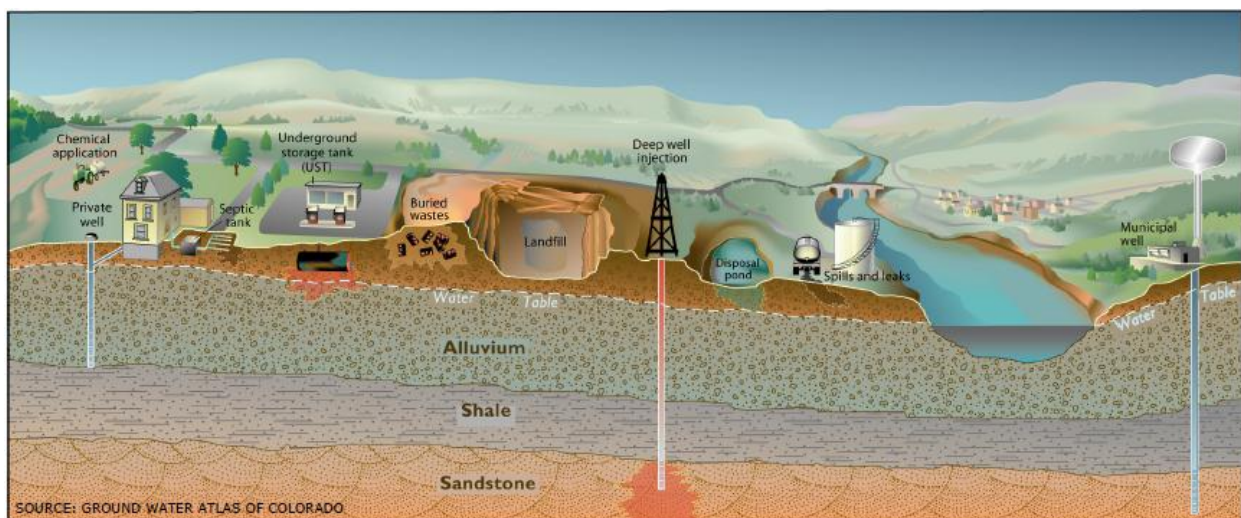


Figure 22: Surface and Groundwater Contaminants

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. While catastrophic contaminant spills or releases can wipe out a water resource, surface and groundwater degradation can result from a plethora of small releases of harmful substances. According to the USEPA, 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).

OIL AND GAS OPERATIONS

Industry Presence in Garfield County



Figure 23: Oil and Gas Development in Garfield County.

The Piceance Basin, where the DWSPAs are located, has been a center of oil and gas activity for decades. When oil shale was poised to become a major component of our national oil supply in the late 1970's, major companies constructed housing and amenities in Garfield County for their proposed workers. This "boom went bust" in the early 1980s when oil prices dropped and government subsidies dried up.

These early endeavors were only the beginning of what has become a thriving natural gas industry in the Piceance Basin. New technology, rising demand and rising prices have made this area attractive to national energy development companies such as Williams, WPX Energy, EnCana, Antero Resources, Bill Barrett Corporation, Shell, and Chevron. Large scale energy development has been underway since the late 90's. While the recent economic recession has caused natural gas prices to fall and reduced resource development, the industry remains a prevalent part of Garfield County's economy.

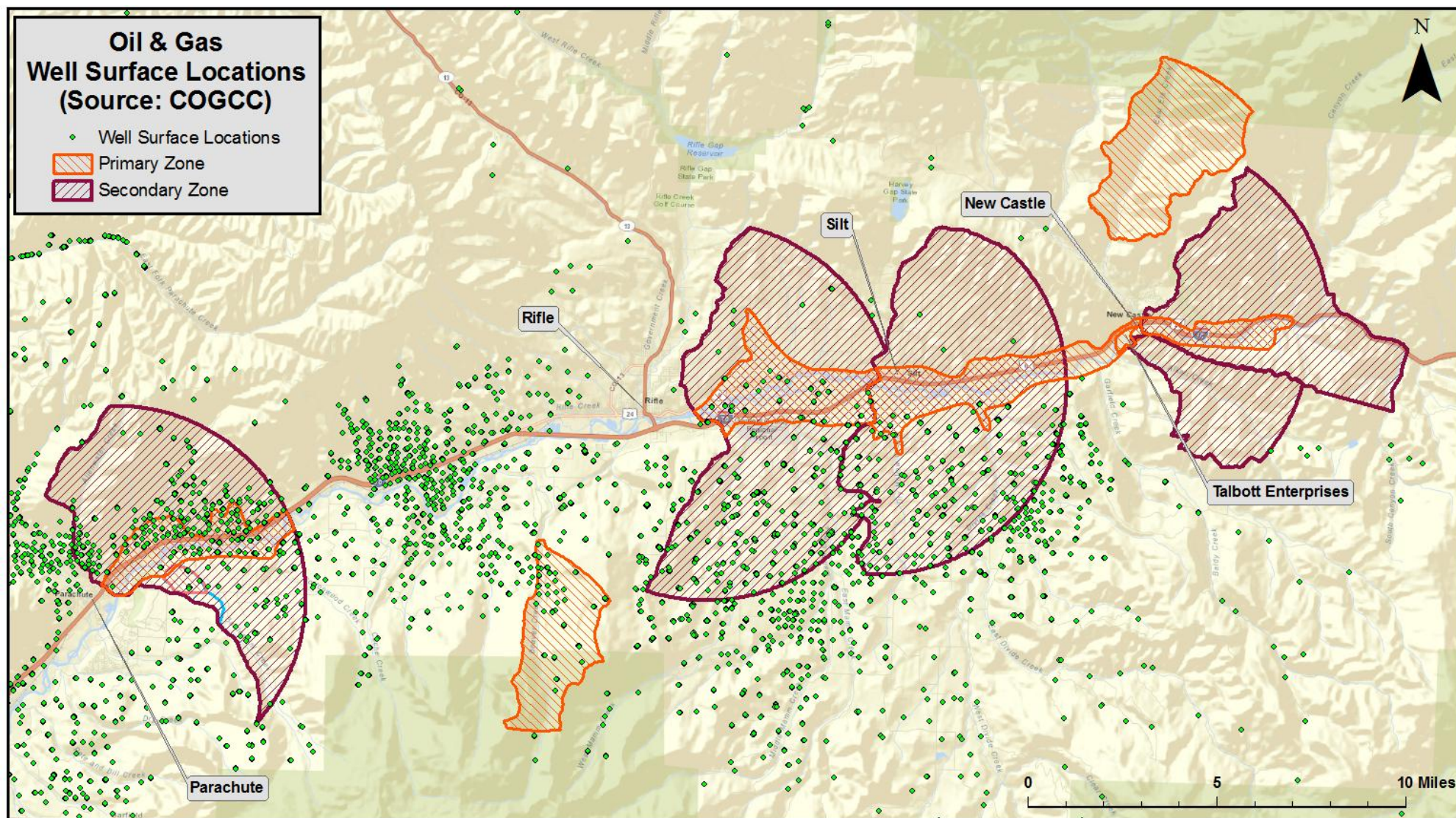
Garfield County will likely remain a major producer of natural gas for years to come, particularly as this energy source has been touted the "transition fuel" in our nation's search for cleaner energy sources. As of 2012, Garfield County represents 28% of oil and gas activity in the State of Colorado. The local economy has benefited tremendously from the jobs created by the industry as well as substantial tax revenues that are brought into the county.

The map below features the Oil and Gas Surface Well locations for the portion of Garfield County in and surrounding the DWSPAs. Each surface well location represents potentially dozens of wells due to the prevalence of directional drilling. This data was taken from the Colorado Oil and Gas Conservation Commission and is current as of 9/25/12. For more information, visit the COGCC website at <http://cogcc.state.co.us>. An online map of locations of additional facilities can be found at <http://dnrwebcomapg.state.co.us/mq2010app/>.



Figure 24: Natural Gas Drilling Rigs in Garfield County

Figure 25: Oil and Gas Well Surface Locations



Water Quality Concerns

Many activities associated with natural gas drilling, completion, and production activities have the potential for adverse impacts to surface and ground water quality within the Colorado River watershed. Land disturbed from the construction of roads, well pads, pipelines, and compressor stations can lead to soil erosion and sediment transport to surface water bodies during storm water runoff. During the “well completion” phase of natural gas extraction, a process called hydraulic fracturing, also known as “fracing,” is used. As part of the hydraulic fracturing process, fluids comprised primarily of large volumes of sand, water, and a comparatively small volume of chemical additive are pumped into the wellbore and within hydrocarbon bearing rock formations to stimulate the flow of natural gas into the wellbore. In consideration of heightened public awareness and concerns related to fracing, the steering committee decided to include fracing as a potential threat to drinking water supplies. However, impacts to groundwater quality due to fracturing operations are not expected, because this process is isolated from near surface aquifers and occurs at depths below 5,000 feet, while fresh-water aquifers are typically less than 2,000 feet deep and most domestic wells are less than 500 feet deep. (Resource Management Plan, BLM, 2011). The primary source water threat relative to the fracing process is the handling and management of the water and chemicals at the surface to avoid spills.

Produced water, or water that co-resides with natural gas in geologic formations, is often brought to the surface along with the target hydrocarbons. Produced water quality can vary greatly depending on the producing formation, but is often highly saline and may include high concentrations of naturally occurring metals, radioactive substances, and other constituents. Produced water is typically re-used or recycled in the well completion process as much as is practicable and allowed by regulation. Un-usable and/or excess produced water may be stored in tanks on location then transported by truck or pipeline for disposal in licensed or permitted facilities or in “Class II” injection wells, in compliance with COGCC, BLM, and EPA regulations.

While a number of activities in the oil and gas industry have the potential for adverse impacts to surface and groundwater quality within the Colorado River watershed, the following are considered the greatest threat:

- Soil erosion and sediment transport to surface water bodies due to stormwater runoff from roads, well pads and other heavy construction activities.
- Spills of drilling fluid, produced water, hydrocarbons, or other chemicals and fluids used or stored on location during the oil and gas extraction process.
- Spills that occur during transport/disposal of fluids as a result of vehicle incidents/accidents. BMPs related to this last bullet will be covered in the Transportation and Roadways section of the Discussion of Issues of Concern.

Regulations and Associated Organizations

The following represents some of the regulations that industry operators are required to comply with in an effort to protect the quality of the State’s surface water and groundwater.

Colorado Oil and Gas Conservation Commission: Rule 317(b)

The oil and gas industry in Colorado is regulated by the Colorado Oil and Gas Conservation Commission (COGCC). House Bill 1341 directed the COGCC to make and enforce rules consistent with the protection of the environment, wildlife resources, and public health, safety, and welfare. In 2008, the COGCC developed and passed new rules that became effective on May 1, 2009 on federal land and April 1, 2009 on all other land.

One of the new rules, Rule 317(b), protects public water systems by protecting the source of their drinking water. It creates protection zones, or buffer zones, combined with performance requirements applicable within 5 miles upstream of the surface water intake. The most protected Internal Buffer Zone is located within 300 feet of a water segment and is a drilling excluded zone. The purpose for protecting this zone is that a significant release in these areas would likely contaminate surface water used as a drinking water source. The Commission also decided that enhanced drilling and production requirements should apply in areas ½ mile from the water supply segment, in an Intermediate and Extended Buffer Zone (COGCC, 2008). The Rule 317(b) buffer zones can be found on the COGCC's website (<http://cogcc.state.co.us/>). In addition to its many other regulations, COGCC adopted rule 609 that will be effective July 2013. Rule 609 makes mandatory pre- and post- oil and gas well drilling and completion groundwater monitoring. This data will be in addition to the water sampling data that many energy operators have been voluntarily providing to COGCC for public access in recent years.

Stormwater Management Permitting

To prevent adverse impacts from construction activities associated with oil and gas development, the industry is required to obtain a Stormwater Management Permit from the CDPHE's Water Quality Control Division. Compliance with the permit requires the preparation and implementation of a Stormwater Management Plan for systematic monitoring of the site and establishment of site specific adaptive Best Management Practices (BMPs). These could consist of ditches or berms, silt fences, straw wattles, or other erosion control methods.

US EPA: Spill Prevention, Control and Countermeasure (SPCC) 40 CFR 112

To further prevent contamination to water supplies from spills, The U.S. Environmental Protection Agency (EPA) requires oil and gas facilities that have an aggregate aboveground oil storage capacity greater than 1,320 gallons implement an SPCC plan, including providing secondary containment for large tanks or other bulk storage containers. The plan must describe oil handling operations, spill prevention practices, discharge or drainage controls and the personnel, equipment and resources at the facility that are used to prevent oil spills reaching navigable waters.

Garfield County's Role

Within the Garfield County Building and Planning Department, the oil and gas liaison works with citizens, industry, local, State and Federal agencies and to understand and respond to oil and gas development issues. The County does not regulate down-hole aspects of oil and gas drilling and production, but does regulate the permitting for many aspects of the associated surface land uses including facilities and use of county roadways. The county oil and gas liaison serves as the local government designee to the COGCC to review location and drilling permit applications.

Energy Advisory Board

The Garfield County Board of County Commissioners formed the Garfield County Energy Advisory Board (EAB) in 2004. The Board's mission is to provide a forum for the oil and gas industry, the public, impacted landowners and local government to prevent or minimize conflict associated with oil and gas development through positive and proactive communication and actions that encourage responsible and balanced development of these resources within Garfield County.

Community Counts

Oil and gas operators, Garfield County, and other regulatory entities recognized there was a need for a unified connection between them and the public. Community Counts is a community-based program designed to offer residents a resource for open and respectful dialogue when they have issues, concerns or questions relating to the natural gas industry. Their response line provides 24/7 on-call contact with oil and gas operators to receive a resolution to a concern or answer to a question in a timely manner (<http://communitycountscolorado.com/>). This number is (866) 442-9034.

The Bureau of Land Management (BLM) and US Forest Service (USFS)

The US Bureau of Land Management (BLM) manages 261 million acres of public land and another 700 million acres of sub-surface minerals. A large portion of the land in Garfield County is managed by this agency, which oversees and administers permits and leases to oil and gas industry operators. They enforce conditions of approval to each well drilled under their jurisdiction through the NEPA (National Environmental Policy Act) process. In their 2004 Best Management Practice policy, the BLM instructs field offices to incorporate appropriate BMPs into Applications for Permit to Drill and associated on- and off- lease approvals. The US Forest Service (USFS) manages and permits surface uses on their lands; however, the BLM still manages sub-surface mineral extraction. A COGCC permit is required for all drilling on federal lands.

Oil and Gas Operations Management Approaches:

- The Steering Committee recognizes that extensive regulations for the oil and gas industry are already in place. Therefore, the first BMP recommended by the Steering Committee is to outline existing COGCC, CDPHE, EPA, BLM, and Garfield County regulations designed to help protect drinking water, coordinate on education and outreach related to existing regulations, and provide input on the development of new regulations where appropriate.
- Continue rapport (and develop where it does not exist) with local oil and gas operators and maintain communication about present and future industry activity within the DWSPAs to allow for ongoing protection from spills and other risks, including understanding of industry BMPs related to spill response plans and prevention measures. SWPCRP Emergency Response Cards should also be distributed to oil and gas operators.
- Provide a copy of the final Source Water Protection Plan, along with GIS shapefiles/DWSPA maps to government agencies and oil and gas operators alike. This will allow government entities to be informed about water protection measures in these areas in their decision making; as well as oil and gas operators to be aware of when their facilities are in the DWSPAs. Water operators can also be notified of any new activity.
- SWPCRP Water Operators should periodically review the most recent pre- and post- oil and gas development sampling results that will be available from the COGCC's website (<http://cogcc.state.co.us/>) effective as of July 2013, per Rule 609. Water providers are also encouraged to engage local energy operators to review sampling results with them and discuss implications, if any, relative to water treatment and supply operations.

- Continue the utilization of the Watershed Protection District Ordinances permits.

PIPELINES

Many pipelines in Garfield County are below-ground and could allow contaminants to enter the water table in the event of a leak. Companies who own and manage natural gas and produced water pipelines are often separate from operators involved in drilling and production. Therefore, the Steering Committee felt it would be beneficial to keep pipelines as a distinct issue of concern rather than to include them with Oil and Gas Operations.



Figure 26: Natural Gas pipeline.

Pipelines in the DWSPA are managed by several entities depending on land use and ownership as well as pipeline dimensions. Garfield County Building and Planning Department permits and regulates all pipelines that are of these specified dimensions:

- Greater than 12" wide
- Greater than 2 miles in length
- Greater than 5 miles in length with any diameter

In the application for a pipeline development plan, an applicant is required to assess impacts on a variety of issues such as sensitive areas, weed management, traffic, re-vegetation and water quality.

Federal agencies also permit and regulate pipelines that cross their lands. The Bureau of Land Management permits pipelines via approval of "Right-of-Ways" across BLM lands. Pipelines associated with a new well or pad, such as to consolidated facilities for fluids or to the larger transmission lines, are generally permitted along with the Application for Permit to Drill process. If the minerals transported in the pipelines are federal, they are permitted by the BLM as well. The US Forest Service similarly utilizes "Special Use Permits" to give authorizations to pipelines that cross their lands.

Colorado Oil and Gas Conservation Commission

The COGCC regulates pipelines through its 1100 Series Rules. These govern the Installation and Reclamation; Operations, Maintenance, and Repair; and Abandonment of all pipelines involved in Oil and Gas Operations within the State of Colorado. Visit their website for more information (<http://cogcc.state.co.us/>).

Pipelines Management Approaches:

- Work with Garfield County, the COGCC, the Federal Energy Regulatory Commission (FERC) and the federal Department of Transportation to obtain a contact list of all pipeline companies located within the DWSPA and meet with these companies to raise awareness about Source Water Protection and distribute SWPCRP Emergency Response cards in the event of a leak or rupture.

TRANSPORTATION AND ROADWAYS

The primary roadway within the DWSPA is Interstate 70 (I-70). This interstate highway provides for interstate commerce, movement of supplies through the region, and general travel. Highway 6 & 24 runs adjacent to I-70 and serves essentially as a frontage road. The oil and gas industry, as well as many other industries and private users, use both Highway 6 & 24 and I-70 for

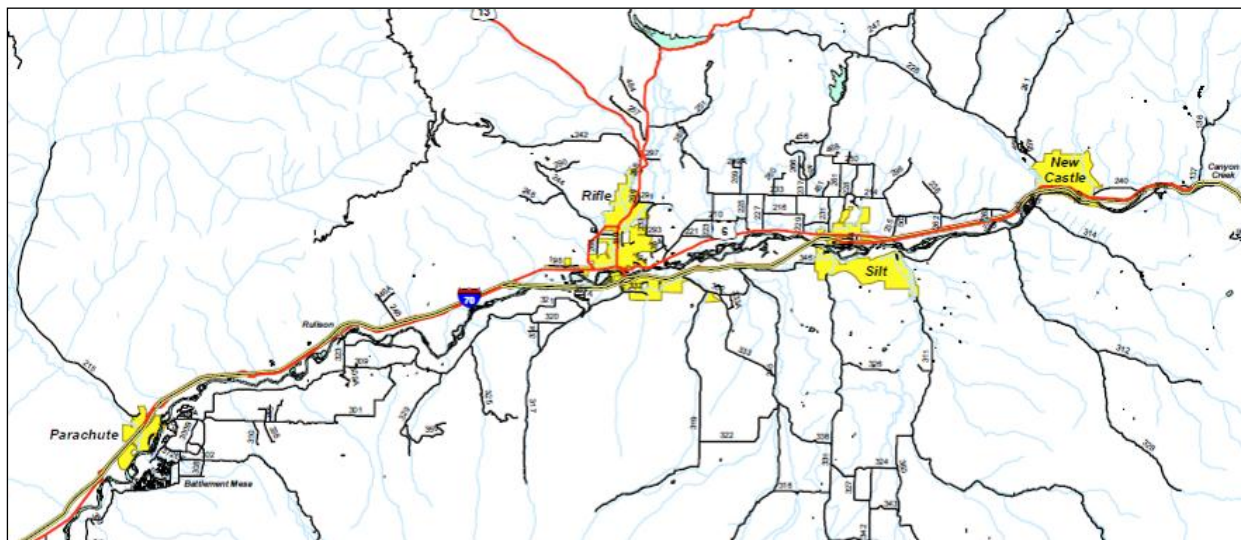


Figure 27: Major Roadways in the DWSPAs

transportation of goods and services. Additionally, there are numerous County, municipal, and private roads that lie within the DWSPA that also have the potential to contribute to contamination via spills and releases, stormwater runoff, and erosion.

Water Quality Concerns

Roads and parking facilities and the vehicles they transport are a major source of water pollution to both surface and groundwater. An estimated 46% of US vehicles leak hazardous fluids, including crankcase oil, transmission, hydraulic, and brake fluid, and antifreeze, as indicated by oil spots on roads and parking lots, and rainbow sheens of oil in puddles and roadside drainage ditches. An estimated 30-40% of the 1.4 billion gallons per year of lubricating oils used in automobiles are either burned in the engine or lost in drips and leaks, and another 180 million gallons are disposed of improperly onto the ground or into sewers. Runoff from roads and parking lots has a high concentration of toxic metals, suspended solids, and hydrocarbons, which originate largely from automobiles (Gowler and Sage, 2006). Storm water runoff from these roads can deliver contaminants from the road surface into the nearby groundwater. Trash thrown from or blown off of vehicles can also migrate into surface water and clog waterways. These wastes can sometimes be hazardous themselves, such as cleaning supplies or even illicit drug manufacturing materials.

Incident Spills vs. Cumulative Effects

The impacts and management approaches for incident spills vs. cumulative effects can differ greatly. Incident spills typically come from trucks that transport fuels, waste, and other chemicals getting in an accident or going off the road. Chemicals from accidental spills are often diluted with water in the process of cleaning up the spill, potentially washing the chemicals

into the soil and infiltrating into surface water and groundwater. Illegal dumping of hazardous or other potentially harmful wastes is considered an incident spill as well. These spill events are addressed through emergency responders at the fire district or state/county hazard mitigation crews.

Cumulative effects to roads can result from a number of factors. Small but frequent accidents that spill chemicals can lead to overall degradation of waters, dust from roadways can increase sediment loading, and chemical application can alter the chemistry of the water supply. Sediment loading from sand application, while a prevalent problem in higher elevations and lower-flow streams, is not a priority issue in Western Garfield County. The section below will describe in greater detail the types of chemicals used and the issues they present.



Figure 28: Salt and Sand application.

Chemical Application

During the winter season, CDOT and other road maintenance groups apply a salt-sand mixture and de-icer (magnesium chloride, M1000 or Ice Slicer) to melt snow and prevent slippage by vehicles. These applications occur along routes within the source water protection area, such as I-70 and major county roads. Salt from the highway is introduced into the water supply through several pathways:

- 1) Runoff from roads is sometimes carried to ditches and unlined channels through which the water can infiltrate into the soil and eventually into groundwater. Salt-sand mixtures can also migrate on land and enter surface water directly.
- 2) Snow containing these salts can often be plowed off the road and into large piles. When this accumulated pile melts during warmer weather, the water that results contains dissolved salts that can drain into surface and groundwater supplies.

Salts used in the de-icing process can contribute to elevated chloride levels in groundwater and surface water through infiltration of runoff from roadways. Unlike other contaminants that can result from transportation activities such as heavy metals and hydrocarbons, chloride is not naturally removed from the water during migration through soils. It may remain in the water table for long periods of time if groundwater velocity is too slow to flush it away. These slower residence times can account for elevated levels of chloride throughout the year, not just during winter (Seawell, et al, 1998).

Regulatory Responsibility

The Colorado Department of Transportation (CDOT) is responsible for the maintenance of I-70, U.S. Highway 6 & 24, and Colorado State Highway 13 that runs north out of the City of Rifle. Their maintenance forces take care of the highway system, plowing snow and repairing pavement. Their highway construction programs attract private contractors and the low bidder is awarded the project; they are in turn responsible for construction of that project (CDOT, 2011). CDOT has operations that run the length of the DWSPA. Garfield County Road and Bridge Department is responsible for the maintenance of county roads within the source water protection area.

Landslides

Land and rock slides have the potential to occur along the county roads that follow East Elk Creek and Beaver Creek. Should a large landslide occur, it could add large quantities of sediment to the creek and potentially interfere with stream flow to the drinking water intake. Garfield County Road and Bridge Department has primary responsibility for the maintenance of these roads and would likely conduct cleanup and removal efforts.

Transportation and Roadways Management Approaches:

- Distribute SWPCRP Emergency Response Cards to all emergency responders (State Patrol, Hazmat, Fire Protection Districts, CDOT Hazmat Responder, Garfield County Emergency Responder, Hanging Lake Tunnel, and especially local dispatch) in the event of accidents, incidents, and spills. Coordinate with the Garfield County Emergency Management Department in utilizing Garfield County's emergency notification system, called "Everbridge."
- To address cumulative effects, coordinate with CDOT and the Garfield County Road and Bridge Department and provide them with a copy of the Source Water Protection Plan and GIS shapefiles/maps of DWSPAs. Encourage continued use of their BMPs to prevent road materials from entering source waters (see management tables for list of BMPs already in place). Research long term effects of magnesium chloride entering the water supply from roads.
- Develop rapport with local landowners and residents who live along critical roads to facilitate reporting of spill incidents to the local water operators, particularly up East Elk Creek.
- Erect "Drinking Water Supply Protection Area" signs in strategic places throughout the DWSPA to encourage people to report unlawful activity or spills.
- Work with Garfield County and the Town of Parachute to minimize the risk of a spill on the sharp turns of County Rd. 309 that lie just above Parachute's springs.



Figure 29: Landslide on Roadway. Source: www.demotix.com/news

AGRICULTURAL PRACTICES

Agriculture and ranching is a significant land use throughout the western portion of Garfield County and in the DWSPA. A large portion of the lands within the five mile secondary zones are privately owned and utilized for these purposes. While many of the operations are relatively small, with fewer than 1000 cattle for ranching and smaller acreages, their cumulative impacts can be a threat to water supplies.

Irrigated Fields

A variety of crops are grown within the DWSPA, including hay and alfalfa. There are also several organic and local farms in the area. Excess fertilizer use and poor application methods at these operations can cause fertilizer movement into surface and groundwater. If the land is over-irrigated, this can lead to excess runoff of fertilizers as well. Fertilizers usually consist of nitrogen and phosphorus, the two compounds which are of greatest concern to drinking water supplies. The increased nutrient loads in water from these fertilizers can lead to changes in dissolved oxygen content and cause algal blooms to grow around intakes. Pesticide application to crops, another potential source of contamination, will be discussed individually in a later section.



Figure 30: Hay Production in the Roaring Fork Valley.

Ranching and Livestock Grazing

Small ranching operations are ubiquitous to the landscape of much of Garfield County. While there are no operations large enough to be classified as Concentrated Animal Feeding Operations (CAFOs), many ranches in the area have several hundred cattle and other livestock that remain in a contained area for a sustained period of time. When this is the case, the greatest risks to the water supply include fecal/bacterial contamination, sedimentation, and



Figure 31: Cows in stream.

increased temperatures. Potential pathogens carried in animal waste include E. Coli, salmonella, cryptosporidium, and giardia. Significant damage to wetland areas and stream-bank erosion may also occur. This damage can add large amounts of sediment directly into streams, particularly wet meadow streams or those with erosive topography that is prone to gully formation. New Castle's East Elk Creek intake, Rifle's Beaver Creek intake, and Parachute's springs are particularly at risk with the prevalence of ranching in their primary zones and their reduced capacity for dilution.

Grazing on Public Lands

Livestock grazing is allowed on many of the public lands within Garfield County with the granting of a permit or lease. Operations are authorized based on the kind and number of livestock, season of use, and amount of use permitted each grazing year. Active allotment plans that have been recently updated by the Rifle Ranger District stress grazing practices that protect water resources. Grazing standards designed to protect range and riparian areas will be included in grazing permits and allotment operating plans. Range specialists monitor allotments to ensure these practices are implemented and effective.

The Bureau of Land Management manages a substantial portion of the land open for grazing in the County. They use a semi-quantitative rapid assessment tool, called Land Health Assessments (LHAs), which specifically address water quality. They defer to the State of Colorado's beneficial use classification, 303d/M&IE lists, and whatever field data are available

to make decisions about whether an area is meeting the water quality land health standard (Adams, 2012).

Agricultural Practices Management Approaches:

- Identify and develop relationships with agricultural landowners within the DWSPA and encourage them to practice stewardship of their lands, using only the recommended amounts of pesticides and fertilizers.
- Work with the local NRCS Field Office, local conservation districts, and the local Colorado State University Extension office on public education campaigns on subjects such as grazing management, manure management, irrigation practices, chemical application, animal rendering, and chemical use and storage (see management tables for education techniques and materials). Request their services in conducting site visits to landowners (upon request by the landowner) within the DWPSA to evaluate practices and provide recommendations. Provide these agencies with a copy of the plan and GIS shapefiles of DWSPAs.

RAILROADS

The active railway that runs through the DWSPAs is owned by Union Pacific Corporation. The Corporation's principle operating company, Union Pacific Railroad, links 23 states in the Western two-thirds of the country. Primary commodities handled by Union Pacific in the State include coal, grain, automobiles and trucks, consumer and manufactured goods, chemicals, energy, and industrial products. Amtrak also provides passenger service over the Union Pacific line, along with other companies like BNSF (Burlington-Northern Santa Fe).

The primary concerns related to drinking water quality from railroads in the area are potential spills from cargo (be it accident related or leaking rail cars), and weed management along the train tracks. Rail cars can carry a variety of hazardous materials that could pose a threat were they to enter the water supply. Were a spill to occur, the incident would be managed in partnership with Garfield County Emergency Management. Weed and vegetation control is also conducted, in part, by Garfield County's vegetation program.

Railroads Management Approaches:

- All railroad companies in the area have an emergency response and Hazardous Materials cleanup plan in place. Work with railroad companies operating in the DWSPA to become informed on these plans as well as those of Garfield County Emergency Management. Distribute SWPCRP Emergency Response Cards to railroad companies.
- Utilize reports supplied by Union Pacific Railroad Company on materials transported through the county to better understand emergency response needs. See Appendix H to view this report.

PESTICIDE APPLICATION

Pesticides can be harmful to both aquatic life and human health should they be allowed to enter the water supply. The term “pesticides” in this case applies to both herbicides and insecticides. Many of the Steering Committee’s efforts will be concentrated on herbicide application since that is one of the primary functions of the Garfield County Vegetation Management Department.

Private Farming and Ranching

Farmers and ranchers in the DWSPA utilize a variety of pesticides on their crops and to control weeds on their grazing lands. Their use poses the greatest risk when they are improperly applied. If the private landowner uses an incorrect dosage and exceeds the recommended concentration of the pesticide per volume of water or sprays too frequently; when runoff or infiltration into the water table occurs these pesticides can migrate into drinking water supplies.

Garfield County Vegetation Management

The Garfield County Vegetation Management Department has three primary functions in regards to pesticide application. The Department works with a citizen board, the County Noxious Weed Advisory Board. The Weed Board, as mandated by the Colorado Noxious Weed Act, has developed a county weed management plan. The Plan has established a county noxious list of targeted species. In addition the State of Colorado has a noxious weed list that includes species that are not on the County’s List. These species are List A and List B species and also require management. The state list is dynamic and may change slightly from year to year.

The implementation of the county weed management plan involves three primary goals. The first is to manage county and state listed noxious weeds in on county land. This includes 900 miles of county roads, the Garfield County Airport outside the City of Rifle, and the Anvil Points Landfill; however, the primary focus is on roadside spraying. They have developed a list of 21 noxious weeds and subsequent suppression methods for each. The Colorado Department of Public Health and Environment (CDPHE) has also recently developed a Discharge Permit System that regulates potential discharges of pesticides. Garfield County must now abide by these standards when working near navigable waters. Part of this process also involves developing a Pesticide Discharge Management Plan, which the Department expects to complete soon.

The Vegetation Management Department also works with other agencies through Intergovernmental Agreements on weed management and pesticide application as well as re-vegetation and reclamation standards. The BLM and Forest Service, as well as the Colorado Department of Transportation, all benefit from these practices.

Finally, the Vegetation Management Department, in partnership with the Conservation Districts, NRCS, and CSU Extension, works on education and awareness programs with private landowners. Workshops are held throughout the year that educate residents on how to identify weeds, how and where weeds are spread, and how to manage them. They provide continuing education credits for residents who take these courses, often with a license to use a broader range of pesticides. They also conduct a cost-share program in partnership with Conservation Districts to provide financial assistance to landowners for controlling noxious weeds. This document can be found at <http://garfield-county.com/vegetation-management/documents/2012->

[garfield-weed-cost-share.pdf](#). As a last resort, the County has weed enforcement capabilities on private lands under the Colorado Noxious Weed Act.

Pesticide Application Management Approaches:

- Continue to work with the Garfield County Vegetation Management Department to discuss current vegetation management plans and BMPs within the DWSPA. Update maps of the DWSPA and GIS shape files as necessary (maps and files have already been provided to the department).
- Coordinate with Garfield County Vegetation Management, the NRCS, and CSU Extension to distribute a SWPCRP Emergency Response Card to licensed commercial and private applicators in the area. Provide these regulatory agencies with a copy of the plan.

SEPTIC TANKS

Septic tanks, also called Onsite Wastewater Treatment Systems (OWTS), are permitted and regulated by the Garfield County Building and Planning Department. The County follows Colorado Department of Public Health and Environment codes in their permit process. Currently, there are numerous residences and subdivisions within the DWSPA that use septic tanks for their wastewater treatment, particularly in the East Elk Creek and Beaver Creek watersheds. Residents with septic tanks are required to utilize the proper materials and spacing requirements in the construction process; however, proper maintenance of septic tanks is not always performed. When this is the case, these systems can contribute excessive nutrients, bacteria, pathogenic organisms, and chemicals to groundwater. If the storage tank overflows or the leach fields become saturated, runoff to surface waters can also result. Garfield County recommends that septic tanks be inspected once a year and cleaned when necessary and that they be pumped once every four years when yearly inspection by the owner is not practical.



Figure 32: Septic System Maintenance.

Septic Tank Management Approaches:

- Collaborate with the Garfield County Building and Planning Department to develop an inventory of septic systems located within the DWSPAs, particularly those that have the greatest potential to enter drinking water sources.
- Coordinate with Garfield County Public Health Department to develop a public education campaign which provides information about the proper use and maintenance of septic systems and the risks to drinking water sources when they are functioning improperly.

Educational materials may include direct mailings, water bill inserts, a complimentary Presence/Absence Test, workshops, etc.

FIRES

There are several major factors in the DWSPA that could contribute to a high wildfire risk, particularly for the East Elk Creek and Beaver Creek drainages. Large stands of forests in these drainages, some with heavy fuel loads, could produce a catastrophic fire. Residential and campground fire-pits are common throughout this region, with the potential to spread and ignite surrounding vegetation. Agricultural and controlled burning, a common practice in the region, can also spread and turn into wildfires. Historically, however, most of Colorado's wildfires are caused by lightning strikes from the frequent thunderstorms that pass through the State during the summer months. Lightning strikes sometimes create hotspots which can spread into full-fledged fires under the right conditions.

Wildfire and related suppression activities are potential sources for surface water contamination. Sources of contaminants from a burned area may include increased sediment, debris, and ash flows into surface waters. 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). The potential of a watershed to deliver sediments to surface waters after a wildfire depends on forest and soil conditions, the physical condition of the watersheds, and the sequence and magnitude of rain fall on the burned area. In cases of a high-severity fire, normal runoff and erosion processes can be dramatically altered and magnified.

Community Wildfire Protection Plan

As part of its Hazard Mitigation Planning efforts, Garfield County commissioned Walsh Environmental Scientists and Engineers, LLC, to develop a Community Wildfire Protection Plan (CWPP). The plan purposes include the assessment of wildfire risks and hazards to Garfield County and to help communities and their local fire departments coordinate their preparation and response to a wildfire. The CWPP is focused on the Wildland-Urban Interface. As we have seen, wildfires can pose significant threats to water supplies. This Source Water Protection Plan, therefore, will be included as a component of the Community Wildfire Protection Plan.

Building on CWPP efforts are Critical Community Watershed Wildfire Protection Plans (CCWWPPs), which broaden the CWPP concept to incorporate critical watersheds within wildfire protection areas. CCWWPPs are written plans that provide guidance to local stakeholders about the types and locations of treatments necessary to reduce wildfire hazards within the watershed, as well as to protect reservoirs, intakes, water transportation and distribution services and other facilities through the use of specific site-level treatments. For the Garfield County CCWWPP, Walsh Environmental used an approach developed by the Front Range Watershed Wildfire Protection Working Group. Their group developed a method to rank Front Range watershed risk to wildfire; a method applicable to Garfield County.

The working group strategy uses several components to develop a composite score of watershed hazard ranking. These include: wildfire hazards, flooding or debris flow risk, soil

erosion potential, and water use rankings. This composite hazard ranking score characterizes watershed risk to wildfire damage from very low to very high. Once this ranking is completed, mitigation strategies are put in place. These begin with pre-fire fuel treatments and stabilization plans. Initial attack strategies once a fire begins could be employed to reduce the potential for watershed damage from loss of vegetation cover and soil disturbance. Finally, post fire response plans can identify specific treatments and locations that are of highest benefit or priority to protect streams and rivers.

Wildfire Susceptibility Index

The Wildfire Susceptibility Index (WFSI) is defined as the probability of wildfire occurrence and its predicted rate of spread once an ignition occurs. As a part of the CWPP, Walsh Environmental and Garfield County Emergency Response developed a WFSI for each Wildland-Urban-Interface (WUI) zone in the county. The WFSI data used in this CWPP assessment was derived from the Western Colorado Wildfire Risk Assessment that was presented in the CSFS report, Colorado Statewide Forest Resource Assessment: A Foundation for Strategic Discussion and Implementation of Forest Management in Colorado, published in 2008. The chart below depicts an overall risk of each community to wildfires. FRCC Hazard Rating represents the Fire Regime Condition Class Hazard Rating; FBFM is the Fire Behavior Fuel Model Hazard Rating; WFSI is the Wildfire Susceptibility Index; and WFII is the Wildfire Intensity Index. These four categories are combined to give each Wildland-Urban Interface an Overall Risk Rating.

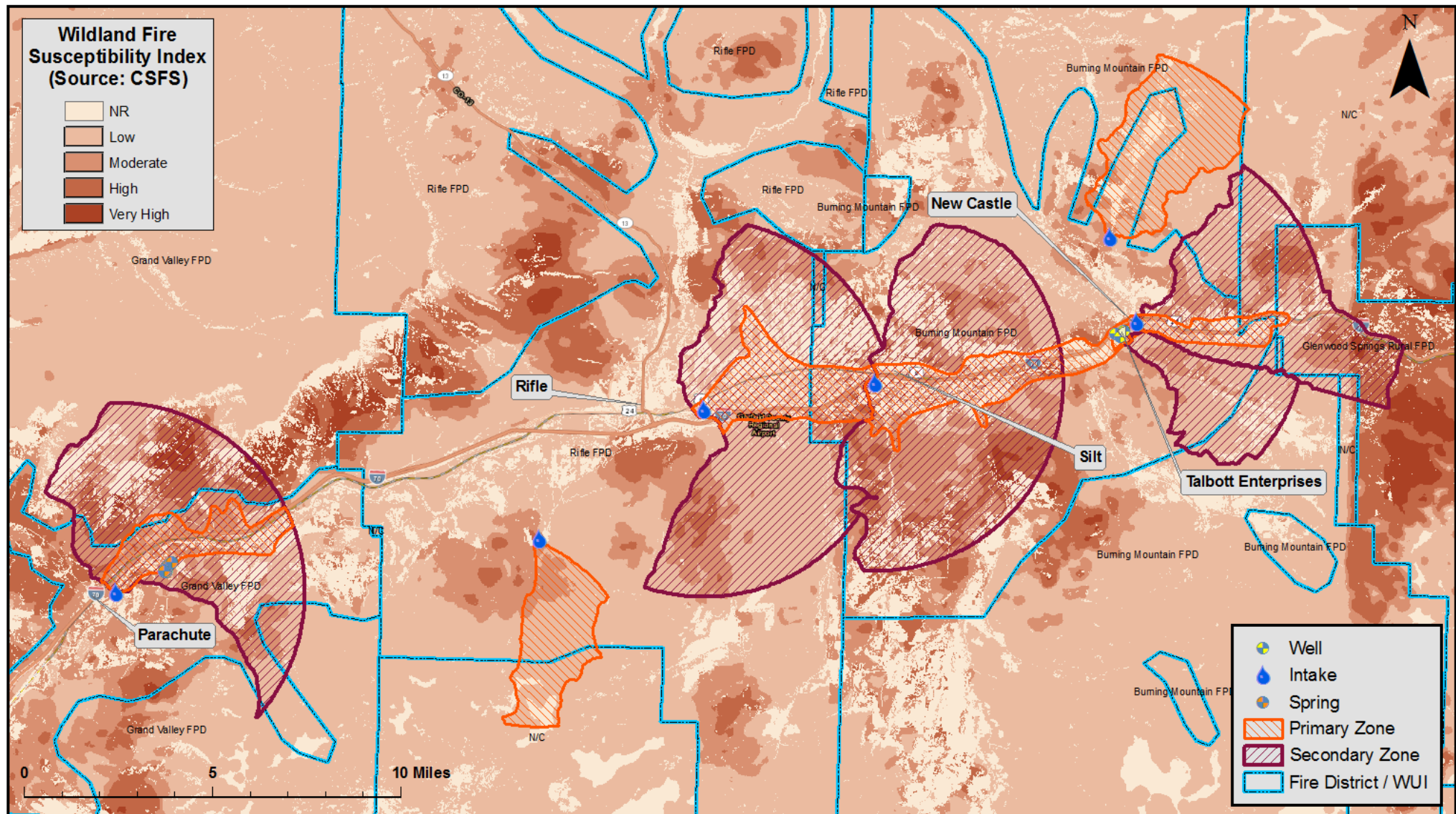
Table 6: Overall Risk Summary for the Wildland Urban Interface Areas in Garfield County

Wildland Urban Interface	Community	FRCC Hazard Rating	FBFM Hazard Rating	WFSI Risk Rating	WFII Risk Rating	Overall Risk
Burning Mountains	Silt	High	High	Low to Moderate	Low to Moderate	High
	New Castle					
Glenwood Springs	Greater Glenwood Springs	High	High	High to Very High	Low to Moderate	Extreme
Grand Valley	Battlement Mesa	High	High	Low to Moderate	Low to Moderate	High
	Parachute					
	Rulison					
Lower Valley	Dispersed	High	High	Low	Low to Moderate	High
Rifle	Rifle	High	High	Low	Moderate	High

Table 7: Source Water Protection Areas within a Fire Protection District and Wildland Urban Interface

Fire Protection District	Source Water Protection Area (Acres)	Source Water Protection Area within the Wildland Urban Interface (Acres)
Burning Mountains	47,831	38,495
Glenwood Springs	6,734	6,734
Grand Valley	18,765	9,324
Rifle	25,102	25,102
County	22,192	0
Total	123,907	81,629

Figure 33: Wildland Fire Susceptibility Index Overlaid with DWSPAs



Structure Fires

Structure fires present a different set of potential threats to drinking water supplies. The two fire districts in the DWSPA, the Colorado River Fire Rescue Authority and Grand Valley Fire Districts, will aggressively attack a structure fire using large quantities of water. The large volume of water applied to these fires can exit the building in the form of runoff, carrying with it a myriad of chemicals and plastics that exist throughout the home, particularly in the garage. When exposed to the heat, and mixed with subsequent water application, these constituents can create a toxic runoff mixture that can enter and contaminate both ground and surface waters. The Steering Committee will work with each of these fire districts to make them aware of source water protection efforts and inform them of the location of water intakes. Knowledge of the DWSPAs can better equip the fire districts to implement protocols that will prevent contamination from structure fires.

Wildland and Structure Fires Management Approaches:

- Collaborate with Walsh Environmental Scientists and Engineers, the authors of the Garfield County Community Wildfire Protection Plan, to overlay the DWSPA's on the Wildfire Susceptibility Analysis maps to identify high-risk areas and determine recommended action items. Coordinate with the Garfield County Emergency Management Department to have each community in the SWPCRP participate on the Garfield County Community Wildfire Protection Plan Implementation Team.
- Work with local Fire Protection Districts to initiate pre-fire mitigation such as: sediment fences, wattles, emergency seeding, etc. Also, coordinate with fire districts to identify storm drain locations which drain upstream of an intake and that may risk contamination of source waters.
- Provide a copy of the final Source Water Protection Plan along with GIS shapefiles to the DWSPAs to Natural Resource Specialists in the BLM Colorado River Valley Field Office, the White River National Forest, and the Upper Colorado River Fire Management Unit for consideration during fire suppression as well as when planning and implementing short term and long term wildland fire mitigation projects.
- Meet with the appropriate ranger district of the White River National Forest and the local fire protection districts to provide them with a copy of this Source Water Protection Plan and GIS data of the protection areas. The District Ranger can then determine if "Retardant Exclusion Zones" may be implemented around the primary zones of the SWPCRP's DSWPAs; as well as if opportunities exist to increase the awareness of this issue among key staff members and fire suppression personnel.

LANDFILLS

There are two designated landfills within Garfield County. The first, South Canyon Landfill, is managed by the City of Glenwood Springs. The Town of New Castle's DWSPA was enlarged to include this potential source of contamination; as the creek downstream of the landfill drains into the Colorado River approximately seven miles upstream of the New Castle Colorado River intake. Toxic or hazardous wastes are not accepted at this landfill. Management Approaches are put in place to prevent runoff and seepage into the creek, including retention ponds and

liners. West Garfield County Landfill, operated by the county, is also a non-hazardous solid waste disposal facility. The landfill is located outside DWSPA boundaries; however, management approaches will be implemented due to the high risk of contamination.

Landfill Management Approaches:

- Meet with local landfill managers to provide them with SWPCRP Emergency Response Cards in the event of a spill or release; as well as to become familiar with operations at these landfills. Encourage local landfill managers to notify drinking water system operators of any significant findings from their routine groundwater monitoring program.
- Continue to rely on Garfield County Emergency Management and Everbridge for accident and spill reporting.

STORAGE TANKS (ABOVEGROUND AND UNDERGROUND)

There are numerous fuel storage tanks within the DWSPA. Some of them are currently in use (active), while others have been permanently closed. There have also been storage tank spills or leak events at each of the DWSPAs except Talbott Enterprises. For these numbers, see the table below. Information of the current status of Aboveground Storage Tanks (AST) and Underground Storage Tanks (UST) within the DWSPA was obtained from the Colorado Department of Labor and Employment Division of Oil and Public Safety's database via their Colorado Storage Tank Information System (COSTIS) website at <http://costis.cdle.state.co.us>.

Table 8: Aboveground and Underground Storage Tanks in Garfield County

	Active	Closed	Confirmed releases	Mitigated?
New Castle	3	11	5	Yes
Talbott	3	3	0	
Silt	4	7	5	Yes- 1 still being monitored
Rifle	10	8	6	Yes- 2 still being monitored
Parachute	6	3	2	Yes

Storage Tank Releases

Less than half of the storage tank facilities have had leaking underground storage tanks, recorded as confirmed releases. Each municipality except Talbott Enterprises has had a confirmed release; however, many of them occurred decades ago and have long since been mitigated. The DWSPA for Town of Silt has one confirmed release that is still being monitored for the spread of contamination. City of Rifle has experienced two confirmed releases that are still being monitored, one of which is also an active site. A release is defined as any spilling, leaking, emitting, discharging, escaping, leaching, or disposing of a regulated substance from a storage tank into groundwater, surface

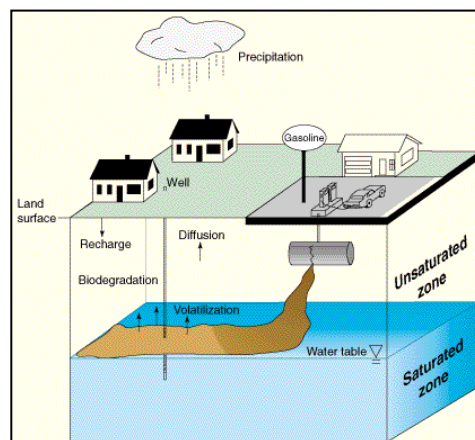


Figure 34: Schematic of a LUST spill site

water, or soils. The owner/operator must report a suspected release to the state 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.

Gasoline, or “liquid phase hydrocarbon,” can leak from tanks and descend through the unsaturated soil zone. Because gasoline is lighter than water, it generally floats on the water table, potentially closer to drinking water sources. Gasoline contains Class A acute health concern compounds like the carcinogenic benzene, toluene, ethylbenzene, and xylenes (BTEX) suite. As such, releases from gasoline storage tanks are a serious concern because of its potential to contaminate public and private water supply sources. Besides the potential for being consumed in drinking water, volatile organic compounds such as the BTEX suite can enter nearby buildings. If the building is poorly ventilated, the compounds can accumulate and pose a health risk.

Residential Storage Tanks



Figure 35: Residential aboveground storage tanks near Town of Parachute

Residents of rural communities may have private aboveground or underground storage tanks that contain fuel for heating and/or vehicles. The substantial rural population in Garfield County suggests that there could be quite a few tanks within the DWSPAs. If an underground storage tank is 110 gallons capacity or less or if the aboveground storage tank is less than 660 gallons, they are excluded from the Colorado Department of Labor and Employment Division of Oil and Public Safety regulations. Many of the tanks are old and subject to leakage, which can be caused by corrosion, improper installation, failure of piping systems, spills and overfills that occur during fuel transfers, and improper operation and maintenance.

Because it only takes a small amount of petroleum to contaminate a significant area of the ground or surface water supplies, proper petroleum product storage practices are important. Fuel tanks located within a floodplain or in areas where the water table is close to the surface is of particular concern. Aboveground storage tanks should utilize secondary containment, such as an impermeable liner made of concrete or aluminum. The containment area should be able to hold 110% of the tank capacity. A manually controlled sump pump should also be used to remove rain water that could accumulate in the secondary containment area.

Storage Tanks (Aboveground and Underground) Management Approaches:

- Maintain a current inventory of regulated above and underground storage tanks in the DWSPA using the Colorado Storage Tank Information (COSTIS) website at <http://costis.cdle.state.co.us>. Conduct regular field checks of active sites.
- Using COSTIS, Identify Leaking Underground Storage Tanks (LUST) events that have occurred within the DWSPA. Maintain contact with the Colorado Department of Labor and Employment: Division of Oil and Public Safety at (303) 318-8000 for information regarding LUST events within the DWSPA. Contact the Public Records Center for file review at (303) 318-8512 or (303) 318-8522.

- Develop an inventory of high-priority/risk unregulated residential or agricultural storage tanks within the DWSPAs. Build relationships with the owners of these high-priority tanks and provide information regarding actions to prevent petroleum products from leaking and entering surface water and groundwater. Encourage private unregulated storage tank owners to construct secondary containment areas under their storage tanks and research funding opportunities to assist them in this endeavor.

LAND USE CHANGE

Development and Construction Excavation

New development and construction commonly occurs within the DWSPA. Depending on the location and ownership of undeveloped lands, various municipal planning and the Garfield County Building and Planning department typically regulate land use changes and new construction projects; however, the State of Colorado allows the subdivision of property into lots with a minimum of 35 acres without county review. Construction projects, whether residential or industrial, pose a threat of water contamination if not properly managed with suitable BMPs. Potential issues involve runoff of sediment and construction materials from sites, disturbances to groundwater, and the introduced presence of residential and industrial issues.

Stormwater Runoff and Sediment Loading

Sediment loading from unpaved dirt and gravel roads represent one of the greatest threats to surface water supplies in rural environments. Both the Beaver Creek and East Elk Creek intakes are at risk for sediment loading from the county roads adjacent to these creeks. The relationship between connected disturbed areas (high-runoff areas that present a continuous path for surface runoff into water bodies) and detrimental effects on the health of the associated stream channel has been well-documented. Roadside ditches, if not properly constructed, can provide a direct conduit for sediment and contaminants to surface waters.

Land Use Change Management Approaches:

- Provide a copy of the final Source Water Protection Plan along with GIS shapefiles of the protection areas to the Garfield County Building and Planning Department, municipalities, and Planning and Zoning Commissions; and encourage them to overlay the DWSPAs on their land use map and use it as a tool for decision making on land use and permitting in the area. Encourage the department to inform the water system operators about current and potential development and/or other activities within the DWSPAs that may affect source waters; provide feedback where appropriate.
- Continue to rely on the local town governments to enforce current requirements for new development, construction, and stormwater runoff through the use of permits. Encourage planning departments and town engineers to inform their corresponding water systems of new development and construction within the DWSPAs. City of Rifle should continue implementation of the recommendations made in the “Beaver Creek Watershed Cumulative Impact Assessment” prepared in October 2011 by Resource Engineering, Inc.

RESIDENTIAL ISSUES

- **Illegal Dumping on Private Property**
- **Material Stockpiling**
- **Garbage Collection**
- **Urban Runoff**

The DWSPAs include rural, urban, and sub-urban residential land use areas. Common household practices including washing vehicles, lawn fertilization, and pet wastes can allow chemicals and biologic pollutants to enter the water supply. Particularly in rural areas, where garbage collection services are minimal and land is more abundant, residents sometimes dispose of garbage on their property. This can include hazardous materials at times. Material stockpiling also represents a threat to water supplies when residents allow toxic materials to accumulate, such as paints, fuels, and cleaning products. The garbage collection process at all types of properties is a potential source of contamination if garbage cans are blown or knocked over and release trash into the environment. These potential issues are of particular concern for East Elk Creek, Beaver Creek, and the Town of Parachute's springs, where dilution potential is low and rural properties are in close proximity to drinking water intakes.

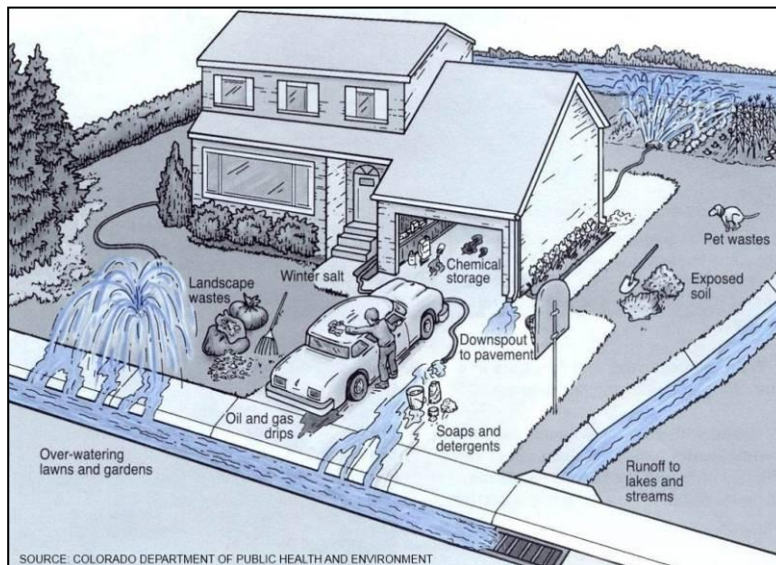


Figure 36: Residential Potential Sources of Contamination

Urban Runoff

The communities in the SWPCRP are experiencing increased effects of urban runoff as a result of a rise in population and land development. Development can alter the local hydrologic cycle, replacing surface materials like plants and soils that absorb water and replaces them with impervious surfaces like concrete. Cleared and grades sites are often severely compacted which prevents storm water from infiltrating into the water table.

When water hits impervious surfaces and cannot absorb, it flows over streets and other urban sites and can pick up fertilizers, dirt, pesticides, oil and grease, and other pollutants and transport them into drinking water supplies. Runoff from urban areas can affect stream hydrology, morphology, water quality and aquatic ecology. Water quality problems can include turbid water, nutrient enrichment, bacterial contamination, organic matter loads, metals, salts, temperature increases in surface water, and deposition of trash and debris.

Residential Issues Management Approaches:

- Conduct public education and outreach programs for residents in the DWSPA to encourage practices that will protect their drinking water source. See Management Tables for a list of educational topics and outreach ideas, including installation of signs

at strategic locations throughout the DWSPAs. Encourage resident reporting of any issues that may threaten to contaminate the water supply.

CAMPGROUNDS AND RECREATION

The expanses of public and private lands surrounding the DWSPA attract both tourists and locals for camping and recreation. These activities are of particular concern for the East Elk Creek and Beaver Creek intakes as camping frequently occurs in these areas. Many of the campgrounds (both designated and un-designated) are on BLM lands. Several camping areas in the upper Beaver Creek watershed are in close proximity to the creek and do not include waste management facilities. Should a runoff event occur, or a camper fail to practice proper outdoor ethics, these wastes could enter the water supply. There are several camps in close proximity to New Castle's intake on East Elk Creek. The Elk Creek Campground just below the intake is privately owned and operated, with both cabins and tent camping available. Camp Christian, a private Christian Camp, sits above the intake and poses similar PSOCs to residential issues.

Off-road vehicles, hunting, fishing, and boating near drinking water intakes all have the potential to impact the water supply. Increased erosion can occur when trail and road users leave designated routes and remove vegetation; garbage and litter from visitors can be left at sites or even deposited directly in the water.

Campgrounds and Recreation Management Approaches:

- Provide the US Forest Service, Private Campgrounds, and Heron's Nest RV Park with a copy of the final SWPP along with GIS shapefiles and SWPCRP Emergency Response Cards.
- Work with US Forest Service to erect DWSPA signs at the Beaver Creek Campground, located at the Beaver Creek Trailhead.

TIMBER HARVESTING

Timber harvesting within the DWSPAs are managed by the White River office of the US Forest Service and the Bureau of Land Management. Forest management activities, including harvesting and fuels management, can generate several forms of non-point source pollution. Disturbance of land surfaces from road construction, log landings, and skid trails is a primary cause of sediment transport into streams from these activities. Other potential impacts include: debris from timber harvesting ending up in the stream, oils and fuels used in machinery being transported into streams, and an increase in temperature as a result of clearing timber along stream banks. Timber harvesting is tightly managed and regulated. Typically implementing water conservation practices, BMPs, guidelines, and proper timber harvesting operation design criteria can be effective to prevent or reduce sediment loading to water bodies.

Timber Harvesting Management Approaches:

- Continue to rely on the US Forest Service's enforcement of federal regulations on timber harvesting and implementation of extensive BMPs that reduce environmental impact.
- Drinking water system operators should become actively involved in reviewing new timber harvesting plans proposed by the US Forest Service. Provide comment when needed regarding potential sources of contamination and source water protection concerns.

INDUSTRIAL AND COMMERCIAL AREAS

- **Concrete, Sand and Gravel Operations**
- **Auto Service, Body, and Repair Stations**
- **Machine and Equipment Operation, Welding, Materials Manufacturing**
- **Recycling Centers**
- **Golf Courses**
- **Garfield County Airport**

Concrete, Sand and Gravel Operations

There are several large sand, gravel, and concrete operations within the DWSPA. Most of them are situated within the river alluvium in the primary zone of the Colorado River intakes for Silt and Rifle. These operations have the potential to adversely impact ground and surface water quality, both as a result of the extraction or refining process and in site reclamation. Sand and gravel mining can cause contamination of a river alluvium or aquifer because it reduces or eliminates the barrier between the land surface and the water table. In some cases, the excavation actually penetrates shallow aquifers, creating a pond or lake and direct access to the water table. The excavation pit and the continual collection and infiltration of wash water increase the probability that other contamination sources could enter the water supply. Possible sources of releases to ground or surface water could include rainwater running off piles of waste or aggregate, leaks and spills from heavy machinery and fuel tanks, the substances used for dust control, water washing discharges at processing plants, and leachate from fill placed in the pits (Greystone, 1999).

Auto Service, Body and Repair Stations

Water operators in the SWPCRP are concerned by the potential for chemicals and other fluids used in the service and repair of automobiles to enter the water supply. There are a variety of chemicals used in auto body and repair shops. Waste paint and waste solvents used in paint gun clean-up are the primary hazardous wastes generated in body shops. Used oil, oil filters, and anti-freeze are typically found in service and repair stations and can be hazardous wastes if not managed properly. They have the potential to enter the drinking water supply through wastewater systems that often treat for them, as well as through urban stormwater runoff if the operations occur outside or fluids leak out of the vehicles. Use of these substances in auto body and repair shops is regulated by the Colorado Department of Public Health and Environment; who also encourages BMPs related to their use and disposal.

Machine and Equipment Operation, Welding, and Materials Manufacturing

The industrial areas surrounding the City of Rifle, and to a lesser degree the other towns in this plan, have numerous welding and materials manufacturing sites as well as operations that utilize heavy machinery and equipment. These operations often produce waste products that are considered hazardous; oils, solvents, paints, and other engine fluids necessitate proper use and disposal.

Recycling Centers

Recycling centers are a concern to the water operators in the SWPCRP because of the materials they collect and the transport of those materials in areas near the water supply. There are four listed recycling centers in the DWSPA: Colorado Computer Recycle in New Castle; Green Zone Recycling in Silt; and Next Generation Recycling LLC and CARS Creative Auto Recycler West of Rifle. They are permitted by the Colorado Department of Public Health and Environment through their "Regulations Pertaining to Solid Waste Disposal Sites and Facilities." These operate under the framework of the Resource Conservation and Recovery Act (RCRA), which classifies them as either Hazardous or Non-hazardous.

Golf Courses

There are two golf courses that lie within the DWSPA. In the Town of New Castle, the Lakota Golf course and subdivision sits at the East side of town. Here, the potential exists for water applied to the course to run off into the Colorado River above their intake. However, this concern remains a low priority for New Castle as the course is a fair distance from the river and New Castle is not currently utilizing this intake. Of a much higher priority for drinking water supplies is the Battlement Mesa Golf course that sits above the Town of Parachute's springs and not far from their Colorado River intake. Fertilizers and pesticides from golf courses can migrate into groundwater and runoff into surface water, particularly when land has been overwatered or vegetation treatments have been misapplied. Improper storage of these materials can also result in them entering the water supply.

Garfield County Airport

The Garfield County Airport is of potential concern to the City of Rifle water operators. Located southeast of the City, spills or leakages could migrate into the Colorado River just above the city's intake. There are a number of fluids and other materials used in operating and maintaining the airport that could contaminate drinking water. Operators at the airport are required to comply with all environmental rules and regulations. The Airport Director is responsible for assuring compliance; operators who provide services involving aircraft maintenance, washing, or painting, crop dusting, aerial application, or other commercial use of chemicals and cleaners are required to provide a written copy of their procedures indicating this compliance. For a list of these rules and regulations, visit the Garfield County website.

Industrial and Commercial Areas Management Approaches:

- Meet with various industrial and commercial entities within DWSPA to raise awareness about source water protection and to distribute SWPCRP Emergency Response Cards.

MUNICIPAL AND RESIDENTIAL WATER RESOURCES

- **Private Water Supply Wells**
- **Water and Sewage Companies- Municipal and Private**
- **Raw Water Customers**
- **Flooding**

Private Water Supply Wells

As with many other issues of concern, the rural nature of the DWSPA means that there are a substantial number of private drinking water wells serving residences and agricultural needs. Depending on the geographic and hydrologic conditions, drilling of new wells or changes to existing wells can alter the movement and characteristics of groundwater. Water containing contaminants from a newly drilled well then has the potential to migrate into other drinking water wells or surface water; and can transport microorganisms, radionuclides, nitrates, and heavy metals. Monitoring groundwater, including adjacent water wells, is encouraged after a new well is drilled.

Cross-contamination from well casings, improperly abandoned wells, or wells with improper flow-back prevention measures can also be a concern to drinking water supplies. Shallow aquifers, which are where many private drinking water wells in Garfield County often draw their supply, also have the potential to cross-contaminate deeper aquifers. This can occur through penetration of an intervening aquitard or around aquitard pinchouts; but often it is well casings or long well screens that create pathways for contaminants to enter drinking water supplies. When the barrier between shallow and deep water aquifers is broken, contaminants may be allowed to move between the two. (Santi et al., 2005)

Water and Sewage Companies- Municipal and Private

Water and wastewater operators process and treat wastes that, without being removed, could contaminate water supplies for downstream users. Sewage, pharmaceuticals, and food waste from garbage disposals are a potential source of contamination to water supplies. Wastewater treatment processes are heavily regulated by the Colorado Department of Public Health and Environment and should not necessitate much action by the Steering Committee.

Raw Water Use

The City of Rifle has 15 raw water users within its Beaver Creek water system. The City of Rifle's concern related to these users is backflow from user delivery systems to the creek and upstream contamination. The water operators for the City believe protection of the creek is critical since contamination upstream of their intake can make its way to these homes before water can be treated. Potential sources of contamination can also backflow from these raw water customers into Beaver Creek. However, the City utilizes a Hach Continuous Monitor that allows for detection of contamination to alert those below the intake that a problem has occurred.

Flooding

Though the risk of a severe flood in the Colorado River Valley is low, the damage to drinking water supplies if there is a severe flood could be significant. Floodwaters transport hazardous chemicals that have been removed from their normal storage places; or pathogenic bacteria from waste management operations. These potential sources of contamination could pose

challenges and potentially overwhelm the water treatment plant. Floodwaters can also wash out or plug intakes and remove critical infrastructure.

Municipal and Residential Water Resources Management Approaches:

- Develop a public education campaign which provides information about potential sources of contamination and distribute this material and/or the SWPCRP Emergency Response Cards as appropriate.
- Continue to rely on the Colorado Department of Public Health and Environment's enforcement of the current drinking water and wastewater regulations, as well as for notification of violations at discharge points.

RULISON BLAST SITE

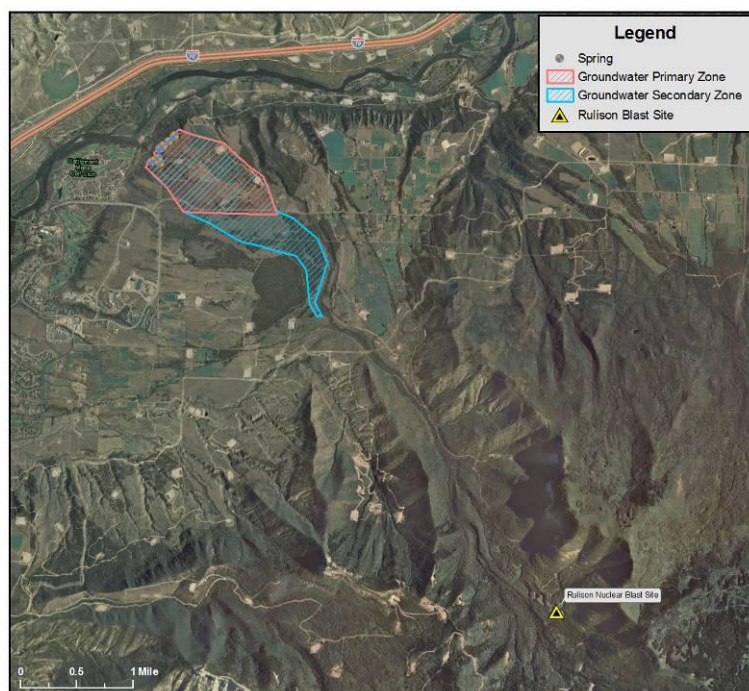


Figure 37: Aerial View of Rulison Blast Site with Town of Parachute's Revelle Springs DWSPA

The Rulison Blast Site is located about 12 miles southwest of the City of Rifle and eight miles southeast of the Town of Parachute, on Battlement Mesa. As part of a natural gas stimulation experiment, in 1969, the Atomic Energy Commission detonated a 40-kiloton nuclear device 8,426 feet below the ground surface to stimulate the flow of natural gas through fractures created by the blast site and use the chimney as a collection chamber. This experiment was conducted as part of the Plowshare Program, a program designed to develop peaceful uses for nuclear energy. The blast created a cavity about 152 feet in diameter. Significant quantities of the natural gas were released in the process, but the discovery of radionuclides made it unusable. Today, the federal

government and the COGCC has issued surface-use and downhole restrictions on drilling within certain boundaries of the blast zone. The US Environmental Protection Agency and Department of Energy monitor groundwater annually at the site and in surrounding areas. No radioactive contamination associated with the site has been detected in samples collected taken from the nearby municipal drinking water supply springs, the water supply wells on five local ranches, or the spring and three wells on the test site (Washington Nuclear Museum and Educational Center, 2011).

Rulison Blast Site Best Management Practices and Recommendations:

- Continue to rely on the Environmental Protection Agency's and the Department of Energy's current monitoring plan to track any changing site conditions that may be of concern to the Town of Parachute's source waters. In addition to relying on these agencies, Parachute should receive regular monitoring results and contact the DOE and EPA if these results are not received.
- Continue to rely on the Colorado Oil and Gas Conservation Commission's requirements for Oil and Gas activity in the Rulison Blast Site area.



Figure 38: Rulison Blast Site

UNIFORM MUNICIPAL SAMPLING AND MONITORING

The water operators at each municipality have agreed that it would be beneficial to have more uniformity in the sampling and monitoring of their source waters and to share this data when it is collected. Currently, the operators included in this plan test for various parameters and with different frequencies; all of which adhere to the standards implemented by the CDPHE's Water Quality Control Division. It is difficult for water operators to identify and correct issues when test results cannot be compared. With a collective plan, trends in water quality can be identified and water operators can make more informed decisions regarding their treatment processes.

Uniform Sampling and Monitoring Management Approaches:

**Subject to change if a different sampling and monitoring plan is developed*

- The five water systems included in the SWPCRP have agreed to notify all water systems in the SWPCRP of any water quality issues or anomalies that may arise. This includes both abnormal test results as well as specific incidents. The Town of Parachute and the City of Rifle currently have continuous source water monitoring equipment installed at their intakes that will help in this effort.
- Water Operators should utilize the Colorado Data sharing Network (CDSN) provided by the Colorado Water Quality Monitoring Council (<http://www.coloradowaterdata.org>). This project is designed to establish a water quality data management system that meets the needs of Colorado's NPS Grant Program and local data providers. Water operators should attend the CDSN training on inputting data. Use of the database will allow water operators to easily upload and share their data with each other and the public if desired.
- The Steering Committee agrees that water quality data is vital to the management of a public water system. Therefore, they feel that it is necessary to have access to the water quality data and testing results that all public water systems have submitted to the Colorado Department of Public Health and Environment - Water Quality Control Division (CDPHE - WQCD) as required. The Steering Committee will strongly encourage the

CDPHE – WQCD to compile and host this data in a manner which is accessible to all public water systems.

UNKNOWN SOURCE OF TOWN OF PARACHUTE'S SPRINGS

No significant research has been done to study the migration of groundwater to the Town of Parachute's Revelle springs. It has been difficult for the Town to identify their risk of contamination to PSOCs without a clear knowledge of their source such as the depth of the water table and the time of travel of formation water. If they are shallower in origin, the springs might be more at risk to surface pollutants. If they are deeper, other pollutants could be an issue. Knowing the source of the springs, and the direction of the groundwater flow leading to the springs, will allow the Town of Parachute to better protect the drinking water source from potential contamination.

WPX Limited Site Investigation

In March 2012, WPX Energy Rocky Mountain, LLC, a local oil and gas operator, contracted Terracon Consultants to conduct a Limited Site Investigation for a well pad. Terracon drilled a test well to a depth of 125 feet below the surface, finding basaltic cobble and boulder sized rocks within a silty, sandy clay mix. No water was found at this depth, nor in the open bore hole three days after drilling was completed. This could lead us to believe that the water table is lower and water comes from deeper within the formation. However, without more extensive research, no conclusions can be made about the source of Parachute's springs from this study.

Unknown Source of Town of Parachute's Springs Management Approaches:

- The Steering Committee believes the Town of Parachute should consider contracting to have a hydrogeological study done which will help form a better understanding of the subsurface hydrologic and geologic conditions in the area of Parachute's springs. The Town of Parachute should also keep informed of Supplemental Environmental Funds that may become available and attempt to obtain them for conducting this study.

Issue of Concern (in no particular order)	Management Approach
Oil & Gas Operations	1. Outline existing COGCC, CDPHE, EPA, BLM, and Garfield County regulations designed to help protect drinking water. Coordinate on education and outreach related to existing regulations, and provide input on the development of new regulations where appropriate. 2. Identify O&G features (pipelines, haul routes, well pads, and other critical infrastructure) within the DWSPA's which pose the highest risk to the source waters and coordinate with operators and risk managers to ensure a level of ongoing protection equal to the risk that these features pose to the source waters. 3. Continue rapport (and develop where it does not exist) with local O&G operators and maintain ongoing communication about present and future industry activity within the DWSPAs to allow for ongoing protection from spills and other risks, including understanding of industry BMPs related to spill response plans and prevention measures. Additionally, share Final SWPP with these local operators. 4. Provide a copy of the final Source Water Protection Plan along with GIS shapefiles of the protection areas to the Garfield County Oil & Gas Liaison, COGCC Environmental Protection Specialists, and the BLM Natural Resource Specialist and encourage them to inform the local water system operators about current and potential development and/or other activities within the DWSPA that have the potential to affect their source waters. This will provide the opportunity for the community water system to provide input and feedback where appropriate. 5. Provide a copy of the final Source Water Protection Plan along with GIS shapefiles of the protection areas to local O&G operators to incorporate into their spill response protocol. I.e. to amend the Spill Prevention Control Countermeasures (SPCC) to include a separate checkbox for the DWSPA in addition to the checkbox for Rule 317B. 6. Distribute SWPCRP Emergency Response Card to O&G operators. 7. Coordinate with Garfield County on update of Land Use Codes. 8. SWPCRP Water Operators should periodically review the most recent pre- and post- oil and gas development sampling results that will be available from the COGCC's website (http://cogcc.state.co.us/) effective as of July 2013, per Rule 609. Water providers are also encouraged to engage local energy operators to review sampling results with them and

	discuss implications, if any, relative to water treatment and supply operations. 9. Continue the utilization of Watershed Protection District Ordinance permits and other various permits to inform the Municipality of new activity within the DWSPA.
Transportation / Roadways / Spills / Surfaces / Landslides	1. Accidents, Incidents, and Spills – distribute SWPCRP Emergency Response Cards to all local emergency responders (State Patrol, Hazmat, Fire Protection Districts, CDOT Hazmat Responder, Garfield County Emergency Responder, Hanging Lake Tunnel, and especially local dispatch), and keep the information on the emergency response cards updated. 2. Coordinate with the Garfield County Emergency Management Department to have the local water operators added to Garfield County’s emergency paging system, called "Everbridge." 3. Cumulative Effects – Meet with CDOT and Garfield County Road and Bridge Department to provide them with a copy of the Source Water Protection Plan and map of the DWSPA along with GIS shapefiles. Encourage them to continue the use of their road Best Management Practices to prevent road materials from entering the source waters. Recommendations for application of road deicing and dust abatement materials include: • applying minimum amounts necessary; • apply only when removal of snow and ice cannot be accomplished by blading, plowing or sanding; • minimize use of chemicals in and adjacent to streams, aquifers, and flood prone areas; and • avoid dumping or storing chemically treated or sanded snow where it can melt and infiltrate groundwater or flow into surface waters. 4. Research long-term effects of magnesium chloride entering the source waters from roads, and consider the development of a monitoring program to determine if there are cumulative impacts to the source waters. 5. Erect “Drinking Water Supply Protection Area” signs in strategic places throughout DWSPA to encourage people to help protect source water and to report unlawful activity or spills. 6. Develop rapport and maintain open dialog with local residents and distribute SWPCRP Emergency Response Cards near intakes and wells to facilitate the reporting of any incidents to the local water operator. (E.g. residents up East Elk Creek). 7. Work with Garfield County and the Town of Parachute to identify and implement BMP’s at the sharp turns on County Rd. 309 to minimize risk to Parachute’s springs in the event of a vehicle

	accident or spill. The Steering Committee will also maintain awareness of Supplemental Environmental Project (SEP) funds as they become available and petition for consideration of BMP's on County Rd. 309. 8. Rely on local landowners and Garfield County's emergency paging system, called "Everbridge," to notify New Castle water operators of any disturbances (rockslides, washouts, etc.) that may occur on County roads along East Elk Creek.
Agricultural Practices	1. Identify agricultural landowners within the DWSPA and maintain an open dialog with them in order to make them aware of the location of the DWSPA and to encourage stewardship of their lands to protect the quality of the surface and ground water within the DWSPA. 2. Work with the local NRCS Field Office and/or the local Conservation District to develop a public education campaign for area residents within the DWSPA on agricultural Best Management Practices for grazing management, manure management, irrigation practices, chemical application, animal rendering, chemical use and storage, wastewater sludge application, etc.. Education techniques may include: workshops, mailings and community meetings/workshops, and demonstration projects. Materials may also include the "Well-A-Syst" program on Livestock Management and a complimentary "Presence/Absence Test" to test the quality of their private water well. 3. Contact the local NRCS Field Office and the local Conservation Districts to request their services in providing site visits (upon request by landowners) within the DWSPA to evaluate their agricultural practices and provide educational outreach.
Railroads	1. Meet with local railroad companies to become informed on their emergency response plan and to provide a copy of the final Source Water Protection Plan along with GIS shapefiles of the protection areas. In addition, provide them with the SWPCRP Emergency Response Cards and request their feedback and input on additional actions that can be taken to minimize risk of contamination to the SWPCRP's source waters. 2. Maintain current contact information with the Garfield County Emergency Responders and continue to rely on them to notify the SWPCRP water operators of all emergency events or accidents that have the potential to affect their source waters.

Pesticides Application (By the County, CDOT, and the Railroad)	1. Meet with the Garfield County Vegetation Management Department to discuss current vegetation management plans and BMP's within the DWSPA and to provide them with a map of the DWSPA and GIS shapefiles, along with a SWPCRP Emergency Response Card. 2. Coordinate with Garfield County Vegetation Management and the NRCS to distribute a SWPCRP Emergency Response Card to all licensed private applicators in the area.
Septic Tanks	1. Collaborate with the Garfield County Building and Planning Department to develop an inventory of septic systems located within the DWSPA's. 2. Coordinate with Garfield County Public Health Department to develop a public education campaign which provides information about the proper use and maintenance of septic systems and the risks to drinking water sources due to an improperly functioning septic system. This may include direct mailings, water bill inserts, a complimentary Presence/Absence Test, workshops, etc.
Fires (Wildland and Structure)	1. Collaborate with Walsh Environmental Scientists and Engineers, the authors of the Garfield County Community Wildfire Protection Plan, to overlay the DWSPA's on the Wildfire Susceptibility Analysis maps to identify high-risk areas and determine recommended action items. 2. Coordinate with the Garfield County Emergency Management Department to have each community in the SWPCRP participate on the Garfield County Community Wildfire Protection Plan Implementation Team. This will raise awareness of the vulnerabilities of the municipal water systems to wildland fires, and provide persuasion for future wildland fire mitigation projects within the DWSPA's. 3. Work with local Fire Protection Districts to initiate pre-fire mitigation such as: sediment fences, waddles, emergency seeding, etc. The SWPCRP should also work with Local Fire Protection Districts on short term and long term planning with various groups, agencies, and organizations such as: private landowners, the BLM, the USFS, the Upper Colorado River Fire Management Unit, the Colorado State Forest Service, local conservation districts, etc. 4. Provide a copy of the final Source Water Protection Plan along with GIS shapefiles of the protection areas to Natural Resource Specialists in the BLM Colorado River Valley Field Office, the White River National Forest, and the Upper Colorado River Fire Management Unit for consideration during fire suppression as well as when planning and implementing wildland

	fire mitigation projects. 5. Work with local Fire Protection Districts to identify storm drain locations which drain above an intake. This information will better equip these local Fire Protection Districts to follow their current protocol and to prevent the contamination of source waters from structure fire runoff in the area. 6. Meet with the appropriate ranger district of the White River National Forest and the local fire protection districts to provide them with a copy of this Source Water Protection Plan and GIS data of the protection areas. The District Ranger can then determine if "Retardant Exclusion Zones" may be implemented around the primary zones of the SWPCRP's DSWPAs; as well as if opportunities exist to increase the awareness of this issue among key staff members and fire suppression personnel.
Landfills	1. Meet with local landfill management to provide them with SWPCRP Emergency Response Cards that will outline communication details in the event of a spill or release within the DWSPA's. The SWPCRP water operators should also utilize this opportunity to become familiar with operations at these local landfills. 2. Encourage local landfill management to notify water operators if any significant results are obtained through their routine groundwater monitoring program. 3. Maintain current contact information with the Garfield County Emergency Responders and continue to rely on them to notify the SWPCRP water operators of all emergency events or accidents that have the potential to affect their source waters.
Land Use Change	1. Provide a copy of the final Source Water Protection Plan along with GIS shapefiles of the protection areas to the Garfield County Building and Planning Department and encourage them to overlay the DWSPA's on their land use map and use it as a tool for decision making on land use in the area. 2. Encourage the Garfield County Planning and Zoning Department to inform the local water system operators about current and potential development and/or other activities within the DWSPA that have the potential to affect their source waters. This will provide the opportunity for the community water system to provide input and feedback where appropriate. 3. The City of Rifle should continue the implementation of the recommendations made in the "Beaver Creek Watershed Cumulative Impact Assessment" that was prepared in October 2011

	by Resource Engineering Inc. 4. Continue to rely on the local town governments as well as Garfield County governments to enforce current requirements for new development, construction, and stormwater runoff through the use of permits. Also, encourage the New Castle and Rifle Planning Departments, as well as the Silt and Parachute Town Engineers to keep the corresponding water system informed of new development and construction within the DWSPA's.
Residential Issues (Urban Runoff, Pesticides, Fertilizers, Pharmaceuticals, Hazardous Waste Disposal, Solid Waste Management)	1. Conduct public education and outreach programs for residents in the DWSPA to encourage practices that will protect their drinking water source. Topics may include: source water protection, urban runoff, pesticides, fertilizers, pharmaceuticals, household hazardous waste storage and disposal, solid waste management, pet waste cleanup, and secondary containment for above ground fuel storage tanks. 2. Opportunities for public education include: newspaper articles, poster displays at local utility offices and public buildings, water bill inserts, flyers, town festivals, public forums, workshops and community events. 3. Conduct public education program which encourages residents to report any issues that may threaten to contaminate the drinking water supply. This may include the installation of signs at strategic locations throughout the DWSPA's.
Storage Tanks (Above and Underground)	1. Maintain a current inventory and information on the status of regulated above and underground storage tanks in the source water protection area using the Colorado Storage Tank Information (COSTIS) website at http://costis.cdle.state.co.us. Storage tank information from this site includes: facility, tank, owner, and events. 2. Identify Leaking Underground Storage Tank (LUST) events that have occurred within the SWPA using the State's database COSTIS. Contact the Colorado Department of Labor and Employment Division of Oil and Public Safety (303-318-8000) for information regarding LUST events within the SWPA. Contact the Public Records Center for a file review at (303) 318-8521 or (303) 318-8522. Monitor progress on any remedial action conducted for the known contamination sites. 3. Conduct regular field-checks of active tank sites. 4. Develop an inventory of residential or farm unregulated storage tanks within the DWSPA's and

	designate those tanks located closest to the intakes, wells, and springs as the highest priority of concern. - Using the inventory, the water operators will develop relationships and maintain open dialog with the owners of these high priority storage tanks. The water operators should also become familiar with local regulations and existing information sources and utilize existing programs to provide information to these high priority tank owners on actions they can take to prevent petroleum products from leaking onto the ground and entering the surface water and groundwater systems. - Encourage private unregulated tank owners to construct secondary containment areas under their storage tanks, and research funding opportunities to assist them in this endeavor.
Pipelines	- Work with Garfield County to obtain a contact list of all pipeline companies located within the DWSPA. - Meet with all pipeline companies within DWSPA to raise awareness about source water protection and to distribute SWPCRP Emergency Response Cards.
Camps / Campgrounds / Recreation	- Provide the US Forest Service, Private Campgrounds, and Heron's Nest RV Park with a copy of the final SWPP along with GIS shapefiles, and SWPCRP Emergency Response Cards. - Work with US Forest Service to erect DWSPA signs at the Beaver Creek Campground, located at the Beaver Creek Trailhead.
Industrial and Commercial (Service Stations, Asphalt / Concrete / Sand / Gravel Plants and Operations, Auto Body and Repair Shops, Golf Courses, Recycling Centers, Machine / Welding / Equipment, Airport, Aircraft Servicing and Maintenance)	Meet with various industrial and commercial entities within DWSPA to raise awareness about source water protection and to distribute SWPCRP Emergency Response Cards.

Water Resources (Private Water Supply Wells, Groundwater / Surface Water Interactions, Raw Water Customers (cross contamination), Water & Sewage Companies)	1. The Steering Committee will develop a public education campaign which provides information about potential contaminants to the public source waters and will distribute this material and/or the SWPCRP Emergency Response Cards where appropriate. 2. The Steering Committee will continue to rely on the Colorado Department of Public Health and Environment's enforcement of the current drinking water and wastewater regulations, as well as for notification of violations at discharge points.
Timber Harvesting	1. The Steering Committee will continue to rely on the U.S. Forest Service's enforcement of federal regulations on timber harvesting and implementation of extensive BMP's to reduce environmental impact. 2. If a new timber harvesting plan is proposed by the USFS, there will be a public scoping process. The Steering Committee and local government will become actively involved in reviewing the plan and providing comment when needed on source water protection concerns.
Rulison Blast Site	1. Continue to rely on the Environmental Protection Agency's and the Department of Energy's current monitoring plan to track any changing site conditions that may be of concern to the Town of Parachute's source waters. The Town of Parachute should continue to receive regular monitoring results and will follow up with the EPA and DOE if not 2. The Steering Committee will also continue to rely on the Colorado Oil and Gas Conservation Commission's requirements for Oil & Gas activity in the Rulison Blast Site area.
Sampling and Monitoring	1. The five water systems included in the SWPCRP have agreed to notify all water systems in the SWPCRP of any water quality issues or anomalies that may arise. This includes both abnormal test results as well as specific incidents. The Town of Parachute and the City of Rifle currently have continuous source water monitoring equipment installed at their intakes that will help in this effort. 2. The Steering Committee agrees that water quality data is vital to the management of a public water system. Therefore, they feel that it is necessary to have access to the water quality data and testing results that all public water systems have submitted to the Colorado Department of Public Health and Environment - Water Quality Control Division (CDPHE - WQCD) as required. The Steering Committee will strongly encourage the CDPHE – WQCD to compile and host this data in a manner which is accessible to all public water systems.

Hydrogeological Study of Parachute's Springs	1. The Steering Committee believes the Town of Parachute should consider contracting to have a Hydrogeological study done which will help form a better understanding of the subsurface hydrologic and geologic conditions in the area of Parachute's springs. Knowing the source of the springs, and the direction of the groundwater flow leading to the springs, will allow the Town of Parachute to better protect the drinking water source from contamination.
General Plan Outreach	1. Present final SWPP to Garfield County Commissioners and all Town/City Councils participating in the SWPCRP. 2. Present final SWPP to the Middle Colorado River Watershed Partnership and encourage them to integrate it into their Watershed Plan that is currently in development.
Annual Review	1. Complete annual update and review of emergency contacts, water system maps and contacts on file with Garfield County Emergency Management Department, and contingency plans.

Table 10: SWPCRP's Issues of Concern and Management Approaches to Implement for Source Water Protection

REFERENCES

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Images:

Cover Photos: Jim Wark, AirPhotoNA.com

Figure 2: Garfield County. Wikipedia

Figure 4: Colorado River Basin. Colorado Division of Water Resources, Division 5.

Figure 13: Source Water Assessment and Protection Process. Colorado Department of Public Health and Environment, Water Quality Control Division

Figure 21: Surface and Groundwater Contaminants. Groundwater Atlas of Colorado

Figure 22: Oil and Gas Development, Roan Plateau. Ecoflight.

Figure 25: Natural Gas Pipeline. Kinder Morgan.

Figure 26: Major Roadways in the DWSPAs. Garfield County GIS.

Figure 28: Landslide on Roadway. www.demotix.com/news

Figure 29: Hay Production in the Roaring Fork Valley. Aspen Ranch Real Estate.

Figure 30: Cows in Stream. Wolfenotes.com

Figure 35: Residential Potential Sources of Contamination. Colorado Department of Public Health and Environment.

*All other figures were produced by Plan Developer Morgan Hill and Source Water Specialist Dylan Eiler.

List of Appendices

*All Appendices are located on the CD attached to this plan.

Appendix A: Potential Source of Contamination Inventories:

- 1: Town of New Castle
- 2: Talbott Enterprises
- 3: Town of Silt
- 4: City of Rifle
- 5: Town of Parachute

Appendix B: CDPHE Source Water Assessment Reports

- 1: Town of New Castle
- 2: Talbott Enterprises
- 3: Town of Silt
- 4: City of Rifle
- 5: Town of Parachute

Appendix C: City of Rifle Watershed Ordinance

Appendix D: Town of Parachute Watershed Ordinance

Appendix E: Community Wildfire Protection Plan- Garfield County

Appendix F: Contingency Plans for:

- 1: Town of New Castle
- 2: Talbott Enterprises
- 3: Town of Silt
- 4: City of Rifle
- 5: Town of Parachute

Appendix G: Material Data Safety Sheets (MSDSs) for Fire Retardants

Appendix H: Commodity Flow Report: Union Pacific Railroad