# City of Yuma
# Source Water Protection Plan – PUBLIC VERSION

## Yuma County, Colorado
## March 2019


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For the Community Water Provider:
City of Yuma, PWSID: CO0163020

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Cover photo: City of Yuma's North Water Tower.

This Source Water Protection Plan is a planning document and there is no legal requirement to implement the recommendations herein. Actions on public lands will be subject to federal, state, and county policies and procedures. Action on private land may require compliance with county land use codes, building codes, local covenants, and permission from the landowner. This SWPP for the City of Yuma was developed using version 16. 09. 09 of the Colorado Rural Water Association's Source Water Protection Plan Template.

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## COMMON ACRONYMS

| | |
|---|---|
| AST | Aboveground Storage Tank |
| BMP | Best Management Practice |
| BNSF | Burlington Northern Santa Fe |
| CAP | Corrective Action Plan |
| CDOT | Colorado Department of Transportation |
| CDPHE | Colorado Department of Public Health and Environment |
| CDPS | Colorado Discharge Permit System |
| COGCC | Colorado Oil and Gas Conservation Commission |
| COSTIS | Colorado Storage Tank Information System |
| CRWA | Colorado Rural Water Association |
| EPA | Environmental Protection Agency |
| GIS | Geographic Information System |
| HAZMAT | Hazardous Materials |
| LGD | Local Governmental Designee |
| LUST | Leaky Underground Storage Tank |
| MCL | Maximum Contaminant Level |
| MGD | Million Gallons per Day |
| NRCS | Natural Resource Conservation Service |
| OWTS | Onsite Wastewater Treatment System |
| PSOC | Potential Source of Contamination |
| RCRA | Resource Conservation and Recovery Act |
| SCADA | Supervisory Control and Data Acquisition |
| SPCC | Spill Prevention Control and Countermeasure |
| SWAA | Source Water Assessment Area |
| SWAP | Source Water Assessment and Protection |
| SWMP | Stormwater Management Plan |
| SWPA | Source Water Protection Area |
| SWPP | Source Water Protection Plan |
| TOT | Time of Travel |
| UST | Underground Storage Tank |
| VFD | Variable Frequency Drive |

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# EXECUTIVE SUMMARY

There is a growing effort in Colorado to protect community drinking water sources from potential contamination. Many communities are taking a proactive approach to preventing the pollution of their drinking water sources by developing a source water protection plan. A source water protection plan identifies a source water protection area, lists potential contaminant sources and outlines best management practices to reduce risks to the water source. Implementation of a source water protection plan provides an additional layer of protection at the local level beyond drinking water regulations.

The City of Yuma values a clean, high quality drinking water supply and decided to work collaboratively with area stakeholders to develop a Source Water Protection Plan. The source water protection planning effort consisted of public planning meetings with stakeholders including local citizens and landowners, private businesses, water operators, local and state governments, and agency representatives during the months of August 2018 through March 2019, in Yuma, CO. Colorado Rural Water Association was instrumental in this effort by providing technical assistance in the development of this Source Water Protection Plan.

The City of Yuma obtains its drinking water from seven groundwater wells in the Ogallala Aquifer. The Source Water Protection Areas for these water sources were determined by calculating the distance from each wellhead through which a parcel of water travels over a two- and five-year time period, and by taking into account the land uses near the wellheads. This Source Water Protection Area is the area that the City of Yuma has chosen to focus its source water protection measures to reduce source water susceptibility to contamination. The Steering Committee conducted an inventory of potential contaminant sources and identified other issues of concern within the Source Water Protection Area.

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

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

- Improperly Abandoned Wells (Priority #1)
    - Create inventory of private well owners
    - Conduct public outreach to owners of private wells
    - Work with owners of abandoned wells to ensure they are properly plugged
    - The Steering Committee recognizes that the usefulness of this Source Water Protection Plan lies in its implementation and will begin to execute these best management practices upon completion of this Plan.

- Backflow Prevention/Cross Connection Control (Priority #2)
    - Educate citizens on importance of cross connection (include an article in the City Spotlight and post on City's website)

    - Continue working to ensure 100% of commercial users have proper cross connection control within two years

- Onsite Wastewater Treatment Systems (Priority #3)
    - Create inventory of homeowners with OWTS onsite within SWPA
    - Conduct public outreach to OWTS owners (distribute outreach material such as Westbank Ranch HOA OWTS maintenance video, Pueblo County Health Dept. OWTS Homeowner Guidelines)
    - Request notification by Northeast Colorado Public Health Dept. of septic system failures and unpermitted septic systems in SWPA

This Plan is a living document that is meant to be updated to address any changes that will inevitably come. The Steering Committee will review this Plan at a frequency of once every three to five years or if circumstances change resulting in the development of new water sources and source water protection areas, or if new risks are identified.

# 1. INTRODUCTION

Source water protection is a proactive approach to preventing the pollution of lakes, rivers, streams, and groundwater that serve as sources of drinking water. For generations water quality was taken for granted, and still today many people assume that their water is naturally protected. However, as water moves through and over the ground, contaminants may be picked up and carried to a drinking water supply.

While a single catastrophic event may wipe out a drinking water source, the cumulative impact of minor contaminant releases over time can also result in the degradation of a drinking water source. Contamination can occur via discrete (point source) and dispersed (nonpoint source) sources. A discrete source contaminant originates from a single point, while a dispersed source contaminant originates from diffuse sources over a broader area. According to the US Environmental Protection Agency, nonpoint source pollution is the leading cause of water quality degradation (Ground Water Protection Council, 2007).

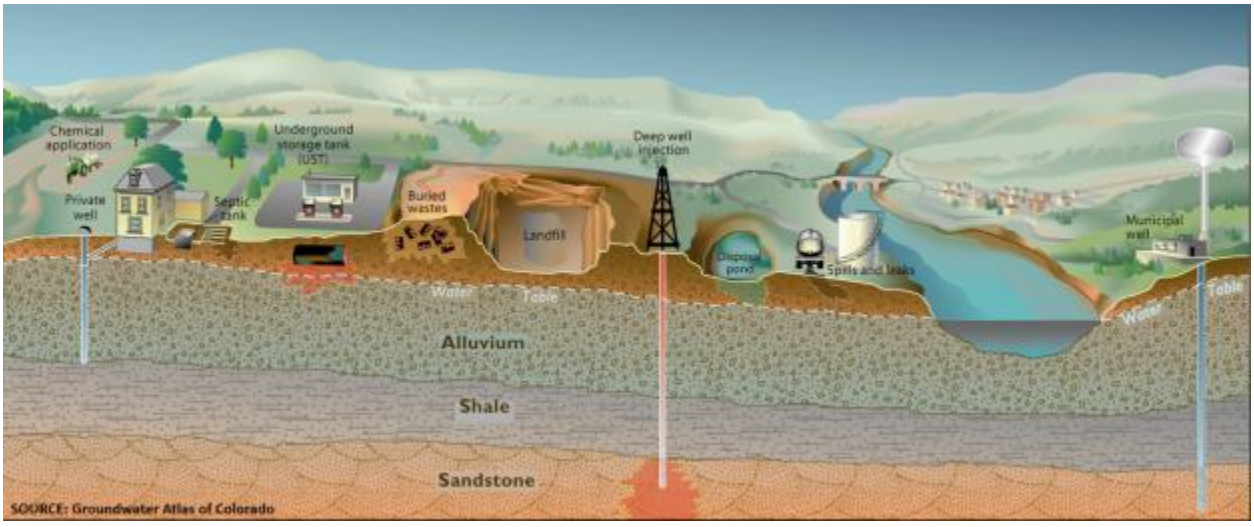


*Figure 1: Schematic drawing of the potential source of contamination to surface and groundwater*

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

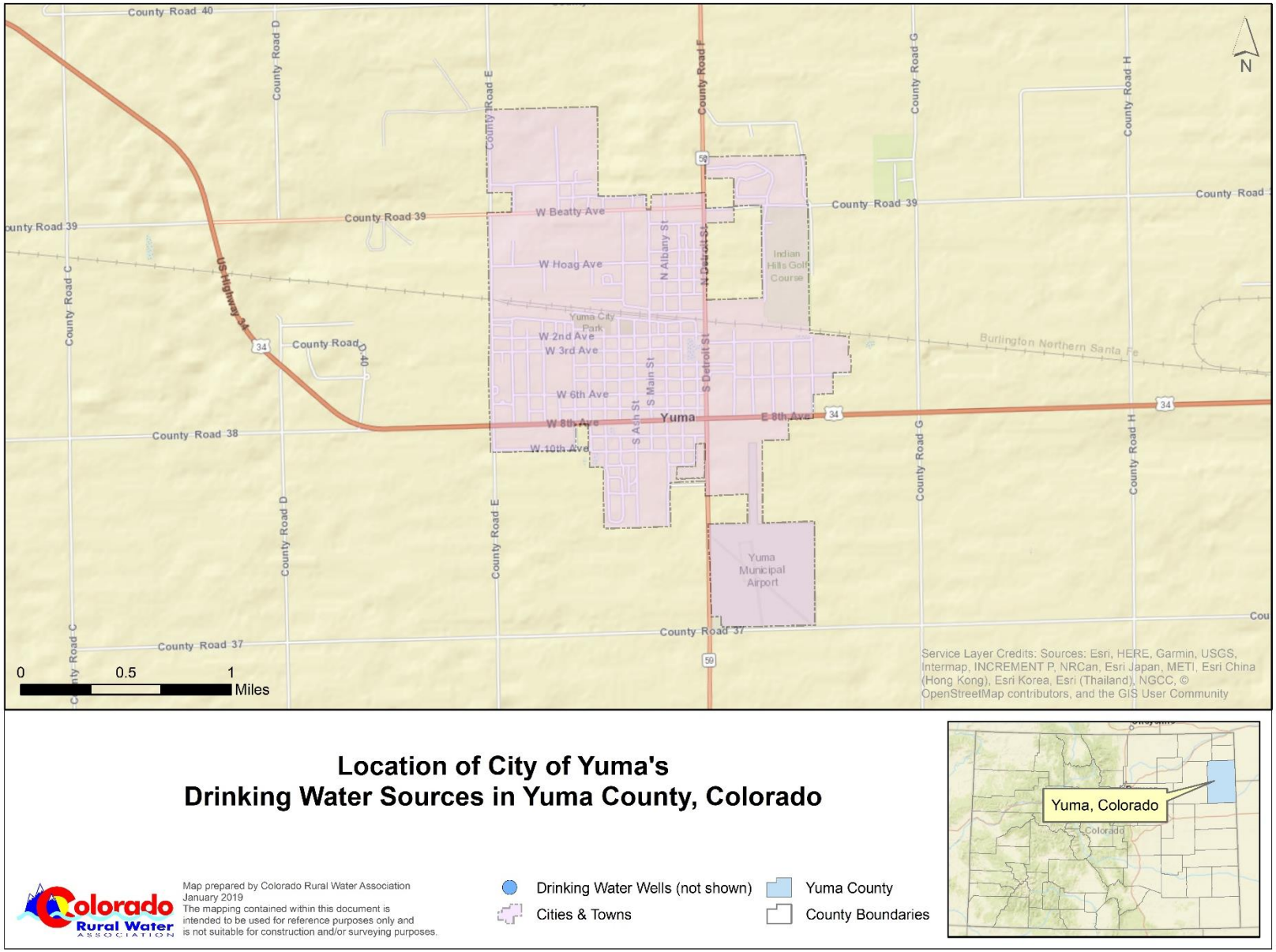


*Figure 2: Location of City of Yuma's Drinking Water Sources in Yuma County, Colorado*

## 1.1. Purpose of the Source Water Protection Plan

The Source Water Protection Plan (SWPP) is a tool for the City of Yuma to ensure clean and high-quality drinking water sources for current and future generations. This Source Water Protection Plan is designed to:

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

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

## 1.2. Background of Colorado's SWAP Program

Source water assessment and protection came into existence in 1996 as a result of Congressional reauthorization and amendment of the Safe Drinking Water Act. These amendments required each state to develop a source water assessment and protection (SWAP) program. The Water Quality Control Division, an agency of the Colorado Department of Public Health and Environment (CDPHE), assumed the responsibility of developing Colorado's SWAP program and integrated it with the Colorado Wellhead Protection Program.

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

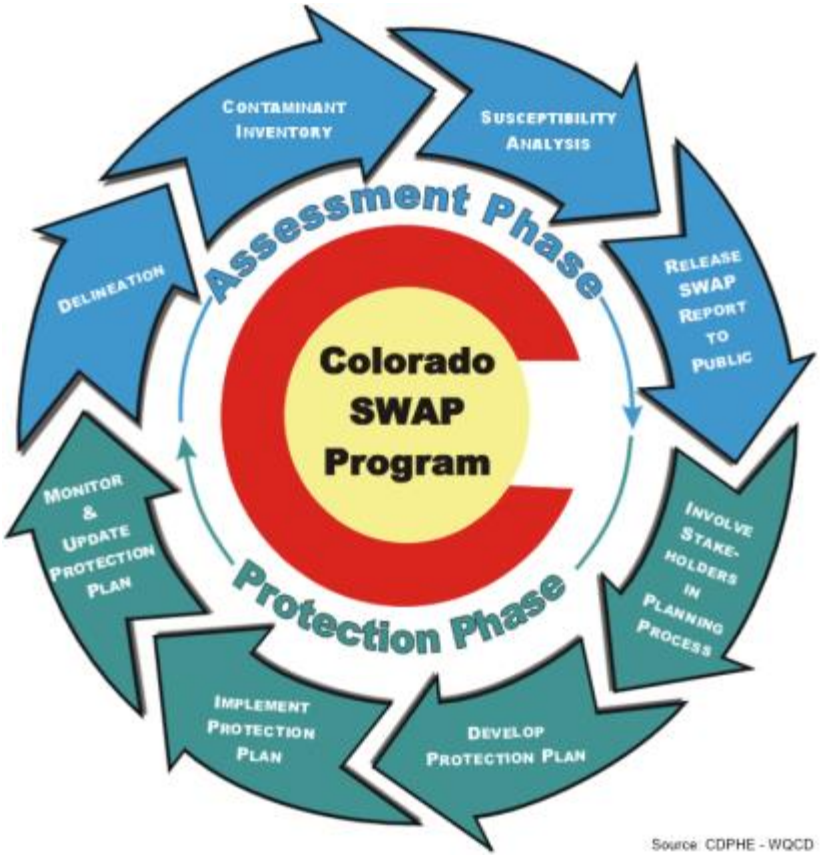


*Figure 3: Source Water Assessment and Protection Phases*

### 1.2.1. Source Water Assessment Phase

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

1. Delineating the source water assessment area for each of the drinking water sources;
2. Conducting a contaminant source inventory to identify potential sources of contamination within each of the source water assessment areas;
3. Conducting a susceptibility analysis to determine the potential susceptibility of each public drinking water source to the different sources of contamination;
4. Reporting the results of the source water assessment to the public water systems and the general public.

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

### 1.2.2. Source Water Protection Phase

The Protection Phase is a non-regulatory, ongoing process in which all public water systems have been encouraged to voluntarily employ preventative measures to protect their water supply from the potential sources of contamination to which it may be most susceptible. The Protection Phase can be used to take action to avoid unnecessary treatment or replacement costs associated with potential contamination of the untreated water supply. Source water protection begins when local decision

makers use the source water assessment results and other pertinent information as a starting point to develop a protection plan. As depicted in the lower portion of Figure 3, the source water protection phase for all public water systems consists of four primary elements:

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

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

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

# 2. SOURCE WATER SETTING

## 2.1. Location and Description

The City of Yuma is a Home Rule Municipality in Yuma County, Colorado. Yuma has a population of over 3,500 residents and is located in the northeast corner of Colorado, approximately 40 miles from both the Nebraska and Kansas borders. Yuma has a Mayor/City Council Government with an appointed City Manager (City of Yuma, 2019).

The Utility Services Department oversees the City's municipal water system. Yuma's water supply consists of seven groundwater wells located both within city boundaries and in unincorporated areas of Yuma County. Land use in the source water areas consists primarily of agricultural and rural residential development.

The City of Yuma lies within the Colorado Piedmont section of the Great Plains Physiographic Province that encompasses approximately 40% of the state. The Great Plains are characterized predominantly by sedimentary rocks. Underlying bedrock consists primarily of the Cretaceous age Foxhills Sandstone and Pierre Shale that gently dips to the east (Topper, Spray, Bellis, Hamilton, & Barkmann, 2003).

The climate in the land surrounding Yuma is semi-arid with an estimated average annual precipitation of 17 inches. Rainfall typically occurs as frontal storms in the spring and early summer, and as high intensity, convective thunderstorms in late summer. Maximum precipitation is from mid spring through late autumn, with little precipitation as snow in winter. The average annual temperature is from 35 to 66 degrees F. The frost-free period averages 154 days but ranges from 106 to 187 days (USDA Natural Resource Conservation Service, September 2008).

## 2.2. Hydrologic Setting

The City of Yuma obtains its drinking water from seven wells drilled into the High Plains Aquifer. The High Plains Aquifer, also known as the Ogallala Aquifer, is an extensive regional aquifer that underlies approximately 174,000 square miles of the Great Plains states extending from South Dakota on the north to Texas and New Mexico on the south (Figure 4).

The High Plains aquifer is typically under unconfined conditions throughout Colorado, and the primary source of recharge is from infiltration of precipitation in the form of rain and snow. Recharge is limited by the low precipitation and high evaporation rates that are common to the eastern plains. Ground-water flow is generally towards the east at a hydraulic gradient ranging from 0. 004 to 0. 05. Water levels in the High Plains aquifer have been steadily dropping with increasing ground-water withdrawals.

The High Plains aquifer is composed principally of the unconsolidated to semi-consolidated sands, gravels, clays, and silts of the Miocene-aged Ogallala Formation. Quaternary-age alluvial, valley-fill, dune sand, and loess deposits are also considered a part of the High Plains aquifer where they are hydraulically connected to the underlying Ogallala Formation.

The water from the Colorado High Plains aquifer is generally of good quality, and the total dissolved solids (TDS) range from 100 to 600 milligrams per liter (mg/L). The waters tend to be moderate to very

hard, containing 100 to 350 mg/L of calcium carbonate (Topper, Spray, Bellis, Hamilton, & Barkmann, 2003).

Steering Committee Member, Gene Wagner with Quality Irrigation, presented information on the groundwater formations at each of Yuma's wells with the intent to show the natural barrier in the ground formation to any contaminants. The average static water level for Yuma's wells is approximately 230 feet. Shale is the lowest confining layer, which allows for no water to pass through it. There are many clay layers as well, which are very similar to shale in that they allow almost no water to pass through, thus creating a lot of natural protection to the wellheads.

The Water Quality Control Commission has established a classified ground water area and associated site-specific ground water quality standards for the City of Yuma's groundwater intakes under Regulation No. 42. The Classification or Designated Use for the ground water in this area is for domestic and agricultural use.


*Figure 4: Location and extent of the High Plains aquifer from a regional perspective (Topper, Spray, Bellis, Hamilton, & Barkmann, 2003)*

# 3. DRINKING WATER SUPPLY OPERATIONS

## 3.1. Water Supply and Infrastructure

The City of Yuma operates a community water supply system that supplies drinking water to approximately 3,500 residents located within Yuma County, Colorado. Yuma obtains their drinking water from seven groundwater wells in the High Plains Aquifer. Five wells are located within the city, and two wells are located on a field just outside of Yuma's boundaries. All seven wells are treated onsite using a 10% Sodium Hypochlorite solution. Yuma is required by the State of Colorado to maintain a minimum of 0. 2 mg/L of free chlorine leaving each treatment site (City of Yuma, 2019). Free chlorine residual samples are conducted each day to ensure that regulations for disinfection are met.

The treated water is piped to two different aboveground storage tanks located in within city boundaries. The North Tank holds 750,000 gallons, and the South Tank holds 250,000 gallons. In total they can store a combined total of 1,000,000 gallons of water. The water is then gravity-fed to customers via a series of underground pipes.

*Table 1: Groundwater Supply Information*

| Water System Facility Name | Water System Facility Number | Total Depth of Well (ft) | Depth of Plain Casing (ft) | Depth of Perforation (ft) | Yield (gpm) | Year Drilled |
|---|---|---|---|---|---|---|
| Hansen Park Well | 163020-001 | 420 | 0-370 | 370-420 | 800 | 1994 |
| Mitchell Well | 163020-002 | 380 | 0-240 | 240-380 | 1100 | 1977 |
| West Grade School Well | 163020-003 | 380 | 0-290 | 290-380 | 1000 | 1972 |
| Fairgrounds Well | 163020-004 | 380 | 0-290 | 290-380 | 750 | 1952 |
| Shop Well | 163020-005 | 410 | 0-375 | 375-410 | 900 | 1992 |
| Koenig Well | 163020-008 | 320 | 0-175 | 175-320 | 600 | 1956 |
| Hamrick Well | 163020-009 | 420 | 0-280 | 280-420 | 600 | 1966 |

*Figure 5: Typical drinking water treatment site for City of Yuma wells*

*Figure 6: City of Yuma Wellhouse*

## 3.2. Water Supply Demand Analysis

The City of Yuma serves an estimated 1,600 connections and approximately 3,500 residents and other users in the service area annually. The water system has the current capacity to produce 607 MG annually. Current estimates indicate that the average daily demand is approximately one million gallons per day (MGD), and that the average peak daily demand is approximately 1.8 MGD. Using these estimates, Yuma has a surplus average daily demand capacity of 0.65 MGD and a surplus average peak daily demand capacity of 6.0 MGD. As a groundwater system, Yuma is limited by how many acre feet of water that can be pumped per well site.

Based on the estimates above, the City of Yuma has determined that if six of the water sources become disabled for more than two months due to contamination, the water system may not be able to meet the average daily demand of its customers. And in the event that five of the water sources become disabled for more than two months, the City of Yuma may not be able to meet the average peak daily demand of its customers. The ability of City of Yuma to meet either of these demands for an extended period of time is also affected by the amount of treated water the water system has in storage at the time a water source(s) becomes disabled.

The City of Yuma recognizes that potential contamination of its groundwater sources could result in having to treat the groundwater and/or abandon the water source if treatment proves to be ineffective or too costly. To understand the potential financial costs associated with such an accident, the City of Yuma estimates that it could cost between two to four million in today's dollars to replace one of its water sources (i.e., replacement of the intake structure and the associated infrastructure). Treatment costs, which can vary depending on the type of contaminant(s) that need(s) to be treated, were not included in this estimate.

The potential financial and water supply risks related to the long-term disablement of one or more of Yuma's water sources are a concern to the Steering Committee. As a result, the Steering Committee believes the development and implementation of a source water protection plan for City of Yuma can help to reduce the risks posed by potential contamination of its water sources. Additionally, the City of Yuma has developed an emergency response plan or contingency plan to coordinate rapid and effective response to any emergency incident that threatens or disrupts the community water supply.

# 4. SOURCE WATER PROTECTION PLAN DEVELOPMENT

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

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

*Table 2: Planning Meetings*

| Date | Purpose of Meeting |
|---|---|
| August 29, 2018 | SWPP Kickoff Meeting between CRWA, & City of Yuma - Review CDPHE's SWAP report. Develop preliminary stakeholder list and potential contaminant source inventory. Set date for first SWPP workshop. |
| October 4, 2018 | First SWPP Workshop - Introduction on Colorado's Source Water Protection Program. Presentation about Yuma's drinking water sources. Review CDPHE's Source Water Assessment Areas and potential contaminant source inventory. Discuss timeline for completion of SWPP. |
| November 5, 2018 | Second SWPP Workshop – Review revised SWPAs for Yuma's drinking water sources. Presentations and discussion on potential sources of contamination. |
| January 10, 2019 | Third SWPP Workshop - Continue discussions on potential sources of contamination (Upstream Wastewater Treatment Facilities, Oil and Gas Development, Active and Abandoned Mines) |
| January 29, 2019 | Fourth SWPP Workshop - Review and discuss draft Best Management Practices, Prioritize potential contaminants. Discuss timeline & review process for draft SWPP |
| March 22, 2019 | Plan Review Meeting - Review and finalize SWPP. Discussion on timeline for implementation of Best Management Practices. |

## 4.1. Stakeholder Participation in the Planning Process

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

The City of Yuma's source water protection planning process attracted interest and participation from 16 stakeholders including local citizens and landowners, private businesses, water operators, local, state, and governments, and agency representatives. During the months of August 2018 through March 2019, six planning meetings were held in Yuma, CO to encourage local stakeholder participation in the planning process. Stakeholders were notified of meetings vis letters, emails, postcards, and phone calls.

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

*Table 3: Stakeholders and Steering Committee Members*

| Stakeholder | Title | Affiliation | Steering Committee Member |
|---|---|---|---|
| Claude Strait | Water/Wastewater Superintendent | City of Yuma | X |
| Scott Moore | City Manager | City of Yuma | X |
| Darlene Carpio | Regional Director | Senator Cory Gardner | X |
| Gene Wagner | Pump Installation Contractor | Quality Irrigation | X |
| Ron Swehla | Mayor | City of Yuma | X |
| Roger Brown | Emergency Manager | Yuma County | X |
| Kody Dixon | EMT | City of Yuma | |
| Gary Baucke | Farmer | Yuma, CO | |
| Brent Chapman | Location Manager | CHS | |
| Colten Yoast | Yuma County Land Use Administrator | Yuma County | X |
| J. R. Colden | Road & Bridge | Yuma County | |
| Jessica Paz | Road & Bridge | Yuma County | |
| Tony Rayl | Journalist | Yuma Pioneer | |
| Keriann Josh | Paramedic | City of Yuma | |
| Deb Wilkins | Operations Coordinator/EMT-I RN | City of Yuma | |
| Eric Metcalfe | Water/Wastewater Technician | City of Yuma | X |

## 4.2. Development and Implementation Grant

The City of Yuma has been awarded a $5,000 Development and Implementation Grant from the Colorado Department of Public Health and Environment (CDPHE). This funding is available to public water systems and representative stakeholders committed to developing and implementing a source water protection plan. A one to one financial match (cash or in-kind) is required. The City of Yuma was approved for this grant in August 2018, and it expires on August 17, 2020. The City of Yuma intends on utilizing the grant funds to implement management approaches that are identified in this Plan.

## 4.3. Source Water Assessment Report Review

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

## 4.4. Defining the Source Water Protection Area

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

After carefully reviewing their Source Water Assessment Report and the CDPHE's delineation of the Source Water Assessment Area for each of the City of Yuma's sources, the Steering Committee chose to accept it as their Source Water Protection Area for this Source Water Protection Plan.

The City of Yuma's Source Water Protection Area is defined as:

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

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

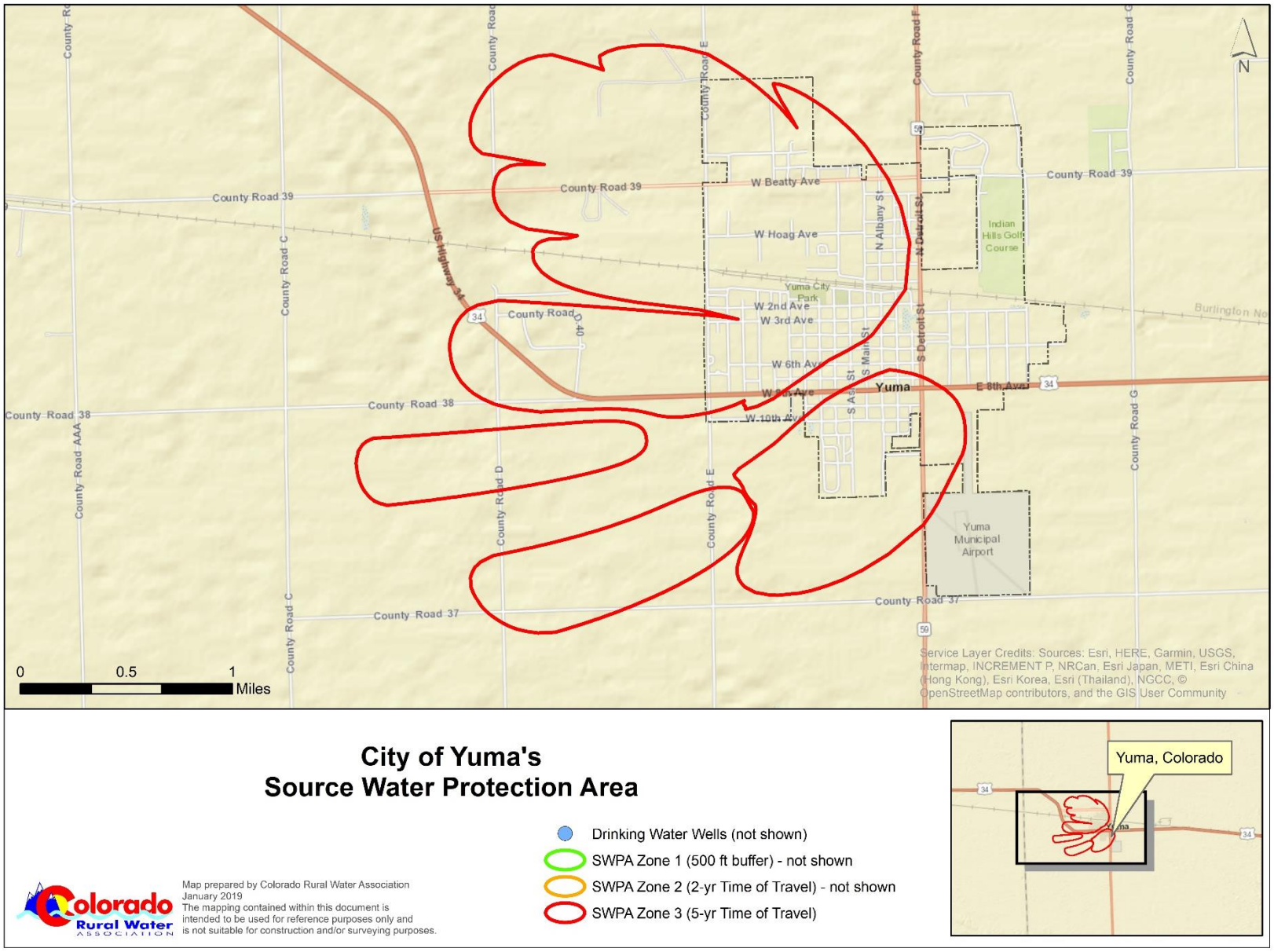


*Figure 7: City of Yuma's Source Water Protection Area*

## 4.5. Inventory of Potential Contaminant Sources and Other Issues of Concern

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

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

After much consideration, discussion, and input from local stakeholders, the City of Yuma and the Steering Committee have developed a more accurate and current inventory of contaminant sources located within the Source Water Protection Area and other issues of concern that may impact the City of Yuma's drinking water sources. [1] In addition to the discrete and dispersed contaminant sources identified in the contaminant source inventory, the Steering Committee has also identified other issues of concern that may impact the City of Yuma's drinking water sources (see Table 5: Risk of Assessment and Control Level of Potential Contaminant Sources & Issues of Concern, page 23). Upon completion of this contaminant source inventory, the City of Yuma has decided to adopt it in place of the original contaminant source inventory provided by the CDPHE.

## 4.6. Risk Assessment & Level of Control of Potential Contaminant Sources and Other Issues of Concern

After developing a contaminant source inventory and list of issues of concern that is more accurate, complete, and current, The City of Yuma assessed the risk level and level of control of each item. The level of risk for each contaminant source is a measure of the water source's potential exposure to contamination. Yuma utilized CRWA's *SWAP Risk Assessment Matrix* (Figure 8), which calculates the level of risk by estimating the following:

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

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

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

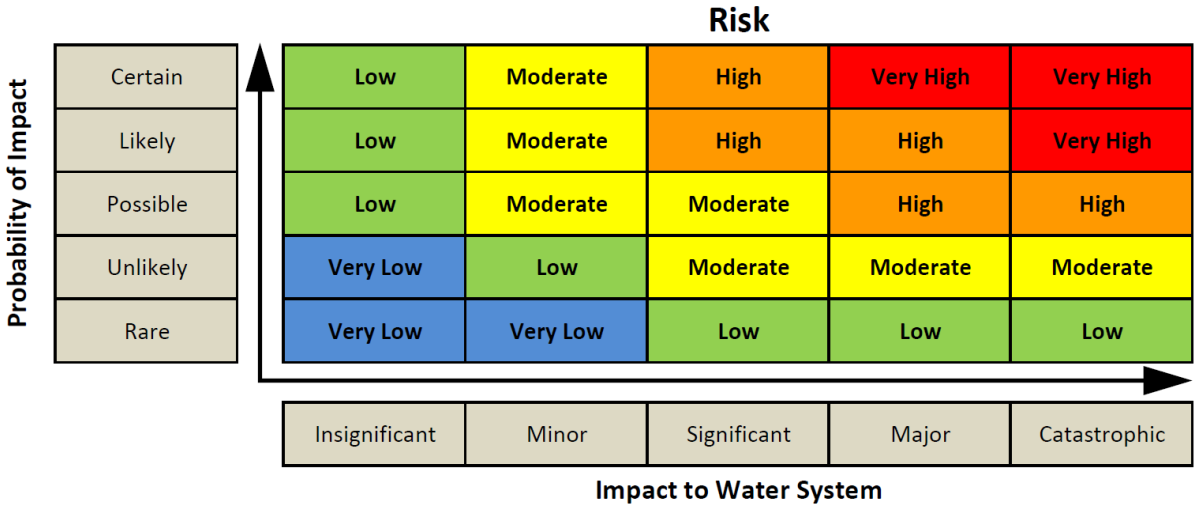


*Figure 8: CRWA's SWAP Risk Assessment Matrix*

The level of water system control describes the ability of the water system to take measures to prevent contamination or minimize impact. A potential contaminant source that falls within a water system's jurisdiction (i.e. direct control), may be of higher priority since they can take direct measures to prevent contamination or minimize the impact.

- **Direct Control** – The water system can take direct measures to prevent.
- **Indirect Control** – The water system cannot directly control the issue but can work with another person or entity to take measures to prevent.
- **No Control** – The PSOC or issue of concern is outside the control of the public water system and other entities.

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

*Table 4: Risk of Assessment and Control Level of Potential Contaminant Sources & Issues of Concern*

| Potential Contaminant Source or Issue of Concern | Probability of Impact (Rare, Unlikely, Possible, Likely, Certain) | Impact to Water System (Insignificant, Minor, Significant, Major, Catastrophic) | Risk (Very Low, Low, Intermediate, High, Very High) | Control (Direct, Indirect, No) |
|---|---|---|---|---|
| Improperly Abandoned Wells | Possible | Significant | Moderate | Indirect |
| Backflow Prevention/Cross Connection Control | Possible | Significant | Moderate | Direct |
| Onsite Wastewater Treatment Systems | Rare | Insignificant | Very Low | Indirect |
| Security Around Wellheads | Rare | catastrophic | Low | Direct |
| Public Outreach | N/A | N/A | N/A | Direct |
| Private Irrigation Wells | Rare | Minor | Very Low | Indirect |
| Oil & Gas Development | Possible | Minor | Moderate | Indirect |
| Industrial Spills/Accidents/Discharge | Rare | Significant | Low | Indirect |
| Leaking Fuel Storage Tanks | Rare | Minor | Very Low | Indirect |
| Severe Weather Events | Unlikely | Minor | Low | No |
| Railroad Hazmat Incidents | Rare | Minor | Very Low | Indirect |
| Road Spills & Accidents | Rare | Minor | Very Low | No |
| Improper Agricultural Practices | Rare | Minor | Very Low | Indirect |

## 4.7. Identifying Best Management Practices

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

The Steering Committee recommends the best management practices listed in Table 7: Source Water Protection Best Management Practices (pages 39-41) be considered for implementation.

## 4.8. Prioritization of Potential Contaminant Sources and Other Issues of Concern

After identifying best management practices for each potential contaminant source and issue of concern, the City of Yuma prioritized issue to guide the implementation efforts upon completion of this Source Water Protection Plan. The prioritization ranking factored in the level of risk, the water system control, as well as the feasibility of implementing the BMPs that Yuma developed. Yuma assigned each issue a numerical priority ranking from "1" to "13", with "1" being the highest priority as shown in Table 6 below.

*Table 5: Priority Ranking of Potential Contaminant Sources & Issues of Concern*

| Potential Contaminant Source or Issue of Concern | Priority Ranking |
|---|---|
| Improperly Abandoned Wells | **1** |
| Backflow Prevention/Cross Connection Control | **2** |
| Onsite Wastewater Treatment Systems | **3** |
| Security Around Wellheads | **4** |
| Public Outreach | **5** |
| Private Irrigation Wells | **6** |
| Oil & Gas Development | **7** |
| Industrial Spills/Accidents/Discharge | **8** |
| Leaking Fuel Storage Tanks | **9** |
| Severe Weather Events | **10** |
| Railroad Hazmat Incidents | **11** |
| Road Spills & Accidents | **12** |
| Improper Agricultural Practices | **13** |

# 5. DISCUSSION OF POTENTIAL CONTAMINANT SOURCES AND ISSUES OF CONCERN

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

## 5.1. Improperly Abandoned Wells

*Priority Ranking: 1*

According to the Colorado Division of Water Resources (DWR), there are many private wells within or near the City of Yuma's SWPA. The majority of the wells are domestic, but there are several irrigation wells as well. The status of most wells is currently unknown, and the highest priority concern to the Steering Committee are potential contamination to Yuma's drinking water wells due to private wells that are no longer in use and abandoned improperly. An unused well is a direct route to the groundwater and unless they are properly filled, sealed, and plugged, they can allow pollutants to contaminate other wells that draw from the same groundwater source or aquifer (Gardner, n.d.).

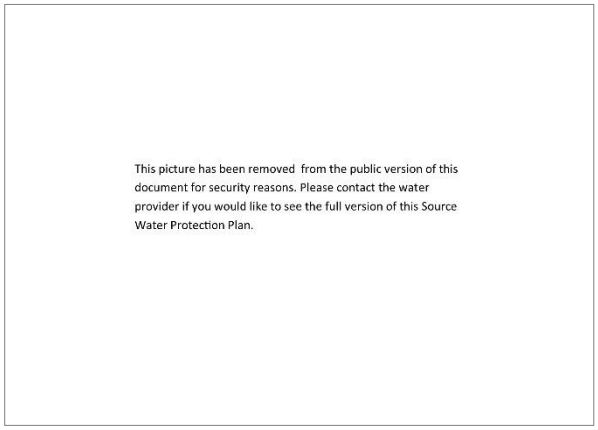


*Figure 9: Improperly abandoned well near City of Yuma's Shop Well*

There is one known abandoned well within 100 feet of Yuma's Shop Well that is not properly plugged. As shown in Figure 9, the cement cap can easily be lifted off. When the Shop Well is pumping water, air can be heard at the abandoned well location, meaning the two wells are hydrologically connected. Properly plugging and sealing this well in particular is the Steering Committee's number one priority. To seal an unused well properly, a new barrier must be created that restores the isolation/protection of the groundwater.

<u>Improperly Abandoned Wells Best Management Practices Recommendations:</u>

- Create inventory of private well owners
- Conduct public outreach to owners of private wells
- Work with owners of abandoned wells to ensure they are properly plugged

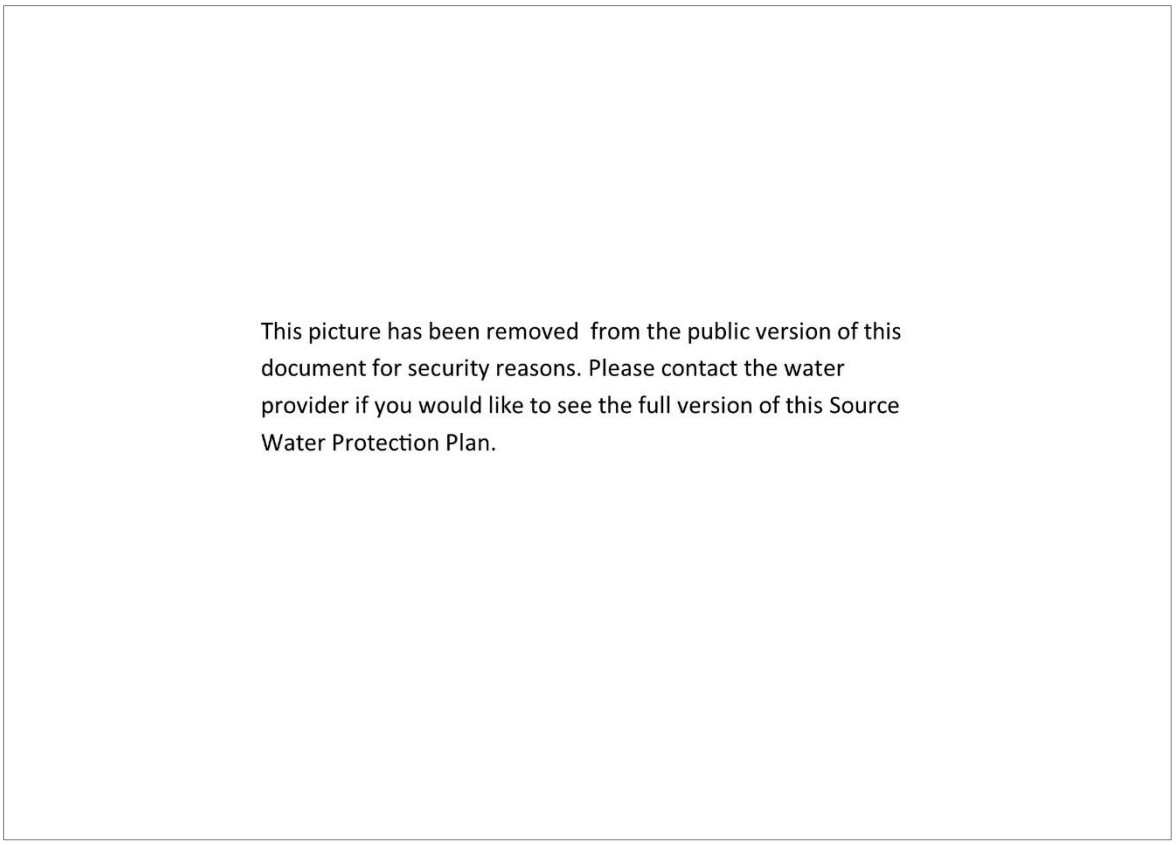


*Figure 10: Location of improperly abandoned well in relation to City of Yuma's Shop Well*

## 5.2. Backflow Prevention/Cross-Connection Control

*Priority Ranking: 2*

A cross-connection is a point within distribution systems in which nonpotable water sources can be connected to potable water sources. A common example is a garden hose submerged in a puddle of contaminated water. These cross-connections can provide a pathway for backflow of nonpotable water into potable sources. Backflow can occur either because of reduced pressure in the distribution system (termed backsiphonage) or the presence of increased pressure from a nonpotable source (termed backpressure). Backsiphonage may be caused by a variety of circumstances, such as main breaks, flushing, pump failure, or emergency firefighting water drawdown. Backpressure may occur when heating/cooling, waste disposal, or industrial manufacturing systems are connected to potable supplies and the pressure in the external system exceeds the pressure in the distribution system. Both situations act to change the direction of water, which normally flows from the distribution system to the customer, so that nonpotable and potentially contaminated water from industrial, commercial, or residential sites flows back into the distribution system through a cross-connection. During incidents of backflow, these chemical and biological contaminants have caused illness and deaths, with contamination affecting a number of service connections. The number of incidents actually reported is believed to be a small percentage of the total number of backflow incidents in the United States (U.S. Environmental Protection Agency , 2001).

The best way to prevent cross-connection contamination is to educate residential and commercial users, and work to ensure they have a proper backflow presentation device installed on their property. The device should be tested annually. Some and effective devices installed to prevent backflow include:

- Air Gap (AG): Used mainly on tanks and sinks, it is a gap between the outlet and the basin.
- Hose Bibb Vacuum Breaker (HBVB): A simple device used to prevent backflow installed on an outdoor faucet.
- Pressure Vacuum Breaker (PVB): Used mainly on lawn irrigation systems. It has a one-way check and a spring-loaded air inlet valve that closes when water pressure drops.
- Atmospheric Vacuum Breaker (AVB): A non-testable mechanical backflow preventer with a gravity opening poppet air opening, designed to admit atmosphere into the downstream sides of the unit under a no flow condition to prevent back siphonage. This device is installed on certain equipment that uses potable water by the manufacturer or contracted installer, such as dishwashers, soap dispensers, faucets and deep sinks, etc.
- Reduced Pressure (RP) Principle Assemblies: A mechanical valve assembly that consists of two internally loaded independently operating check valves and a mechanically independent, hydraulically dependent relief valve located between the check valves. It is used for services that have either health hazards or non-health hazards and under conditions of backpressure or backsiphonage. It provides the highest level of protection among the mechanical backflow prevention devices. (City of Marshall Water Utilities )

The City of Yuma has a Backflow Prevention Program in place and is working to ensure 100% of commercial users or non-single residents have been surveyed and fitted with a backflow prevention device within two years. Currently, 80% of commercial users have been surveyed and fitted with the proper device.

<u>Backflow Prevention Best Management Practices Recommendations:</u>

- Educate citizens on importance of cross connection (include an article in the City Spotlight and post on City's website)
- Continue working to ensure 100% of commercial users have proper cross connection control within two years

## 5.3. Onsite Wastewater Treatment Systems

*Priority Ranking: 3*

Within the source water protection areas there are properties that rely on septic systems to dispose of their sewage. These properties lie in the unincorporated areas of Yuma County outside of the city boundaries. A septic system is a type of onsite wastewater treatment system (OWTS) consisting of a septic tank that collects all the sewage and a leach field that disperses the liquid effluent onto a leach field for final treatment by the soil.

OWTS are the second most frequently cited source of groundwater contamination in our country. Unapproved, aging, and failing septic systems have a large impact on the quality and safety of the water supply. The failure to pump solids that accumulate in the septic tank will also eventually clog the lines

and cause untreated wastewater to back up into the home, to surface on the ground, or to seep into groundwater. If managed improperly, these residential septic systems can contribute excessive nutrients, bacteria, pathogenic organisms, and chemicals to the groundwater.

In Yuma County, individual sewage disposal systems are permitted by the Northeast Colorado Health Department (NCHD) which provides service to the counties of Logan, Morgan, Phillips, Sedgwick, Washington and Yuma counties. The NCHD administers and enforces the minimum standards, rules, and regulations outlined in the state of Colorado's Revised Statutes (CRS 25-10-105). It is unknown at this time the number of septic systems within Yuma County, the number of unapproved systems currently in use and the age of all OWTS in the county. The absence of effective monitoring and education increases the risk of contaminants from OWTS entering the groundwater.

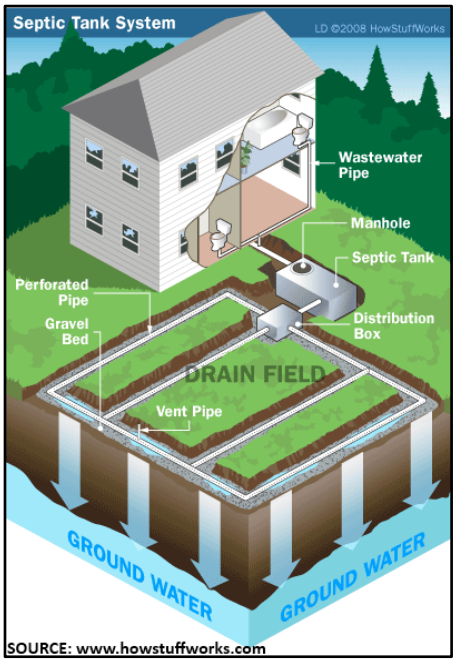


*Figure 11: Schematic of a septic system*

Onsite Wastewater Treatment Systems Best Management Practices Recommendations:

- Create inventory of homeowners with OWTS onsite within SWPA
- Conduct public outreach to OWTS owners (distribute outreach material such as Westbank Ranch HOA OWTS maintenance video, Pueblo County Health Dept. OWTS Homeowner Guidelines)
- Request notification by Northeast Colorado Public Health Dept. of septic system failures and unpermitted septic systems in SWPA

## 5.4. Security Around Wellheads

*Priority Ranking: 4*

Although there have been no major acts of vandalism to the City of Yuma's water supplies, this is still a concern for the Steering Committee. While the probability for these acts to occur is rare, this remains a concern, as the impacts could be major. Water infrastructure could be targeted directly, or water can be contaminated through the introduction of poisonous chemicals or disease-causing biological agents (Gleick, 2006). All wells are housed in concrete buildings with locks and security alarms. The alarms are connected to Yuma's Supervisory Control and Data Acquisition (SCADA) system which would notify water operators of a break-in event. The Steering Committee recommends maintaining current alarms as well as installing security cameras or other security measures at or near the wellheads.

Security Best Management Practices Recommendations:

- Maintain current fencing and lighting, and install security cameras or other security measures at/near intakes
- Continue inspecting wellhouses and ensure that SCADA system continues to work properly

## 5.5. Public Outreach

*Priority Ranking: 5*

The majority of Yuma's SWPA surrounds the town boundaries and includes many residential properties. Common household practices including washing vehicles, lawn fertilization and pet wastes can allow chemicals and biologic pollutants to run off residential property and enter the surface or ground water as indicated in Figure 12 below.

While public education is not a potential source of contamination, the Steering Committee believes that educating community members and decision-makers about source water protection efforts is essential to the prevention of drinking water contamination. Public education can help community members understand the potential threats to their drinking water sources and motivate them to participate as responsible citizens to protect their valued resources.

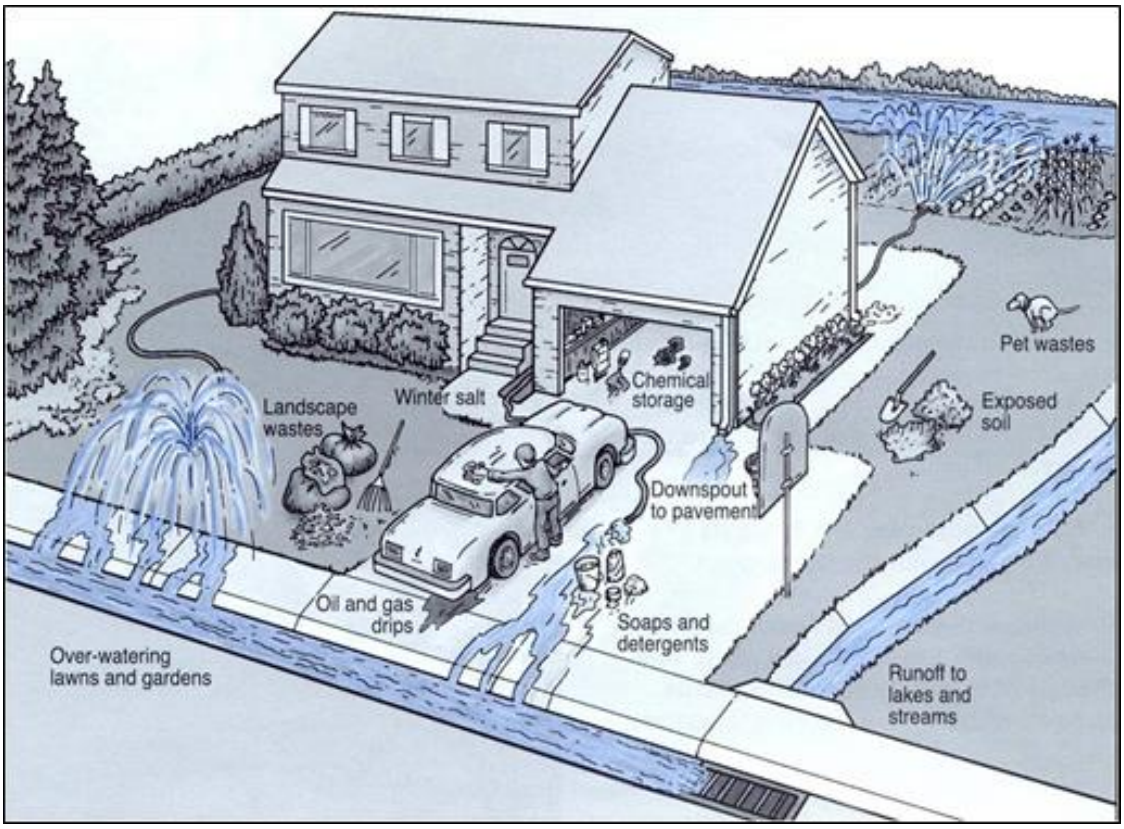


*Figure 12: Residential Practices (Colorado State University Extension/NRCS, 2017)*

Public Education Best Management Practices Recommendations:

- Develop public education campaigns for community members and residents within the City of Yuma's SWPAs to explain the importance of source water protection
- Post articles or educational materials on City Spotlight, City website, and at City Hall that explains the importance of source water protection
- Hold public meeting to introduce citizens to the SWPP
- Post a copy of SWPP on City of Yuma's website

## 5.6. Private Irrigation Wells

*Priority Ranking: 6*

As discussed in Chapter 5.1 “Improperly Abandoned Wells”, there are many private irrigation wells within or near the City of Yuma’s SWPA. Active irrigation wells can be a direct route for contaminants to enter the groundwater if not properly cased and maintained. Contaminants, such as pesticides, that infiltrate from the surface are more likely to pollute wells that are old, shallow, or uncased. Well owners should inspect well casings for cracks or other damage, and make sure that the casing extends at least 12 inches above the soil level. The top of the casing should be sealed with a well cap or rubber grommet.

The grout seal between the well casing and the borehole walls should also be checked for signs of cracking. Required well casing and grout depth vary from state to state, and even within states, depending on soil characteristics. (Gardner, n.d.).

Private Irrigation Wells Best Management Practices Recommendations:

- Create inventory of private irrigation well owners
- Conduct public outreach to owners of private irrigation wells

## 5.7. Oil & Gas Development

*Priority Ranking: 7*

Many areas of Colorado are experiencing an increase in oil and gas production. There are over 6200 oil and gas wells in Yuma County, and of those, approximately 3752 are active or producing wells. Within Yuma’s SWPA, 13 oil and gas wells have been drilled, but only six are currently producing (see Figure below). The remainder are listed as abandoned locations or dry and abandoned. There has been no history of oil and gas spills in the SWPA. Yuma considers their drinking water sources vital to their community and impacts from resource development are a concern to the Steering Committee.

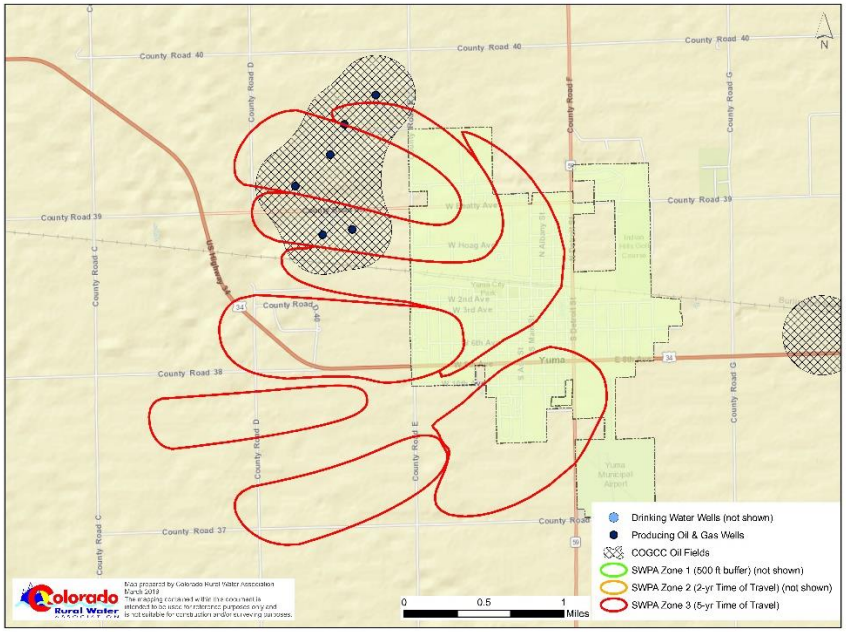


*Figure 13: Producing Oil and Gas Wells within or near City of Yuma's SWPA*

### 5.7.1. Water Quality Concerns

Oil and gas development can impact surface and ground water quality. Land disturbed from 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. Well drilling and production also has a potential to result in spills or releases of drilling fluids, fracturing fluids, produced water, hydrocarbons, or other chemicals transported within SWPAs.

### 5.7.2. Colorado Oil and Gas Conservation Commission: Rule 317B

The oil and gas industry in Colorado is regulated by the Colorado Oil and Gas Conservation Commission (COGCC). The mission of the COGCC is "to promote responsible development of Colorado's oil and gas natural resources. " The Colorado legislature passed House Bill 1341 in 2007 to increase environmental and public health protections in the face of unprecedented oil and gas development. House Bill 1341 directed the Colorado Oil and Gas Conservation Commission 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.

### 5.7.3. Control Measures

The latest published EPA research indicates that releases contributing to the contamination of aquifers are extremely rare. These releases are even rarer in Colorado due to strict State regulations. Under Colorado rules, all wells constructed must comply with COGCC standards for drilling, completion, and abandonment. Multiple strings of casing and cement through the aquifers isolate the producing formations from the aquifers. Completeness of the cement is required to be tested by running cement bond logs and by pressure-testing. In Colorado, open storage pits are rarely allowed which decreases the chances of releases. Instead, fluids are held in steel tanks. In addition, multiple layers of casing and cement through the aquifer formations and the producing formations, as well as Stormwater Management Plans (SWMP) and Spill Prevention Control and Countermeasure (SPCC) Plans all serve to protect the surface and subsurface water supplies in and around oil and gas facilities.

Under the CDPHE Water Quality Control Division (WQCD) regulations, Stormwater Construction Permits are required for construction of oil and gas facilities. The WQCD requires stormwater discharge permit coverage for all construction activities that disturb one acre or greater (or that are part of a larger common plan of development) including construction of well pads, roads, pipelines, pumping stations, etc. The Stormwater Construction Permit requires dischargers to control and eliminate the sources of pollutants in stormwater through the development and implementation of a Stormwater Management Plan (SWMP).

The purpose of the SWMP is to identify possible pollutant sources that may contribute pollutants to stormwater and identify Best Management Practices (BMPs) that, when implemented, will reduce or eliminate any possible water quality impacts. For construction activities, the most common pollutant source is sediment. Other pollutant sources include fuels (hence the need to develop a SPCC Plan), fueling practices and chemicals/materials stored on site. BMPs encompass a wide range of practices, both structural and non-structural in nature, and may include silt fences, sediment ponds, vehicle tracking controls, good housekeeping, inspection and maintenance standard operating procedures, training, etc.

The SPCC plan, required by EPA, includes monitoring, inspections, recordkeeping, secondary containment, high level indicator alarms, readily available sorbent materials, and employee training

requirements. Compliance with the Colorado Discharge Permit System (CDPS) and the SPCC Plan drastically reduces the number and severity of spills statewide. Inspections by COGCC include evaluation of compliance with State and Federal rules.

#### 5.7.4. Yuma County's Role

Yuma County has a Local Governmental Designee (LGD) who is a COGCC recognized individual designated by the local government to receive copies of all state oil and gas permit applications, notifications of oil and gas facility construction starts, drilling, and fracturing, as well as all spill reports. The LGD may make comments to the COGCC regarding any permit applications. The LGD also serves as a liaison between COGCC, COGA, local government, the oil and gas industry, local oil and gas operators and the public.

Oil & Gas Development Best Management Practices Recommendations:

- Periodically monitor Colorado Oil and Gas Conservation Commission (COGCC) website for new/active spills and pending well permit applications;
- Provide GIS shapefiles of SWPA to CDPHE so they may update locations on their website
- Share SWPP and maps/GIS shapefiles of SWPA with COGCC, Yuma County OEM, and LGDs

## 5.8. Industrial Spills/Accidents/Discharge

*Priority Ranking: 8*

There are many businesses within Yuma's SWPAs including industrial shops, vehicle repair shops, fertilizer/pesticide producers, and many others who use chemicals and produce chemical waste to carry out their business functions. Improper storage and disposal of chemicals from these users can reach ground or surface water through a number of pathways. If substances from these businesses are accidentally or intentionally discharged into sewers, contamination of ground and surface waters can occur (US Environmental Protection Agency, 2001).

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

Industrial Spills/Accidents/Discharge Best Management Practices Recommendations:

- Develop emergency response cards that includes water system contact info and City of Yuma's well locations; distribute to industrial owners
- Provide tour of City of Yuma's water system to industrial owners
- Display emergency contact information at wellhouses along w/ legal description (GIS location)

## 5.9. Leaking Fuel Storage Tanks

*Priority Ranking: 9*

5.9.1. Regulated Storage Tanks

The Colorado Department of Labor and Employment's Division of Oil and Public Safety Petroleum Program regulates petroleum storage facilities with USTs (underground storage tanks) that hold 110 gallons or more and ASTs (aboveground storage tanks) that hold between 660 and 40,000 gallons (Colorado Department of Labor and Employment, 2016). Within the Yuma's SWPAs, there are three facilities that have permitted storage tanks onsite. In total, there are five permitted underground storage tanks and one permitted aboveground storage tank. In addition to the regulated USTs, some property owners have private ASTs containing petroleum products (gasoline, diesel) to store for vehicular fuel.

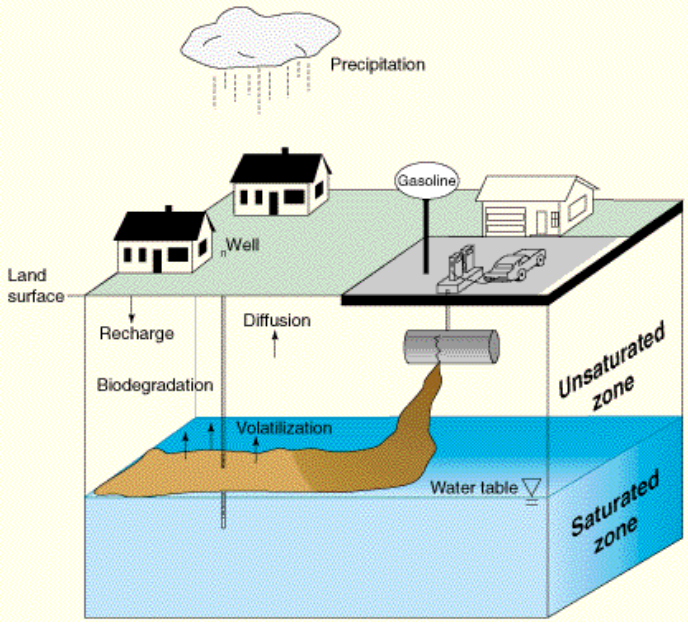


*Figure 14: Schematic of a LUST spill site.*

Storage tanks can become leaky due to corrosion, failure of the piping systems, spills, and overfills, as well as equipment failure and human operational error. Even a small spill can have a serious impact. A single pint of oil released into the water can cover one acre of water surface area and can seriously damage an aquatic habitat. A spill of one gallon can contaminate a million gallons of water (US Environmental Protection Agency, 2001).

The owner/operator of a regulated storage tank must report a suspected release within 24 hours and investigate suspected releases within seven days. After confirming a release and conducting the initial response and abatement, the owner/operator must continue further source investigation, site assessment, characterization and corrective actions.

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

Spills from leaking underground storage tanks sites can contaminate the groundwater and also present other hazards. Because gasoline is lighter than water, gasoline floats on the water table and remains relatively close to the land surface. The most hazardous compounds in groundwater (the BTEX compounds) are quite volatile and carcinogenic. Besides the potential for being consumed in drinking water, volatile compounds can enter nearby buildings. In poorly ventilated buildings, the compounds can accumulate and present a health risk through inhalation. In buildings, the volatile compounds can also present an explosion hazard (Ryan, 2006).

According to the CDLE's Colorado Storage Tank Information System (COSTIS) website, there have been eight spill events in the past, although all of them are closed. The City of Yuma has not seen any impacts to their drinking water sources due to spill events. There are currently no known open spill events that has a corrective action plan (CAP) in place. A CAP is required when the results of a site characterization report identify that remediation is necessary to abate the concerns associated with a release. Yuma will review information about storage tanks within their SWPA on the COSTIS website on a regular basis for any changes. For more information about storage tank releases visit https://opus. cdle. state. co. us/OIS2000/home. asp.

#### 5.9.2. Residential Storage Tanks

In addition to the regulated storage tanks, rural residents within the SWPAs may have private aboveground storage tanks containing petroleum products (gasoline, diesel) to store for vehicular fuel. The private aboveground storage tanks are a concern because they may be old and subject to leakage. It only takes a small amount of petroleum to contaminate the ground or surface water. Fuel tanks should be inspected visually on an annual basis and properly seated on a type of secondary containment structure to prevent spills from reaching the ground. The containment area should be able to hold 125% of the tank capacity.

Storage Tanks Best Management Practices Recommendations:

- Periodically visit the COSTIS website to review status of regulated storages tanks within SWPA
- Gather information on the status of unregulated USTs and ASTs within the SWPAs using local knowledge
- Educate private landowners who have unregulated ASTs about the importance of Source Water Protection and encourage them to provide secondary containment for their ASTs

## 5.10. Severe Weather Events

*Priority Ranking: 10*

If a natural hazard event such as tornado, wildfire, drought, or other natural disaster were to occur within the City of Yuma's source water protection area, the results could endanger its drinking water supply. Events such as flooding and wildfires are unlikely, however, drought events are common in Colorado.

#### 5.10.1. Tornadoes

Colorado averages around 53 reported tornados per year, and Yuma County is one of the top ten tornado-prone counties in the state. Between 1950 and 2012, Yuma County experienced 81 tornadoes, all of which fall into the lower classifications of the Fujita/Enhanced Fujita scale.

Tornadoes can have wind gusts from 65 to over 200 miles per hour (mph) and are often accompanied by floods, high straight-line winds up to 140 mph, hail and lightning. Tornadoes can have devastating impacts to water and wastewater utilities. Impacts may include, but are not limited to:

- Damage to infrastructure (e. g., storage tanks, hydrants, residential plumbing fixtures, distribution system) due to hail, wind, debris and flash flooding, resulting in loss of service and/or reduced pressure throughout the system
- Restricted access to the facility due to debris and damaged roads

- Loss of power and communication lines
- Potential contamination due to chemical leaks from ruptured containers
- Severe water and pressure loss due to ruptured service lines in damaged buildings and broken fire hydrants from airborne debris (Environmental Protection Agency, 2015)

Each of Yuma's wells have a generator hookup onsite in case of loss of power, and three wells are equipped with a Variable Frequency Drive (VFD) on their pumps to help maintain pressure. The VFDs are tested on a regular basis.

### 5.10.2. Wildfire/Grassfire

The City of Yuma's SWPA includes lands that contain pasture grass, crops, and areas of undisturbed natural grasslands. Small brush and grass fires are a concern for these areas, as the combination of dry brush, dry air, and gusty winds will allow any fire that ignites to spread rapidly. During 2007-2011, local fire departments across the country responded to an estimated average of 334,200 brush, grass, and forest fires per year. This translates to 915 such fires per day. Only 10% of those fires were coded as forest, woods, or wildland fires. The remainder were brush and grass fires (Ahrens, 2013).

Nationally, wildfires are primarily naturally caused (i. e., lightning), however, grassfires can be started accidentally when using machinery such as chainsaws, lawnmowers, tractors, and welders during the summer. Grassfires can spread quickly, travelling up to 15 miles per hour. They tend to be less intense than a forest fire, however they can still generate enormous amounts of radiant heat. The taller and drier the grass, the more intensely a grassfire will burn. The shorter the grass, the lower the flame height, and the easier the fire will be to control. Short grass under 10 centimeters is a much lower risk (County Fire Authority, 2012).

A large, hot fire in the SWPA and surrounding lands can have an impact on source waters by removing vegetation and decreasing infiltration during rain events. This can result in soil erosion and sediment and ash pollution in drinking water. Large rain events can produce mudslides and debris flow capable of destroying water infrastructure and altering clarity and pH of the source waters.

### 5.10.3. Drought

Drought is an extended period of months or years when a region has a deficiency in its water supply whether surface or groundwater. When precipitation is reduced or deficient over an extended period of time, this shortage will be reflected in declining surface and groundwater levels. Although drought is a common natural phenomenon in Colorado, research indicates that observed temperature trends may have created conditions more favorable to droughts or have exacerbated the impacts of droughts. In Colorado, temperatures have increased by approximately two degrees between 1997 and 2006. Climate models project Colorado will warm by four degrees by 2050. This, combined with a seasonal shift in precipitation, warmer spring temperatures, and increase evaporation rates, will result in an impact to Colorado's water resources (Colorado Water Conservation Board, 2008).

Drought conditions in Yuma County may result in both short term and long-term impacts. In order to appropriately address and reduce drought-related impacts, it is imperative for municipal water providers throughout the state to anticipate and plan for droughts. The Colorado Water Conservation Board recommends that water providers develop a Drought Mitigation Plan to preserve essential public services and minimize the adverse effect of a water supply emergency. The drought plan would identify actions and procedures for responding to a drought-related water supply shortage before an actual water supply emergency occurs.

Severe Weather Events Best Management Practices Recommendations:

- Regularly test VFDs at wellheads to ensure they are working properly
- Continue inspecting wellhouses following power outages

## 5.11. Railroad HAZMAT Incidents

*Priority Ranking: 11*

A railroad corridor that runs east and west through the City of Yuma's SWPA, in particular through Zone 1 of their Shop Well. Currently, the main operator of the track is the Burlington Northern Santa Fe (BNSF) Railway. In 2014, the most common commodities shipped and received by the BNSF Railway were consumer products (e. g. truck trailers or containers), industrial products (e. g. crude oil and asphalt), coal, and agricultural products (e. g. fertilizer) (BNSF Railway, 2017). All rail cars must comply with Department of Transportation placard and labeling requirements for hazardous materials and carry a manifest of rail car contents. The Yuma County Office of Emergency Management receives reports regularly about the hazardous materials carried by the rail.

Rail corridors serving passenger or freight trains are potential sources of contamination due to chemicals released during normal use, track maintenance, and accidents. Accidents can release spills of train engine fluids and commercially transported chemicals that could potentially contaminate the surface water and, potentially, the groundwater. As with any other hazardous materials (HAZMAT) incident, local response from a train derailment is from the Yuma Volunteer Fire Department as well as the Yuma County Sheriff's Office of Emergency Management.

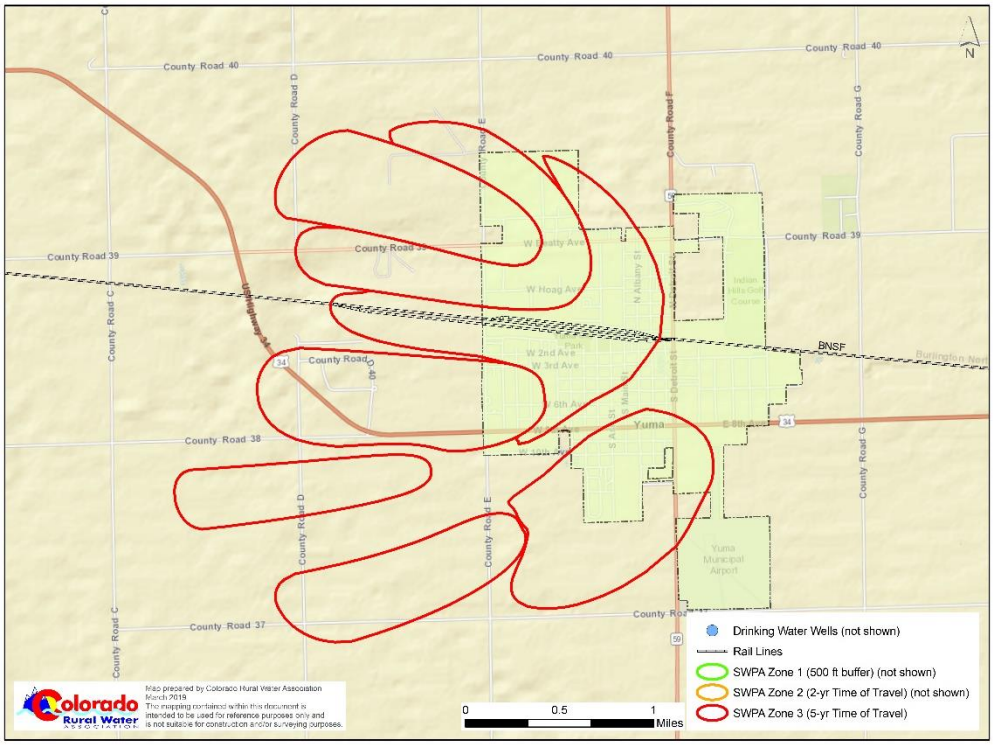


*Figure 15: Map of BNSF Railroad through the City of Yuma's SWPA*

Railroad Best Management Practices Recommendations:

- Supply local fire department with spill kits that can be used for HAZMAT spills or other incidents within the SWPA if needed
- Develop emergency response cards that includes water system contact info and intake locations; distribute to emergency responders and BNSF HAZMAT liaison

## 5.12. Road Spills & Accidents

*Priority Ranking: 12*

The City of Yuma's Source Water Protection Areas are served by a network of roads that lie within a variety of jurisdictions. Within city limits, there are approximately 28. 5 miles of roads, most of which are paved. Colorado State Highway 34 is maintained by the Colorado Department of Transportation (CDOT). The SWPA also includes county roads which are maintained by Yuma County Road & Bridge Department.

### 5.12.1. Groundwater Contaminant Pathways

Motor vehicles, roads, and parking facilities are a major source of water pollution to both surface and groundwater. An estimated 46% of US vehicles leak hazardous fluids, including crankcase oil, transmission, hydraulic, and brake fluid, and antifreeze, as indicated by oil spots on roads and parking lots, and rainbow sheens of oil in puddles and roadside drainage ditches. An estimated 30-40% of the 1. 4 billion gallons of lubricating oils used in automobiles are either burned in the engine or lost in drips and leaks, and another 180 million gallons are disposed of improperly onto the ground or into sewers. Runoff from roads and parking lots has a high concentration of toxic metals, suspended solids, and hydrocarbons, which originate largely from automobiles (Gowler & Sage, 2006). Storm water runoff over these roads can deliver contaminants from the road surface into the nearby groundwater.

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

Local response for spills and accidents on roadways is from the Yuma Volunteer Fire Department, Colorado State Patrol, and the Yuma County Sheriff's Office of Emergency Management.

Road Spills & Accidents Best Management Practice Recommendations

- Supply local fire department with spill kits that can be used for HAZMAT spills or other incidents within the SWPA if needed
- Develop emergency response cards that includes water system contact info and intake locations; distribute to emergency responders
- Provide tour of City of Yuma's water system to emergency responders
- Display emergency contact information at wellhouses along w/ legal description (GIS location)

## 5.13. Improper Agricultural Practices

*Priority Ranking: 13*

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

The majority of Yuma County, including most of the private land within the City of Yuma's SWPA is zoned for agriculture. Most of the agriculture consists of irrigated crops, but there are areas of open range land as well. The Natural Resource Conservation Service (NRCS) and CSU Extension work extensively with agricultural producers to educate them on best management practices they can implement to help reduce their environmental impacts to surrounding lands. The Steering Committee believes impacts from improper agriculture to be a low risk and considers it to be a low priority.

### 5.13.1. Fertilizer & Pesticide Use

The majority of crops grown within Yuma's SWPA include hay and grains. Excess fertilizer use and poor application methods at farming operations can cause fertilizer movement into surface and groundwater. If 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.

Nitrogen fertilizer, whether organic or inorganic, is biologically transformed to nitrate that is highly soluble in water. Use of nitrogen-containing fertilizers can contribute to nitrates in drinking water. Consumption of nitrates can cause methemoglobinemia (blue baby syndrome) in infants, which reduces the ability of the blood to carry oxygen. If left untreated, methemoglobinemia can be fatal for affected infants. Due to this health risk, EPA set a drinking water maximum contaminant level (MCL) of 10 milligrams per liter (mg/l) or 10 parts per million (ppm) for nitrate measured as nitrogen (US Environmental Protection Agency, 2001). The City of Yuma routinely monitors for nitrate in their drinking water. Nitrate is detected at a level of 2. 82 mg/L, far below the maximum contaminant level (MCL) set by the EPA of 10 mg/L (City of Yuma, 2018).

Phosphorus is the other element of concern in fertilizer. Under certain conditions phosphorus can be readily transported with the soil. In fact, 60 to 90 percent of phosphorus moves with the soil. Phosphorus is the major source of water quality impairments in lakes nationwide. Even though regulations that affect the taste and odor of water are not federally enforceable under the Safe Drinking Water Act, municipalities often must treat their drinking water supplies for these aesthetic reasons (US Environmental Protection Agency, July 2001).

Pesticide application to crops, another potential source of contamination, can seep into surface and groundwater supplies if mismanaged. Synthetic organic chemicals in pesticides have been linked to serious health problems, including cancer, liver and kidney damage, reproductive difficulties, and nervous system effects.

Improper Agricultural Practices Best Management Practice Recommendations

- Work with NRCS, CSU Extension, and local conservation districts to educate agricultural producers on proper land management by incorporating source water protection into workshops or presentations

# 6. SOURCE WATER BEST MANAGEMENT PRACTICES

The following table lists the best management practices and their priority rating recommended by the Steering Committee to be considered for implementation.

*Table 6: Source Water Protection Best Management Practices*

| Priority Ranking | Issues | Risk Level | Best Management Practices |
|---|---|---|---|
| 1 | **Improperly abandoned wells** | Moderate | • Create inventory of private well owners<br>• Conduct public outreach to owners of private wells<br>• Work with owners of abandoned wells to ensure they are properly plugged |
| 2 | **Backflow prevention/Cross connection control** | Moderate | • Educate citizens on importance of cross connection (include an article in the City Spotlight and post on City's website)<br>• Continue working to ensure 100% of commercial users have proper cross connection control within two years |
| 3 | **Onsite Wastewater Treatment Systems** | Very Low | • Create inventory of homeowners with OWTS onsite within SWPA<br>• Conduct public outreach to OWTS owners (distribute outreach material such as Westbank Ranch HOA OWTS maintenance video, Pueblo County Health Dept. OWTS Homeowner Guidelines)<br>• Request notification by Northeast Colorado Public Health Dept. of septic system failures and unpermitted septic systems in SWPA |
| 4 | **Security around wellheads** | Low | • Maintain current fencing and lighting, and install security cameras or other security measures at/near intakes<br>• Continue inspecting wellhouses and ensure that SCADA system continues to work properly |
| 5 | **Public outreach** | N/A | • Develop public education campaigns for community members and residents within the City of Yuma's SWPAs to explain the importance of source water protection<br>• Post articles or educational materials on City Spotlight, City website, and at City Hall that explains the importance of source water protection<br>• Hold public meeting to introduce citizens to the SWPP<br>• Post a copy of SWPP on City of Yuma's website |

| Priority Ranking | Issues | Risk Level | Best Management Practices |
|---|---|---|---|
| | | | • Install CDPHE Drinking Water Protection Area signage at strategic locations within the SWPA |
| **6** | **Private irrigation wells** | Very Low | • Create inventory of private irrigation well owners<br>• Conduct public outreach to owners of private irrigation wells |
| **7** | **Oil & Gas** | Moderate | • Periodically monitor Colorado Oil and Gas Conservation Commission (COGCC) website for new/active spills and pending well permit applications;<br>• Provide GIS shapefiles of SWPA to CDPHE so they may update locations on their website<br>• Share SWPP and maps/GIS shapefiles of SWPA with COGCC, Yuma County OEM, and LGDs |
| **8** | **Industrial Spills/Accidents/Discharge** | Low | • Develop emergency response cards that includes water system contact info and City of Yuma's well locations; distribute to industrial owners<br>• Provide tour of City of Yuma's water system to industrial owners<br>• Display emergency contact information at wellhouses along w/ legal description (GIS location) |
| **9** | **Leaking fuel storage tanks** | Very Low | • Periodically visit the COSTIS website to review status of regulated storages tanks within SWPA<br>• Gather information on the status of unregulated USTs and ASTs within the SWPAs using local knowledge<br>• Educate private landowners who have unregulated ASTs about the importance of Source Water Protection and encourage them to provide secondary containment for their ASTs |
| **10** | **Severe weather events** | Low | • Regularly test VFDs at wellheads to ensure they are working properly<br>• Continue inspecting wellhouses following power outages |
| **11** | **Railroad HAZMAT Incidents** | Very Low | • Supply local fire department with spill kits that can be used for HAZMAT spills or other incidents within the SWPA if needed<br>• Develop emergency response cards that includes water system contact info and intake locations; distribute to emergency responders and BNSF HAZMAT liaison |
| **12** | **Road Spills & Accidents** | Very Low | • Supply local fire department with spill kits that can be used for HAZMAT spills or other incidents within the SWPA if needed |

| Priority Ranking | Issues | Risk Level | Best Management Practices |
|---|---|---|---|
| | | | • Develop emergency response cards that includes water system contact info and intake locations; distribute to emergency responders<br>• Provide tour of City of Yuma's water system to emergency responders<br>• Display emergency contact information at wellhouses along w/ legal description (GIS location) |
| **13** | **Improper agricultural practices** | Very Low | • Work with NRCS, CSU Extension, and local conservation districts to educate ag producers on proper land management by incorporating source water protection into workshops or presentations |

# 7. EVALUATING EFFECTIVENESS OF SOURCE WATER PROTECTION PLAN

The City of Yuma is committed to evaluating the effectiveness of the various source water best management practices that have been implemented. The purpose of evaluating the effectiveness is to determine if the various source water best management practices are being achieved, and if not, what adjustments to the Source Water Protection Plan will be taken in order to achieve the intended outcomes. It is further recommended that this Plan be reviewed at a frequency of once every three to five years or if circumstances change resulting in the development of new water sources and source water protection areas, or if new risks are identified.

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

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# 9. APPENDICES[2]

A. Source Water Assessment Report

B. Source Water Assessment Report Appendices

C. Table A-1 Discrete Contaminant Types

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

E. Table B-1 Dispersed Contaminant Types

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

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