

FINAL
PRELIMINARY ENGINEERING REPORT

for the
Water System Purchase and I-40 Waterline Crossing

Prepared for
The Town of Edgewood, NM

Prepared by
Wilson & Company, Inc., Engineers & Architects
4401 Masthead Street NE, Suite 150
Albuquerque, NM 87109

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& COMPANY**

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The TOWN of EDGEWOOD, NM

I, Dennis D. Brand certify that I am a licensed Professional Engineer (NMPE # 8374), and that this Preliminary Engineering Report was prepared by me or under my direction.



Dennis D. Brand (NM PE # 8374)



Prepared By

Wilson & Company, Inc., Engineers & Architects
4401 Masthead Street, NW
Albuquerque, NM 87109
(505) 348-4000
(505) 348-4055 Fax

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1 GENERAL - INTRODUCTION

1.1 INTRODUCTION

The project is located in the town of Edgewood NM, which is located primarily in Santa Fe County, approximately 16 miles East of Albuquerque. The planning area is further defined in the following subsection, titled: "1.2 PROJECT PLANNING AREA."

The primary purpose of this project is for the Town of Edgewood to investigate the feasibility of purchasing and operating the existing water system in the Town of Edgewood. Currently the system is owned and operated by EPCOR Water Company, from whom the town would need to buy the system via adverse possession. The town would make immediate improvements to the system after purchasing.

Immediate or near-term improvements considered in this report include:

(a) Improving the water system connection between the North side production wells and South side water storage tanks of the town. Currently the system is inhibited by a bottle neck causing pressure and capacity problems at the water line crossings of Interstate Highway 40. Construction could provide an additional waterline connection crossing the interstate between the critical elements of the system, improving flows between the wells and the southern tanks by supplying the Edgewood Tank sufficient water to handle distribution and fire flow needs for the southern portion of the system.

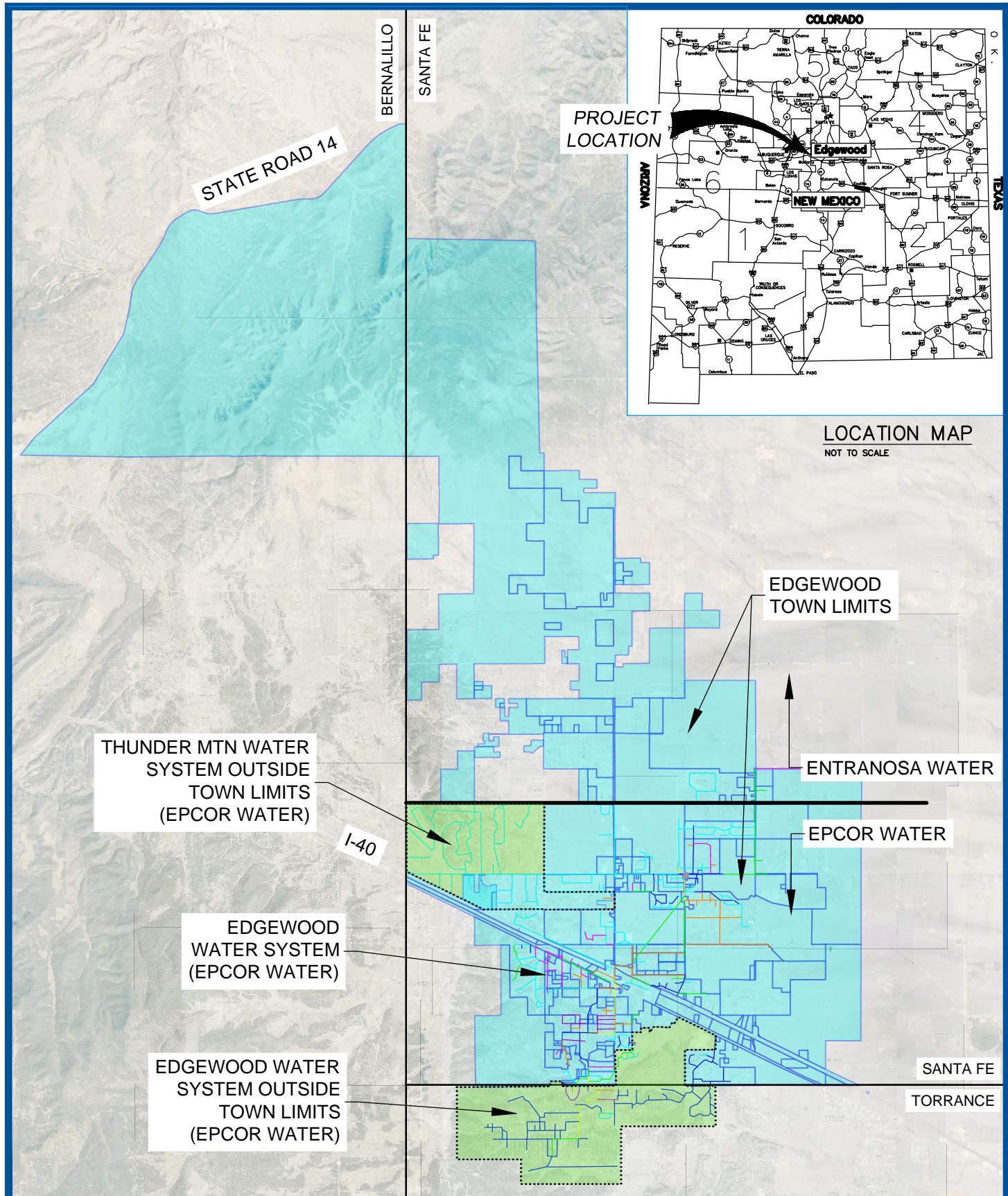
(b) Provide water treatment to improve water quality and reduce water contaminants. This water quality improvement primarily includes remediating high hardness present in the system. According to the EPCOR 2018 Consumer Confidence Report the hardness in the system is stated as between 35-44 Grains per gallon, which is very hard water. Complaints have been received from the public that the hardness causes replacement of home water softeners and water heaters at an alarming frequency.

1.2 PROJECT PLANNING AREA

1.2.1 LOCATION

The project is located in the town of Edgewood NM, which is a town located primarily in Santa Fe County. The town also contains annexations located in Bernalillo and Torrance County. Edgewood is located approximately 16 miles east of Albuquerque. **See Appendix A** for a USGS topographic map of Edgewood NM and the surrounding areas. The town is generally located along Interstate 40, with the southern border being along Windmill/Riverview Rd. The northern boundary of the town has been recently extended northwesterly to NM state road 14. The western boundary is located at Barton Rd, and the Eastern Boundary is located at the intersection of E. Frontage Road and Thompson Rd.

The project planning area encompasses the entire EPCOR water system service area (for both the Edgewood and Thunder Mountain Systems) within and around the southern portion of the town of Edgewood: some portions of which are outside the town limits. The planning area is located generally in Township 10N, Range 7E, and includes Sections 13-36. Portions of the planning area also extend into Township 10N, Range 8E, Sections 30 & 31, and Township 9N, Range 7E, Sections 1-9; which are located in Torrance County NM. **See Exhibit 1.1** below which shows both the regional location of Edgewood, NM, and highlights the existing town limits and the specific water system planning area.



WILSON
& COMPANY

2600 The American Rd. SE, Ste. 100
Rio Rancho, New Mexico 87124
505-898-8021

NTS

EXHIBIT 1.1:
LOCATION MAP
Town of Edgewood and
EPCOR Water System

The project includes both existing Edgewood and Thunder Mountain water systems, which are operated and owned by EPCOR. This planning area encompasses all of the water system infrastructure east of the Santa Fe County/ Bernalillo County Boundary and south of Sections 7-12 of Township 10N, 7E. The EPCOR Water Company, a private water company, operates both the Edgewood Water System and the Thunder Mountain System. The water supply wells and booster systems that are part of the Edgewood Water System also provide the water supply to the Thunder Mountain System water storage tanks.

Approximate maps of the planning area water system infrastructure can be seen in **Exhibit 2.1** and **Exhibit 2.2** located later in this report. The system maps were developed using data from the 2017 EPCOR Annual Report to the NM Public Regulation Commission, old system maps and field observations of existing surface level structures, hydrants, and meters. This is because no as-built information or current system line mapping is available from the current system owners. The system includes wells, pumps, tanks, hydrants, meters, valves and all other appurtenances and piping related to the water distribution system. The EPCOR 2017 report identifies 2720 residential and commercial service connections (customers) in the combined systems of Edgewood-Thunder Mountain water.

Also of note, the water system in Edgewood, north of the project planning area, is serviced by the Entranova Water and Wastewater Association, which is a private cooperative non-profit association. Entranova Water serves approximately 500 customers in the northern areas of the town of Edgewood. Entranova Water is excluded from this project.

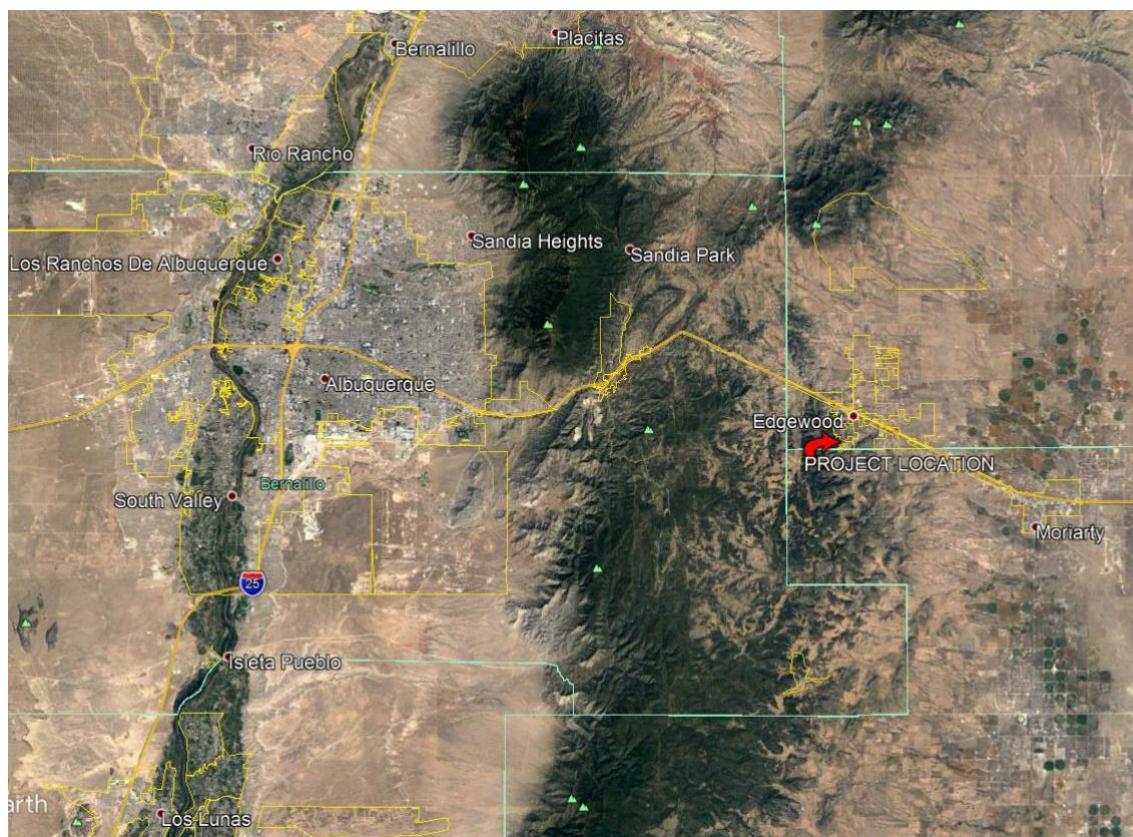


Figure 1: Project Location

1.2.2 ENVIRONMENTAL RESOURCES PRESENT

Important Land Resources: Areas surrounding and within Edgewood include National Forest Land, Farmland, Stream crossings, and Cultural Resources. As the system is already existing, no impact on any of these environmental resources is present. See Appendix A for a USGS land cover map which was used to determine land use, as well as US Forest Land Boundaries. Below is a brief summary of the environmental resources present. A more comprehensive description of the environmental resources provided in specific Environment Reports that will be submitted for funding as needed.

Farmland:

Although farmland is present to the east of Edgewood, no impact is anticipated from this project. The water system does not extend into any farm land. See the Appendix A, USGS map for the location of farmlands in relation to Edgewood.

Forest Land:

Areas within and immediately adjacent to Edgewood are considered forest land. Edgewood is directly east and on the edge of the Manzano mountain and Sandia mountain ranges, and Cibola National Forest which provides hiking, camping and picnic areas. There are also non-forest service forested areas located in the south west portions of Edgewood. None of these lands will be impacted by the Alternatives considered in this Preliminary Engineering Report.

Range Land:

Edgewood contains shrub land/grassland to the north east of town center, some of which is used as range land by cattle ranches. No impact on range land due to the existing water system is anticipated.

Wetlands and Flood Plains:

Per the National Wetlands Inventory, there are several riverine, freshwater emergent wetlands, and freshwater pond areas located within the project area, see Appendix A for the Wetlands Inventory Maps. There are also several Zone A flood plains with no established flood elevations located within the village limits, see attached FIRM panels 1000E and 0875D in Appendix A for Flood plain locations. No new impacts on existing wetlands are anticipated for this project.

Endangered Species Present:

See appendix A for a list of possible endangered and threatened species present in Bernalillo, Torrance, and Santa Fe Counties. As this is an existing system, no impact on endangered species is anticipated, however any future improvements to the system will need to accommodate any nesting sites / habitats of any possible endangered or threatened species. A further study may be required to determine any possible impacts to local endangered or threatened species, as the BISON M database is county wide, and does not highlight any local habitats.

1.2.3 POPULATION TRENDS

See Appendix A for Census information on Edgewood, NM. The estimated 2017 population for Edgewood NM is 3,892 persons, per the US Census bureau. The 2010 and 2000 census information is available in appendix A, the 1990 census data is not available for Edgewood, as the town was not incorporated until 1998-1999. Growth rates from previous years' census estimates were averaged to

determine an appropriate growth rate for Edgewood NM. County growth rates were not used, as the growth rates for Santa Fe County would be misleading for the town of Edgewood, because the town is much closer to Albuquerque than Santa Fe. Additionally, the town of Edgewood experienced a 97% growth rate between 2000 and 2010; so when calculating the average growth rate this period was omitted as this was a series of events connected to incorporation (1998-1999) and annexations and not indicative of the typical town population growth rate.

US Census
Information:

Year:	2000	2010	2011	2012	2013	2014	2015	2016	2017
Population:	1893	3735	3788	3815	3827	3841	3846	3866	3892
Growth Rate /yr:		9.73%	1.42%	0.71%	0.31%	0.37%	0.13%	0.52%	0.67%

Average growth /yr*: **0.59%**

Growth Projections:

Year:	2017	2018	2020	2030	2040	2050	2060	2070
Population @ 0.59% Growth:	3892	3915	3962	4203	4458	4730	5017	5323

* Average growth from 2000 to 2010 is omitted, as Edgewood experienced a 97% growth rate from 2000 to 2010. Trimmean (Excel function) was used to exclude the extreme outliers of the data set.

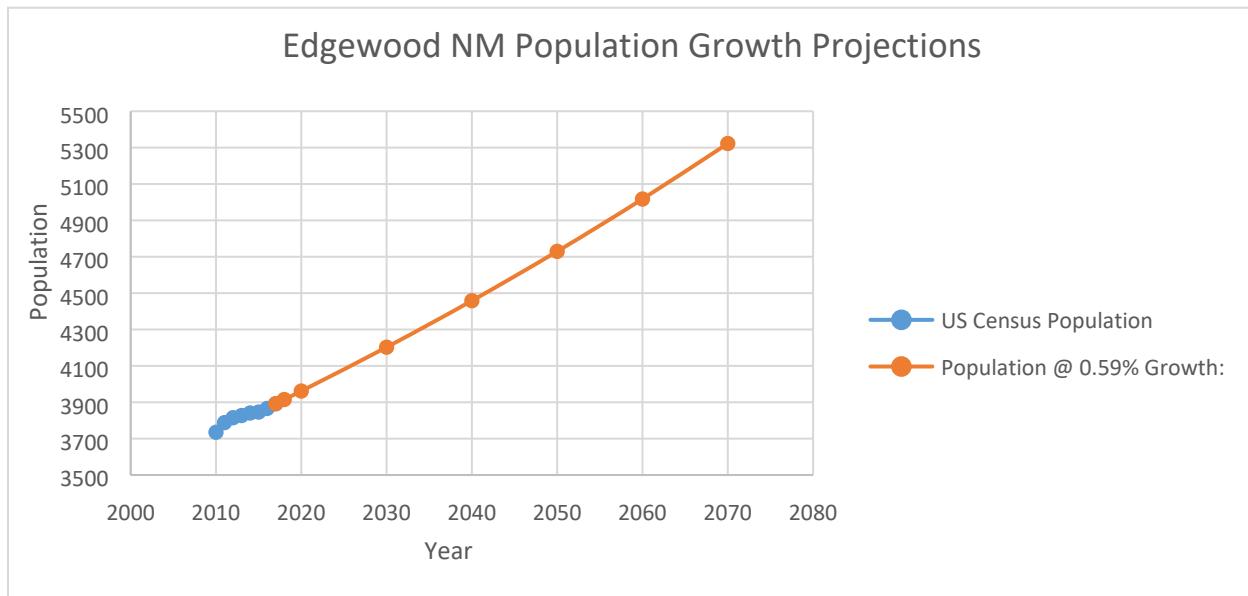


Figure 2: Population Growth Projections

1.2.4 WATER SYSTEM GROWTH TRENDS

The existing water system in the planning area is the EPCOR-owned system, consisting of both the Edgewood Water System and Thunder Mountain Water System. This existing water system covers all of the southern half of the town city limits, and includes substantial area and water customers outside of the town proper. Because the number of water system customers varies significantly from the population projections, the decision was made to utilize the population projection rate of change for future growth of the Town, 0.59% growth, but apply it to records of existing water system connections for the EPCOR-Owned system as the starting point. These numbers were used to determine the expected growth of the water system production in terms of new connections (customers), and growth in water production needs. The 2017 EPCOR Water System Report to the NM Public Utility Commission for the Edgewood/Thunder Mountain systems identifies an existing total of 2,720 total service connections (2623 residential and 97 commercial service connections). The existing daily water production (again from the EPCOR Report) is projected using the 0.59% growth rate from the population. Rate was applied to the initial service total to develop service area growth projections. Average household size (2.8 capita per dwelling unit) was obtained from Santa Fe County census records.

Service Area Population (2018):

Services in Service Area	2720
No of Commercial Services:	97
No of Residential Services:	2623
Average Household Size:	2.8
Estimated Serviced Population:	7344

Year:	2018	2020	2030	2040	2050	2060	2070
SVC Area Pop @ 0.59% Growth:	7344	7432	7884	8364	8873	9412	9985
No. of Residential Services @ 0.59% Growth:	2623	2654	2816	2987	3169	3362	3566

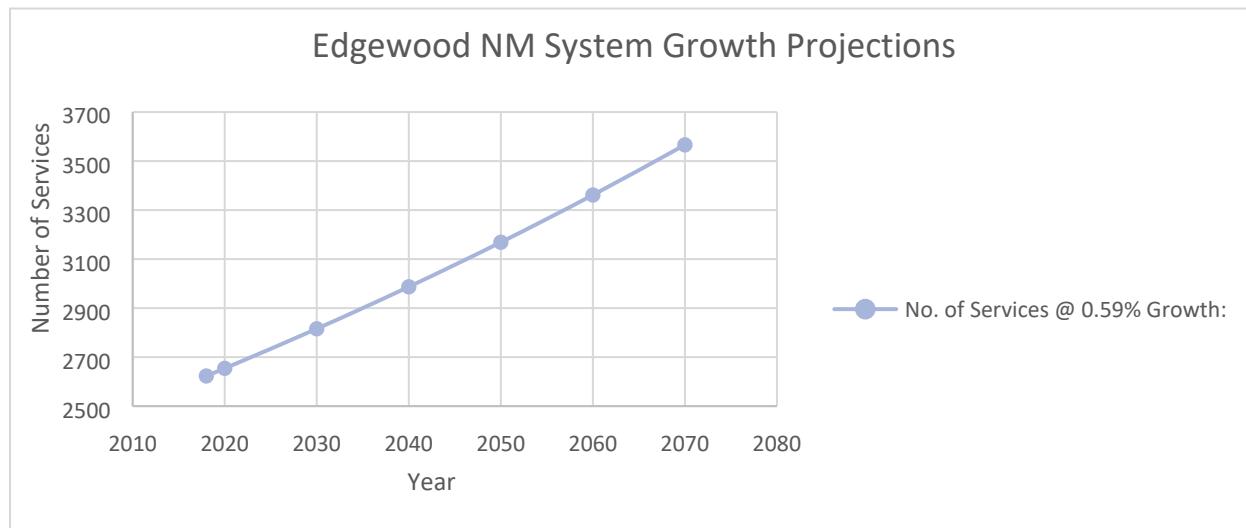


Figure 3: Water System Growth Projections (by number of services)

Because the final water system purchase price is based upon the results of the condemnation / adverse possession proceedings, and is currently unknown; and because substantial detailed information on the overall condition of the existing water system facilities is not currently forthcoming from EPCOR, the planning projection study period for purchase and improvements was reduced to a shorter time period from the present (2018) to the year 2040, or a period of 22 years, in order to provide more accurate estimates of water production requirements, future projections of water users and for sizing any immediate improvements. For the year of 2040, the number of residential services supplied by the water system is projected as 2987 residential connections (versus 2623 residential currently), with the existing daily water system production expanding from an average of 573,962 gallons per day (gpd) to a total average of 653,611 gallons per day in the year 2040. Because the existing production wells are stated in the 2017 EPCOR report as having a combined capacity of 950 Gallons per minute(GPM), or a maximum production of 1,368,000 gallons per day; the current well production system is fully capable of sustaining the projected increase required by the water system future projections at the year 2040. (IE: $653,611 / 1,368,000$ equals 0.478, or 48 percent of the time required for well production operations, which equals approximately 11-3/4 hours per day of operation in a 24-hour period in the year 2040).

1.2.5 COMMUNITY ENGAGEMENT

The town of Edgewood has engaged local citizens in enquiries about the advisability of purchase of the Edgewood and Thunder Mountain Water Systems. Included in the enquiries were two public meetings: a regular public meeting on Tuesday, July 3, 2018, and a special meeting held on Saturday, July 7, 2018, to discuss the possible purchase of the water system. Continuing efforts have been made to advise and update the citizenry, through public announcements and through additional discussions at public meetings, and publishing of town council minutes. Future meetings are anticipated.

2 EXISTING FACILITIES

2.1 INTRODUCTION

2.1.1 EDGEWOOD AND THUNDER MOUNTAIN WATER SYSTEM

The water system as operated by EPCOR is identified by the State as public water system ID # NM 3500326. The system has operated continuously under a number of previous water system names, but is currently known as the Edgewood Water system. The overall EPCOR water system in Edgewood and surrounding areas is divided into two entities. The two entities are the Edgewood water system and the Thunder Mountain water system, both owned and operated by EPCOR. As described earlier, the water production wells of the Edgewood water system are utilized to also supply the Thunder Mountain water system. See **Exhibit 2.1-Existing Wells and Tanks** and **Exhibit 2.2-Existing Piping and Hydrants** for overall maps of the existing combined Edgewood Water/Thunder Mountain Water system.

2.1.1.1 WELLS

The wells for both Edgewood and Thunder Mountain are the same, as the Edgewood Wells also serve the Thunder Mountain system. The wells are all located in the Northern portion of the Planning Area. All wells are drawing out of the same underground aquifer. The wells are rated for a total of 950 GPM, and are adequate for the population served. See **Exhibit 2.3-Existing Well Sites** for the location of all of the existing wells. See **Table 2.1- System Capacity Analysis**, and **Table 2.2-Well Details**, located in the **Tables**

and Figures section at the end of the PER body. Table 2.1 provides well production utilization as exists in 2017, but also proposed well utilization in the year 2040. This indicates that the existing wells are capable of supplying water to the combined system into the future. Table 2.2 provides physical data of the wells, from New Mexico Office of the State Engineer (NMOSE) records.

Summary Descriptions of wells:

Dinkle – Dinkle well contains a Goulds pump rated for 300 GPM @ 556 feet. The motor is run on average for 8.43 hours per day, or 253 hours per month.

Homestead – Homestead well contains a Goulds pump rated for 70 GPM @ 562 feet. The motor is run on average for 10.87 hours per day, or 326 hours per month.

Quail S2 – Quail S2 well contains a Goulds pump rated for 300 GPM @ 560 feet. The motor is run on average for 12.14 hours per day, or 364 hours per month.

Bachelor – Bachelor well contains a Berkeley pump rated for 140 GPM @ 562 feet. The motor is run on average for 11.43 hours per day, or 343 hours per month.

Quail S5 – Quail S5 well contains a Goulds pump rated for 140 GPM @ 556 feet. The motor is run on average for 7.37 hours per day, OR 221 hours per month.

Turner – Turner well currently has no pump.

Edgewood – Edgewood well currently has no pump.

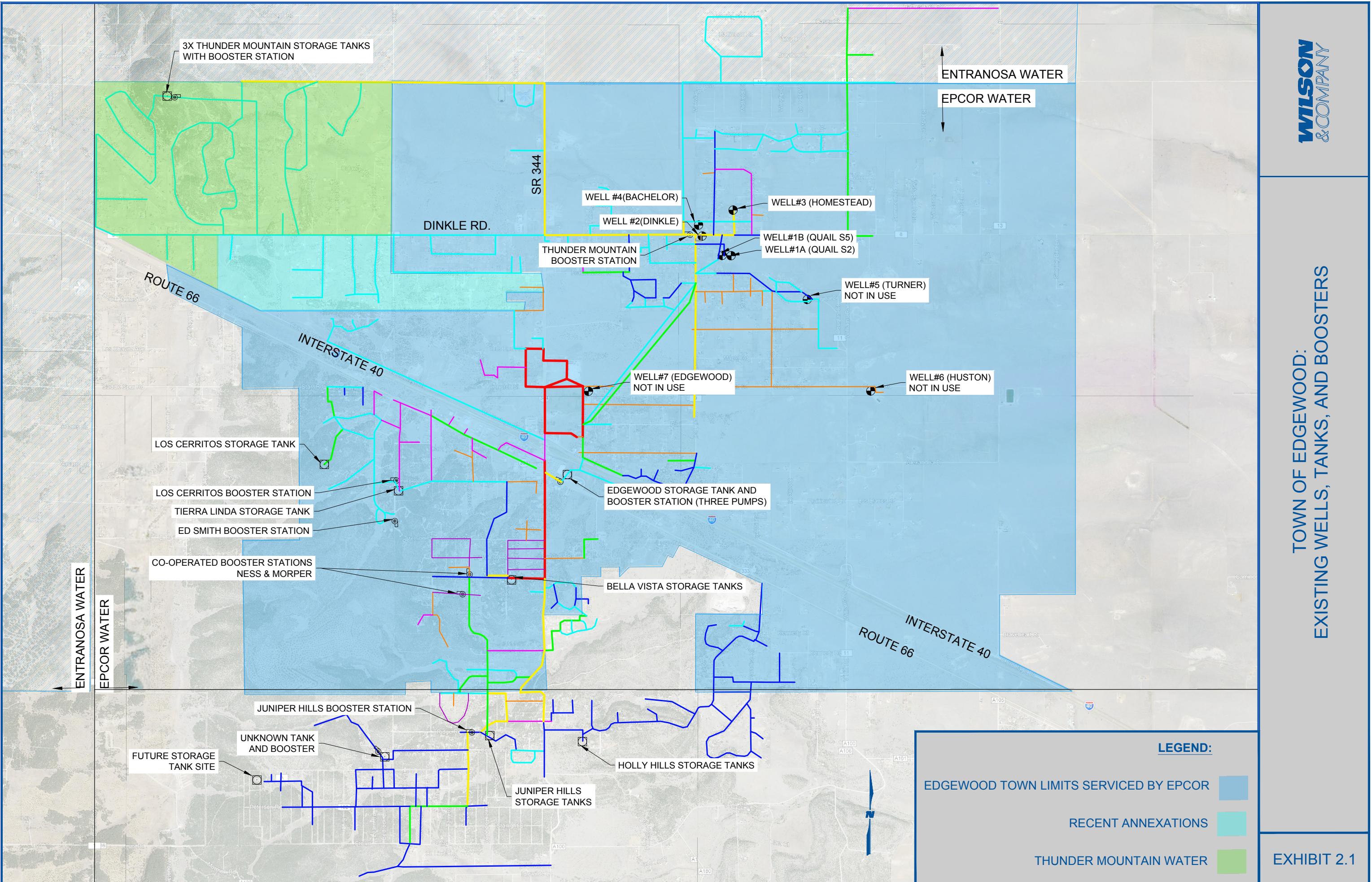
Huston – Huston Well currently has no pump

2.1.1.2 BOOSTER PUMPS

The booster pumps for both Edgewood and Thunder Mountain are indicated on **Exhibit 2.1**. Almost all of the booster systems are located within the Edgewood system. An older system layout, contour mapping and the arrangement of storage tanks and wells all indicate a number of different pressure zones (See “**Old Existing System Map**”, created by “Edgewood water, Inc.”, found in **Appendix B**) and which are designated in this report as Zones 1-5, ascending from the NE to the SW and South. As the wells are located primarily in the North of the planning area, and the water storage tanks are all located to the West, South and Southwest of the system, on hills or rises, and at higher pressure zones; a number of booster pumps are required to supply water to the higher pressure zones in the system.

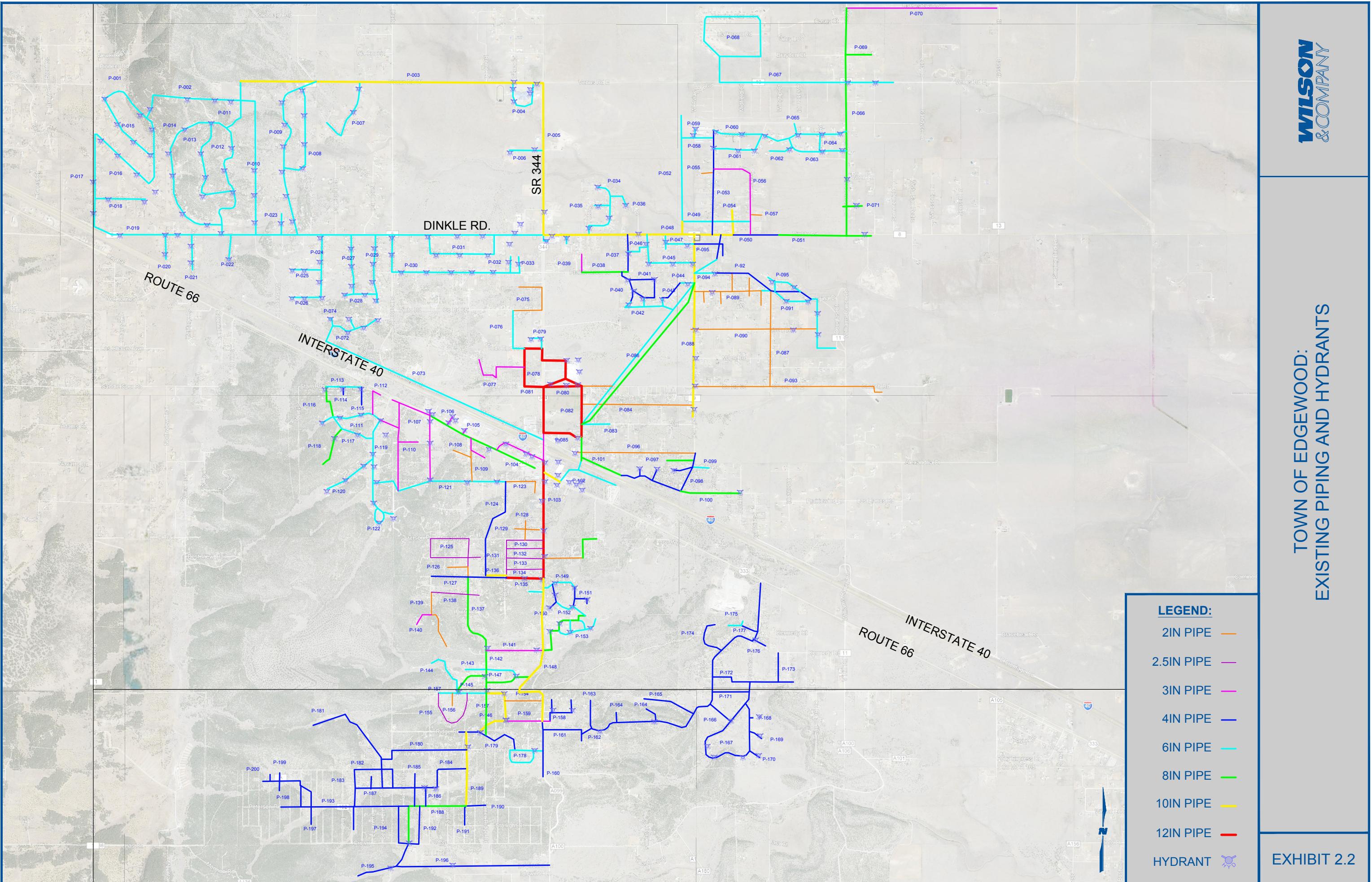
In general terms, the wells (1) supply sufficient water pressures to the surrounding areas (Zones 1 and 2), and also supply water via a pipeline to (2) a central storage tank, (Edgewood tank) and booster system, located south of I-40 near the Edgewood interchange. The central booster system in turn, supplies water and pressures to the areas of the system South of I-40, (Zone 3) including several of the storage tanks. The additional booster systems are required to boost the water further west and Southwest (Zones 4 and 5). Not all of the zones match exact elevations or pressure. (3) The Thunder Mountain system and related storage tanks are a special situation, in that a booster system located at the site of the Dinkle well (See again Exhibit 2.1) provides water and pressures to the Thunder Mountain system. The pressures provided at the thunder mountain system storage tanks do not exactly fit into the Edgewood system zones. See **Table 2.3 - Edgewood Booster Stations**, located in the **Tables and Figures** section at the end of the Preliminary Engineering Report body, for some details on the booster stations.

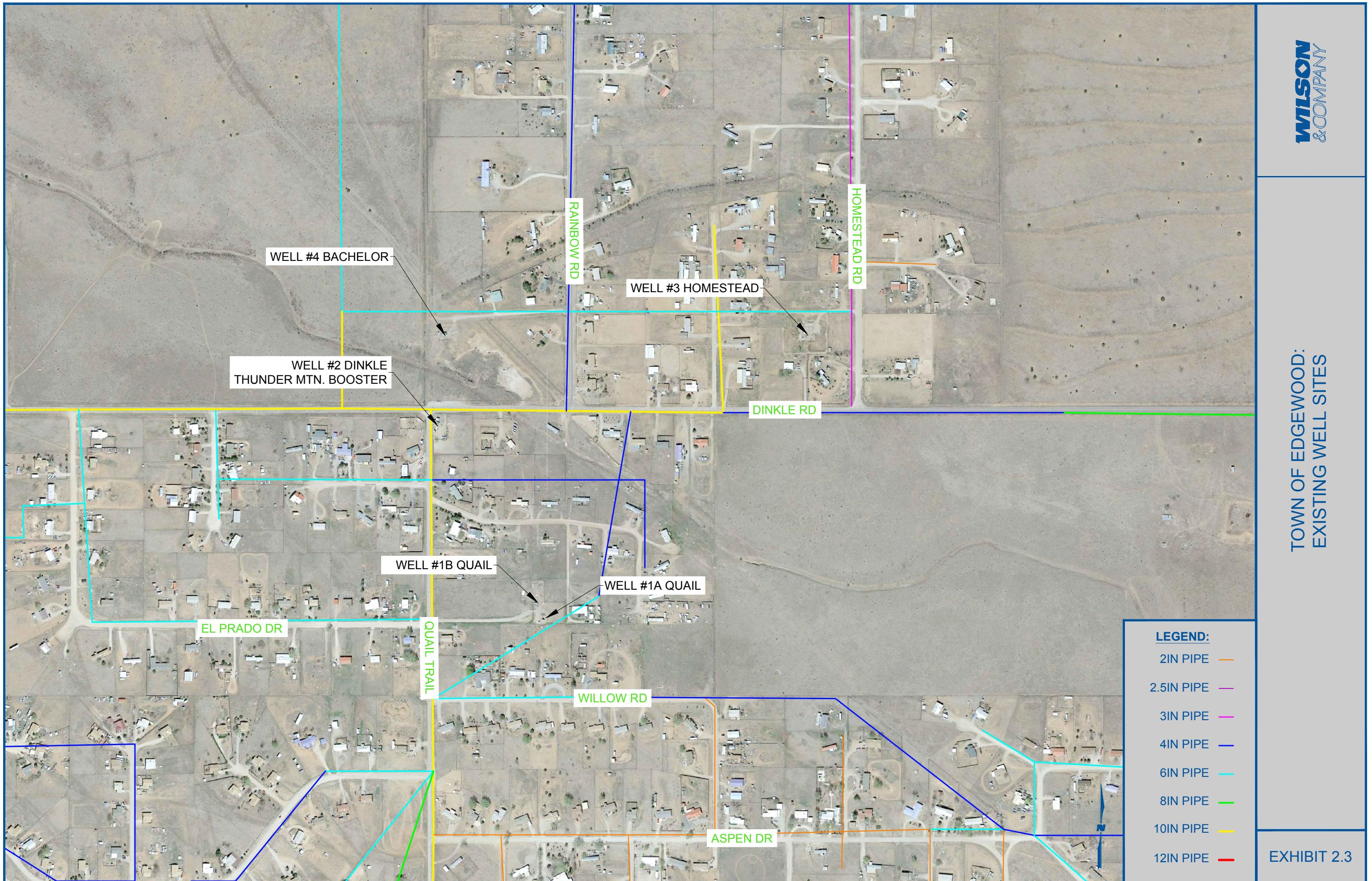
**TOWN OF EDGEWOOD:
EXISTING WELLS, TANKS, AND BOOSTERS**



**TOWN OF EDGEWOOD:
EXISTING PIPING AND HYDRANTS**

EXHIBIT 2.2





Summary Descriptions of Booster Stations:

Thunder Mountain Booster System – the Thunder Mountain booster is located at Dinkle well within the Edgewood system. (See Exhibit 2.1). The Booster system includes three pumps, (1) a 60 HP, (2) a 40 HP and (3) a 7.5 HP pump. One of the pumps is designated as a Variable Frequency Drive (VFD) Pump. The Booster station pumps to the thunder mountain tanks.

Ed Smith Booster System – the Ed Smith booster system is located near the Tierra Linda Storage tank, and boosts into Peterson Place (See Exhibit 2.1). The Booster system includes two pumps, (1 & 2) both 5 HP pumps. The Booster station pumps to Peterson Place.

Los Cerritos Booster System – the Los Cerritos booster system is located near the Tierra Linda Storage tank, and boosts to the Los Cerritos Storage tank (See Exhibit 2.1). The Booster system includes two pumps, (1) a 10 HP pump with a VFD and (2) a 60 HP pump. The Booster station pumps to Zone 4.

Ness Booster system- The Ness Booster is located near the Bella Vista Tank and draws water from that tank. The Booster consists of one 10 HP pump with a VFD and pumps into Zone 4 at Moriarty Road.

Morper Booster system- The Morper Booster system is located near the Bella Vista Tank and draws water from the tank. The Booster consists of (1) 7.5 HP pump and pumps into Zone 4 at Palomino Road.

Juniper Booster System – the Juniper booster system is located near the Juniper Hills Storage tank, and boosts to an unidentified storage tank located some $\frac{3}{4}$ mile due west of the booster station. (See Exhibit 2.1). The Booster system includes two pumps, (1 & 2) both are 10 HP pumps with a VFD. The booster station pumps to the storage tank.

Edgewood Booster System – the Edgewood booster system is located near the Edgewood Storage tank, and boosts water to at least four storage tanks (Bella Vista, Tierra Linda, Juniper Hills and Holly Hills). As previously described, the Booster Station and storage tank is located south of I-40, near the Edgewood interchange, and supplies all water to the system south of I-40 (See Exhibit 2.1). The Booster system includes three pumps, (1 & 2 & 3). All three are 60 HP, and the booster station pumps to both the aforementioned storage tanks, and all of the southern areas of pressure Zones 2 and 3.

2.1.1.3 WATER STORAGE TANKS

Because the higher elevations and pressure zones are located to the South and West of the Planning Area, and because the water system wells are located at lower elevations in the North of the planning area, a system of booster stations and storage tanks were required as development occurred (See **Exhibit 2.1.**) The water system has grown to meet primarily subdivision growth. The description of the wells and booster station precedes this storage tank section, and provides ample description of the locations and interaction between the storage and booster systems. All of the storage tanks except for the Thunder Mountain Storage tanks are part of the Edgewood system. See **Table 2.4 - Edgewood Storage Tanks**, located in the **Tables and Figures** section at the end of the Preliminary Engineering Report body.

Summary Descriptions of Water Storage Tanks:

Edgewood – The Edgewood tank is a 20' H X 48' D Steel Tank. The tank has a capacity of 264,000 gallons and is located 100' from the nearest pumping station (See **Exhibit 2.1.**).

Bella Vista – The Bella Vista tanks are a 20' H X 48' D Steel Tank, and a 20' H X 68' D Steel Tank. The tanks have a capacity of 264,000 and 500,000 gallons and located 1.5 miles from the nearest pumping station.

Juniper Hills – The Juniper Hills tanks are a 17.7' H X 19.9' D Steel Tank, a 18.8' H X 35' D Steel Tank, and a 24' H X 21.5' D Steel Tank. The tanks have a capacity of 39,000, 130,000 and 65,000 gallons and are located 500' from the nearest pumping station.

Holly Hills – The Holly Hills tanks are a 15' H X 16' D Steel Tank, and a 17' H X 20' D Steel Tank. The tanks have a capacity of 22,500 and 40,000 gallons and are located 60' from the nearest pumping station.

Tierra Linda – The Tierra Linda tanks are a 28' H X 11' D Steel Tank, and a 26' H X 20' D Steel Tank. The tanks have a capacity of 19,900 and 61,000 gallons and located 500' from the nearest pumping station.

Los Cerritos – The Los Cerritos tank is an 18' H X 31.9' D Steel Tank. The tank has a capacity of 105,000 gallons and is located 0.5 miles from the nearest pumping station.

Unknown Tank – An unknown tank of unknown size is located within the Edgewood system, approximately $\frac{3}{4}$ mile due West of the Juniper Hills Storage Tank and Booster system, within

2.1.1.4 *DISTRIBUTION*

Reference both **Exhibit 2.1** and **Exhibit 2.2**. The Edgewood system contains **430,000 linear feet** of distribution piping, ranging in size from 2" to 12", most of which is PVC pipe. The vast majority of piping is of 4-inch diameter or less in size. There is one length of 6" Asbestos Cement (AC) line that is used as the sole transmission line between the well field and the Edgewood tank and booster, crossing Interstate 40. See **Table 2.5- Edgewood/Thunder Mountain Water Lines**, found in the **Tables and Figures** Section located following the body of this PER, for a more detailed breakdown of pipe lengths and sizes description of the water lines.

The Edgewood system, including Thunder Mountain, contains a total of **263 Fire Hydrants** of variable manufacture and age. A table containing a comprehensive itemization and description of the existing fire hydrants is included in **Appendix B**. The 2017 EPCOR report does not identify whether the entire water service area, (including areas outside of the Town limits) are fully-covered by fire flow protection, but the report indicates that separate fire protection agreements exist with some customers.

The Edgewood system contains a total of **2,087 meters** in use, of which 2,003 meters are in residential service, ranging in size from 5/8" to 1" meters. 84 meters are in commercial service, ranging from 5/8" to 2". No meters are noted as in industrial use. See page 18-Edgewood of the EPCOR 2017 report found in **Appendix E** in the appendix for a more detailed breakdown of meter sizes.

2.1.1.5 *TREATMENT*

Currently, the only treatment for the system is disinfection, located at each well site. The water is treated with Sodium Hypochlorite (for chlorination) located primarily at the wells. Other chlorination stations may be located within the system, but they are not identified in any data from EPCOR. The system uses approximately 13587 lbs of NaOCL per year to treat the water in the system.

2.1.1.6 *ENERGY CONSUMPTION*

The 2017 EPCOR yearly statement identifies the electrical costs from pumping as \$112,914 per year for the Edgewood portion of the water system. No breakdown as to electric rates per Kilowatt Hours or other indications are provided in the report.

2.1.2 THUNDER MOUNTAIN

2.1.2.1 *WELLS*

Thunder Mountain utilizes water supply from the wells of the Edgewood system, and has no independent water supply (See Thunder Mountain Booster System, indicated previously).

2.1.2.2 *PUMPS*

Thunder Mountain identifies a pumping station located at the Thunder Mountain tank site, presumed to pressurize the system for homes that do not have sufficient pressures from the Thunder Mountain storage tanks. Size and number of booster pumps are not known.

2.1.2.3 *TANKS*

Thunder Mountain tanks – The Thunder Mountain tanks consist of three (3) Tanks located centrally within the system. The three tank capacities are 50,000 gallons, 50,000 gallons and 80,000 gallons. Additional description of dimensions are not available. The tanks are supplied from the Thunder Mountain Booster System, located at the Dinkle well site in the Edgewood system.

2.1.2.4 *DISTRIBUTION*

The Thunder Mountain system contains 175,000 linear feet of distribution piping, ranging in size from 2" to 10", all of which is PVC pipe. See **Table 2.5- Edgewood/Thunder Mountain Water Lines**, found in the **Tables and Figures** Section located following the body of this PER, for a more detailed breakdown of pipe lengths and sizes description of the water lines.

The Thunder Mountain system contains a total of **768 meters** in use, of which 750 meters are in residential service, ranging in size from 5/8" to 1" meters. 18 meters are in commercial service, ranging from 5/8" to 2". No meters are noted as in industrial use. See -page 18-Thunder Mountain of the EPCOR 2017 report found in **Appendix E** in the appendix for a more detailed breakdown of meter sizes.

2.1.2.5 *TREATMENT*

Currently, the only treatment for the system is disinfection, located at each well site. The water is treated with Sodium Hypochlorite (for chlorination) located primarily at the wells. The cost of disinfection at Dinkle well and Thunder Mountain Booster is included. The water is treated with Sodium Hypochlorite, approximately 5234 lbs of NaOCL is used per year to treat the water in the system.

2.1.2.6 *ENERGY CONSUMPTION*

The 2017 EPCOR yearly statement identifies the electrical costs from pumping as \$13,630 per year for the Thunder Mountain portion of the water system. No breakdown as to electric rates per Kilowatt Hours or other indications are provided in the report.

2.1.3 ASSET MANAGEMENT

It is currently unknown if EPCOR maintains an active asset inventory solely for the Edgewood/Thunder Mountain System. This PER assumes that a formal Asset Management Plan for Edgewood does not exist.

2.2 LOCATION MAP

See **Figure 1** on page 4, shown previously for Edgewood location Map. See **Exhibit 1.1** for Project Location on a New Mexico State inlaid map, with Edgewood Town boundary and Project Planning Area/EPCOR Water system boundary shown on the main map. See **Exhibit 2.1** and **Exhibit 2.2**, shown previously, for location of water system elements and facilities for the Edgewood/Thunder Mountain water system, currently owned and operated by EPCOR.

2.3 HISTORY OF EDGEWOOD

The Edgewood area has developed as a bedroom and rural community located along the Eastern edge of the Sandia / Manzano mountains and the Cibola National Forest, since around 1960. The creation of an interchange on I-40 at Edgewood in the 1968 timeframe, and reconstructed in 2003, has enabled further development. The Town of Edgewood was incorporated in 1999. Population for Edgewood essentially doubled between the years 2000 and 2010 (from 1893 to 3735) per the U.S. Census, with most of the jump due to Incorporation and annexations. Recent years has seen a more modest growth, and that growth has been projected as 0.59%/year, detailed in **Section 1.2.3** and **Section 1.2.4**.

2.4 HISTORY OF THE EDGEWOOD/ THUNDER MOUNTAIN WATER SYSTEM

Early development of the water systems in the Edgewood area were by individuals, developers and corporations interested in providing water for various subdivision developments. The **Edgewood Water Company** was started in approximately 1960. Other developments in 1962 and later, added to the water system infrastructure and supply needs. At numerous times, the water production (well) facilities (wholesale water supply) and the pipelines, and storage tanks associated with development (retail water supply) were in separate hands. The main well field, located in Section 14 and Section 23 of T 10N R 7E, near and East of the Intersection of Dinkle Road and Quail Trail, was developed between **1971-1984** (See **Exhibit 2.3**). In the late 1980's thru mid-1990's, the Thunder Mountain water system infrastructure was developed, and contracted to purchase water from the Edgewood Water system. That water company was known as **Thunder Mountain Water**. The retail side of the Edgewood Water System passed through several owners between 1994 and 2002, at which time it was purchased by the American Water Company. In 2003 or 2004 American Water assumed control of both wholesale and retail sides of the Edgewood Water System. In 2011, a corporate takeover/purchase was initiated by **EPCOR Water**, a water company whose sole shareholder is the **City of Edmonton, Province of Alberta, Canada**. EPCOR owns and operates the system to this day. The local system consists of the assets/infrastructure, lands, facilities and water rights of **Edgewood Water Company** and **Thunder Mountain Water Company**.

2.5 CONDITION OF EXISTING FACILITIES

Condition of the existing system must be further investigated by audit. Current knowledge is based on age of facilities, testimony from the former system owner, and a series of visual inspections from public

property. No inspection of tank interiors, booster stations, well pump houses or other systems was able to be undertaken that cannot be seen from outside the buildings on public property. Inquiries and meetings with several Town of Edgewood officials and local citizens added information on age of various parts of the system. Parts of the system are 45 years older or more

Storage tanks vary in average age from more than 35 years to one tank that was constructed less than 10 years ago. The wells were drilled and entered into the records of the New Mexico Office of the State Engineer (NMOSE) from 1971 through the early 1980's. Also the details on the existing system (See Figure 2.2) show a large number of the main system waterlines as three inches (3") in diameter or less, and a large part of the system is in excess of 30 years old (Southern waterline development is dated between 1980 and 1986, and northern development is dated between 1977 and 1984, except for Thunder Mountain). Some development along the Interstate is older. Almost all of the water system line materials are reported by EPCOR as Polyvinyl Chloride (PVC) pipe. Most of the water booster pumping stations have been installed over 20 years ago, although the pumps may have been replaced. In summary, the Edgewood/Thunder Mountain system is of average age of more than 30 years. Parts of the system are obviously older than 30 years. The Central Tank and original booster system (Edgewood Tank) was constructed on or about 1975, which would make the facility about 43 years old. The Thunder Mountain system was developed in the late 1980's to mid-1990's which would make it an average age as old as 25-30 years. More recent waterline improvements have occurred, mostly along the central north-south NM Hwy 344 corridor, due to the construction of Wal-Mart.

The overall condition of the system is difficult to discern directly from the EPCOR Annual Report in 2017 (See **Appendix E**). In the annual report, individual portions of the system lines or facilities are not individually described in terms of age or for itemized depreciation, but only the budget items as shown are summarized in the EPCOR financial report.

2.6 FINANCIAL STATUS OF ANY EXISTING FACILITIES

The Edgewood/Thunder Mountain Water System is currently not a publicly-owned system, so **no direct financial data on the system** is available, except that which is available from EPCOR in their Annual Report to the New Mexico State Utility Commission. The EPCOR Annual Report provides a financial status of a private water company which owns multiple separate water systems in New Mexico (Clovis, Edgewood & Thunder Mountain). The Clovis water system size far outweighs the Edgewood/Thunder Mountain systems in population served (37,775 in year 2010), number of water users, miles of pipeline, operations staff and billings personnel. Therefore budgeting information on whether the existing water rate structure for Edgewood/Thunder Mountain system is appropriate, or allows for annual improvements is not readily discernable from the information provided.

2.7 WATER/ENERGY/WASTE AUDITS

No public information on water/energy or waste audits was made available to the Edgewood public body as of the date of this Preliminary Engineering Report.

3 NEED FOR PROJECT

The project for the Town of Edgewood consists of purchasing, by adverse possession, the existing Edgewood and Thunder Mountain private water systems, currently owned and operated by the private water company EPCOR. Also, the need for added immediate or delayed improvements are also discussed following, and later in detail in some of the construction options.

There are several reasons for converting the specific private water system to a public water system. The reasons are summarized as follows: (1) **CONSOLIDATION OF DIRECTION AND CONTROL:** Ability of the existing municipality to best direct and control all development, including water supply needs, without having the water utility actively limit, curtail, stymie or abstain from development, or disagree to provide improvements, which would contradict the actions of the publicly-elected municipal body.. (2) **PROVIDE OTHER AVENUES OF FUNDING ASSISTANCE:** Open up additional avenues for funding that are available for public entities (municipalities) other than directly from rate-payers for various improvements, including upgrades to the system. (3) **PROVIDE DIRECT CITIZEN INVOLVEMENT:** Provide more direct involvement from rate-payers and citizens concerning water rates, rate structure or rate increases, through public hearings held in Edgewood, rather than hearings in Santa Fe, NM. (4) **INCORPORATE MANPOWER SAVINGS AND ECONOMIES OF SCALE:** Other municipal operations, such as wastewater treatment plant and sewers, roadways and streets, and finance department could be utilized to make operations more synergistic.

3.1 DIFFERENCE BETWEEN PRIVATE / PUBLIC UTILITIES AND WHY PUBLIC

3.1.1 PRIVATE WATER SYSTEMS

In New Mexico, under a private water system, such as EPCOR, the company aims to make a profit. Operations, maintenance, repairs, and scheduled improvements must be supported by the rate-payers. The water rate structure supports all of the company operations, including all of the necessary yearly items in the budget. As a consequence of operating as a private company, improvements may not be made unless they can be supported financially by the existing rate structure, or by rate increases. A private company would not initiate improvements unless they can be shown to be supported financially. Thus, only normal maintenance and repairs, emergencies and pre-budgeted improvements would be made, and only if they were shown to be in the company's best interest. EPCOR Water is a private utility company whose sole shareholder is the city of Edmonton, Alberta, Canada.

The private company's rate increases must go before the NM Public Utility Commission, which allows small increases to occur without public hearings. The Utility Commission requires yearly statements of the water utility be published. The latest available EPCOR Annual Report is for 2017, (See Appendix E) and forms the basis for much of the detailed information in this report. The EPCOR water system company appears to be operating Edgewood and Thunder Mountain systems appropriately, and professionally. SCADA system operations have minimized labor, and saved on electricity.

However, the existing system has NOT been extensively upgraded in years, and is an aged system, with a number of older water tanks, old wells, some undersized lines, and limited inter-connectivity within the water distribution system. The age and condition of the system cries out for assessment and upgrades, which may only be undertaken with added public resources, outside assistance and an infusion of

finances. EPCOR has depreciated the water system assets in the company books, but complete detail on age of all components and individual facilities is currently lacking from available public records.

3.1.2 PUBLIC WATER SYSTEMS

Publically-owned water systems, as operated and controlled by the public body (Town, city, village or county through a county commission or city/town council) provide a consolidation of direction and control, provide additional avenues of funding, provide more consistent and local public responsiveness, and incorporate savings of manpower and economies of scale.

3.1.2.1 CONSOLIDATION OF DIRECTION AND CONTROL

Under a publicly-owned water system, any development, repairs or operations may be better controlled, directed and coordinated with all elements of public improvements, such as roads, culverts and storm sewers, sanitary sewers, water, gas and electric lines. Public utility repairs and minor improvements may be scheduled with and assisted by other crews from the municipality, including road or other utility crews for ancillary assistance in emergencies. Any utility billing may be run out of the town's or city's finance department. Many municipal utilities in small towns are operated in this way.

3.1.2.2 PROVIDING OTHER AVENUES OF FUNDING

In Contrast to private water systems, publically-owned (municipal) water systems have more avenues of financial support than water rates. Although the public-owned water systems are to be largely supported by the rate-payers, and the water rate structure would form the bulk of the finances, any municipal-owned or county-owned system may support the system with other means of funding and assistance. Other avenues of funding would include grants, loans or both from state and federal governments, backed up by the assets of the system, and the revenue stream from the water usage.

Various agencies of both the state of New Mexico and the United States Federal Government have programs to assist in providing upgrading and enhancing water supply and water quality to the various municipalities across New Mexico. One such example would be a combination of low interest loans from the U. S. Department of Agriculture (USDA), to purchase the system and make improvements. Other avenues of assistance would include both grants and loans from the New Mexico Water Trust Board, and direct assistance from the NM Legislature through the NM Department of Finance and Administration. The Town of Edgewood also could, through its citizens, provide general obligation bonds, or revenue bonds to support any necessary improvements to meet the needs of the public. A potentially large advantage of the Edgewood water system in becoming a publically-owned water system, consists in the availability of direct financial assistance. Any grants or direct financial assistance from either the state of New Mexico or the U.S. Government, would be money not needing to be paid back, and which would then not factor into any water rate increases, or the water rate structure.

3.1.2.3 PROVIDING DIRECT CITIZEN INVOLVEMENT

Also, more direct involvement by citizens and rate-payers would be available under the municipal-owned water system, as any changes in the water rate structure, including rate increases or other issues, would be subject to public hearings and ordinance changes. Such changes would be voted upon by the public body of Edgewood, instead of a state of NM Public Utility Commission (PUC) located in Santa Fe, NM.

3.1.2.4 INCORPORATE MANPOWER SAVINGS AND ECONOMY OF SCALE

The town of Edgewood currently owns and operates the existing sanitary sewer system and wastewater treatment plant. Utilizing savings from cross-training the water system personnel with the sewer system personnel, (by providing operator cross-training) and by having the finance department do billings of both water and sewer rates would together result in manpower savings. Also, combining the roadway equipment yards and utility equipment yards at the same locations and providing all utility billings at Town Hall allows for reduced manpower, rather than with two separate operating entities (Town and private company). However, by public law and separation of finance reasons, the water rate structure must support the water system operations, and the sewer/wastewater rate structure must continue to separately support the sewer and wastewater treatment system.

3.2 NEED FOR ADDITIONAL IMPROVEMENTS

NEED FOR additional Improvements: As stated previously, THIS Preliminary Engineering Report identifies two major needed improvements to accompany the intended purchase of the water system from EPCOR. They are:

(1) Constructing an additional pipeline connection between the production wells that are located several miles north of US Interstate I-40, and the Central Tank and Booster Station (Edgewood Tank and Booster), located South of I-40. Currently, the overall direct connective pipeline between the Edgewood Water System Well Field and the central Edgewood Tank and Booster Station consists of a single pipe of 6-inch diameter. As the well field is located north of the interstate, and the central tank is located south of the interstate, and this tank and pump station then provides both supply and pressures (by pumping to various higher-zone tanks) to all of the town water services located south of the interstate highway, an immediate additional highway crossing pipeline improvement is warranted to provide pressure relief for this bottle neck, and provide added water supply capacity and fire flows as required. This project would not require added yearly operations costs, and is included as part of the initial capital costs.

(2) Constructing a central Water Treatment Plant located near the production wells to treat the water and bring it in line with water quality norms, is warranted for further investigation. The existing system does not treat the water for hardness. The Edgewood water is classified as very hard water, between 35 and 44 grains per gallon (which equals between 600 and 760 milligrams per liter of Hardness). This water treatment plant, along with the necessary buildings, storage tanks and treatment tanks, pipelines, and brine or waste evaporative storage ponds, would necessitate high capital costs and high additional operations costs. Treatment options investigated include: (a) Lime Softening; (b) Reverse Osmosis; and (c) Ion-Exchange. Projected design requirements for each Water Treatment Plant option, including pipelines, ponds and other appurtenances, sized for the year 2040, are separately presented. They are: **Table 3.1-Lime Softening Plant Calculations-Year 2040; Table 3.2- Reverse Osmosis Plant Calculations-Year 2040; and Table 3.3-Ion-Exchange Plant Calculations-Year 2040**, which are included in the **Tables and Figures** Section following the PER Body. Each option has advantages and disadvantages that are discussed in subsequent sections, but all are expensive to construct and operate. Detailed costs are presented later in Section 4.

Currently the lack of treatment for hardness requires each homeowner receiving the system water to install a home water softener. The treatment project would directly improve the water quality for each and every homeowner using the water, and combine savings for all of the ratepayers, which includes

reducing the individual home costs in repairs or replacements of hot water heaters, RO units and softener units and reducing individual usage of salt in individual softener units.

In addition, the hard water is detrimental to the life of the membranes at the Town's Wastewater Treatment Plant. Reduction of hardness in the overall system would extend the life cycle of the membranes and reduce wastewater operations costs. Therefore, a central water treatment plant is further explored. The initial cost of the system would be increased with this improvement, and the operational costs would also increase.

Information from public meetings and input from the public indicates that the public is frustrated with the hardness of the water. Numerous complaints from Edgewood indicate homeowners/rate-payers have been replacing both water heaters and water softeners at a "relatively short frequency".

4 ALTERNATIVES CONSIDERED

4.1 ALTERNATIVE 1- NOT PURCHASING THE SYSTEM

The Alternative # 1 consists in (1) the Town of Edgewood NOT purchasing the system, and allowing the system to continue to be Owned and Operated by EPCOR. This alternative would result in the following circumstances going forward.

4.1.1 WATER RATES

Water rate structure would remain the same, subject to EPCOR requiring new rates, based upon higher operational costs or new improvements. Current Water System Revenues obtained from records are reported as \$ 2,143,025 per year.

4.1.2 SYSTEM CONTROL

System control on development would reside with both entities (the Town of Edgewood and EPCOR). This creates a number of jurisdictional issues, and is paramount in all discussions of the alternatives, as EPCOR could decide that a long water pipeline to support a new commercial entity is NOT in the company's interest, and so either: (a) require the applicant to provide or finance all related water system improvements; or (b) Refuse service because of water system costs. This requirement would, in effect, stymie the development. This decision may not be in the best interest of the Town or the citizens, as there may be other reasons to allow the development. Other reasons to add or allow a development would include a commercial development that would add to the New Mexico Gross Receipts Tax (NMGRT) base, or a commercial entity that is a desired addition to the town, or a type of business that would provide a service or product that is not currently available in the town.

4.1.3 FUNDING

Any additional funding for the water system, including operational increases required by non-budgeted items or improvements to the system would be born entirely by the rate-payers and water rate structure under privately-owned and operated systems.

4.1.4 CITIZEN / RATE-PAYER LIMITED INVOLVEMENT IN RATE INCREASES

Currently the Public Utility Commission (PUC) holds hearings in Santa Fe on any substantial water rate structure revisions or water rate increases for any privately-owned water systems. If the utility's

increase is sufficiently controversial, they may endeavor to hold the PUC commission meeting/public hearing at a site more local, but they are not required to do so. Public comment is limited in time at these PUC meetings. Increases under a certain percentage do not require a public hearing and the PUC can unilaterally approve them.

4.1.5 LIMITED OPPORTUNITY FOR REDUCED MANPOWER OR ECONOMY OF SCALE

With the Water System in private ownership and the other municipal services directed by the Town of Edgewood, the opportunity for mutual work efforts and combining of equipment and materials is largely lost. Synergies in direction, manpower needs and combinations of operations would not occur in the future, and the system operations would be separate from any municipal operations.

4.1.6 SUMMARY

Leaving the water system in the hands of the private water company, EPCOR, limits options for added funding, combined manpower, combined control and direction, and rate-payer access to rate changes. The existing (current) water rate structure for the combined Edgewood and Thunder Mountain systems is reported to generate an income of **\$2,143,025.00 per year**, per information obtained from the Town of Edgewood.

4.2 ALTERNATIVE 2-PURCHASE SYSTEM & CONSTRUCT WL HIGHWAY CROSSING

The Alternative # 2 consists of (1) Purchasing the existing water system, utilizing financing from the US Department of Agriculture (USDA); and (2) Constructing a second transmission waterline connection from the portion of the system North of US Interstate I-40, which contains all of the water production wells, thence across the Interstate to the central storage tank and main feeder Booster Station (Edgewood Tank), which provides water supply to the entire south side of the water system. The two portions of the system are essentially dissected by the interstate highway. The added pipeline would both relieve the smaller (six-inch diameter) existing highway crossing pipeline, (thus eliminating serious downtime in the case of the existing pipeline crossings failure), and would also significantly increase the water system supply between the two parts of the system, thus greatly aiding fire flow capacities to each side of the town.

4.2.1 PURCHASE OF THE EXISTING WATER SYSTEM

The reasoning and supporting information by which the Town of Edgewood is basing the purchase of the Edgewood/Thunder Mountain combined Water System, currently owned and operated by EPCOR, is previously described in detail in Section 3, and Sub-Sections 3.1 and 3.2. Purchasing the existing Edgewood and Thunder Mountain water systems consists in adverse condemnation proceedings, court costs, attorneys, and accounting and engineering assistance, as well as the waterline highway crossing. The preliminary estimates of purchase price are stated as Twelve Million Dollars (\$12,000,000.00), with the added total of capital costs, consisting of: (a) The highway crossing pipeline construction; and (b) related capital expenses, (court costs, attorneys, accounting, engineering and surveying) together totaling Two Million Five Hundred Thousand Dollars (\$2,500,000.00). Together, the purchase cost of acquiring the existing water system, making improvements and operating the system for public use is Fourteen Million, Five Hundred Thousand Dollars (\$14,500,000.00). The estimated yearly operational costs are **\$ 793,200.00 per year**. See **Table 4.1 – Town of Edgewood Water Department-Startup** in the **Tables and Figures** section at the end of the Preliminary Engineering Report Body, for detailing of the yearly operational costs expected.

4.2.2 FINANCING ESTIMATES FOR THE PURCHASE OF THE WATER SYSTEM

Edgewood has investigated a number of financing options with the **U.S. Department of Agriculture (USDA)**. One such favored option shows the revenue and expenditures for a 40-year direct loan at 3.875% for a total amount of \$4,500,000.00, and a 30-year guaranteed loan at 5.25% for an amount of \$10,000,000.00. See **Table 4.2 – Edgewood Water System Probable Net System Revenue Study**, and the Left-hand column, identified as **40 Yr/30Yr** and under which the yearly revenue and expense total equals; (a)The existing water revenue per year; then (b) subtract the yearly expected water Operating Expenses; (c) USDA Direct Loan Principal and Interest (P&I); (d) USDA Direct Loan Debt Service Fund; (e) the USDA Guaranteed Loan P&I; and (f) Subtract USDA Guaranteed Loan Debt Service Fund.

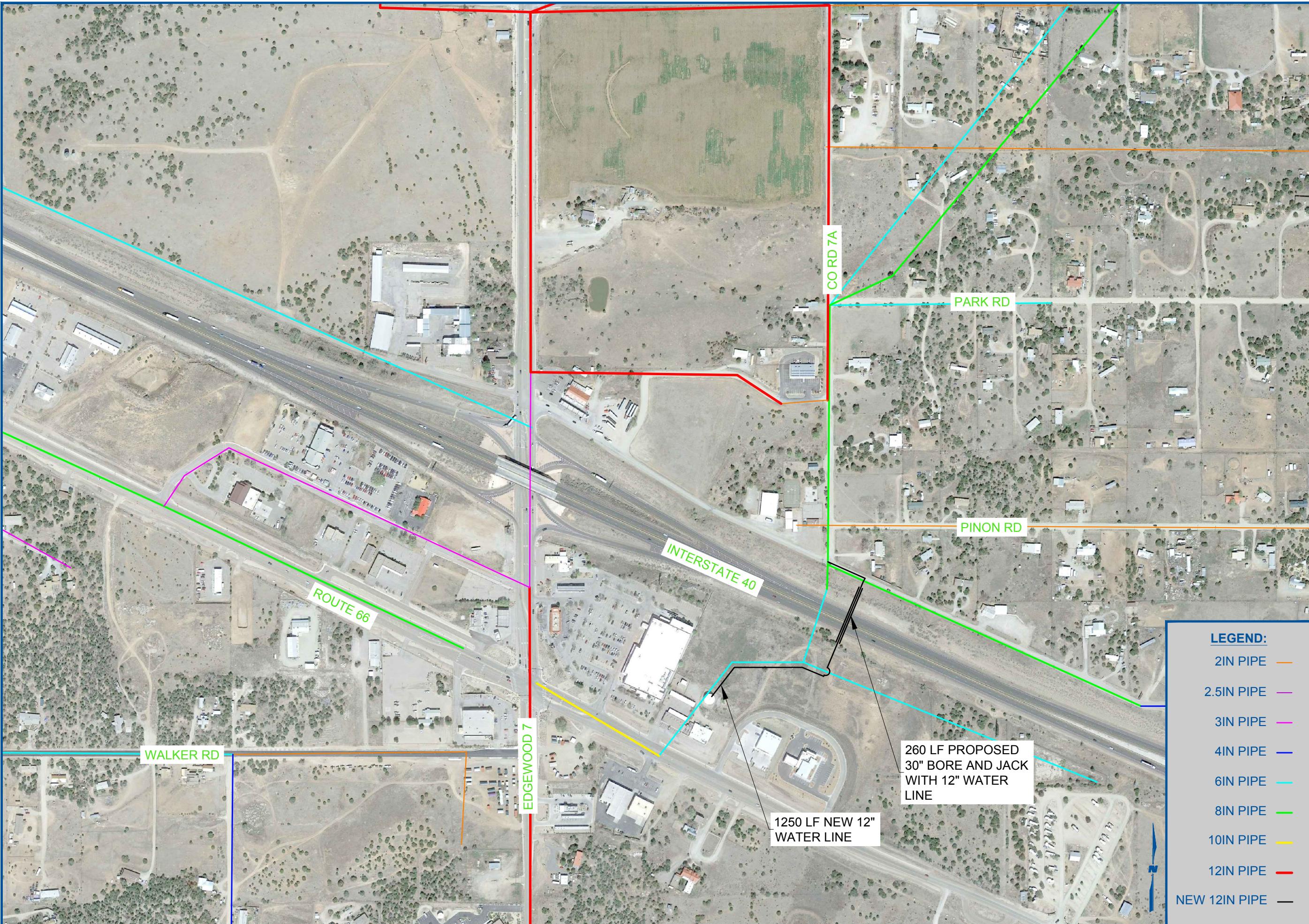
Together, the Gross Revenue of **\$2,143,025.00** minus the operating expenses of **\$793,200.00**, minus the projected Loan Principal, interest and debt service funds of **\$972,566.54**, leaves a net yearly positive revenue of **\$377,248.66**. Thus purchase of the water system is entirely feasible without raising the existing published water rates or modifying the water rate structure.

4.2.3 ADDITIONAL IMPROVEMENT–WATERLINE CROSSING OF INTERSTATE HIGHWAY I-40

In Section 3.2 paragraph 2 earlier in this PER an Interstate Highway waterline crossing by direct drilling methods; was shown to be a needed capital improvement as part of the project, alongside the purchase of the water system. The need of this improvement included providing added water system capacity required for the entire southern portion of the Edgewood Water System, by allowing added transfer flow and fire flow capability, and providing an alternate pipeline crossing of the interstate to provide double connections, in case an emergency disabled one of the pipeline crossings.

The crossing location is shown on **Exhibit 3.1 -Proposed Waterline Crossing Site** included in this document. An estimate of probable construction cost is detailed in **Table 4.3 –Estimate of Probable Cost-Alternate 2-Highway Crossing**, as found in the **Tables and Figures** Section at the end of the report body. The total estimated project cost, including engineering, surveys, and contingencies, is **\$356,728.44**, which is included in the initial \$14.5 million capital cost of the system. The exact budgeted total as included in the \$2.5 million added capital costs is **\$385,000.00** The improvement would then fit into the net projected \$2.5 million added capital for associated costs for the startup of the system.

The project construction, as included in the capital cost portion of the system, would include NO added operational expenses, and so would not be an added burden to the operational costs for the system. However, due to the uncertainty of the final purchase price, the final terms of financial assistance and the date of transfer of the system as imposed by the courts, the construction improvement should at least be delayed until the purchase price is confirmed, and the water system is firmly in the hands of the Town of Edgewood. In addition, while the highway crossing project is being designed, the town should watch finances, so that the system transfer and startup progresses smoothly, and revenue is available as indicated by the financial computations, so that adequate funds are available before the pipeline crossing project is constructed.



4.3 ALTERNATIVE 3-PURCHASE SYSTEM & CONSTRUCT WATER TREATMENT

The Alternative # 3 consists of: (1) Purchasing the existing water system as is detailed in ALTERNATIVE 2, and (2) Constructing a central water treatment system upgrade to enhance the water supply quality, taste and odor characteristics provided to the customers.

4.3.1 PURCHASE OF THE EXISTING WATER SYSTEM

Summarizing the purchase particulars from ALTERNATIVE 2; using **Table 4.1** and **Table 4.2**, the first year Gross Revenue of **\$2,143,025.00** minus the operating expenses of **\$793,200.00** and the projected Loan Principal, interest and debt service funds of **\$972,566.54**, leaves a net positive revenue of **\$377,248.66**. Additionally, years 2-40 estimate larger net revenue. Thus the purchase of the water system is entirely feasible without raising the existing published water rates or modifying the existing water rate structure.

As previously noted, the existing water supply is safe and does not exceed any primary contaminant limits, as set by EPA under the **Safe Drinking Water Act (SDWA)** for 2017. See the **EPCOR 2017 Water Quality Report**, found in **Appendix E**. The water is currently treated with chlorination at the wells to provide a potable source of water for the system.

4.3.2 WATER QUALITY ISSUES (HARDNESS)

However, the Edgewood water is classified as very hard water, between 35 and 44 grains per gallon (which equals 600 to 760 milligrams per liter of Hardness). This requires each homeowner receiving the system water to install a home water softener. The home water softener requires both an initial cost to purchase and install, requires very high levels of salt consumption for ongoing operations, and for such very hard water, the equipment life is reduced, for each and every homeowner that uses the water. Information from public meetings and input from the public indicates that the public is frustrated with the hardness of the water. Numerous complaints indicate homeowners have been replacing both water heaters and water softeners at an alarming frequency.

A current water quality analysis from a sample that combined water from all wells was taken, and the results are tabulated in **Table 4.4 – Summary of Water Quality Results: Edgewood Water System-Combining all 5 Producing Wells Together-Lab Results by Hall Environmental-9/6/2018**, as detailed in the **Tables and Figures** Section at the end of the report body. This analysis was obtained in order to provide a more complete determination of water constituents to design alternative water treatment.

4.3.3 ADDITIONAL IMPROVEMENT-CENTRAL WATER TREATMENT FACILITY

As described in **Section 2.1.1.1**, the existing five (5) current wells are reported to produce a maximum rate of 950 Gallons per Minute (GPM) combined. According to the (a) EPCOR Yearly Report (2016) to NM Public Utility Commission and the EPCOR 2017 Yearly Water Quality Report, the water does meet all of the EPA primary water quality limits for primary contaminants. However, the very high hardness and other secondary constituents in the water tend to require treatment, whether at a central utility water treatment facility, or at the individual points of use (home water softening units or Reverse Osmosis home Units, or both).

For water Treatment systems, the study looked at three (3) central water treatment plant options with which to treat the water and mitigate the various chemical issues with the existing water as produced by the Edgewood wells. The existing five (5) current wells are reported to produce a maximum rate of 950 Gallons per Minute (GPM) combined (See **Table 2.1 – Well Capacity Analysis**). The three treatment

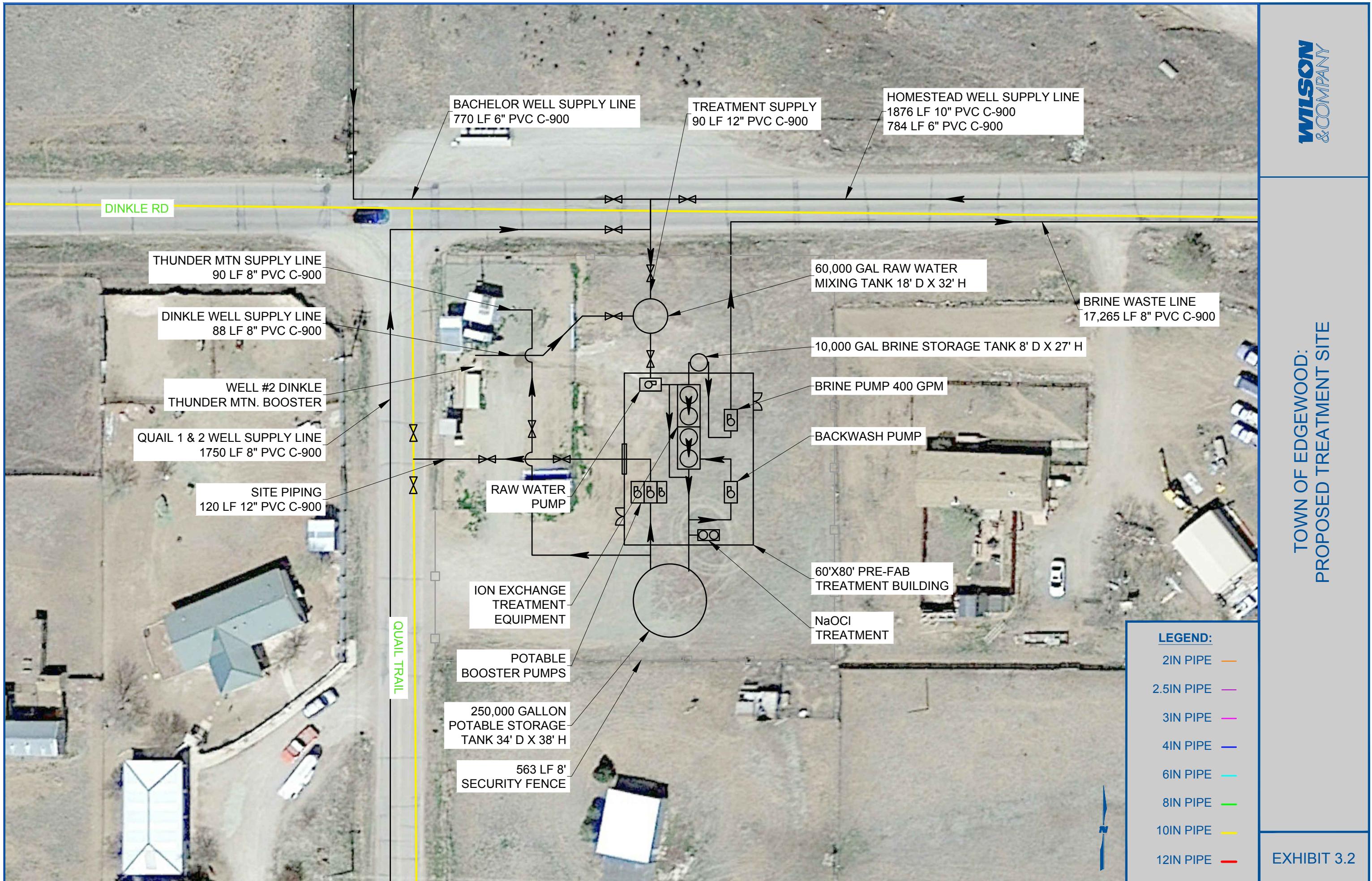
options are to be preliminarily designed to treat a total of 1050 GPM flow rate, (or 1.5 MGD, accounting for a 20-year increase in required capacity. The three treatment options explored are: (a) Lime Softening; (b) Reverse Osmosis; and (c) Ion-Exchange. See respective sizing data in **Table 3.1-Lime Softening Plant Calculations-Year 2040**, **Table 3.2-Reverse Osmosis Plant Calculations-Year 2040** and **Table 3.3-Ion-Exchange Plant Calculations-Year 2040**, all found in the **Tables and Figures** Section following this Preliminary Engineering Report (PER) Body. All three treatment options are available as options to treat well water with high reported Hardness, high Alkalinity, High Total Dissolved Solids (TDH) and High concentrations of Calcium, but with no primary contaminants that exceed SDWA Limits. Water quality for the Edgewood Wells meets these criteria (See **Table 4.4- Summary of Water Quality Results: Edgewood Water System-Combining all 5 Producing Wells Together-Lab Results by Hall Environmental-9/6/2018**, as detailed in the **Tables and Figures** Section at the end of the report body.

The water from the well sample was found to be extremely hard, with a hardness level of 760 milligrams per liter (MGL) as Calcium Carbonate (CaCO_3). The EPA has no enforceable requirements for hardness. However, it has been found that the public typically tolerates water in the range of 80 to 250 milligrams per liter (MGL) as calcium carbonate. The reduction in hardness can be achieved either by individual home Water Softeners, or by a Water Treatment Facility. The target final hardness for each option of water treatment process at the Central Water Treatment Facility is 150 milligrams per liter (mgl).

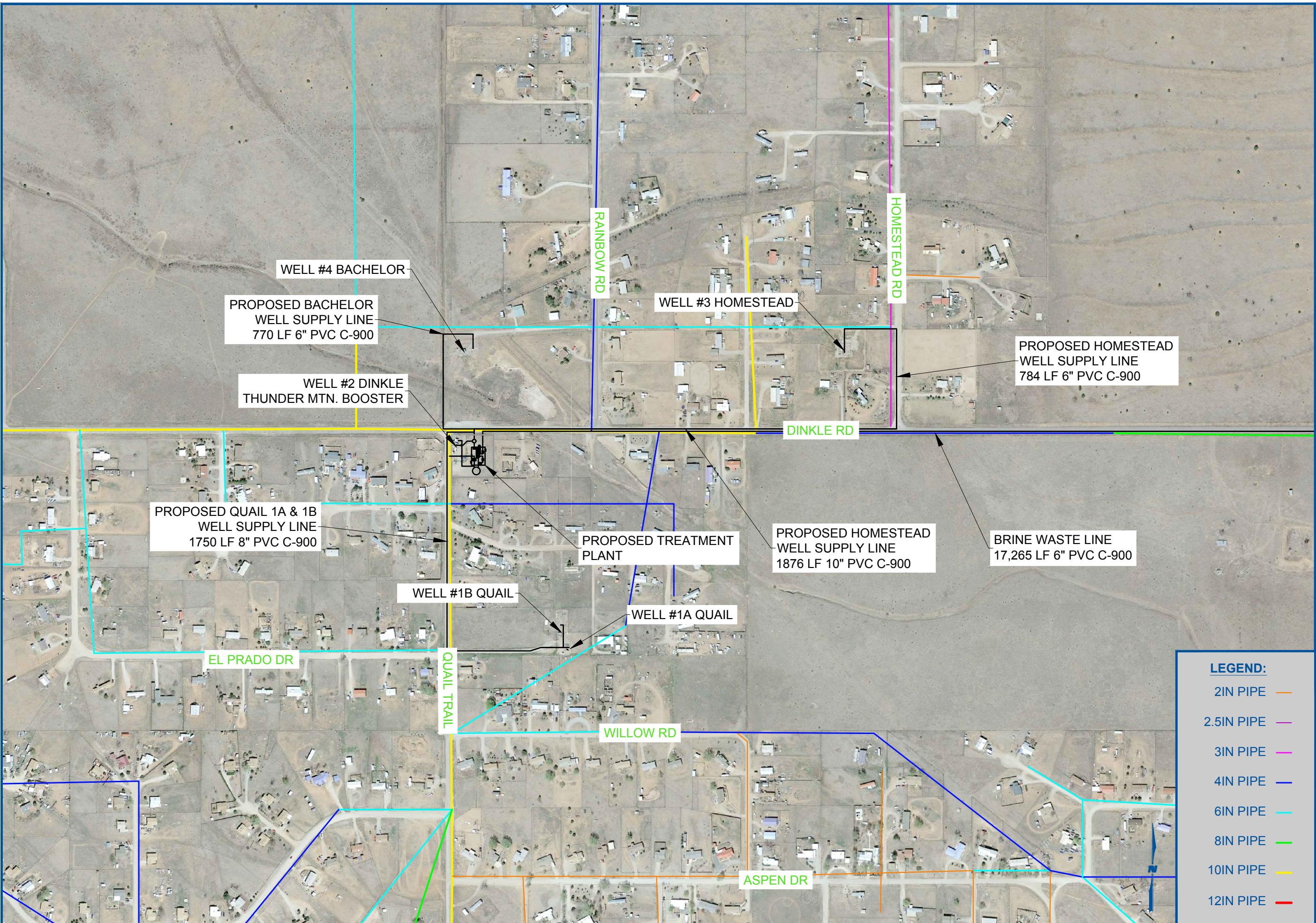
Location of the proposed Central Water Treatment Facility is selected to be in the Southeast corner lot at the Intersection of Dinkle Road and Quail Trail, which is near the center of the five existing Edgewood production wells. This location is approximately three (3) miles from the existing wastewater treatment plant (WWTP), and no sanitary sewers are nearby. Therefore, any waste solids produced by any of the treatment processes must be trucked to a receiving landfill or to the existing WWTP. In addition, any liquid waste must either be trucked to receiving ponds at the WWTP, or pumped and piped to the same receiving ponds. See **Exhibit 3.2-Proposed Treatment Site**, which is preliminarily located at the Dinkle Road & Quail Trail lot. **Exhibit 3.3-Proposed Connections to Well Sites** shows the well sites in relation to the proposed Water Treatment Plant, identifies the proposed piping from the wells to the treatment plant, and shows the proposed waste discharge line from the plant to the Edgewood WWTP for the waste evaporative ponds. The Water Treatment plant layout is preliminarily based upon Ion-Exchange, but can be used for each of the three options of treatment. **Exhibit 3.4-Proposed Evaporation Ponds**, shows new evaporation ponds at the existing WWTP site to serve as liquid waste evaporation ponds for each of the three water treatment options. The force main waste pipeline from the water treatment site to the WWTP ponds is identified on **Exhibit 3.2- Proposed Treatment Site**, but not shown in its entirety. The length (17,265 lineal feet) and cost, however, is identified in all of the alternate cost estimates.

4.3.3.1 LIME SOFTENING

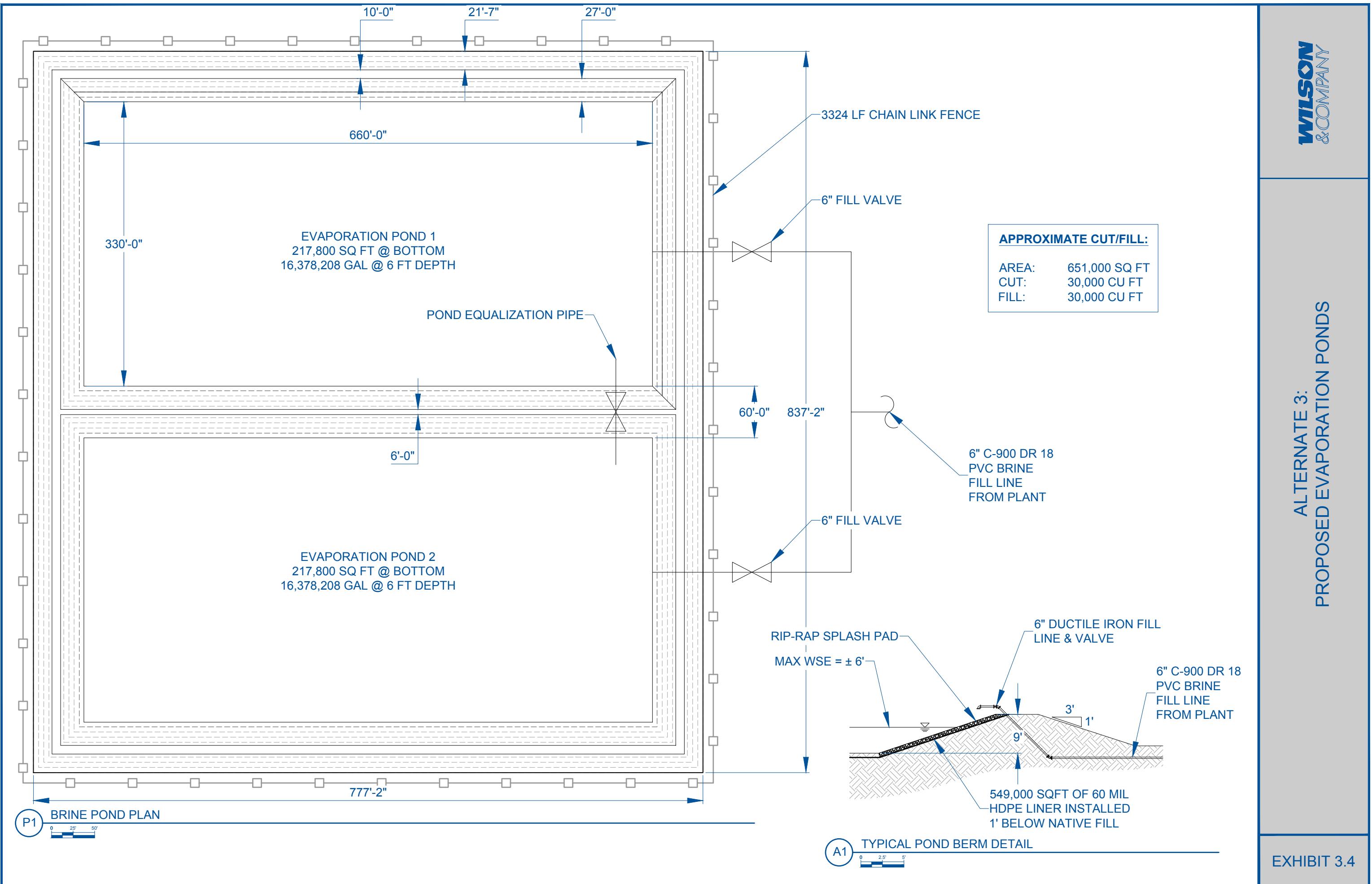
Lime Softening is the most traditional and established of the three alternative process design approaches. The process is used for a wide range of water treatment applications. The process works by adding lime as a coagulant chemical to the raw water that will adhere to the calcium and magnesium ions and create a precipitate that settles to remove hardness. Soda Ash can also be used in conjunction with lime as an additional coagulant. Often, chemical polymers are also added to enhance precipitation.



**PROPOSED CONNECTIONS TO WELL SITES:
TOWN OF EDGEWOOD:**



**ALTERNATE 3:
PROPOSED EVAPORATION PONDS**



The precipitate is then settled out of the water and removed from the system. After the precipitates are removed, the water flows through multi-media filters made up of granular carbon and micro-sand, to further remove contaminant particles. See **Figure 4.1-Lime-Softening Treatment Process** in the **Tables and Figures** Section at the end of the PER Body, for a simplified description of the process. The treatment system is uniquely built for each plant water quality, source water and design flows, as the basins are usually large, and made concrete or steel, with portions of the plant in basements or underground concrete basins housing the treatment reactor equipment. The use of large bulk storage and handling facilities for both Lime and Soda Ash are also required.

ADVANTAGES: The process is most effective for hard waters. One other advantage to the process is the lesser amount of liquid waste water used in backwashing the filters, usually between five percent and eight percent of the water production.

DISADVANTAGES: The lime-softening process produces large amounts of sludge daily, which requires hauling the sludge to a receiving landfill, or to the wastewater plant drying beds, on a regular basis because of the distance from the Wastewater Treatment Plant. The Lime-Softening process must be run with reactor basins that require much longer reaction times, thus a slower rate of flow across the basins is required at each to allow for flocculation and settling. Such a plant also requires a minimum of two (2) treatment trains. Therefore, the basins are much larger, and the footprint (building size and building height) of any Lime-Softening water treatment facility is on the order of 175% to 280% in comparison to the other two treatment options, in order to treat the same water rate of flow. Water waste from backwashing, while smaller than the Reverse-Osmosis option and in the same range of the Ion-exchange option, would yet require pumping, pipelines and receiving evaporation ponds at the WWTP. Finally, the lime softening precipitant sludge (solids) would need to be hauled at a continuous reoccurring rate from the Water Treatment Facility, to an accepting landfill, or at the Edgewood Wastewater Treatment Plant.

CONCLUSION: The Lime-softening option as located at the central Water Treatment Site, is estimated to cost the most of the three treatment options (**See Table 4.5 – Estimate of Probable Cost: Alternate 3A-Water Treatment (Lime Softening)**, found in the **Tables and Figures** Section following this Preliminary Engineering Report Body. The estimate puts the total project cost at a total cost of **\$10,299,976.52**, will probably require more land than is available on the selected site, and is the only treatment option to require sludge handling and hauling, at an estimated cost of **\$120,000.00 per year** over and above the normal plant process, pumping and manpower operational costs, due to the fact the Wastewater Treatment Plant site is more than three (3) miles away.

Because of the proposed purchase cost, and yearly loan costs and system operating costs required for the **purchase of the water system**, the remainder capital costs and yearly operational costs due to the proposed Lime-Softening water treatment facility would NOT be able to fit into the remaining available first year net revenue of **\$377, 258.46**, as presented on the system purchase financials. Due to the inability to justify the added costs at this time, this treatment option will not be further investigated or considered at this time.

4.3.3.2 REVERSE OSMOSIS

Reverse Osmosis (RO) as a treatment process has improved dramatically in recent years. The RO membrane systems have become more compact in overall size, and require less energy than previous

RO units, due to lesser required pumping pressures. Also production efficiency, in terms of percentage of production water versus reject water has increased. Most new RO systems produce 85% production water to 15% reject water, or in some cases a higher percentage of production water. The newer RO systems, called low-pressure RO systems are low-energy systems, which means that the systems are able to “push” water through the system membranes using a lower initial input pressure. While older systems required 70 pounds per square inch (psi) to 90 psi input pressures, the newer systems can be run with 50 psi or less, thus saving energy on input pumping. The RO membranes will remove particles from 0.0001 micro-meters (μm) to 0.002 μm . The membranes will remove most or all of the aqueous salts and dissolved metals from the water. RO will also reduce any sulfate levels in the water, and sodium levels are greatly reduced after treatment. See **Figure 4.2-Reverse Osmosis Treatment Process** in the **Tables and Figures** Section at the end of the PER Body, for a simplified description of the process

Reverse Osmosis systems are now relatively small in size. The units are usually mounted on skid platforms that can be easily placed in a building. For a 1050 GPM (or 1.5 MGD) designed flow rate facility, with 150 GPM bypass (water not treated, and re-blended), the water treatment units (2) would treat 450 to 550 GPM each, for a total of 900 GPM to 1100 GPM. The rate changes are dependent upon the final selection of a bypass rate to provide water quality meeting all parameters, the actual future water supply from the well system in 2040, and the actual rate of reject water. Two (2) Units, each 22 feet-10 inches long by 8 feet-4 inches wide by 8 feet-4 inches high would produce the water supply required. The typical life spans of the filters are approximately five (5) years.

ADVANTAGES: The process is most effective for treating all types of waters. One other advantage to the process is the rate of flow into the treatment units can be adjusted. The plant is very adjustable to the rate of flow required. The process has a very short filter break-in time, so it can be shut down and restarted with a minimal energy and water loss. RO will treat a certain overall volume of water (usually expressed in “bed volumes”), regardless of the rate of flow going through the system, and is not dependent upon operation time, before it is necessary to change the filters. This allows the process to be adjusted to better meet the needs of the distribution system.

DISADVANTAGES: The RO process, depending upon the well water quality, may need a pre-treatment process to lower any Total Suspended Solids (TDS), any sand encountered or other constituents or abrasives that may “foul” the membranes prematurely. Silicon, in particular, would create huge problems for a membrane-based facility. The project Water Quality Analysis (See Table 4.4) was obtained from the Community Center, which is a location in the distribution system and not near the wells. All public information from EPCOR does not address the well sand issues.

Because the membranes contain such small openings, the process consists of a larger percentage of reject, or waste water, usually on the average of 15% of production. This 15% waste affects three issues: (a) Required Input pressures are higher than Lime-softening and Ion Exchange processes, thus higher energy costs; (b) the waste or reject stream requires larger pumps and pipelines for the disposal of the waste stream and requires larger receiving evaporation ponds at the wastewater treatment plant; and (c) The larger reject losses requires the plant treatment capacity to be upgraded in size by about ten percent (10%) to account for the treatment production difference. In addition, the chemical additions for pH adjustment, pre-treatment process and other chemical additions, backwashing of membranes, de-scaling and other chemicals may require a level IV operator in the future.

CONCLUSION: The Reverse Osmosis option as located at the central Water Treatment Site, is estimated to cost the middle of the three treatment options (**See Table 4.6 – Estimate of Probable Cost: Alternate 3B-Water Treatment (Reverse-Osmosis)**, found in the **Tables and Figures** Section following this Preliminary Engineering Report Body. The estimate puts the total project cost at a total cost of **\$9,359,082.86**, may require more land than is available on the selected site, and the treatment process may require a level IV operator, once population served increases to more than 10,000.

Because of the proposed purchase cost, and yearly loan costs and system costs required for the **purchase of the water system**, the remainder capital costs and yearly operational costs due to the proposed Reverse-Osmosis water treatment facility would NOT be able to fit into the remaining available first year net revenue of **\$377, 258.46**, as presented on the system purchase financials. Because of the inability to justify the added costs at this time, this treatment option will not be further investigated or considered at this time.

4.3.3.3 ION-EXCHANGE

Ion-exchange is a reliable method to soften water. Most ion-exchange water softening systems utilize a Zeolite resin bed that the water flows through. The largest advantage to ion-exchange is that there is a relatively lower volume of waste from the process. In our treatment system, the rate calculates as 8.59% wastewater (brine solution). The ion-exchange also replaces the Magnesium and Calcium ions with Sodium ions, thus increasing the sodium levels of the water. The finished water from an ion-exchange system will tend to have higher sodium levels. The Ion-exchange process removes contaminants by chemical replacement, and backwashing, rather than by filtration or membrane barrier. The most efficient Ion-exchange system utilizes a three-tank or four-tank system. If a four-Tank system, the first three would operate sized at 300 GPM each, for a total of 900 GPM, with a fourth tank at 300 GPM on standby, rotating on as the first of the tanks is flushed and the zeolite resin is regenerated. Together, the production would total 900 GPM at any one time. A plant bypass of approximately 150 GPM (water not treated, and re-blended) would be maintained, to provide a finished water with 100 to 150 milligrams per liter (mg/l) or less to the public. Two (2) Skids, each with two tanks that are about 8 feet tall by 8-feet in diameter placed on each skid. Each Skid would be 22 feet long by 10 feet wide by 8 feet-6 inches high to produce the water supply required. Typical resin regeneration is between 3-1/2 hours and 5 hours, depending upon the rate of water used. The typical life spans of the ion-exchange resin is about 2000 regenerations. This gives the resin a life span of between 14 months and two years. The resin is regenerated with an approximate solution of 10% sodium chloride solution. See **Figure 4.3-Ion-Exchange Treatment Process** in the **Tables and Figures** Section following the PER Body

ADVANTAGES: The process is the simplest to operate and is most effective for treating water hardness, when Iron and manganese concentrations are low. Another advantage to the process is the rate of flow can be adjusted, as the treatment system regenerating process is based upon a certain overall volume of water treated (expressed in “bed volumes”), regardless of the rate of flow going through the system, and not dependent upon operation time, before it is necessary to change out the zeolite Resin. This allows the process to be adjusted to better meet the needs of the distribution system. A third advantage consists in the fact that the process results in a smaller rate of process liquid waste (approximately 8.59%). Thus the disposal costs (IE: the pumping, pipeline and evaporation ponds), would be less in costs than the other treatment options. Also, the treatment process would only require a Level III operator.

DISADVANTAGES: The Ion-Exchange process, depending upon the final established well water quality, will need a very large volume of salt (for the brine solution) for the treatment process. The costs of transporting, storing and using the salt will be a significant factor in operational costs. This cost should be offset by the great reduction of salt used by individual homeowners and businesses throughout the water system (IE: the cost of the salt used in central treatment process would directly benefit the existing ratepayers, through reductions or elimination of their house-unit water softeners).

CONCLUSION: The Ion-Exchange option as located at the central Water Treatment Site, is estimated to cost the least of the three comparative treatment options (See **Table 4.7 – Estimate of Probable Cost: Alternate 3C-Water Treatment (Ion-Exchange)**, found in the **Tables and Figures** Section following this PER Body. The estimate puts the total project cost at a total of **\$7,137,246.47**, may require more land than the selected site, and is one of the treatment processes that would probably require a larger ongoing supply of treatment process materials (salt).

The water treatment facility utilizing Ion-Exchange was further investigated for yearly operational costs, in case the Town was interested in pursuing any treatment option. However, for the Ion-exchange process, the first yearly operational costs are estimated to total **\$191,518.68** per year. (See **Table 4.8- Ion Exchange Treatment Process and Table 4.9-Ion-Exchange-First Year Operation Costs**, found in the **Tables and Figures** Section following this PER Body. The operational costs are primarily influenced by the yearly cost of salt consumed in the Treatment Process. To explain the total cost for the Ion Exchange Option, the capital costs are also amortized (See again Table 4.9). At the projected 5.25% interest rates, the 20-year amortized capital cost of \$7,137.246.47 equals a yearly payment of **\$584,913.64**. Together with a Loan Debt Service Fund of **\$58,491.36** and the operations cost of **\$191,518.68** the total yearly cost of the Ion-Exchange Option totals **\$834,923.69**. This yearly cost total, roughly representing all of the water treatment options, does not fit into the water system projected revenue by a wide margin.

Because of the proposed purchase cost, operational cost and yearly loan costs and system costs required for the **purchase of the water system**, the remainder capital costs and yearly operational costs due to the proposed Ion-Exchange water treatment facility would NOT be able to fit into the remaining available projected yearly net revenue of **\$377, 258.46**, as presented on the system purchase financials. Due to the inability to justify the large added costs at this time, this treatment option will not be further investigated or considered at this time.

4.3.4 DISCUSSION ON ALTERNATE 3A, 3B & 3C – CENTRAL WATER TREATMENT FACILITY

The forward-looking direction of Edgewood and its citizens to look at providing water treatment at a central location to alleviate the very high hardness in the production water, is a prudent and desired enterprise. However, the current data surrounding the proposed water system purchase, which is to be provided entirely by federal (FDA) loans, affords little “wiggle room” for making the water system improvements fit within the projected revenue. Together, the Gross Revenue of **\$2,143,025.00** minus the forward operating expenses of **\$793,200.00**, and the projected Loan Principal, interest and debt service funds of **\$972,566.54**, leaves a net yearly positive revenue of **\$377,248.66**. This remainder of income does not allow for any substantial improvements to be made under the proposed financial situation, except for the highway waterline crossing project. In addition, it is recommended to wait on actual system purchase, and assessment of the overall financial situation before analyzing what, if any substantial added improvements may occur.

5 SELECTION OF ALTERNATIVE

Thus, although the purchase of the water system is entirely feasible without raising the existing published water rates or modifying the water rate structure, any improvements considered at the same time would need to be included in the funds for purchase, or fit within the available yearly revenues as projected. In addition to possible variation in the finalized finance loan rates and payback structure, the negotiated or imposed purchase price has not been finally determined, so the amount available for added improvements is not yet determined. However, the aforementioned project described as the "Highway water pipeline crossing", is directly included on the capital costs associated with the water system purchase, in order to assure it may be constructed. According to available information, the existing water rate structure generates revenue of **\$2,143,025.00** per year. With current operating expenses of **\$793,200.00**, and the projected Loan Principal, interest and debt service funds of **\$972,566.54**, the remainder yearly net operational revenue is **\$377,258.46**. $[\$2,143,025.00 - (\$793,200.00 + \$972,566.54) = \$377,258.46]$. Therefore the loan repayment, and operational costs will be able to be provided by the existing water system revenue.

All of the water treatment options (Alternates #3a, 3B and 3C will cost in excess of \$7,000,000.00. Unless additional Grant Funds are obtained, or other changes to the system financial structure are made, the Central Water Treatment Alternatives (# 3A, 3B and 3C) must be delayed or held in abeyance for some time, until such time as the future financial health of the system would support such a project.

Both the project costs, and the projected System Operational cost for any of the central water treatment alternatives would far exceed the current financial limitations as represented by the purchase of the water system.

Therefore, the **Selected Alternative** is **ALTERNATE 2-Purchase System & Construct the Waterline Highway Crossing**. Alternate 2 consists of: (1) Purchasing the existing water system, utilizing financing from the US Department of Agriculture (USDA); and (2) Constructing a transmission waterline connection from the portion of the system North of US Interstate I-40, thence across the Interstate to the central storage tank and main feeder Booster Station, identified as Edgewood Tank (See again **Exhibit 3.1**) The added pipeline connection would both provide duplicate highway crossing pipelines, (thus eliminating serious downtime in the case of the smaller existing pipeline crossing failure), and would also significantly increase the water system supply to the southern half of the system, thus also greatly aiding fire flow capacities for that area. Overall advantages to this recommended improvement includes: (a) The project may be included in the up-front capital costs of the system purchase, and included in the initial efforts; (b) No additional yearly operational cost is attached to the system pipeline improvement, so that under the current system financial income and expenditures breakdown, the improvement would not be a burden to the net operations budget (Thus not requiring any added financial considerations). Also, the highway crossing improvement design and permitting would take about six to nine months, so construction could be held in abeyance until the first year's net revenue is better proven, to make sure the construction costs are available.

5.1 LIFE CYCLE COST ANALYSIS

5.1.1 WATER SYSTEM PURCHASE

This Life-cycle cost analysis is not to compare between any options, but to insure that ongoing financial sustainability may be assured in the purchase of the water system and the selected improvement. The Purchase costs of the water system, as described in several sections earlier, is a total of **\$14,500,000.00** in capital expenditure. Current yearly revenue of the system is **\$2,143,025.00**. Projections of yearly increases of the system revenue, as determined from the water system growth projections in **Section 1.2.4**, is less than one percent (0.59%) increase per year, based upon the data in **Figure 2** and **Figure 3** in the sub-section. This percent projection is utilized for all revenue projections.

5.1.2 WATER SYSTEM YEARLY OPERATIONAL COSTS

Life-cycle costs are also generated by the operation of the water system. The first-year operational and capital costs related to setting up the Municipal Water Department for Edgewood is summarized in **Table 4.1-Town of Edgewood Water Department –Startup**, as found in the Section **Tables and Figures**, located at the end of the Preliminary Engineering Report Body. The Table shows a total of **\$ 793,200.00** in first-year costs for startup of the system. This total includes: (a) one-time costs (non-recurring); (b) recurring operational costs; (c) initial purchase of items and materials that then have reduced operational costs for the subsequent years operations; and (d) recurring items that should not increase in subsequent years. **Table 5.1 – 20-Yr Operational Cost Estimates** is an effort to show the four types of costs in the table. One-Time purchase costs (a) total **\$116,000.00**, (b) recurring operational costs that will increase at 3% per year totals **\$513,700.00**; (c) Initial purchased items (materials and supplies) that have lower recurring operational costs total **\$88,900.00** in the startup year, but reduce to **\$10,100.00** in the second and subsequent years; and the non-increasing recurring items total **\$64,500.00**. Using the **Table 5.1** totals, second-year recurring operational costs total **\$588,300.00**. The total operational cost at the end of 20 years is **\$990,718.28**. **Table 5.2 -20 year and 40 year Life Cycle Costs**, is included to cover the periods of proposed USFDA Loans (30 Yrs and 40 Yrs), in order to assure that the operations costs are covered by projected revenue during the total period of the loans.

5.1.3 WATERLINE CROSSING OF HIGHWAY I-40

The selected Improvement outlined in ALTERNATE 2, is the waterline crossing of Interstate Highway I-40, described in **Exhibit 3.1 -Proposed Crossing Site** located earlier in this document. The description of the improvement is found in Section 4.2.3 of this document. An estimate of probable construction cost is detailed in **Table 4.3 –Estimate of Probable Cost-Alternate 2-Highway Crossing**, in the **Tables and Figures** Section at the end of the report body. The total estimated cost, including engineering, surveys, and contingencies, is **\$356,728.44**. **Table 6.1** rounds to **\$385,000.00**. Construction of the highway crossing is to be financed by loans, as part of the initial capital costs of the water system purchase. The improvement fits into the projected costs as covered by the initial \$14.5 Million Dollar capital budget, as summarized later, in **Table 6.1-Water System Startup**, found in the **Tables and Figures** Section following the PER Body. Also, after construction, no recurring operational costs are expected, for the following reasons: (a) pipelines are expected to last over 50 years, and no operating or moving parts are included except for valves. Valves are also expected to last over 40 years, provided periodic operation of the valves (open/close) is included in the preventive maintenance of the overall system, which is a minor project expense for the four (4) valves included, versus an estimated 1500 valves in the existing water system. Therefore, no recurring operational costs shall be attributed to the pipeline improvement.

5.2 NON MONETARY FACTORS

Because the Proposed Waterline Crossing of Highway I-40 consists of a lesser part of the overall decision of whether to purchase the entire Edgewood Water System, and would of itself not be controversial, the Non-Monetary Factor Analysis shall, instead focus on the actual decision between ALTERNATE 1 and ALTERNATE 2. Essentially, the most significant decision is between: (a) The Town of Edgewood Not Purchasing the EPCOR-Owned Water System (Alternate 1); and (b) Edgewood Purchasing the Water System and making immediate improvements (Alternate 2). The non-monetary factors then would be concentrated on issues between continued ownership by EPCOR as a separate water system entity, and the water system as purchased, owned and run by the Town of Edgewood.

The usual Non-Monetary factors related to construction such as: Land Acquisition, Constructability, Zoning, Permitting and Environmental concerns do not apply in this case. The Waterline Highway Crossing construction, while important, is a small part in the decision between the two Alternatives. For purchase of the overall water system, the construction-related issues have minor importance. The decision for the Town of Edgewood between purchasing the water system and not purchasing the water system is the major decision.

The set of Non-cost criteria for judging between purchase and non-purchase of the system are more broad in nature, and related more to whether (a) separate entities will be more effective and responsive to the public, or whether a single entity would be able to do more with financing, consolidation and economies of scale. The set of factors selected to help make the decision are as follows: (1) Familiarity with the existing water system; (2) Setup to manage waterline and facility Repairs; (3) Citizen Involvement in water system decisions, including monetary decisions [water rates]; (4) Sources of water system Funding Availability; (5) Consolidation of control and response to development issues; (6) Emergency response for water system incidents; (7) Consolidation of manpower and economies of scale.

The non-Cost factors are arranged in **Table 5.3** following:

TABLE 5.3:
NON-COST FACTORS CONSIDERED FOR RECOMMENDATION FOR PURCHASE OF THE EDGEWOOD - THUNDER MOUNTAIN WATER SYSTEM

ITEM	DESCRIPTION
1	Familiarity with the existing water system
2	Setup to manage water line and facility repairs
3	Citizen involvement in water system decisions, including monetary decisions (water rates)
4	Sources of water system funding availability
5	Consolidation of control and response to development issues
6	Emergency response for water system incidents
7	Consolidation of manpower and economies of scale

Each of the factors favor one or the other Alternate (Alternate 1 or Alternate 2). Each Factor in the table is given a ranking value scale of 1, 2, 3, 4 or 5 for each of the two Alternates, based upon information provided by discussions with the Town personnel, a thorough reading of all of the available documents provided by EPCOR, and a series of field observations and discussions with individuals knowledgeable of the existing water system as managed by EPCOR.

The ranking value of 5 indicates the factor has a positive impact on the decision for that Alternative, a ranking value of 3 indicates a neutral impact on the decision for that factor for the alternative, and a ranking value of 1 indicates a negative impact on the decision to select a specific alternative. Because of the size and impact of the decision, this report judged each of the non-cost factors to have equal weighting in the non-monetary ranking decision.

The ranking of Non-Cost Factors and summary totals for both ALTERNATE 1 (No water system purchase) and ALTERNATE 2 (Water system purchase and construct Waterline Crossing of I-40 Highway), is presented in **Table 5.4** following. Explanation of the rankings system follow the table.

**TABLE 5.4:
NON-COST FACTOR RANKING SYSTEM**

ALTERNATE 1: NO ACTION (EPCOR) RANKING (1-5)	DESCRIPTION	ALTERNATE 2: PURCHASE SYSTEM & CONSTRUCT I-40 WATER CROSSING RANKING (1-5)
5	1. Familiarity with the existing water system	3
5	2. Setup to manage water line and facility repairs	4
3	3. Citizen involvement in water system decisions, including monetary decisions (water rates)	5
2	4. Sources of water system funding availability	5
3	5. Consolidation of control and response to development issues	5
4	6. Emergency response for water system incidents	4
3	7. Consolidation of manpower and economies of scale	5
25	TOTALS	31

Explanation of the Ranking System values

Non-Cost factor 1-Familiarity with the existing water system: As shown in data from earlier in this report, the existing Water system as owned and operated by EPCOR, has the advantage in familiarity. EPCOR has been managing the water system in some form or another since 2002. The Town of Edgewood has some intimate knowledge of the system from citizens and office holders that were former managers or operators of the system.

Non-Cost factor 2-Setup to manage water line and facility repairs: The existing EPCOR entity also is setup currently to operate and maintain the system. The Town of Edgewood has some intimate knowledge of the system from citizens and office holders that were former managers or operators of the system. Although EPCOR has the setup to deal with water line and Facility repairs, Edgewood, with the financial backing as proposed, should be able to “Ramp Up” to the same level of operations and maintenance in a few short months, and so would get high marks also.

Non-Cost Factor 3-Citizen Involvement with water system monetary decisions: Citizen Involvement clearly favors the system as run by a public agency. Local responsiveness, and financial decisions would be subject to local hearings and public input at meetings, as dictated by the New Mexico code for municipalities. A private utility corporation is not subject to all of the same levels of disclosure, and the location of the administrative offices in Arizona (and ownership in Canada) does not help with the public input as clearly or consistently.

Non-Cost Factor 4-Sources of water system funding availability: Water system funding availability also clearly favors a public system. Municipalities have access to State and Federal Grants, other local resources, and may also rely on other municipal funds, if ordinances are followed. A Private utility depends almost exclusively on the rate structure or any internal reserves for funding, and must try to make a profit. This limits improvements to those that are in the interest of the utility company

Non-Cost Factor 5-Consolidation of control and response to development issues: Consolidation of Control and response for development issues also clearly favors the municipality if it becomes the director of the water system, in that dual control of development allows the Private Water Company to overrule or stop some development that is deemed not in its best interest, due to monetary concerns or other issues. This may stymie development that is desired by the citizenry, the municipality or both.

Non-Cost Factor 6-Emergency response for water system incidents: Emergency response for water system line breaks or pump/motor failures, is expected to be the same under both scenarios. The Private Utility (EPCOR) also operates in the City of Clovis, a city of some 30,000 persons some 2-1/2 hours away by truck, so emergency help is not far. The Town of Edgewood, if and when the Water System is up and running, will be able to augment its water system staff and resources with an emergency open-end contract with one or more companies out of Albuquerque, located only 16 miles away, for assistance.

Non-Cost Factor 7-Consolidation of Manpower and Economies of Scale: Both the private utility (EPCOR) and operation by a public Municipality have some advantages. EPCOR runs some 16 private utility systems throughout Arizona and New Mexico, so Billings can be provided with fewer personnel and the same software. However, as with all municipalities when manpower is concerned, the Town of Edgewood could draw on personnel in the roadway & streets department, or the sewer and wastewater treatment department for help with emergencies or for assistance with equipment. Also, the central finance department could run billing software for all municipal operations.

The ranking system as provided and assessed shows the ALTERNATIVE 2 option (Purchase of the Water System and Construction of the Waterline Highway Crossing) to be favored by a ranking total of 31 to 25, which indicates that the Alternative is the best choice, based upon a number of Non-Monetary considerations.

Therefore, this exercise confirms that **ALTERNATE 2** is the favored Alternative, and the recommended Alternative to be included in the plan of action.

6 PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

6.1 PRELIMINARY PROJECT DESIGN

Although Purchase of the existing water system, and all related finances and costs need to be included in all decisions as to the financial viability of the proposed action as proposed in **Alternate 2**, the construction project alone is detailed herein, except for the overall financial information, which also includes the water system purchase.

The proposed construction project, as shown in **Exhibit 3.1 Proposed Crossing Site**, consists of a waterline crossing the interstate highway (Interstate I-40) at a location just east of the highway diamond-type interchange with the Edgewood exit. As previously described, the connection is proposed to provide a stronger and duplicate water supply connection for fire flow between the well field, located north of the Interstate, and the principal supply tank and booster station for the southern part of the system located south of the Interstate.

The construction consists of: (a) a 30-inch diameter Bore and jack (or directional drilling) in an approximate length of 260 lineal feet; installation of a 30-inch diameter steel casing; and (b) 260 lineal feet of 12-inch diameter PVC or Ductile Iron waterline carrier pipe. The 12-inch pipeline then interconnects with existing piping on the existing system on both the North and South ends. The additional length of 982 lineal feet of 12-inch interconnecting piping, together with the 260 feet of carrier pipe within the bore & jack/directional drilling/ 30-inch diameter steel casing, totals 1,242 lineal feet of 12-inch pipe. A total of four (4) 12-inch gate valves are included.

Design decisions, include: (1) utilizing the pricing and probability of utilizing directional drilling, which is more expensive than boring and jacking, because of local information that hard rock was present in the subsurface at the potential crossing location; (2) Lengthening the directional drilling construction to avoid any bore and jack pits or receiving pits that would be within the Interstate clearance buffer (recommended minimum of 30 feet from the highway shoulders), thus potentially lessening the highway permit conditions and the need for extensive construction traffic control; (3) Require providing laser-guided boring equipment to assure accurate crossing elevations; (4) Require higher-pressure-rated PVC (IE: AWWA C900-DR 14) for the 12-inch carrier waterline, to match or exceed the pressure-rating of DI pipe; and (5) Install 12-inch gate valves for isolation at each end of the highway crossing (but outside of the Highway ROW) and two additional 12-inch gate valves at each interconnection with the existing system pipelines. Also, the project design phase may include subsurface geotechnical investigations, although the inclusion of those services cannot be determined at this time.

6.2 PROJECT SCHEDULE

The beginning of the construction schedule will, of necessity, be tied to and required to follow the confirmation of purchase of the water system. Therefore, instead of providing a calendar schedule, we shall provide a duration for the various elements. At onset of the proposed project, the following chronological events will be required:

1. Survey and design	100 calendar days
2. Highway Permit (NMDOT-Preliminary)	90 Days (partial concurrent with NMED (DWB)*
3. New Mexico Environment Dept. (DWB) Permit	65 Days (partial concurrent with NMDOT)*
4. Bidding and Award	45 Days
5. <u>Construction of the waterline connection</u>	120 Days
Total Schedule Length	355 Calendar Days*

The beginning dates of the construction project will be affected by the water system purchase arrangements, the time of transition to a publicly-owned water system, various NMED and other state agencies requirements for the system startup and the conditions imposed upon the purchase by the Court of jurisdiction. Also, as the NMED Permit is reviewed and issued before bidding and NMDOT

permit is only partially reviewed before bidding, the overlap between these two permits is estimated to be only part of the duration, thus a total duration of permits would remain at 90 days.

6.3 PERMIT REQUIREMENTS

The permits required by the waterline crossing of the Interstate Highway include, as previously discussed: (a) A New Mexico Department of Transportation (NMDOT) crossing permit; and (b) A New Mexico Environment Department, Drinking Water Bureau construction permit.

The Highway crossing permit required data usually is included in the Engineer's plan drawings and specifications, specifically as required by NMDOT, and viewed for conformity and engineering requirements by NMDOT. If the plans and specifications portion of the permit is approved, the actual permit, is then obtained by the contractor, who accomplishes the work. The review process may take from 30 to 90 days. Sometimes the final permit review results in the construction contract time being extended.

The Water Construction permit is required from the NMED before the first Advertisement for Bidding. Therefore, as the review from NMDOT is only partially completed at that time, the NMED review minimum of 65 days should be separate, and a minimum of total review time in any case.

Because the proposed waterline construction passes under existing roadways and an existing Interstate Highway, no Federal NEPA requirements are anticipated except for No Significant Impact determinations, as long as construction proceeds as the NMDOT has approved.

6.4 SUSTAINABILITY CONSIDERATIONS

Because the waterline crossing project contains no machinery, and only a very few moving parts (four gate valves), the project improvement (pipeline) is expected to last 50 years without any issues. Routine maintenance (opening and closing of valves) will be included in the overall maintenance schedule of the entire system. Therefor the project construction is fully sustainable over the 40-year life reviewed.

6.5 TOTAL PROJECT COST ESTIMATE

The Construction Project cost estimate for the highway crossing is included as **Table 4.3-Estimate of Probable Cost-Alternate 2-Highway Crossing**, located in the **Tables and Figures** Section at the end of the report body. The total project cost estimate, including Engineering, Surveying and Contingencies totals **\$356,728.44**. The total includes 10% Engineering and Surveying, and 15% contingency. As noted earlier, the project cost for the waterline crossing of Highway I-40 is included in the initial capital cost of purchasing the system, and would not affect operation of the Edgewood Water/Thunder Mountain Water System by the Town of Edgewood. Under the purchase-related costs as represented later in **Table 6.1-Water System Startup Summary**, found in the **Tables and Figures** Section after the PER body, the Waterline Highway Crossing construction budget is increased to a total of **\$385,000.00**, for the system purchase in order to provide some additional contingency in the construction costs.

6.6 ANNUAL OPERATING BUDGET

Because any immediate or near-term improvements are bound into the purchase of the system, with the proposed financial loans from USDA and operating Income and Expenses of the entire system, any

Prepared by:

Wilson & Company Inc.

Engineers & Architects

Town of Edgewood, NM

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financial information and any project viability must include the purchase of the system, in order to determine whether and when any improvements may be made. The Highway Crossing improvement as proposed, may be initiated as soon as the actual water system purchase price, terms and conditions are completed, and USDA Loan terms and conditions are solidified. The final purchase price of the overall system also depends upon the assessed condition of the water system facilities and elements. The proposed waterline highway crossing is tied to the viability of the water system purchase, so the operating budget for the total purchase and the waterline highway crossing project are viewed together as one combined capital purchase.

6.6.1 INCOME

Beginning Annual Income as provided by the Town of Edgewood, for the existing Edgewood/Thunder Mountain combined systems (as managed by EPCOR) is reported as **\$2,143,025.00** per year.

6.6.2 ANNUAL O & M COSTS

Beginning Annual Operations and Maintenance costs are first presented in **Table 4.1 Town of Edgewood Water Department-Startup**, found in the **Tables and Figures** section following this report, and which presents the Town summary of system Startup Costs. The Total has been segregated by this report into the following elements: (1) Non-recurring startup costs, such as "Furniture and Equipment"; Recurring startup costs that have reduced year 2 operational beginnings, such as "Telephones", which have an initial purchase, but a much lower yearly use cost; (3) Recurring costs that are projected to not increase, such as memberships; and (4) Recurring costs that are projected to increase by 3% per year, which includes labor costs and many other items. A fifth (5th) category of related costs were provided no operations costs, either because they would not be recurring each year, or because they would not be required.

A summary table outlining the breakdown of the operations costs for the first and second years is presented in **Table 5.1 20-year Operational Cost Estimates**, found in the **Tables and Figures** section following this report. The First year of operations and startup costs totals **\$793,200.00** per year, and the second year of startup costs totals **\$604,252.08** per year.

Because of the variable (combined) percentage rate of inflation increase in the operations cost, the increases start at approximately 2.712 % at year 1, and increase to approximately 2.95 % at 40 years.

6.6.3 DEBT REPAYMENTS

Debt Repayments for the purchase of the system (and the waterline highway crossing project) are presented in a table entitled **Table 4.2-Edgewood Water System Probable Net System Revenue Study**, as obtained from the Town of Edgewood, and which is presented as the Town's preferred loan setup for the water system purchase and any immediate improvements (including the waterline highway crossing construction). The selected loan mix appears in the first column on the left in the Table. The loans include: (a) a USDA direct loan for a total of **\$4.5 million at 3.875%**, paid back over a period of 40 years; with Principal and Interest (P & I) of **\$221,506.95** per year and a USDA Debt service fund of **\$22,150.70** per year; and (b) a USDA Guaranteed loan for a total of **\$10 million at 5.25%**, paid back over 30 years; with P & I of **\$662,644.44** per year, and a USDA Debt service fund of **\$66,264.44**. Together, the total loan payments would total **\$972,566.54** per year.

6.6.4 RESERVES

Reserves would consist of both loan (debt service) reserves, and any reserves required for short-duration assets, such as pumps or other operating machinery.

6.6.4.1 DEBT SERVICE RESERVE

The Debt Service reserves of **\$22,150.70** for the 40-year USDA direct loan, and **\$66,264.44** for the 30-year USDA Guaranteed loan, are included in the totals for the operational cost summary in Table 4.2.

6.6.4.2 SHORT-LIVED ASSET RESERVE

Because of the unknowns of the water system purchase, including: (1) The final purchase price; (2) Any added costs involved in the purchase scenario; (3) Unknown conditions (depending upon a third-party assessment) of the water system; and (4) actual depreciation totals to date of the water system, a knowledgeable estimate of required short-lived asset reserve is not currently feasible. However, Edgewood has built in two added financial reserves into the financial package, in addition to the required USDA debt service reserves. They are: (a) The purchase-related capital cost of the system includes a contingency total of **\$215,000.00** placed into the additions to the stated purchase price of the system; and (b) A total of **\$60,000.00** yearly reserve account is included in the first and successive years of the operations costs, to deal with any additional Short-lived reserve concerns.

6.6.5 ANNUAL OPERATIONS BUDGET-SUMMARY

The project summary of (1) Initial purchase costs , including actual purchase cost and associated costs for purchase and startup, related to legal, accounting/software, engineering and other services; and (2) the beginning yearly operational budgets, including revenue, loan expenses and operations and maintenance expenses are shown in **Table 6.1 –Water System Startup Summary**, found in the **Tables and Figures** Section. It is noted, once again, that the Project Cost of the waterline Highway crossing (**See Table 4.3**), a total of \$356,728.44, is included in the purchase-related capital expenses, although the actual construction total included in the capital budget (**See Table 6.1**) is rounded up as **\$385,000.00**. Therefore, the Highway waterline crossing Project will not affect the yearly revenue described for the operations budget projected for the system

The 40-year projection of the Edgewood water system Revenue, loan payments and expenses are presented in **Table 5.2-20-year and 40-year Life Cycle Costs**, and which table shows projected net positive revenue for the entire time period.

7 CONCLUSIONS AND RECOMMENDATIONS

Based upon the analysis conducted within this Preliminary Engineering Report (PER), it is recommended that the Town of Edgewood proceed with the outlined ALTERNATE 2 Recommendations, which consist of the following steps: (a) Purchasing the Edgewood Water/Thunder Mountain Water systems, combined and jointly owned currently by EPCOR, by adverse possession, for an estimated Cost of **\$14,500,000.00**; and thereafter (b) Constructing the I-40 Waterline Highway Crossing, for an estimated project Cost of \$356,728.44, which is included in the capital water system purchase as a total of **\$385,000.00**, to provide some extra contingency . The selected alternative was selected because of the ability to be included within the financial capital funds of the system, and not affect the yearly operations budget as developed and described in this report.

This report also provided analysis reviewing the feasibility of providing Water Treatment for the system at this time. However, the three treatment options (Lime Softening, Reverse Osmosis and Ion-Exchange) would cost between **\$7,137,246.47** and **\$10,299,976.52** in current dollars. The Least expensive option, Ion-Exchange was investigated further, to represent all of the options in case the Town was interested in pursuing the range of treatment options. However, for the Ion-exchange treatment process, the first yearly operational costs are estimated to total **\$191,518.68** per year (See **Tables 4.8 and 4.9**). The operational costs are primarily influenced by the yearly cost of bulk salt utilized in the Treatment Process. Similar bulk chemical costs are anticipated for both of the other two treatment options examined.

Together, the added water treatment costs of over seven million dollars requires the yearly amortized (20-year) capital costs of **\$584,913.64** per year and a loan debt service fund of **\$58,491.36**. Together, annualized capital and operational costs would total **\$834,923.69** per year (See again, **Table 4.9**). This total yearly cost WOULD NOT fit into the current operations budget as proposed. At some time in the future the treatment plant options may become feasible, but the existing water rate structure and revenue dictates that those options cannot be undertaken at this time.

Other tasks that would help to optimize the system purchase and the design project at this time, would include an early thorough analysis and condition assessment of the water system, including both modeling and review of all available records. This effort is paramount in determining for all parties the future needs of the water system.

TABLE 2.1 SYSTEM CAPACITY ANALYSIS

WELL	RATED CAPACITY (GPM)	AVERAGE HOURS PER MONTH	AVERAGE OPERATING HOURS/DAY (PRESENT)	WELL UTILIZATION (PRESENT)	AVERAGE OPERATING HOURS/DAY (2040)	WELL UTILIZATION (2040)	GAL PER DAY (GPD)	GAL PER MONTH
BACHELOR	140	342.91	11.43	48%	12.55	52%	96014.8	2,880,444
DINKLE	300	252.98	8.43	35%	9.26	39%	151788	4,553,640
EDGEWOOD	NO PUMP							
HOMESTEAD	70	326.21	10.87	45%	11.94	50%	45669.4	1,370,082
QUAIL A (S2)	300	364.27	12.14	51%	13.33	56%	218562	6,556,860
QUAIL B (S5)	140	221.17	7.37	31%	8.09	34%	61927.6	1,857,828
TURNER	NO PUMP							
SUM	950						573961.8	17,218,854

* AS OF 12/31/2017

Average Pumped / Day: 573,962 GPD

Average pumped / Minute: 399 GPM

100% well capacity: 950 GPM 1,368,000 GPD

Percent of Well capacity used: 41.96%

Well Capacity / Daily Usage: 2.38

Total No of Services: 2720

Average Usage/service: 211 GPD/SVC

TABLE 2.2: WELL DETAILS

WELL NAME	FACILITY	BEGIN DATE	HP	GPM	LONG	LAT	DRAW DOWN (FT)	WELL DEPTH (FT)	STATIC WELL LEVEL (FT-BGL)	WELL DIAMETER (IN)	NEAREST STREET
Well#1 A (Quail S2)	326001	33865	60	300	-106.170722	35.082027	19	400	246	7	Quail Run
Well #1 B (Quail S5)	00326001	33865	40	140	-106.170722	35.082027	19	400	246	7	Quail Run
Well #2 (Dinkle)	00326002	33865	60	300	-106.173055	35.083888	4	309	182	12.75	Dinkle Road
Well #3 (Homestead)	00326003	33865	40	70	-106.168000	35.084527	10	290	177	12	Homestead Road
Well #4 (Bachelor)	00326008	33865	40	140	-106.173468	35.084935	4	705	210	6.63	Rainbow Road
Well #5 (Turner)	00326004	33866	OUT OF SERVICE		-106.155858	35.069214		209	172		
Well #6 (Edgewood)			OUT OF SERVICE		-106.187028	35.0696778					
Well #7 (Huston)			OUT OF SERVICE		-106.153144	35.0687722					

SUM

Well capacity and horsepower are per the EPCOR Annual Report

TABLE 2.3: EDGEWOOD BOOSTER STATIONS

BOOSTER STATION	HP	FLOWS TO:	VFD
Thunder Mountain Booster 1	60	THUNDER MTN	Y
Thunder Mountain Booster 2	40	THUNDER MTN	N
Thunder Mountain Booster 3	7.5	THUNDER MTN	N
ED Smith (1)	5	PETERSON PL	N
ED Smith (2)	5	PETERSON PL	N
Los Cerritos 1	10	CAMINO CERRITOS / CERRITOS TANK	Y
Los Cerritos 2	60	CAMINO CERRITOS / CERRITOS TANK	N
Ness	10	MORIARTY RD	Y
Morper	7.5	PALOMINO RD	N
Juniper (1)	10	JUNIPER HILLS	Y
Juniper (2)	10	JUNIPER HILLS	Y
Edgewood 1	60	BELLA VISTA, TIERRA LINDA, JUNIPER HILLS, & HOLLY HILLS TANKS	N
Edgewood 2	60	BELLA VISTA, TIERRA LINDA, JUNIPER HILLS, & HOLLY HILLS TANKS	N
Edgewood 3	60	BELLA VISTA, TIERRA LINDA, JUNIPER HILLS, & HOLLY HILLS TANKS	N

TABLE 2.4: EDGEWOOD STORAGE TANKS

STORAGE TANK	FACILITY ID#	BEGIN DATE	VOLUME (GAL)	MATERIAL	LONGITUDE	LATITUDE	GRD ELEV.
Bella Vista Storage Tank #1	00326005	9/18/1992	264,000	Steel	-106.195611	35.051055	6897
Bella Vista Storage Tank #2	00326007	9/18/1992	500,000	Steel	-106.195361	35.051027	
Edgewood Storage Tank #1	00326009	9/18/1992	264,000	Steel	-106.188805	35.060888	6683
Edgewood Storage Tank #2	00326010	9/18/1992		Steel	-106.188722	35.060861	
Edgewood Storage Tank #3	00326011	9/18/1992		Steel	-106.188861	35.061055	
Tierra Linda Storage Tank #1	00326017	9/18/1992	19,900	Steel	-106.208416	35.059527	6876
Tierra Linda Storage Tank #2	0326018	9/18/1992		Steel	-106.208416	35.0595	
Holly Hills Storage Tank #1	00326019	9/18/1992	22,500	Steel	-106.187	35.035583	6779
Holly Hills Storage Tank #2	00326020	9/18/1992	40,000	Fiberglass	-106.186999	35.035583	
Juniper Hills Storage Tank #1	00326021	9/18/1992	39,000	Steel	-106.197777	35.036138	6895
Juniper Hills Storage Tank #2	00326022	9/18/1992	130,000	Steel	-106.197722	35.036055	
Juniper Hills Storage Tank #3	0326023	9/18/1992	65,000	Steel	-106.197916	35.036222	
Los Cerritos Storage Tank	0326024	9/18/1992	105,000	Steel	-106.217055	35.062055	7000
Thunder Mountain Tank #1 (MB)			50,000	Steel			6960
Thunder Mountain Tank #2 (MB)			50,000	Steel			
Thunder Mountain Tank #3 (MB)			80,000	Steel			
SUM			1,690,400				

Table 2.5:
Edgewood/Thunder Mountain
Water Lines

Pipe Material:	Pipe Diameter:	Pipe Length (Edgewood):	Pipe Length (Thunder Mtn):	Total Pipe Length:
PVC	2 IN	56659 FT	2360 FT	59019 FT
PVC	2.5 IN	31009 FT	0 FT	31009 FT
PVC	3 IN	39700 FT	0 FT	39700 FT
PVC	4 IN	105340 FT	1985 FT	107325 FT
PVC	6 IN	88039 FT	128803 FT	216842 FT
PVC	8 IN	75321 FT	29073 FT	104394 FT
PVC	10 IN	23650 FT	12779 FT	36429 FT
PVC	12 IN	2920 FT	0 FT	2920 FT
AC	6 IN	8300 FT	0 FT	8300 FT
Total:				605938 FT

Table 3.1:
Lime Softening Plant Calculations Year 2040

Assumptions:

Base Evaporation Rate in Edgewood (IN/YR):	50
Current Water Consumption (GPD):	573961.8
Current # of Residential Services:	2623
Future # of Residential Services:	2987
Ratio of Future Services to Present:	1.14
Future Water Consumption in 2040 (GPD):	653612
Design Plant Operating flow (GPM):	1050
Design Plant Treatment Flow:	900
Design Plant Bypass Flow:	150
Design Bypass Ratio:	14.29%

Lime Softening:

Plant Operating hours:

Treatment Liquid Waste Ratio:	5.00%
Treatment Solid Waste Ratio:	1.50%
Water Treated (GPD):	560238.73
Bypass Flow (GPD):	93373.12
Liquid Waste Flow (GPD):	28011.94
Solid Waste Flow (LB/DAY)*:	11683.35 = 2132.21 TONS/YR**
Plant Operating hours per day @ 1050 gpm:	10.37

Flow Rates in plant with Calculated Operating Hours

Water Treated (GPM):	900
Bypass Flow (GPM):	150
Liquid Waste Flow (GPM):	45
Solid Waste Flow (LB/M):	19
Pond Sizing:	
Waste Flow (GPD):	28011.94
Waste Flow (AC-FT/YR):	31.38
Minimum Pond Size (no bypass) (AC):	7.53

* Using 62.4 lb/cuft, and 1.5% solid waste by weight of water treated

** Solid waste flow per year, must be hauled to landfill

Table 3.2:
Reverse Osmosis Plant Calculations Year 2040

Assumptions:

Base Evaporation Rate in Edgewood (IN/YR):	50
Current Water Consumption (GPD):	573961.8
Current # of Residential Services:	2623
Future # of Residential Services:	2987
Ratio of Future Services to Present:	1.14
Future Water Consumption in 2040 (GPD):	653612
Design Plant Operating flow (GPM):	1050
Design Plant Treatment Flow:	900
Design Plant Bypass Flow:	150
Design Bypass Ratio:	14.29%

Reverse Osmosis:

Plant Operating hours:

Treatment Waste Ratio:	15.00%
Water Treated (GPD):	560238.73
Bypass Flow (GPD):	93373.12
Waste Flow (GPD):	84035.81
Plant Operating hours per day @ 1050 gpm:	10.37

Flow Rates in plant with Calculated Operating Hours

Water Treated (GPM):	900
Bypass Flow (GPM):	150
Waste Flow (GPM):	135
Waste Flow (GPD):	84035.81
Waste Flow (AC-FT/YR):	94.13
Minimum Pond Size (no bypass) (AC):	22.59

Table 3.3:
Ion Exchange Plant Calculations Year 2040

Assumptions:

Base Evaporation Rate in Edgewood (IN/YR):	50
Current Water Consumption (GPD):	573961.8
Current # of Residential Services:	2623
Future # of Residential Services in 2040:	2987
Ratio of Future Services to Present:	1.14
Future Water Consumption in 2040 (GPD):	653612
Design Plant Operating flow (GPM):	1050
Design Plant Treatment Flow:	900
Design Plant Bypass Flow:	150
Design Bypass Ratio:	14.29%

Ion Exchange:

Plant Operating hours:

Treatment Waste Ratio:	8.59%
Water Treated (GPD):	560238.73
Bypass Flow (GPD):	93373.12
Waste Flow (GPD):	48124.51
Plant Operating hours per day @ 1050 gpm:	10.37

Flow Rates in plant with Calculated Operating Hours

Water Treated (GPM):	900
Bypass Flow (GPM):	150
Waste Flow (GPM):	77
Pond Sizing:	
Waste Flow (GPD):	48124.51
Waste Flow (AC-FT/YR):	53.91
Minimum Pond Size (no bypass) (AC):	12.94

TABLE 4.1:
TOWN OF EDGEWOOD WATER DEPARTMENT - STARTUP

TABLE 4.1 TOWN OF EDGEWOOD WATER DEPARTMENT - STARTUP	
TOWN OF EDGEWOOD WATER DEPARTMENT	
200-5001-2-1	Personnel Services *
200-5005-2-1	Personnel Benefits *
200-5010-2-0	Training
200-5015-2-0	Travel & Per Diem
200-5016-2-0	Gas & Oil
200-5017-2-0	Auto Maintenance
200-5020-2-0	Janitorial Supplies
200-5021-2-0	Utilities
200-5022-2-0	Water Conservation Fee
200-5023-2-0	Telephone
200-5028-2-0	Audit
200-5030-2-0	Membership
200-5032-2-0	Engineering
200-5035-2-0	Insurance
	Office Supplies Billing
200-5036-2-0	Office Supplies
200-5037-2-0	Uniforms
200-5039-2-0	Printing
200-5041-2-0	Postage
200-5045-2-0	Professional Services
200-5046-2-0	Trash Collections
200-5051-2-0	Water Rights Study
200-5052-2-0	Miscellaneous
200-5054-2-0	Chemicals
200-5066-2-0	Building Maintenance
200-5067-2-0	Property Taxes
200-5070-2-0	Materials & Supplies
200-5072-2-0	Equip. Repair & Maint.
200-5073-2-0	Tools
200-5075-2-0	Lab Supplies
200-5077-2-0	Sludge Removal
200-5078-2-0	Analysis
200-5080-2-0	Bureau of Reclamation
200-5082-2-0	Contract Maintenance
200-5083-2-0	Reserve Account
200-6006-1-4	Furniture & Equipment
200-6010-1-4	Computers
	\$ 793,200.00
	\$ 293.23

* Assumes 6 employees at average of \$29,583

TABLE 4.2

EDGEWOOD WATER SYSTEM
PROBABLE NET SYSTEM REVENUE STUDY

Revenues & Expenditures: **40 Yr./30 Yr.** **30 Yr./ 30 Yr.** **20 Yr. / 20 Yr.**

Gross System Revenues	\$ 2,143,025.00	\$ 2,143,025.00	\$ 2,143,025.00
Operating Expenses *	\$ (793,200.00)	\$ (793,200.00)	\$ (793,200.00)
Net System Revenues	\$ 1,349,825.00	\$ 1,349,825.00	\$ 1,349,825.00
USDA Direct Loan P&I **	(\$221,506.95)	(\$253,928.03)	(\$323,683.55)
USDA Debt Service Fund	(\$22,150.70)	(\$25,392.80)	(\$32,368.35)
USDA Guaranteed Loan P&I ***	(\$662,644.44)	(\$662,644.44)	(\$808,613.00)
USDA Debt Service Fund	(\$66,264.44)	(\$66,264.44)	(\$80,861.30)
Total Debt Service	(\$972,566.54)	(\$1,008,229.71)	(\$1,245,526.20)
Net Revenues	\$ 377,258.46	\$ 341,595.29	\$ 104,298.80
* 2705 hookups @	\$ (793,200.00)	\$ (293.23)	
** USDA Direct Loan	\$ 4,500,000.00	3.875%	
*** USDA Guaranteed Loan	\$ 10,000,000.00	5.25%	

TABLE 4.3**ESTIMATE OF PROBABLE COST: ALTERNATE 2, HIGHWAY CROSSING**

NO.	ITEM DESCRIPTION	UNIT	QTY	COST	TOTAL
GENERAL					
1	MOBILIZATION/DEMOBILIZATION @ 8%	LS	1	\$19,011.52	\$19,011.52
2	CONSTRUCTION STAKING, COMPL.	LS	1	\$4,752.88	\$4,752.88
3	PERMITTING	LS	1	\$2,376.44	\$2,376.44
4	TRAFFIC CONTROL	LS	1	\$2,000.00	\$2,000.00
Subtotal General:					\$26,140.84
HIGHWAY CROSSING					
4	JACKING AND BORING, 30" CASING, COMPLETE	LF	260	\$575.00	\$149,500.00
5	12" C-900 PVC PIPE, TRENCHING AND FITTINGS INCLUDED	LF	1242	\$40.00	\$49,680.00
6	CONNECTION TO EXISTING WATER LINE, CIP	EA	2	\$1,500.00	\$3,000.00
7	ASPHALT PAVEMENT, REMOVE AND REPLACE	SY	160	\$50.00	\$8,000.00
8	12" GATE VALVE W/ BOX, CIP	EA	4	\$3,266.00	\$13,064.00
9	REMOVE AND DISPOSE OF UNSUITABLE MATL	CY	720	\$10.00	\$7,200.00
10	FILL, BORROW	CY	720	\$10.00	\$7,200.00
Subtotal Highway Crossing:					\$237,644.00
Subtotal All:					\$263,784.84
ENGINEERING/SURVEY/CONTINGENCY					
ENGINEERING 8% SURVEY 2% CONTINGENCY 15%					\$65,946.21
TOTAL:					\$329,731.05
NMGRT @ 8.1875 %:					\$26,997.39
TOTAL + NMGRT:					\$356,728.44

SUMMARY OF WATER QUALITY RESULTS : EDGEWOOD WATER SYSTEM-
 COMBINING ALL 5 PRODUCING WELLS TOGETHER-Lab Results-Hall
 Environmental 9/6/18

ANALYSIS	RESULTS	UNITS	EPA STANDARDS
Hardness (as CaCO ₃)	760	mg/L	
Chloride	45	mg/L	250 **
Sulfate	34	mg/L	250
Bicarbonate (as CaCO ₃)	675.7	mg/L Ca	
Carbonate (as CaCO ₃)	ND	mg/L Ca	
Total Alkalinity (as CaCO ₃)	675.7	mg/L Ca	
Total Dissolved Solids	853 *	mg/L	500 **
pH	6.57 H	pH Units	6.5-8.5 **
Aluminum	ND	mg/L	0.05 - .002 **
Calcium	260	mg/L	
Copper	0.14	mg/L	1.3
Iron	0.11	mg/L	0.3 **
Magnesium	27	mg/L	
Manganese	0.0020	mg/L	0.05 **
Silver	0.0065	mg/L	0.10 **
Zinc	0.028	mg/L	5 **

* - Value Exceeds Secondary Maximum Contaminant Level

** - Secondary MCL

H - Holding times for preparation or analysis exceeded

EPCOR 2017 WATER QUALITY REPORT

SUBSTANCE (UNITS)	YEAR	MCL	HIGHEST	RANGE OF DETECTIONS	EPA MCL
			AMOUNT DETECTED		
Barium (PPB)	2017	200	0.5	0.3 - 0.5	YES
Chromium (PPB)	2014	100	2	ND - 2	YES
Flouride (PPM)	2017	4	0.27	0.17 - 0.27	YES
Nitrate (PPM)	2017	10	5.5	1.9 - 5.5	YES
Sodium (PPB)	2017	MNR	27	20 - 27	YES
Alpha Emitters (pCi/L)	2014	15	8.8	1.6 - 8.8	YES
Combined Uranium (PPB)	2014	30	6	4 - 6	YES
Combined Radium (226 & 228) (pCi/L)	2014	5	0.7	0.4 - 0.7	YES

SUBSTANCE (UNITS)	YEAR	MCL/MRDL	HIGHEST	RANGE OF DETECTIONS	EPA MCL
			AMOUNT DETECTED		
TTHMs (PPB)	2017	80	6.6	5.8 - 6.6	YES
HAA5 (PPB)	2017	60	1.6	1.4 - 1.6	YES
Chlorine Residual (PPM)	2017	4	0.6	0.6 - 0.6	YES

SUBSTANCE (UNITS)	YEAR	LEVEL	ACTION	90TH	SAMPLES
			RESULTS	PERCENTILE	ABOVE ACTION LEVEL
Copper (PPM)	2017	1.3	1.2	0	YES
Lead (PPB)	2017	15	9.3	1	YES

TABLE 4.5**ESTIMATE OF PROBABLE COST: ALTERNATE 3A, WATER TREATMENT (LIME SOFTENING)**

NO.	ITEM DESCRIPTION	UNIT	QTY	COST	TOTAL
GENERAL					
1	MOBILIZATION/DEMOBILIZATION @ 5%	LS	1	\$355,241.38	\$355,241.38
2	CONSTRUCTION STAKING, COMPL.	LS	1	\$85,257.93	\$85,257.93
3	PERMITTING	LS	1	\$71,048.28	\$71,048.28
				Subtotal General:	\$511,547.59
TREATMENT PLANT (REVERSE OSMOSIS)					
4	SITE CLEARING & GRUBBING	AC	1.0	\$1,450.00	\$1,450.00
5	RO TREATMENT EQUIPMENT	LS	1	\$1,800,000.00	\$1,800,000.00
6	EARTHWORK	CY	3792	\$9.00	\$34,128.00
7	TREATMENT BUILDING	SF	6400	\$230.00	\$1,472,000.00
8	8' CHAINLINK SECURITY FENCE, W/ GATE	SF	6400	\$4.00	\$25,600.00
9	12" SITE PIPING, PVC, TRENCHING AND FITTINGS INCL	LF	270	\$41.00	\$11,070.00
10	8" GATE VALVE W/ BOX, CIP	EA	1	\$1,000.00	\$1,000.00
11	12" GATE VALVE W/ BOX, CIP	EA	3	\$3,300.00	\$9,900.00
12	40K GAL SLUDGE TANK	GAL	40000	\$2.00	\$80,000.00
13	250K GAL POTABLE WATER TANK	GAL	250000	\$1.50	\$375,000.00
14	BACKWASH WATER PUMP	LS	1	\$20,000.00	\$20,000.00
15	POST TREATMENT WATER PUMP	LS	1	\$15,000.00	\$15,000.00
16	12" MAGNETIC FLOW METER	EA	1	\$7,000.00	\$7,000.00
17	HYPOCHLORITE TREATMENT	LS	1	\$25,000.00	\$25,000.00
18	TRIPLEX BOOSTER PUMP STATION	LS	1	\$30,000.00	\$30,000.00
19	POWER DROP	LS	1	\$15,000.00	\$15,000.00
20	GENERATOR	LS	1	\$140,000.00	\$140,000.00
21	SLUDGE DISPOSAL*				
				Subtotal Treatment Plant:	\$4,062,148.00
WELL AND REJECT PIPELINES					
21	QUAIL 1 & 2 PIPE 8" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	1750	\$37.00	\$64,750.00
22	BACHELOR PIPE 6" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	770	\$27.00	\$20,790.00
23	HOMESTEAD PIPE 6" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	784	\$27.00	\$21,168.00
24	HOMESTEAD PIPE 10" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	1876	\$39.00	\$73,164.00
25	DINKLE PIPE 8" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	88	\$37.00	\$3,256.00
26	6" GATE VALVE W/ BOX, CIP	EA	3	\$1,000.00	\$3,000.00
27	8" GATE VALVE W/ BOX, CIP	EA	4	\$1,250.00	\$5,000.00
28	10" GATE VALVE W/ BOX, CIP	EA	1	\$1,650.00	\$1,650.00
29	REJECT PIPE 8" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	17265	\$37.00	\$638,805.00
30	8" PVC GATE VALVE W/ BOX, CIP	EA	3	\$1,000.00	\$3,000.00
				Subtotal Pipelines:	\$834,583.00
PONDS					
31	SITE CLEARING & GRUBBING	AC	15	\$1,450.00	\$21,750.00
32	8' CHAINLINK SECURITY FENCE, W/ GATE	SF	6097	\$4.00	\$24,386.67
33	EARTHWORK	CY	34000	\$8.00	\$272,000.00
34	60 MIL HDPE POND LINER	SF	732000	\$1.70	\$1,244,400.00
35	PLAIN RIPRAP, CIP	CY	7506	\$80.00	\$600,460.00
36	GROUTED RIPRAP SPLASH PAD	CY	7	\$200.00	\$1,400.00
37	REMOVE AND DISPOSE OF UNSUITABLE MATL	CY	2000	\$10.00	\$20,000.00
38	FILL, BORROW	CY	2000	\$10.00	\$20,000.00
39	8" PVC EQUALIZATION PIPE W/ GATE VALVE	LS	1	\$3,700.00	\$3,700.00
				Subtotal Pond:	\$2,208,096.67
				Subtotal All:	\$7,616,375.26
ENGINEERING/SURVEY/CONTINGENCY					
	ENGINEERING 8% SURVEY 2% CONTINGENCY 15%			\$1,904,093.81	
				TOTAL:	\$9,520,469.07
				NMGRT @ 8.1875 %:	\$779,507.45
				TOTAL + NMGRT:	\$10,299,976.52

* Sludge hauling estimated to add \$300,000.00 per year to operating costs

TABLE 4.6**ESTIMATE OF PROBABLE COST: ALTERNATE 3C, WATER TREATMENT (ION EXCHANGE)**

NO.	ITEM DESCRIPTION	UNIT	QTY	COST	TOTAL
GENERAL					
1	MOBILIZATION/DEMOBILIZATION @ 5%	LS	1	\$246,160.30	\$246,160.30
2	CONSTRUCTION STAKING, COMPL.	LS	1	\$59,078.47	\$59,078.47
3	PERMITTING	LS	1	\$49,232.06	\$49,232.06
				Subtotal General:	\$354,470.83
TREATMENT PLANT (ION EXCHANGE)					
4	SITE CLEARING & GRUBBING	AC	0.7	\$1,450.00	\$1,015.00
5	ION EXCHANGE TREATMENT EQUIPMENT AND PIPING	LS	1	\$800,000.00	\$800,000.00
6	TREATMENT BUILDING	SF	4800	\$175.00	\$840,000.00
7	8' CHAINLINK SECURITY FENCE, W/ GATE	SF	4000	\$4.00	\$16,000.00
8	12" SITE PIPING, PVC, TRENCHING AND FITTINGS INCL	LF	270	\$41.00	\$11,070.00
9	8" GATE VALVE W/ BOX, CIP	EA	1	\$1,000.00	\$1,000.00
10	12" GATE VALVE W/ BOX, CIP	EA	3	\$3,300.00	\$9,900.00
11	12K GAL BRINE TANK	GAL	12000	\$1.50	\$18,000.00
12	60K GAL RAW WATER TANK	GAL	60000	\$1.50	\$90,000.00
13	250K GAL POTABLE WATER TANK	GAL	250000	\$1.50	\$375,000.00
14	BRINE PUMP	LS	1	\$20,000.00	\$20,000.00
15	RAW WATER PUMP	LS	1	\$10,000.00	\$10,000.00
16	BACKWASH PUMP	LS	1	\$10,000.00	\$10,000.00
17	10" MAGNETIC FLOW METER	EA	1	\$7,000.00	\$7,000.00
18	HYPOCHLORITE TREATMENT	LS	1	\$25,000.00	\$25,000.00
19	TRIPLEX BOOSTER PUMP STATION	LS	1	\$30,000.00	\$30,000.00
20	POWER DROP	LS	1	\$15,000.00	\$15,000.00
21	GENERATOR	LS	1	\$140,000.00	\$140,000.00
				Subtotal Treatment Plant:	\$2,418,985.00
WELL AND BRINE PIPELINES					
22	QUAIL 1 & 2 PIPE 8" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	1750	\$37.00	\$64,750.00
23	BACHELOR PIPE 6" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	770	\$27.00	\$20,790.00
24	HOMESTEAD PIPE 6" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	784	\$27.00	\$21,168.00
25	HOMESTEAD PIPE 10" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	1876	\$39.00	\$73,164.00
26	DINKLE PIPE 8" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	88	\$37.00	\$3,256.00
27	6" GATE VALVE W/ BOX, CIP	EA	3	\$1,000.00	\$3,000.00
28	8" GATE VALVE W/ BOX, CIP	EA	4	\$1,250.00	\$5,000.00
29	10" GATE VALVE W/ BOX, CIP	EA	1	\$1,650.00	\$1,650.00
30	BRINE PIPE 8" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	17265	\$37.00	\$638,805.00
31	8" PVC GATE VALVE W/ BOX, CIP	EA	3	\$1,000.00	\$3,000.00
				Subtotal Pipelines:	\$834,583.00
PONDS					
32	SITE CLEARING & GRUBBING	AC	15	\$1,450.00	\$21,750.00
33	8' CHAINLINK SECURITY FENCE, W/ GATE	SF	26592	\$4.00	\$106,368.00
34	EARTHWORK	CY	30000	\$8.00	\$240,000.00
35	60 MIL HDPE POND LINER	SF	549000	\$1.70	\$933,300.00
36	PLAIN RIPRAP, CIP	CY	4289	\$80.00	\$343,120.00
37	GROUTED RIPRAP SPLASH PAD	CY	7	\$200.00	\$1,400.00
38	REMOVE AND DISPOSE OF UNSUITABLE MATL	CY	1000	\$10.00	\$10,000.00
39	FILL, BORROW	CY	1000	\$10.00	\$10,000.00
40	8" PVC EQUALIZATION PIPE W/ GATE VALVE	LS	1	\$3,700.00	\$3,700.00
				Subtotal Pond:	\$1,669,638.00
				Subtotal All:	\$5,277,676.83
ENGINEERING/SURVEY/CONTINGENCY					
ENGINEERING 8% SURVEY 2% CONTINGENCY 15%					\$1,319,419.21
TOTAL: NMGRT @ 8.1875 %: TOTAL + NMGRT:					\$6,597,096.04
					\$540,150.43
					\$7,137,246.47

TABLE 4.7**ESTIMATE OF PROBABLE COST: ALTERNATE 3B, WATER TREATMENT (REVERSE OSMOSIS)**

NO.	ITEM DESCRIPTION	UNIT	QTY	COST	TOTAL
GENERAL					
1	MOBILIZATION/DEMOBILIZATION @ 5%	LS	1	\$322,790.40	\$322,790.40
2	CONSTRUCTION STAKING, COMPL.	LS	1	\$77,469.70	\$77,469.70
3	PERMITTING	LS	1	\$64,558.08	\$64,558.08
Subtotal General:					\$464,818.18
TREATMENT PLANT (REVERSE OSMOSIS)					
4	SITE CLEARING & GRUBBING	AC	0.7	\$1,450.00	\$1,015.00
5	RO TREATMENT EQUIPMENT	LS	1	\$1,000,000.00	\$1,000,000.00
6	TREATMENT BUILDING	SF	4800	\$175.00	\$840,000.00
7	8' CHAINLINK SECURITY FENCE, W/ GATE	SF	4000	\$4.00	\$16,000.00
8	12" SITE PIPING, PVC, TRENCHING AND FITTINGS INCL	LF	270	\$41.00	\$11,070.00
9	8" GATE VALVE W/ BOX, CIP	EA	1	\$1,000.00	\$1,000.00
10	12" GATE VALVE W/ BOX, CIP	EA	3	\$3,300.00	\$9,900.00
11	10K GAL REJECT TANK	GAL	10000	\$1.50	\$15,000.00
12	60K GAL RAW WATER TANK	GAL	60000	\$1.50	\$90,000.00
13	250K GAL POTABLE WATER TANK	GAL	250000	\$1.50	\$375,000.00
14	REJECT WATER PUMP	LS	1	\$20,000.00	\$20,000.00
15	RO WATER PUMP	LS	1	\$15,000.00	\$15,000.00
16	BACKWASH PUMP	LS	1	\$10,000.00	\$10,000.00
17	12" MAGNETIC FLOW METER	EA	1	\$7,000.00	\$7,000.00
18	HYPOCHLORITE TREATMENT	LS	1	\$25,000.00	\$25,000.00
19	TRIPLEX BOOSTER PUMP STATION	LS	1	\$30,000.00	\$30,000.00
20	POWER DROP	LS	1	\$15,000.00	\$15,000.00
21	GENERATOR	LS	1	\$140,000.00	\$140,000.00
Subtotal Treatment Plant:					\$2,620,985.00
WELL AND REJECT PIPELINES					
22	QUAIL 1 & 2 PIPE 8" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	1750	\$37.00	\$64,750.00
23	BACHELOR PIPE 6" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	770	\$27.00	\$20,790.00
24	HOMESTEAD PIPE 6" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	784	\$27.00	\$21,168.00
25	HOMESTEAD PIPE 10" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	1876	\$39.00	\$73,164.00
26	DINKLE PIPE 8" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	88	\$37.00	\$3,256.00
27	6" GATE VALVE W/ BOX, CIP	EA	3	\$1,000.00	\$3,000.00
28	8" GATE VALVE W/ BOX, CIP	EA	4	\$1,250.00	\$5,000.00
29	10" GATE VALVE W/ BOX, CIP	EA	1	\$1,650.00	\$1,650.00
30	REJECT PIPE 8" C-900 PVC PIPE, FITTINGS AND TRENCH INCLUDED	FT	17265	\$37.00	\$638,805.00
31	8" PVC GATE VALVE W/ BOX, CIP	EA	3	\$1,000.00	\$3,000.00
Subtotal Pipelines:					\$834,583.00
PONDS					
32	SITE CLEARING & GRUBBING	AC	30	\$1,450.00	\$43,500.00
33	8' CHAINLINK SECURITY FENCE, W/ GATE	SF	9145	\$4.00	\$36,580.00
34	EARTHWORK	CY	51000	\$8.00	\$408,000.00
35	60 MIL HDPE POND LINER	SF	1098000	\$1.70	\$1,866,600.00
36	PLAIN RIPRAP, CIP	CY	7506	\$80.00	\$600,460.00
37	GROUTED RIPRAP SPLASH PAD	CY	7	\$200.00	\$1,400.00
38	REMOVE AND DISPOSE OF UNSUITABLE MATL	CY	2000	\$10.00	\$20,000.00
39	FILL, BORROW	CY	2000	\$10.00	\$20,000.00
40	8" PVC EQUALIZATION PIPE W/ GATE VALVE	LS	1	\$3,700.00	\$3,700.00
Subtotal Pond:					\$3,000,240.00
Subtotal All:					\$6,920,626.18
ENGINEERING/SURVEY/CONTINGENCY					
ENGINEERING 8% SURVEY 2% CONTINGENCY 15%					\$1,730,156.54
TOTAL:					\$8,650,782.72
NMGRT @ 8.1875 %:					\$708,300.14
TOTAL + NMGRT:					\$9,359,082.86

TABLE 4.8 - ION EXCHANGE PROCESS

 <p>Intelligent thinking.....clean water</p>		Town of Edgewood, NM Treatment System for Hardness Reduction		Site Profile & Proposal APUIX WaterPOD Integrated System																																																																	
Contact Information		<p>Date: 10/4/2018</p> <p>Project Contact: Dennis Brand - Wilson & Company, Inc.</p> <p>Contact Phone: 505-948-5216 (Office)</p> <p>Contact Email: dennis.brand@wilsonco.com</p> <p>Rep Contact: Douglas Craver - AdEdge Regional Manager</p> <p>Rep Information: 480-243-1824, dcraver@adedgetechnologies.co</p>																																																																			
End User / Utility: Town of Edgewood / EPCOR Site / Well Identity / Location: Edgewood, NM Local Engineer / Firm: Dennis Brand / Wilson & Company, Inc. Other Pertinent Notes: Operator: EPCOR Target Date for Installation: 2019 Specific Treatment Goals: Hardness reduction; blend to 150 mg/l Total Hardness																																																																					
System Parameters / Site Specific		<p>System Type / Application: Municipal (municipal, institution, industry) Population Served: (estimated) Number of Connections: (for municipal applications) Number of Wells: 5 (# wells to be treated) Design Flow (GPM): 1,000 (max design flow rate to be treated) Ave Flow (GPM): (typical) Gallons per Day: 573,930 (average daily usage over 12 months) Gallons per Year: 209,484,450 (annual usage or quantity)</p> <p>Existing Treatment or Disinfection: Chlorine</p> <p>Equipment Available for Offloading:</p> <p>Pump Operation / Pressure: Assumed < 100 psi</p> <p>Available Electrical Supply:</p> <p>Atm Storage Tank Present / Size: To Be Confirmed</p> <p>Hydropneumatic Tank Present / Size: To Be Confirmed</p> <p>Building Present/ Available Space: To Be Confirmed</p> <p>Any Additives i.e. Phosphates, Fluoride:</p> <p>Discharge Options Available: No sewer - may need to consider low waste</p>																																																																			
		<p>Site Specific Notes:</p> <p>*Limited site information available *Assumed 50% utilization *WaterPOD enclosure desired *Brine to be hauled from the site for disposal</p>																																																																			
Water Chemical Analysis		<table border="1"> <thead> <tr> <th>Codes</th> <th>Parameters</th> <th>Codes</th> <th>Parameters</th> </tr> </thead> <tbody> <tr> <td>All</td> <td>pH 7.20</td> <td>4.5,7</td> <td>Sodium 27.00</td> </tr> <tr> <td>1,2,7</td> <td>Total As No Data</td> <td>4,5,7</td> <td>Nitrate 5.50</td> </tr> <tr> <td>Optional</td> <td>As(III) No Data</td> <td>4,5,7</td> <td>Chloride 45.00</td> </tr> <tr> <td>All</td> <td>Total Sulfides No Data</td> <td>3,4,5,7</td> <td>Bicarbonate 676.00</td> </tr> <tr> <td></td> <td>Hardness 760.00</td> <td>3,4,5,7</td> <td>Sulfate 34.00</td> </tr> <tr> <td></td> <td>Alkalinity 676.00</td> <td>3,4,5,7</td> <td>Fluoride 0.27</td> </tr> <tr> <td></td> <td>Calcium 260.00</td> <td>3,4,5,6,7</td> <td>Conductivity No Data</td> </tr> <tr> <td></td> <td>Magnesium 27.00</td> <td>3,4,5,6,7</td> <td>TDS 853.00</td> </tr> <tr> <td></td> <td>Silica 7.45</td> <td>3,4,5,7</td> <td>Gross Alpha No Data</td> </tr> <tr> <td></td> <td>Phosphate No Data</td> <td>4,5,7</td> <td>Radium No Data</td> </tr> <tr> <td></td> <td>Suspended Solids ND</td> <td>4,5,7</td> <td>Uranium No Data</td> </tr> <tr> <td></td> <td>Iron 0.11</td> <td>All</td> <td>Turbidity No Data</td> </tr> <tr> <td></td> <td>Manganese 0.01</td> <td>All</td> <td>Temperature No Data</td> </tr> <tr> <td></td> <td>TOC No Data</td> <td>1,2,4,5,7</td> <td>Tannins No Data</td> </tr> <tr> <td>rev 03.11.16</td> <td>Ammonia No Data</td> <td>1,2,4,5,7</td> <td>Chromium VI No Data</td> </tr> </tbody> </table>				Codes	Parameters	Codes	Parameters	All	pH 7.20	4.5,7	Sodium 27.00	1,2,7	Total As No Data	4,5,7	Nitrate 5.50	Optional	As(III) No Data	4,5,7	Chloride 45.00	All	Total Sulfides No Data	3,4,5,7	Bicarbonate 676.00		Hardness 760.00	3,4,5,7	Sulfate 34.00		Alkalinity 676.00	3,4,5,7	Fluoride 0.27		Calcium 260.00	3,4,5,6,7	Conductivity No Data		Magnesium 27.00	3,4,5,6,7	TDS 853.00		Silica 7.45	3,4,5,7	Gross Alpha No Data		Phosphate No Data	4,5,7	Radium No Data		Suspended Solids ND	4,5,7	Uranium No Data		Iron 0.11	All	Turbidity No Data		Manganese 0.01	All	Temperature No Data		TOC No Data	1,2,4,5,7	Tannins No Data	rev 03.11.16	Ammonia No Data	1,2,4,5,7	Chromium VI No Data
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APUIX-Softening		<p>AdEdge Packaged System: APUIX-SOFT-9660CS-4-AVH</p> <p>Media: APUIX-SOFT cation resin</p> <p>Number of Vessels: Three (3)</p> <p>Qty of media (cu ft): 155 cuft/vessel</p> <p>System footprint: 472" L x 126" W x 120" H</p> <p>Operation: Parallel</p> <p>Regeneration: Approx 4x / day</p> <p>Backwashing rate: 201.06</p> <p>Est. Regen water (gallons) per vessel: 7,914</p> <p>Treatment Goals: Hardness <150 mg/L as CaCO₃</p> <p>Loading Rate: 2.0 gpm/cuft (based on peak flow)</p> <p>Flow Rate: 1,000 gpm (typical expected)</p> <p>Ave gallons/day: 573,930 (based on utilization)</p> <p>Hydraulic Utilization %: 40% (actual system utilization 24-7)</p> <p>Regenerant: NaCl - 7.5 lbs/cuft (basis)</p> <p>Est. Media life (months): 60 (est frequency of changeout)</p> <p>Est. Media life (Years): 5 (est frequency of changeout)</p>																																																																			
System Costs		<table border="1"> <thead> <tr> <th colspan="2">Capital Costs</th> <th colspan="2">Estimated Annualized OPEX</th> </tr> </thead> <tbody> <tr> <td>Packaged Treatment System:</td> <td>Included</td> <td>Replacement media:</td> <td>\$12,053 (media, excluding labor)</td> </tr> <tr> <td>Equipment Shop drawings:</td> <td>Included</td> <td>Salt consumption:</td> <td>\$132,139 (based on \$125/ton salt cost)</td> </tr> <tr> <td>AdEdge Startup and Commissioning:</td> <td>Included</td> <td>Est. Annual Oper. Costs:</td> <td>\$144,192 (prorated media, chemical)</td> </tr> <tr> <td>Engineering / Permitting:</td> <td>By others</td> <td>Operating Costs per 1000 gal:</td> <td>\$0.69 (ave. estimated per 1,000 gals)</td> </tr> <tr> <td>Freight:</td> <td>Not Included</td> <td></td> <td></td> </tr> <tr> <td>Brine Maker, Silo, Pump:</td> <td>Included</td> <td></td> <td></td> </tr> <tr> <td>Total capital, startup:</td> <td>To Be Confirmed</td> <td></td> <td></td> </tr> </tbody> </table> <p>Estimated Waste Volumes:</p> <table border="1"> <tr> <td>Brine wastewater (estimated volume)</td> <td>17,744,345 gallons per year</td> </tr> <tr> <td>Approx. % waste</td> <td>8.59% % of throughput</td> </tr> </table>				Capital Costs		Estimated Annualized OPEX		Packaged Treatment System:	Included	Replacement media:	\$12,053 (media, excluding labor)	Equipment Shop drawings:	Included	Salt consumption:	\$132,139 (based on \$125/ton salt cost)	AdEdge Startup and Commissioning:	Included	Est. Annual Oper. Costs:	\$144,192 (prorated media, chemical)	Engineering / Permitting:	By others	Operating Costs per 1000 gal:	\$0.69 (ave. estimated per 1,000 gals)	Freight:	Not Included			Brine Maker, Silo, Pump:	Included			Total capital, startup:	To Be Confirmed			Brine wastewater (estimated volume)	17,744,345 gallons per year	Approx. % waste	8.59% % of throughput																												
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TABLE 4.9:
ION EXCHANGE FIRST YEAR OPERATIONS COSTS

TREATMENT COSTS:

Replacement Media:	\$	(12,053.00)
Salt Consumption:	\$	(132,139.00)

ENERGY COSTS:

Primary Booster Pumps:	\$	(29,926.79)
Other Pumps / HVAC:	\$	(6,583.89)

LABOR:

Operator:	\$	(10,816.00)
-----------	----	-------------

Total Operating Costs: **\$** **(191,518.68)**

LOAN PAYMENT CALCULATION:

Interest Rate:		5.25%
Loan Term (Years):		20
Principal:	\$	7,137,246.47
Loan Payment:	\$	(584,913.64)
Debt Service Fund (10%):	\$	(58,491.36)
Total Loan Payment:	\$	(643,405.01)

TOTAL ALL: **\$** **(834,923.69)**

TABLE 5.1 20-YEAR OPERATIONAL COST ESTIMATES

	NON RECURRING STARTUP COSTS	RECURRING OPERATIONAL COSTS			
	Startup Cost	Year 1	Year 2	Year 10	Year 20
NON RECURRING STARTUP COSTS					
Professional Services	\$ 35,000.00				
Postage	\$ 25,000.00				
Furniture & Equipment	\$ 20,000.00				
Audit	\$ 14,000.00				
Water Rights Study	\$ 10,000.00				
Uniforms	\$ 6,000.00				
Analysis	\$ 6,000.00				
REDUCED STARTUP COST W/ RECURRING COST @ 3% PER YEAR					
Materials & Supplies	\$ 53,000.00	\$ 2,000.00	\$ 2,060.91	\$ 2,619.93	\$ 3,644.24
Tools	\$ 14,000.00	\$ 1,000.00	\$ 1,030.45	\$ 1,309.96	\$ 1,768.27
Telephone	\$ 13,900.00	\$ 3,600.00	\$ 3,709.64	\$ 4,715.87	\$ 6,365.76
Computers	\$ 6,000.00	\$ 1,000.00	\$ 1,030.45	\$ 1,309.96	\$ 1,768.27
Training	\$ 2,000.00	\$ 2,500.00	\$ 2,576.14	\$ 3,274.91	\$ 4,420.67
RECURRING COSTS INCREASING @ 3% PER YEAR					
Personnel Services *		\$ 177,500.00	\$ 182,905.68	\$ 232,518.69	\$ 313,867.40
Utilities		\$ 118,800.00	\$ 122,418.00	\$ 155,623.78	\$ 210,070.13
Personnel Benefits *		\$ 77,000.00	\$ 79,345.00	\$ 100,867.26	\$ 136,156.56
Insurance		\$ 46,000.00	\$ 47,400.91	\$ 60,258.36	\$ 81,340.28
Gas & Oil		\$ 30,000.00	\$ 30,913.64	\$ 39,298.93	\$ 53,048.01
Auto Maintenance		\$ 15,000.00	\$ 15,456.82	\$ 19,649.47	\$ 26,524.01
Equip. Repair & Maint.		\$ 15,000.00	\$ 15,456.82	\$ 19,649.47	\$ 26,524.01
Contract Maintenance		\$ 12,000.00	\$ 12,365.45	\$ 15,719.57	\$ 21,219.20
Chemicals		\$ 10,000.00	\$ 10,304.55	\$ 13,099.64	\$ 17,682.67
Travel & Per Diem		\$ 2,500.00	\$ 2,576.14	\$ 3,274.91	\$ 4,420.67
Building Maintenance		\$ 2,500.00	\$ 2,576.14	\$ 3,274.91	\$ 4,420.67
Lab Supplies		\$ 2,500.00	\$ 2,576.14	\$ 3,274.91	\$ 4,420.67
Miscellaneous		\$ 2,000.00	\$ 2,060.91	\$ 2,619.93	\$ 3,536.53
Office Supplies		\$ 1,500.00	\$ 1,545.68	\$ 1,964.95	\$ 2,652.40
Janitorial Supplies		\$ 1,000.00	\$ 1,030.45	\$ 1,309.96	\$ 1,768.27
Property Taxes		\$ 400.00	\$ 412.18	\$ 523.99	\$ 707.31
CONSTANT RECURRING COSTS					
Office Supplies Billing		\$ 3,000.00	\$ 3,000.00	\$ 3,000.00	\$ 3,000.00
Reserve Account		\$ 60,000.00	\$ 60,000.00	\$ 60,000.00	\$ 60,000.00
Membership		\$ 1,500.00	\$ 1,500.00	\$ 1,500.00	\$ 1,500.00
NO ASSOCIATED COST					
Water Conservation Fee			\$ -		\$ -
Engineering			\$ -		\$ -
Printing			\$ -		\$ -
Trash Collections			\$ -		\$ -
Sludge Removal			\$ -		\$ -
Bureau of Reclamation			\$ -		\$ -
TOTAL:		\$ 204,900.00	\$ 588,300.00	\$ 604,252.08	\$ 750,659.38
					\$ 990,825.99

TABLE 5.2 - 20 YEAR AND 40 YEAR LIFE CYCLE COSTS (PAGE 1 OF 2)

	Year 1	Year 2	Year 3	Year 4	Year 5*
Revenue	\$ 2,143,025.00	\$ 2,155,706.22	\$ 2,168,462.48	\$ 2,181,294.23	\$ 2,303,912.00
Operational Expenses	\$ (588,300.00)	\$ (604,252.08)	\$ (620,689.98)	\$ (637,628.49)	\$ (655,082.85)
Operational Startup	\$ (204,900.00)	\$ -	\$ -	\$ -	\$ -
Debt Service	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)
Net Revenue	\$ 377,258.46	\$ 578,887.60	\$ 575,205.96	\$ 571,099.20	\$ 676,262.61
System Reserves	\$ 377,258.46	\$ 956,146.06	\$ 1,531,352.01	\$ 2,102,451.21	\$ 2,778,713.82
	Year 6	Year 7	Year 8	Year 9	Year 10*
Revenue	\$ 2,317,545.26	\$ 2,331,259.19	\$ 2,345,054.27	\$ 2,358,930.99	\$ 2,491,534.31
Operational Expenses	\$ (673,068.78)	\$ (691,602.45)	\$ (710,700.57)	\$ (730,380.30)	\$ (750,659.38)
Debt Service	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)
Net Revenue	\$ 671,909.94	\$ 667,090.20	\$ 661,787.17	\$ 655,984.15	\$ 768,308.39
System Reserves	\$ 3,450,623.76	\$ 4,117,713.95	\$ 4,779,501.12	\$ 5,435,485.26	\$ 6,203,793.66
	Year 11	Year 12	Year 13	Year 14	Year 15*
Revenue	\$ 2,506,277.82	\$ 2,521,108.56	\$ 2,536,027.07	\$ 2,551,033.86	\$ 2,694,435.92
Operational Expenses	\$ (771,556.04)	\$ (793,089.11)	\$ (815,277.95)	\$ (838,142.54)	\$ (861,703.46)
Debt Service	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)
Net Revenue	\$ 762,155.23	\$ 755,452.92	\$ 748,182.58	\$ 740,324.78	\$ 860,165.91
System Reserves	\$ 6,965,948.89	\$ 7,721,401.81	\$ 8,469,584.39	\$ 9,209,909.17	\$ 10,070,075.08
	Year 16	Year 17	Year 18	Year 19	Year 20*
Revenue	\$ 2,710,380.08	\$ 2,726,418.59	\$ 2,742,552.00	\$ 2,758,780.89	\$ 2,913,861.10
Operational Expenses	\$ (885,981.92)	\$ (910,999.77)	\$ (936,779.53)	\$ (963,344.39)	\$ (990,718.28)
Debt Service	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)
Net Revenue	\$ 851,831.61	\$ 842,852.27	\$ 833,205.93	\$ 822,869.95	\$ 950,576.27
System Reserves	\$ 10,921,906.69	\$ 11,764,758.97	\$ 12,597,964.90	\$ 13,420,834.86	\$ 14,371,411.13

20-Year Net Present Value: **\$10,388,335.72**

Notes:

1. Year 1 operations costs are separated into recurring operational expenses and operational startup expenses.
2. Revenue is increased at 0.59% per year except for years with rate increases
3. Rate increases are set at 5% every 5 years
4. Operational expenses increase at approximately 2.712% at year 1, and increase to approximately 2.95% at 40 years
5. Loan paybacks are at 30 years for the \$4.5 million loan, and 40 years for the \$10 million loan. Page 2 of this table continues the analysis for the full length of the loans.

TABLE 5.2 - 20 YEAR AND 40 YEAR LIFE CYCLE COSTS (PAGE 2 OF 2)

	Year 21	Year 22	Year 23	Year 24	Year 25*
Revenue	\$ 2,931,103.69	\$ 2,948,448.32	\$ 2,965,895.58	\$ 2,983,446.09	\$ 3,151,155.48
Operational Expenses	\$ (1,018,925.83)	\$ (1,047,992.42)	\$ (1,077,944.22)	\$ (1,108,808.20)	\$ (1,140,612.12)
Debt Service	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)
Net Revenue	\$ 939,611.32	\$ 927,889.36	\$ 915,384.82	\$ 902,071.36	\$ 1,037,976.82
System Reserves	\$ 15,311,022.46	\$ 16,238,911.82	\$ 17,154,296.63	\$ 18,056,367.99	\$ 19,094,344.81
	Year 26	Year 27	Year 28	Year 29	Year 30*
Revenue	\$ 3,169,802.25	\$ 3,188,559.36	\$ 3,207,427.47	\$ 3,226,407.22	\$ 3,407,774.26
Operational Expenses	\$ (1,173,384.61)	\$ (1,207,155.17)	\$ (1,241,954.20)	\$ (1,277,813.02)	\$ (1,314,763.91)
Debt Service	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)	\$ (972,566.54)
Net Revenue	\$ 1,023,851.10	\$ 1,008,837.65	\$ 992,906.72	\$ 976,027.66	\$ 1,120,443.81
System Reserves	\$ 20,118,195.91	\$ 21,127,033.55	\$ 22,119,940.28	\$ 23,095,967.94	\$ 24,216,411.75
	Year 31	Year 32	Year 33	Year 34	Year 35*
Revenue	\$ 3,427,939.55	\$ 3,448,224.18	\$ 3,468,628.83	\$ 3,489,154.24	\$ 3,685,291.15
Operational Expenses	\$ (1,352,840.11)	\$ (1,392,075.91)	\$ (1,432,506.61)	\$ (1,474,168.62)	\$ (1,517,099.42)
Debt Service	\$ (728,908.89)	\$ (728,908.89)	\$ (728,908.89)	\$ (728,908.89)	\$ (728,908.89)
Net Revenue	\$ 1,346,190.55	\$ 1,327,239.38	\$ 1,307,213.33	\$ 1,286,076.73	\$ 1,439,282.84
System Reserves	\$ 25,562,602.30	\$ 26,889,841.68	\$ 28,197,055.01	\$ 29,483,131.74	\$ 30,922,414.58
	Year 36	Year 37	Year 38	Year 39	Year 40*
Revenue	\$ 3,707,098.63	\$ 3,729,035.17	\$ 3,751,101.50	\$ 3,773,298.42	\$ 3,985,408.02
Operational Expenses	\$ (1,561,337.66)	\$ (1,606,923.15)	\$ (1,653,896.93)	\$ (1,702,301.27)	\$ (1,752,179.74)
Debt Service	\$ (728,908.89)	\$ (728,908.89)	\$ (728,908.89)	\$ (728,908.89)	\$ (728,908.89)
Net Revenue	\$ 1,416,852.09	\$ 1,393,203.13	\$ 1,368,295.69	\$ 1,342,088.26	\$ 1,504,319.38
System Reserves	\$ 32,339,266.67	\$ 33,732,469.80	\$ 35,100,765.49	\$ 36,442,853.75	\$ 37,947,173.13

* RATE INCREASE @ 5 YEAR INTERVALS: 5%
 40-Year Net Present Value: \$19,834,163.82

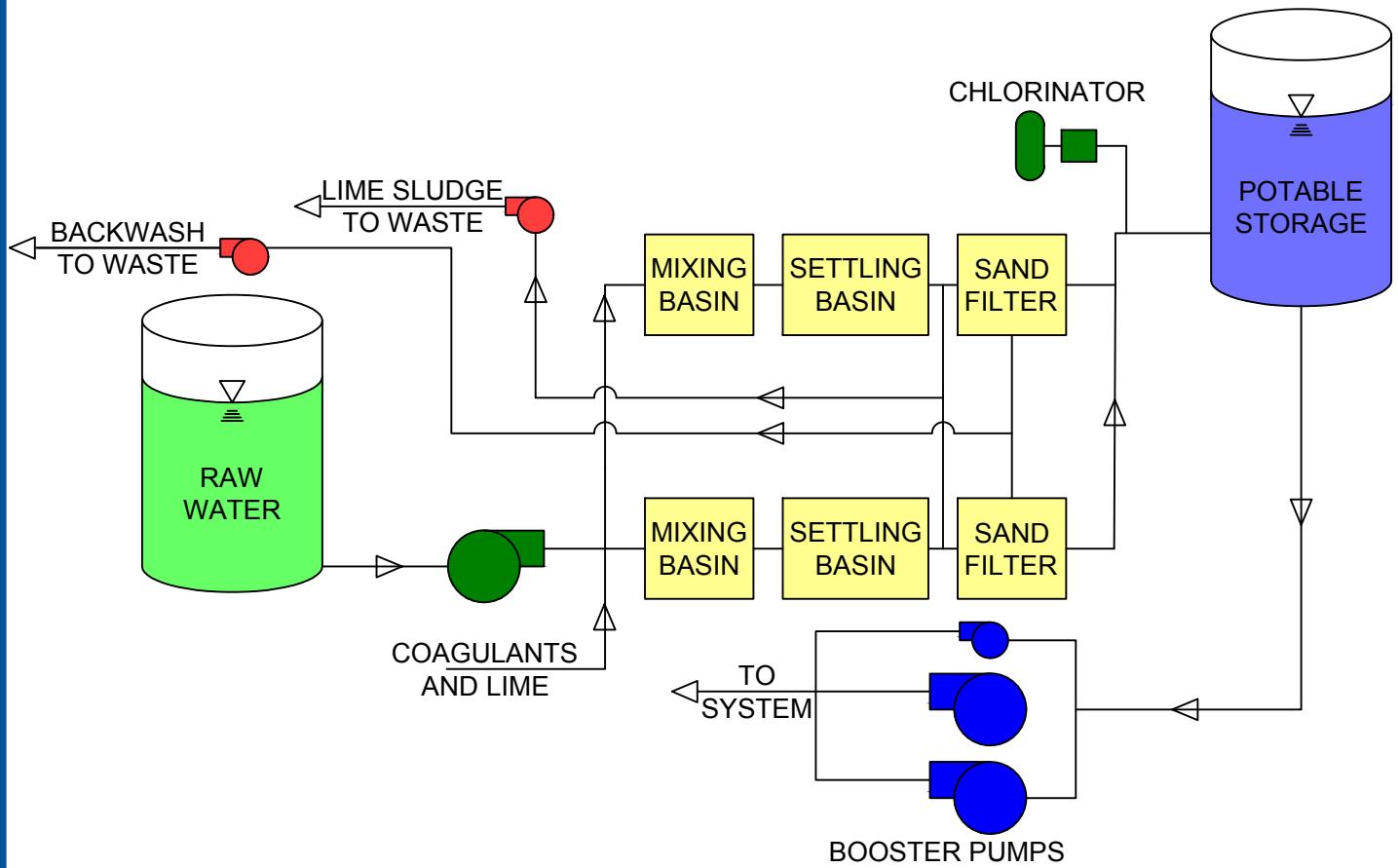
TABLE 6.1
WATER SYSTEM STARTUP

SYSTEM BUDGET CALCULATIONS

CAPITAL EXPENSES		FULL CAPITALIZATION	
Purchase of Facilities	\$ 12,000,000.00	Life Cycle	40 Years
Startup/ Initial Engineering	\$ 350,000.00	Inflation Rate	2.712 to 2.95%
Legal / Atty Fees	\$ 1,000,000.00	Loan Rate USDA Direct (4.5 M)	3.875%
Accounting /Audit / Software	\$ 400,000.00	Loan Rate USDA Guaranteed (10 M)	5.250%
Construction of Hwy Xing	\$ 385,000.00	Total Loan Rate (Weighted Avg)	4.823%
Leaseholder Improvements	\$ 150,000.00		
Contingency	\$ 215,000.00		
Total	\$ 14,500,000.00		
USDA Direct Loan 40 Year		USDA Guaranteed Loan 30 Year	
Amount	\$ 4,500,000.00	Amount	\$ 10,000,000.00
Rate	3.875%	Rate	5.250%
USDA Debt Service Fund 10%	\$ 22,150.70	USDA Debt Service Fund 10%	\$ 66,264.44
Annual Loan Payment	\$ 221,506.95	Annual Loan Payment	\$ 662,644.44
Total Annual Payment	\$ 243,657.65	Total Annual Payment	\$ 728,908.88
Total Debt Service (Direct + Guaranteed Loan Payments): \$ 972,566.53			
ESTIMATED ANNUAL REVENUE			
USERS	CONNECTIONS	MONTHLY RATE (Avg Per Connection)	ANNUAL REVENUE
Residential & Commercial*	2705	\$ 66.02	\$ 2,143,025.00
ESTIMATED ANNUAL EXPENSES			
Capital Repayment:			\$ 972,566.53
Operations and Maintenance:			\$ 793,200.00
Net Annual Budget (First Year):			\$ 377,258.47

* Actual total number of services is 2720, 2705 services is used here to maintain consistency with Table 4.2 located in the Tables and Figures Section.

** Construction cost for Alternate 2, Including engineering, surveying, legal and contingencies

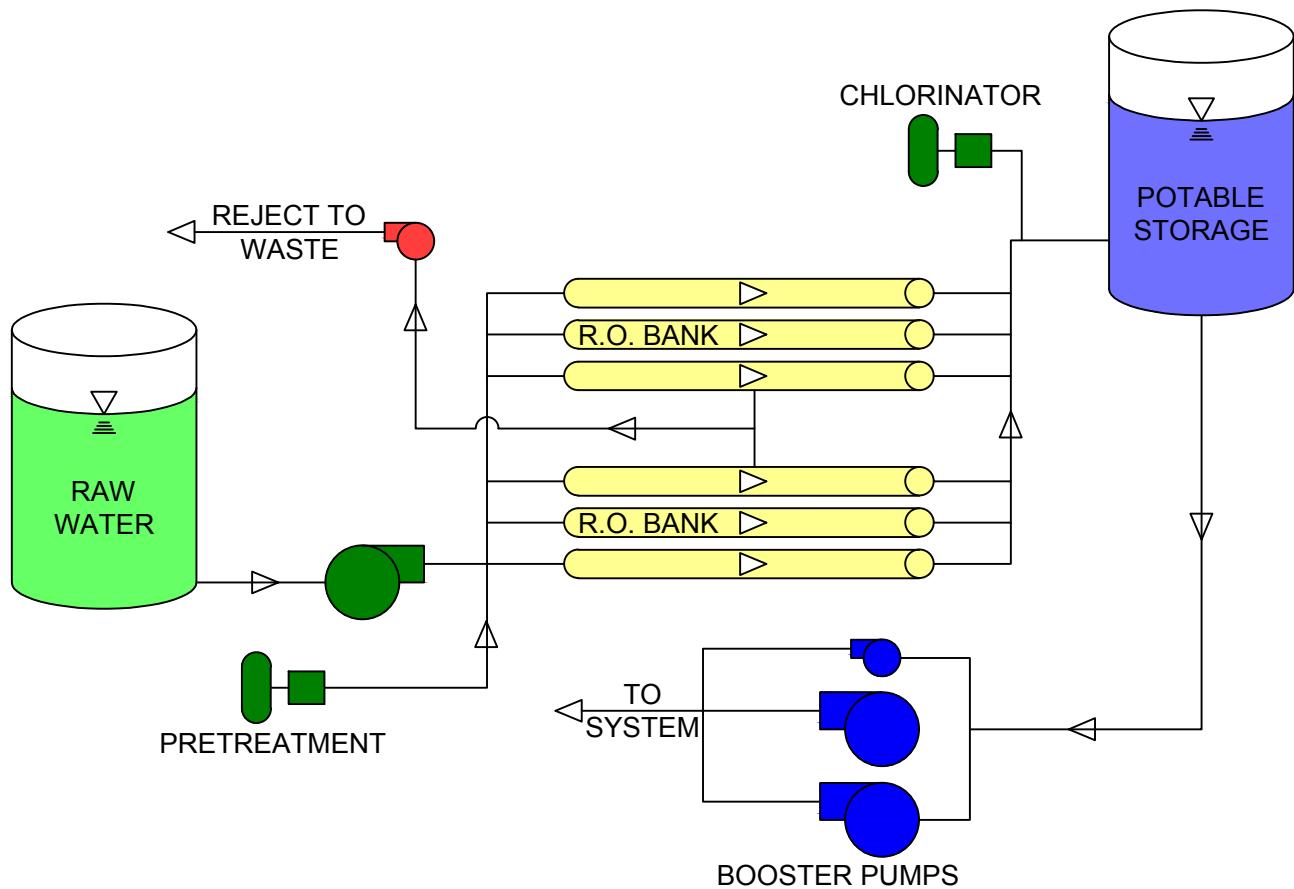


WILSON
& COMPANY

2600 The American Rd. SE, Ste. 100
Rio Rancho, New Mexico 87124
505-898-8021

FIGURE 4.1:
LIME SOFTENING TREATMENT

Town of Edgewood PER



WILSON
& COMPANY

2600 The American Rd. SE, Ste. 100
Rio Rancho, New Mexico 87124
505-898-8021

FIGURE 4.2:
REVERSE OSMOSIS TREATMENT

Town of Edgewood PER

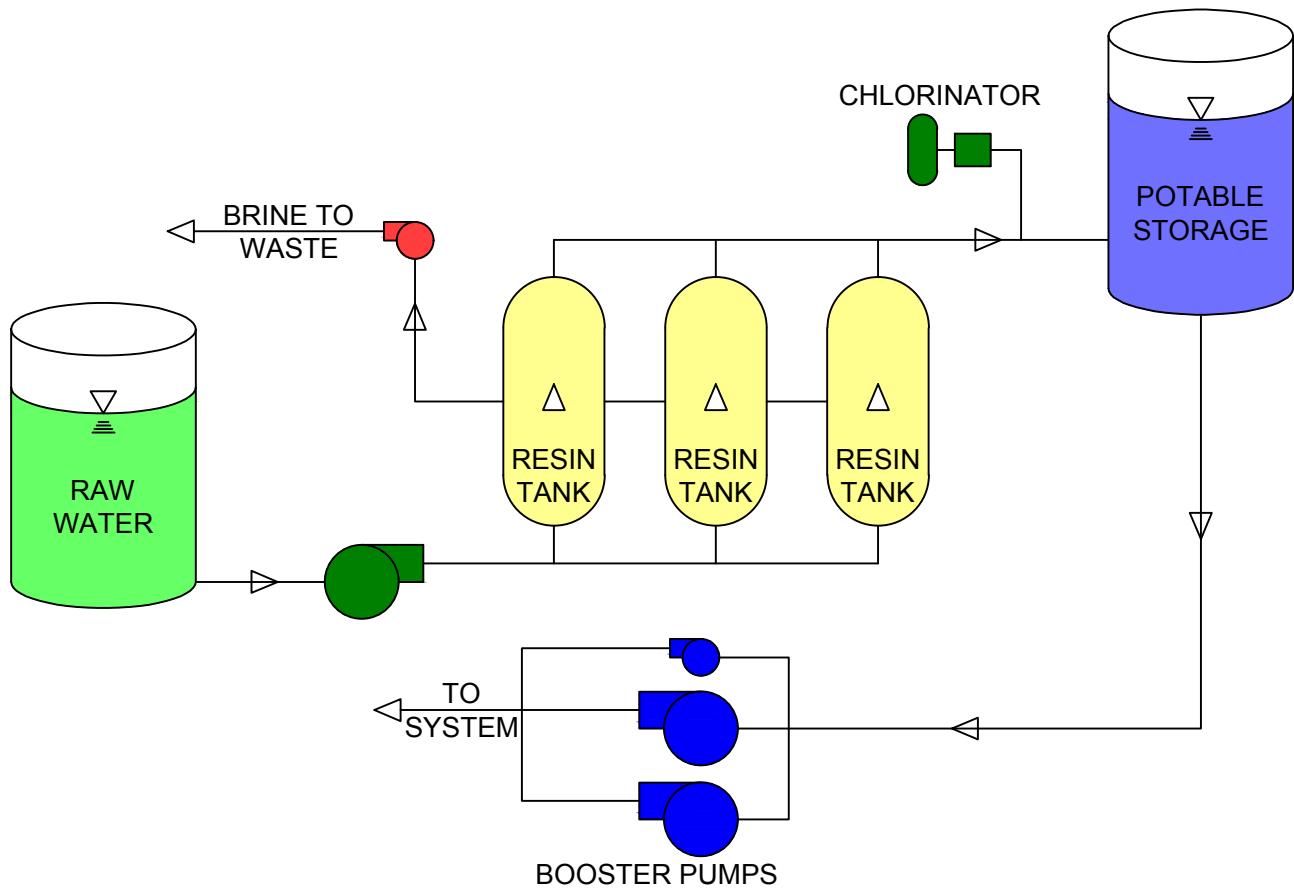


FIGURE 4.3:
ION EXCHANGE TREATMENT
 Town of Edgewood PER