



February 27, 2014

Hand Delivered

Public Utilities Commission of Nevada
1150 East William Street
Carson City, Nevada 89701-3109

***Subject: Silver Knolls Mutual Water Company – Arsenic Compliance Project
Utility Environmental Protection Act Filing***

Dear Sir or Madame:

On behalf of Silver Knolls Mutual Water Company (SKMWC), Resource Concepts Inc., hereby files an Application for a permit under the Utility Environmental Protection Act with the Public Utilities Commission of Nevada. This permit is being requested in connection with the proposed construction of an arsenic treatment facility located at the existing SKMWC water treatment facility near Stead in Washoe County, Nevada.

If you have any questions regarding this filing, please contact me at 775-883-1600.

Sincerely,

A handwritten signature in blue ink that reads 'JoAnne Michael'.

JoAnne Michael
Sr. Environmental Specialist

JM:jm

Enclosures/Attachments

**Public Utilities Commission of Nevada
Utility Environmental Protection Act
Permit Application**

For

**Silver Knolls Mutual Water Company
Arsenic Compliance Project**

February 26, 2014

Prepared For:

Silver Knolls Mutual Water Company
P.O. Box 4522
Sparks, NV 89432-4522

Prepared By:



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- Attachment F NEPA Categorical Exclusion

2014-2-26 UEPA 13142-4 Silver Knolls JM-td L2-37.doc
February 26, 2014

1.0 INTRODUCTION

1.1 Background

The Silver Knolls Mutual Water Company (SKMWC) is located in Washoe County, Nevada, northwest of Reno (due west of the Stead Airport). SKMWC was formed in 1981 and provides water utility services for 63 residential lots within the surrounding larger community of Silver Knolls. Additionally, SKMWC provides water service to a regional park maintained by Washoe County.

The SKMWC potable water system includes a system with approximately 1.16 miles of distribution mains ranging in size from 6-inch to 8-inch diameter, one water storage tank (operational capacity of 211,500 gallons), and a booster pump system to pressure the water from the storage tank prior to distribution. Water production is provided by a total of two wells, the Lower Well and Upper Well. There is currently no treatment of the water other than injection of chlorine. Arsenic levels in both wells range from 8-15 parts per billion (ppb), which at times exceeds the 10 ppb allowed by the U.S. Environmental Protection Agency's arsenic standards set for drinking water.

On December 5, 2012 SKMWC was issued a "Final" Arsenic exemption extension by the State Environmental Commission. The extension requires installation and operation of a treatment system that meets the arsenic standard of 10 parts per billion (0.010 mg/L) to be completed by May 1, 2014.

Pursuant to N.R.S. 704.870 and N.A.C. 703.415 et seq., SKMWC hereby applies for a permit under the Utility Environmental Protection Act (UEPA) to upgrade its existing water supply system to provide removal of arsenic to meet EPA mandated arsenic standard for drinking water. Arsenic levels would be removed by piping the raw water from the SKMWC wells through an absorptive media container and into the existing storage tank for later use in the system. The piping and treatment unit will require expansion of the existing booster station building, upgrade of existing electrical components, and upgrade of the existing control system. Additionally, the Lower Well would be re-equipped with a smaller 185-gpm pump. This smaller pump reduces electrical demand charges for the well while also reducing the size of the required treatment unit.

2.0 REQUIREMENTS OF NAC 703.423

2.1 Description of Location of Proposed Facility

2.1.1 General Description of Location of the Proposed Utility Facility

The proposed treatment process will be located in a new addition to the existing pump building at the SKMWC tank site. The proposed project site is located near Stead in Washoe County, Nevada (reference Figures 1, 2, and 3 in Attachment A). Specifically, the service area is located within a portion of the NW $\frac{1}{4}$, NE $\frac{1}{4}$, of Section 26 T.21N., R. 18E.

2.1.2 Legal Description of Site

The legal descriptions for the facility parcel, pump station, and well site are located in Attachment B.

2.1.3 Appropriately Scaled Site Plans and Maps

NAC 703.423(1)(c) requires submittal of appropriately scaled site plan drawings of the proposed facility, vicinity maps, and routing maps as found in Attachment A – Maps and Drawings.

2.2 General Description of Proposed Facility

2.2.1 Size and Nature of the Proposed Utility Facility

The existing pump in the Lower Well will be replaced with a smaller pump (185 gpm +/-) to allow for treatment of 40% of the supply flow with an arsenic system capable of treating 75 gpm. The new treatment process will be located in a new addition (± 240 square feet) to the existing pump building at the SKMWC tank site. The existing piping at the tank site will be modified to allow for both the Upper and Lower Wells to be fed through the new treatment process. Additionally, flow meters and new dedicated sample tap locations will be included in the project improvements to allow for consistent flow measurement and to improve the ease/accuracy of sampling.

Figure 10 shows a schematic of the proposed system layout to be constructed to treat for arsenic (reference Attachment A – Maps and Drawings).

2.2.2 Natural Resources that will be Used During the Construction and Operation

Resources required for construction would be:

- Steel to form new pump at the Lower Well,
- Iron for ductile pipe,
- Building materials necessary for construction of a new ± 240 square foot masonry block building,
- Fuel for vehicles and equipment used to construct the new addition to the existing pump building, and
- Fuel for vehicle and equipment necessary to transport materials to site.

Construction and operation of the proposed project will not have any significant adverse impact on natural resources.

2.2.3 Layout Diagrams of Proposed Facility and Its Associated Equipment

Figure 5 shows a schematic of the proposed system layout to be constructed to treat for arsenic (reference Attachment A – Maps and Drawings).

2.2.4 Scaled Diagrams of the Structures at the Proposed Facility

Figures 7 and 10 illustrate the proposed system layout to be constructed to treat for arsenic (reference Attachment A – Maps and Drawings).

2.3 Environmental Studies

The proposed treatment facility will require an expansion of the existing booster station building into existing areas of disturbance. The soils are covered by an imported gravel surface with occasional rabbitbrush. There are no on-site wetlands, and the site is not located within a FEMA designated floodplain (reference Figure 4 in Attachment A). Due to the existing disturbance, the proposed facility site does not support habitat for sensitive plant or wildlife species, and there will be no impacts to cultural resources.

All ground disturbing activities will include installation of appropriate BMPs to minimize runoff from the site and protect water quality. There will be temporary, minor impacts to air quality and noise related to construction activities. Work hours will be limited and dust control maintained to mitigate noise and air quality.

Attachment C is a Preliminary Engineering Report (PER). The report provides a discussion of potential impacts to the environment from the proposed arsenic treatment strategies evaluated.

2.4 Reasonable Alternative Locations for Proposed Facility

2.4.1 Description of Reasonable Alternative Locations for the Proposed Facility

The utility facility project described in this application proposes to expand the existing booster station building and install an absorptive media container to remove arsenic in the drinking water. Locating the proposed facility at any other site would require relocation of the booster station, resulting in significantly greater environmental impacts and increased cost. As a result, no alternate sites were evaluated.

In assessing whether installation of arsenic absorption media was the best alternative, three (3) other alternatives were considered and are described below.

Dedicated Connection to Silver Knolls Park from Upper Well Alternative

One alternative considered involved connection of Silver Knolls Park irrigation system to Upper Well and revisions to the existing piping to allow the Upper Well to serve 100% of the irrigation needs of the Silver Knolls Park while maintaining a backup connection from the Upper Well to the domestic system in the event of a failure with the Lower Well (reference Figure 6 in Attachment A). The Upper Well currently exceeds the arsenic standard of 10 ppb on a regular basis and is of lower quality water as compared to the Lower Well. Some original sampling of arsenic from the wells showed some potential to need arsenic treatment with the Lower Well. If arsenic treatment were not necessary with the Lower Well this alternative would have resolved the treatment issue for the Upper Well. However, further testing of the Lower Well showed that arsenic treatment would be required for both the Upper and Lower Wells. With that in mind, this alternative was still examined to see if the cost savings of reducing the flow requiring arsenic treatment would be enough to justify the capital costs. By creating a dedicated service from the Upper Well to serve the irrigation needs of the Silver Knolls Park the summertime demand on the Lower Well (which is anticipated to be treated for arsenic), will reduce the amount of water requiring treatment and will reduce the cost and size of arsenic treatment for the system. The Silver Knolls Park consumes approximately 23% of the summer time water usage within the SKMWC.

This alternative is not a stand-alone alternative and is a side alternative to be tied to a treatment method. The intent of this alternative is to increase the long-term operational efficiency of the necessary arsenic treatment system by reducing the amount of water that requires treatment.

Reverse Osmosis Arsenic Removal Alternative

One of the methods examined to reduce the arsenic levels is to remove the arsenic with a Reverse Osmosis system. This would consist of piping the raw water from the SKMWC wells through a Reverse Osmosis system and into the existing storage tank for later use in the system (reference Figure 8 in Attachment A). The piping and treatment unit will require an expansion of the existing booster station building, upgrade of existing electrical components, and upgrade of the existing control system. The Reverse Osmosis system will also require a chemical feed system and a means of containing/holding the backwash and filtrate from the system, as there is no existing sewer disposal system in the area of the SKMWC. Additionally, the Lower Well would be re-equipped with a 185-gpm pump. This smaller pump reduces electrical demand charges for the well while also reducing the size of the required treatment unit.

This alternative was rejected based on 1) greater cost, and 2) because it would require some means of storing/evaporation/disposal of the backwash and waste streams from the treatment process as there is no existing sewer system in the immediate area. The availability of land for a pond or onsite storage is limited and would most likely require the purchase of property.

Micro-filtration Arsenic Removal Alternative

One of the methods examined to reduce the arsenic levels is to remove the arsenic with a micro-filtration system. This would consist of piping the raw water from the SKMWC wells through a micro-filtration system and into the existing storage tank for later use in the system (reference Figure 9 in Attachment A). The piping and treatment unit will require an expansion of the existing booster station building, upgrade of existing electrical components, and upgrade of the existing control system. The micro-filtration system will also require a chemical feed system and a means of containing/holding the backwash and filtrate from the system as there is no existing sewer disposal system in the area of the SKMWC. Additionally, the Lower Well would be re-equipped with a 185-gpm pump. This smaller pump reduces electrical demand charges for the well while also reducing the size of the required treatment unit.

This alternative was rejected based on 1) greater cost, and 2) because it would require some means of storing/evaporation/disposal of the backwash and waste streams from the treatment process as there is no existing sewer system in the immediate area. The availability of land for a pond or onsite storage is limited and would most likely require the purchase of property.

Regional Interconnection Alternative

A very schematic look at a regional interconnection with existing Truckee Meadows Water Authority (TMWA) was conducted as a potential alternative for arsenic mitigation. However, based on the timing required of SKMWC to comply with arsenic levels in their water and also due to the extremely high cost of connecting to the nearest TMWA, this alternative was not deemed feasible both for timing and for monetary reasons. Based on these a full in-depth look at the alternative is not provided.

2.4.2 Description of the Comparative Merits or Detriments of Each Location Submitted

No other locations were considered.

2.4.3 Statement of Reasons Why the Location Chosen is Best Suited for the Proposed Facility

Locating the proposed facility in existing disturbance at the existing booster station results in the least amount of impact to the environment.

2.5 Public Notice and Proof of Publication

As required by subsection 4 of NRS 704.870 (NAC 703.423(5)), a copy of the public notice is included in Attachment D. A copy of the proofs of publication will be filed as soon as they are available under separate cover.

2.6 Proof of Submission of Copy of Application to the Nevada State Clearinghouse

A copy of the certificate of service is found in Attachment E.

2.7 Nature and Probable Effect of Construction of the Proposed Facility on Environment

Construction of the proposed arsenic treatment facility will have no significant environmental impact. The new treatment process will be located within a ±240 square-foot expansion to the existing pump building at the SKMWC tank site and constructed within existing disturbed property owned by SKMWC. The new, smaller pump at the Lower Well will be installed within the existing well house and no new disturbance will occur.

Temporary disturbance related to construction activities provides the most potential for adverse effects, but the project proposes measures to avoid and minimize impacts to less than significant. Work hours will be limited and dust control maintained to mitigate noise and air quality impacts. Best management practices will be implemented to minimize impacts to surface and groundwater quality.

The Nevada Department of Environmental Protection, Department of Conservation & Natural Resources has reviewed the project and determined that the project is eligible for a Categorical Exclusion and may be exempted from further substantive environmental review requirements (reference Attachment F).

2.7.1 A Reference to any studies, if applicable (NAC 703.423(7)(b))

Not applicable.

2.7.2. Environmental Statement (NAC 703.423(7)(b))

- (a) The name, qualifications, professions and contact information of each person with primary responsibility for preparation of the environmental statement (NAC 703.423(7)(b)(1)):

Not applicable.

- (b) The name, qualifications, professions and contact information of each person who has provided comments or input in the preparation of the environmental statement (NAC 703.423(7)(b)(2)):

JoAnne Michael
Sr. Environmental Specialist
Resource Concepts, Inc.
340 N. Minnesota Street
Carson City, NV 89703

Tim Russell, P.E.
Project Engineer
Resource Concepts, Inc.
340 N. Minnesota Street
Carson City, NV 89703

2.7.3 A bibliography of materials used in the preparation of the environmental statement (NAC 703.423(7)(b)(3))

Not applicable.

2.7.4 A description of (NAC 703.423(7)(b)(4))

- (a) The environmental characteristics of the project area existing at the time of the application or amended application is filed with the Commission:

The portion of Washoe County in which SKMWC site is located is characterized by open spaces containing sagebrush, rabbitbrush, and bitterbrush and rural residential communities. SKMWC serves a population of less than 200. The area served by SKMWC is a rural residential community just north of the Reno/Sparks/Stead area. Air quality meets all state and federal standards. Traffic congestion is minimal and U.S. Highway 395 is the primary north-south transportation corridor near the SKMWC linking it with the Reno/Sparks area.

The drainage area around the area served by SKMWC is relatively small and FEMA mapping shows the nearest flooding to be associated with Silver Lake. The entire SKMWC service area is located in Flood Hazard Zone X (reference Figure 4 in Attachment A).

The predominant vegetation community is upland scrub-shrub, consisting of both sagebrush and salt desert scrub communities. The area north and west of the developed area supports wildlife habitat for small mammals, reptiles, songbirds and raptors, as well as a potential for mule deer in the foothills north and west of the service area. None of these wildlife species would be impacted by the project.

(b) The environmental impacts of the construction and operation of the proposed utility facility will have on the project area before mitigation, and:

The proposed construction activities will result in increased noise levels, emissions of greenhouse gases, and fugitive dust.

(c) The environmental impacts that the construction and operation of the proposed utility facility will have on the project area after mitigation:

No significant adverse environmental impacts are anticipated.

2.8 Extent to Which the Proposed Facility is Needed to Ensure Reliable Utility Service to Customers in Nevada

2.8.1 An explanation of the extent to which the proposed utility facility is needed to ensure reliable utility service to customers in this State, including:

The proposed arsenic removal system is designed to provide improved treatment to potable water supplies consistent with the U.S. Environmental Protection Agency's arsenic standards set for drinking water.

2.8.2 Description of the Extent to Which the Proposed Facility Will Enhance the Reliability of Utility Service in Nevada.

The proposed treatment facility will enhance the reliability of utility service in Nevada by replacing aging infrastructure and by allowing SKMWC to provide water for drinking which meets the Federal standards for safe drinking water.

(a) If the proposed utility facility was approved in a resource plan or an amendment to a resource plan, a reference to the previous approval by the Commission (NAC 703.423(8)(a)):

The proposed utility facility was not approved in a resource plan.

(b) If the proposed utility facility was not approved in a resource plan or an amendment to a resource plan, a description of the extent to which the proposed utility facility will (NAC 703.423(8)(b)):

1. Provide utility service to customers in this State (NAC 703.423(8)(b)(1)):
With implementation of the proposed project, the existing water system will provide customers within the Silver Knolls service area with drinking water that is compliant with the arsenic MCL as required by federal and state law.

2. Enhance the reliability of utility service in this State (NAC 703.423(8)(b)(2)):
The project will enhance the reliability of utility service in this State by bringing water supplies into compliance with the arsenic MCL as required by federal and state law.

3. Achieve interstate benefits by the proposed construction or modification of transmission facilities in this State, if applicable (NAC 703.423(8)(b)(3)):
Not Applicable

2.9 Need Versus Effect on Environment

2.9.1 An explanation on how the need for the proposed utility facility as described in subsection eight balances any adverse effects on the environment as described in subsection seven (NAC 703.423(9))

The proposed project is not expected to cause any significant adverse environmental impacts. The proposed project is needed to meet the new drinking water standards for arsenic set forth by the EPA and adopted by the Nevada Division of Environmental Protection.

2.10 Minimum Adverse Impact on Environment

2.10.1 Provide an explanation of how the proposed utility facility represents the minimum adverse effect on the environment, including:

(a) State of available technology (NAC 703.423(10)(b)):

There are several treatment technologies available for removal of arsenic to meet EPA drinking water standards. Based on the minimal levels by which SKMWC water exceeds the arsenic standards and existing facility configuration, the Preliminary Engineering Report (Attachment C) selected the following treatment technologies for detailed evaluation: arsenic absorption media, reverse osmosis, and microfiltration.

(b) The nature of various alternatives (NAC 703.423(10)(b)):

The technologies listed above use one of two generalized removal approaches: 1) adsorption by proprietary media, and 2) membrane technologies. Adsorption processes utilize a stationary media to attract and bind arsenic. Reverse osmosis and microfiltration depends on entrapment of particles by a membrane through which the water is filtered.

(c) The economics of various alternatives (NAC 703.423(10)(c)):

There are several technologies that would be effective in reducing arsenic levels within the SKMWC drinking water. The arsenic absorption media was considered the best technology for the SKMWC because it resulted in the least environmental impacts while simultaneously being the most cost affective option. Detailed alternative analysis is contained in the PER (Attachment C)

2.11 Facility Conforms to Local Laws

2.11.1 An explanation of how the location of the proposed utility facility conforms to applicable and local laws and regulations, including a list of permits, licenses and approvals required by federal, state and local statutes, regulations, and ordinances. The explanation must include a list that indicates:

(a) All permits, licenses and approvals the applicant has obtained, including copies there of (NAC 703.423(11)(a)):

Reference table in part 2.11.1 (b) below.

(b) All permits, licenses and approvals the applicant is in the process of obtaining to commence construction of the proposed utility facility. The applicant must provide an estimated timeline for obtaining these permits, licenses and approvals (NAC 703.423(11)(b)):

Permit/Approval Required	Approving Agency and Contact Information	Application Submittal Date	Date of Issuance
UEPA Permit to Construct	Nevada Public Utilities Commission 1150 East William St. Carson City, NV 89701-3109 Edmund Quaglieri 775-684-6179	February 27, 2014	
Environmental Clearance	State Clearinghouse Nevada Department of Administration Division of Budget and Planning 209 East Musser Street, Room 200 Carson City, NV 89701-4298 775-684-0222	February 27, 2014	
Building Permit	Washoe County - Building Department 1001 E. Ninth Street P.O. Box 11130 Reno, NV 89520-0027 775-328-2020	March 3, 2014	
Design Approval	Nevada Div. of Environmental Protection 901 South Stewart St., Suite 4001 Carson City, NV 89701-5249	To be filed	

2.12 Public Interest

2.12.1 An explanation of how the proposed utility facility will serve the public interest, including:

(a) The economic benefits that the proposed utility facility will bring to the applicant and this State (NAC 703.423 (12)(a)):

The proposed project will benefit the SKMWC by providing community residents with drinking water compliant with the arsenic MCL, and allowing SKMWC to retain control and operation of the facility in the foreseeable future. In addition, the proposed expansion of the facility to house the absorption media and installation of new pump at Well 2 will result in a temporary increase in construction activities in the area with its associated financial benefits to the community.

- (b) The nature of the probable effect on the environment in this State if the proposed utility facility is constructed (NAC 703.423(12)(b)):

The proposed project will have no significant adverse impact on the environment. The project will result in short term, minor construction related impacts to noise and air quality.

- (c) The nature of the probable effect on the public health, safety, and welfare of the residents of this State if the proposed utility facility is constructed (NAC 703.423(12)(c)):

The proposed project will improve public health, safety and welfare of the community residents by providing drinking water that will meet the MCL for arsenic.

- (d) The interstate benefits expected to be achieved by the proposed electric transmission facility in this State, if applicable (NAC 703.423(12)(d)):

Not Applicable

Attachments

Attachment A

Maps and Drawings

PROJECT
LOCATION

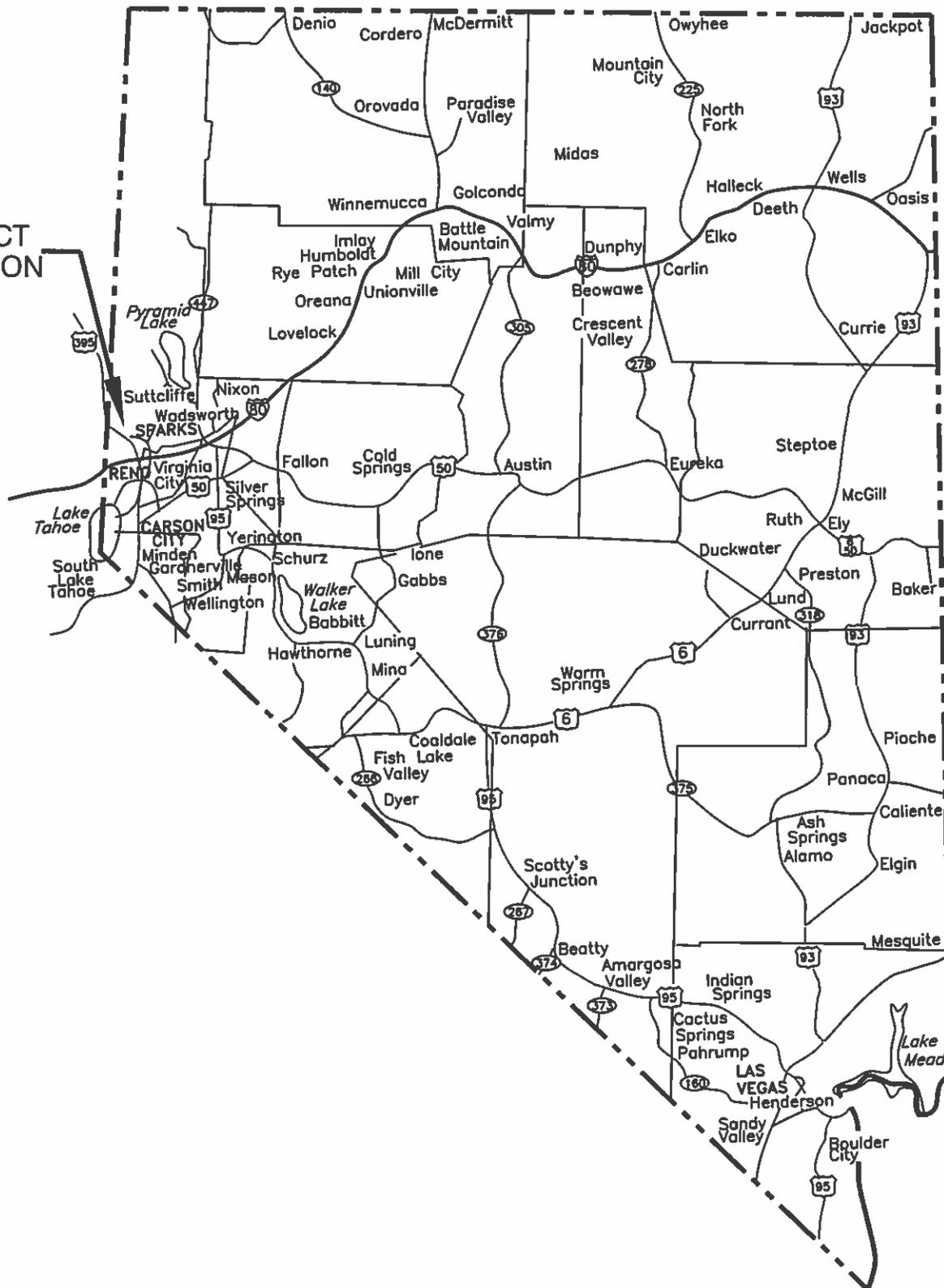


FIGURE 1
Silver Knolls Mutual Water Company
Location Map

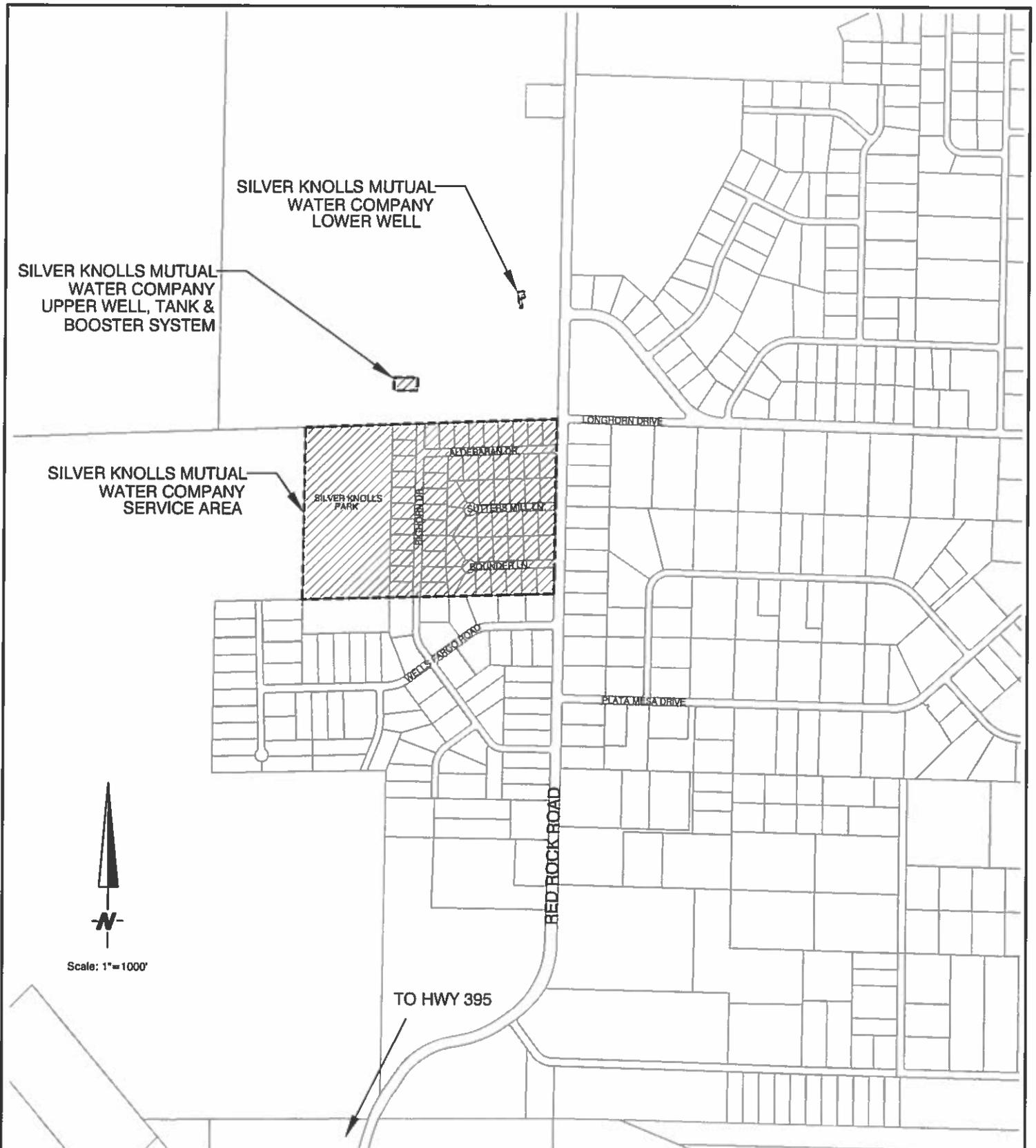
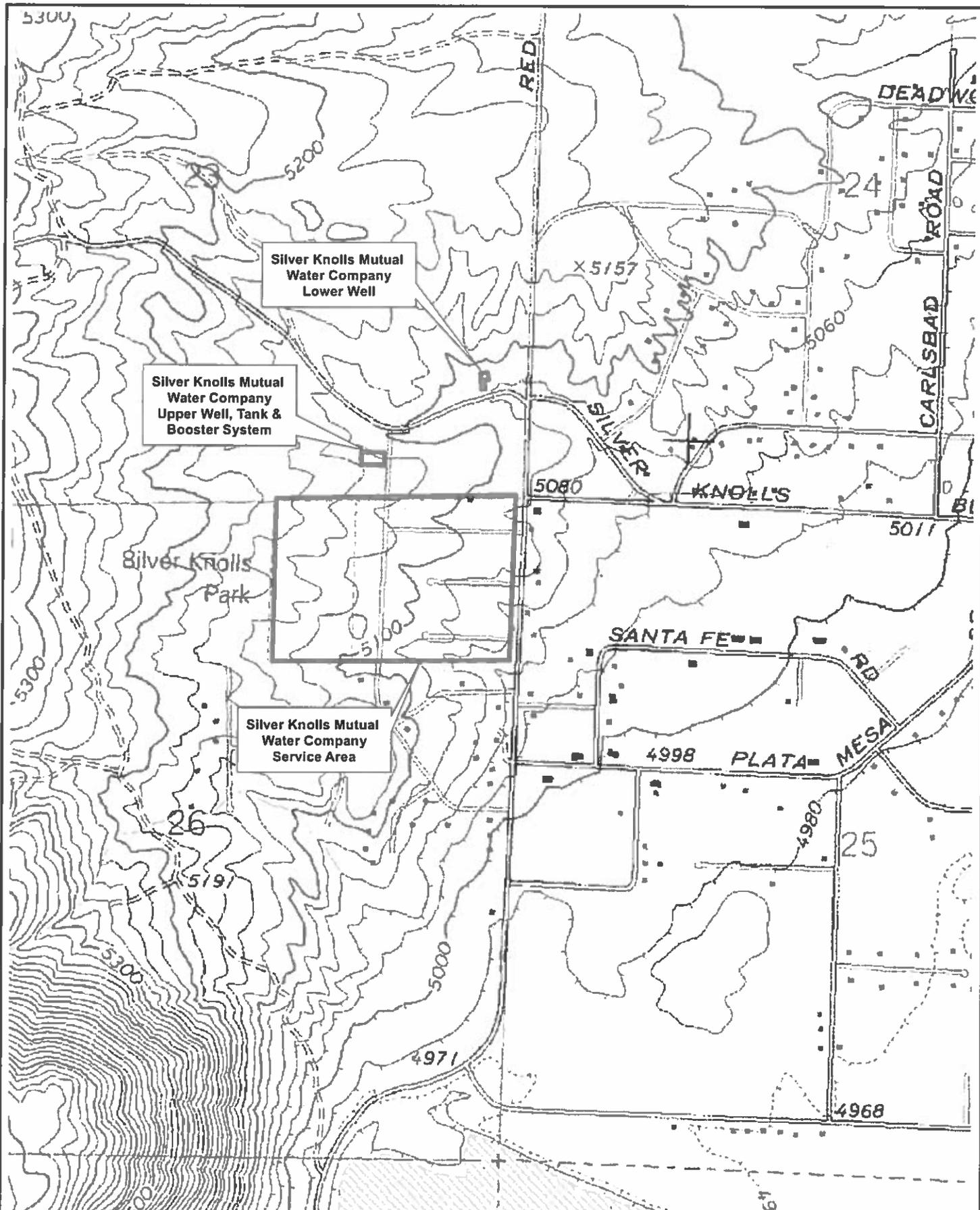


FIGURE 2
Silver Knolls Mutual Water Company
Service Area
 November 2013



1 inch = 1,000 feet
 0 500 1,000 Feet

Source: USGS 7.5' Quads

Figure 3
Silver Knolls Mutual Water Company
Service Area

Date: 11/5/2013
RCI
 Resource Concepts Inc

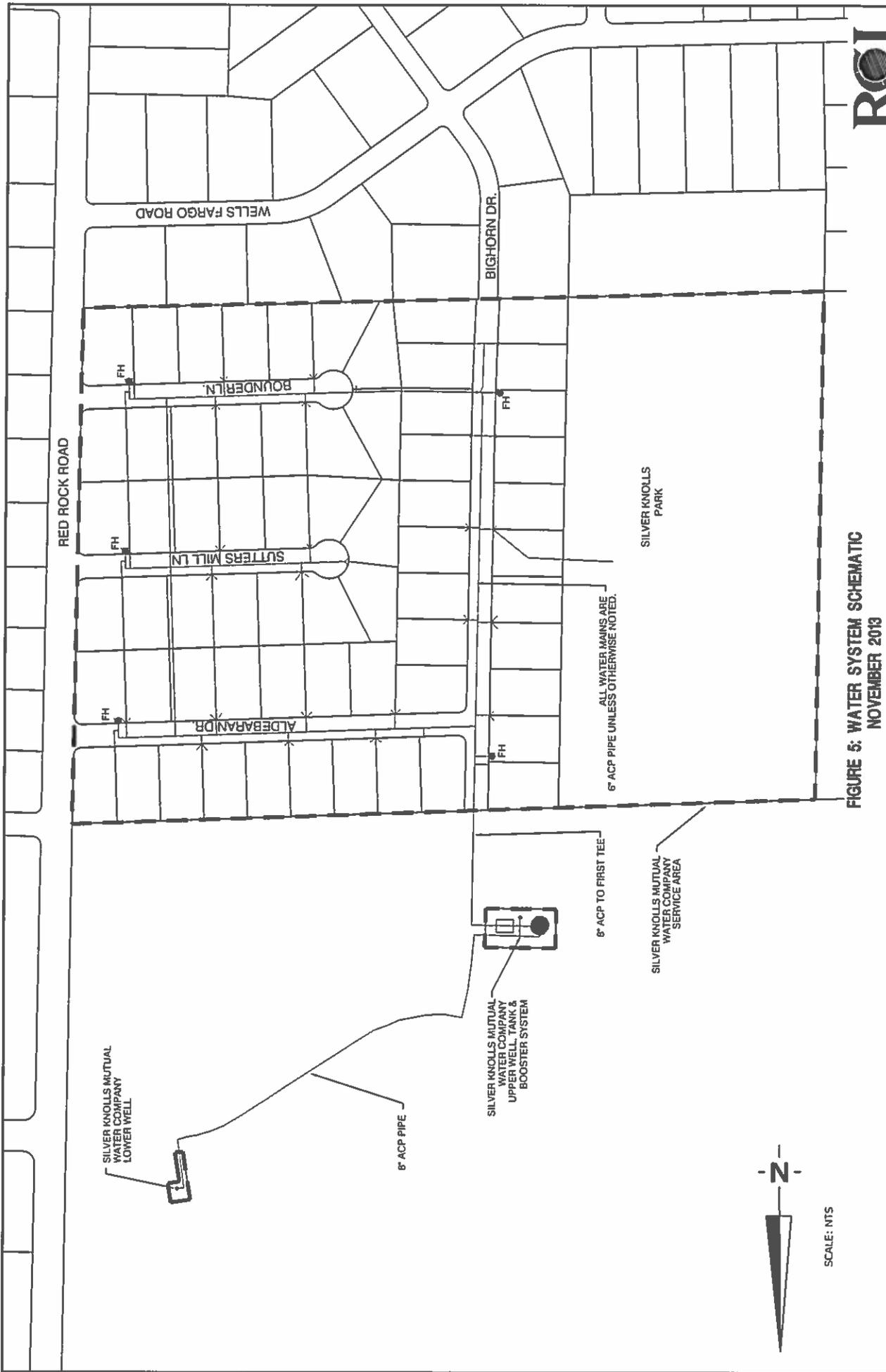


FIGURE 5: WATER SYSTEM SCHEMATIC
NOVEMBER 2013

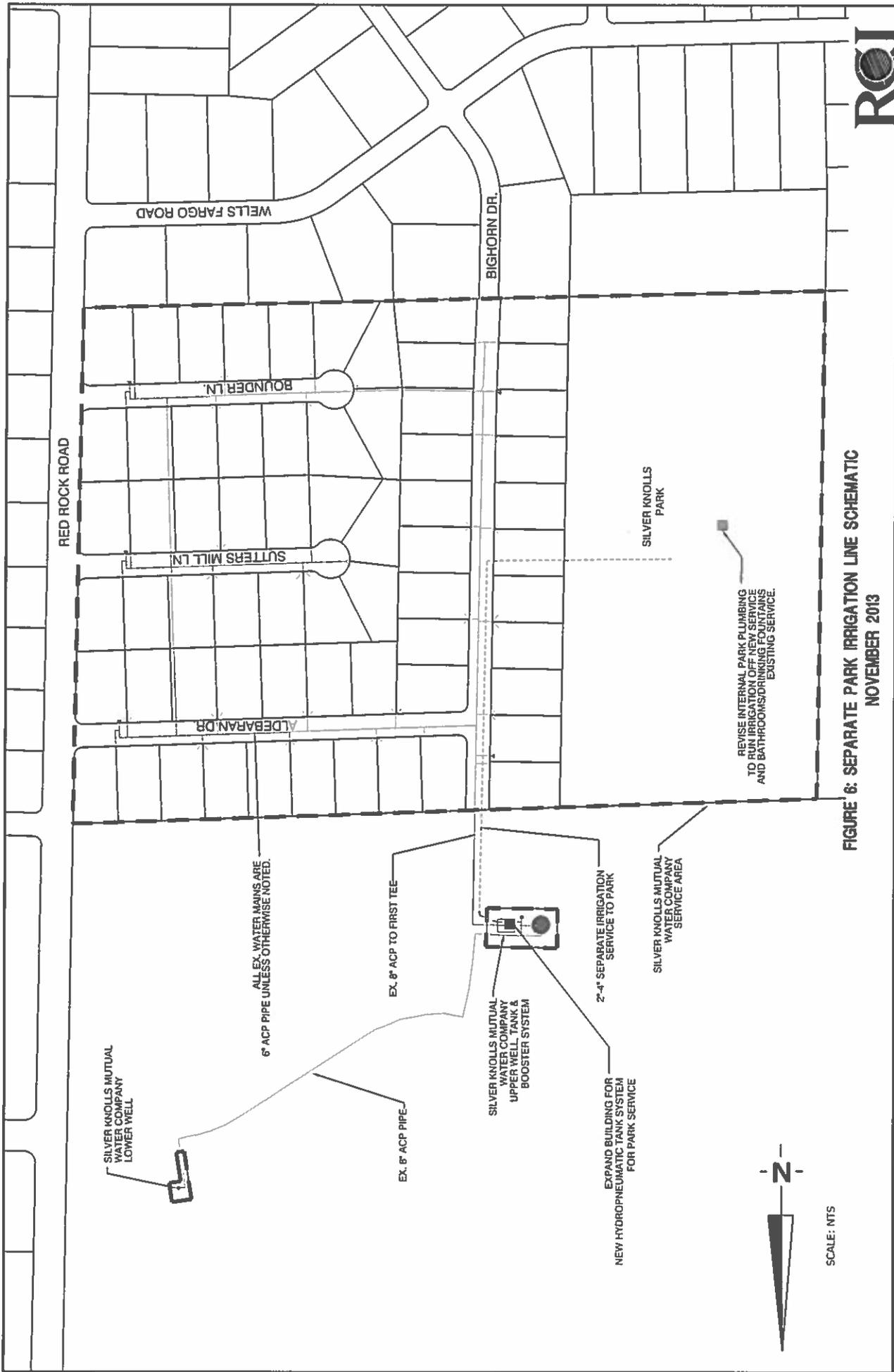


FIGURE 6: SEPARATE PARK IRRIGATION LINE SCHEMATIC
NOVEMBER 2013



SCALE: NTS

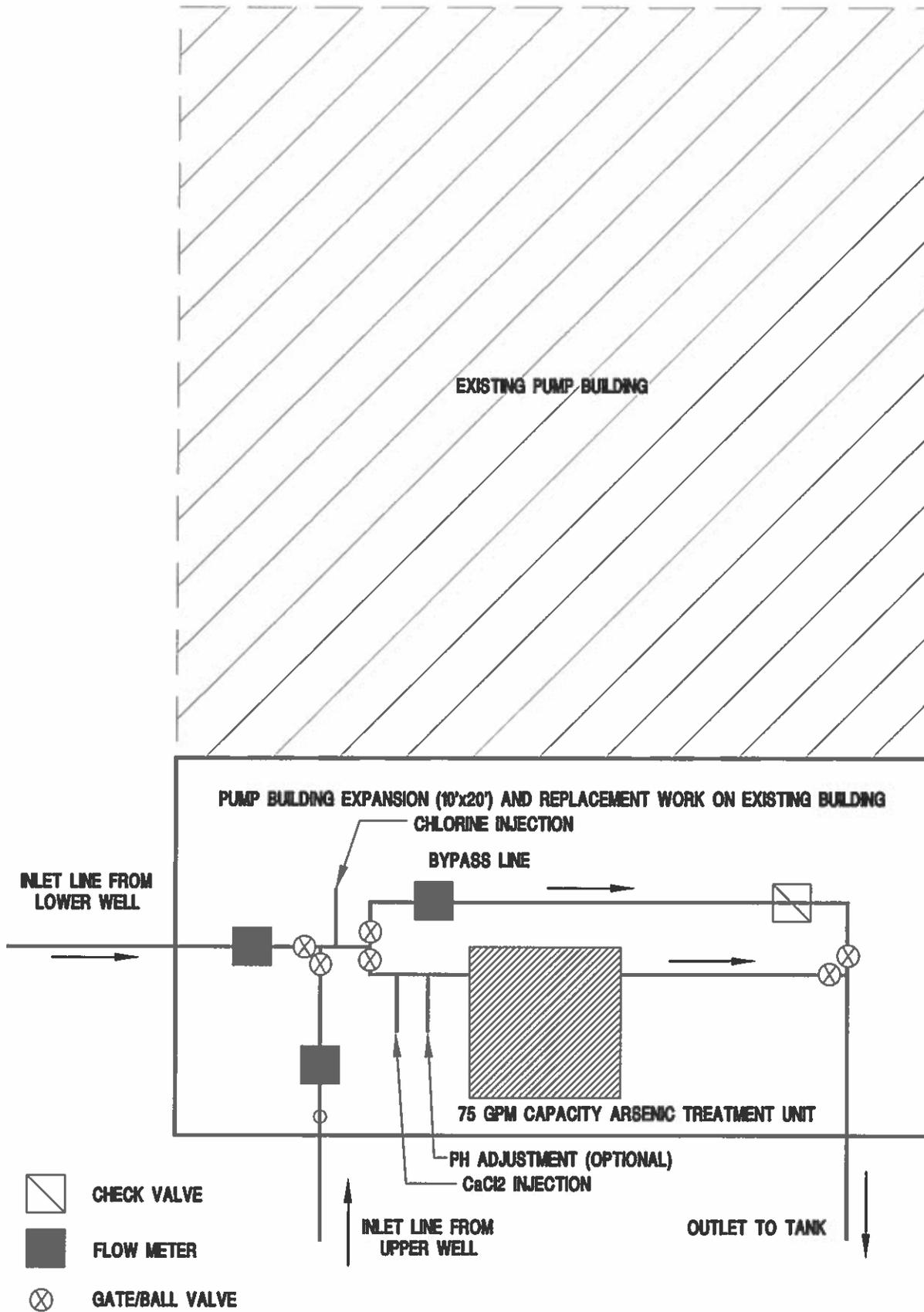


FIGURE 7: Absorption Media Schematic
 November 2013

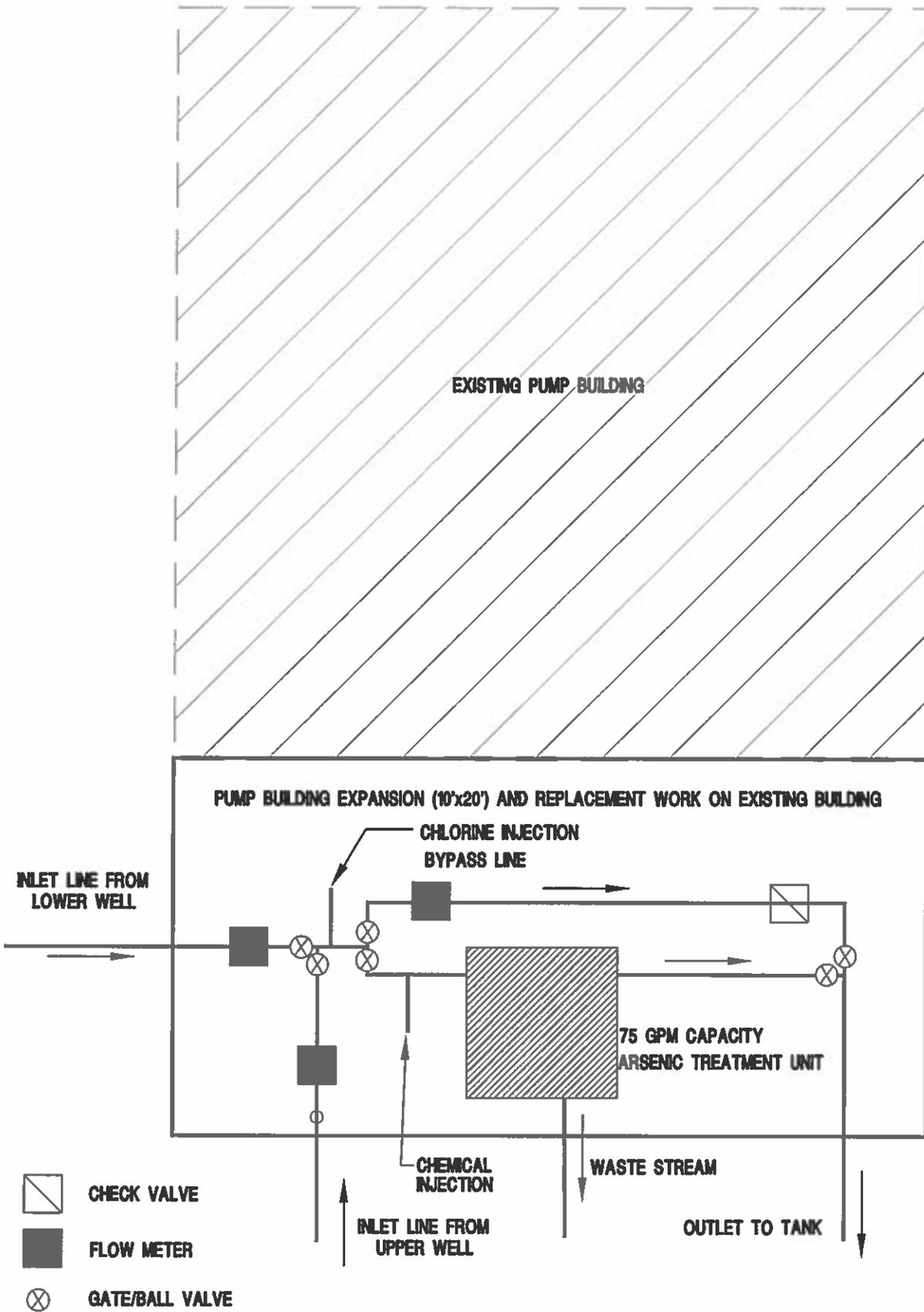


FIGURE 8: Reverse Osmosis Schematic
November 2013

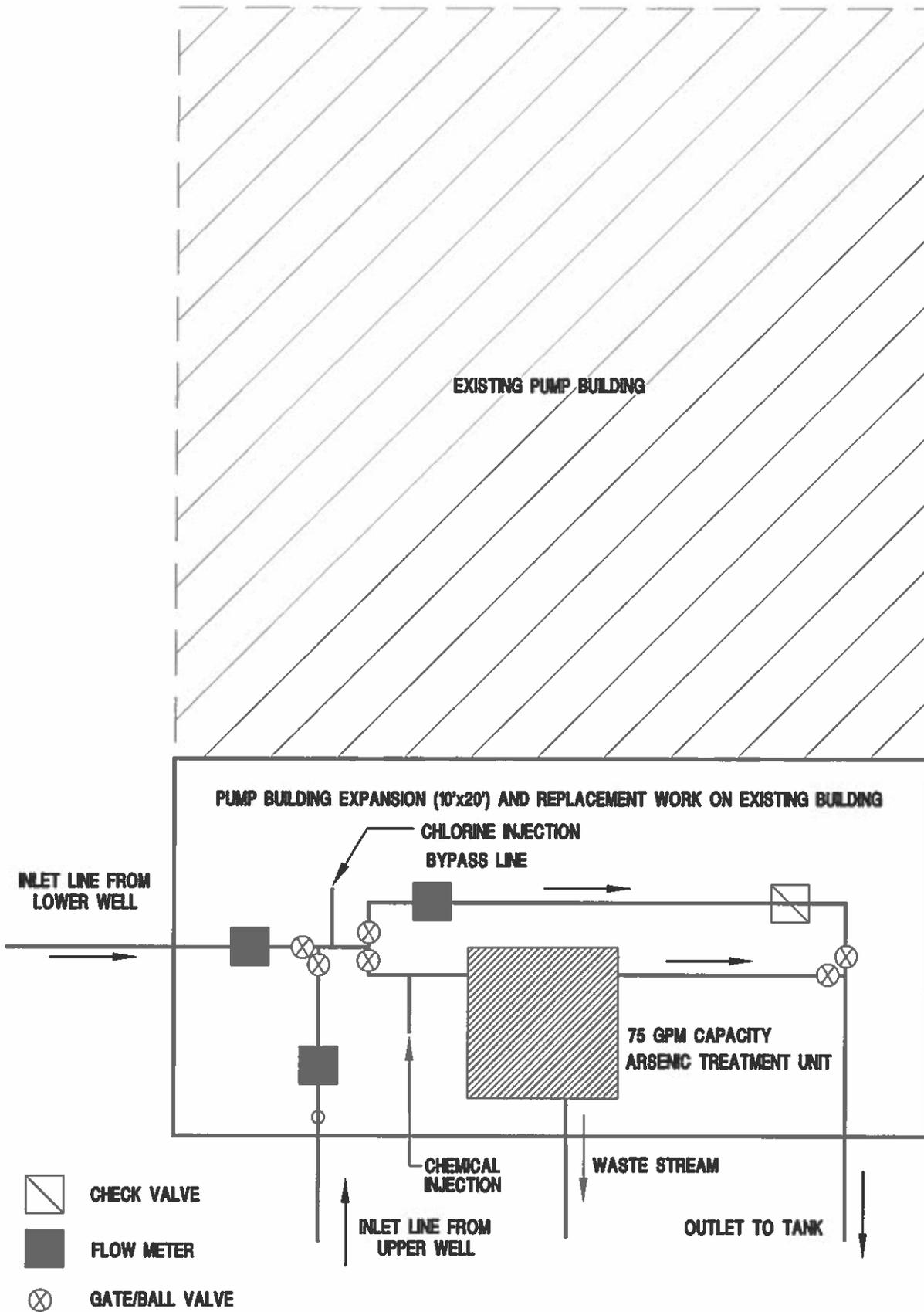
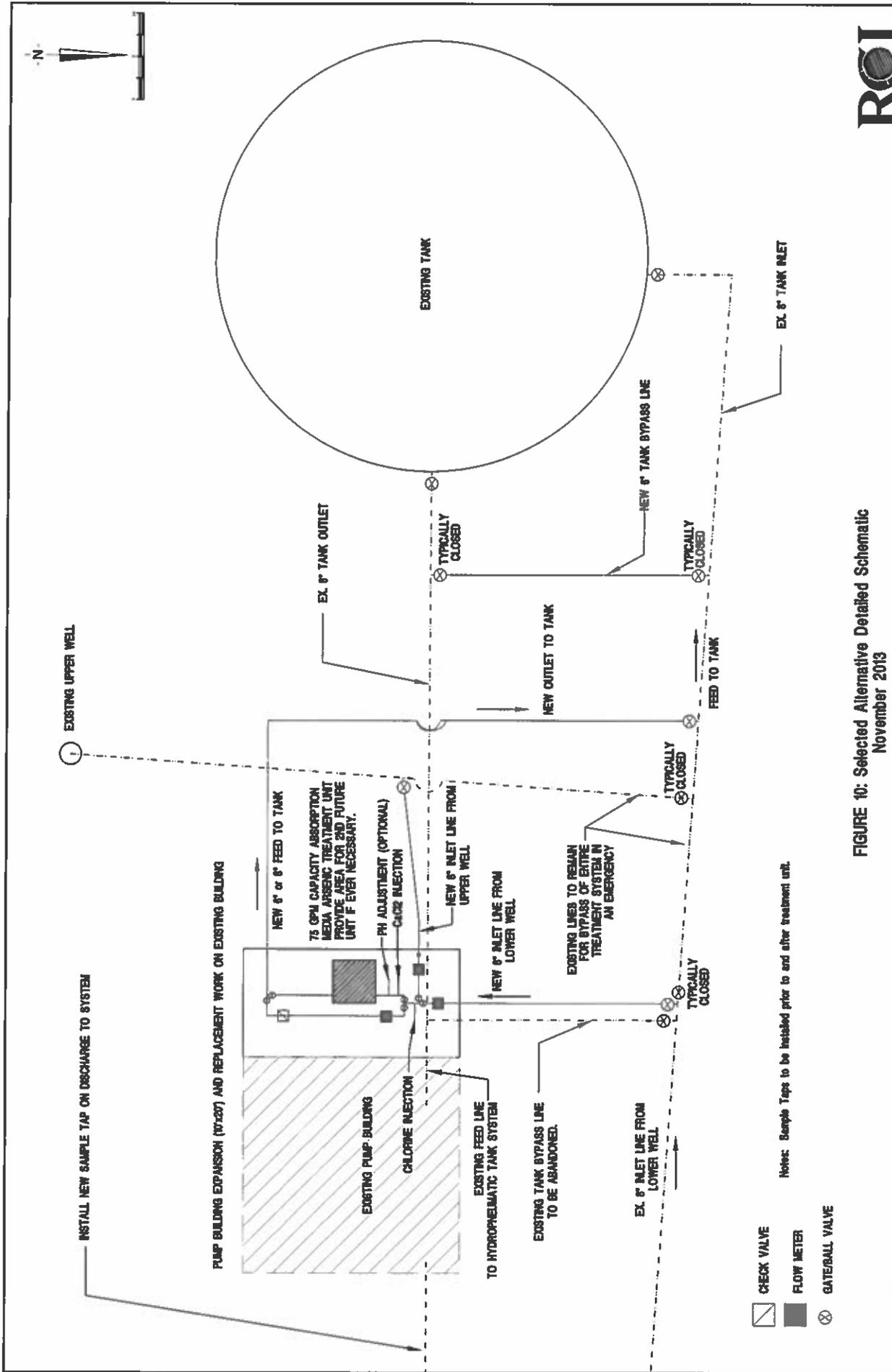


FIGURE 9: Micro-Filtration Schematic
November 2013



Attachment B

Legal Description

Acc 1839-1

232846

JAN 26 1972

When recorded return to: F. O. T. O. 1850 So Virginia, Reno

EASEMENT AGREEMENT

The undersigned, JAMES C. SWEGER and JOYCE E. SWEGER, husband and wife, GORDON B. MILLER and EDDIE MILLER, husband and wife, and SILVER HILLS, a Limited Partnership of Nevada, parties of the first part, and GREEN VALLEY RANCH, INC., a Nevada corporation, party of the second part;

W I T N E S S E T H:

WHEREAS, JAMES C. SWEGER and JOYCE E. SWEGER, husband and wife have title to sixtyeight percent (68%) interest, GORDON B. MILLER and EDDIE MILLER, husband and wife, have title to twelve percent (12%) interest, and SILVER HILLS, a Limited Partnership of Nevada, has title to twenty percent (20%) interest in and to the following described Parcel of Land,

Section 23, T. 21 N., R. 18E., M.D.B. & M., Washoe County, State of Nevada, EXCEPT the easterly 80.0 feet thereof, which is dedicated to Washoe County for road purposes, and EXCEPT the NW 1/4 of the NW 1/4 of the NW 1/4 thereof.

NOW, THEREFORE, in consideration of the sum of TEN DOLLARS (\$10.00), lawful money of the United States, and for other valuable consideration, the receipt whereof is hereby acknowledged, the parties of the first part do grant unto said party, its successors and assigns, easements and right of ways upon and over the lands above described, as follows, to be used for the purpose of drilling, installing and maintaining two (2) water wells for irrigation, domestic and quasi-municipal purposes to serve any or all of Sections 13, 23 and 25, the W 1/2 and NW 1/4 of Section 24, the E 1/2 of the E 1/2 and the SW 1/4 of the NE 1/4 of Section 26, the E 1/2 and NW 1/4 of the NE 1/4 of Section 35 and the SE 1/4 of Section 15, all located in T. 21 N., R. 18 E., M.D.B. & M., Washoe County, State of Nevada

PARCEL 1, Commencing at the Southeast Corner of Section 23, T. 21 N., R. 18E., M.D.B. & M., Washoe County, Nevada; thence along the line common to Sections 23 and 24 which forms the easterly Right-of-Way line of Red Rock Road in a N 0°00'34"E direction a distance of 800.0 feet to the point of intersection of said Right-of-Way line with the Centerline of Silver Knolls Boulevard; thence departing said Right-of-Way line and crossing Red Rock Road in a N 89° 59'26" W direction a distance of 80.0 feet; thence continuing along the Centerline of Silver Knolls Boulevard in a S 80°00'00" W direction a distance of 180.0 feet; thence departing said Centerline in a N 10° 00' 00" W direction a distance of 40.0 feet to a point in the northerly Right-of-Way line of said Silver Knolls Boulevard and the TRUE POINT

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232846

JAN 26 1972

OF BEGINNING; thence from said TRUE POINT of BEGINNING and continuing along said Right-of-Way line in a S 80°00'00" W direction a distance of 147.58 feet; thence departing said Right-of-Way line in a N 10°W direction a distance of 147.58 feet; thence N 80°E, 147.58 feet; thence S 10°E, 147.58 feet to the TRUE POINT OF BEGINNINGAN Area containing 0.500 acres, more or less.....

PARCEL 2. Commencing at the Southeast Corner of Section 23, T. 21N., R. 18E. M.D. B & M., Washoe County, Nevada; thence along the line common to Sections 23 and 24 which forms the easterly Right of Way line of Red Rock Road in a N 0°00'34" E direction a distance of 3923.8 feet; thence departing said Right-of-Way line and crossing Red Rock Road in a N 89°59'26" W direction a distance of 80.0 feet to the westerly Right-of-Way of said Red Rock Road and the TRUE POINT of BEGINNING; thence from said TRUE POINT of BEGINNING AND continuing along said Right of Way line in a S 0°00'34" W direction a distance of 73.79 feet; thence departing said Right-of-Way line in a N 89°59'26" W direction a distance of 147.58 feet; thence N 0°00'34" E, 147.58 feet; thence S 89°59'26" E, 147.58 feet to a point in the aforesaid westerly Right-of-Way line of Red Rock Road; thence along said Right-of-Way line in a S 0°00'34" W direction a distance of 73.79 feet to the TRUE POINT of BEGINNINGAn area containing 0.500 acres, more or less.

BOOK 609 PAGE 446

First parties further agree and by these presences do assign and transfer to second party, the right and privilege to erect, construct and maintain all necessary, appropriate or convenient water mains and pipes, apparatus, appliances and equipment, underground or otherwise, in, upon, over, under, across and along the existing and future streets and public grounds in order properly, successfully, and conveniently to construct, extend, maintain and operate a water distribution system in the SILVER KNOLLS AREA of Washoe County, Nevada. Second party, its successors and assigns shall lay and install the water mains, pipes, apparatus, appliances and equipment hereinabove mentioned so as not unduly to in

JAN 26 1972

terfer with the ordinary travel and use of the said streets or public grounds. Second party, its successors and assigns, shall have the right to furnish and sell water for drinking and other uses to all public or private customers and conduct water to points beyond the above-mentioned described property.

BOOK 609 PAGE 447

IN WITNESS WHEREOF, we have hereby set our signatures, this 27th day of January 1972

James C. Sweger
JAMES C. SWEGER

Joyce E. Sweger
JOYCE E. SWEGER

x Gordon B. Miller
GORDON B. MILLER

x Eddie Miller
EDDIE MILLER

SILVER HILLS, a Limited Partnership

Don S. York
By: DON S. YORK
General Partner

33886

BOOK 603 PAGE 438

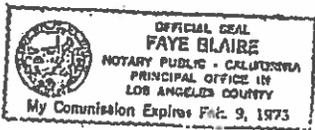
REC'D
COUNTY REC'D
JAN 27 1972
DEPT. OF REVENUE
CIVIL DIVISION
FIRST FLOOR
RECORDS BY
AVENUE
OF THE STATE

232846

JAN 26 1972

-E-

STATE OF CALIFORNIA,
COUNTY OF LOS ANGELES



On January 24 1972
before me, the undersigned, Notary Public in and for said State, personally appeared
Therese P. Miller and Eddie Miller
persons whose names are subscribed to the within instrument,
and acknowledged to me that they executed the same.

WITNESS my hand and official seal.

232846

Faye Blaire
Notary Public in and for said State. FAYE BLAIRE

ACKNOWLEDGMENT—General—Notarials Form 232—Rev. 3-64

STATE OF NEVADA,

County of Washoe

On December 20, 1971

DATE

personally appeared before me,

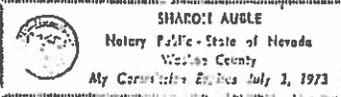
a Notary Public (or judge or other officer, as the case may be),

JAMES C. SWEGER, JOYCE E. SWEGER & DON S. YORK

who acknowledged that he executed the above instrument.

IN WITNESS WHEREOF, I have hereunto
set my hand and affixed my official stamp at my
office in the County of Washoe
the day and year in this certificate first above
written.

[Signature]
Signature of Notary



CARLISLE'S FORM NO. 26 N (ACKNOWLEDGMENT GENERAL)—A-58409

BOOK 609 PAGE 448

232846

OFFICIAL RECORDS
WASHOE COUNTY, NEV.
RECORD REQUESTED BY
FIRST COMMERCIAL TITLE, INC.
JAN 26 1972
ARDIS BROWN
COUNTY RECORDER
FEE 6.00 DEP JW

232846

LAND DEVELOPMENT
SUBDIVISIONS
CITY RIGHTS
SURVEYING



R. L. FULLER ENGINEERING
P. O. BOX 817, CARSON CITY, NEV. 89401
702/883-1770

CIVIL ENGINEERS - PLANNERS - LAND SURVEYORS
LICENSED IN NEVADA & CALIFORNIA

Legal description for water storage
tank and pump station site

A parcel of land situated in the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of
Section 23, T. 21 N., R. 18 E., M.D.B.&M., Washoe County,
Nevada, being more particularly described as follows:

Commencing at the southeast corner of said Section 23,
as marked by a standard U.S. General Land Office capped pipe,
proceed thence S. 87° 08' 34" W. along the south line of said
Section 23 a distance of 1150.59 feet to a point on the west
right of way line of a county road known as Bighorn Drive;
thence N. 00° 01' 06" W. along a projection of said right of way
line a distance of 251.49 feet to the True Point of Beginning;
thence continue N. 00° 01' 06" W. a distance of 39.36 feet to
a point of curvature; thence northerly along a curve to the
right an arc distance of 60.67 feet, said curve subtends a
central angle of 03° 17' 44" and has a radius of 1054.82 feet;
thence leaving said right of way line proceed S. 89° 58' 54"
W. a distance of 183.24 feet; thence S. 00° 01' 06" E. a dis-
tance of 100.00 feet; thence N. 89° 58' 54" E. a distance of
181.50 feet returning to the TRUE POINT OF BEGINNING.

Said parcel contains 0.420 acres, more or less.

BOOK 1427 PAGE 843

BOOK 1432 PAGE 387

SEP 21 1979

OFFICIAL RECORDS
WASHE CO., NEVADA
RECORD REQUESTED BY
Shirley D. Hayden et al.
79-SEP 7 AM 11:43

JOE WELCHER
COUNTY CLERK
FEE *10.00* DEP *90*

628199

RE RECORD
631016

EXHIBIT "A"

LAND DEVELOPMENT
SUBDIVISIONS
WATER RIGHTS
SURVEYING



R. L. FULLER ENGINEERING
P. O. BOX 517, CARSON CITY, NEV. 89401
DEC 28-1974

CIVIL ENGINEERS - PLANNERS - LAND SURVEYORS
LICENSED IN NEVADA & CALIFORNIA

Legal description of Silver
Knolls Blvd. well site

A parcel of land situated in the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of
Section 23, T. 21 N., R. 18 E., M.D.B. & M., Washoe County
Nevada, being more particularly described as follows:

Beginning at a point on a curve on the northerly right
of way line of an 80 foot wide road known as Silver Knolls
Blvd., from which point the southeast corner of said Section
23, as marked by a standard U.S. Land Office capped pipe,
bears S. 24° 36' 01" E. a distance of 917.02 feet, proceed
thence N. 09° 40' 45" E. along a line that is radial to said
curve, a distance of 125.00 feet; thence N. 80° 19' 15" E.
a distance of 50.00 feet; thence S. 09° 40' 45" E. a distance
of 50.00 feet; thence S. 80° 19' 15" W. a distance of 30.00
feet; thence S. 09° 40' 45" E. a distance of 75.45 feet to a
point on the afore-mentioned curve on the northerly right
of way line of said Silver Knolls Blvd., thence westerly
along said right of line and along a curve to the left an arc
distance of 20.01 feet returning to the TRUE POINT OF BEGINNING,
said curve subtends a central angle of 02° 36' 19" and a radius
of 440.00 feet.

The subject parcel contains 0.092 acres more or less.

BOOK 1432 PAGE 388
SERIAL 427 PAGE 648

SUB 1 2 136

OFFICIAL RECORDS
WASHOE COUNTY, NEVADA
RECORD REQUESTED BY
Budd Hagerstad
79 SEP 21 10 09

625200

RECORDS DEPARTMENT
FEE \$2.00
2.00

EXHIBIT "B"

RE-RECORD
631016

Attachment C

Preliminary Engineering Report

Silver Knolls Mutual Water Company

Arsenic Compliance

Preliminary Engineering Report

November 15, 2013

Prepared For:

Silver Knolls Mutual Water Company
P.O. Box 4522
Sparks, NV 89432-4522

Prepared By:



Resource Concepts, Inc. (RCI)
340 North Minnesota Street
Carson City, NV 89703-4152
Office: (775) 883-1600
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www.rci-nv.com

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Appendix E Arsenic Sampling Results of Lower and Upper Well for 2013

*2013-11-15 PER final rpt 13-142.1 Silver Knolls tr-jm L11-1.doc
[November 15, 2013]*

1.0 GENERAL OVERVIEW

The Silver Knolls Mutual Water Company (SKMWC) is located in Washoe County, Nevada, northwest of Reno (due west of the Stead Airport). SKMWC was formed in 1981 and provides water utility services for 63 residential lots within the surrounding larger community of Silver Knolls. Additionally, SKMWC provides water service to a regional park maintained by Washoe County. On December 5, 2012 SKMWC was issued a “Final” Arsenic exemption extension by the State Environmental Commission. The extension was granted with the following stipulations:

- By January 21, 2013, the System shall provide public notice that the extension was granted on December 5, 2012, and provide proof of posting of such public notice to the Nevada Division of Environmental Protection, Bureau of Safe Drinking Water (NDEP-BSDW) per NRS 445A.940. Public Notice shall be provided annually while the extension is in effect and proof of posting shall be provided to the NDEP-BSDW within 10 days of completion.
- By May 1, 2014, the system shall have installed, tested, and have in full operation a treatment system or other compliance option capable of producing drinking water that meets the arsenic standard of 10 parts per billion (0.010 mg/L).
- By January 23, 2015, the System shall demonstrate that the Running Annual Average of arsenic data from the System’s delivered water is in compliance with the standard of 10 ppb.
- The System shall provide quarterly progress reports to NDEP-BSDW by January 10, April 10, July 10, and October 10 of each year of the extension period.
- The System shall continue to monitor and report quarterly for arsenic to the NDEP-BSDW.

Per the letter, SKMWC has retained Resource Concepts, Inc. (RCI) to prepare this Preliminary Engineering Report in order to evaluate action alternatives to comply with the requirements of the arsenic compliance extension from the State. Four alternatives along with a sub action alternative common to the treatment alternatives, and one no-action alternative are proposed in this PER. The three action alternatives are similar in that they all include upgrades to the existing water supply system and provide for the removal of arsenic. Each action alternative proposes a different arsenic treatment process. The work proposed in all of the action alternatives is contained within the existing service area of SKMWC. No easements or land acquisition are required.

2.0 PROJECT PLANNING AREA

2.1 Location

SKMWC is located near Stead in Washoe County, Nevada (Figures 1 and 2). Specifically, the service area is located within a portion of the NW1/4 NE1/4 of Section 26 T.21N., R.18E.

The proposed project falls within the existing service/system area.

The service area encompasses:

- The 64 lots accessed by Bounder Lane, Sutters Mill Lane, Aldebaran Drive and the northern end of Big Horn Drive (beginning approximately 500 ft north of Wells Fargo Road). Lots are generally 0.5 acres in size, plus roadways maintained by the County. The lots served by the SKMWC were created in 1979 under the Silver Knolls Ranch Estates Unit 7 Subdivision Map - #1889 on file at the Washoe County Recorders Office.
- The Silver Knolls Regional Park maintained by Washoe County Parks. The park parcel is approximately 20 acres in size.
- The tank and wells sites located north of the 64 lots are serviced by the SKMWC (combined area of 0.51 acres).

The service area, which encompasses approximately 58.5 total acres, generally slopes from northwest to southeast. Elevations across the service area range from approximately 5175 feet in the northwest corner to approximately 5048 feet in the southeastern corner of the service area. Figure 3 shows the water system on a USGS Quadrangle Map.

2.2 Environmental Resources Present

The portion of Washoe County in which SKMWC is located is characterized by open spaces containing sage, rabbit, and bitter brush and rural residential communities. SKMWC serves a population of less than 200. The area served by SKMWC is a rural residential community just north of the Reno/Sparks/Stead area. Air quality meets all state and federal standards. Traffic congestion is minimal and U.S. Highway 395 is the primary north-south transportation corridor near the SKMWC linking it with the Reno/Sparks area.

The drainage area around the area served by SKMWC is relatively small and FEMA mapping shows the nearest flooding to be associated with Silver Lake. The entire SKMWC service area is located in Flood Hazard Zone X (See Figure 4).

The predominant vegetation community is upland scrub-shrub, consisting of both sagebrush and salt desert scrub communities. The area north and west of the developed area supports wildlife habitat for small mammals, reptiles, songbirds and raptors, as well as a potential for mule deer in the foothills north and west of the service area. None of these wildlife species would be impacted by the project.

2.3 Population Trends

The SKMWC service area is not an incorporated city or a census block, therefore no population estimates are provided by the Nevada State Demographer's Office. There is no population information available for 2000 from the United States Census Bureau for SKMWC, but for 2010 an interactive

population map was used to estimate the population of SKMWC and more specifically the area that SKMWC is responsible for. It is assumed the population is stagnant and therefore no projections will be calculated. According to the 2010 United States Bureau, the estimated population serviced by SKMWC is 170. This estimate was done using the United States Census Bureau’s interactive map, which allowed the breakdown to a census block. It was then assessed which blocks fall within the territory of the SKMWC rendering a population of 170. The SKMWC is responsible for 64 units making the average household size around 2.5 persons.

There is potential for future expansion to surrounding areas, specifically north of the existing service area. However, the timing of such expansion is unknown under current economic conditions. There is a private 308.6 acre parcel owned by Lifestyle Homes LLC to the north of the service area of the SKMWC, which could result in new development and be potential growth for the SKMWC, but there are no current plans for development. The surrounding residential areas to the east and south of the SKMWC service area are serviced by domestic wells and septic systems. Any expansion to these areas will be driven by failures in existing wells and a desire of the residents to become connected to the SKMWC. On the west side of the SKMWC is the Silver Knolls Park that is owned and maintained by Washoe County Parks. Expansion of the existing park could result in further water use; however, there are no known plans for further expansion in the near future.

Table 1 summarizes the current and future demands.

Table 1. Summary of Existing and Projected Water System Demands

	Population Estimate	Equivalent Dwelling Units (Residential and Commercial Service Connections)	Average Daily Demand (MGD)
Existing Demand ^{1/}	170	81	0.457
Increase in Silver Knolls Population by 2028	0	0	0
Total	170	81	0.457

^{1/} Based on average of flows from 2005-2012

2.4 Community Engagement

Within the past 6 months the SKMWC has been actively discussing the arsenic issue with the water users through newsletters and open noticed board meetings. As the process continues, SKMWC will continue to correspond with and inform the water customers associated with the 64 connections within the system through the following means:

- Public meetings noticed to the water customers
- Newsletters
- Board meetings open and noticed to all water customers

3.0 EXISTING FACILITIES

3.1 Location Map

SKMWC is located near Stead in Washoe County, Nevada. Specifically, the service area is located within a portion of the NW1/4 NE1/4 of Section 26 T.21N., R.18E. A schematic of the water system is provided in Figure 5.

The proposed project falls within the existing service/system area.

Figure 4 overlays SKMWC's boundaries on the most recent Flood Insurance Rate Maps in the vicinity of the proposed project. The proposed project falls within NW1/4 NE1/4 of Section 26 T.21N., R.18E and is completely within the existing SKMWC system.

3.2 History of Existing Facilities

Pipeline Distribution System

SKMWC was formed in 1981 to service the designated area within Silver Knolls Ranch Estates Unit 7 located in Washoe County. The SKMWC potable water system includes a system with approximately 1.16 miles of distribution mains ranging in size from 6-inch to 8-inch diameter. The water lines are composed of asbestos cement (AC) pipe within the distribution system. The SKMWC water system currently provides service to approximately 63 residential water connections (63 EDUs) and 1 commercial service connection, Silver Knolls Park (18 EDUs). There are thirty-one double service lines and two single service lines. There are a total of 5 fire hydrants within the distribution system. The entire system was placed in service in 1979, making it thirty-four years old.

Water Production Wells

SKMWC water production is provided by a total of two wells operated by SKMWC

Production capacity and arsenic levels of the two active municipal wells are shown in Table 2.

Table 2. Active Municipal Well Information

Well Name	Year Drilled	Production	Arsenic Level (ppb)
Lower Well	1972	330 gpm	8-15
Upper Well	2000	170 gpm	8-15

The Lower Well production, as SKMWC's primary water source with a capacity rating of 330 gpm, is sufficient to meet existing maximum-day service requirements. Based on water usage records since 2005, the current District summer maximum day service demand can also be met solely by the Upper Well. Based on the available water storage the pumping capacity of the Lower Well could be reduced if desired to match that of the Upper Well.

Water Treatment Facilities

SKMWC does not currently provide any treatment for their water other than injection of chlorine.

Water Storage Facilities

SKMWC owns and maintains one water storage tank. The tank is welded steel with a diameter of 39 feet and a height of 24 feet. The tank is approximately 34 years old. The tank details are in Table 3.

Table 3. Storage Tank Information

Tank Name	Year Constructed	Operational Capacity
SKMWC Tank	1980	211,500 gallons

Booster Station

The SKMWC water system operates with a single water pressure zone for the primary distribution system. However, due to the elevation of the tank (ground based at the same elevation as the residential area) a booster pump system is required to pressure the water from the storage tank prior to distribution to the SKMWC customers. System pressure is maintained via a 760-gallon hydro-pneumatic tank. The operating pressure range for the hydro-pneumatic tank is 50 to 70 psi. The hydro-pneumatic tank is fed by a small jockey pump with a pumping capacity of 130-150 gpm depending on the system pressure. A diesel-driven standby fire demand pump with a rated capacity of 1,000 gpm is also installed within the booster station to provide fire flow to the system if necessary. A chlorine injection pump and related chlorine storage is also located within the booster station. SKMWC chlorinates the water as it enters the water tank. The pump details are in Table 4.

Table 4. Booster Pump Information

Pump Name	Year Installed	Operational Capacity (gpm)
Booster Pump	1980	130-150
Fire Pump	1980	1,000

3.3 Condition of Existing Facilities

Pipeline Distribution System

The SKMWC water pipeline distribution system consists of 1980 water lines made primarily of asbestos cement (AC) with some ductile iron/steel piping within the booster station.

The SKMWC water distribution system is assumed to be in good condition. This is based on meter information from 2000, which showed a 2.4% system loss (unaccounted for use). This was based on a comparison of the customer use records versus production records (an average loss of 10% is considered to represent an efficient water system.). Data from years after 2000 is corrupted and not accurate due to failings in the production well and service meters. The older AC water pipe, first installed in approximately 1979, has now been in operation for 34 years and is approaching a reasonable remaining useful life of about 20 to 30 years. AC pipe is estimated to have a useful life of 40 to 75 years depending on the system conditions. However, the generally expected useful life for water pipes is 60 years. The low system losses experienced by the existing system suggests that the existing AC pipe remains in good condition. SKMWC should plan to begin saving funds for the replacement of the existing mains now to ensure funds are available for system replacement.

Per discussions with the operating staff of SKMWC, routine maintenance and exercising of the existing valves, hydrants, and other distribution components has been minimal or non-existent in the past. This lack of routine maintenance can have a detrimental effect upon the useful life of the distribution system components such as valves, hydrants, and flush valve assemblies. Based on the lack of maintenance there is the possibility that a high percentage of the valves in the system are now inoperable and need to be replaced.

Water Production Wells

Per discussions with the operating staff of SKMWC the water produced by the currently operating two municipal wells does not appear to be corrosive or cause significant scaling of the well casing or screens. This observation is based on the results of cleaning and televising done on the Lower Well in approximately 2000, which did not indicate any major issues with the existing casing and screen on the lower well. However wells should be rehabilitated at least every 10 years by surging, acidizing and flushing, to remove silt and sediment, to break down plugging of the gravel pack, and to remove mineral build-up on the screens. With the Lower Well as the primary source of supply for SKMWC, the water company should continue to monitor the condition of the Lower Well so there is ample time to plan for re-drilling the well or finding another source of supply should the well begin to deteriorate. Additionally, the expected useful life of the submersible pumps in SKMWC wells should be considered to be approximately 10 years.

- The primary production source, Lower Well, was drilled in 1972. However, it was not actually equipped and placed in production until 1980. The submersible pump currently in use was installed in 2000. The arsenic concentration in the water from Lower Well ranges from 8 to 15 parts per billion (ppb), the high range of which exceeds the maximum contaminate level (MCL) of 10 ppb allowed by the Arsenic Rule. Results of arsenic sampling for the Lower Well in 2013 are provided in Appendix E.
- The Upper Well was originally drilled and equipped in approximately 2000. The submersible pump currently in use was installed in 2000. The arsenic concentration in the water from Upper Well ranges from 8 to 15 parts per billion (ppb), the high range of which exceeds the maximum contaminate level (MCL) of 10 ppb allowed by the Arsenic Rule. Results of arsenic sampling for the Upper Well in 2013 are provided in Appendix E.
- The meters for both the Upper and Lower Well are no longer functioning properly and need to be replaced in order to have accurate production records.

Water Storage Facilities

As previously indicated, SKMWC currently owns and maintains one welded steel water storage tank. The existing tank is currently fully functional and is considered to be structurally in good condition.

While considered to be structurally in good condition, the primary maintenance issue for welded steel storage tanks in SKMWC is the condition of internal and external tank coating systems. Failure of tank surface coatings can jeopardize the condition of the unprotected steel, and can affect water quality primarily as a result of rusting. While the service life of tank coating systems is significantly affected by the quality of the product and by the workmanship in surface preparation and application, a service life of approximately 20 years for the coating is generally expected. In consideration of the expected life of the coating systems, the following is a general description of the current condition of the SKMWC storage tank.

SKMWC Tank: This tank is the only storage facility in service in SKMWC, having been constructed in approximately 1980. There are no specific records of tank inspections or repair/maintenance activities. Verbal discussions indicate there have been some efforts in the past to re-coat the tank as well as dive to tank to verify its condition. A visual inspection of the outside of the tank does not show any major deficiencies other than some denting from bullets. It is recommended that the SKMWC dive and video the tank to obtain a verification of the internal condition of the tank.

SKMWC has contracted a company to dive and clean out the tank; however, this work has not been completed as of the writing of this report.

Water Loss

As part of this PER, RCI analyzed the amount of unaccounted-for water in the system. This was based on a comparison of the total metered water production versus the total metered water usage in the system. The total amount of water pumped from SKMWC wells was compared with the billed water usage for the year 2000. The data for 2000 was used as it was seen to be the most accurate data with the fewest errors in meter readings for either the residential meters or the well production meters. Approximately 0.567 million gallons or 2.4% of the total water pumped was unaccounted for. No specific cause of losses was identified and SKMWC does not have a distribution leak detection program. As previously indicated in this report, a system that operates with less than 10% water loss is typically considered an efficient system, so that at a loss rate of 2.4% the SKMWC system is considered to be efficient.

Currently the SKMWC is functioning as previously, with no major issues with the equipment. However, regarding permitted arsenic levels in the water, the SKMWC is not in compliance with these regulations. The allowed arsenic level is 10 parts per billion (ppb) and the SKMWC is producing water at roughly 8-15 ppb. Additional equipment needs to be installed to treat the water in order to bring the arsenic levels down to 10 ppb.

3.4 Financial Status of Existing Facilities

Current water rates are set at a basic monthly service charge of \$64.04 plus a 1.5% Regional Water Management Fee. The flat rate for all customers is \$65.00/month for the first 50,000 gallons. Usage rates for water used over 50,000 are shown in Table 5.

Table 5. Water Basic Monthly Service Charge Breakdown

Monthly Flat Rate up to 50,000 gallons	Amount (\$)	Regional Management Fee (1.5%)	Total Fee (\$)
		64.04	0.96
Usage 50,001 – 60,000	\$1.00/1000 gal	+1.5%	\$65 + Usage & Fee
Usage 60,001 – 70,000	\$1.50/1000 gal	+1.5%	\$65 + Usage & Fee
Usage 70,001 – 80,000	\$2.00/1000 gal	+1.5%	\$65 + Usage & Fee
Usage 80,001 – 90,000	\$2.50/1000 gal	+1.5%	\$65 + Usage & Fee
Usage 90,001 – 100,000	\$5.00/1000 gal	+1.5%	\$65 + Usage & Fee
Usage 101,000 and over	\$10.00/1000 gal	+1.5%	\$65 + Usage & Fee

Table 6 provides a summary of the existing bond held by SKMWC and the breakdown of the required service change for the bond repayment.

Table 6. Summary of Bonds and Annual Payments

	Amount (\$)	Annual Payment (\$)	Monthly Rate Required (\$) ^{1/}
2001 Water Revenue Bond	120,000	8,796.49	\$11.45
Total:	120,000	8,796.49	\$11.45

^{1/} Rate required is calculated by dividing the annual payment by 64 customers over 12 months.

As of July 2013, SKMWC has \$56,450.10 of remaining principal debt on their revenue bond. With interest payments through July 1, 2022 the SKMWC has a total obligation of \$74,770.16 to complete payment on the existing bond.

Currently no median household income survey has been conducted to determine if SKMWC could qualify for subsidy based upon low-income users.

Annual spending and income statements for the SKMWC for 2009-2013 are in Appendix A.

3.5 Water/Energy/Waste Audits

No specific water, energy, or waste audits have been conducted as associated with the SKMWC operations. A brief analysis of water loss from the system by comparing meter readings from wells and services was done but is not an actual audit. Due to the small size of the SKMWC system and a review of their annual operational financing it does not appear that an audit of water, energy, or waste would turn up anything of significance.

4.0 NEED FOR PROJECT

4.1 Health, Sanitation and Security

In January of 2001, the Federal Arsenic and Clarifications to Compliance and New Source Monitoring Rule was passed which lowered the arsenic MCL from 50 ppb to 10 ppb. Currently, both the Lower Well and Upper Well, which are the sources of water for the SKMWC potable water, exceed the standard of 10 ppb. Water supplied from the Lower Well has an arsenic concentration in the range of 8 to 15 ppb, and water from the Upper Well has an arsenic concentration in the range of 8 to 15 ppb.

On December 5, 2012 SKMWC was issued a “Final” Arsenic exemption extension by the State Environmental Commission. The extension was granted with the following stipulations:

- By January 21, 2013 the System shall provide public notice that the extension was granted on December 5, 2012, and provide proof of posting of such public notice to the Nevada Division of Environmental Protection, Bureau of Safe Drinking Water (NDEP-BSDW) per NRS 445A.940. Public Notice shall be provided annually while the extension is in effect and proof of posting shall be provided to the NDEP-BSDW within 10 days of completion.
- By May 1, 2014 the System shall have installed, tested, and have in full operation a treatment system or other compliance option capable of producing drinking water that meets the arsenic standard of 10 parts per billion (0.010 mg/L).
- By January 23, 2015 the System shall demonstrate that the Running Annual Average of arsenic data from the System’s delivered water is in compliance with the standard of 10 ppb.
- The System shall provide quarterly progress reports to NDEP-BSDW by January 10, April 10, July 10, and October 10 of each year of the extension period.
- The System shall continue to monitor and report quarterly for arsenic to the NDEP-BSDW.

4.2 Aging Infrastructure

The current water system operates efficiently and is in overall good shape. There is minimal water loss (approximately 2.5%) even though sections of the system were built in 1980. The current system has a single loop of 6-inch AC pipe with services and one dead end 6-inch main on Sutter’s Mill Lane served from the 6-inch loop. A simple water model shows that the system is able to maintain a minimum of 1,000 gpm fire flow at all the fire hydrants with the fire pump on.

The system is managed by a part-time operator, who verifies that the system is operational. The system is essentially operated by a SCADA system that handles the day-to-day operation of the system based upon pressure and tank set points.

Regular maintenance of the pumps, tank, wells, valves, hydrants and other infrastructure components has been sporadic per discussions with representatives of SKMWC. The SKMWC should evaluate each piece of equipment within the system and develop a timeline/schedule for regular service, or exercising, of the equipment in order to obtain the longest useful life from the components of the system. Additionally, a plan for funding the replacement of the system components needs to be developed to minimize the need for loans in the future.

4.3 Reasonable Growth

Current maximum summer daily demand within SKMWC is approximately 91,000 gallons, with a corresponding daily production rate of 63 gpm. This current demand is not anticipated to change other than yearly fluctuations unless the existing system is expanded beyond its current water service area.

Primary areas of growth for SKMWC are expansion of the service area through the conversion of adjacent land to private developable land; and expansion to include adjacent areas currently on domestic wells. SKMWC currently has 63 residential service connections (63 EDUs) and 1 commercial service connections (18 EDUs Silver Knolls Park) serving an estimated population of 170 people. Currently, there are no known plans for expansion of the system or the Silver Knolls Park that would result in an increase in the water demand.

5.0 ALTERNATIVES CONSIDERED

5.1 No Action Alternative

Essentially continue as is – this will result in Washoe County Department of Health requiring delivery of bottled water to all users and ultimately will result in Washoe County taking over the system to make the necessary upgrades at the cost of the users. The actual impact in terms of cost to the users is unknown but it can be estimated that Washoe County will make all necessary upgrades to the entire system that they deem necessary for arsenic compliance and will charge the water users for the improvements. Therefore, at a minimum the No Action Alternative will result in similar cost to the alternatives developed in this PER and will result in the loss of control of the water system and potentially the assets associated with the water system.

5.2 Dedicated Connection to Silver Knolls Park from Upper Well Alternative

Description

Connection of Silver Knolls Park irrigation system to Upper Well and revise the existing piping to allow the Upper Well to serve 100% of the irrigation needs of the Silver Knolls Park while maintaining a backup connection from the Upper Well to the domestic system in the event of a failure with the Lower Well. The Upper Well currently exceeds the arsenic standard of 10 ppb on a regular basis and is of lower quality water as compared to the Lower Well. Some original sampling of arsenic from the wells showed some potential to need arsenic treatment with the Lower Well. If arsenic treatment were not necessary with the Lower Well this alternative would have resolved the treatment issue for the Upper Well. However, further testing of the Lower Well showed that arsenic treatment would be required for both the Upper and Lower Wells. With that in mind, this alternative was still examined to see if the cost savings of reducing the flow requiring arsenic treatment would be enough to justify the capital costs. By creating a dedicated service from the Upper Well to serve the irrigation needs of the Silver Knolls Park the summertime demand on the Lower Well (which is anticipated to be treated for arsenic), will reduce the amount of water requiring treatment and will reduce the cost and size of arsenic treatment for the system. The Silver Knolls Park consumes approximately 23% of the summer time water usage within the SKMWC.

This alternative is not a stand-alone alternative and is a side alternative to be tied to an arsenic treatment method.

Design Criteria

The new water system improvements will be designed to ensure the full supply of irrigation water to the park as well as maintaining an emergency connection from the Upper Well to the domestic system should the need arise. Additionally, the new piping from the Upper Well to the domestic system will be plumbed to allow the selected arsenic treatment system to treat the water from the Upper Well prior to discharge to the system to ensure it will meet drinking water standards. All construction will be completed in accordance with Orange Book Standards and Uniform Building Codes. Construction will also comply with all Washoe County Standards and Requirements, particularly in regards to dust and erosion control Best Management Practices (BMPs) for any grading and excavation. Grading will not alter any natural or constructed drainage channels upon the property or divert additional surface runoff to existing storage basins or off-site drainage facilities.

Map

A map of the proposed improvements to provide a separate irrigation service for the Silver Knolls Park is included in the PER as Figure 6.

Environmental Impacts

The potential for alternatives to adversely effect the environment was evaluated for: lands, floodplain, wetland, historic/cultural resources, biological resources, water quality, air quality, noise, and transportation. Temporary disturbance related to construction activities provides the most potential for adverse effects, but the project also proposes measures to avoid and minimize impacts to less than significant. Measures included erosion control BMPs during construction.

Lands: Work related to the new dedicated irrigation service will be within existing disturbed public right of ways and existing dirt and landscaped areas within the Silver Knolls Park.

Floodplain: No FEMA designated floodplains exist within the proposed work area.

Wetlands: No wetlands exist within the proposed work area.

Biological/Cultural Resources: All work is within previously disturbed areas; therefore, there are no impacts to any potential biological/cultural resources.

Water Quality: All work is within previously disturbed areas and will have BMPs installed. There is no impact to surface or groundwater quality.

Air Quality, Noise, and Transportation: Impacts related to air quality, noise, and transportation will be temporary and related to construction activities. Work hours will be limited and dust control maintained to mitigate noise and air quality impacts.

Land Requirements

No land purchases are required for the proposed alternative. A temporary construction access from Washoe County Parks will be necessary in order to install the new dedicated irrigation service, and re-plumbing of the existing service to feed only the bathrooms and drinking fountains within the Silver Knolls Park.

Potential Construction Problems

There are currently no known construction related issues such as high water table, subsurface rock, limited access, or other factors that may have an effect on the cost or operation of the facilities.

Sustainability Considerations

Water and Energy Efficiency: The installation of a dedicated irrigation service to the Silver Knolls Park is proposed to increase the long-term operational efficiency of the necessary arsenic treatment system. During the summer months the park utilizes approximately 23% of the total daily demand for the water company. Irrigation water does not require treatment. By maintaining a dedicated irrigation service to the park, the cost to treat water for domestic use will be reduced and the useful life of the arsenic treatment system will be extended since water that does not require treatment will not be treated. Installing the dedicated irrigation service there will increase the operational efficiency and better management of the water resources of the Silver Knolls Mutual Water Company.

Green infrastructure: The management of storm water is not applicable to this alternative.

Other: There are no other aspects of sustainability associated with this alternative.

Cost Estimate

The estimated construction costs for this alternative total \$158,600. The estimated non-construction costs for this alternative, including project contingency, engineering, permitting, legal, bonding and oversight, total \$88,790. The estimated annual operations and maintenance cost savings for this alternative total (\$2,277) (does not include existing O&M costs). The breakdown of costs for this alternative are included in Appendix B.

5.3 Arsenic Absorption Media Alternative

Description

The SKMWC currently exceeds the EPA mandated arsenic standard for drinking water. A means of reducing the level of arsenic in the drinking water is required in order to come into compliance with the arsenic standard and meet the requirements of the State Environmental Commission. One of the methods examined to reduce the arsenic levels is to remove the arsenic with an absorptive media. This would consist of piping the raw water from the SKMWC wells through an absorptive media container and into the existing storage tank for later use in the system. The piping and treatment unit will require an expansion of the existing booster station building, upgrade of existing electrical components, and upgrade of the existing control system. Additionally, the Lower Well would be re-equipped with a 185-gpm pump. This smaller pump reduces electrical demand charges for the well while also reducing the size of the required treatment unit.

Design Criteria

All waterline design and treatment plant modifications will comply with the design requirements set forth in the State of Nevada Bureau of Safe Drinking Water system design criteria and Washoe County design standards. Additionally, the requirement for the treatment system will be to reduce the arsenic level in the water to below 10 ppb.

The arsenic level in the untreated well water is low enough that the SKMWC will not need to treat 100% of their raw water. This alternative proposes to re-equip the Lower Well with a smaller capacity pump. With the new pump installed in the Lower Well, and based on water quality sampling data, the SKMWC should only need a 75-gpm treatment unit to meet the water quality standards for arsenic.

Map

A schematic of the proposed improvements to provide arsenic treatment via absorption media for the SKMWC is included in the PER as Figure 7.

Environmental Impacts

The potential for alternatives to adversely effect the environment was evaluated for: lands, floodplain, wetland, historic/cultural resources, biological resources, water quality, air quality, noise and transportation. Temporary disturbance related to construction activities provides the most potential for adverse effects, but the project also proposes measures to avoid and minimize impacts to less than significant. Measures included erosion control BMPs during construction.

Lands: Work related to the new treatment system and well re-equipping will be within existing disturbed property owned by SKMWC.

Floodplain: No FEMA designated floodplains existing within the proposed work area.

Wetlands: No wetlands exist within the proposed work area.

Biological/Cultural Resources: All work is within previously disturbed areas; therefore, there are no impacts to any potential biological/cultural resources.

Water Quality: All work is within previously disturbed areas and will have BMPs installed. There is no impact to surface or groundwater quality.

Air Quality, Noise, and Transportation: Impacts related to air quality, noise, and transportation will be temporary and related to construction activities. Work hours will be limited and dust control maintained to mitigate noise and air quality impacts.

Land Requirements

All construction, staging and material storage will be completed on property owned by SKMWC or within existing ROW and easement. No additional land or easements will be required for the treatment component of the project.

Potential Construction Problems

There are currently no known construction related issues such as high water table, subsurface rock, limited access, or other factors that may have an effect on the cost or operation of the facilities.

Sustainability Considerations

Water and Energy Efficiency: The installation of a smaller pump in the lower well will reduce the monthly electrical demand charge for the well, which is based on the highest power draw. However, the pump will run longer at a lower rate so there may not be as much savings as might be anticipated. The smaller pump benefit is more aligned with the ability to install a smaller arsenic treatment system to treat a higher percentage of the well's production. If the existing larger pump were to remain, a more expensive/larger arsenic treatment system would be required in order to reduce the arsenic levels consistently below 10 ppb.

Green infrastructure: The management of storm water is not applicable to this alternative. The new building expansion will be per Washoe County Codes and any efforts for "green" construction materials will be weighed against the available budget for the project.

Other: There are no other aspects of sustainability associated with this alternative.

Cost Estimate

The estimated construction costs for this alternative total \$200,000. The estimated non-construction costs for this alternative, including project contingency, PER, engineering, permitting, testing, inspection, construction management, legal, bonding and oversight, total \$120,750. The estimated annual operations and maintenance costs for this alternative total \$10,822 (does not include existing O&M costs). The operational costs can potentially be reduced by approximately \$1,500 annually by adjusting the pH of the water. The pH adjustment will extend the media life and reduce the replacement cost for media on an annual basis. The breakdown of costs for this alternative are included in Appendix B.

5.4 Reverse Osmosis Arsenic Removal Alternative

Description

The SKMWC currently exceeds the EPA mandated arsenic standard for drinking water. A means of reducing the level of arsenic in the drinking water is required in order to come into compliance with the arsenic standard and meet the requirements of the State Environmental Commission. One of the methods examined to reduce the arsenic levels is to remove the arsenic with a Reverse Osmosis system. This would consist of piping the raw water from the SKMWC wells through a Reverse Osmosis system and into the existing storage tank for later use in the system. The piping and treatment unit will require an expansion of the existing booster station building, upgrade of existing electrical components, and upgrade of the existing control system. The Reverse Osmosis system will also require a chemical feed system and a means of containing/holding the backwash and filtrate from the system, as there is no existing sewer disposal system in the area of the SKMWC. Additionally, the Lower Well would be re-equipped with a 185-gpm pump. This smaller pump reduces electrical demand charges for the well while also reducing the size of the required treatment unit.

Design Criteria

All waterline design and treatment plant modifications will comply with the design requirements set forth in the State of Nevada Bureau of Safe Drinking Water system design criteria and Washoe County design standards. Additionally, the requirement for the treatment system will be to reduce the arsenic level in the water to below 10 ppb.

The arsenic levels in the untreated well water is low enough that the SKMWC will not need to treat 100% of their raw water. This alternative proposes to re-equip the Lower Well with a smaller capacity pump. With the new pump installed in the Lower Well, and based on water quality sampling data the SKMWC should only need a 75-gpm treatment unit to meet the water quality standards for arsenic.

Map

A schematic of the proposed improvements to provide arsenic treatment via Reverse Osmosis for the SKMWC is included in the PER as Figure 8.

Environmental Impacts

The potential for alternatives to adversely effect the environment was evaluated for: lands, floodplain, wetland, historic/cultural resources, biological resources, water quality, air quality, noise and transportation. Temporary disturbance related to construction activities provides the most potential for adverse effects, but the project also proposes measures to avoid and minimize impacts to less than significant. Measures included erosion control BMPs during construction.

Lands: Work related to the new treatment system and well re-equipping will be within existing disturbed property owned by SKMWC.

Floodplain: No FEMA designated floodplains existing within the proposed work area.

Wetlands: No wetlands exist within the proposed work area.

Biological/Cultural Resources: All work is within previously disturbed areas; therefore, there are no impacts to any potential biological/cultural resources.

Water Quality: All work is within previously disturbed areas and will have BMPs installed. There is no impact to surface or groundwater quality.

Air Quality, Noise, and Transportation: Impacts related to air quality, noise, and transportation will be temporary and related to construction activities. Work hours will be limited and dust control maintained to mitigate noise and air quality impacts.

Land Requirements

All construction, staging and material storage will be completed on property owned by SKMWC or within existing ROW and easement. No additional land or easements will be required for the treatment component of the project.

Potential Construction Problems

There are currently no known construction related issues such as high water table, subsurface rock, limited access, or other factors that may have an effect on the cost or operation of the facilities. The primary potential issue is the disposal/storage/containment of the backwash/filtrate waste from the Reverse Osmosis system. There is no sewer system to discharge the waste stream to and will therefore need to be contained on site for periodic disposal at a qualified disposal location.

Sustainability Considerations

Water and Energy Efficiency: The installation of a smaller pump in the Lower Well will reduce the monthly electrical demand charge for the well, which is based on the highest power draw. However, the pump will run longer at a lower rate so there may not be as much savings as anticipated. The smaller pump benefit is more aligned with the ability to install a smaller arsenic treatment system to treat a higher percentage of the well's production. If the existing larger pump were to remain then a more expensive/larger arsenic treatment system would be required in order to reduce the arsenic levels consistently below 10 ppb.

Green infrastructure: The management of storm water is not applicable to this alternative. The new building expansion will be per Washoe County Codes and any efforts for "green" construction materials will be weighed against the available budget for the project.

Other: There are no other aspects of sustainability associated with this alternative.

Cost Estimate

The estimated construction costs for this alternative total \$400,000. The estimated non-construction costs for this alternative, including project contingency, PER, engineering, permitting, testing, inspection, construction management, legal, bonding and oversight, total \$145,000. The estimated annual operations and maintenance costs for this alternative total \$11,270 (does not include existing O&M costs). The breakdowns of costs for this alternative are included in Appendix B.

5.5 Micro-filtration Arsenic Removal Alternative

Description

The SKMWC currently exceeds the EPA mandated arsenic standard for drinking water. A means of reducing the level of arsenic in the drinking water is required in order to come into compliance with the arsenic standard and meet the requirements of the State Environmental Commission. One of the methods examined to reduce the arsenic levels is to remove the arsenic with a Micro-filtration system. This would consist of piping the raw water from the SKMWC wells through a Micro-filtration system and into the existing storage tank for later use in the system. The piping and treatment unit will require an expansion of the existing booster station

building, upgrade of existing electrical components, and upgrade of the existing control system. The Micro-filtration system will also require a chemical feed system and a means of containing/holding the backwash and filtrate from the system as there is no existing sewer disposal system in the area of the SKMWC. Additionally, the Lower Well would be re-equipped with a 185-gpm pump. This smaller pump reduces electrical demand charges for the well while also reducing the size of the required treatment unit.

Design Criteria

All waterline design and treatment plant modifications will comply with the design requirements set forth in the State of Nevada Bureau of Safe Drinking Water system design criteria and Washoe County design standards. Additionally, the requirement for the treatment system will be to reduce the arsenic level in the water to below 10 ppb.

The arsenic levels in the untreated well water is low enough that the SKMWC will not need to treat 100% of their raw water. This alternative proposes to re-equip the Lower Well with a smaller capacity pump. With the new pump installed in the Lower Well, and based on water quality sampling data the SKMWC should only need a 75-gpm treatment unit to meet the water quality standards for arsenic.

Map

A schematic of the proposed improvements to provide arsenic treatment via Micro-filtration for the SKMWC is included in the PER as Figure 9.

Environmental Impacts

The potential for alternatives to adversely effect the environment was evaluated for: lands, floodplain, wetland, historic/cultural resources, biological resources, water quality, air quality, noise and transportation. Temporary disturbance related to construction activities provides the most potential for adverse effects, but the project also proposes measures to avoid and minimize impacts to less than significant. Measures included erosion control BMPs during construction.

Lands: Work related to the new treatment system and well re-equipping will be within existing disturbed property owned by SKMWC.

Floodplain: No FEMA designated floodplains existing within the proposed work area.

Wetlands: No wetlands exist within the proposed work area.

Biological/Cultural Resources: All work is within previously disturbed areas; therefore, there are no impacts to any potential biological/cultural resources.

Water Quality: All work is within previously disturbed areas and will have BMPs installed. There is no impact to surface or groundwater quality.

Air Quality, Noise, and Transportation: Impacts related to air quality, noise, and transportation will be temporary and related to construction activities. Work hours will be limited and dust control maintained to mitigate noise and air quality impacts.

Land Requirements

All construction, staging and material storage will be completed on property owned by SKMWC or within existing ROW and easement. No additional land or easements will be required for the treatment component of the project.

Potential Construction Problems

There are currently no known construction related issues such as high water table, subsurface rock, limited access, or other factors that may have an effect on the cost or operation of the facilities. The primary potential issue is the disposal/storage/containment of the backwash/filtrate waste from the Micro-filtration system. There is no sewer system to discharge the waste stream to and will therefore need to be contained on site for periodic disposal at a qualified disposal location.

Sustainability Considerations

Water and Energy Efficiency: The installation of a smaller pump in the Lower well will reduce the monthly electrical demand charge for the well, which is based on the highest power draw. However, the pump will run longer at a lower rate so there may not be as much savings as might be anticipated. The smaller pump benefit is more aligned with the ability to install a smaller arsenic treatment system to treat a higher percentage of the well's production. If the existing larger pump were to remain then a more expensive/larger arsenic treatment system would be required in order to reduce the arsenic levels consistently below 10 ppb.

Green infrastructure: The management of storm water is not applicable to this alternative. The new building expansion will be per Washoe County Codes and any efforts for "green" construction materials will be weighed against the available budget for the project.

Other: There are no other aspects of sustainability associated with this alternative.

Cost Estimate

The estimated construction costs for this alternative total \$400,000. The estimated non-construction costs for this alternative, including project contingency, PER, engineering, permitting, testing, inspection, construction management, legal, bonding and oversight, total \$145,000. The estimated annual operations and maintenance costs for this alternative total \$11,934 (does not include existing O&M costs). The breakdown of costs for this alternative are included in Appendix B.

5.6 Regional Interconnection Alternative

Description

A very schematic look at a regional interconnection with existing Truckee Meadows Water Authority (TMWA) was conducted as a potential alternative for arsenic mitigation. However, based on the timing required of SKMWC to comply with arsenic levels in their water and also due to the extremely high cost of connecting to the nearest TMWA, this alternative was not deemed feasible both for timing and for monetary reasons. Based on these a full in-depth look at the alternative is not provided.

Cost Estimate

The estimated construction costs for this alternative total \$1,195,000. The estimated non-construction costs for this alternative, including project contingency, PER, engineering, permitting, testing, inspection, construction management, legal, bonding and oversight, total \$274,500. The estimated annual operations and maintenance costs for this alternative total \$4,430 (does not include existing O&M costs). The breakdown of costs for this alternative are included in Appendix B.

6.0 SELECTION OF AN ALTERNATIVE

6.1 Life Cycle Cost Analysis

Table 7 provides a summary of the Present Worth Costs for the alternatives examined with this PER. The Table breaks out the construction costs, non-construction costs, and present worth of the O&M for 20 years.

Table 7. Present Worth Cost Analysis

Alternative	Construction Costs (\$)	Non-Construction Costs (\$)	Present Worth of O & M (\$) (20 years @ 2.7% ^{1/})	Total Cost (\$)
No Action ^{2/}	\$ 0	\$ 0	\$ 0	\$ 0
Direct Feed to Silver Knolls Park	\$ 166,530	\$ 81,653	\$ (34,833)	\$ 213,350
Absorption Media Alternative	\$ 241,500	\$ 110,000	\$ 165,566	\$ 517,066
Reverse Osmosis Alternative	\$ 420,000	\$ 126,500	\$ 72,414	\$ 718,914
Micro-Filtration Alternative	\$ 420,000	\$ 126,500	\$ 182,571	\$ 729,071
Pipeline Intertie Alternative	\$ 1,254,750	\$ 217,738	\$ 67,765	\$ 1,540,252

^{1/} OMB Circular No. A-94, Real Interest Rates on Treasury Notes and Bonds, December 2013, 20-year rate.

^{2/} The No Action Alternative does not have an immediate improvement cost but will result in the loss of control of the system, the requirement to provide bottled water to all residents until arsenic treatment is installed, and the eventual installation of arsenic treatment at the cost of the water system users.

6.2 Non-Monetary Factors

The only non-monetary factor with the alternative for treatment related to arsenic are that the reverse osmosis and micro-filtration alternatives will require some means of storing/evaporating/disposal of the backwash and waste streams from the treatment process as there is no existing sewer system in the immediate area. The availability of land for pond or onsite storage is limited and would most likely require the purchase of property. However, this cost is already factored into the construction costs.

7.0 PROPOSED PROJECT

Based upon the timing of the project (need to have annual running average for 2014 under 10 ppb for arsenic), and the cost estimates for the various alternatives, the proposed project is to install an absorption media system to remove arsenic, Alternative 5.3.

7.1 Preliminary Project Design (Drinking Water)

Water Supply/Treatment

As part of Alternative 5.3, SKMWC will replace the existing pump in the Lower Well with a smaller pump (185 gpm +/-). This smaller pump will still meet the demands of the system but will allow for treatment of 40% of the supply flow with an arsenic system capable of treating 75 gpm. Based on arsenic samples taken throughout 2013 the range of arsenic in the Upper and Lower wells is 8-15 ppb. The treatment of 40% of the supply water will result in arsenic levels consistently below 10 ppb. The tables provided in Appendix C illustrate the resultant arsenic concentration based on the treatment of various flow percentages, arsenic removal efficiencies, and initial arsenic concentrations. Based on pilot studies of an absorption media the removal efficiency can be as high as 90%. Results of the pilot study are included in Appendix D.

The absorption media does not have a waste stream associated with it and simply requires the replacement of the media cartridges as the cartridges become used up.

The new treatment process will be located in a new addition to the existing pump building at the SKMWC tank site, as the existing building is too small to be able to house the new treatment system within the existing building. The existing piping at the tank site will be modified to allow for both the Upper and Lower Wells to be fed through the new treatment process. Additionally, flow meters and new dedicated sample tap locations will be included in the project improvements to allow for consistent flow measurement and to improve the ease/accuracy of sampling.

The pilot testing of the SKMWC water sources indicate that an injection of Calcium Chloride should be added to the water prior to passing through the media. This is to reduce the potential for fouling of the media by silica in the water. Additionally, the pilot testing indicated that an approximate 25% increase in the life of the media could be achieved by reducing the pH of the water prior to passing through the media. Both of these injections can be accomplished with small peristaltic pumps and drums of proper chemicals. The injection of the Calcium Chloride is recommended while the pH adjustment is optional.

Based on this information from the media manufacture, SKMWC will most likely be required to conduct a TCLP test to confirm that the waste media filters are non-hazardous and qualify as Solid Waste Only. Waste Management Inc will accept the waste but may require a TCLP test for each shipment until they are comfortable it is only a solid waste and allow you to just toss it in the dumpster.

Figure 10 shows a schematic of the proposed system layout to be constructed to treat for arsenic.

Storage

There are no changes to the SKMWC storage tank as part of this project

Pumping Stations

There are no changes to the main pumping/hydro pneumatic tank system as part of this project.

Distribution Layout

There are no changes to the main distribution system as part of this project.

7.2 Project Schedule

The following is the anticipated schedule for the project. It should be noted that this schedule is aggressive in order to meet the Environmental Commission's deadline for arsenic compliance, and a number of the dates hinge upon reviews and approvals outside the direct control of SKMWC. The ability to obtain an SRF loan may delay the project; however, as possible SKMWC will continue to fund activities to allow for the schedule to be met.

- Preliminary Engineering Report: A preliminary engineering report (PER) has been initiated and is planned to be completed by November 15, 2013. The PER is a required item for obtaining State Revolving Fund money.
- State Revolving Fund Loan (SRF) Application: An agenda item will be requested at the next scheduled Board for Financing Water Projects meeting to request approval of a loan application for Silver Knolls Mutual Water Company. There is currently no Board for Financing Water Projects meeting scheduled but at least one meeting is anticipated by the end of 2013 or early 2014.
- Design of Facilities:
 - A 70% Design is anticipated to be completed by December 20, 2013.
 - A Permit Level Design is anticipated to be complete by January 17, 2014 for submittal to the various agencies as required for review, comment, and permitting of the project.
 - A Bidding set of plans and specifications will be completed by February 28, 2014 or as soon as comments are received from the reviewing agencies.
- Bidding: The approved and funded improvements reflecting the preferred alternative in the PER will be bid out February 28, 2014 with the intent to award a project by the end of March 2014.
- Construction: Construction should be initiated during April 2014. Long lead items such as treatment equipment may take some time for delivery. To try to move things along as quickly as possible, we will work closely with NDEP Staff to evaluate pre-purchase of long lead items under SRF guidelines to reduce the wait time as much as possible.

7.3 Permit Requirements

The following is a list of the anticipated permits for the project:

- Washoe County Permitting
- NDEP – Bureau of Safe Drinking Water Permit (Washoe County Health)

7.4 Sustainability Considerations –water and energy efficiency; green infrastructure; other

Water and Energy Efficiency

The installation of a smaller pump in the Lower Well will reduce the monthly electrical demand charge for the well, which is based on the highest power draw. However, the pump will run longer at a lower rate so there may not be as much savings as might be anticipated. The smaller pump benefit is more aligned with the ability to install a smaller arsenic treatment system to treat a higher percentage of the well's production. If the existing larger pump were to remain then a more expensive/larger arsenic treatment system would be required in order to reduce the arsenic levels consistently below 10 ppb.

Green Infrastructure

The management of storm water is not applicable to this alternative. The new building expansion will be per Washoe County Codes and any efforts for "green" construction materials will be weighed against the available budget for the project.

Other

There are no other aspects of sustainability associated with this alternative.

7.5 Project Cost Estimate

Table 8 provides the full summary of the project costs for the proposed alternative.

Table 8. Summary of Project Costs

Description	Estimated Cost (\$)
• Construction Costs	
Expansion of Existing Building and New Roof	\$ 60,000.00
Electrical Improvements	\$ 25,000.00
Control Improvements	\$ 20,000.00
New Pump For Lower Well	\$ 20,000.00
Misc. Site Plumbing at Booster Station	\$ 40,000.00
Adsorption Media System, plus chemical feeds	\$ 65,000.00
Contingency	\$ 11,500.00
<i>Subtotal – Construction Costs:</i>	\$ 241,500.00
• Non-Construction Costs	
PER (Funding Agency Required Reports)	\$ 25,000
Design & Permitting	\$ 20,000
Other (Geotech, Electrical, Structural, Architect)	\$ 25,000
Testing, Inspection, and Construction Management	\$ 20,000
Legal and Bonding	\$ 15,000
Interim Interest	\$ 5,000
<i>Subtotal – Non Construction Costs:</i>	\$ 110,000
Total Project Costs:	\$ 351,500
Proposed Funding	
SRF Loan (principal forgiveness if MHI low enough)	\$ 301,500
SKMWC Available Funds	\$ 50,000

7.6 Annual Operating Budget

7.6.1 Income

Table 9 provides the income sources for the SKMWC for 2009-2012. The estimated income for future years is anticipated to be similar to that seen for 2009-2012 unless a change in the rates is made. There is no anticipated growth in services that would affect the income.

Table 9. SKMWC Income 2009-2012

Income	2012	2011	2010	2009
Residential Water Sales	\$ 48,308.39	\$ 47,990.72	\$ 48,815.00	\$ 48,092.04
Interest on Past Due Accts.	\$ 127.04	\$ 122.00	-	-
Irrigation Sales	\$ 13,267.75	\$ 10,128.90	\$ 11,872.80	\$ 11,334.00
Red Tag Charges	\$ 740.00	\$ 300.00		
RWMF	\$ 934.46	\$ 871.78	\$ 906.88	\$ 881.64
Water Shut off Charges	-	-	-	-
Customer Deposits	\$ 325.00	-	-	-
CD - Interest Earned	\$ 135.73	\$ 1,392.51	\$ 276.72	\$ 627.40
Vanguard - Interest Earned	\$ 1,111.75	\$ 1,935.93	\$ 1,862.80	\$ 1,608.02
Total Income	\$ 64,950.12	\$ 62,741.84	\$ 63,734.20	\$ 62,543.10

7.6.2 Annual O & M Costs

Table 10 provides the annual O&M costs for the SKMWC for 2009-2012. There is no anticipated growth in O&M costs other than the new arsenic treatment system. SKMWC currently utilizes a Distribution Level 1 operator on a part time basis.

Table 10. SKMWC Annual O&M 2009-2012

O&M Costs	2012	2011	2010	2009
Salary, Meters & Water Samples	\$ 2,462.50	\$ 2,212.50	\$ 1,861.52	\$ 2,025.00
Salary, Accounting	\$ 9,577.00	\$ 7,900.00	\$ 7,962.50	\$ 7,925.00
Net Payroll	\$ 12,039.50	\$ 10,112.50	\$ 9,824.02	\$ 9,950.00
Bank Service Charges	\$ 62.00	\$ 62.00	\$ 56.00	\$ 56.00
Depreciation	\$ 7,290.00	\$ 7,290.00	\$ 7,290.00	\$ 7,290.00
PO Box Rental	\$ 76.00	\$ -		
Insurance	\$ 7,184.00	\$ 7,133.00	\$ 6,954.96	\$ 7,273.00
Interest				
Pumping Equipment	\$ -	\$ -	\$ -	\$ 2,075.83
License & Permits		\$ 507.00	\$ 2,688.50	\$ 300.00
Maintenance & Repairs Labor	\$ 2,517.50	\$ 4,223.47	\$ 718.75	\$ 4,907.60
Maintenance Supplies	\$ 1,669.40	\$ 1,836.10	\$ 1,553.51	\$ 266.71
Mileage Reimbursement	\$ 644.50	\$ 882.06	\$ 819.07	\$ 912.87
Membership Dues	\$ 150.00	\$ 150.00	\$ 150.00	
Meters			\$ 175.00	
Office Supplies	\$ 473.98	\$ 1,001.69	\$ 504.30	\$ 643.37
Office Equipment		\$ 1,200.00		
Payroll Taxes	\$ 1,031.03	\$ 993.49	\$ 963.96	\$ 866.68
Postage	\$ 927.68	\$ 482.40	\$ 408.33	\$ 394.40
Professional Fees	\$ 3,635.00	\$ 3,944.00	\$ 7,337.50	\$ 3,675.00
RWMF Expense	\$ 735.05	\$ 1,070.17	\$ 910.82	\$ 882.94
Taxes Business	\$ 2,273.26			
Taxes Real Estate	\$ 1,669.44	\$ 1,420.72	\$ 1,355.62	\$ 1,163.08
Telephone	\$ 1,245.73	\$ 1,258.69	\$ 1,060.49	\$ 1,009.09
Training for Operator	\$ 250.00		\$ 480.00	
Utilities	\$ 4,563.19	\$ 2,391.93	\$ 4,235.23	\$ 4,576.17
Water Testing	\$ 2,702.50	\$ 1,174.00	\$ 953.00	\$ 2,240.00
Operating Expenses	\$ 39,100.26	\$ 37,020.72	\$ 38,615.04	\$ 38,532.74

7.6.3 *Debt Repayment*

Table 11 provides the existing debt and debt service for the SKMWC. There is \$56,450.75 in principal remaining under the existing bond from 2001. This existing bond will be paid off by July 2022.

Table 11. Summary of Debt and Debt Service Payments

	Amount (\$)	Annual Payment (\$)	Monthly Rate Required (\$)^{1/}
2001 Water Revenue Bond	120,000	8,796.49	\$11.45
Total:	120,000	8,796.49	\$11.45

^{1/} Rate required is calculated by dividing the annual payment by 64 customers over 12 months.

Table 12 provides the proposed new loan and associated debt service for the SKMWC customers. Based on an estimated \$300,000 loan over 20 years and an interest rate of 4%, SKMWC would need to increase their average monthly revenue per customer by \$28.40 to cover the new loan obligation. There are multiple scenarios to adjust the existing rates but an alternative would be to increase the base rate for all customers. Based on current base rates this would equate to a new base rate of \$93.40 per month (a 43.7% increase).

Table 12. Proposed New Loan and Debt Service Payments

	Amount (\$)	Annual Payment (\$)^{2/}	Monthly Rate Required (\$)^{1/}
2014 Water Revenue Bond	301,500	21,816	\$28.40
Total:	301,500	21,816	\$28.40

^{1/} Rate required is calculated by dividing the annual payment by 64 customers over 12 months.

^{2/} Using an estimated interest rate of 4%

7.6.4 Reserves

The SKMWC has existing reserves in the amount of \$132,486.80 held in various accounts. These funds are set aside to meet replacement of short-lived assets, provide a debt service reserve for the existing bond, and are the beginnings of a fund for the replacement and maintenance of larger cost components of the water system.

A. Debt Service Reserves

SKMWC does not currently have a policy for debt service reserve. As part of the funding approval SWMWC is prepared to establish a reserve policy of the accumulation of one full year of payments as a debt payment reserve.

B. Short Lived Asset Reserve

SKMWC has established a reserve policy for short-lived assets. Currently 12% (\$7,290/yr) of net revenue is reserved for replacement of short-lived and other assets in the water company's annual operation budget. SKMWC does not have a designated reserve account for short-lived asset replacement; however, SKMWC does have available savings to handle the replacement of short-lived assets. A list of the SKMWC Short-Lived Assets is included in Table 13. The estimated annual set aside for short-lived assets is very close to the current depreciation set aside by SKMWC. SKMWC appears to be able to meet the short-lived asset replacement needs for the water system with the existing depreciation funding with a small increase.

Table 13. SKMWC Short Lived Assets

Short Lived Assets	Number	Unit Cost	Useful Life (years)	Cost/yr	Total Replacement Cost/yr
Fire Pump & Motor	1	\$ 4,000	10	\$ 400	\$ 400
Jockey Pump & Motor	1	\$ 2,000	10	\$ 200	\$ 200
Upper Well Pump & Motor	1	\$ 10,000	10	\$ 1,000	\$ 1,000
Lower Well Pump & Motor	1	\$ 10,000	10	\$ 1,000	\$ 1,000
Chlorine Injection Pump & Motor	1	\$ 1,500	10	\$ 150	\$ 150
Control System/Telemetry	1	\$ 10,000	10	\$ 1,000	\$ 1,000
Tank level transducers	1	\$ 2,500	10	\$ 250	\$ 250
Meters	64	\$ 750	30	\$ 25	\$ 1,600
Meter Boxes	64	\$ 750	30	\$ 25	\$ 1,600
Fire Hydrants	5	\$ 2,000	40	\$ 50	\$ 250
Flow Meters	2	\$ 2,000	30	\$ 67	\$ 133
Total Annual Cost					\$ 7,583.33

8.0 CONCLUSIONS AND RECOMMENDATIONS

SKMWC has pursued four “action” alternatives and a fifth alternative (evaluated in an attempt to reduce annual expenses) related to arsenic treatment that will address existing facility deficiencies and provide a cost effective solution to managing arsenic that meets NDEP permit requirements. Taking no action is not a viable alternative as the existing water system is unable to meet required arsenic levels and the system will be taken over by Washoe County Health in a no action alternative. Additionally, the alternative to provide a separate irrigation service to the Silver Knolls Park is not recommended as the overall capital cost for this alternative far exceeds the annual operations savings that might be seen.

Based on comparison of the four action alternatives and the advantages and disadvantages of each (Section 6 and Appendix B), it is recommended that SKMWC pursue design and construction of the improvements described in Section 5.3 as the Absorption Media Alternative. This option provides the most cost effective long-term solution arsenic management for SKMWC while meeting the NDEP permit requirements.

9.0 REFERENCES

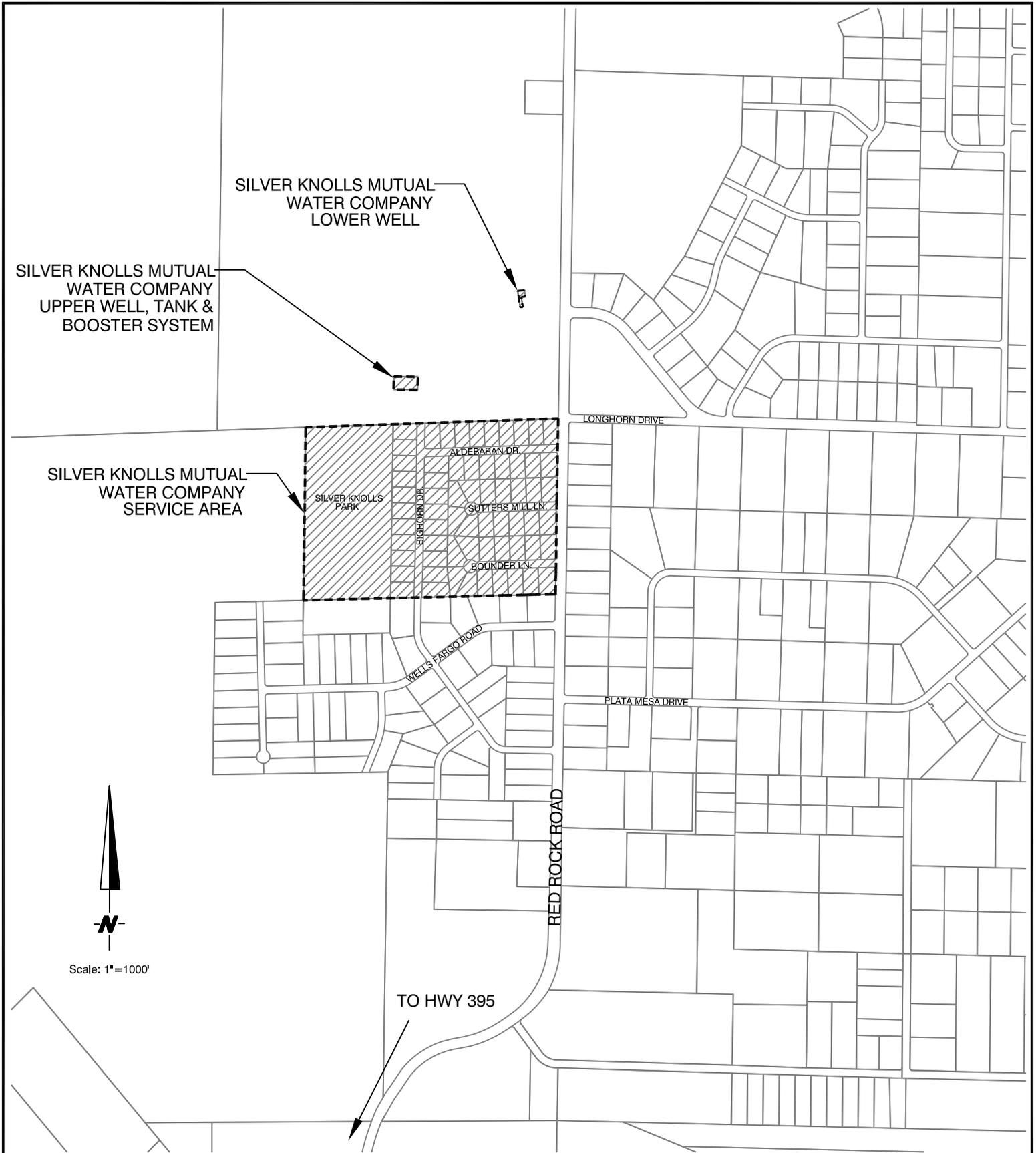
<http://www.census.gov/2010census/popmap/>

FIGURES

PROJECT
LOCATION

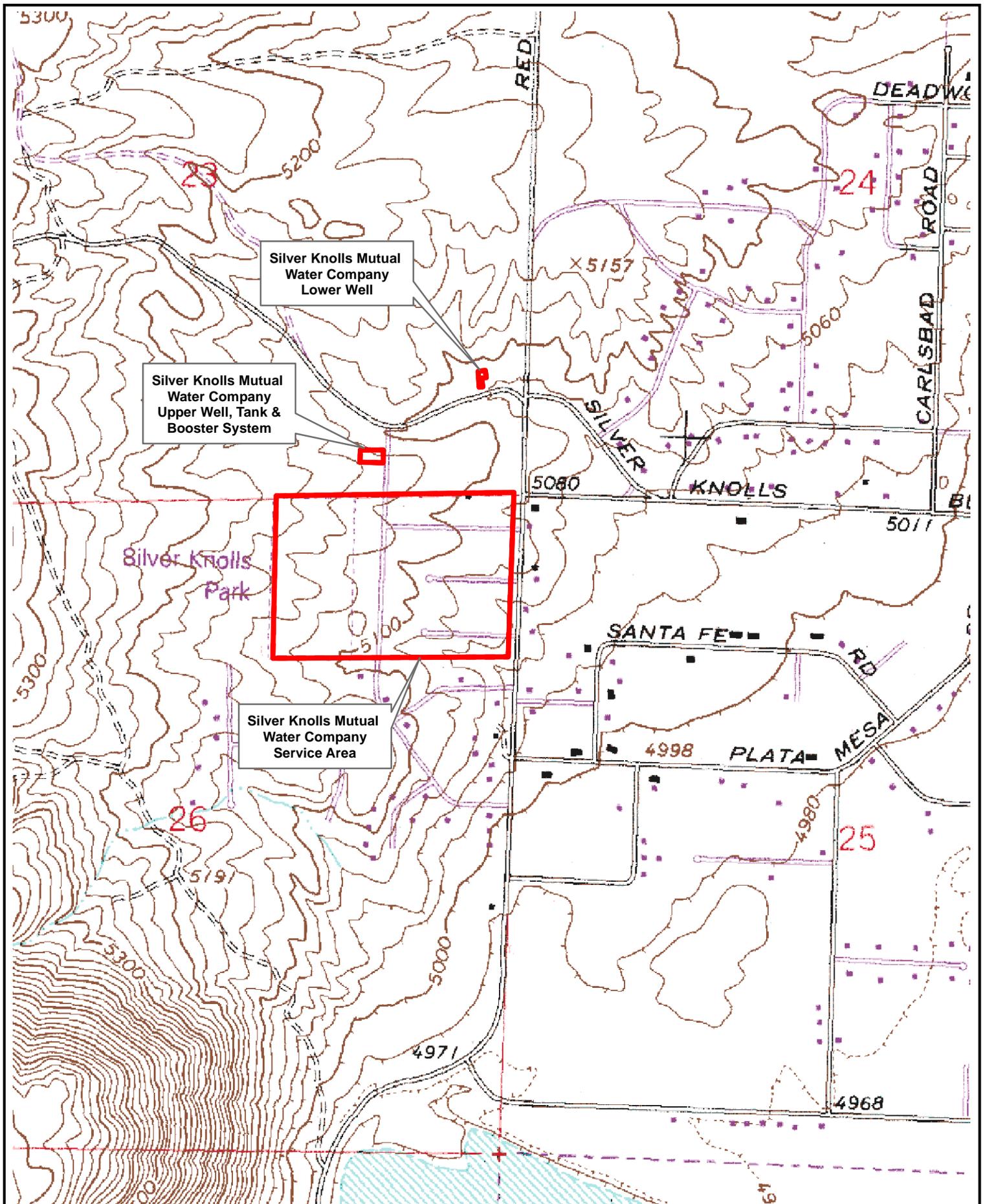


FIGURE 1
Silver Knolls Mutual Water Company
Location Map



Scale: 1"=1000'

FIGURE 2
Silver Knolls Mutual Water Company
Service Area
 November 2013



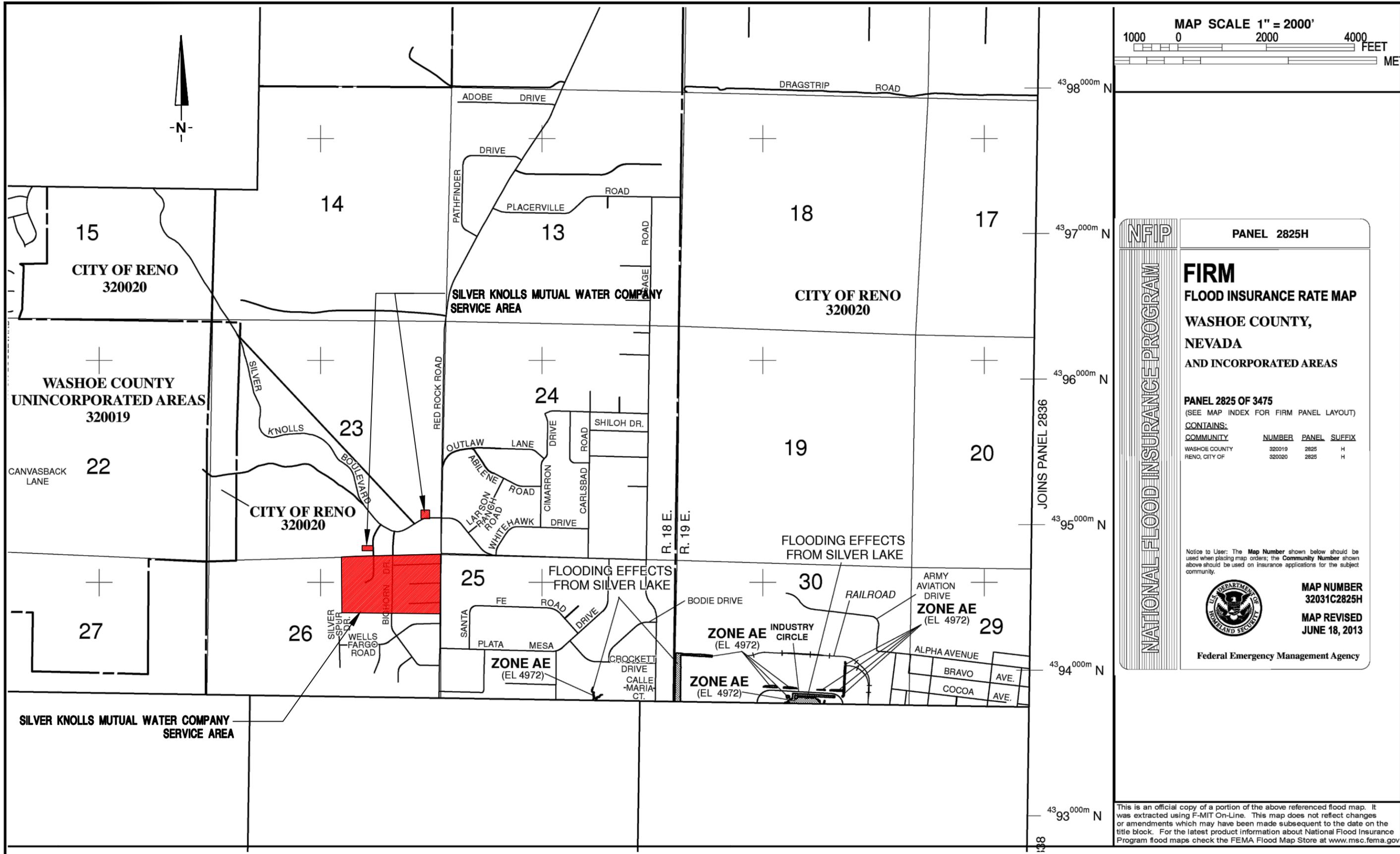
1 inch = 1,000 feet
 0 500 1,000 Feet

Figure 3
Silver Knolls Mutual Water Company
Service Area

Date: 11/5/2013
RCI
 Resource Concepts Inc

Source: USGS 7.5' Quads

Path: R:\projects\Silver_Knolls_Mutual_Water\MXD\Service_Area.mxd



MAP SCALE 1" = 2000'
 1000 0 2000 4000 FEET
 ME

NFIP PANEL 2825H

FIRM
FLOOD INSURANCE RATE MAP
WASHOE COUNTY,
NEVADA
AND INCORPORATED AREAS

PANEL 2825 OF 3475
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WASHOE COUNTY	320019	2825	H
RENO, CITY OF	320020	2825	H

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

 **MAP NUMBER**
32031C2825H
MAP REVISED
JUNE 18, 2013

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

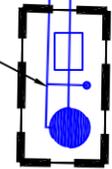
FIGURE 4: FEMA MAP WITH SILVER KNOLLS SERVICE AREA

SILVER KNOLLS MUTUAL
WATER COMPANY
LOWER WELL



8" ACP PIPE

SILVER KNOLLS MUTUAL
WATER COMPANY
UPPER WELL, TANK &
BOOSTER SYSTEM



8" ACP TO FIRST TEE

SILVER KNOLLS MUTUAL
WATER COMPANY
SERVICE AREA



SCALE: NTS

RED ROCK ROAD

FH

FH

FH

ALDEBARAN DR.

SUTTERS MILL LN.

BOUNDER LN.

WELLS FARGO ROAD

FH

FH

BIGHORN DR.

ALL WATER MAINS ARE
6" ACP PIPE UNLESS OTHERWISE NOTED.

SILVER KNOLLS
PARK

FIGURE 5: WATER SYSTEM SCHEMATIC
NOVEMBER 2013

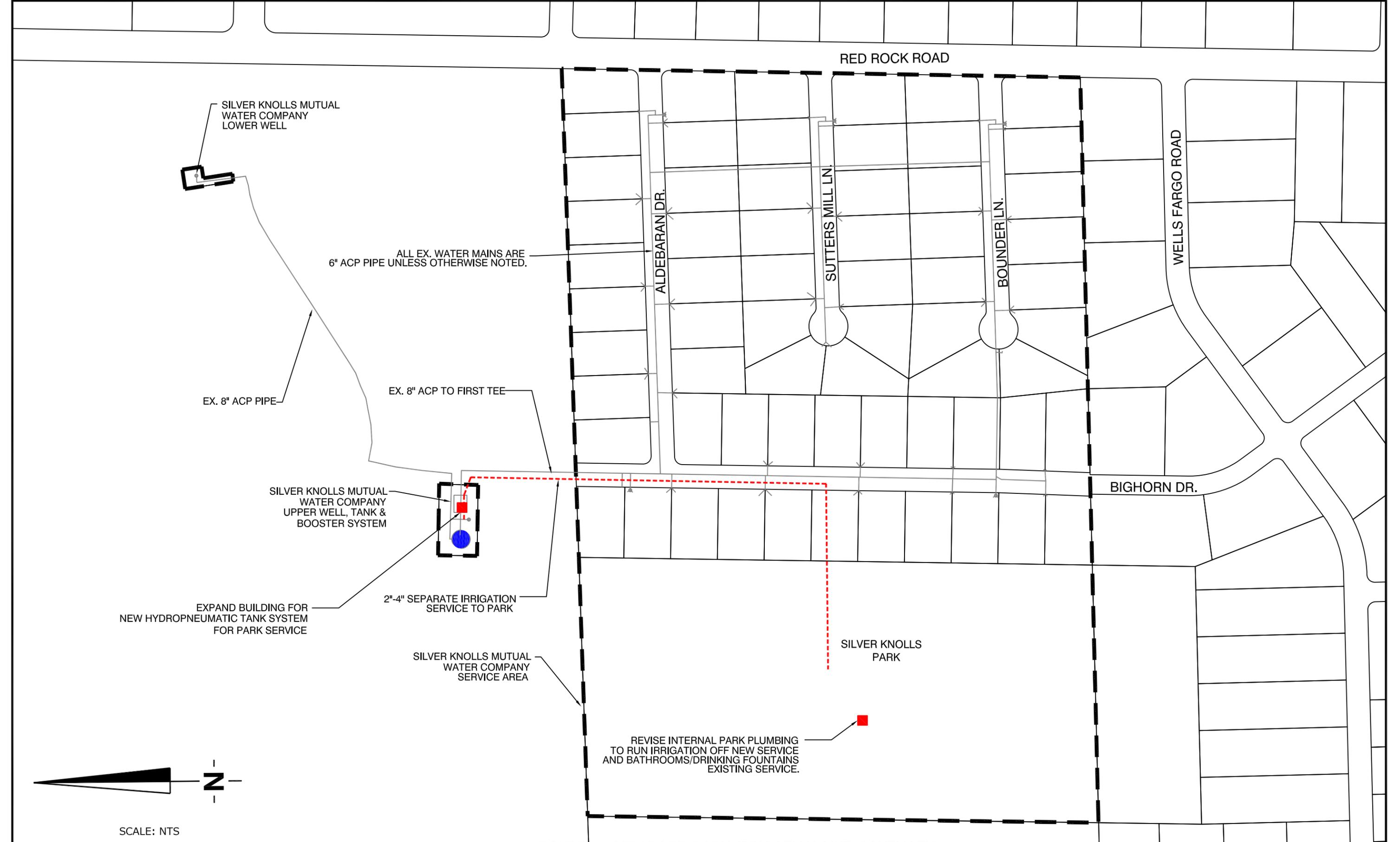
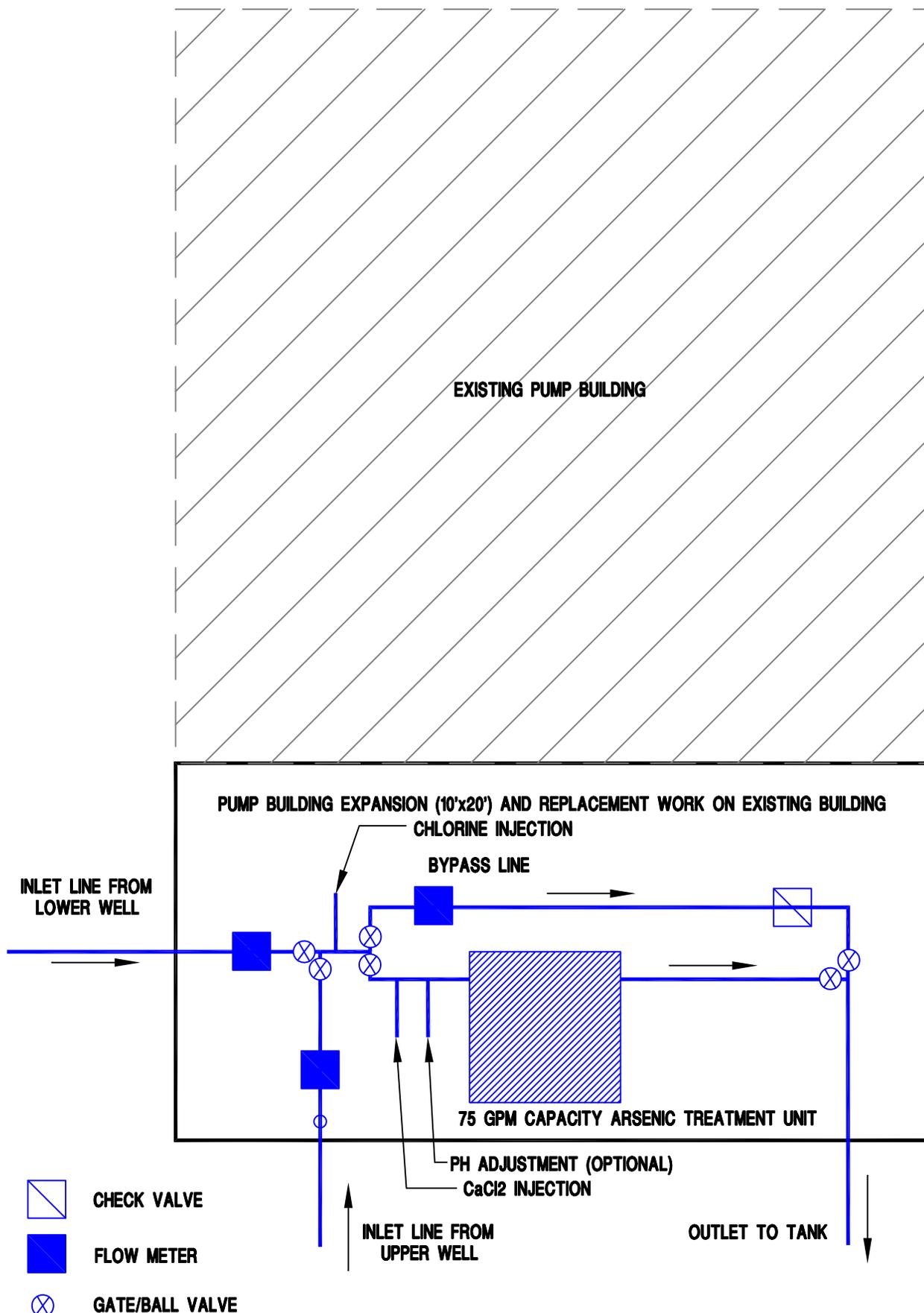


FIGURE 6: SEPARATE PARK IRRIGATION LINE SCHEMATIC
NOVEMBER 2013



SCALE: NTS



**FIGURE 7: Absorption Media Schematic
November 2013**

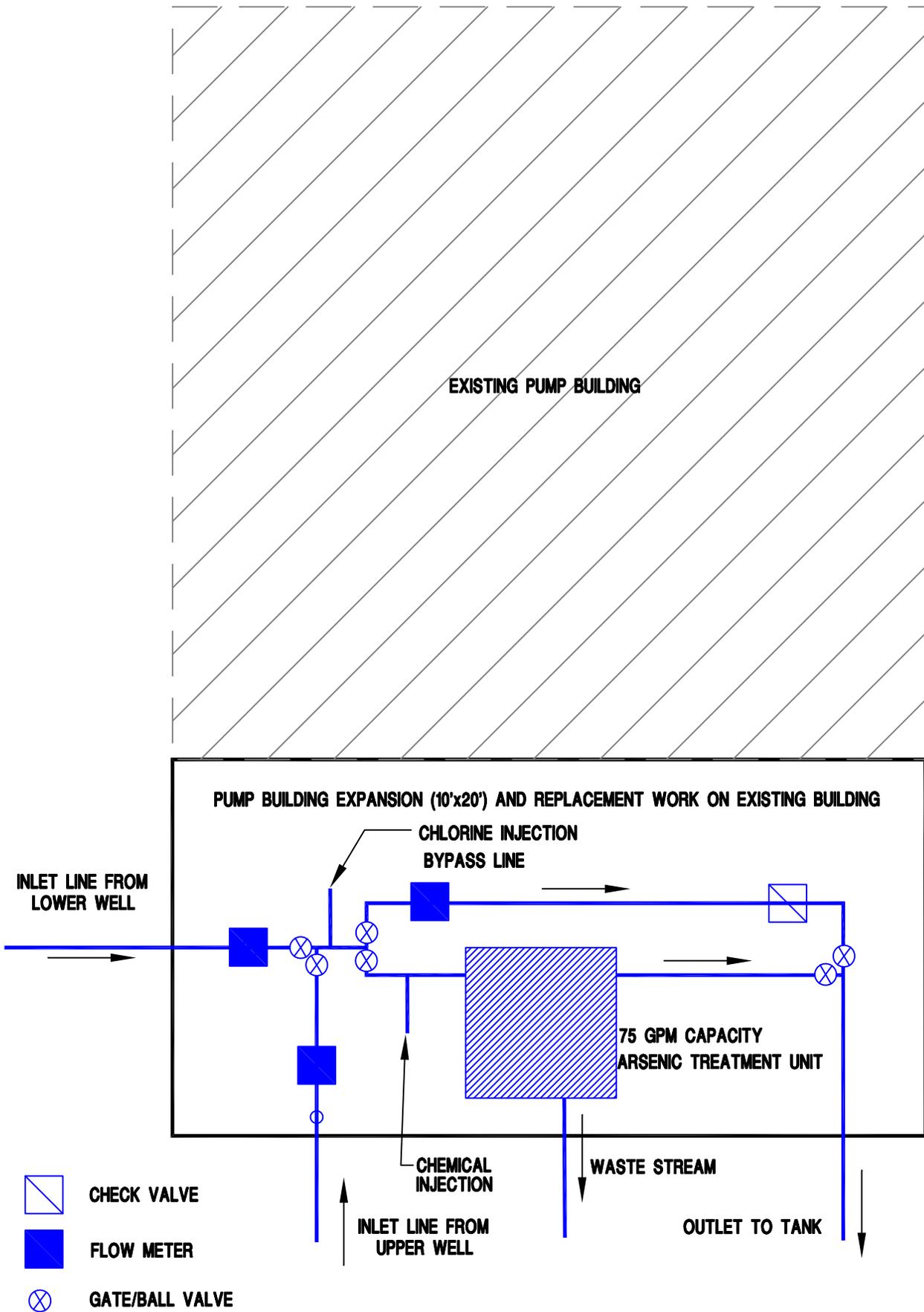


FIGURE 8: Reverse Osmosis Schematic
November 2013

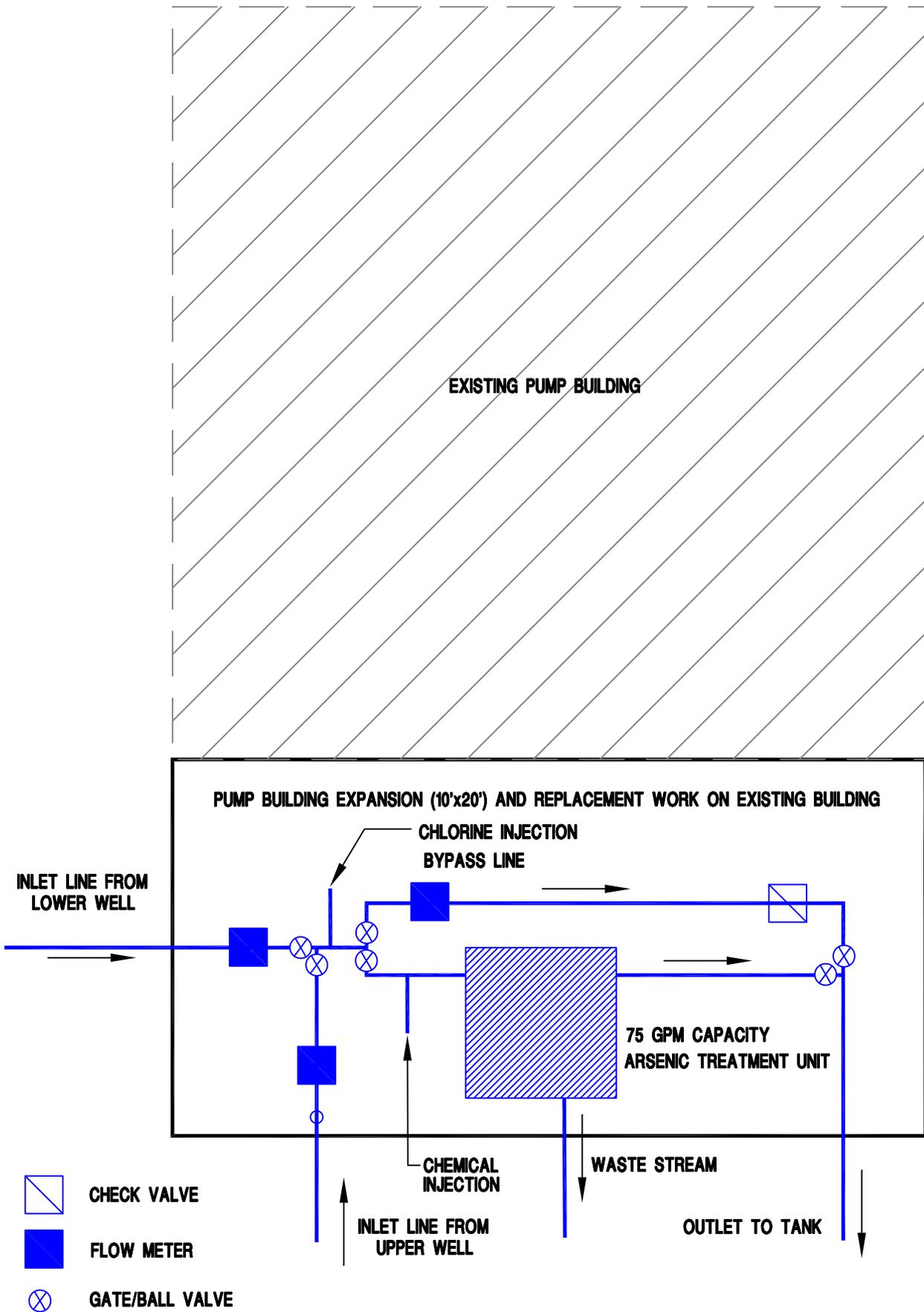
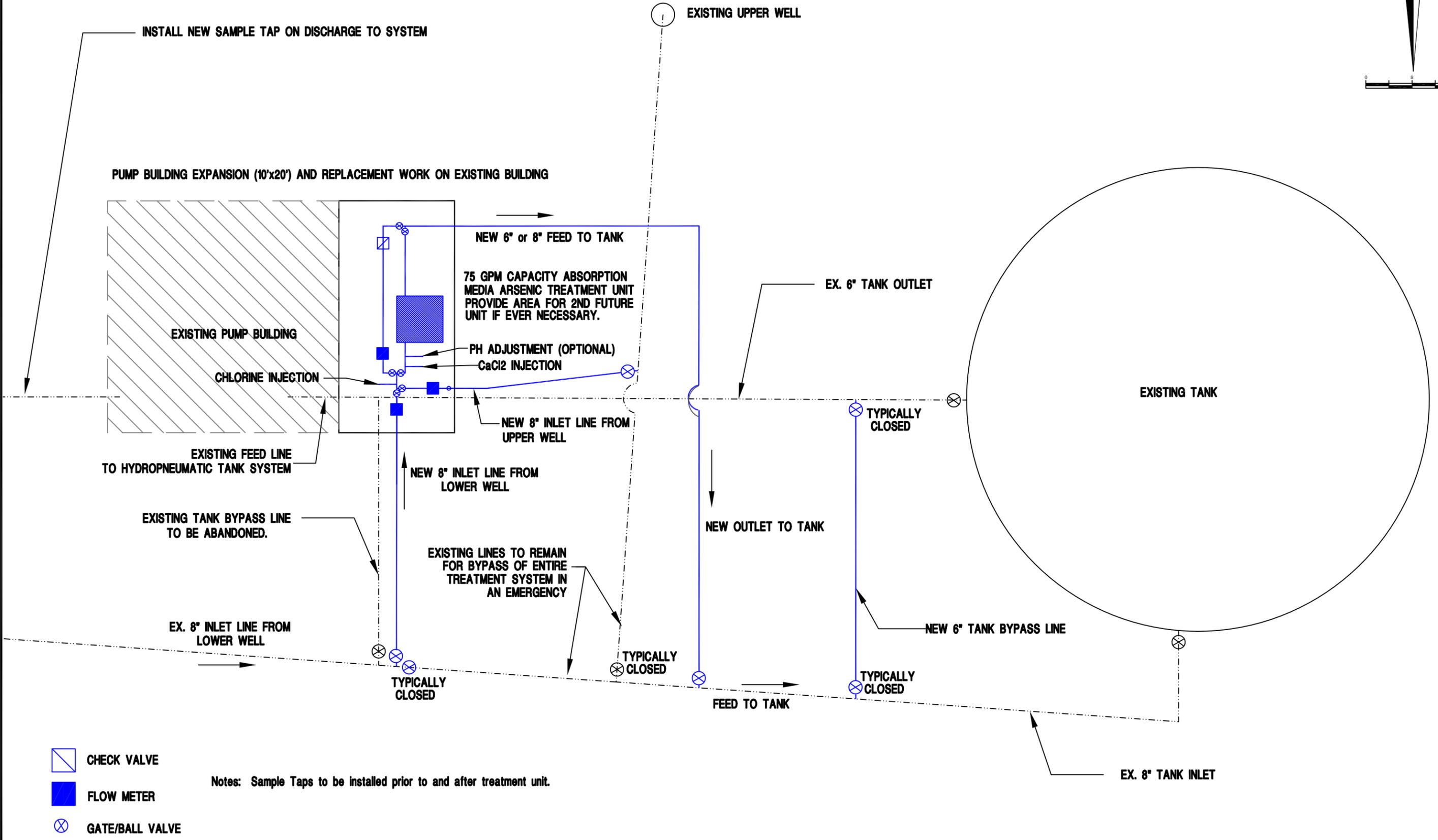
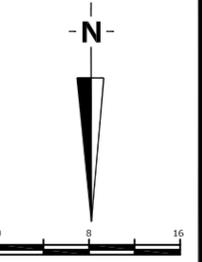


FIGURE 9: Micro-Filtration Schematic
November 2013



-  CHECK VALVE
-  FLOW METER
-  GATE/BALL VALVE

Notes: Sample Taps to be installed prior to and after treatment unit.

FIGURE 10: Selected Alternative Detailed Schematic
November 2013

APPENDICES

Appendix A

Annual Spending and Income Statements for SKMWC

Appendix A
Silver Knolls Mutual Water Co
Annual Spending and Income Statements - 2009-2012

	January to December 2012	January to December 2011	January to December 2010	January to December 2009
Income				
Residential Water Sales	48,308.39	47,990.72	48,815.00	48,092.04
Interest on Past Due Accts.	127.04	122.00		
Irrigation Sales	13,267.75	10,128.90	11,872.80	11,334.00
Red Tag Charges	740.00	300.00		
RWMF	934.46	871.78	906.88	881.64
Water Shut off Charges		-		
Customer Deposits	325.00	-		
Total Sales	63,702.64	59,413.40	61,594.68	60,307.68
Operating Expenses				
Salary, Meters & Water Samples	2,462.50	2,212.50	1,861.52	2,025.00
Salary, Accounting	9,577.00	7,900.00	7,962.50	7,925.00
Net Payroll	12,039.50	10,112.50	9,824.02	9,950.00
	-	-		
Bank Service Charges	62.00	62.00	56.00	56.00
Depreciation	7,290.00	7,290.00	7,290.00	7,290.00
PO Box Rental	76.00	-		
Insurance	7,184.00	7,133.00	6,954.96	7,273.00
Interest				
Pumping Equipment	-	-	-	2,075.83
License & Permits		507.00	2,688.50	300.00
Maintenance & Repairs Labor	2,517.50	4,223.47	718.75	4,907.60
Maintenance Supplies	1,669.40	1,836.10	1,553.51	266.71
Mileage Reimbursement	644.50	882.06	819.07	912.87
Membership Dues	150.00	150.00	150.00	
Meters			175.00	
Office Supplies	473.98	1,001.69	504.30	643.37
Office Equipment		1,200.00		
Payroll Taxes	1,031.03	993.49	963.96	866.68
Postage	927.68	482.40	408.33	394.40
Professional Fees	3,635.00	3,944.00	7,337.50	3,675.00
RWMF Expense	735.05	1,070.17	910.82	882.94
Taxes Business	2,273.26			
Taxes Real Estate	1,669.44	1,420.72	1,355.62	1,163.08
Telephone	1,245.73	1,258.69	1,060.49	1,009.09
Training for Operator	250.00		480.00	
Utilities	4,563.19	2,391.93	4,235.23	4,576.17
Water Testing	2,702.50	1,174.00	953.00	2,240.00
	-	-		
Operating Expenses	39,100.26	37,020.72	38,615.04	38,532.74
Operating Profit	12,562.88	12,280.18	13,155.62	11,824.94
Other Income				
CD - Interest Earned	135.73	1,392.51	276.72	627.40
Vanguard - Interest Earned	1,111.75	1,935.93	1,862.80	1,608.02
Total Other Income	1,247.48	3,328.44	2,139.52	2,235.42
Other Expenses				
Nv St Note Interest Paid	2,714.50	2,965.76	3,239.42	3,400.62
Total Other Expenses	2,714.50	2,965.76	3,239.42	3,400.62
Net Profit/Loss	11,095.86	12,642.86	12,055.72	10,659.74

Appendix B

Alternative Cost Comparisons

**APPENDIX B
ALTERNATIVE PRESENT WORTH COMPARISONS
Silver Knolls Water System Upgrades**

	Construction Cost Estimate	Non-Construction Cost Estimate	PW O&M (Alternative Only)	TOTAL
5.2 - Dedicated Irrigation Service to Silver Knolls Park Alternative	\$ 166,530	\$ 81,653	\$ (34,833)	\$ 213,350
5.3 - Absorbative Media System Alternative	\$ 241,500	\$ 110,000	\$ 165,566	\$ 517,066
5.4 - Reverse Osmosis System Alternative	\$ 420,000	\$ 126,500	\$ 172,414	\$ 718,914
5.5 - Micro/Nano Filtration System Alternative	\$ 420,000	\$ 126,500	\$ 182,571	\$ 729,071
5.6 - Connection to Truckee Meadows Water Authority System Alternative	\$ 1,254,750	\$ 217,738	\$ 67,765	\$ 1,540,252

APPENDIX B
Alternative Construction Cost Estimates
Silver Knolls Water System Upgrades

5.2 - Dedicated Irrigation Service to Silver Knolls Park Alternative

<u>Item</u>	<u>Description</u>	<u>Est Construction Cost</u>
1	4" Service Line - (1000 LF @ 30/FT)	\$30,000.00
2	Replumb Existing Park Service to Only Serve Bathrooms and Drinking Fountains	\$10,000.00
3	Asphalt Repair (If alignment in roadway is required by Washoe County) - 2600 SF @ \$3.5/SF	\$9,100.00
4	2" Service Line - (500 LF @ 20/FT)	\$10,000.00
5	2" Meter Box	\$3,000.00
6	Hydropneumatic Tank System Operating Off Well for Service to Park	\$40,000.00
7	Misc. Site Plumbing at Upper Well Site	\$25,000.00
8	Flush Assembly	\$1,500.00
9	Landscape Repairs	\$10,000.00
10	Electrical Improvements	\$10,000.00
11	Control Improvements	\$10,000.00
12	Contingency (5%)	\$7,930.00
		\$166,530.00

5.3 - Absorbative Media System Alternative

<u>Item</u>	<u>Description</u>	<u>Est Construction Cost</u>
1	Expansion of Existing Building and New Roof	\$60,000.00
2	Electrical Improvements	\$25,000.00
3	Control Improvements	\$20,000.00
4	Potential New Pump For Lower Well	\$20,000.00
5	Misc. Site Plumbing at Booster Station	\$40,000.00
6	Absorbative Media System, plus chemical feeds	\$65,000.00
7	Contingency (5%)	\$11,500.00
		\$241,500.00

5.4 - Reverse Osmosis System Alternative

<u>Item</u>	<u>Description</u>	<u>Est Construction Cost</u>
1	Expansion of Existing Building and New Roof	\$55,000.00
2	Electrical Improvements	\$25,000.00
3	Control Improvements	\$15,000.00
4	Potential New Pump For Lower Well	\$15,000.00
5	Misc. Site Plumbing at Booster Station	\$35,000.00
6	Reverse Osmosis System	\$175,000.00
7	Lined Disposal Basin for RO System Backwash	\$40,000.00
8	Land for Backwash Basin	\$40,000.00
9	Contingency (5%)	\$20,000.00
		\$420,000.00

5.5 - Micro/Nano Filtration System Alternative

<u>Item</u>	<u>Description</u>	<u>Est Construction Cost</u>
1	Expansion of Existing Building and New Roof	\$55,000.00
2	Electrical Improvements	\$25,000.00
3	Control Improvements	\$15,000.00
4	Potential New Pump For Lower Well	\$15,000.00
5	Misc. Site Plumbing at Booster Station	\$35,000.00
6	Micro Filtration System	\$175,000.00
7	Lined Disposal Basin for Filtration System Backwash	\$40,000.00
8	Land for Backwash Basin	\$40,000.00
9	Contingency (5%)	\$20,000.00
		\$420,000.00

5.6 - Connection to Truckee Meadows Water Authority System Alternative

<u>Item</u>	<u>Description</u>	<u>Est Construction Cost</u>
1	Electrical Improvements	\$25,000.00
2	Control Improvements	\$25,000.00
3	Pipeline - 8" (15,500 feet (estimated) @ \$60/FT)	\$930,000.00
4	Booster pumps to feed storage tank, in a vault	\$75,000.00
5	Asphalt Repair (If alignment in roadway is required) - =40000 SF @ \$3.5/SF	\$140,000.00
6	Contingency (5%)	\$59,750.00
		\$1,254,750.00

APPENDIX B
Alternative Non-Construction Cost Estimates
Silver Knolls Water System Upgrades

5.2 - Dedicated Irrigation Service to Silver Knolls Park Alternative

<u>Item</u>	<u>Project Component</u>	<u>Est Non-Construction Cost</u>
1	Engineering Design & Permitting	\$16,653.00
2	Other Discipline Design / Reports (Geotech, Electrical, Structural, Arch.)	\$25,000.00
3	Inspection & Testing	\$10,000.00
4	Construction Management	\$10,000.00
5	Legal and Bonding Expenses	\$15,000.00
6	Interim Interest	\$5,000.00
Total Estimated None Construction Cost =		\$81,653.00

5.3 - Absorbative Media System Alternative

<u>Item</u>	<u>Project Component</u>	<u>Est Non-Construction Cost</u>
1	Engineering Design & Permitting	\$20,000.00
2	Other Discipline Design / Reports (Geotech, Electrical, Structural, Arch.)	\$25,000.00
3	Preliminary Engineering (Funding Requirement)	\$25,000.00
4	Inspection & Testing	\$10,000.00
5	Construction Management	\$10,000.00
6	Legal and Bonding Expenses	\$15,000.00
7	Interim Interest	\$5,000.00
Total Estimated None Construction Cost =		\$110,000.00

5.4 - Reverse Osmosis System Alternative

<u>Item</u>	<u>Project Component</u>	<u>Est Non-Construction Cost</u>
1	Engineering Design & Permitting	\$31,500.00
2	Other Discipline Design / Reports (Geotech, Electrical, Structural, Arch.)	\$25,000.00
3	Preliminary Engineering (Funding Requirement)	\$25,000.00
4	Inspection & Testing	\$10,000.00
5	Construction Management	\$10,000.00
6	Legal and Bonding Expenses	\$20,000.00
7	Interim Interest	\$5,000.00
Total Estimated None Construction Cost =		\$126,500.00

5.5 - Micro/Nano Filtration System Alternative

1	Engineering Design & Permitting	\$31,500.00
2	Other Discipline Design / Reports (Geotech, Electrical, Structural, Arch.)	\$25,000.00
3	Preliminary Engineering (Funding Requirement)	\$25,000.00
4	Inspection & Testing	\$10,000.00
5	Construction Management	\$10,000.00
6	Legal and Bonding Expenses	\$20,000.00
7	Interim Interest	\$5,000.00
	Total Estimated None Construction Cost =	\$126,500.00

5.6 - Connection to Truckee Meadows Water Authority System Alternative

1	Engineering Design & Permitting	\$62,737.50
2	Other Discipline Design / Reports (Geotech, Electrical, Structural, Arch.)	\$20,000.00
3	Preliminary Engineering (Funding Requirement)	\$25,000.00
4	Inspection & Testing	\$35,000.00
5	Construction Management	\$25,000.00
6	Legal and Bonding Expenses	\$30,000.00
7	Interim Interest	\$20,000.00
	Total Estimated None Construction Cost =	\$217,737.50

APPENDIX B
O & M Cost Estimates
Silver Knolls Water System Upgrades

5.2 - Dedicated Irrigation Service to Silver Knolls Park Alternative

<u>Item</u>	<u>O & M Cost Description</u>	<u>Unit</u>	<u>Est Annual Qnt</u>	<u>Unit Cost</u>	<u>Est Total O & M Cost</u>	<u>Assumptions</u>
1	Current O & M Budget	Lump Sum	1	\$38,500.00	\$38,500.00	Total Salary, Service & Supplies Expenses from 2009-2012 (does not include debt service costs)
2	Chlorine Savings	Lump Sum	-1	\$350.00	-\$350.00	Based on 23% of Maintenance Supplies, which is assumed to be primarily chlorine.
3	Media Replacement Savings for Alternative A	Cylinder	-7.13	\$270.25	-\$1,926.88	Estimated based on pilot test information from manufacturer and assuming 40% of well flow treated annually. Replacement cost per media cylinder is \$235 FOB in New Jersey, there are 9 cylinders in a 75 gpm unit. Reduction in treated flow by sending water directly to park
4	Power Savings/Increase	Lump Sum	1	\$0.00	\$0.00	Increase in power for new hydropneumatic tank should be offset by reduction in power on existing pressure tank system

Total Estimated O & M Cost = **\$36,223.12**
Estimated O & M Cost for Alternative = **-\$2,276.88**

5.3 - Absorbative Media System Alternative

<u>Item</u>	<u>O & M Cost Description</u>	<u>Unit</u>	<u>Est Annual Qnt</u>	<u>Unit Cost</u>	<u>Est Total O & M Cost</u>	<u>Assumptions</u>
1	Current O & M Budget	Lump Sum	1	\$38,500.00	\$38,500.00	Total Salary, Service & Supplies Expenses from 2009-2012 (does not include debt service costs)
2	Estimated Power Required by Absorbative Media System	Kilowatt Hour	3,320	\$0.12	\$398.40	Est using hp power rating provided by manufacturer for hours of operation to treat 40% of flow. Assumes 3 HP pump.
3	Annual Media Replacement Cost	Cylinder	23	\$270.25	\$6,323.85	Estimated based on pilot test information from manufacturer and assuming 40% of well flow treated annually. Replacement cost per media cylinder is \$235 FOB in New Jersey, there are 9 cylinders in a 75 gpm unit.
4	Chemical Costs	Lump Sum	1	\$3,600.00	\$3,600.00	Assumes 55-gallon drum of CaCl2 to increase hardness to reduce fouling. Actual amount needed is unknown unless a pilot test is run on the system. Other chemicals may be necessary depending on the manufacturer.
5	Media Disposal Cost	Lump Sum	1	\$500.00	\$500.00	Disposal at Lockwood, or Shipping to Recovery Site

Total Estimated O & M Cost = **\$49,322.25**
Estimated O & M Cost for Alternative = **\$10,822.25**

5.4 - Reverse Osmosis System Alternative

<u>Item</u>	<u>Project Component</u>	<u>Unit</u>	<u>Est Annual Qnt</u>	<u>Unit Cost</u>	<u>Est Total O & M Cost</u>	<u>Assumptions</u>
1	Current O & M Budget	Lump Sum	1	\$38,500.00	\$38,500.00	Total Salary, Service & Supplies Expenses from 2009-2012 (does not include debt service costs)
2	Power Required by RO System	Killowatt Hour	27,665	\$0.12	\$3,319.86	Est using hp power rating provided by manufacturer for hours of operation to treat 40% of flow. Assumes 25 HP pump.
3	Chemical Costs	Lump Sum	1	\$7,200.00	\$7,200.00	Assumes one 55-gallon drum per month of NaOCL (chlorine will degrade over a one month period) and an allowance for other chemicals. Actual amount needed is unknown unless a pilot test is run on the system. Other chemicals may be necessary depending on the manufacturer.
4	Dried Filtrate/Backwash Disposal	Once Per year	1	\$750.00	\$750	Dumpster to Lockwood, assume 20 yard bin + \$50/ton tipping charge (estimated). Includes contractor removing dried remains from drying pond.
Total Estimated O & M Cost =					\$49,769.86	
Estimated O & M Cost for Alternative =					\$11,269.86	

5.5 - Micro/Nano Filtration System Alternative

<u>Item</u>	<u>Project Component</u>	<u>Unit</u>	<u>Est Annual Qnt</u>	<u>Unit Cost</u>	<u>Est Total O & M Cost</u>	<u>Assumptions</u>
1	Current O & M Budget	Lump Sum	1	\$38,500.00	\$38,500.00	Total Salary, Service & Supplies Expenses from 2009-2012 (does not include debt service costs)
2	Power Required by Filtration System	Killowatt Hour	33,199	\$0.12	\$3,983.83	Est using hp power rating provided by manufacturer for hours of operation to treat 40% of flow. Assumes 30 HP pump.
3	Chemical Costs	Lump Sum	1	\$7,200.00	\$7,200.00	Assumes one 55-gallon drum per month of NaOCL (chlorine will degrade over a one month period) and an allowance for other chemicals. Actual amount needed is unknown unless a pilot test is run on the system. Other chemicals may be necessary depending on the manufacturer.
4	Dried Filtrate/Backwash Disposal	Once Per year	1	\$750.00	\$750	Dumpster to Lockwood, assume 20 yard bin + \$50/ton tipping charge (estimated). Includes contractor removing dried remains from drying pond.
Total Estimated O & M Cost =					\$50,433.83	
Estimated O & M Cost for Alternative =					\$11,933.83	

5.6 - Connection to Truckee Meadows Water Authority System Alternative

<u>Item</u>	<u>Project Component</u>	<u>Unit</u>	<u>Est Annual Qnt</u>	<u>Unit Cost</u>	<u>Est Total O & M Cost</u>	<u>Assumptions</u>
1	Current O & M Budget	Lump Sum	1	\$38,500.00	\$38,500.00	Total Salary, Service & Supplies Expenses from 2009-2012 (does not include debt service costs)
2	Power Required by Booster System	Killowatt Hour	36,912	\$0.12	\$4,429.46	Assumes 30 HP pump. Assume 175 gpm pump, 1650 hours of operation.
Total Estimated O & M Cost =					\$42,929.46	
Estimated O & M Cost for Alternative =					\$4,429.46	

**APPENDIX B
O&M PRESENT WORTH CALCULATIONS
Silver Knolls Water System Upgrades**

n = 20 years
i = 2.7%

Per Requested Analysis
Per App C OMB Circular No. A-94

$$PA = \frac{[(1 + i)^n - 1]}{i * (1 + i)^n}$$

PA = 15.2986

Annual O & M

5.2 - Dedicated Irrigation Service to Silver Knolls Park Alternative	\$ 36,223.12
5.2 - O&M Cost for Alternative Only	\$ (2,276.88)
5.3 - Absorbative Media System Alternative	\$ 49,322.25
5.3 - O&M Cost for Alternative Only	\$ 10,822.25
5.4 - Reverse Osmosis System Alternative	\$ 49,769.86
5.4 - O&M Cost for Alternative Only	\$ 11,269.86
5.5 - Micro/Nano Filtration System Alternative	\$ 50,433.83
5.5 - O&M Cost for Alternative Only	\$ 11,933.83
5.6 - Connection to Truckee Meadows Water Authority System Alternative	\$ 42,929.46
5.6- O&M Cost for Alternative Only	\$ 4,429.46

Present Worth = (PA) * (Annual O & M)

5.2 - Dedicated Irrigation Service to Silver Knolls Park Alternative	\$ 554,164.71
5.2 - O&M Cost for Alternative Only	\$ (34,833.22)
5.3 - Absorbative Media System Alternative	\$ 754,563.72
5.3 - O&M Cost for Alternative Only	\$ 165,565.79
5.4 - Reverse Osmosis System Alternative	\$ 761,411.50
5.4 - O&M Cost for Alternative Only	\$ 172,413.56
5.5 - Micro/Nano Filtration System Alternative	\$ 771,569.36
5.5 - O&M Cost for Alternative Only	\$ 182,571.42
5.6 - Connection to Truckee Meadows Water Authority System Alternative	\$ 656,762.65
5.6- O&M Cost for Alternative Only	\$ 67,764.72

Appendix C

Arsenic Side Treatment Tables

Appendix C

Silver Knolls Mutual Water Co

Arsenic Side Treatment Tables

Proposed Lower Well Production 185 gpm
 Target removal % - 90%

Initial Arsenic
 Concentration 15 ppb

Resultant Mixed Arsenic Concentration						
	% Removal					
% of Flow Treated	50%	60%	70%	80%	90%	100%
20%	13.5	13.2	12.9	12.6	12.3	12
40%	12	11.4	10.8	10.2	9.6	9
60%	10.5	9.6	8.7	7.8	6.9	6
80%	9	7.8	6.6	5.4	4.2	3
100%	7.5	6	4.5	3	1.5	0

Initial Arsenic
 Concentration 14 ppb

Resultant Mixed Arsenic Concentration						
	% Removal					
% of Flow Treated	50%	60%	70%	80%	90%	100%
20%	12.6	12.32	12.04	11.76	11.48	11.2
40%	11.2	10.64	10.08	9.52	8.96	8.4
60%	9.8	8.96	8.12	7.28	6.44	5.6
80%	8.4	7.28	6.16	5.04	3.92	2.8
100%	7	5.6	4.2	2.8	1.4	0

Initial Arsenic
 Concentration 13 ppb

Resultant Mixed Arsenic Concentration						
	% Removal					
% of Flow Treated	50%	60%	70%	80%	90%	100%
20%	11.7	11.44	11.18	10.92	10.66	10.4
40%	10.4	9.88	9.36	8.84	8.32	7.8
60%	9.1	8.32	7.54	6.76	5.98	5.2
80%	7.8	6.76	5.72	4.68	3.64	2.6
100%	6.5	5.2	3.9	2.6	1.3	0

Initial Arsenic
Concentration 12 ppb

Resultant Mixed Arsenic Concentration						
% Removal						
% of Flow Treated	50%	60%	70%	80%	90%	100%
20%	10.8	10.56	10.32	10.08	9.84	9.6
40%	9.6	9.12	8.64	8.16	7.68	7.2
60%	8.4	7.68	6.96	6.24	5.52	4.8
80%	7.2	6.24	5.28	4.32	3.36	2.4
100%	6	4.8	3.6	2.4	1.2	0

Initial Arsenic
Concentration 11 ppb

Resultant Mixed Arsenic Concentration						
% Removal						
% of Flow Treated	50%	60%	70%	80%	90%	100%
20%	9.9	9.68	9.46	9.24	9.02	8.8
40%	8.8	8.36	7.92	7.48	7.04	6.6
60%	7.7	7.04	6.38	5.72	5.06	4.4
80%	6.6	5.72	4.84	3.96	3.08	2.2
100%	5.5	4.4	3.3	2.2	1.1	0

Initial Arsenic
Concentration 10 ppb

Resultant Mixed Arsenic Concentration						
% Removal						
% of Flow Treated	50%	60%	70%	80%	90%	100%
20%	9	8.8	8.6	8.4	8.2	8
40%	8	7.6	7.2	6.8	6.4	6
60%	7	6.4	5.8	5.2	4.6	4
80%	6	5.2	4.4	3.6	2.8	2
100%	5	4	3	2	1	0

Appendix D

Pilot Testing Results

Tim Russell

From: Stillman, Mark [MStillman@melchemicals.com]
Sent: Friday, November 08, 2013 7:58 AM
To: Tim Russell
Cc: kylemenath@jbiwater.com; Monks, Gary; Pardini, James J.
Subject: Isolux Water Analysis Lab Results
Follow Up Flag: Follow up
Flag Status: Red
Attachments: Isolux Lab - Silver Knolls NV 11.6.13.xls

Tim,

The results of our water analysis are in the attached file. In general, Isolux will have no problem removing the arsenic from this water down to a level of <2 ppb. The water analysis for both wells is similar with the exception of phosphorus which is discussed below. I have listed the comments below.

1. We measured arsenic at 11 and 14 ppb respectively for Wells 2 and 3, I believe these results are consistent with your historical data.
2. The pH of both wells is similar (7.60 and 7.74 respectively). This is in the middle of the acceptable pH range for arsenic adsorption systems. While pH control is not necessary you may want to consider it now or at some time in the future as a means of reducing operating cost.
3. All arsenic adsorption media adsorb silica and a number of other competing ions in addition to arsenic. It has been Isolux's experience that in soft water situations, i.e. water containing little or no calcium and/or magnesium, adsorbed silica will polymerize and form a gelatinous mass within the media bed. In the case of Isolux media, because of its relatively small particle size, the gelatinous silica plugs the media bed, increasing pressure drop and reducing flow. In more granular media, the gelatinous silica coats the media particles, preventing the arsenic from being adsorbed. The result is premature failure because the arsenic MCL is exceeded in the product water. Although the exact mechanisms are not well understood, it is believed that in the presence of sufficient calcium and/or magnesium, the adsorbed silica forms calcium and/or magnesium silicates. These silicates inhibit the polymerization of silica thereby preventing the formation of the gelatinous material. A combination of chemical theory and Isolux's seven years of field experience indicate the following "rule-of-thumb" can be used to evaluate the susceptibility of a specific site to this kind of problem.

$$\text{Hardness (as ppm CaCO}_3\text{)} > 3.33 \times \text{silica content (ppm)}$$

For Wells 2 and 3 the hardness to silica ratio is 1.61 and 1.08 respectively. Calcium addition will be needed to increase the ratio to 3.33. For Well 2 the calcium concentration should be increased to about 53 ppm. For Well 3 the calcium concentration should be increased to about 55 ppm. We have used a simple chemical feed tank with pump supplying an NSF61 grade of CaCl₂ solution to accomplish this for other customers.

4. Phosphorus concentration is the only parameter that is significantly different between the two wells. Well 2 has 77 ppb phosphorus while Well 3 has <20 ppb. While both are acceptable for an arsenic adsorption system such as Isolux, cartridges used for Well 3 will have a longer life than cartridges on well

2 because of the phosphorus difference.

Based on this water analysis, I estimate Well 2 performance to be in the range of 60 – 70,000 bed volumes. For Well 3, performance should be in the 75 -85,000 bed volume range. This means that for Well 2, a 75-gpm module with a bed volume of 40.5 gallons will process 2,430,000 – 2,835,000 gallons of water before the product arsenic level reaches 10 ppb. The same unit on Well 3 will process 3,037,000 – 3,442,000 gallons.

Hopefully this answers your questions. If you have any others please do not hesitate to let us know.

Mark Stillman

Market Development Executive

Isolux - Melsorb



Tel: 908-782-5800 ext. 1200



A Division of MEL Chemicals, Inc.

500 Barbertown-Point Breeze Rd.
Flemington, NJ 08822
908-782-5800 908-782-3380 fax
www.zrpure.com

Sample Number	Date Sampled	Source	Type	As, ppb	B, ppb	Ba, ppb	Ca, ppm	Fe, ppb	Mg, ppm	Mn, ppb	P, ppb	SiO2, ppm	Va, ppb	pH	Alkalinity, ppm	TDS, ppm	Hardness/SiO2 Ratio
1013006	10/9/2013	Silver Knolls NV - Well 2	MELi Result	11	24	24	24	<30	3	<2	77	42	30	7.60	72	123	1.61
1013007	10/9/2013	Silver Knolls NV - Well 3	MELi Result	14	22	17	16	<30	<3	<2	<20	44	36	7.74	64	104	1.08

Appendix E

Arsenic Sampling Results of Lower and Upper Well for 2013

APPENDIX E
Silver Knolls Mutual Water Company
WQ Data
Total Arsenic mg/l

Sample Date	WO1 (Well-2)	WO2 (Well-3)	SSO1 (DSO1)	
4-3-13			10	
4-10-13	10	9	10	
4-17-13	8		11	
4-23-13	8		11	
5-08-13	10	8	11	
5-15-13	8		11	
5-22-13	9		12	
6-05-13	9		12	
6-12-13	9		12	
6-26-13	9		12	
7-03-13	9	13	12	
7-10-13	10	15	14	
7-18-13	13	14	14	
7-22-13	14	14	14	
7-31-13	15		14	
8-08-13	10	15	14	
8-15-13	14	12	14	
8-21-13	9	14	14	
8-30-13	15	12	13	
9-06-13	11	14	15	
9-12-13	10	14	14	
9-20-13	15	14	14	
9-30-13	14	14	13	
10-04-13	14	14	13	
10-09-13	9	14	13	

Attachment D

Public Notice

**NOTICE OF APPLICATION FOR PERMIT
UNDER UTILITY ENVIRONMENTAL PROTECTION ACT
FOR CONSTRUCTION OF AN ARSENIC ABSORPTION MEDIA SYSTEM**

PLEASE TAKE NOTICE THAT SILVER KNOLLS MUTUAL WATER COMPANY (SKMWC) will file an Application with the Public Utilities Commission of Nevada (Commission) for a Permit Under the Utility Environmental Protection Act for construction of an Absorption Media System to remove arsenic at its facilities located in Washoe County, Nevada. SKMWC provides water utility services for the community of Silver Knolls. Arsenic levels would be removed by piping the raw water from the SKMWC wells through an absorptive media container and into the existing storage tank for later use in the system. The piping and treatment unit will require expansion of the existing booster station building, upgrade of existing electrical components, and upgrade of the existing control system. Additionally, the Lower Well would be re-equipped with a smaller 185-gpm pump.

This project is being undertaken to bring the existing water system into compliance with the arsenic maximum contaminant level as established by the U.S. Environmental Protection Agency.

Appendix E

Certificate of Service to State Clearinghouse

Submission to Nevada State Clearinghouse

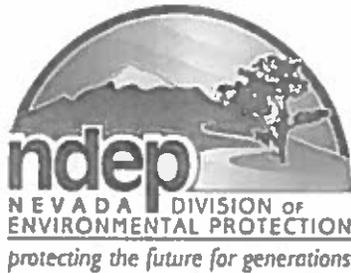
This Application was sent by email in electronic format to the Nevada State Clearinghouse on February 27, 2014. A copy of confirmation of receipt and distribution of the Application by the Clearinghouse has not yet been received. More formal proof of that submission will be provided under separate cover.

Dated: Feb 27, 2014

Anne Michael
Sr. Environmental Specialist

Appendix F

NEPA Categorical Exclusion



STATE OF NEVADA

Department of Conservation & Natural Resources

DIVISION OF ENVIRONMENTAL PROTECTION

901 S. Stewart Street, Suite 4001 Carson City, Nevada 89701 (775) 687-4670 FAX 687-5856

Public Notice

CATEGORICAL EXCLUSION DRINKING WATER STATE REVOLVING FUND LOAN

The Nevada Administrative Code (NAC) in Sections NAC 445A.6758 to 445A.67612, inclusive, outlines the environmental review procedures to be followed by the Division of Environmental Protection (NDEP) to meet the requirements of the National Environmental Policy Act (NEPA). In accordance with these procedures, NDEP has determined that the project described below is eligible for a Categorical Exclusion and may be exempted from further substantive environmental review requirements.

Project Name: Arsenic Treatment

Project No.: #8 Year 2014 Priority List

Applicant: Silver Knolls Mutual Water Company

Estimated Drinking Water State Revolving Fund Assistance: \$301,500

The Silver Knolls Mutual Water Company (SKMWC) is located in Washoe County approximately 15 miles north of Reno off of Red Rock Road. SKMWC provides water services to 63 residential lots and a 20-acre regional park maintained by Washoe County. The water supply for SKMWC exceeds the maximum contaminant level for arsenic. The proposed project includes the installation of a central treatment system to remove arsenic and bring the water system into compliance with the drinking water standard for arsenic. The project includes the expansion of the existing booster pump building on the storage tank and Upper Well site. The treatment process will use an adsorptive media cartridge design where the media is contained in individual cartridges that are replaced when the media is exhausted. There is no contact with spent media or hazardous waste disposal and no discharges to the environment.

The project is eligible for a categorical exclusion because it is unlikely to have a negative effect on human health or the quality of the environment. Construction will take place in an area that has been previously disturbed and is owned by the SKMWC. Best management practices will be utilized during construction. The project will have a beneficial effect by ensuring the customers receive water that is safe to drink. Compliance with section 106 of the National Historic Preservation Act will occur before construction begins. Documentation to support this conclusion is available for public examination at the office of the Division of Environmental Protection, 901 S. Stewart St., Suite 4001, Carson City, Nevada.

Comments for consideration on this proposed decision must be submitted by March 7, 2014 to:

Michelle Stamates
Drinking Water State Revolving Fund Program
901 S. Stewart St., Suite 4001
Carson City, NV 89701-5405

Comments may be submitted by FAX to (775) 687-9510 or by e-mail to mstamate@ndep.nv.gov.
Questions regarding this notice may be directed to Michelle Stamates at (775) 687-9331.

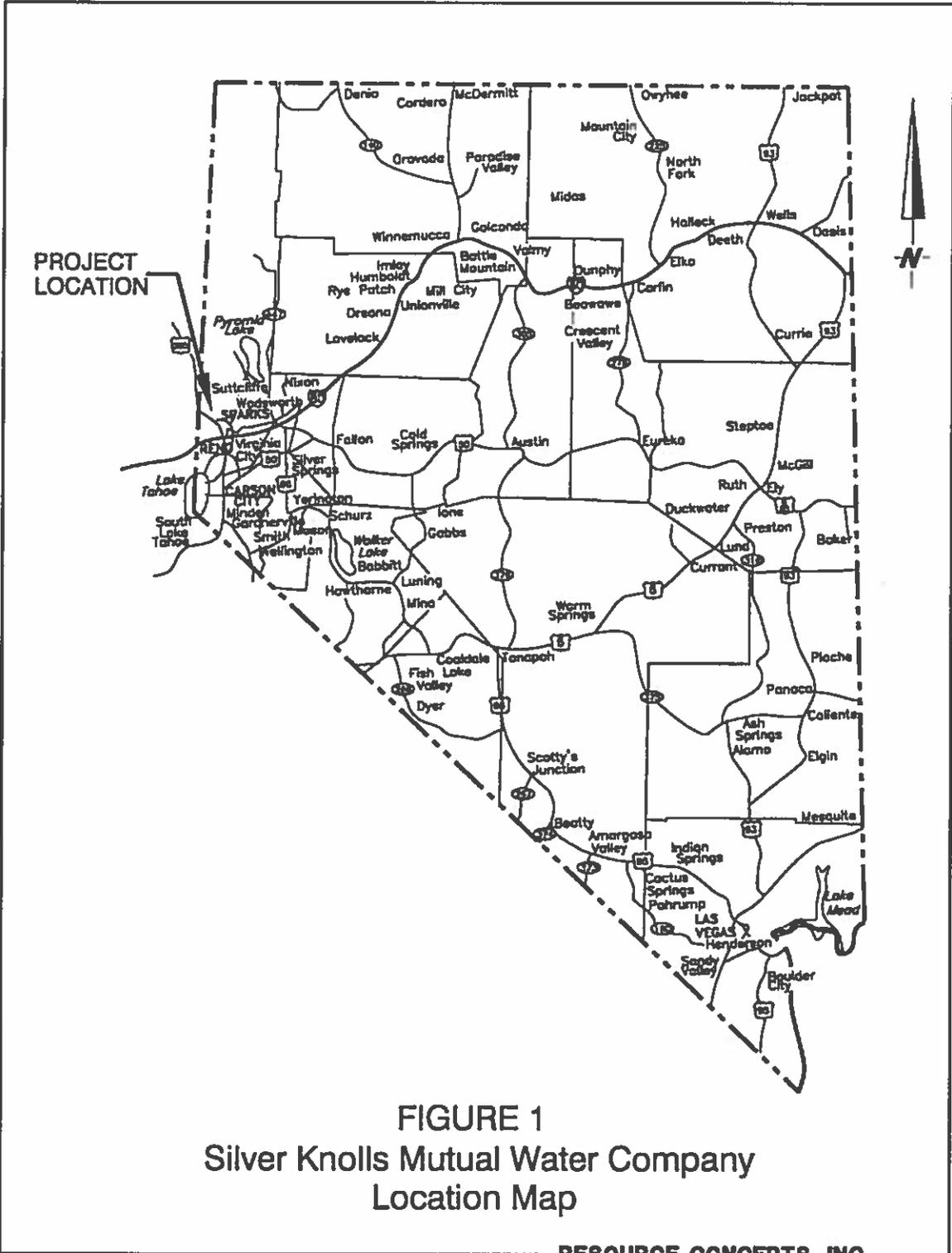
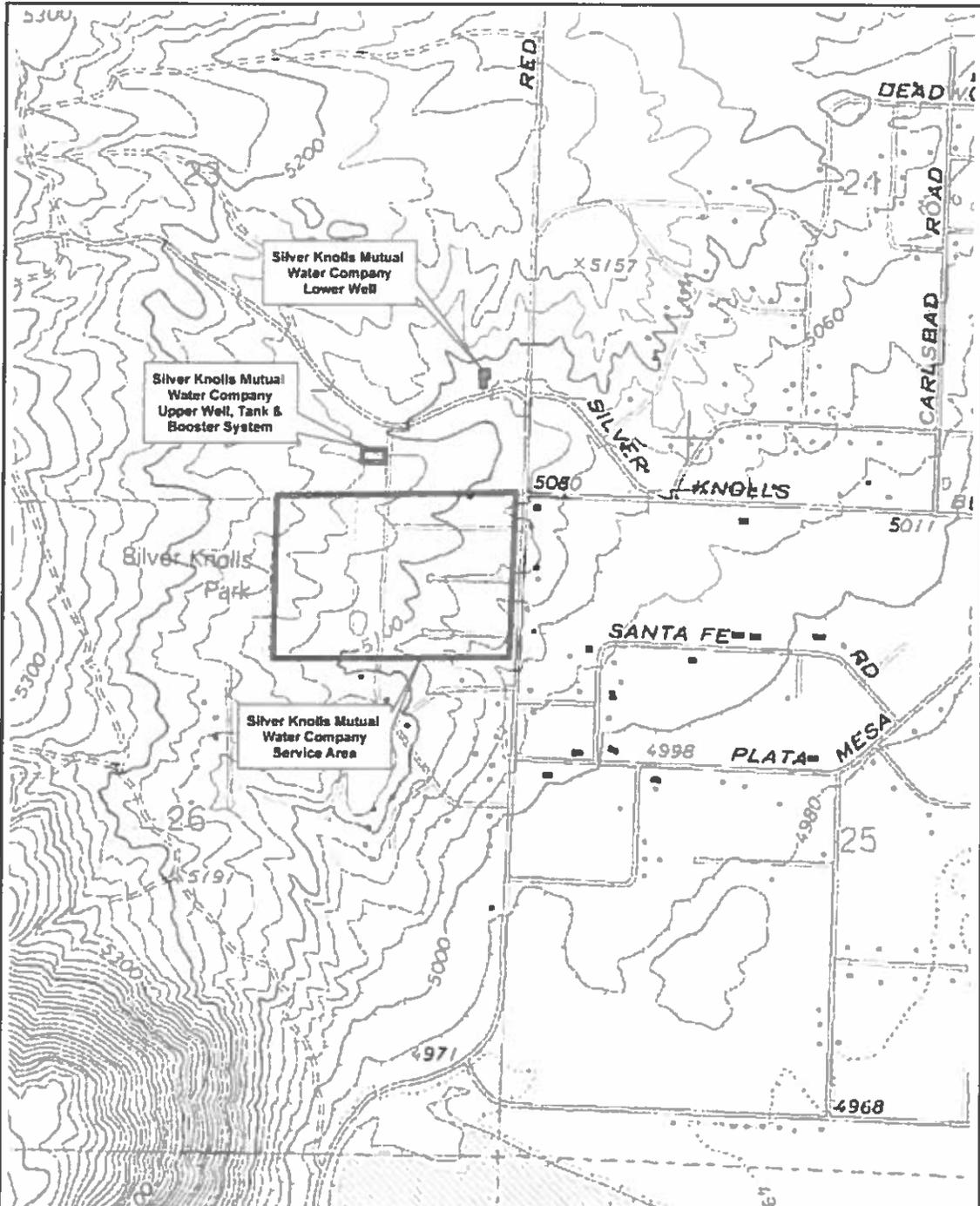


FIGURE 1
 Silver Knolls Mutual Water Company
 Location Map



1 inch = 1,000 feet
 0 500 1,000 Feet
 Source: USGS 7.5' Quads

Figure 3
Silver Knolls Mutual Water Company
Service Area



Path R:\projects\Silver_Knolls_Mutual_Water\ARC\GIS\Service_Area.mxd

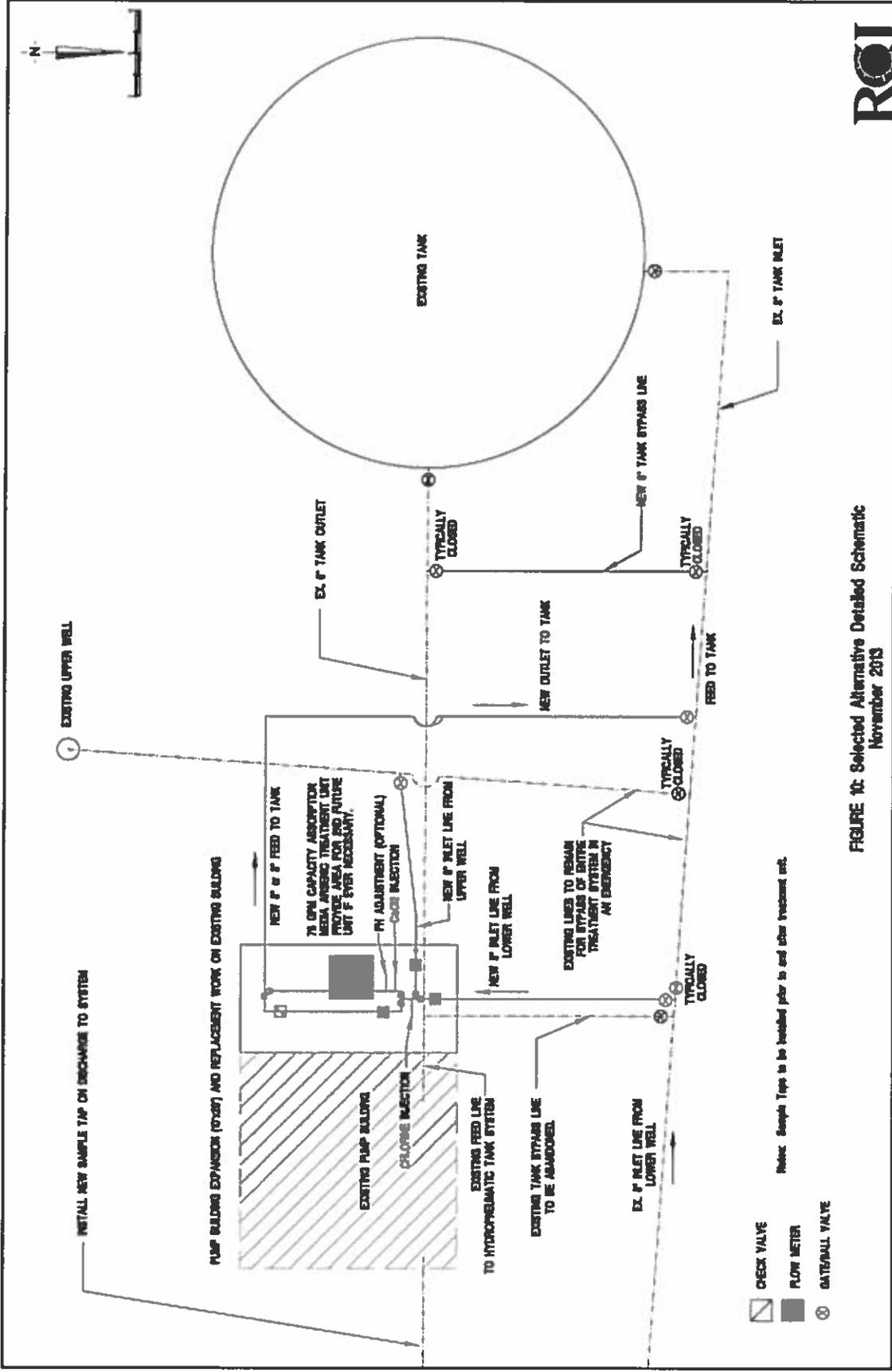


FIGURE 10: Selected Alternative Detailed Schematic
November 2013



Storage tank, well, & booster pump house site – looking west



Close-up of storage tank, well, & booster pump house site – looking west



Storage tank, well, & booster pump house site – looking north



Close-up of booster pump house site – looking north



Storage tank, well, & booster pump house site – looking east



Storage tank, well, & booster pump house site – looking south



Close-up of booster pump house site – looking south