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City of Portales
Preliminary Engineering Report for Additional Water Supply

Prepared for **City of Portales, New Mexico**

September 11, 2015

Daniel B. Stephens & Associates, Inc.

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Executive Summary

This Preliminary Engineering Report was prepared for the City of Portales, New Mexico, by Daniel B. Stephens & Associates (DBS&A) to examine alternatives for meeting water supply needs for the next 20 years. The City's current and exclusive source of water supply is from groundwater wells that draw from the Ogallala Aquifer. This regional aquifer underlies eastern New Mexico and portions of Texas, Oklahoma, Kansas, Colorado, Nebraska, and South Dakota. The Ogallala Aquifer is being pumped at a faster rate than it is being recharged, resulting in declining water levels and reduced saturated thickness.

A long-term regional solution to water supply shortages in eastern New Mexico, the Eastern New Mexico Rural Water System (ENMRWS) project is being developed to deliver water from Ute Reservoir to a number of communities, including Portales. While this project represents a long term solution to Portales water supply problems, it does not meet the immediate need, as the project is not anticipated to reach Portales for 10 years or more. In order to address the City's supply needs in the interim, as well as to have a contingency plan in the event that the ENMRWS never reaches Portales (which will be the last customer to be served), this report presents water supply alternatives to the ENMRWS.

The study period for this report is 20 years, and the costs developed are based on supplying water to meet Portales water demand in the year 2035, without the benefit of water from the ENMRWS.

Four alternatives are examined. Alternative 1, the No Action Alternative, is not considered feasible as the City's existing water sources are being rapidly depleted. Alternative 2 comprises aquifer storage and recovery of treated wastewater effluent in direct injection wells, either at the Sandhill Well Field (Option 1) or the Blackwater Well Field (Option 2). Alternative 3 consists of rehabilitation of existing wells and drilling of new wells at the City's Blackwater Well Field; a test hole drilling program is included, which would allow characterization of the aquifer conditions throughout the well field. Alternative 4 is water conservation, including continuation of successful measures already implemented and implementation of more aggressive efforts to lower consumption.

The Recommended Alternative combines Alternative 2, Option 2, with Alternatives 3 and 4. This Recommended Alternative would accomplish storage of treated effluent during seasonal low demand months and recovery of that water during high demand times, thereby extending the life of the well field by increasing recharge, along with development of additional wells for supply. At the same time, the per capita water consumption would be reduced through conservation.

The project is recommended to be implemented in three phases. Phase 1, to be completed in the next five years would include test hole drilling, well rehabilitation and well drilling, and a feasibility study for aquifer storage and recovery. Phase 2, to be completed within 10 years, would include drilling additional wells, constructing an advanced water treatment facility, and completing the first direct injection well. Phase 3, to be completed in the next 20 years would include constructing additional wells on property to be acquired outside of the existing well field. All phases of the Recommended Alternative would include water conservation, to continually lower the per capita demand through a variety of strategies, including wastewater reuse, customer rebates and incentives to lower both indoor and outdoor water use, enforcement of existing ordinances related to water conservation and water waste, leak detection and repair, and an ongoing public education campaign.

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General Introduction

This Preliminary Engineering Report (PER) was prepared for the City of Portales, New Mexico, by Daniel B. Stephens & Associates (DBS&A) to examine alternatives for meeting water supply needs for the next 20 years. The City's current and exclusive source of water supply is from groundwater wells that draw from the Ogallala Aquifer. This regional aquifer underlies eastern New Mexico and portions of Texas, Oklahoma, Kansas, Colorado, Nebraska, and South Dakota. The Ogallala Aquifer is being pumped at a faster rate than it is being recharged, resulting in declining water levels and reduced saturated thickness.

The long-term regional solution to water supply shortages in eastern New Mexico that is being developed is the Eastern New Mexico Rural Water System (ENMRWS) project. This project will deliver water from Ute Reservoir to a number of communities, including Portales, through a 151-mile pipeline. The project includes an intake facility, treatment, pumping, and piping. Each benefiting community will pay a share of the construction costs and of operating and maintenance costs and will in addition pay for the water itself. The cost estimate for the full project was $500 million at the time of the 2009 federal legislation (Widdison, 2014). While this project would provide a long-term solution to Portales water supply problems, it does not meet the immediate need, as the project is not anticipated to reach Portales for 10 years. In addition, the City desires to develop a contingency plan in the event that the ENMRWS never reaches Portales; as Portales is the last customer to be served (and will deliver water to Grady). Therefore, this report evaluates water supply alternatives other than the ENMRWS.

The study period for this report is 20 years, and the costs developed are based on supplying water to meet Portales water demand in the year 2035, without the benefit of water from the ENMRWS.

Three feasible alternatives are examined:

- Alternative 1, No Action: This alternative is not considered feasible as the City's existing water sources are being rapidly depleted.

- Alternative 2, Aquifer Storage and Recovery: This alternative consists of direct injection of treated wastewater effluent through injection wells for aquifer storage and later recovery. Two options were considered:
  - Option 1, injection at the Sandhill Well Field
  - Option 2, injection at the Blackwater Well Field

- Alternative 3, Rehabilitation of Existing Wells and Drilling of New Wells: Wells at the City's Blackwater Well Field include both production and agricultural wells that the City plans to use for water supply. Production wells that show declining pumping rates and agricultural wells to be converted to production will be rehabilitated as needed, and additional supply wells would be drilled. A test hole drilling program is included, which would allow characterization of the aquifer conditions throughout the well field.

- Alternative 4, Water Conservation: The City has an ongoing conservation program and prepared an updated water conservation plan in 2014 (Wilson, 2014b). This alternative consists of continued water conservation to lower the overall City demand.

1. Project Planning

a. Location

The City of Portales is located in eastern New Mexico, in Roosevelt County (Figure 1). Portales is approximately 16 miles from the Texas border. In addition to City residents, the City's water system serves rural users outside of the City limits and Eastern New Mexico University (ENMU).

The study area for this project extends to the east of the City to include the Blackwater Well Field, to the north of the City to include the Sandhill Well Field, and to the south of the City to encompass the wastewater treatment plant (WWTP). These extents reflect the areas affected by the proposed infrastructure needed for each of the alternatives examined in this report. The locations of these landmarks are shown on Figure 2.

b. Environmental Resources Present

An Environmental Information Document (EID) was prepared by DBS&A in conjunction with this PER and is included as Appendix A. The EID was prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), the New Mexico Environment Department (NMED) Construction Programs Bureau State Environmental Review Process, and other applicable guidelines and regulations.

Maps and figures describing the natural environmental are included in the EID. A brief synopsis of the information contained in that document is provided below.

i. Environmental Setting

The City of Portales is located within the level, treeless, elevated plains that are part of the Llano Estacado, a large caprock formation that covers parts of eastern New Mexico and west Texas. The mesa or caprock rises in elevation from 3,750 to 5,300 feet above mean sea level (ft msl) over such a large area as to be almost imperceptible except in a few locations around

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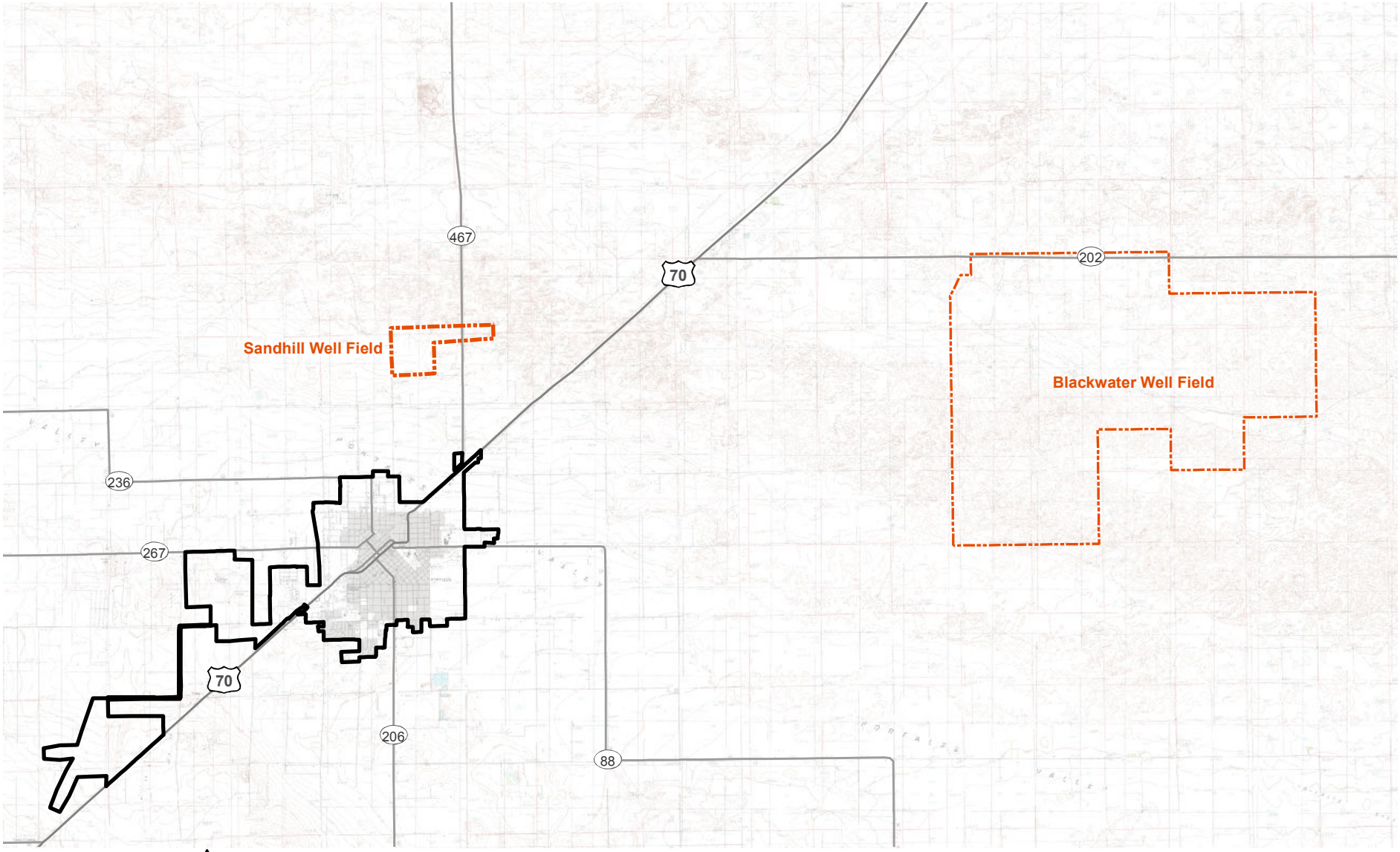

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Explanation

Road

City of Portales

CITY OF PORTALES WATER SUPPLY
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Vicinity Map

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Figure 1

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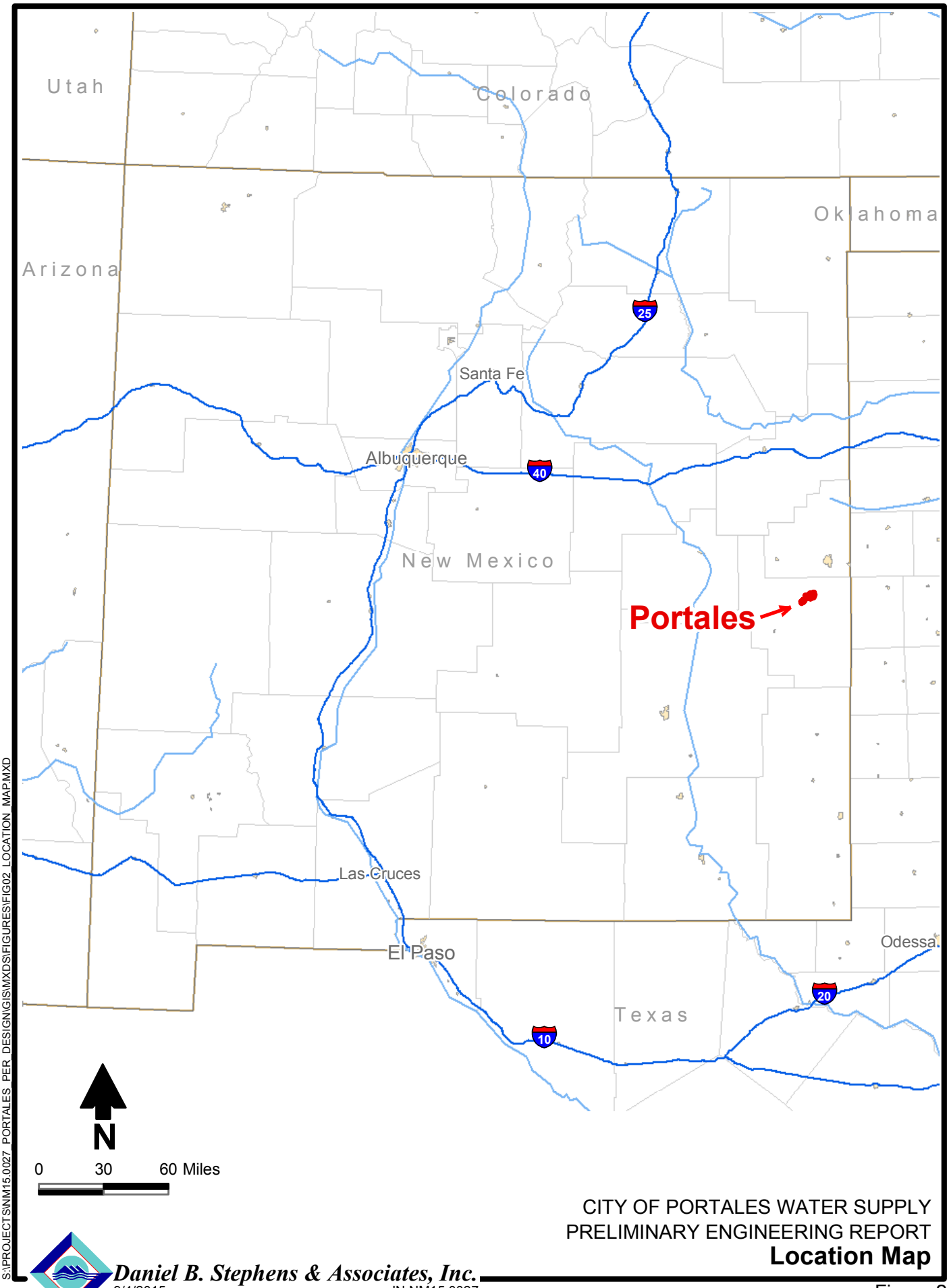

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CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Location Map

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9/4/2015

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Figure 2

the edge where cliffs drop off to the plains below. The Llano Estacado is the remnant of the Ogallala Formation, formed of Miocene-Pliocene sediments from the Southern Rocky Mountains, which at one time extended to the foot of the mountains but over time has eroded away, leaving behind the caliche caprock as the prominent geological feature of the Eastern Plains. The caliche caprock of the Llano Estacado overlies Jurassic rocks, which in turn rest on Triassic rocks (Chronic, 1987).

The area outside the town limits has been used historically for rangeland, then for agricultural purposes to grow crops of wheat, corn, and other grain crops. The Portales Valley, an inset of the Llano Estacado, is located north of the city. The Sandhill Well Field is located on the southern edge of the valley and the Blackwater Well Field is located within the sand hills and dune-dominated valley.

Precipitation averages approximately 17.0 inches per year and the average temperature is 58.8 degrees Fahrenheit (°F) with an annual high average of 74.3°F and annual low average of 43.3°F. Water is very limited, with few to no streams and ephemeral pools or playas typically being the only source of surface water (Griffith et al., 2006).

ii. Land Use

The predominant land use of the area around the City of Portales is agricultural and livestock range with scattered rural residential development.

iii. Floodplains

Portions of the study area are located within a Zone X or Zone AH (FEMA, 2010). Zone X areas are those with a 0.2 percent annual chance of floods; areas with a 1 percent annual chance of flood with an average depth of less than 1 foot, or areas protected by levee from a 1 percent annual chance of floods (FEMA, 2010). Zone AH areas are a special flood hazard area with a 1 percent annual chance flood, flood depths of 1 to 3 feet (usually ponded areas) with base flood elevations determined (FEMA, 2010).

iv. Wetlands

There are no designated wetlands within the study area.

v. Water Resources

The study area contains scarce water resources. Surface water comes primarily from ephemeral springs, ephemeral streams, playas, stock tanks, and irrigation wells.

The primary groundwater resource of the region primarily is the Ogallala Aquifer. This regional aquifer underlies eastern New Mexico and portions of Texas, Oklahoma, Kansas, Colorado, Nebraska, and South Dakota. The Ogallala Aquifer is being pumped at a faster rate than it is being recharged, resulting in declining water levels and reduced saturated thickness.

vi. Coastal Resources

As specified in 40 CFR 6.302(d) and (f), all federal activities in coastal areas are required to be consistent with approved State Coastal Zone Management Programs. No areas in New Mexico are within a coastal zone.

vii. Air Quality

The Clean Air Act (CAA) of 1970 mandated that the U.S. Environmental Protection Agency (EPA) establish a list of pollutants for the purpose of establishing the national primary and secondary ambient air quality standards. The six pollutants for which the National Ambient Air Quality Standards (NAAQS) have been promulgated include carbon monoxide (CO), lead (Pb), ozone (O_3), particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM10), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2). The fundamental method by which EPA tracks compliance with NAAQS is through the designation of areas as in either attainment, nonattainment, or maintenance or as unclassifiable. Areas are given the status of nonattainment due to violations of one or more of the established NAAQS, and must then comply with standards that are more stringent until the NAAQS are achieved in that area. The City of Portales and the Sandhill and Blackwater well fields are within Roosevelt County, in an

area that is currently designated by EPA as an attainment area for all air pollutants identified in the NAAQS (U.S. EPA, 2015a).

viii. Biological Resources

The region of the City of Portales is within the Llano Estacado ecoregion with the exception of the Portales Valley north of the city, which is part of the Shinnery Sands ecoregion (Griffith et al., 2006). The Llano Estacado ecoregion is part of the level, treeless, elevated plains typical of eastern New Mexico and western Texas. The Llano Estacado, or the caprock, is higher and drier than the central Great Plains to the east and is subject to high solar radiation and long windy periods, particularly during winter and early spring (Brown, 1994). The region historically was a vast grassland of shortgrass prairie species dominated by buffalo grass (*Buchloe dactyloides*), blue, hairy and sideoats grama (*Bouteloua spp.*), and little and silver bluestem (*Andropogon spp.*), mixed with herbaceous plants such as globe mallow (*Sphaeralcea parvifolia*), sunflower (*Helianthus annuus*), and purple prairie clover (*Dalea purpurea*) (Griffith et al., 2006). Shrubs including mesquite (*Prosopis glandulosa*), narrowleaf yucca (*Yucca glauca*), and western soapberry (*Sapindus drummondii*) have spread into the shortgrass prairie and are the dominating plant community in many areas.

Vegetation associated with the Shinnery Sands area is dominated by the shin oak shrub (*Quercus havardii*) and sand sagebrush (*Artemisia filifolia*). Other vegetation includes broom snakeweed (*Gutierrezia sarothrae*) and yucca (*Yucca* spp.) as well as arid grassland species such as bush muhly (*Muhlenbergia porterii*), dropseed (*Sporobolus* spp.), and grama grasses.

Much of the study area has been altered from its natural state for the production of crops and thus contains very little native prairie (Google Earth, 2014). The area to the north of the City of Portales, toward the Sandhill Well Field, is developed with residential housing to scattered rural housing and irrigated agricultural fields. The undeveloped area around the Sandhill Well Field to the east of S. Roosevelt Road R is shortgrass prairie, with much of the area dominated by invading shrubs of mesquite and yucca. Most of the surrounding developed lands are irrigated fields with crops of wheat, corn, and other grains. The areas of shortgrass prairie are comprised of grasses such as buffalo grass, blue and sideoats grama, and little bluestem and forbs including globemallow, sunflower, and stiffstem flax mixed with shrubs that include mesquite

and narrowleaf yucca. The area of the Blackwater Well Field is within the Portales Valley and the Shinnery Sands ecoregion. Much of the well field has been farmed previously but has been retired from irrigated agricultural fields and the land appears to be returning somewhat to native vegetation (Google Earth, 2014). The undisturbed areas of the Blackwater Well Field contain the shin oak and sand sagebrush community.

Wildlife associated with the Llano Estacado ecoregion include a rich diversity of species acclimated to shortgrass prairies. At least 186 bird species occur in this region and include species such as ferruginous hawk (*Buteo regalis*), ash-throated flycatcher (*Myiarchus cinerascens*), American goldfinch (*Spinus tristis*), Cassin's kingbird (*Tyrannus vociferans*), mourning dove (*Zenaida macroura*), horned lark (*Eremophila alpestris*), and western meadowlark (*Sturnella neglecta*). Large mammals of the area include coyote (*Canis latrans*) and pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), white-tail deer (*Odocoileus virginianus texana*), and smaller mammals such as cottontail rabbit (*Sylvilagus audubonii*), black-tail prairie dog (*Cynomys ludovicianus*), and banner-tail kangaroo rat (*Dipodomys spectabilis baileyi*). At least 30 reptiles including the Great Plains toad (*Anaxyrus cognatus*), New Mexico spadefoot (*Spea multiplicata*), horned lizard (*Phrynosoma modestum*), and snakes such as the western diamondback rattlesnake (*Crotalus atrox*), prairie racerunner (*Aspidoscelis sexlineata*), and gophersnake (*Pituophis catenifer*) are commonly found in the area. There are no surface water resources in the project area to support fish.

ix. Archaeological, Cultural, and Historic Resources

A Class I Cultural Resource Survey was conducted by Okun Consulting for this project and is included as an attachment to the EID (Appendix A). The Class I survey found that most of the study area has not been previously surveyed for the presence of cultural resources, although 19 previous cultural resource investigations either intersect with one of the alternatives considered or are within 500 meters of the alternatives. Only 1 archaeological site (LA 181338) intersects with the project area for one of the three action alternatives; 7 additional sites and 4 register-listed properties are located within 500 meters of the project area for one or more of the alternatives.

Most of the buildings within Portales have been assessed during previous cultural resource surveys and 468 historic buildings are located within 500 meters of one or more of the project areas.

A large portion of the Blackwater Well Field is within the register-listed Blackwater Draw District (SR2), which contains the Clovis type-site, one of the earliest most well-known Paleoindian sites in North America. The study area overlaps with Anderson Basin/Blackwater Draw Locality No. 2, a register-listed property, which contains a series of Paleoindian sites and preserved Pleistocene deposits containing the remains of extinct animals. This property is shown on Figure 7 of the Class I report (Appendix A, Attachment 3).

The work for this PER did not include field surveys (Class III surveys). Field surveys for cultural resources will be required on a project-specific basis to identify resources and develop a design that either mitigates impacts to those resources or avoids them.

x. Socioeconomic/Environmental Justice

Economic issues evaluated include business, employment, and economic conditions. There are higher than average numbers of low-income residents within the City of Portales (surrounding the project study area) than in New Mexico as a whole. Social issues include demographics such as housing, schools, shops, and other services. The residents of the city would experience no changes to existing services, public, recreational, or other land use.

The potential environmental justice consequences of the alternative were evaluated using the EJ View tool (U.S. EPA, 2015b) to determine the potential for disproportionate effects on minority and low income populations. The City of Portales reports 46 percent of its population as minority and 54 percent non-Hispanic white alone (i.e., reporting no other race group) (U.S. EPA, 2015b). This compares to 59 percent minority and 41 percent non-Hispanic white alone in the City of Albuquerque, New Mexico. The poverty rate of Portales is higher than the average of the State of New Mexico.

The City of Portales does not have high populations of minorities; therefore, the proposed projects do not disproportionately affect any minority and low income populations.

xi. Other Resources

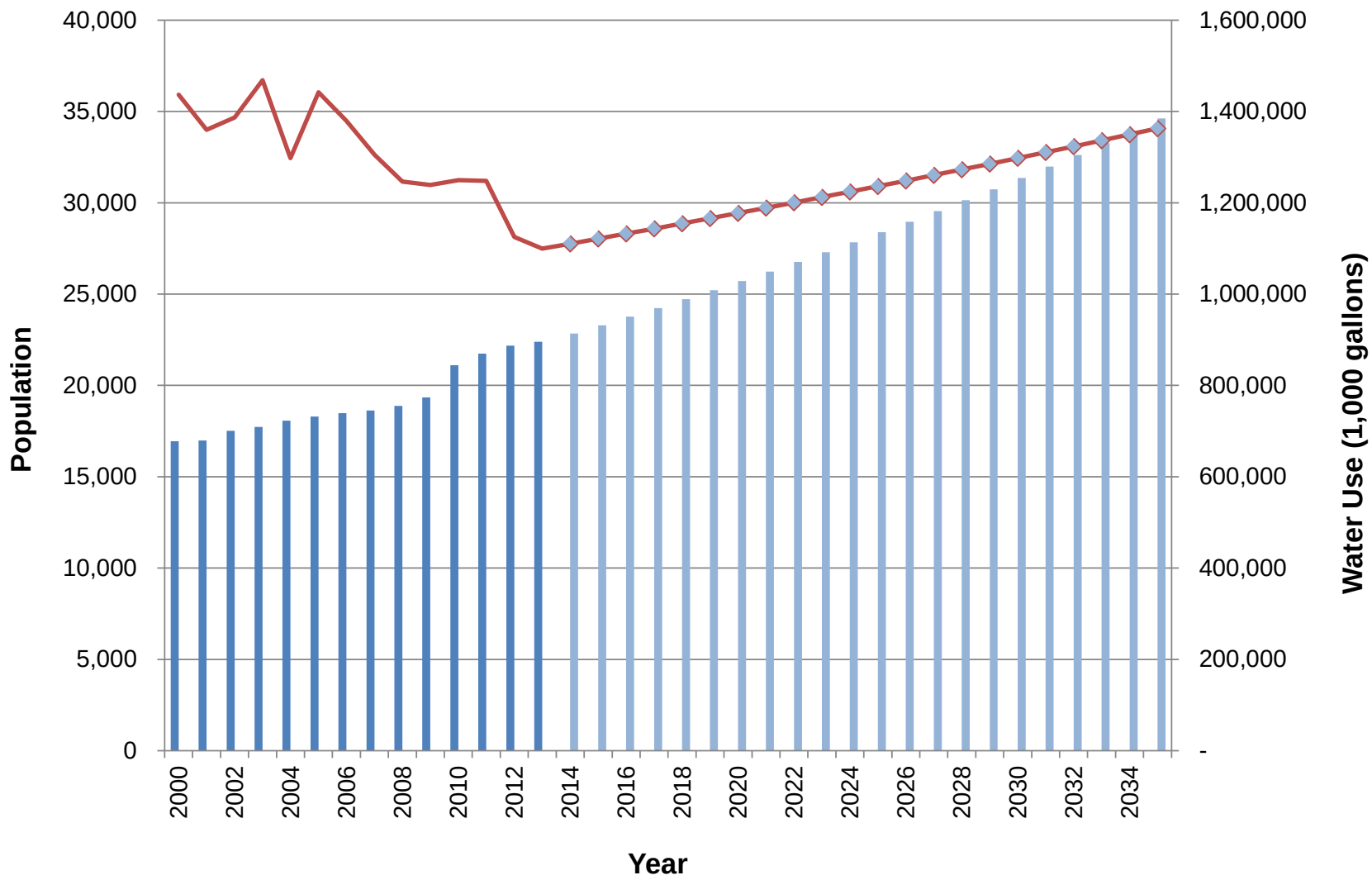
Other resources evaluated were the public health and safety (including water quality and traffic), energy, transportation, visual impacts, and noise impacts of each alternative.

c. Population Trends

The population of the water service area has grown steadily over the past 20 years (Figure 3). The City's population was 12,280 at the 2010 census. The *2014 Water Conservation and Use Report* (Wilson, 2014a) estimated the 2013 water service area population as 12,648 in the City, 3,888 people in the surrounding rural areas, and 5,855 students at ENMU, for a total of 22,391. The average annual growth rate since year 2000 has been approximately 2 percent. While the population has grown steadily, the City has implemented water conservation measures, and the overall water consumption has declined. Total annual average daily water use in 2000 was 3.9 million gallons per day (mgd), decreasing to 3.0 mgd in 2013. This decline is equivalent to a reduction from 232 gallons per capita per day (gpcd) in 200 to 135 gpcd in 2013.

Figure 3 shows the historical (through 2013) and projected service area population and corresponding water use. Population projections are based on 2 percent growth per year; water use projections are based on a 1 percent reduction in per capita use per year.

Table 1 summarizes historical population and water demand and population projections for Portales. Three water demand projections are shown: (1) without continued conservation, (2) with a 1 percent decrease in per capita demand due to conservation, and (3) with a 1 percent annual decrease due to conservation plus an annual savings due to wastewater reuse of 600,000 gallons per day for 6 months of the year starting in 2016. Portales is currently completing construction of a water reuse system, which will provide the ability to irrigate all of the City parks with treated wastewater effluent, thus reducing the demand on the potable water system. In addition, ENMU is in the process of transitioning away from using potable water for irrigation. These two efforts combined are expected to result in a reduction in demand on the potable water system of 219,150,000 gallons per year.



* Calculated based on a 2% growth rate and 1% reduction in per capita use per year.

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Historical and Projected Population and Water Use

Figure 3

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Dramatic declines in historical water use are due to the following:

- The Ethanol plant shut down (1 mgd savings)
- Water use by ENMU has decreased
- ENMU is using water from a non-potable well (savings of 500,000 gallons per day [gpd])
- Two dairies went out of business

The population information and projected water use shown in Figure 3 reflects the continued per capita declines in water demand due to conservation measures.

d. Community Engagement

This draft PER and accompanying draft EID will be available for public comment. The City will hold a public meeting to collect comments, and formal written responses to comments will be prepared.

As water supply projects are developed under the alternative recommended by this PER, the City will provide opportunity for public comment on a project by project basis.

Table 1. Historical and Projected Population and Water Use

Year	Total Service Area Population	Water Use (gpcd)	Total Water Use (1,000 gallons)		
			With Conservation	Without Conservation	With Conservation and Water Reuse
2000	16,942	232	1,436,471	1,436,471	1,436,471
2001	16,992	219	1,359,522	1,359,522	1,359,522
2002	17,512	217	1,386,600	1,386,600	1,386,600
2003	17,721	227	1,468,275	1,468,275	1,468,275
2004	18,069	197	1,297,600	1,297,600	1,297,600
2005	18,296	216	1,441,960	1,441,960	1,441,960
2006	18,483	204	1,379,406	1,379,406	1,379,406
2007	18,629	192	1,305,415	1,305,415	1,305,415
2008	18,874	181	1,246,192	1,246,192	1,246,192
2009	19,349	175	1,238,909	1,238,909	1,238,909
2010	21,100	162	1,249,633	1,249,633	1,249,633
2011	21,736	157	1,248,046	1,248,046	1,248,046
2012	22,180	139	1,124,908	1,124,908	1,124,908
2013	22,391	135	1,099,563	1,099,563	1,099,563
2014	22,839	133	1,110,339	1,110,339	1,110,339
2015	23,296	119 [a]	1,121,220	1,132,545	1,011,720
2016	23,762	118 [a]	1,132,208	1,155,196	1,022,708
2017	24,237	117 [a]	1,143,304	1,178,300	1,033,804
2018	24,721	116 [a]	1,154,508	1,201,866	1,045,008
2019	25,216	115 [a]	1,165,822	1,225,904	1,056,322
2020	25,720	114 [a]	1,177,247	1,250,422	1,067,747
2021	26,235	113 [a]	1,188,784	1,275,430	1,079,284
2022	26,759	112 [a]	1,200,434	1,300,939	1,090,934
2023	27,295	111 [a]	1,212,199	1,326,958	1,102,699
2024	27,840	110 [a]	1,224,078	1,353,497	1,114,578
2025	28,397	109 [a]	1,236,074	1,380,567	1,126,574
2026	28,965	108 [a]	1,248,188	1,408,178	1,138,688
2027	29,544	107 [a]	1,260,420	1,436,342	1,150,920
2028	30,135	106 [a]	1,272,772	1,465,068	1,163,272
2029	30,738	105 [a]	1,285,245	1,494,370	,1175,745
2030	31,353	104 [a]	1,297,841	1,524,257	1,188,341
2031	31,980	103 [a]	1,310,559	1,554,742	1,201,059
2032	32,619	102 [a]	1,323,403	1,585,837	1,213,903
2033	33,272	101 [a]	1,336,372	1,617,554	1,226,872
2034	33,937	100 [a]	1,349,469	1,649,905	1,239,969
2035	34,616	99 [a]	1,362,693	1,682,903	1,253,193

gpcd = Gallons per capita per day
[a] = Values based on use with conservation and water reuse

2. Existing Facilities

a. Location Map

The City obtains most of its water supply from the Blackwater Well Field, with additional supply provided from the smaller and older Sandhill Well Field. The City purchased the Blackwater Farm and adjacent Las Lomas properties in 2001 and retired agriculture in those areas to expand the Blackwater Well Field and create a groundwater reserve (Wilson, 2013).

Figure 2 shows the Portales City limits and the location of the Sandhill and Blackwater Well Fields.

b. History

Portales was incorporated in 1906. The water system dates back to 1913. Much of it was built in the 1930s and 1940s. The water system serving the center of the City is 60 to 70 years old. Water line pipe materials vary from cast iron to polyvinyl chloride (PVC) to asbestos cement pipe.

Historically, wells were located in town and were constructed in a perched aquifer. Later, the City developed the Sandhill Well Field, and subsequently the Blackwater Well Field. The City has three 3-million gallon tanks plus an elevated tank that is not currently being used. The City's water system is shown on Figure 4.

The City is developing an asset management program and has already established a regular program for replacing aging infrastructure as required. For this reason, distribution system improvements are not addressed in this PER.

A 2013 study (Wilson, 2013) evaluated options for enhancing or conserving the City's water supply, including shallow groundwater, deep groundwater, Ute Reservoir, wastewater recycling, and water conservation. This study found that deep groundwater from below the Ogallala Aquifer is not a promising water supply because it is expensive to access, of low quality, and

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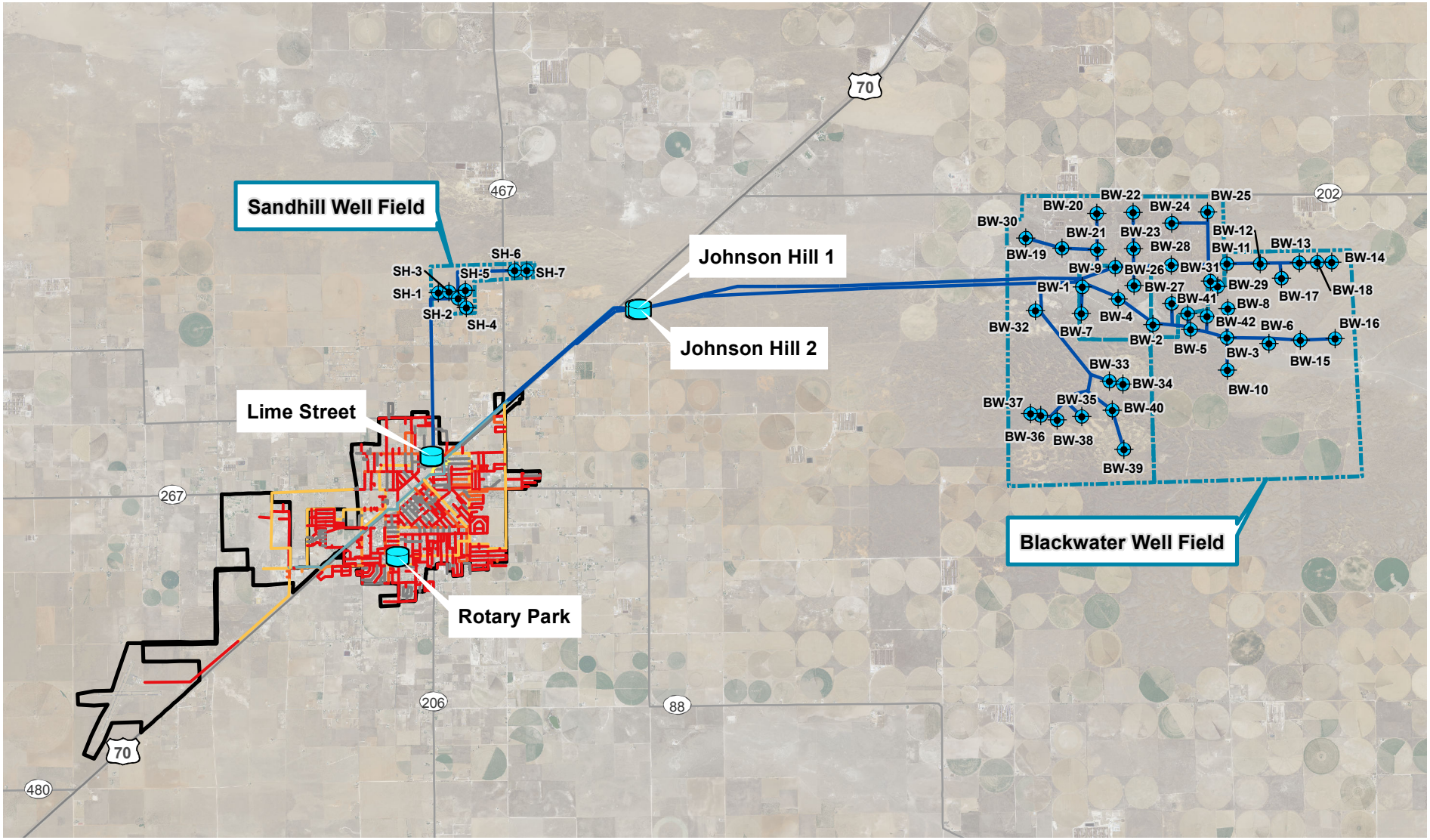

Source: City of Portales

Explanation

- Well
- Water tank
- Transmission line

Water pipeline Diameter (in)

- 6
- 8
- 10
- 12
- 16
- 18
- 22
- 24
- 36

N

0 1 2 Miles

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Portales Water System

Daniel B. Stephens & Associates, Inc.

9/11/2015 JN NM15.0027

Figure 4

also of potentially low quantity. The study recommended increased conservation combined with wastewater reuse to lower the demand for water. The ENMRWS project represents a renewable, long term supply, but the timing of that project necessitates an interim solution. That interim solution is the focus of this report.

c. Condition of Existing Facilities

The existing water supply is exclusively from groundwater supply wells, which are experiencing declining production rates as the underlying Ogallala Aquifer is depleted. Construction of the wells in the Blackwater Well Field dates from the 1960s to the 1990s. In addition, many of the wells in the Blackwater Well Field were originally agricultural wells with torch cut slots, which are a larger size than those of an engineered screen. This often results in sand entering the well during pumping, which can cause clogging and pump wear. Due to the age of these wells, they may have also experienced corrosion, mineral encrustation, and biofouling. The City has been converting the agricultural wells to municipal supply wells by re-sleeving them with a smaller-diameter casing and engineered screens, but some of these conversions were done without first cleaning the old casing and screen and those wells have exhibited poor performance.

d. Financial Status of Any Existing Facilities

The City's Financial Statements for 2014 are attached as Appendix B and include the Water and Sewer Enterprise Fund statement of revenues and expenditures. For 2014, the net income after transfers financial statement basis was $1.7 million for the Water and Sewer Enterprise Fund.

e. Water/Energy/Waste Audits

The most recent City of Portales Water Conservation Plan (Wilson, 2014b) included a water audit for year 2013 that was prepared using American Water Works Association (AWWA) water loss software, under the New Mexico Office of the State Engineer's water conservation planning guidelines.

The audit input values are summarized below.

- The total water supplied in 2013 from the City's well field, including an estimated 1 percent meter under-reading error, was 1,110.559 million gallons.
- Of the above 2013 supply, 16 percent, or approximately 179.609 million gallons, also including meter error, was sold to the Roosevelt County Water Coop.
- The total water supplied to the City was 930.949 million gallons.
- The total authorized consumption of 801.152 million gallons was 86 percent of the City's total water supply.
- The total apparent losses of 14.466 million gallons were 1.6 percent of the City's total water supply.
- The total real losses of 115.332 million gallons were 12.4 percent of the City's total water supply.
- The total operating budget for the City's Water Utility Department was about $4.6 million in 2013.
- The volume weighted average customer unit retail cost, including wastewater treatment, was about $5.65 per 1,000 gallons.

The results of the 2013 audit are summarized below. The AWWA Water Audit software reports performance as financial and operational efficiency indicators.

Financial indicators include:

- Non-revenue water amounted to 17.3 percent of the total volume of water supplied and cost the City about $115,000 or 2.5 percent of the cost of operating the system.
- Apparent losses were calculated to cost the City $81,733.
- Real losses were calculated to cost the City $24,516.

Operational indicators include:

- The amount of real loss considered to be unavoidable was 26.37 million gallons, which is about 23 percent of the total real loss and 2.8 percent of the total water supply. The unavoidable annual real loss represents the theoretical lower limit of leakage that could be achieved if today's best technology were successfully applied. This is not a practical goal for utilities, but can be used as a relative measure.
- The overall Water Audit Data Validity Score for Portales for 2013 was 77 out of 100.

AWWA provides recommendations to utilities based on the range within which the overall score falls. Portales falls in Level IV (where V is the highest performing level). The recommendations for Level IV utilities are as follows:

- Refine data collection practices.
- Refine ongoing programs based upon economic justification.
- Conduct detailed planning, budgeting, and launch of comprehensive improvements for metering, billing, or infrastructure management.
- Establish mid-range apparent and real loss reduction goals.
- Conduct performance benchmarking through use of the Infrastructure Leakage Index (ILI), defined as total real losses divided by unavoidable real losses.

Portales's ILI was 4.37, which falls in the upper end of the mid-range. This score indicates loss control performance appropriate for a city with only minor concerns about limitations in water supply. Given that Portales has significant concerns about water supply limitations, this result indicates that the City needs to focus more resources on minimizing real losses.

3. Need for Project

The Eastern New Mexico Regional Water Authority is developing the Eastern New Mexico Rural Water Supply (ENMRWS) project, which will provide a long-term regional solution to water supply in eastern New Mexico. This project will convey water from Ute Reservoir to cities in eastern New Mexico that currently rely on groundwater from the Ogallala Aquifer. The ENMRWS allocation for Portales is 1.12 billion gallons per year (Wilson, 2013). The ENMRWS presents a possible long term, sustainable solution to the City of Portales' supply shortage; however, the City must find a way to meet interim needs until the project is constructed and reaches Portales, located at the southern end of the proposed supply pipeline (Figure 5).

At the time of this report, the raw water intake structure has been constructed and parts of the pipeline are being designed and constructed. However, due to Portales's location at the southern end of the regional system, water is not expected to be delivered to Portales until 2025. For this reason, this PER has been prepared to examine alternatives for water supply that will meet the needs anticipated through the 20-year planning period.

a. Health, Sanitation and Security

Water is essential to health, sanitation, and security, and the City of Portales faces a shortage in meeting the needs of its users due to declining groundwater levels in the area. The aquifer's saturated thickness in the Blackwater Well Field has been steadily declining and has been accompanied by a decrease in well yields. According to the 2014 water conservation report (Wilson 2014a), the combined pumping capacity of the Blackwater wells is 3,416 gallons per minute (gpm).

b. Aging Infrastructure

The City's sole source of water at this time is groundwater wells that draw from the Ogallala Aquifer. Construction of the wells in the Blackwater Well Field dates from the 1960s to the 1990s. The Ogallala Aquifer is being depleted in this area at a rapid rate, and as a result, groundwater production has declined dramatically. The City has implemented conservation

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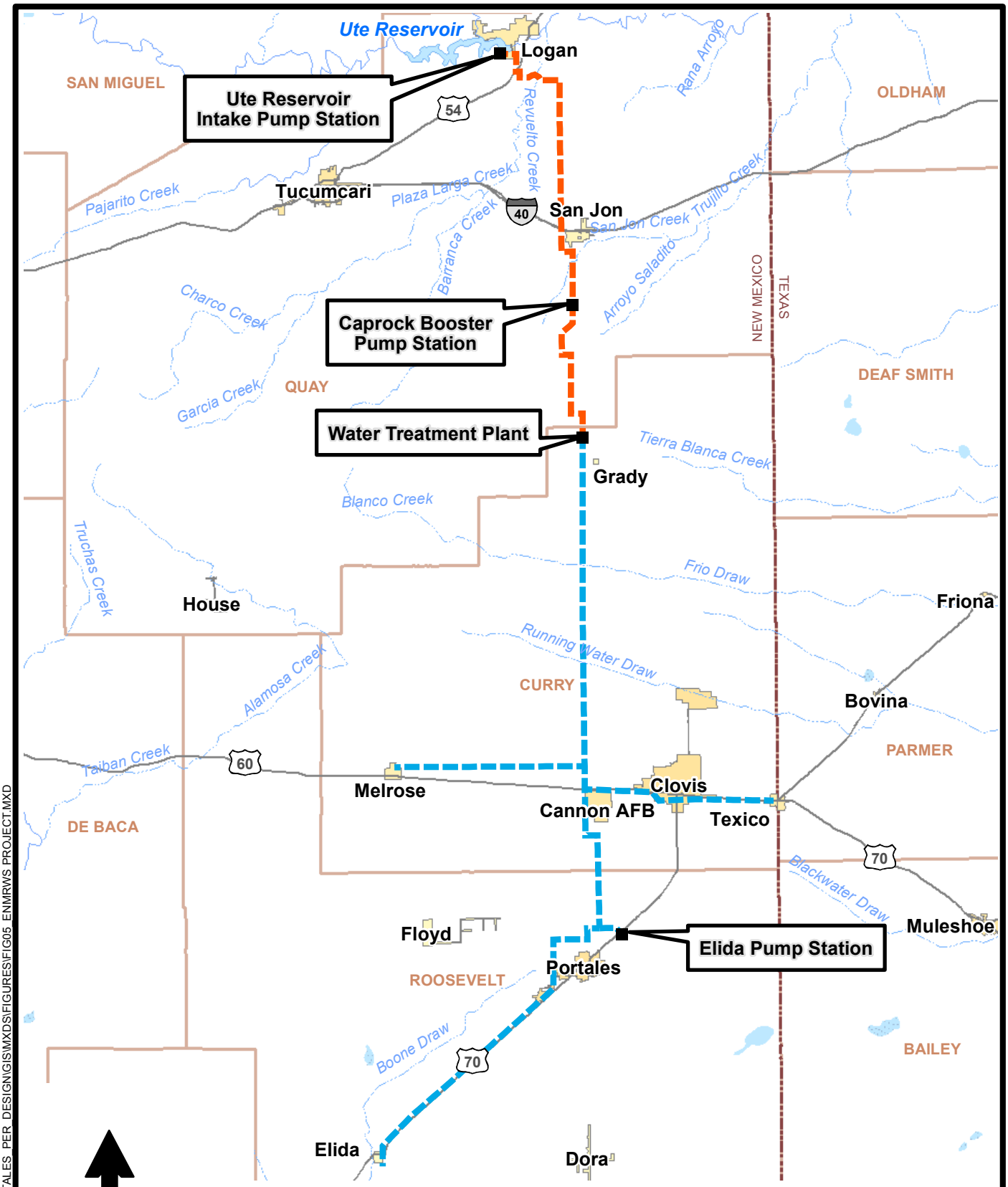

Explanation

- Proposed raw water pipeline
- Proposed finished water pipeline
- County

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Eastern New Mexico Rural Water Supply Project

Daniel B. Stephens & Associates, Inc.

9/4/2015

JN NM15.0027

Figure 5

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measures and has recently experienced steadily decreasing water demands; the City's water use in 2013 was approximately 25 million gallons less than in 2012. The City prepared a water conservation plan in 2001 (Wilson, 2001), which was updated in 2014 (Wilson, 2014b), and has prepared annual water conservation and use reports for each calendar year starting in 2000. The reported total water savings since the year 2000 have amounted to more than 2 billion gallons (Wilson, 2014b).

c. Reasonable Growth

This study assumes that the annual average population growth in the water service area is 2 percent, the average of yearly growth rates since year 2000. Based on this growth rate, the population served by the water system in 2035 will be 34,616, with a corresponding water use of 1,253,193,000 gallons per year, or 3.7 mgd, assuming the continuation of conservation and water reuse.

4. Alternatives Considered

Four options for additional water supply were evaluated under this study. In order to evaluate alternatives, it was necessary to quantify the amount of water that will be needed during the planning period.

The population and water demand projections were examined in conjunction with historical well production to determine the well production capacity needed for the last year of the study period, 2035. The projected water demand incorporated anticipated savings due to conservation, based on Portales's long history of water conservation and resulting declining per capita demands, along with their plans to reuse treated wastewater effluent for park and golf course irrigation, which is expected to be operational next year.

The current (2013) average day demand is 3.0 mgd, and the peak monthly demand is 150 million gallons. Based on the peak monthly demand, the current peak day is approximately 5 mgd. The total production for 2013 was 1,111 million gallons. The production records showed that of the 42 wells in the Blackwater well field, 25 were in service during 2013. Although 8 wells appeared to be permanently out of service, 9 wells were out of service for repairs, and it is assumed that these can be returned to service.

The total additional annual water demand needed to be met in 2035 is 241 million gallons, which reflects a 3.4-mgd average day demand. Based on a peak day to average day ratio of 1.8, the peak day was assumed to be 6.2 mgd.

Four alternatives were considered:

- Alternative 1, No Action
- Alternative 2, Aquifer Storage and Recovery
- Alternative 3, Rehabilitating Existing Wells and Drilling New Wells
- Alternative 4, Water Conservation

These alternatives are described in the following subsections.

a. Alternative 1: No Action

i. Description

This alternative requires no improvements to existing facilities. The water supply from existing wells would continue to decline, while the water demand would continue to increase due to growth. This would result in a shortfall of water supply to meet water demands.

ii. Design Criteria

No design or construction is necessary for this alternative. Therefore, no design criteria were identified.

iii. Map

Figure 4 shows the existing water system, with the supply wells.

iv. Environmental Impacts

There will be no environmental impacts of the No Action alternative.

v. Land Requirements

No land requirements are necessary for this alternative.

vi. Potential Construction Problems

No construction is included in this alternative.

vii. Sustainability Considerations

Declining water levels in groundwater wells and reduced production from those wells is considered an unsustainable condition, making the No Action alternative unsustainable.

viii. Cost Estimate

No costs are associated with the No Action alternative.

b. Alternative 2: Aquifer Storage and Recovery

i. Description

Construction of the City's wastewater effluent reuse system is underway and the City expects to begin irrigating public parks and other designated properties in the summer of 2016. However, reuse will not be possible year-round due to reduced irrigation demand during the cold weather season. During months with reduced irrigation demand the City would like to use the treated wastewater effluent for aquifer recharge, thereby storing water underground that can be withdrawn during higher demand times of the year.

This alternative would consist of additional treatment of treated wastewater effluent, a pump station, piping, and direct injection wells. The City evaluated two options for direct injection, either at the Sandhill Well Field or at the Blackwater Well Field:

- *Option 1: Injection at Sandhill Well Field.* This option includes the construction of seven injection wells. Water would be supplied from the WWTP through a booster station into the reuse distribution system. Advanced water treatment (AWT) would be located within Portales city limits, along with a second booster station that would deliver the water to the injection wells at the Sandhill Well Field.

- Option 2: Injection at Blackwater Well Field. This option includes the construction of four injection wells. Water would be supplied from the WWTP through a booster station

into the reuse distribution system. The booster station would pump to the AWT facility located within Portales city limits. From there, a second booster station would deliver the reuse water to the injection wells at the Blackwater Well Field.

ii. Design Criteria

Injection Wells

For this study, it was assumed that the injection rate achievable for each well would be approximately half of the maximum rate for production wells in the vicinity of the proposed injection wells. A review of historical pumping rates for the Sandhill Well Field (Table 2) indicated that six injection wells in the Sandhill Well Field would provide the ability to recharge 100 percent of the effluent from the WWTP (1.6-mgd capacity, or 1,111 gpm over a 24-hour period).

Table 2. Sandhill Well Field Historical Pumping and Assumed Injection Rates

Well Number	Historical Pumping [a]		Assumed Injection Rate
	Maximum Pumping Capacity	Year of Measurement	
SH-1	475	1998	240
SH-2	425	1998	210
SH-3	280	2000	140
SH-4	300	2000	150
SH-5	400	1998	200
SH-6	200	1998	100
SH-7	375	1998	190
Total	2,455		1,230

[a] Wilson, 2014a, Appendix B

A review of historical records for wells in the northern portion of the Blackwater well field, where the saturated thickness is most depleted, indicated that four injection wells would be adequate to provide the ability to recharge 100 percent of the effluent from the WWTP.

Table 3. Blackwater Well Field Historical Pumping and Assumed Injection Rates

Well Number	Historical Pumping [a]		Assumed Injection Rate
	Maximum Pumping Capacity	Year of Measurement	
BW-1	750	1969	375
BW-4	620	1970	310
BW-24	900	1977	450
BW-25	800	1977	400
BW-29	1,000	1986	500

[a] Wilson, 2014a, Appendix B

Treatment

Direct injection to the aquifer requires that the treated wastewater meet NMED drinking water standards. In addition, treatment for unregulated trace constituents or micro-constituents including endocrine disrupting compounds (EDCs) and pharmaceuticals and personal care products (PPCPs), is recommended due to growing public concern.

The WWTP is designed to produce Class 1B effluent, but includes a tertiary filtration system allowing treatment to Class 1A effluent quality, as required (Smith Engineering, 2014). The WWTP consists of extended aeration treatment ponds with a bypass/pretreatment system to address strong industrial wastewater influent. The facility includes dewatering and compost facilities. The effluent reuse system includes a synthetically lined effluent reuse storage pond, gas chlorination, tertiary filtration, and effluent reuse pump station. To meet the requirements of the existing discharge permit (DP-887), the effluent must have a total nitrogen concentration of less than 15 mg/L, and the total nitrogen loading of the effluent applied to the discharge playa must not exceed 200 pounds per acre per year. Table 4 summarizes the design criteria upon which the WWTP is based:

Table 4. Wastewater Treatment Plant Design Criteria

Wastewater Characteristics	Influent Design Criteria for Biological Treatment Including Pretreatment Process	Effluent Quality Performance Criteria
Biological oxygen demand (mg/L)	600	<10
Total suspended solids (mg/L)	700	<20
TKN (mg/L); TN (mg/L)	60	<10
NH_3·N (mg/L)	45	<2
NO_3/NO_2·N (mg/L)	0	<5
Alkalinity (mg/L)	350	NA
pH	7.0 – 9.0	7.0 – 9.0
Temperature, min/max (°C)	10/23	10/23
Average daily flow (mgd)	1.6	1.6
Peak daily flow (mgd)	3.2	3.2

Source: Smith Engineering, 2014

mg/L = Milligrams per liter
TKN = Total Kjeldahl nitrogen
TN = Total nitrogen
NH_3·N = Ammoniacal nitrogen
NO_3/NO_2·N = Nitrate/nitrite as nitrogen
°C = Degrees Celsius
mgd = Million gallons per day

Technologies generally used for AWT include membrane filtration or advanced oxidation, following by ultraviolet or chemical disinfection. For the purposes of cost estimating, costs were compiled for a number of reuse/recharge facilities in a variety of states, and an average cost for the proposed capacity of the AWT facility was selected that is representative of AWT facilities but not specific to a particular technology.

The AWT facility was assumed to be sized for 1,200 gpm of treatment, which is slightly above the WWTP capacity of 1.6 mgd (1,111 gpm).

Pumps

The effluent reuse pumping system was designed for a maximum flow rate of 3,000 gpm. The reuse pump station at the WWTP is designed to lift the water to the highest point in the City's reuse distribution network, to an elevation of approximately 4,005 ft msl (at the end of the proposed 16-inch piping). Comparatively, the elevations of the Sandhill and Blackwater well fields are approximately 4,080 feet and 4030 feet, respectively. Based on the additional lift

needed and a design flow of 1,200 gpm, a 25-horsepower (hp) booster station would be required for Option 1, Direct Injection at the Sandhill Well Field, and a 50-hp booster station would be required for Option 2, Direct Injection at the Blackwater Well Field.

Piping

For purposes of cost estimating, PVC C900 piping was assumed. Based on a maximum velocity of 5 feet per second, the piping from the reuse system to either well field would be 10 inches in size.

iii. Map

Figure 6 displays the location of existing and proposed infrastructure associated with Alternative 2 using direct injection wells.

iv. Environmental Impacts

Environmental impacts from Alternative 2 include ground disturbance from water line installation. In order to minimize impacts, the proposed water line installation for Option 1 is parallel to existing water lines, in or along existing roadways. For Option 2, the water line alignment is along rural roadways. Water line construction would be designed such that temporarily disturbed areas would be returned to pre-construction elevations and reseeded with native vegetation as needed.

The AWT facility would be located near the connection to the existing reuse system, within the City limits. A 50-foot by 50-foot site is assumed for treatment. Ground disturbance would occur at that footprint and along access roads to that facility.

For all construction, best management practices would be in place for construction impacts such as erosion, traffic control, and waste management.

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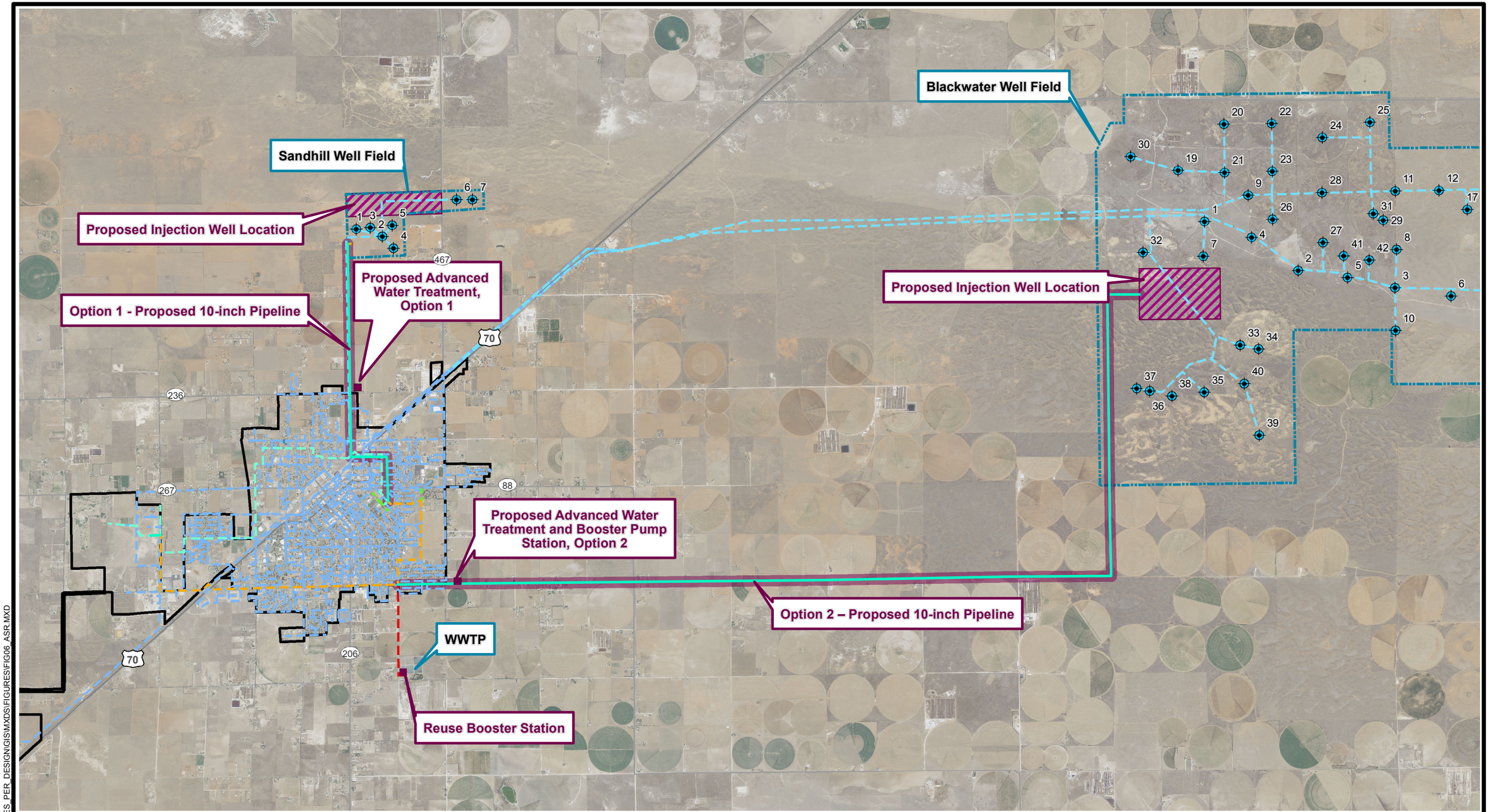

2011 aerial photography (USDA, 2011)

N

0 0.5 1 Miles

Explanation

- City of Portales
- Existing well
- Transmission line
- Water line

Reuse pipeline Diameter (in)

- 4
- 6
- 8
- 10
- 12
- 16
- Existing pipeline
- 50-ft buffer

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Alternative 2

Aquifer Storage and Recovery

Daniel B. Stephens & Associates, Inc.

9/14/2015

JN NM15.0027

S:\PROJECTS\NM15.0027_PORTALES_PER_DESIGN\GIS\MXDS\FIGURES\FIG06_ASR.MXD

Figure 6

v. Land Requirements

The City owns property at both the Sandhill and Blackwater well fields, so land acquisition would not be required for the wells. However, property would need to be required for the AWT facility and booster station.

The majority of the pipeline for Option 1 is assumed to be located along existing roadways, within the right-of-way. The majority of the pipelines for Option 2 are assumed to be along a section line in an existing rural roadway; it is assumed that the right-of-way does not exist in this area and that easements will have to be acquired. For both options, there will be some piping constructed within developed areas of the City in order to connect to the reuse piping system.

vi. Potential Construction Problems

No construction problems are anticipated with this alternative. A geotechnical investigation and environmental surveys should be conducted prior to construction. The geotechnical investigation would include soil borings to predict excavation conditions for the pipeline and make recommendations on foundations for structures (such as the treatment building). The environmental surveys would identify biological and/or cultural resources that must be protected during construction.

vii. Sustainability Considerations

Water and Energy Efficiency

This alternative increases the City's water production efficiency by storing water in the aquifer for later withdrawal. Aquifer storage through direct injection is more efficient than surface impoundments, such as ponds, because water is not lost to evaporation. In addition, this alternative is designed to recharge the local aquifer, which as discussed earlier, is being depleted at a faster rate than it is being recharged; thus this alternative would lengthen the life span of the well field.

Other

This alternative increases the City's resiliency by adding to the strategies that the City already employs for responsible management of their water resource. Portales has experienced decreasing per capita water consumption for many years due to water conservation measures and is finishing construction of a reuse system to irrigate City parks with treated wastewater effluent. This alternative further develops the City's multi-faceted approach to managing their water resources.

viii. Cost Estimate

Detailed cost estimates for capital and ongoing operations and maintenance are provided in Appendix C. Cost estimates include engineering design, construction, survey, contingency, and New Mexico gross receipts tax (NMGRT).

The estimated cost of Alternative 2, Option 1, to the Sandhill Well Field, is $17.4 million. This cost includes the construction of seven injection wells, a 1,200-gpm booster pump station, AWT facility, and approximately 3.2 miles of 10-inch piping.

The estimated cost of Alternative 2, Option 2, to the Blackwater Well Field, is $20.4 million. This cost includes the construction of four injection wells, a 1,200-gpm booster pump station, AWT facility, and approximately 11 miles of 10-inch piping.

c. Alternative 3: Rehabilitating Existing Wells and Drilling New Wells

i. Description

Alternative 3 includes rehabilitating existing wells and drilling new wells in the Blackwater Well Field. Test holes would be drilled in the vicinity of existing poorly performing wells targeted for potential rehabilitation in order to assess the localized hydrogeologic conditions and determine whether the low specific capacity in these wells is a result of unfavorable or depleted aquifer conditions. If the rehabilitation evaluation test holes indicate that hydrogeologic conditions remain favorable for production, the low specific capacity is likely caused by well deterioration and there is a reasonable likelihood that rehabilitation can improve the specific capacity to a

level that is comparable to that observed elsewhere in the well field. If the rehabilitation evaluation test holes indicate that the low specific capacity in these wells is caused by unfavorable or depleted aquifer conditions, rehabilitation would not be recommended.

Test holes would also be drilled at locations targeted for new well construction in order to characterize the site-specific lithologic and hydrologic conditions at each location so that an appropriate well design can be developed with a suitable screen length, slot size, and filter pack designed to match the site conditions. New wells should be drilled no farther than 5 to 10 feet from a test hole, as subsurface conditions in the Ogallala Aquifer can vary significantly in a short distance.

Proposed locations for rehabilitation evaluation and site characterization test holes are shown on Figure 7, and proposed locations for new supply wells are shown on Figure 8. For the purposes of cost estimating, it was assumed that all of the rehabilitation evaluation and site characterization test hole sites shown on Figure 7 will be drilled and that supply wells will be constructed at each site characterization test hole location.

The City has identified eight existing wells in the northern part of the Blackwater Well Field (BW-1, -19, -20, -21, -22, -23, -24, and -25 [Figures 7 and 8) as potential candidates for rehabilitation. These wells were originally constructed as agricultural wells without engineered screens. One problem associated with these types of wells is that they were typically constructed with torch cut slots, which have significantly larger openings than the machined or wire wrap slots in an engineered screen. This often results in sand getting into the well, which can cause clogging and pump wear. Due to the age of these wells, they may have also experienced corrosion, mineral encrustation, and biofouling. After pulling the pumps and performing video surveys to assess well conditions, recommended rehabilitation of these wells would include acid treatment and mechanical cleaning followed by installation of a sleeve consisting of a smaller-sized casing and appropriately sized slotted screen within the existing casing and screen. If initial assessments indicate that well conditions have deteriorated to the extent that rehabilitation is not practical and hydrologic conditions are still favorable for continued production, drilling replacement wells may be considered. For the purposes of cost estimating, it was assumed that well rehabilitation will be performed for each of the eight targeted wells.

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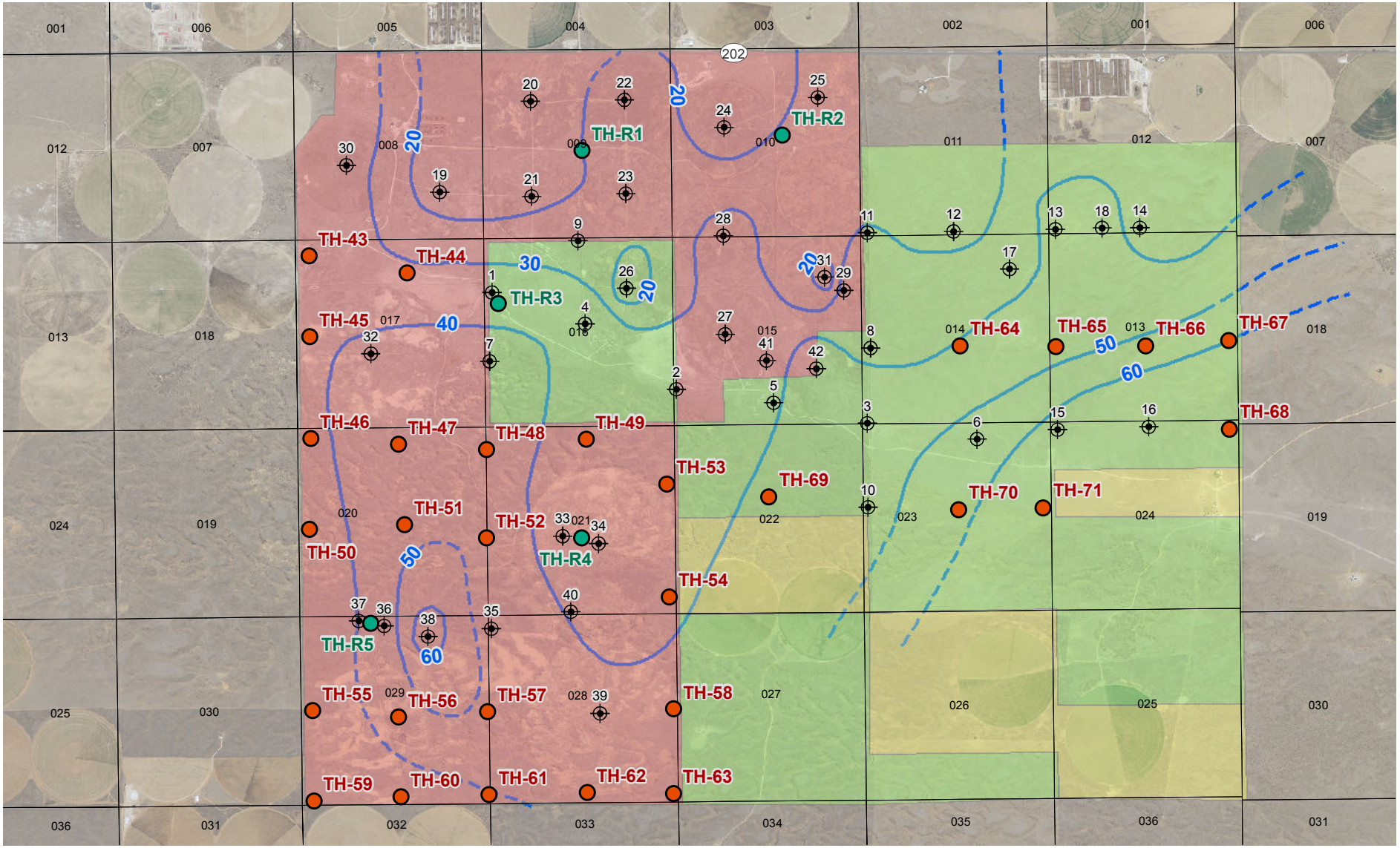

Source: City of Portales

Explanation

- City property
- State property
- Private property
- Section
- Saturated thickness contour (ft)
- Existing Well
- Site characterization test hole
- Rehabilitation evaluation test hole

N

0 2000 4000 Feet

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Alternative 3

Proposed Test Holes

Daniel B. Stephens & Associates, Inc.

9/7/2015 JN NM15.0027

Figure 7

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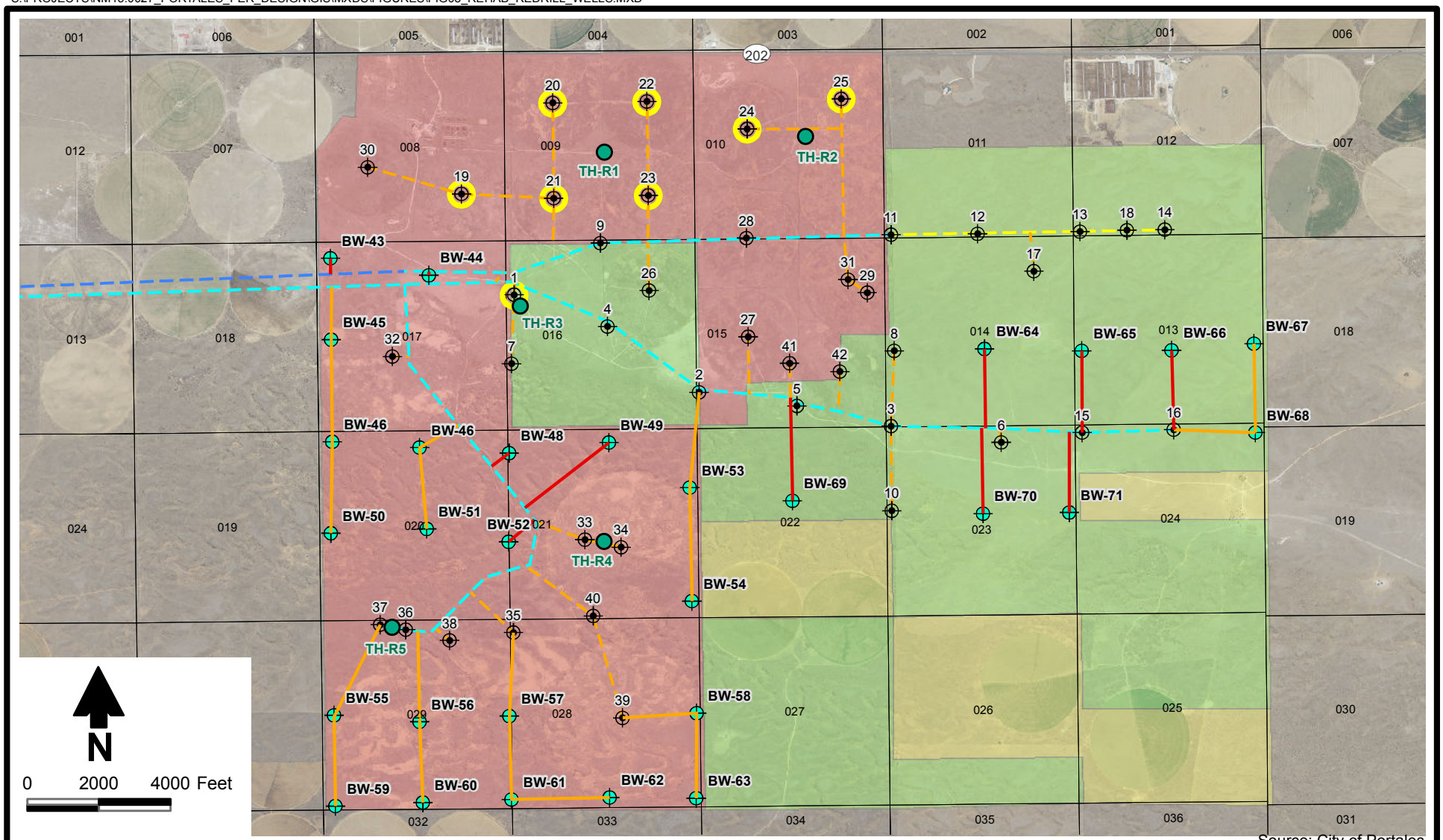

Source: City of Portales

Explanation

- City property
- State property
- Private property
- Section
- Existing Well
- Rehabilitation evaluation test hole
- Proposed test hole and well
- Well to be rehabilitated

Transmission line (diameter in inches)

- 6
- 8
- 12
- 16
- 18
- 24
- 36
- Existing pipeline

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Alternative 3

Rehabilitation and Drilling of New Wells

Daniel B. Stephens & Associates, Inc.

9/8/2015

JN NM15.0027

Figure 8

Projected future production from the expanded Blackwater Well Field was analyzed to determine the number of wells needed to meet projected future demand in 2035. The analysis included a phased timing of new well construction required to meet the growing demand while accounting for the effects of aquifer depletion and resultant declining production over time from both existing wells and new wells.

Documented historical production decline rates of existing wells vary from 2.9 to 14.3 percent per year (Wilson, 2014a). Projected future production from each existing well was reduced annually from its reported 2014 pumping rate by the documented rate of decline for that well except for wells with decline rates greater than 7 percent. Decline rates exceeding 7 percent are likely due to mineralization, biofouling, or sanding and are not representative of regional depletion effects. Those wells are therefore targeted for rehabilitation and were assumed to be rehabilitated and brought online in 2016 with initial production assumed at the median of the documented 2014 pumping rates (128 gpm) except for BW-21, -22, -23, -24 and -25, where available drawdown has currently been exceeded at either the 2014 rate or the estimated rehabilitated well rate. Subsequent pumping for these wells was initiated at 50 percent of the estimated rehabilitated well rate. Future production from the rehabilitated wells was reduced annually by 5.3 percent (the median value of documented historical production decline rates for wells with less than a 7 percent annual decline in pumping capacity).

Future production from existing wells was also adjusted by applying documented historical water level decline rates annually and tracking when available drawdown (saturated thickness minus pumping drawdown) will be exceeded for each well. During a year when the available drawdown was projected to be exceeded at the estimated pumping rate, the assumed pumping rate was reduced to 50 percent of the prior year's rate and the available drawdown was increased by half of the previous year's assumed drawdown. Subsequent projected pumping rates continued to be reduced by the documented historical water level decline rates until the available drawdown was again exceeded, whereupon the rate was again halved (to 25 percent of the prior year's rate) and the available drawdown adjusted as before. This process was continued until either the available drawdown was exceeded a third time or the projected pumping rate dropped below 10 gpm, after which the well was assumed to be abandoned the following year. Based on this procedure, pumping from the existing wells was projected through

the year 2035, resulting in a predicted decline from a total capacity of 4,444 gpm in 2016 to 192 gpm in 2035 (Table 5, Figure 9).

Future demand was projected through 2035 assuming an annual population growth rate of 2 percent and an annual decline in per capita water usage of 1 percent. Projected future demand was further reduced by 600,000 gallons per day based on replacing use of potable water for irrigation with reclaimed wastewater. The projected average daily demand in 2035 is 3.4 mgd (2,384 gpm), resulting in an estimated peak day demand of 6.2 mgd (4,292 gpm). Assuming an average utilization rate of 80 percent, the well capacity required to meet the peak day demand is projected to grow from 4,378 gpm in 2016 to 5,365 gpm in 2035 (Table 5, Figure 9).

The new supply required to meet this demand was determined by subtracting the projected existing wells' supply from the projected peak day demand for each year. Production for each new well was assumed at 179 gpm (the 75th percentile of the existing wells' 2014 pumping rates). Test hole sites for potential new well locations were laid out within the currently available properties on a roughly ½-mile spacing (Figure 7). This resulted in a total potential 29 new well locations (Figure 8). New wells were assumed to be constructed each year as needed to meet the projected peak day demand for that year.

Annual declines in the production rates and water levels attributable to aquifer depletion were applied in a similar fashion as used for the existing wells to project future production from the new wells. The annual rate of water level decline for each new well was assumed at 2.7 feet per year (the median of the existing wells' water level decline rates), and pumping level drawdowns were determined assuming the median of the existing well's specific capacity values (8.1 gallons per minute per foot [gpm/ft]). The annual rate of production decline for the new wells was assumed to be 3.6 percent (the median production decline for the Baker Farm wells over the previous 2 years).

The initial saturated thickness for each well was estimated from the Winter 2014 saturated thickness map (Figure 10), and assumed water level declines and computed pumping level drawdowns were applied to determine available drawdown for each well during each year.

Table 5. Blackwater Well Field Supply Projections

Year	Projected Supply (gpm)			Average Day Projections (gpm)			Peak Day Projections (gpm)					
							1.8 Peaking Factor			1.6 Peaking Factor		
	Existing Wells	New Wells	Total	Demand	Required Well Capacity [a]	Total Supply Surplus	Demand	Required Well Capacity [a]	Total Supply Surplus	Demand	Required Well Capacity [a]	Total Supply Surplus
2016	4,444	0	4,444	1,946	2,432	2,012	3,502	4,378	66	3,113	3,892	553
2017	3,883	716	4,599	1,967	2,459	2,140	3,540	4,426	173	3,147	3,934	665
2018	3,465	1,048	4,513	1,988	2,485	2,028	3,579	4,473	40	3,181	3,976	537
2019	2,957	1,726	4,683	2,010	2,512	2,171	3,618	4,522	161	3,216	4,019	663
2020	2,332	2,379	4,711	2,031	2,539	2,172	3,657	4,571	140	3,250	4,063	648
2021	1,854	2,944	4,797	2,053	2,567	2,231	3,696	4,620	177	3,285	4,107	691
2022	1,657	3,135	4,792	2,076	2,594	2,198	3,736	4,670	122	3,321	4,151	641
2023	1,295	3,451	4,746	2,098	2,622	2,123	3,776	4,720	25	3,357	4,196	550
2024	1,076	3,803	4,879	2,121	2,651	2,228	3,817	4,771	108	3,393	4,241	638
2025	927	3,997	4,925	2,143	2,679	2,245	3,858	4,823	102	3,429	4,287	638
2026	798	3,765	4,563	2,166	2,708	1,855	3,900	4,875	-311	3,466	4,333	230
2027	612	3,392	4,003	2,190	2,737	1,266	3,942	4,927	-924	3,504	4,379	-376
2028	478	3,187	3,665	2,213	2,767	899	3,984	4,980	-1,315	3,541	4,426	-761
2029	360	2,779	3,138	2,237	2,796	342	4,027	5,033	-1,895	3,579	4,474	-1,335
2030	326	2,536	2,862	2,261	2,826	36	4,070	5,087	-2,225	3,617	4,522	-1,660
2031	313	2,128	2,441	2,285	2,856	-415	4,113	5,142	-2,700	3,656	4,570	-2,129
2032	288	1,971	2,259	2,310	2,887	-628	4,157	5,197	-2,938	3,695	4,619	-2,360
2033	239	1,533	1,772	2,334	2,918	-1,146	4,202	5,252	-3,480	3,735	4,668	-2,896
2034	217	1,413	1,630	2,359	2,949	-1,319	4,246	5,308	-3,678	3,775	4,718	-3,088
2035	192	1,107	1,299	2,384	2,980	-1,681	4,292	5,365	-4,065	3,815	4,769	-3,469

[a] Assumes 80% utilization

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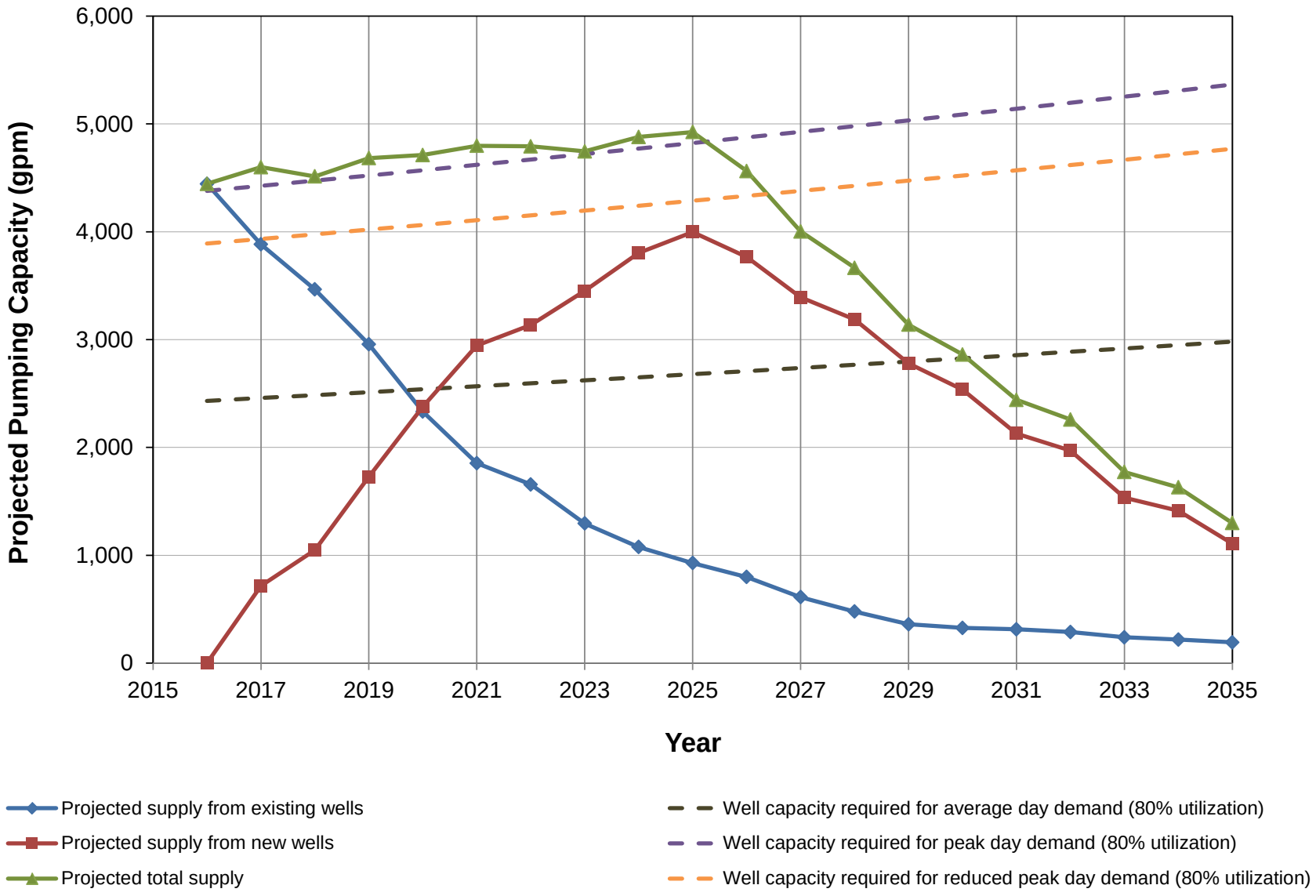

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Blackwater Well Field Supply Projections

Figure 9

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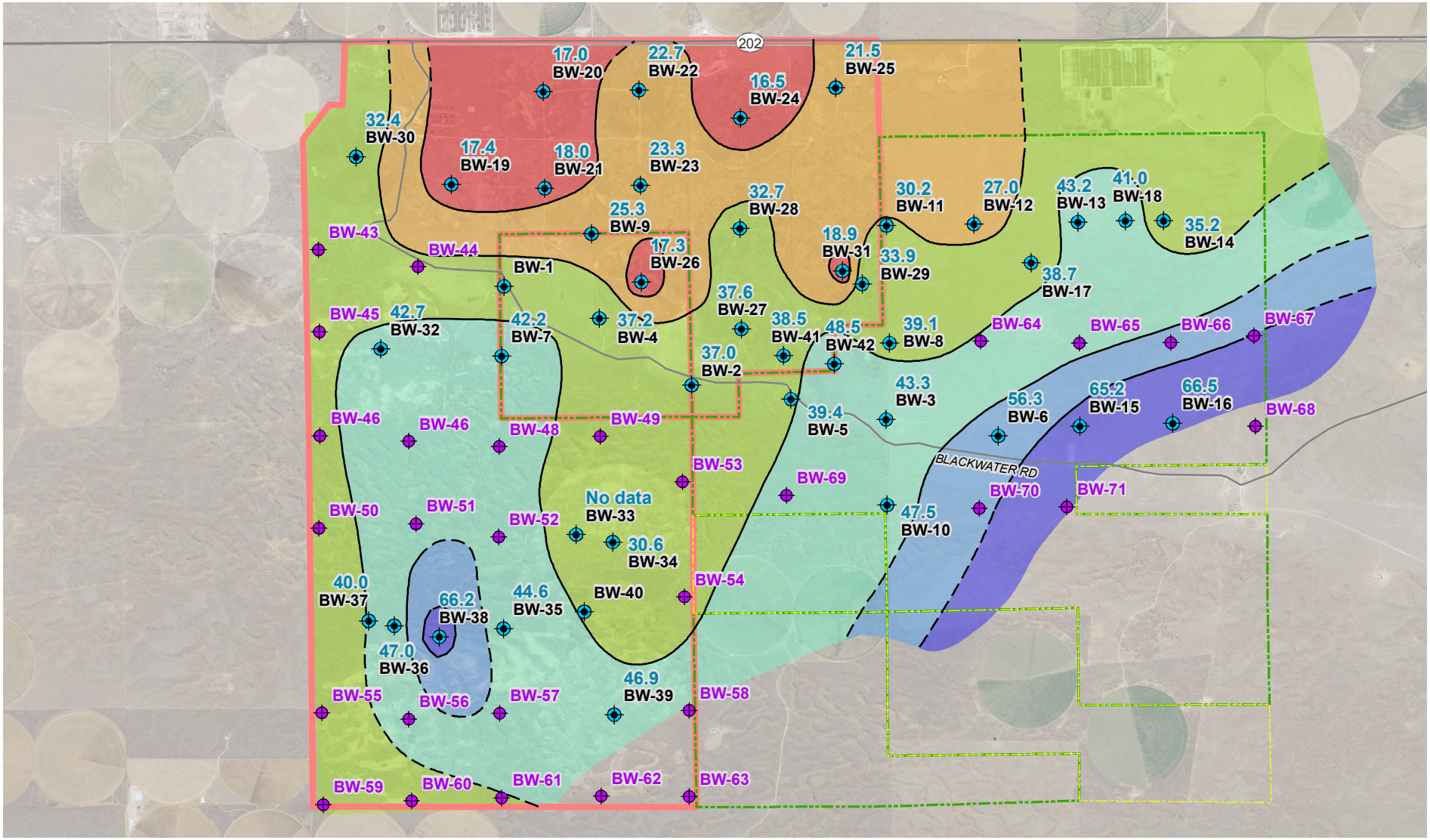

Source: City of Portales

N

0 2000 4000 Feet

Explanation

- Road
- City property
- State property
- Private property
- Proposed well

Saturated thickness (ft)

- <20
- 20-30
- 30-40
- 40-50
- 50-60
- >60

- Existing well
- 46.9 Total saturated thickness (ft)
- BW-39 Well designation

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Saturated Thickness at Blackwater Well Field

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JN NM15.0027

Figure 10

When available drawdown was predicted to be exceeded, the projected pumping rate was reduced to half of the original rate and the available drawdown was increased by half of the computed drawdown at the original rate. Pumping rate declines and water level declines continued to be applied at the assumed rates until the available drawdown was exceeded for a second time, at which point the pumping rate was reduced to 25 percent of the original rate and the available drawdown was increased by one-fourth of the computed drawdown at the original rate. If continued declines in production capacity and water levels resulted in exceeding the available drawdown for a third time, the pumping rate was reduced to 12.5 percent of the original rate and the well was assumed to be abandoned the following year.

Based on this procedure, the total supply from the existing wells and new wells was projected to grow from 4,444 gpm in 2016 to a maximum of 4,925 gpm in 2025, after which total production is predicted to decline to 1,299 gpm in 2035 due to aquifer depletion and resultant well abandonments. The projected supply from the expanded well field is predicted to be sufficient to meet the estimated peak day demand through the year 2025, after which supply deficits are predicted grow from 311 gpm in 2026 to 4,065 gpm in 2035 (Table 5, Figure 11).

This analysis demonstrates that even with full development of the City-owned portion of the Blackwater Well Field and expansion of the well field onto State land within the current well field boundary, the 2035 demand cannot be met. Additional land will need to be acquired for 20 more wells located outside of those two areas.

The components of Alternative 3, therefore, are as follows:

- Rehabilitation of 8 existing wells.
- Drilling of 54 test holes for new wells and for rehabilitation evaluation.
- Drilling of 29 new wells on existing City- and State-owned property within the current well field boundary
- Drilling of 20 new wells on property to be acquired
- Construction of approximately 22 miles of new water line (6- and 8-inch)

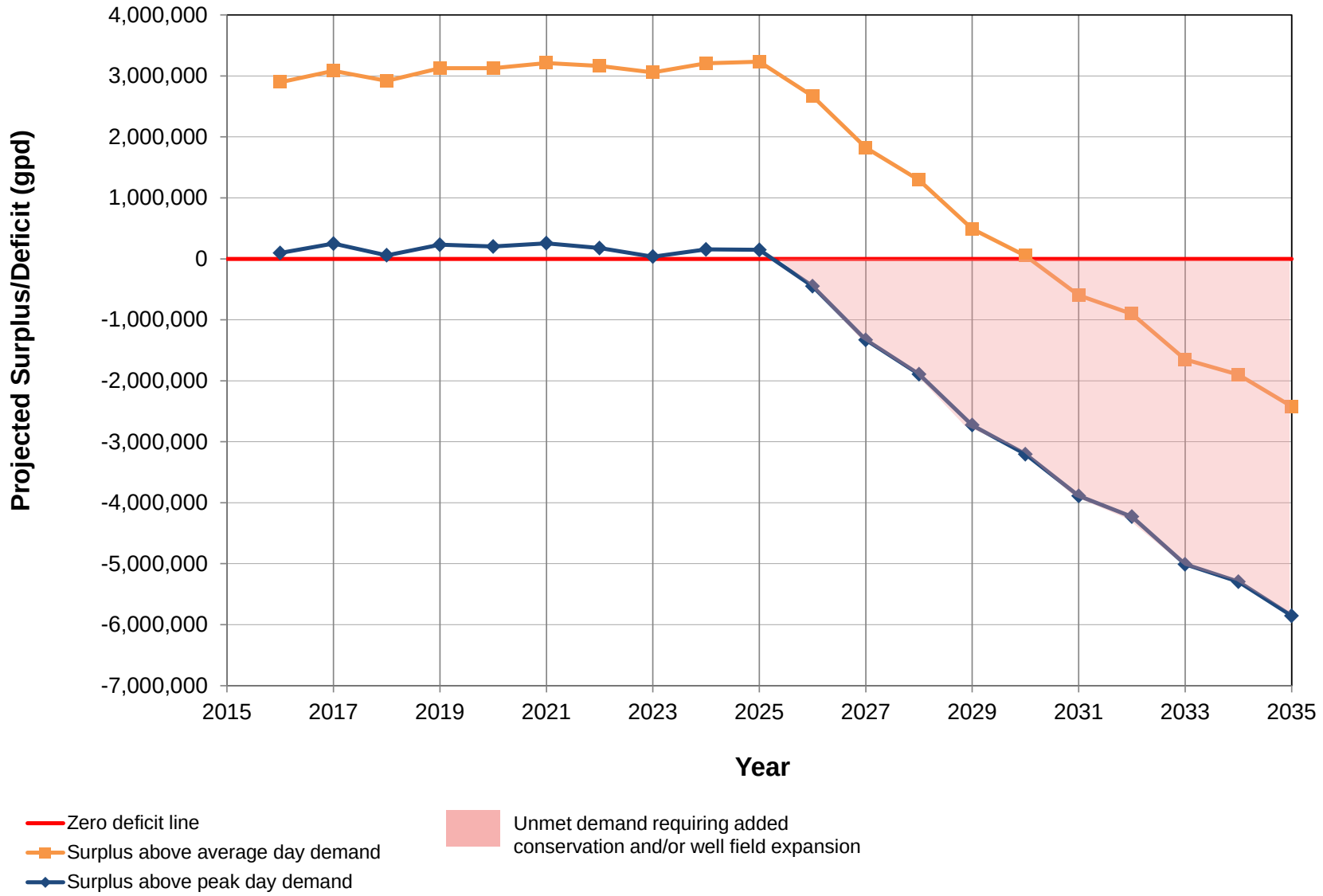

Figure 11

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Blackwater Well Field Projected Surplus Capacity

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According to the State of New Mexico leasing rules, wells on state land permitted for water exploration/development are subject to a minimum $1,000 yearly leasing fee. This fee has been included for new wells on State land in the cost estimates for this alternative.

ii. Design Criteria

New wells should be drilled to the bottom of the Ogallala Aquifer, a depth of approximately 200 feet below ground surface. Test holes should be drilled to at least 20 feet below the base of the aquifer to assure that the contact has been penetrated. Figure 10 shows saturated thickness in relation to existing wells and proposed test holes at the Blackwater Well Field.

Based on the assumed production capacity of 179 gpm, the new wells are sized at 10 inches in diameter with an 18-inch borehole. For the purposes of cost estimating, it was assumed that each well will be constructed with 40 feet of stainless steel wire-wrap screen joined to a low-carbon steel riser casing using a dielectric coupling. Based on the depth to water in the existing wells, which is approximately 150 feet, and the elevation of the Johnson Hills water storage tanks, to which the wells pump, well pumps will be approximately 15 hp.

iii. Map

Figure 8 shows the locations of proposed test holes, wells to be rehabilitated, and new wells to be drilled.

iv. Environmental Impacts

Ground disturbance would occur along pipeline alignments and areas identified for new wells. A 20-foot corridor for disturbance is estimated for waterline installation, and a 100-foot by 100-foot area of disturbance is anticipated for each new well site, although the permanently disturbed area would be roughly 20 feet by 20 feet. The ground disturbance where existing wells are to be rehabilitated would be minimal. Ground disturbance would be most significant for water lines and any new roads needed for access. Construction would be designed such that temporarily disturbed areas would be returned to pre-construction elevations and reseeded with native

vegetation as needed. Best management practices would be in place for construction impacts such as erosion, traffic control, and waste management.

v. Land Requirements

Except for the state land portions, the City owns the Blackwater Well Field, so land acquisition would not be required for the wells or the pipelines connecting those wells to existing transmission pipelines (from the well field to the Johnson Hill tanks and from the tank to the City's distribution network). As mentioned above, to meet the 2035 projected demand, Portales will need to acquire additional land or state leases for 20 of the new wells. Based on a ½ mile spacing between wells, 1,920 acres, or 3 sections, will be required to meet the projected demand. New pipelines will be needed to connect the proposed 29 new wells within the existing well field and to make the connections to the 20 wells on the newly acquired land.

vi. Potential Construction Problems

No construction problems are anticipated with this alternative. A geotechnical investigation and environmental surveys should be conducted prior to construction. The geotechnical investigation would include soil borings to predict excavation conditions for the pipeline and make recommendations on foundations for structures (such as the treatment building). The environmental surveys would identify biological and/or cultural resources that must be protected during construction.

vii. Sustainability Considerations

Water and Energy Efficiency

Groundwater in the Ogallala Aquifer is being depleted throughout the region. This depletion has resulted in declining production in the City's wells. This alternative seeks to maximize production from the well field in areas where the saturated thickness is greater and to rehabilitate wells in order to achieve greater efficiency in producing the groundwater. However, because groundwater in the Ogallala aquifer is a finite resource, the City is actively pursuing a diversified approach to water resources that includes reuse, recharge, and participation in the ENMRWS project.

viii. Cost Estimate

Detailed cost estimates for capital and ongoing operations and maintenance are provided in Appendix C. Cost estimates include engineering design, construction, survey, contingency, and NMGRT.

The estimated cost of Alternative 3 is $32.7 million. This cost includes rehabilitation of 8 wells, drilling of 54 test holes, acquisition of 1,920 acres of land, installation of 49 new wells, and construction of approximately 21 miles of new 6- and 8-inch piping connecting the new wells to the existing transmission piping.

d. Alternative 4: Water Conservation

i. Description

This alternative would consist of continued water conservation to lower the overall City demand. Conservation would affect both indoor and outdoor water use, but the greatest water savings would be realized in outdoor water use. The total calculated annual water demand in year 2035, with a yearly reduction in water use of 1 percent and an annual irrigation savings of 600,000 gallons per day for 6 months of the year, is 1,253 million gallons, corresponding to an average day demand of 3.4 mgd. At the current estimated peak day factor of 1.8, the peak day demand, which must be met by the available water sources, would be 6.2 mgd. This average day demand corresponds to a per capita demand, based on the population projections presented in this report, of 99 gpcd. With conservation, the peaking factor (ratio of peak day to average day) is expected to be reduced. At a peaking factor of 1.6, the peak day demand would be 5.5 mgd.

The calculated per capita water use of 99 gpcd is an aggressive goal but considered achievable. The City has reduced per capita water usage from 225 gpcd in the year 1995 to 134 gpcd in 2013 (Wilson, 2014a, Table 5). The City of Santa Fe is a leader in water conservation and drought management, and their record with regard to per capita usage and peak day factor was reviewed. The City of Santa Fe reduced their overall per capita

consumption from 168 gpcd in 1995 to 98 gpcd in 2009 (SdCWD, 2010, Figure 2). Their peak day to average day factor was reported as 1.67 (Brown and Caldwell, 2009). Based on these numbers, the 99-gpcd usage and 1.6-peaking factor projected for Portales are considered reasonable.

The projected total water supply from wells in 2035 is 1,299 gpm, which corresponds to 1.87 mgd if all wells were pumped 24 hours per day. At a reduced peak day demand of 5.5 mgd, at 80 percent utilization of wells, the required pumping capacity would be 4,769 gpm, versus 5,365 gpm to meet a peak day of 6.2 mgd. Further savings could be realized by increasing irrigation with treated effluent from the WWTP, up to the capacity of the plant, which is 1.6 mgd.

The analysis described above shows that even with aggressive conservation, the City will need to pursue land acquisition and development of additional groundwater wells outside of the current Blackwater Well Field boundary.

The City completed water conservation plans in 2001 and 2014 (Wilson, 2001, 2014b). The 2014 Water Conservation Plan (Wilson 2014b) identified a water demand reduction goal of 40 percent from 2012 to 2016. This goal was to be achieved through the reuse project and a combination of enhanced seasonal landscape irrigation restriction, reductions in water distribution system losses, and continued reduction in indoor water use. Reductions in water use will be implemented through education for public awareness and incentives for water conserving features, along with the continued use of inverted block water rates with progressive rate increases and the enforcement of City water management ordinances.

The following conservation measures and targeted reductions were outlined in the 2014 Conservation Plan (Wilson, 2014b):

- Stakeholder involvement and public outreach (no direct reduction calculated)
- Seasonal landscape irrigation restrictions (70 million gallon per year reduction)
- Water conservation rebates (no direct reduction calculated)

- Reduction in system losses (20 million gallons per year reduction)
- Wastewater reuse (325 million gallons per year reduction)
- Other current best management practices (10 million gallons per year reduction)

Components of Alternative 4, Water Conservation are described below.

- *Water Conservation Plan updates.* The water conservation plan should be updated every 5 years in order to summarize progress and revisit goals for conservation. The conservation plan should be prepared in accordance with New Mexico Office of the State Engineer (OSE) guidelines. A conservation plan is one of the requirements to apply for funding through the New Mexico Water Trust Board.

- *Yearly water audits.* Yearly water audits should be completed using American Water Works Association (AWWA) free water audit software. The AWWA water audit is a required component of the conservation plan under the OSE guidelines. The 2014 conservation plan (Wilson, 2014b) used the AWWA software to evaluate whether Portales's water losses are consistent with the cost and availability of its water supply.

- *Customer rebates/incentives.* Customer rebates/incentives should be implemented to encourage replacement of household fixtures with low-water-use models, to encourage replacement of traditional landscaping with xeriscaping, and to promote other water savings measures such are rainwater harvesting and graywater reuse.

- *Public education/outreach.* The preparation of the 2014 conservation plan involved public participation during the planning process, and this should be continued for subsequent plans. In additional the City should continue its efforts to educate the public and local businesses on the importance of conservation. The City's approach consists of four elements: (1) distribution of printed information, (2) presentation and other outreach, (3) support for school education efforts, and (4) demonstration facilities.

- *Enforcement.* The City has adopted ordinances related to conservation and emergency drought management. The conservation ordinances, which require landscaping with drought-tolerant plants over most yard areas for new developments and when substantial improvements are made to existing developments and prohibit water waste, should continue to be enforced.

- *Leak detection and repair program.* The City's program to replace water meters will result in better information on the quantity and location of leaks. The City also has a program to routinely replace aging water mains. The City aims to reduce real water losses from 12.4 percent to 8.9 percent, which is the median for systems surveyed by AWWA in 2007.

ii. Design Criteria

The City is targeting a total system consumption of 99 gpcd and reuse of up to 325 million gallons per year of treated wastewater effluent for irrigation. In addition, the City plans to reduce real water losses to 8.9 percent of total water use through a leak detection and repair program. The City's wastewater reuse system has been constructed and is planned to start irrigating parks in the spring of 2016.

iii. Map

Alternative 4 requires no physical improvements; therefore, no map is provided.

iv. Environmental Impacts

This alternative has no anticipated adverse environmental consequences.

v. Land Requirements

No land is required for Alternative 4.

vi. Potential Construction Problems

Only small-scale construction is planned for Alternative 4, comprising repair of leaking water mains. No construction problems are anticipated.

vii. Sustainability Considerations

The results of the water audit prepared as part of the 2014 conservation plan (Wilson, 2014b) are discussed in Section 2. Alternative 4 is entirely focused on improving the City's overall efficiency of water use, with a goal of reducing real system losses and lowering per capita consumption.

viii. Cost Estimate

Detailed cost estimates for capital and ongoing operations and maintenance are provided in Appendix C. Cost estimates include contingency and NMGRT.

The estimated cost of Alternative 4 is $7.8 million. This cost includes regular updates of the City's water conservation plan, yearly water audits, enforcement of City ordinances related to water conservation and water waste, customer rebates and incentives, leak detection and repair, and public education and outreach.

5. Selection of an Alternative

a. Life Cycle Cost Analysis

Detailed capital cost and operating and maintenance costs (O&M) costs are included in Appendix C. A summary of the life cycle costs for each of the action alternatives, Alternatives 2 (Options 1 and 2), 3, and 4, are summarized in Table 6.

Table 6. Life Cycle Cost Analysis of Action Alternatives

Alternative	Cost [a] ($)			
	Capital	O&M	Salvage Value [b]	Net Present Value
2, Option 1	17,439,000	10,016,000	4,539,000	22,916,000
2, Option 2	20,387,000	9,923,000	5,391,000	24,919,000
3	32,689,000	31,245,000	1,410,000	62,524,000
4	7,844,000	NA	NA	7,844,000

Assumptions: Planning period = 20 years
[a] See Appendix C for anticipated life of assets.
[b] Salvage value calculated based on anticipated life expectancy using straight line depreciation to end of the planning period and converted to present day dollars.

O&M = Operations and maintenance
NA = Not applicable

The life cycle cost analysis shown in Table 6 was prepared in accordance with U.S. Department of Agriculture Rural Utilities Service (RUS) Bulletin 1780-2, as follows:

$$NPV = C + USPW\ (O\&M) - SPPW\ (S)$$

where NPV = Net present value
C = Capital cost of alternative
USPW (O&M) = Present worth of the uniform series of annual O&M
SPPW(S) = Single payment present worth of salvage value

The discount rate used is the “real” discount rate taken from Appendix C of Office of Management and Budget Circular A-94 (OMB, 2014), which indicates that the real interest rate for a 20-year bond maturity period is 1.2 percent.

b. Non-Monetary Factors

From the analysis described in this report, it is apparent that the City of Portales long-term water supply shortage cannot be solved through a single approach. Each of the feasible action alternatives examined contributes to a holistic approach to extending the life of the aquifer, reducing water demand, and providing additional source water.

Alternative 2, Aquifer Storage and Recovery, will store water for future use in the aquifer, increasing recharge and extending the life of the well field, but it will not produce additional water to meet the City’s needs. Based on the life cycle cost analysis presented in Table 6, Option 2 of Alternative 2 is preferable to Option 1. Option 2 is also preferred because the potential for additional development of wells and better producing wells is higher at the Blackwater Well Field than at the Sandhill Well Field.

Based on the need to produce additional groundwater to meet the City’s needs and the desire to store water underground and extend the life of the well field, a combination of Alternative 2, Option 2, Alternative 3, and Alternative 4 is recommended to recharge the aquifer with treated wastewater effluent, rehabilitate existing wells and drill new wells, and continue to decrease per capita demand.

6. Proposed Project (Recommended Alternative)

a. Preliminary Project Design

The recommended project will combine Option 2 of Alternative 2 (ASR through direct injection wells at the Blackwater Well Field) with Alternative 3, rehabilitation and drilling new wells at the Blackwater Well Field and Alternative 4, water conservation. The layout of the project is shown in (Figure 12). The project is recommended for implementation in three phases (Figure 13). The work of each phase is described in the following subsections.

i. Phase 1, 5 Years (by Year 2020)

The projected average day water demand for Year 2020, with conservation and water reuse, is 2.9 mgd. At a peak day factor of 1.8, the projected peak day water demand is 5.3 mgd (3,657 gpm). In order to meet that demand, the following are proposed under Phase 1.

- Rehabilitate 8 wells.
- Drill 19 test holes.
- Install 14 new wells.
- Complete feasibility study for aquifer storage and recovery via direct injection, incorporating information from test holes and evaluating treatment options.
- Conduct pilot testing of AWT for direct injection.
- Install pilot injection well and conduct pilot testing of injection well.
- Design AWT facility

ii. Phase 2, 10 Years (by Year 2025)

The projected average day water demand for year 2025 is 3.1 mgd, and the projected peak day water demand is 5.6 mgd (3,858 gpm). In order to meet that demand, the following are proposed under Phase 2.

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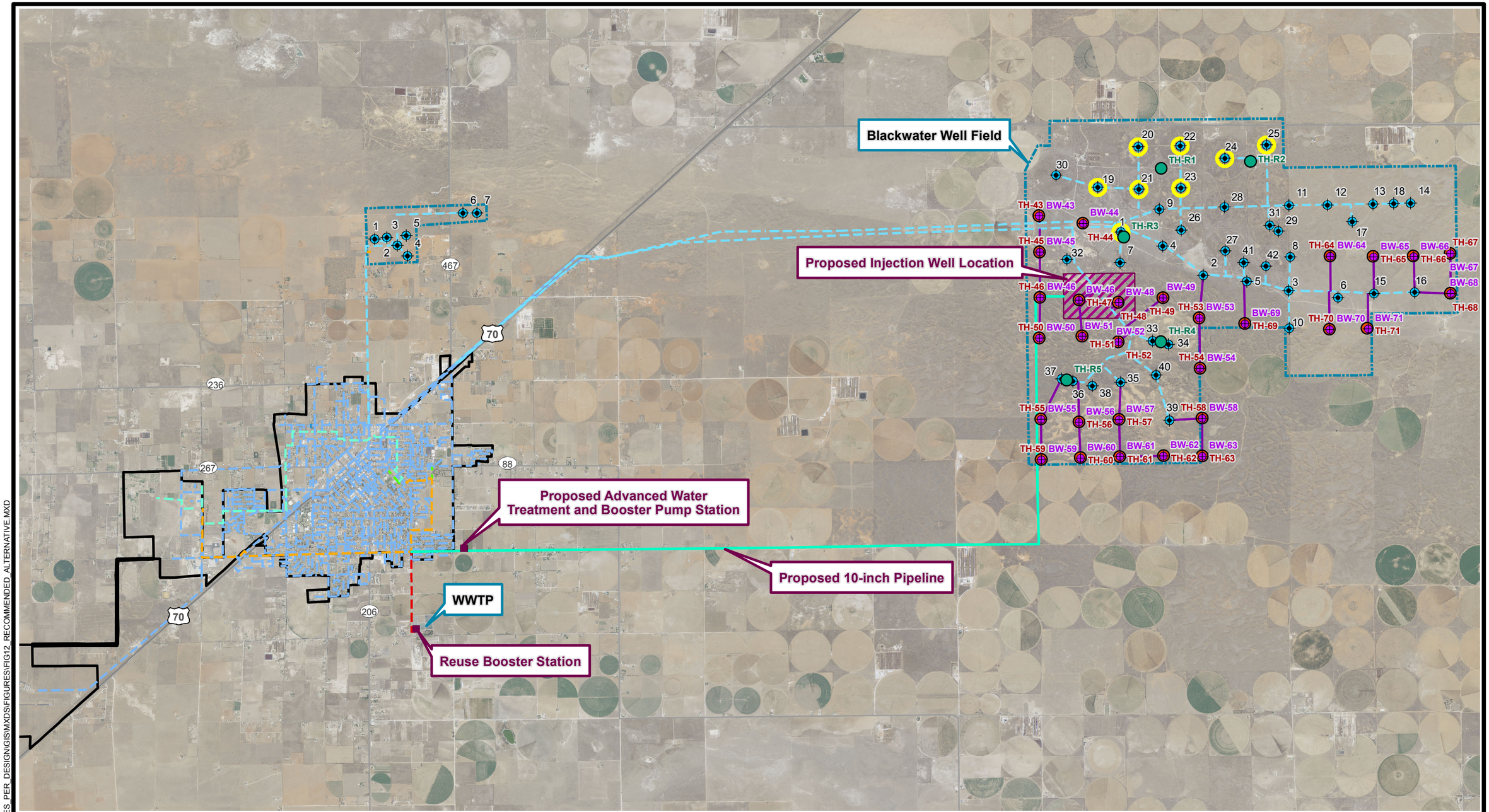

2011 aerial photography (USDA, 2011)

N

0 3000 6000 Feet

Explanation

- City of Portales
- Existing well
- Well to be rehabilitated
- Transmission line
- Water line
- Proposed well
- Exploratory test hole
- Rehabilitation evaluation test hole
- Proposed transmission line

Reuse pipeline Diameter (in)

- 4
- 6
- 8
- 10
- 12
- 16
- Existing pipeline

CITY OF PORTALES WATER SUPPLY
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Recommended Alternative

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Figure 12

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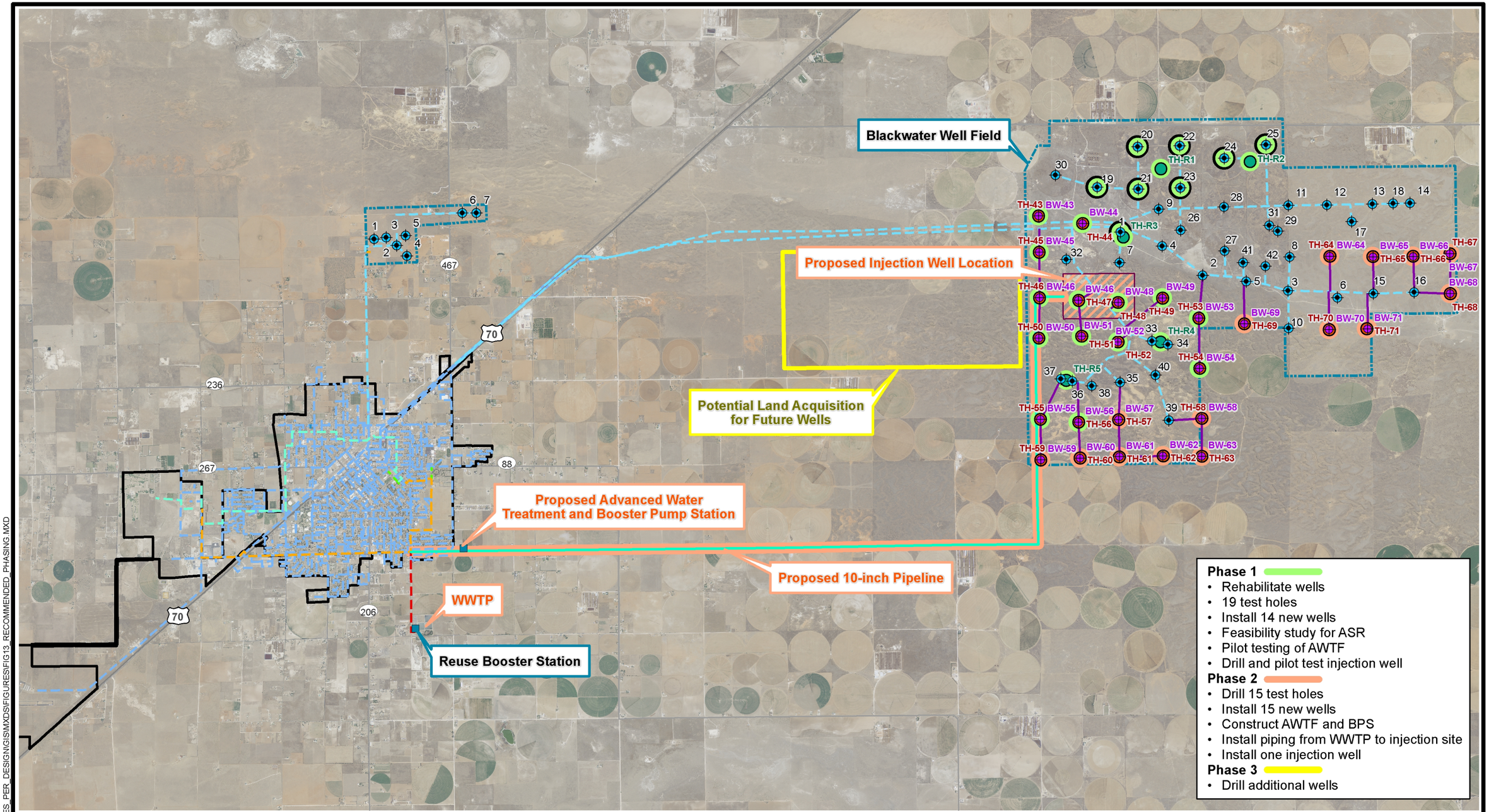

2011 aerial photography (USDA, 2011)

N

0 3000 6000 Feet

Explanation

- City of Portales
- Existing well
- Well to be rehabilitated
- Transmission line
- Water line
- Proposed well
- Exploratory test hole
- Rehabilitation evaluation test hole
- Proposed pipeline

Reuse pipeline Diameter (in)

- 4
- 6
- 8
- 10
- 12
- 16
- Existing pipeline

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9/14/2015

JN NM15.0027

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Recommended Project Proposed Phasing

Figure 13

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- Drill 15 test holes.
- Install 15 new wells.
- Construct AWT facility for direct injection
- Design and install booster pump station from reuse distribution piping to injection site.
- Install piping from WWTP to injection site.
- Install one injection well.

iii. Phase 3, 20 Years (by Year 2035)

The projected average day water demand for year 2035 is 3.4 mgd, and the projected peak day water demand is 6.2 mgd (4,292 gpm). In order to meet that demand, the following are proposed under Phase 3.

- Acquire 1,920 acres of additional land or state leases
- Drill 20 test holes.
- Install 20 new wells.
- Install 2 injection wells.

iv. Costs by Phase

Preliminary planning level costs by phase for the recommended project are presented in Table 7.

Table 7. Capital Cost Analysis by Phase of Recommended Alternative

Phase	Cost ($)				
	Construction	Non-Construction	25% Contingency	8.1875% NMGRT	Total
1	6,072,000	3,411,000	2,370,750	970,526	12,824,276
2	15,521,000	5,289,000	5,202,500	2,129,773	28,142,273
3	10,206,000	4,858,000	3,766,000	1,541,706	20,371,706

b. Project Schedule

A preliminary project schedule is provided as Figure 14.

c. Permit Requirements

The following permits will be required for various elements of the recommended project.

- *General:* The contractor will be required to comply with air quality, dust, and noise control regulations, as required by the Occupational Safety and Health Administration (OSHA) and any local ordinances.

- *Wells:* Permitting for wells is conducted under the jurisdiction of the New Mexico OSE. Permits are required for replacement wells, for modifications to existing wells, and for drilling new wells.
  - A replacement well can be drilled within 100 feet of the original well prior to application, publication, and hearing if the well is drilled in the same aquifer as the original well, the appropriation is for the same amount of water allowed by the existing water right in the original well, and an emergency situation exists that would result in serious economic loss if application, publication, and hearing were required. If these conditions are met, the well can be drilled and used prior to formal permit application as long as the OSE is sent a registered notification letter prior to drilling. Subsequently, the City will need to file an *Application for Permit to Change an Existing Water Right (Non 72-12-1)* within 30 days after drilling begins.
  - Exploratory test holes will require filing an *Application for Permit to Drill a Well with No Consumptive Use of Water*. A separate permit will subsequently be required to apply the water to beneficial use.
  - Modifications to existing wells will require filing an *Application for Permit to Repair and/or Deepen Well (Non 72-12-1)*.

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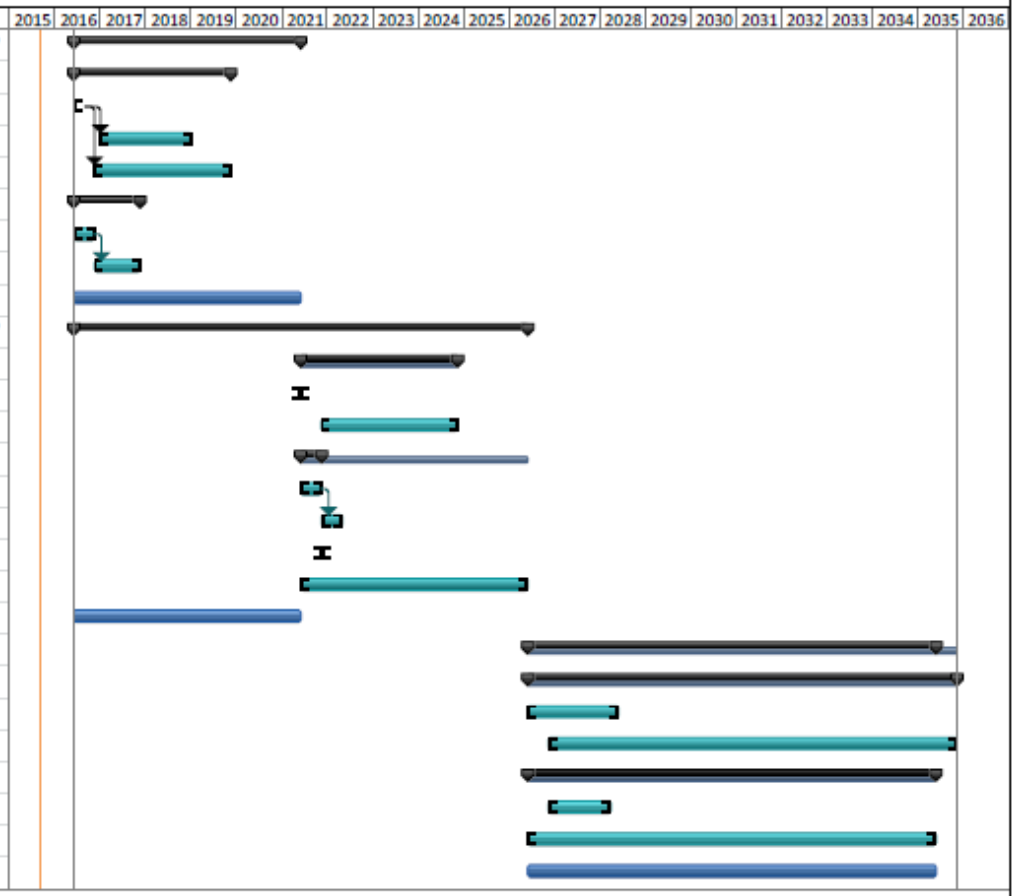
CITY OF PORTALES
PRELIMINARY ENGINEERING REPORT FOR WELL

Recommended Project - Preliminary Schedule

ID	Task Name	Duration
1	**Phase 1**	**1305 days?**
2	**Well Rehabilitation and Drilling**	**903 days?**
3	Test Hole Drilling (14 holes)	6 mos
4	Well Rehabilitation (8 wells)	523 days
5	New Wells and Waterline Installation (14 wells)	784 days
6	**Aquifer Storage and Recovery**	**382 days**
7	Feasibility Study	6 mons
8	Pilot Test AWT Facility	262 days
9	**Water Conservation**	1305 days
10	**Phase 2**	**2609 days?**
11	**Well Rehabilitation and Drilling**	**903 days?**
12	Test Hole Drilling (15 holes)	1 day
13	New Wells and Waterline Installation (15 wells)	784 days
14	**Aquifer Storage and Recovery**	**121 days?**
15	Pilot Test Injection Well	6 mons
16	Permitting of Injection Facility	6 mons
17	Construct Booster Pump Station and Waterline	1 day
18	Install Direct Injection Well	1305 days
19	**Water Conservation**	1305 days
20	**Phase 3**	**2350 days**
21	**Well Rehabilitation and Drilling**	**2468 days**
22	Test Hole Drilling (20 holes)	524 days
23	New Wells and Waterline Installation (20 wells)	2349 days
24	**Aquifer Storage and Recovery**	**2348 days**
25	Construct Booster Pump Station and Waterline	18 mons
26	Install Direct Injection Wells (3)	2348 days
27	**Water Conservation**	2350 days



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Task	External Tasks	Manual Task	Finish-only
Split	External Milestone	Duration-only	Deadline
Milestone	Inactive Task	Manual Summary Rollup	Progress
Summary	Inactive Milestone	Manual Summary	
Project Summary	Inactive Summary	Start-only	

Figure 14

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT
Project Schedule

Daniel B. Stephens & Associates, Inc.

9/15/15

- Since the Portales Basin is closed to new appropriations, all new wells will require submitting an *Application for Permit to Change an Existing Water Right (Non 72-12-1)*.

Application forms for these permits can be obtained from the OSE web site at http://www.ose.state.nm.us/WR/forms.php.

- *Pipelines:* Pipelines are proposed to be located in existing roadway right-of-ways where possible. One exception is the proposed water line delivering treated effluent from the WWTP to the injection site. Easements for this waterline will need to be acquired from private landowners. Water lines crossing jurisdictional waterways as designated by the U.S. Army Corps of Engineers are subject to permitting under Section 404 of the Clean Water Act.

The design of water system improvements, including treatment and pumping systems, will need to be reviewed and approved by the New Mexico Environment Department Construction Programs Bureau.

d. Sustainability Considerations

The recommended alternative incorporates recharge of the aquifer underlying the City's Blackwater Well Field using direct injection from the City's WWTP, rehabilitation or replacement of existing wells in order to improve production, and drilling of new wells throughout the existing and expanded well field. It includes continuing water conservation to lower the City's per capita water usage to 99 gpcd, an aggressive goal that reflects a commitment by the City to maximize sustainability of the scarce water resource.

The proposed plan to develop the well field is hoped to distribute the effects of groundwater pumping across a larger area, minimizing excessive localized drawdown impacts to the extent possible and maximizing well field life. The capacities proposed for future wells are below the expected well yields in order to prolong the life of the wells. The project described in this section represents part of the City's water management strategy, which also includes continued reduction in per capita demand through conservation strategies.

References

Brown, D.E. 1994. *Biotic communities, Southwestern United States and northwestern Mexico*. University of Utah Press.

Chronic, H. 1987. *Roadside geology of New Mexico.* Mountain Press Publishing Company, Missoula, Montana.

Brown and Caldwell. 2009. *Water transmission and storage system master plan.* Prepared for City of Santa Fe, New Mexico. September 3, 2009.

Federal Emergency Management Agency (FEMA). 2010. Flood insurance rate map, Roosevelt County, New Mexico and incorporated areas. Map number 35041C0490E. October 6, 2010.

Google Earth. 2014. Imagery of Portales, NM. January 17, 2014.

Griffith, G.E., J.M. Omernik, M.M. McGraw, G.Z. Jacobi, C.M. Canavan, T.S. Schrader, D. Mercer, R. Hill, and B.C. Moran. 2006. Ecoregions of New Mexico (color poster with map, descriptive text, summary tables, and photographs). U.S. Geological Survey. Scale 1:1,400,000.

New Mexico Environment Department (NMED) Construction Programs Bureau State Environmental Review Process (*Approved by EPA 12/15/05; Revised 01/08/2104*)

Office of Management and Budget (OMB). 2014. Discount rates for cost-effectiveness, lease purchase, and related analyses. Circular A-94 Appendix Cl. Revised December 2014. <https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c>.

Sangre de Cristo Water Division (SdCWD). 2010. *City of Santa Fe water conservation and drought management plan.* Submitted to the New Mexico Office of the State Engineer. November 2010.

Smith Engineering. 2014. *City of Portales wastewater treatment plant and effluent reuse system: Preliminary engineering report - Amended.* April 2014.

U.S. Department of Agriculture Rural Utilities Service (RUS). 2013. Bulletin 1780-2: Preliminary engineering reports for the water and waste disposal. April 4, 2013.

U.S. Environmental Protection Agency (EPA). 2015a. *Green book current nonattainment counties for all criteria pollutants*. <http://www.epa.gov/oaqps001/greenbk/ancl.html> Accessed August 18, 2015.

U.S. EPA. 2015b. *EJ View ACS summary report.* <http://www.epamap14.epa.gov/ejmap/entry.html> Accessed August 20, 2015.

Widdison, Jerold. 2014. Eastern New Mexico Rural Water System (Ute Pipeline Project). *Water Matters!* <http://uttoncenter.unm.edu/pdfs/water-matters-2014/24-eastern-new-mexico-rural-water-system.pdf>.

Wilson, Charles R. 2001. City of Portales, Water Conservation Plan. Prepared for the City of Portales by Charles R. Wilson, Consultant. Santa Fe, New Mexico. June 2001.

Wilson, C.R. 2013. City of Portales review of water supply options. Consultant report prepared for the City of Portales. November 2013.

Wilson, C.R. 2014a. *2014 Water conservation and use report*. Consultant report prepared for the City of Portales. June 2014.

Wilson, C.R. 2014b. *Water conservation plan.* Consultant report prepared for the City of Portales. December 2014.

Appendix A

Environmental Information Document

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Environmental Information Document for City of Portales Proposed Additional Water Supply Project

Prepared for **City of Portales, New Mexico**

September 11, 2015

Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109

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1. Purpose of and Need for Project

The current and exclusive source of the City of Portales water supply is groundwater drawn from the Ogallala Aquifer. This regional aquifer underlies eastern New Mexico and portions of Texas, Oklahoma, Kansas, Colorado, Nebraska, and South Dakota. The Ogallala Aquifer is being pumped at a faster rate than it is being recharged, resulting in declining water levels and reduced saturated thicknesses. As a result the City has experienced a steadily declining water supply.

A long-term regional solution to water supply shortages in eastern New Mexico is being developed. This project, the Eastern New Mexico Rural Water System (ENMRWS) project, will deliver water from Ute Reservoir to a number of communities, including Portales, through a 151-mile pipeline. While this project represents a long-term solution to Portales's water supply problems, it does not meet the immediate need, as the project is not anticipated to reach Portales for 10 years or more. In addition, the City desires to develop a contingency plan in the event that the ENMRWS never reaches Portales, as Portales will be the last customer to be served (and will deliver water to Grady). The City is therefore evaluating alternatives for meeting water supply needs for the next 20 years.

This environmental information document (EID) evaluates the action selected (through the evaluation outlined in the *City of Portales Preliminary Engineering Report for Additional Water Supply* [PER], (to which this EID is appended) to expand the City's water supplies and has been prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), the New Mexico Environment Department (NMED) Construction Programs Bureau State Environmental Review Process (*Approved by EPA 12/15/05; Revised 01/08/2104*), and other applicable guidelines and regulations.

1.1 Project Description

The City of Portales currently obtains most of its water supply from the Blackwater Well Field, with additional supply provided from the smaller and older Sandhill Well Field (Figures 1 and 2).

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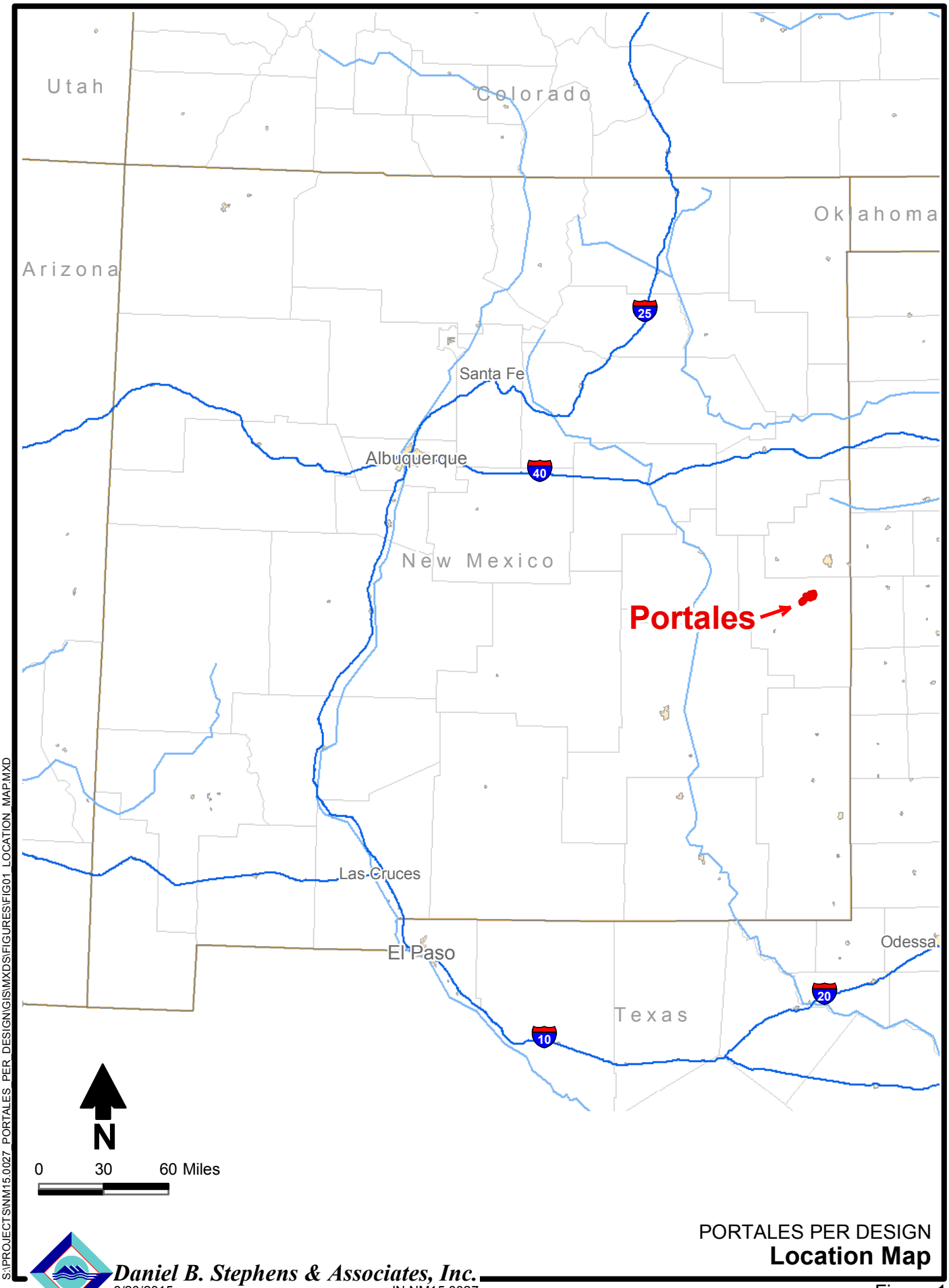

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PORTALES PER DESIGN
Location Map

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8/20/2015
JN NM15.0027

Figure 1

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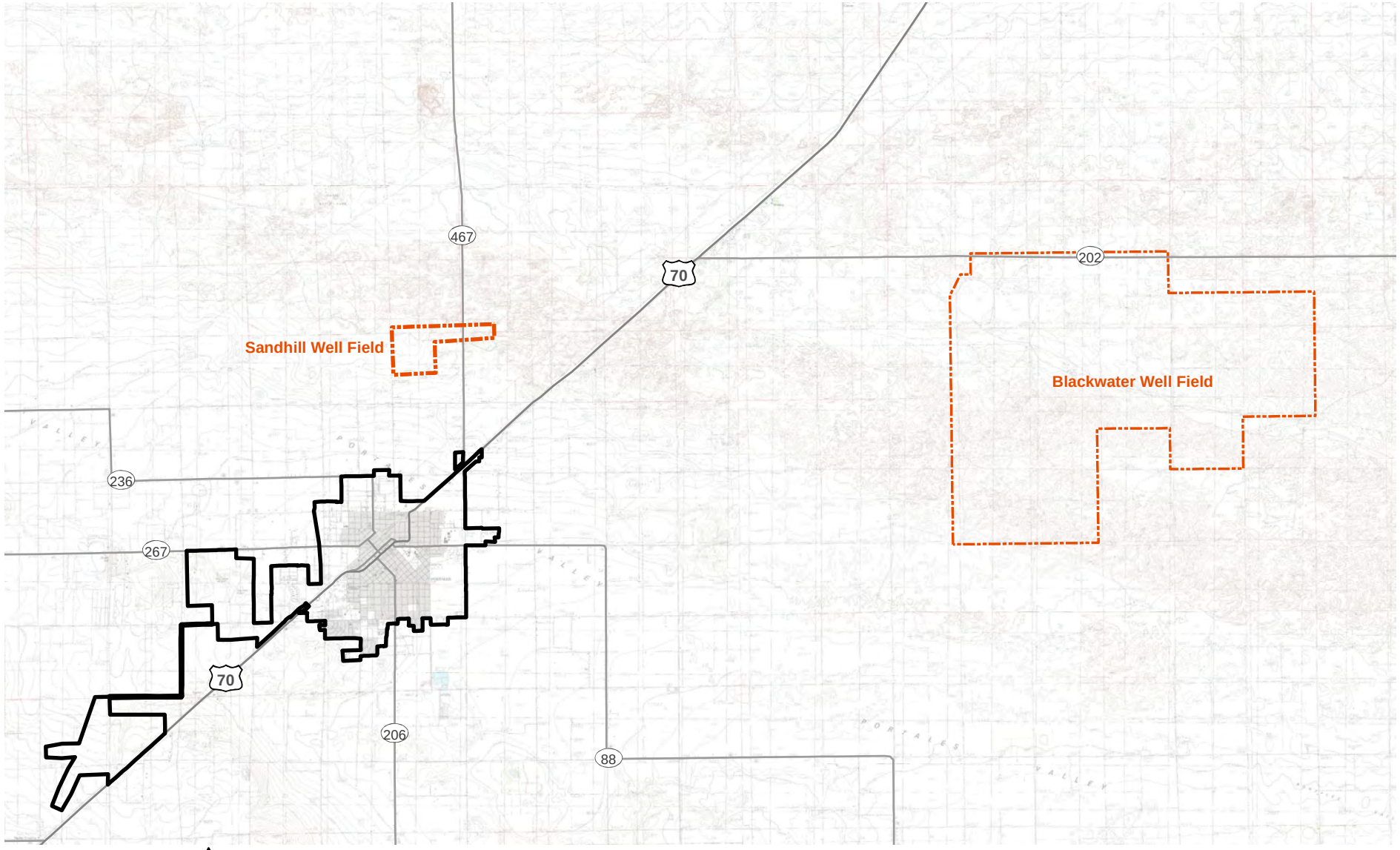

N

0 1 2 Miles

Explanation

Road

City of Portales

PORTALES PER DESIGN

Vicinity Map

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8/20/2015

JN LT13.0036

Figure 2

The City is also in the process of expanding their water supply by constructing a water reuse project designed to irrigate public parks and other municipal landscaping.

The City purchased the Blackwater Farm and adjacent Las Lomas properties in 2001 and retired agriculture in those areas to allow expansion of the Blackwater Well Field and create a groundwater reserve. Wells previously used for irrigation have been converted to municipal water supply wells by the City. All wells currently used for municipal water supply in the Blackwater Well Field and Sandhill Well Field are City-maintained groundwater wells.

The project (Preferred Alternative) is detailed in Section 2. Construction is anticipated to begin in 2016 and be completed in 2035.

1.2 Purpose and Need

The purpose of the project is to provide a sustainable water supply that will meet the City of Portales needs for the next 20 years, specifically addressing:

- *Health, sanitation and security:* Water is essential to health, sanitation, and security, and the City of Portales, even with the conservation measures already in place, continues to face a shortage in meeting the needs of its users due to declining groundwater levels in the area.

- *Population Growth:* This study assumes that the population in the water service area will continue to grow at the annual average rate experienced since year 2000 of approximately 2 percent. Based on this growth rate, the population served by the water system in 2035 will be 34,616 with a corresponding water use of 1,362,693,000 gallons per year, or 3.7 million gallons per day (mgd). As the population grows, the need for more water will also increase. An increased water demand will put the City at risk of a further diminished water supply such that the demands may exceed the available water supply.

2. Alternatives

This section discusses alternatives considered for meeting the project purpose and need. The PER evaluated four alternatives: (1) No Action, (2) Aquifer Storage and Recovery (ASR), (3) Rehabilitation of Existing Wells and Drilling New Wells, and (4) Water Conservation. The No Action alternative and the Preferred Action alternative are discussed in Sections 2.1 and 2.2.

2.1 Alternative A – No Action

This alternative requires no improvements to existing facilities. The water supply from existing wells would continue to decline, while the water demand due to growth would continue to increase. This would result in a shortfall of water supply to meet water demands. The No Action alternative would have no environmental effects because no action would occur.

2.2 Alternative B – Preferred Action

The Preferred Action recommended in the PER combines elements from the second, third, and fourth alternatives described above. This Preferred Action would include (1) rehabilitation of existing wells and drilling new wells, (2) storage of treated effluent during seasonal low demand months and recovery of that water during high demand times using ASR, and (3) continuation and expansion of the City's conservation program. No environmental consequences are associated with the conservation component of the Preferred Action; therefore this EID focuses on the well rehabilitation/drilling and ASR components.

2.2.1 Description

The Preferred Action consists of additional treatment of treated wastewater effluent, a pump station, piping, and direct injection wells. The Preferred Action also includes rehabilitating existing wells and drilling new wells in the Blackwater Well Field. The area of potential effect would vary depending on the location of well construction and the type of construction (e.g., construction of the pump station vs. pipe installation). Figures 1 and 2 show the location of the study area and Figure 3 shows the layout of the components of the Preferred Action.

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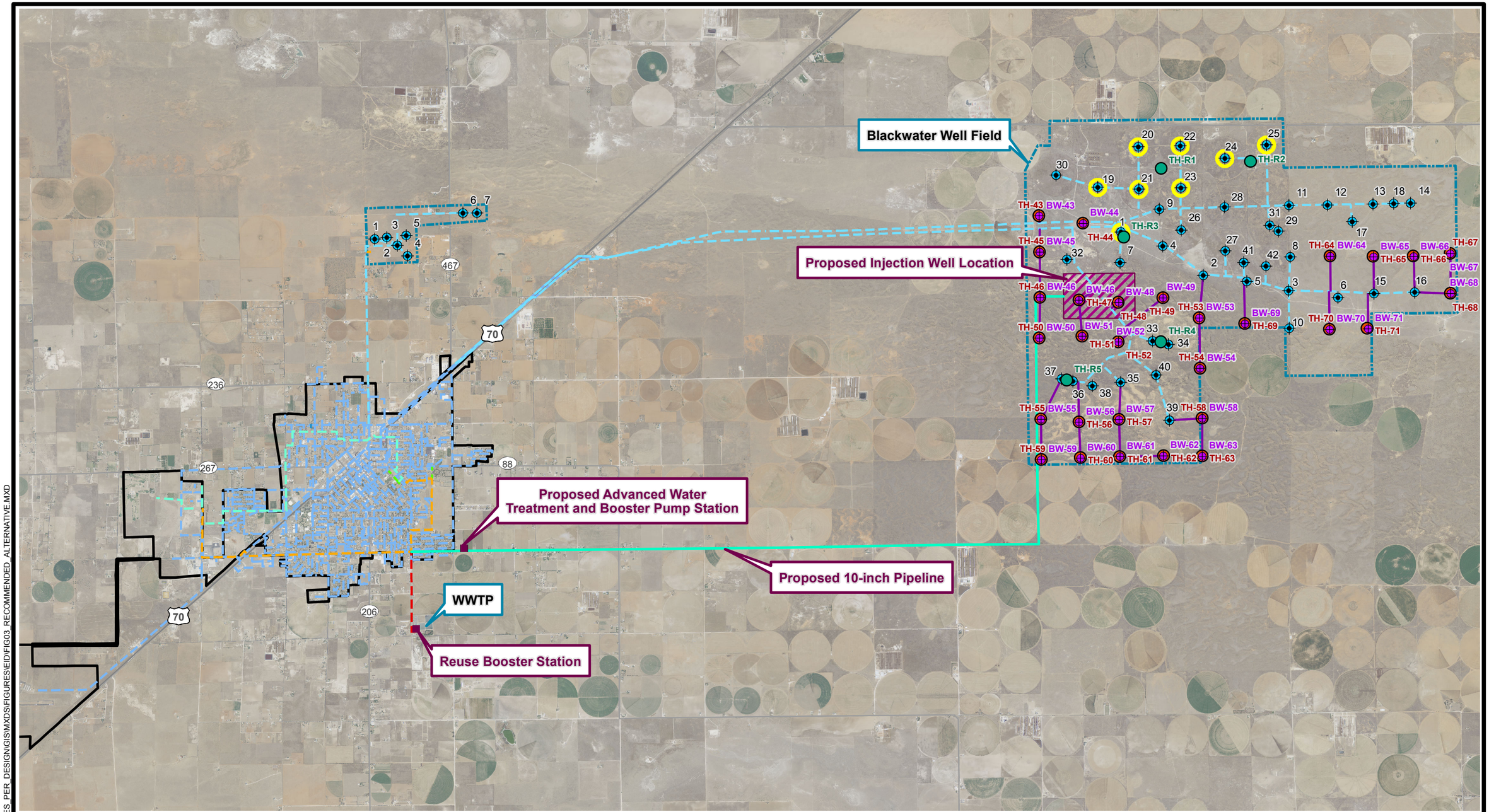

2011 aerial photography (USDA, 2011)

N

0 3000 6000 Feet

Explanation

- City of Portales
- Existing well
- Well to be rehabilitated
- Transmission line
- Water line
- Proposed well
- Exploratory test hole
- Rehabilitation evaluation test hole
- Proposed transmission line

Reuse pipeline Diameter (in)

- 4
- 6
- 8
- 10
- 12
- 16
- Existing pipeline

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Recommended Alternative

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JN NM15.0027

Figure 3

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2.2.1.1 Rehabilitating Existing Wells and Drilling New Wells

This part of the preferred action includes rehabilitating 8 existing wells and drilling 29 new wells in the current Blackwater Well Field area on City- and State-owned lands. An estimated 1,920 acres of additional property would also be acquired for drilling 20 additional new wells outside of the current Blackwater Well Field area. Test holes would be drilled in areas where new wells are to be constructed to characterize the exact lithology and saturation conditions at each location so that an appropriate well design can be developed. Test holes would also be drilled in the vicinity of wells to be rehabilitated in order to evaluate whether depleted or unfavorable aquifer conditions may be causing the observed low specific capacity in these wells. New wells would be drilled no farther than 5 to 10 feet from a test hole, as subsurface conditions can vary significantly in a short distance within the Ogallala Aquifer. Unpaved access roads would be constructed to the new wells as necessary.

Recommended locations for test holes are shown on Figure 3. Additional wells beyond those that can be developed in the existing Blackwater Well Field will be needed to meet the projected 20-year demand. This will require acquisition of land for a new well field. Figure 4 shows the proposed location for land acquisition, west of the existing well field and south of the existing transmission pipeline. Three sections of land are estimated to be required for development of the 20 wells.

New wells would be drilled to the bottom of the Ogallala Aquifer, a depth of approximately 200 feet below ground surface. Based on the assumed production capacity, the new wells are sized at 10 inches in diameter with an 18-inch borehole. The water from the wells would be pumped to the Johnson Hills water storage tanks, west of the Blackwater Well Field, along U.S. Highway 70. Water would then be transported to the existing treatment plant in Portales through existing municipal water lines.

2.2.1.2 Aquifer Storage and Recovery (ASR) at Blackwater Well Field.

The ASR component would consist of additional treatment of treated wastewater effluent, a pump station, piping, and 4 direct injection wells. Water would be supplied from the existing wastewater treatment plant (WWTP) by a booster station from the reuse distribution system. The booster station would pump to an advanced water treatment (AWT) facility located on

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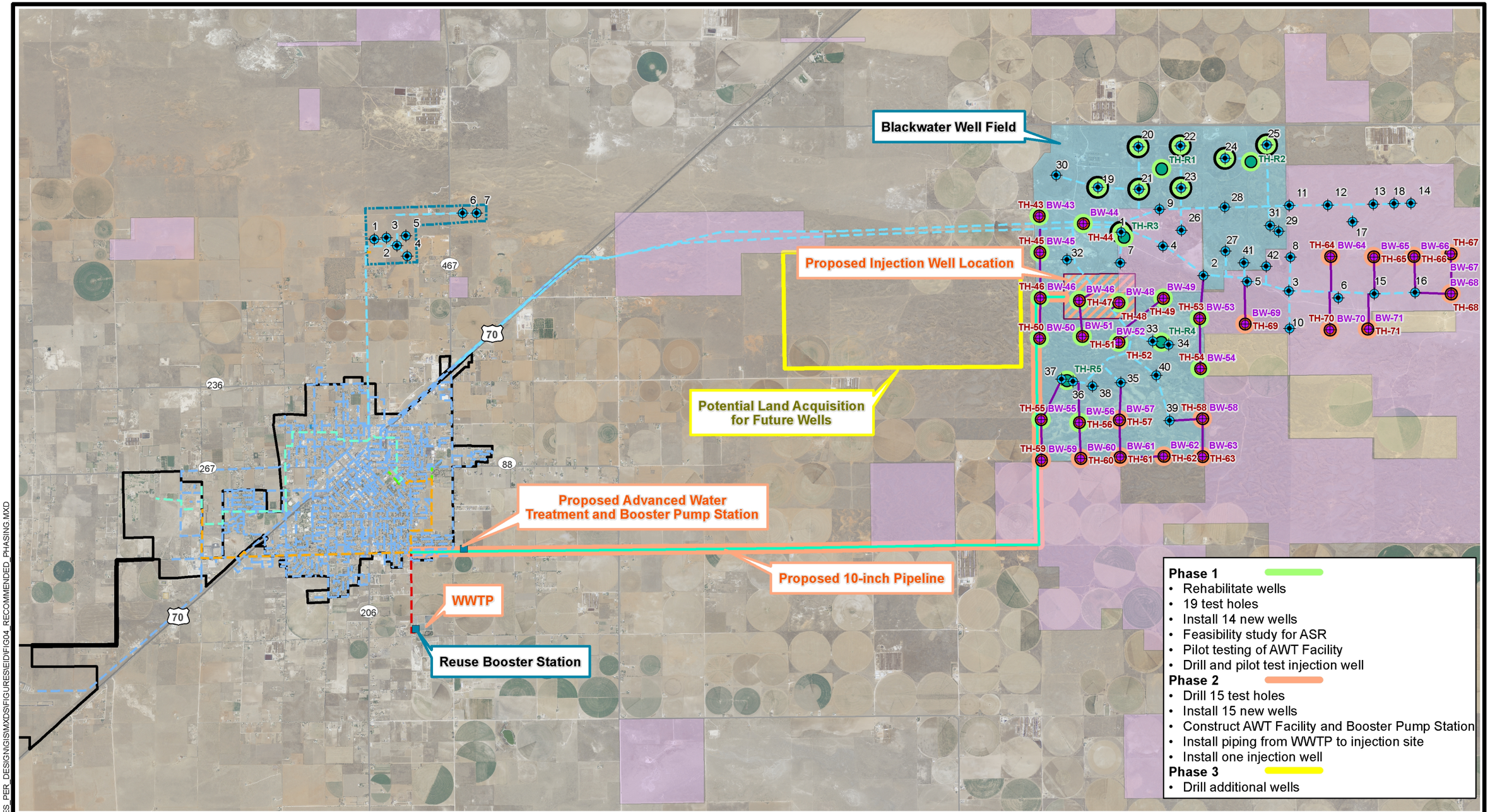

N

0 3000 6000 Feet

Explanation

- City of Portales
- Existing well
- Well to be rehabilitated
- Transmission line
- Water line
- Proposed well
- Exploratory test hole
- Rehabilitation evaluation test hole
- Proposed pipeline

Reuse pipeline Diameter (in)

- 4
- 6
- 8
- 10
- 12
- 16
- Existing pipeline

Land ownership

- City property
- State property
- Private property

CITY OF PORTALES WATER SUPPLY
PRELIMINARY ENGINEERING REPORT

Recommended Project Proposed Phasing

Daniel B. Stephens & Associates, Inc.
9/14/2015 JN NM15.0027

Figure 4

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private property to be acquired within the Portales city limits (Figure 3). From there, a second booster station will deliver the reuse water to the injection wells at the Blackwater well field (Figure 3).

The AWT facility will receive treated wastewater from the WWTP and will be designed to include membrane filtration or advanced oxidation, following by ultraviolet or chemical disinfection. The treated water released for injection to the aquifer would meet New Mexico Environment Department drinking water standards. In addition, treatment for unregulated trace constituents, or micro-constituents, including endocrine disrupting compounds (EDCs) and pharmaceuticals and personal care products (PPCPs) would be implemented.

A 75-horsepower (hp) booster station would be required for the direct injection at the Blackwater Well Field. Piping installed from the AWT to the well field would be 10-inch polyvinyl chloride (PVC) C900 piping. The piping would be constructed within existing road right-of-way or State lands. Access and easements would be coordinated with Roosevelt County and/or the New Mexico State Land Office as necessary.

2.2.2 Phasing

The Preferred Action would be implemented in three phases. Phase 1, to be completed in the next 5 years, would include test hole drilling, existing well rehabilitation and new well drilling, and a feasibility study for ASR. Phase 2, to be completed within 10 years, would include drilling additional new wells, constructing the AWT facility, and installing the first direct injection well. Phase 3, to be completed in the next 20 years, would include constructing additional new wells on property to be acquired outside of the current well field boundary. All phases of the Preferred Alternative would include water conservation, to continually lower the per capita demand through a variety of strategies including wastewater reuse, customer rebates and incentives to lower both indoor and outdoor water use, enforcement of existing ordinances related to water conservation and water waste, leak detection and repair, and an ongoing public education campaign. Figure 4 shows the phasing for the Preferred Action.

2.2.3 Land Requirements

The City owns property at the Blackwater Well Field, so land acquisition would not be required for the wells or pipelines within the existing well field. Once the existing well field is completely developed, however, acquisition of additional land would be required. Existing transmission pipelines from the well field to the Johnson Hill tanks can be used, and new pipelines are assumed to be located within the right-of-way along existing roadways, on City-owned property, or on State-leased land. The City would coordinate with the State Land Office for access and a utility easement. Access permits and temporary easements would be coordinated with and obtained from the City, County, and/or New Mexico Department of Transportation (NMDOT) as required for any pipeline construction within the road right-of-ways. Land required for additional new wells outside of City-owned property and for the AWT facility would be acquired from private property owners as necessary. New wells are also proposed to be drilled on State lands adjacent to City-owned land. Leases would be negotiated with the New Mexico State Land Office for these lands.

2.2.4 Cost Estimate

The cost estimates for the Preferred Action would be phased over time as shown in Table 1:

Table 1. Capital Cost Analysis by Phase of Recommended Alternative

Phase	Cost ($)				
	Construction	Non-Construction	25% Contingency	8.1875% NMGRT	Total
1	6,072,000	3,411,000	2,370,750	970,526	12,824,276
2	15,521,000	5,289,000	5,202,500	2,129,773	28,142,273
3	10,206,000	4,858,000	3,766,000	1,541,706	20,371,706

NMGRT = New Mexico gross receipts tax

The total estimated cost for all three phases in 2015 dollars is $61,338,255.

3. Affected Environment/Environmental Consequences

The City of Portales is located in east-central New Mexico within Roosevelt County. The City is part of what is designated as the Clovis-Portales Micropolitan Area, which includes parts of both Roosevelt and Curry counties. The region is part of the Eastern Plains, where the local economy is driven primarily by agricultural, dairy farms, ranching, Eastern New Mexico University, and the nearby Cannon Air Force Base. The area outside the city limits, including the Sandhill Well Field and the Blackwater Well Field, is rural residential development, agricultural fields, and rangeland.

Sections 3.1 through 3.12 detail the affected environment of the project area for the ASR and well rehabilitation/drilling components of the Preferred Action and the environmental consequences of implementing this action.

3.1 Environmental Setting

The City of Portales is located within the level, treeless, elevated plains that are part of the Llano Estacado, a large caprock formation that covers part of eastern New Mexico and west Texas. The mesa or caprock rises in elevation from 3,750 to 5,300 ft msl over such a large area as to be almost imperceptible except in a few locations around the edge where cliffs drop off to the plains below. The Llano Estacado is the remnant of the Ogallala Formation, formed of Miocene-Pliocene sediments from the southern Rocky Mountains, and at one time extended to the foot of the mountains but over time has eroded away, leaving behind the caliche caprock as the prominent geological feature of the Eastern Plains. The caliche caprock of the Llano Estacado overlies Jurassic rocks, which in turn rest on Triassic rocks (Chronic, 1987).

The area outside the town limits has been used historically for rangeland, then for agricultural purposes to grow crops of wheat, corn, and other grain crops. The Portales Valley, an inset of the Llano Estacado, is located north of the city. The Sandhill Well Field is located on the southern edge of the valley and the Blackwater Well Field is located within the sand hills and dune-dominated valley.

Precipitation averages approximately 17.0 inches per year and the average temperature is 58.8 degrees Fahrenheit (°F); the average annual high is 74.3°F and the average annual low of 43.3°F. Water is very limited, with few to no streams and ephemeral pools or playas typically being the only source of surface water (Griffith et al., 2006).

The scope of the preferred action would include the rehabilitation/ drilling of groundwater wells, an ASR system, and continuation and expansion of the City's conservation program. Some areas of construction would occur on previously undisturbed ground; however, most of the construction would be within previously disturbed areas or along existing roads. Water line construction would be designed such that temporarily disturbed areas would be returned to pre-construction elevations and native vegetation would be reseeded as needed. Best management practices (BMPs) such as erosion, traffic control, and waste management would be in place to mitigate construction impacts. If additional land acquired for new wells outside of City property was used for agricultural purposes, the land would be taken out of production. The effect on the environmental setting would be less than significant, as other lands in the region have also been taken out of production.

3.2 Land Use

The predominant land use of the area around the City of Portales is agricultural and livestock range with scattered rural residential development.

3.2.1 General Land Use

Portions of the Preferred Action are within the City limits in areas that are residential, municipal, commercial, and light industrial development. The Blackwater Well Field is used for supplying water to the City of Portales. The area around the well field consists primarily of agricultural development, vacant grassland, and rural residential land. Portions of the expanded Blackwater Well Field are lands that had previously been used for agricultural purposes; after the City purchased these lands, irrigation of fields was discontinued and the land is no longer used for growing crops.

The City owns the Blackwater Well Field; therefore, no change to land use in the areas of the well field would occur as a result of the project. Access and easement permits and leasing agreements would be obtained from the State Land Office for any land use changes on State lands. A letter seeking input was sent to the Field Office coordinator (Attachment 1). If the water line alignment crosses any private property, the City will coordinate with the landowner(s) to obtain permission and access to the property. Effects to the general land use as a result of implementation of the Preferred Action would range from a change in land use (i.e., agricultural use to vacant land or part of a water treatment facility) to no change. Areas that would be affected would be rezoned if necessary, and leasing agreements and other permits or agreements would be in place prior to the start of any construction; therefore, the overall direct effect of the Preferred Action would be less than significant.

3.2.2 Growth and Population Trends

According to the 2010 census the City of Portales population was 12,265 (U.S. Census, 2015). The estimate for 2013 was 12,497, reflecting an annual average growth rate of 1.8 percent (U.S. Census, 2015). Assuming that this growth rate continues, the population served by the water system in 2035 will be 34,616 with a corresponding water use of 1,362,693,000 gallons per year, or 3.7 mgd.

The Preferred Action would lower the risk of a further diminished water supply and provide a measure of support for maintaining a sustainable water supply for the City of Portales for the next 20 years. This in turn would provide for the City's population to continue to grow at the projected rate. The Preferred Action would therefore have a beneficial effect of aiding in population stability for the City.

3.2.3 Important Farmland

There are no prime farmlands, prime rangelands, or prime forest land within the Blackwater Well Field (USDA NRCS, 2015). There are some farmlands adjacent to the pipeline alignments that are classified as "farmland of statewide importance" (USDA NRCS, 2015). The AWT facility would be located on land that is classified as farmland of statewide importance. Farmland that

is converted to water storage use is not subject to the Farmland Protection Policy Act (FPPA) subtitle I of Title XV, Section 1539-1549 (USDA NRCS, 2015). The NRCS was contacted to provide input on potential effects of the Preferred Action on important farmland.

Farmlands would not be disturbed, as the water lines would be installed in existing road right-of-ways that are adjacent to important farmlands. The Preferred Action would therefore have no effect on any important farmland or other classified lands.

3.2.4 Soils

Figure 5 shows all of the soils within the area of the Preferred Action. Predominant soils in the area of Blackwater Well Field are Nutivoli-Spantara fine sands with areas of Gomez loamy fine sand, a calcareous, sandy eolian deposit from the Blackwater Draw formation of Pleistocene age found on 0 to 3 percent slopes. The area of the AWT facility (Figure 3) is located within Amarillo fine sandy loam and Acuff very fine sandy loam. These soils are classified as soils of statewide importance and significance.

Soils would be directly affected from ground disturbance as a result of the Preferred Action. Erosion control measures would be taken as part of construction BMPs; therefore, any direct effects would be minimized and temporary.

3.2.5 Formally Classified Lands

There are no formally classified lands within the project area for the Preferred Action. Therefore, no effects to formally classified lands would result from implementation of the Preferred Action.

3.3 Floodplains

Federal Emergency Management Agency (FEMA)-designated flood zones are shown on Figure 6. The portions of the project area for the Preferred Action that are within the city limits are classified as flood zone X or flood zone AH (FEMA, 2010). Zone X areas are those with a

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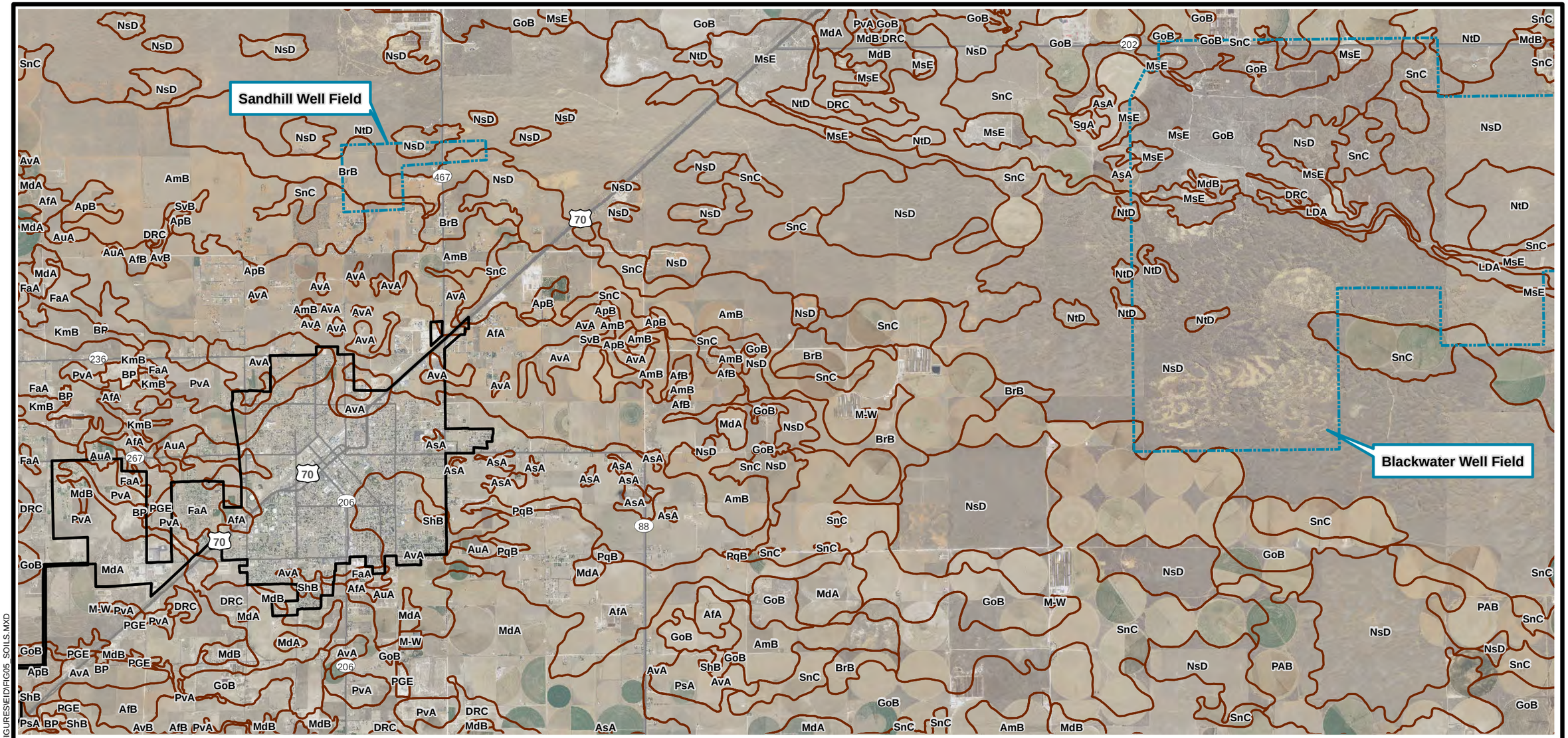

Source: USDA NRCS, 2014

Explanation

City of Portales

Soil map unit

AfA - Amarillo fine sandy loam, 0 to 1 percent slopes
AfB - Amarillo fine sandy loam, 1 to 3 percent slopes
AmB - Amarillo loamy fine sand, 0 to 3 percent slopes
ApB - Arvana loamy fine sand, 1 to 5 percent slopes
AsA - Arch fine sandy loam, 0 to 1 percent slopes
AuA - Acuff very fine sandy loam, 0 to 1 percent slopes
AvA - Arvana fine sandy loam, 0 to 1 percent slopes
AvB - Arvana fine sandy loam, 1 to 3 percent slopes
BP - Borrow pits
BrB - Brownfield fine sand, 0 to 3 percent slopes
DRC - Drake soils, 1 to 8 percent slopes
FaA - Friona very fine sandy loam, 0 to 1 percent slopes
GoB - Gomez loamy fine sand, 0 to 3 percent slopes
KmB - Kimberson gravelly loam, 0 to 3 percent slopes
LDA - Levelland soils, 0 to 2 percent slopes, occasionally flooded
M-W - Miscellaneous water
MdA - Midessa fine sandy loam, 0 to 1 percent slopes
MdB - Midessa fine sandy loam, 1 to 3 percent slopes
MsE - Milsand and Arch soils, 1 to 20 percent slopes
NsD - Nutivoli-Spantara fine sands, 1 to 12 percent slopes
NtD - Nutivoli fine sand, 8 to 20 percent slopes
PAB - Patricia and Amarillo loamy fine sands, 0 to 3 percent slopes
PGE - Potter soils, 3 to 20 percent slopes
PqB - Pep very fine sandy loam, 1 to 3 percent slopes
PsA - Posey fine sandy loam, 0 to 1 percent slopes
PvA - Portales very fine sandy loam, 0 to 1 percent slopes
PvB - Portales very fine sandy loam, 1 to 3 percent slopes
SgA - Seagraves fine sandy loam, 0 to 1 percent slopes
ShB - Sharvana fine sandy loam, 0 to 3 percent slopes
SnC - Spantara fine sand, 1 to 5 percent slopes
SpA - Sparenberg clay, 0 to 1 percent slopes, occasionally ponded
SvB - Sharvana loamy fine sand, 0 to 3 percent slopes

N

0 0.5 1 Miles

PORTALES PER DESIGN

Soils

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JN NM15.0027

Figure 5

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S:\PROJECTS\NM15.0027_PORTALES_PER_DESIGN\GIS\MXDS\FIGURES\EID\FIG06_FEMA_FLOOD.MXD

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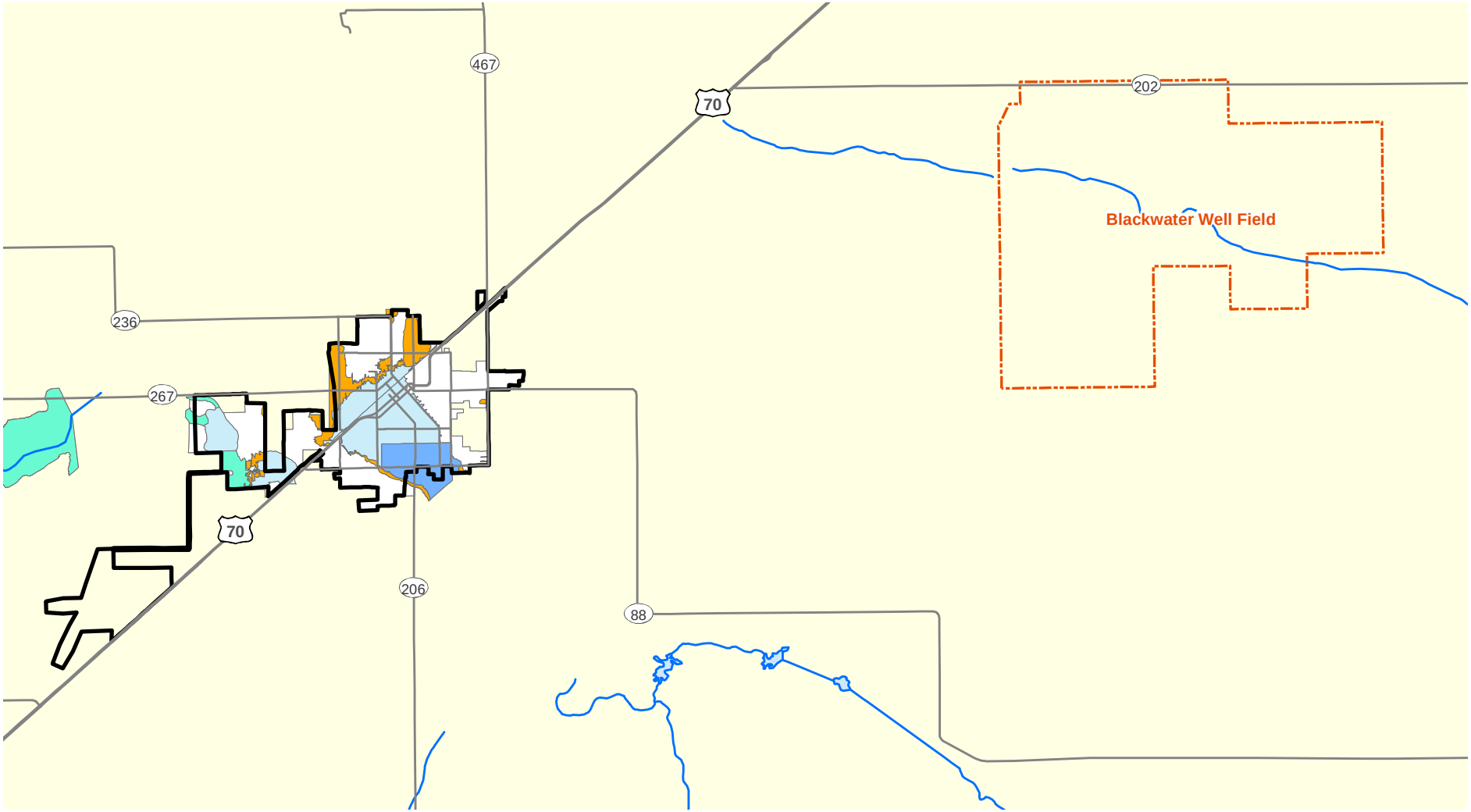

Source: FEMA, 2015

N

0 1 2 Miles

Explanation

FEMA flood zone

- Zone A - 1% annual chance flood hazard; no base flood elevations determined
- Zone AE - 1% annual chance flood hazard; base flood elevations determined
- Zone AH - Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined
- Zone X - 0.2% annual chance flood hazard
- Zone X - Area of minimal flood hazard
- Zone D - Area in which flood hazards are undetermined, but possible
- Road
- City of Portales

Figure 6

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PORTALES PER DESIGN

FEMA Flood Designations

0.2 percent annual chance of floods, areas with a 1 percent annual chance of floods with an average depth of less than 1 foot, or areas protected by levee from a 1 percent annual chance of floods (FEMA, 2010). Zone AH areas are a special flood hazard area with a 1 percent annual chance of flood with depths of 1 to 3 feet (usually ponded areas) with base flood elevations determined (FEMA, 2010). The flood hazard of the area outside of the city limits, including the Blackwater Well Field, is undetermined, so those areas are potentially within a flood zone (FEMA, 2010).

The Roosevelt County Floodplain Administrator was contacted for input on potential flood-related consequences of implementing the Preferred Action (Attachment 1).

3.4 Wetlands

A desktop review of mapped wetlands within the study area of the Preferred Action identified no designated wetlands (USFWS, 2015a). Based on this review of mapped wetlands, no effects to wetlands would occur as a result of the Preferred Action. The U.S. Army Corps of Engineers (USACE) was contacted for input on potential effects to wetlands in the area of the Preferred Action (Attachment 1).

3.5 Water Resources

3.5.1 Surface Water

The area of the Preferred Action contains scarce surface water resources. Surface water comes primarily from ephemeral springs, ephemeral streams, playas, stock tanks, and irrigation wells (Griffith et al., 2006).

The NMED Surface Water Quality Bureau was contacted for input on surface water resources that might result from implementation of the Preferred Action (Attachment 1). The WWTP located southeast of the city currently contains lagoons for treatment. After treatment, the discharge is then stored at a playa and reused for crop irrigation (Wilson, 2014). Implementation of the Preferred Action would divert the water for direct injection to the aquifer

rather than for irrigation; the playa would therefore not receive future discharge and would dry over time. Given that the playa is currently used for agricultural purposes, it is not a water resource of value to wildlife, recreation, or other purposes. Thus the Preferred Action would only affect the supply of surface water for irrigation purposes; however, this would be offset by the City's purchase and retirement of farms in the area. Therefore, the effect of the elimination of the surface water would be less than significant.

3.5.2 Groundwater

The primary groundwater resource of the region is the Ogallala Aquifer, which underlies eastern New Mexico and portions of six other states. As noted in Section 1, the Ogallala Aquifer is being pumped at a faster rate than it is being recharged resulting in declining water levels and reduced saturated thickness.

As discussed in Section 2.1, if no action is taken, the resource would be pumped at a rate that would not be sustainable for the predicted growth of the City of Portales for the next 20 years. A negative, long-term direct effect would therefore result from the No Action alternative.

The NMED Ground Water Quality Bureau was contacted for input on potential impacts to groundwater resulting from the ASR component of the Preferred Action (Attachment 1). Through reinjection of treated water into the aquifer, groundwater would be receiving a new recharge source, and the ongoing decline in saturated thickness would be mitigated to some degree (though not eliminated), serving to lengthen the life of the well field. A beneficial, long-term direct effect would therefore result from implementation of the Preferred Action.

Groundwater wells are currently pumping from the Blackwater Well Field for municipal use. Two farms in the well field area were purchased by the City and retired from pumping for agricultural purposes. The groundwater resource in the area is allocated to the City and would be used for municipal water. Pumping of additional water would occur in currently undeveloped areas of the well field. However, the impacts of new pumping would be offset by the elimination of pumping for agricultural purposes. Due to this offset, effects on groundwater would be expected to be minimal.

3.6 Coastal Resources

As specified in 40 CFR 6.302(d) and (f), all federal activities in coastal areas are required to be consistent with approved State Coastal Zone Management Programs. No areas in New Mexico are within a coastal zone.

3.7 Air Quality

The Clean Air Act (CAA) of 1970 mandated that the U.S. Environmental Protection Agency (EPA) establish a list of pollutants for the purpose of establishing the national primary and secondary ambient air quality standards. National Ambient Air Quality Standards (NAAQS) have been promulgated for six pollutants: carbon monoxide (CO), lead (Pb), ozone (O_3), particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM10), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2). The fundamental method by which EPA tracks compliance with the NAAQS is through the designation of areas as in either attainment, nonattainment, or maintenance or as unclassifiable. Areas are given the status of nonattainment due to violations of one or more of the established NAAQS and must then comply with more stringent standards until the NAAQS are achieved in that area.

The City of Portales and the Blackwater Well Field are within Roosevelt County, in an area that is currently designated by EPA as an attainment area for all air pollutants identified in the NAAQS (U.S. EPA, 2015a). In addition, no hazardous emissions, as defined by the National Emission Standard for Hazardous Air Pollutants (NESHAP), would be associated with the Preferred Action, including the AWT facility, because it is a secondary advanced treatment plant processing water already treated at the primary WWTP. Therefore, no emissions would result from the Preferred Action that would require compliance with state or federal implementation plans.

Temporary air quality effects would occur from construction activities, from dust and emissions from construction equipment. Best management practices would be implemented in accordance with NMED requirements to mitigate air quality issues. The Preferred Alternative would therefore have a less than significant effect on air quality.

The NMED Air Quality Bureau was contacted for input on potential air quality effects of implementing the Preferred Action (Attachment 1).

3.8 Biological Resources

3.8.1 Vegetation

The region of the City of Portales is within the Llano Estacado ecoregion with the exception of the Portales Valley north of the city, which is part of the Shinnery Sands ecoregion (Griffith et al., 2006). The Llano Estacado ecoregion is part of the level, treeless, elevated plains typical of eastern New Mexico and western Texas. The Llano Estacado, or the caprock, is higher and drier than the central Great Plains to the east and is subject to high solar radiation and long windy periods, particularly during winter and early spring (Brown, 1994). The region historically was a vast grassland of shortgrass prairie species dominated by buffalo grass (*Buchloe dactyloides*), blue, hairy, and sideoats grama (*Bouteloua spp.*), and little and silver bluestem (*Andropogon spp.*), mixed with herbaceous plants such as globe mallow (*Sphaeralcea parvifolia*), sunflower (*Helianthus annuus*), and purple prairie clover (*Dalea purpurea*) (Griffith et al., 2006). Shrubs including mesquite (*Prosopis glandulosa*), narrowleaf yucca (*Yucca glauca*), and western soapberry (*Sapindus drummondii*) have spread into the shortgrass prairie and are the dominating plant community in many areas.

Vegetation associated with the Shinnery Sands area is dominated by the shin oak shrub (*Quercus havardii*) and sand sagebrush (*Artemisia filifolia*). Other vegetation includes broom snakeweed (*Gutierrezia sarothrae*) and yucca (*Yucca* spp.) as well as arid grassland species such as bush muhly (*Muhlenbergia porterii*), dropseed (*Sporobolus* spp.), and grama grasses.

The majority of the Preferred Action project area has been altered from its natural state for the production of crops and contains very little native prairie (Google Earth, 2014). Most of the surrounding developed lands are irrigated fields with crops of wheat, corn, and other grains. The areas of shortgrass prairie are comprised of grasses such as buffalo grass, blue and sideoats grama, and little bluestem and forbs including globemallow, sunflower, and stiffstem flax mixed with shrubs that include mesquite and narrowleaf yucca. The area of the Blackwater

Well Field is within the Portales Valley and the Shinnery Sands ecoregion. Much of the well field has been farmed previously but has been retired from irrigated agricultural fields and the land appears to be returning somewhat to native vegetation (Google Earth, 2014). The undisturbed areas of the Blackwater Well Field would contain the shin oak and sand sagebrush community.

Implementation of the Preferred Action would result in the clearing of vegetation in some areas; however, much of the alignment would use existing roads or previously disturbed areas, thereby minimizing vegetation disturbance. Areas that would be cleared would be reseeded with native seed as necessary. BMPs would be implemented to deter the spread of noxious weeds. Implementation of ASR would have a short-term effect but not a long-term effect on vegetation.

3.8.2 Wildlife

Wildlife associated with the Llano Estacado ecoregion include a rich diversity of species acclimated to shortgrass prairies. At least 186 bird species occur in this region, including ferruginous hawk (*Buteo regalis*), ash-throated flycatcher (*Myiarchus cinerascens*), American goldfinch (*Spinus tristis*), Cassin's kingbird (*Tyrannus vociferans*), mourning dove (*Zenaida macroura*), horned lark (*Eremophila alpestris*), and Western meadowlark (*Sturnella neglecta*). Large mammals of the area include coyote (*Canis latrans*) and pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), white-tail deer (*Odocoileus virginianus texana*), and smaller mammals such as cottontail rabbit (*Sylvilagus audubonii*), black-tail prairie dog (*Cynomys ludovicianus*), and banner-tail kangaroo rat (*Dipodomys spectabilis baileyi*). At least 30 reptiles, including the Great Plains toad (*Anaxyrus cognatus*), New Mexico spadefoot (*Spea multiplicata*), horned lizard (*Phrynosoma modestum*), and snakes such as western diamondback rattlesnake (*Crotalus atrox*), prairie racerunner (*Aspidoscelis sexlineata*) and gophersnake (*Pituophis catenifer*), are commonly found in the area. There are no surface water resources in the project area to support fish.

The direct effects (permanent and temporary) of the Preferred Action to non-listed species would include temporary noise increase and ground disturbance during construction. Noise disturbance during construction could affect wildlife in the project area. Although much of the

habitat has been disturbed by agriculture and other development, there is undisturbed ground within the utility corridors and in the area of proposed development at the Blackwater Well Field that may contain habitat suitable for ground-nesting birds. Few trees are located within the utility corridor and well fields; however, there are shrubs that could present foraging and nesting habitat for birds including migratory bird species. The project therefore has a potential to impact nesting birds if construction occurs during the nesting season of March 15 through September 15. If construction activities begin during the migratory bird breeding season (March 15 through September 15), a pre-construction nesting bird survey of the project area should be completed, and if occupied nests are found, they must be avoided until the young have fledged. The project should comply with the requirements of the Migratory Bird Treaty Act and should not cause harm or harassment to migratory birds.

Rodent burrows may be disturbed within the project area. If other wildlife, such as by burrowing owls (*Athene cunicularia*), use the burrows, direct disturbance would affect these species during construction. Wildlife dens may also be affected by construction activities. Heavy equipment usage and access would largely be confined to existing roadway surfaces; therefore, disturbance and impact to wildlife habitat from the movement of heavy equipment would be negligible.

Smaller species such as rodents, lizards and snakes could possibly be trapped in trenches during construction and installation of pipelines. Mitigation measures would be implemented as recommended by the New Mexico Department of Game and Fish (NMDGF, 2003) to minimize the potential of trapping wildlife. Measures include the following:

- Trenching and backfilling crews will be kept close together, to minimize the number of open trenches at any given time

- Trenches will not be left open overnight. Where trenches cannot be backfilled immediately, escape ramps should be constructed at least every 90 meters. Escape ramps would be short lateral trenches or wooden planks sloping to the surface at less than 45 degrees (1:1). Trenches that have been left open overnight will be inspected and animals removed prior to backfilling.

3.8.3 Threatened and Endangered Species

A review of federal threatened and endangered species was conducted for this evaluation by generating an online report for the Blackwater Well Field using the U.S. Fish and Wildlife Service (USFWS) Information, Planning and Conservation (IPaC) tool. The IPaC report listed a total of three federal threatened, endangered, or candidate species (USFWS, 2015b). According to the New Mexico Department of Game and Fish *Biota Information System of New Mexico* (BISON-M), nine state-listed endangered or threatened species have the potential to occur in Roosevelt County (NMDGF, 2015a). No plant species were listed as federal or state threatened or endangered species (USFWS, 2015b; NMEMNR, 2015), and no critical habitat is located within the project area or within the surrounding region (USFWS, 2015c). Table 2 summarizes the federal- and state-listed species of the region.

Only one state or federally listed species was determined to have the potential to occur in the project area (Figure 7). The lesser prairie-chicken (*Tympanuchus pallidicinctus*) is federally listed as threatened. It is a prairie grouse species of the southern Great Plains that is threatened by habitat loss, degradation, and fragmentation. The lesser prairie-chicken occupies mid-grass rangelands characterized by shinnery oak, sand sagebrush, and mixed-grass communities of bluestem, grama, and dropseed grasses. The lesser prairie-chicken requires several distinct habitat types, including open areas for display and mating, dense vegetative cover for nesting, and areas with suitable resources and cover for brood-rearing and winter feeding (NM Avian Conservation Partners, 2015).

The Blackwater Well Field is within shortgrass prairies and/or shinnery oak and sand sagebrush communities preferred by the lesser prairie-chicken. While the project area is not within designated critical habitat, according to Southern Great Plains Crucial Habitat Assessment Tool (SGP CHAT) mapping, the Blackwater Well Field is located within a crucial habitat connectivity zone and a portion of the Blackwater well field is within the 2013 estimated occupied range of the lesser prairie chicken (KARS, 2013). Figure 7 shows the habitat in relation to the study area. Further evaluation and coordination with the USFWS would be necessary prior to start of construction to determine the significance of any potential effects.

Table 2. State and Federal Threatened and Endangered Species
Page 1 of 5

Species Category	Species	Status [a]	Habitat Associations	Evaluation
Listed invertebrates	None			
Listed fish	None			
Listed amphibians	None			
Listed mollusks	None			
Listed reptiles	Dunes sagebrush lizard (*Sceloporus arenicolus*)	SE	The dunes sagebrush lizard inhabits sand dune habitat with shinnery oak (*Querqus havardii*) complexes. It is most abundant in the vicinity of active and semi-stabilized sand dunes within the Mescalero Sands east of Carlsbad.	The area of Portales including the Blackwater Well Field may contain areas of suitable habitat; however, because of fragmentation in the area caused by agricultural and other development, suitable habitat would likely be marginal. In addition, dunes sagebrush is not known to occur within the area of Portales.
Listed birds	Varied bunting (*Passerina versicolor*)	ST	The varied bunting is found in Chihuahuan desert scrub and desert riparian deciduous woodlands and marsh, with a preference for the desert canyons and riparian edges. According to Avian Conservation Partners species account, in New Mexico, varied buntings occur within desert canyons, thorn-scrub, and riparian edge habitats within the extreme southern portion of New Mexico. Very small breeding populations exist at three locations in southern New Mexico within Hidalgo, Doña Ana, and Eddy Counties.	The area of Portales including the Blackwater Well Field is not within Chihuahuan desert scrub or desert canyons or riparian edge habitats and is north of known occupation locations in New Mexico. The varied bunting is therefore not likely to be present.
	Peregrine falcon (*Falco pergrinus*)	ST	Habitat of the peregrine falcon is primarily located in open wetlands near cliffs. In New Mexico, the breeding territories center on cliffs that are in wooded/forested habitats with large “gulfs” of air nearby in which these predators can forage.	The area of Portales including the Blackwater Well Field is not within cliffs near wetlands. The peregrine falcon is therefore not likely to be present.

[a] Explanations and definitions are provided on the last page of the table.

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Table 2. State and Federal Threatened and Endangered Species
Page 2 of 5

Species Category	Species	Status [a]	Habitat Associations	Evaluation
Listed birds (cont.)	Arctic peregrine falcon (*Falco peregrinus tundrius*)	ST	The Arctic peregrine falcon inhabits tundra, wintering along the Gulf Coast from Florida west to eastern Mexico and parts of Baja California.	The area of Portales including the Blackwater Well Field is not within tundra habitat. The Artic falcon is therefore not likely to be present.
	Bald eagle (*Haliaeetus leucocephalus*)	ST	The bald eagle is usually found along seacoasts, lakes, and rivers. Nesting sites are usually isolated high in trees, on cliffs, or on pinnacles. In New Mexico, bald eagles occur casually to occasionally in summer near localized large waterbodies and rivers. They migrate and winter almost statewide.	The area of Portales is not within or near any large water sources. The bald eagle is therefore not likely to be present.
	Lesser prairie chicken (*Tympanuchus pallidicinctus*)	FT	Lesser prairie chickens occupy mid-grass rangelands characterized by shinnery oak, sand sagebrush, and mixed-grass communities., the Blackwater well Field is located within a crucial habitat connectivity zone.	The area around Portales including the Blackwater Well Field may contain shinnery oak, sand sagebrush, and mixed-grass communities preferred by the lesser prairie chicken. The Blackwater Well Field area is shown as being within crucial habitat connectivity zones and a portion of the Blackwater Well Field is within the 2013 estimated occupied range (KARS, 2013); therefore, the well field may contain suitable habitat (Figure 7). Depending on the location of utilities, the water treatment facility, pump stations, new access roads, and new wells, further evaluation and coordination with the USFWS would be necessary.

[a] Explanations and definitions are provided on the last page of the table.

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Table 2. State and Federal Threatened and Endangered Species
Page 3 of 5

Species Category	Species	Status [a]	Habitat Associations	Evaluation
Listed birds (cont.)	Sprague's pipit (*Anthus spragueii*)	FC	The Sprague's pipit is associated with prairies: flat, grassy plain, and tall and short prairie grasses. The population distribution in New Mexico consists of a small wintering population within grasslands in the southern part of the state.	The area around Portales is outside of the known range for New Mexico. The Sprague's pipit is therefore not likely to be present.
	Whooping crane (*Grus americana*)	FExp/SE	The whooping crane occupies areas near major water sources. In 1975, an effort to establish a self-sustaining migratory flock of whooping cranes known as the Rocky Mountain Experimental population was initiated. This Rocky Mountain population peaked at only 33 birds in 1985. The experiment terminated in 1989 because the birds were not pairing and the mortality rate was too high to establish a self-sustaining population. In 1997, the remaining birds in the population were designated as experimental, non-essential to allow for greater management flexibility and to begin pilot studies on developing future reintroduction methods. In 2001, only two whooping cranes remained in this population. There are currently no known occurrences of whooping cranes in New Mexico.	The area around Portales does not contain suitable habitat to support the whooping crane and there are no known occurrences within the state.

[a] Explanations and definitions are provided on the last page of the table.

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Table 2. State and Federal Threatened and Endangered Species
Page 4 of 5

Species Category	Species	Status [a]	Habitat Associations	Evaluation
Listed birds (cont.)	Baird's sparrow (*Ammodramus bairdii*)	ST	The Baird's sparrow breeds in a fairly small geographic area of south-central Canada, Montana, and North and South Dakota. It winters on grasslands of the northern Mexican plateau, primarily in Chihuahua and Durango, but including portions of bordering states. The winter range extends into small portions of southeast Arizona, southern New Mexico, and southwest Texas. In New Mexico, Baird's sparrow has been found on Otero Mesa and in the Animas Valley, and may occur in other areas of suitable winter habitat, particularly in the southeast portion of state (New Mexico Avian Conservation Partners, 2014; NMDGF, 2015b).	The area around Portales is north of the known winter range of the Baird's sparrow. Grasslands in the region may provide habitat within the migration corridor, but the species would not be likely to occupy the area other than as a transient. The Baird's sparrow is therefore not likely to be present other than as a temporary occurrence.
	Least tern (*Sterna antillarum athalassos*) (NM)	SE	Habitat of the least tern consists of sea beaches, bays, large rivers, and sand bars. The historical distribution of the least tern was the major river systems of the Midwestern U.S., including the Red, Rio Grande, Arkansas, Missouri, Ohio, and Mississippi rivers. In New Mexico, it is primarily known to nest at the Bitter Lake National Wildlife Refuge.	The area around Portales is not within a major river system or other large surface water body. The least tern is therefore not likely to be present.
Listed mammals	Least shrew (*Cryptotis parva*)	ST	In New Mexico, the least shrew is been found in heavily grassed areas, mesic grassy areas with willow trees (*Salix goodingii*), and cattails (*Typha angustifolia*).	mesic grassland would be patchy at best within the area of Portales Valley where the Blackwater Well Field is located. No willow trees or cattails would be in the area. The least shrew is therefore not likely to be present.
Listed plants	None			

[a] Explanations and definitions are provided on the last page of the table.

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Table 2. State and Federal Threatened and Endangered Species

[a] Federal designations: Federal Endangered Species Act, USFWS:
FE = Federal Endangered
FT = Federal Threatened
FExp = Federal Experimental Population

State designations:
SE = State Endangered
ST = State Threatened

Agency jurisdictions:
Fed = Federal (US Fish and Wildlife Service)
NMDGF = New Mexico Department of Game and Fish

Unless otherwise noted, habitat and distribution data was taken from the New Mexico Department of Game and Fish (2015) Biota Information System of New Mexico (BISON-M), New Mexico Rare Plant Technical Council (2015), and the U.S. Fish and Wildlife Species Profile Environmental Online Conservation System (2015c).

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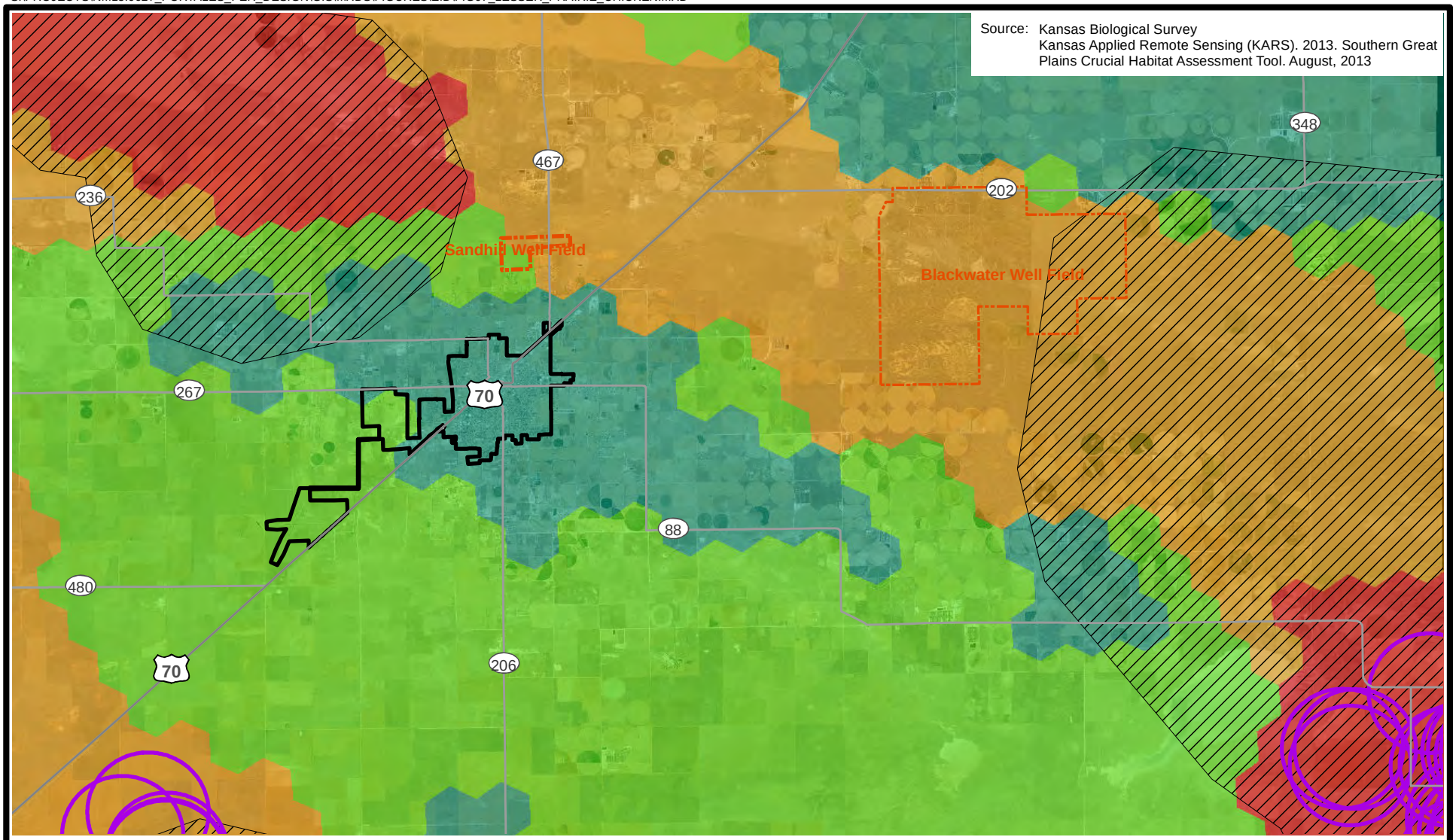

Explanation

- Road
- City of Portales
- 2013 estimated occupied range
- 1.25 mile buffer around known lek areas (2015)

Crucial lesser prairie-chicken habitat

- 1 - Focal area
- 2 - Connectivity zone
- 3 - Modeled habitat
- 4 - Modeled non-habitat

N

0 1.5 3 Miles

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Lesser Prairie Chicken Crucial Habitat

Figure 7

No other federally listed species were determined to occur within the area of the Preferred Action. The U.S. Fish and Wildlife Service was contacted for input on the potential for implementation of the project to affect federally threatened or endangered species (Attachment 1).

In addition, the New Mexico Department of Game and Fish was contacted for input on the potential for the Preferred Action to affect state threatened or endangered species.

3.9 Archaeological, Cultural and Historic Resources

Cultural resources are defined as historic properties as defined by the National Historic Preservation Act (NHPA), cultural items as defined by the Native American Graves and Repatriation Act (NAGPRA), archaeological resources as defined by Archaeological Resources Protection Act (ARPA), sacred sites as defined in EO 13007 to which access is afforded under American Indian Religious Freedom Act (AIRFA), and collections and associated records as defined in 36 CFR 79.

A Class I survey was prepared to assist the City with cultural resource planning and future compliance with cultural resource laws. The survey covered the study area, including the project areas for the alternatives outlined in the PER (including an option for Sandhill Well Field that is not included in the Preferred Alternative), from the City of Portales, north to the Sandhill Well Field and east to the Blackwater Well Field. The Class I Survey was conducted by defining a hypothetical area of potential effects (APE) or study area for each alternative and consulting the New Mexico Cultural Resource Information System (NMCRIS) database to obtain information on all previously conducted cultural resource inventories and documented archaeological sites and historic built environment resources in the project vicinity. Current listings of the National Register of Historic Places (NRHP) and New Mexico State Register of Cultural Properties (NMSRCP) were also consulted to determine the presence of any registered properties or districts near project alternatives (Attachment 3; Okun, 2015).

The record searches indicated that most of the study area has not been previously surveyed for the presence of cultural resources, although 15 previous cultural resource investigations

intersect with one of the two potential alternatives, and 4 additional investigations are within 500 meters (1,640 feet) of one of the alternatives (Attachment 3). One archaeological site (LA 181338) intersects with one of the two alternatives, and 7 additional sites and 4 register-listed properties are located within 500 meters (1,640 feet) of one of the project alternatives. Most of the buildings within Portales have been assessed during previous cultural resource surveys, and 468 historic buildings are located within 500 meters (1,640 feet) of one of the two project alternatives (Attachment 3).

A large portion of the Blackwater Well Field is within the register-listed Blackwater Draw District (SR 2), which contains the Clovis type-site, one of the earliest and most well-known Paleoindian sites in North America. The Clovis site itself, with its stratified Clovis and Folsom remains, is located northwest of the current study area, in Blackwater Locality No. 1. However, the study area overlaps with Anderson Basin/Blackwater Draw Locality No. 2, which also includes a series of Paleoindian sites and preserved Pleistocene deposits containing the remains of extinct animals. The potential effect on this important register-listed property would thus have to be further assessed and a more detailed cultural resources evaluation conducted to determine the significance of the effect on cultural resources. Most of the project area will require Class III cultural resource survey when the Preferred Alternative is further designed. The APE will be defined in consultation with the State Historical Preservation Officer (SHPO) and other agencies (depending on funding sources) and in compliance with any applicable statutes for cultural resources.

The SHPO was contacted for input based on the findings of this Class I survey.

3.10 Socioeconomics/Environmental Justice

3.10.1 Socioeconomic Issues

The City of Portales population and history of growth pattern is largely related to agriculture, Eastern New Mexico University (ENMU), and the mission of the nearby Cannon Air Force Base (CAFB). The estimated population grew by approximately 1.8 percent from 2010 to 2013 (from 12,265 to 12,480), but then dropped by 0.3 percent from 2013 to 2014 (U.S. Census, 2015). At

8.2 percent, the unemployment rate is higher than the national average of 5.3 percent (BLS, 2015). Portales has historically been characterized by wide disparities in its socioeconomic structure, with a large share of the population living below the poverty line; however, in more recent times the gap has narrowed (Mitchell, 2007). The principal strength of the economy in Portales is ENMU and the town's role as Roosevelt County seat. Challenges facing Portales include the continued high rate of poverty, with 29.6 percent of the population living below the rate of poverty (U.S. Census Bureau, 2015). This appears to be due, at least in part, to changes in agricultural practices that result in fewer employment opportunities for untrained workers (Mitchell, 2007).

Demographic data, including income and minority population data for the City of Portales and (for comparison) the State of New Mexico are summarized in Table 3.

Table 3. Demographic Summary for State of New Mexico/City of Portales

	New Mexico	Portales
Population	2,059,192	12,265
Native American (%)	10.4	1.6
Black or African American alone (%)	9.4	2.5
Asian (%)	1.4	1.2
Hawaiian/Pacific Islander (%)	0.1	—
White alone (%)	68.4	74.7
Hispanic or Latino (%)	46.3	43.0
Two or more races	3.7	3.8
Economic Data		
Per capita income	$23,411	$15,007
Median family income	$53,555	$37,769
Civilian labor force unemployment rate	10.2%	8.2%
Percentage of population below poverty level	21.4%	29.6%
Percentage of families below poverty level	16.6%	21.3%

Source: U.S. Census Bureau 2010 Quick Facts Beta

Economic issues evaluated include business, employment, and economic conditions. The numbers of low-income residents within the City of Portales (surrounding the project study area) are higher than in New Mexico as a whole. Social issues that might be affected by the

Preferred Action include demographics such as housing, schools, shops, and other services. The residents of the city would experience no changes to existing services, public, recreational, or other land use. Implementation of the Preferred Action would result in a short-term positive direct economic effect due to the creation of construction jobs and additional local spending and revenue during construction. There would also be a long-term positive direct effect from the implementation of the water supply project, as it would provide residents with a stable, 20-year water supply.

The Preferred Action would also provide an indirect, beneficial effect to the economy of the City in that plans for economic growth would not be hindered due to lack of a 25-year water supply.

3.10.2 Environmental Justice

The potential environmental justice consequences of the Preferred Action were evaluated using the EJ View tool to generate data to determine the potential for disproportionate effects on minority and low income populations (U.S. EPA, 2015b) (Attachment 4). The City of Portales reports 46 percent of its population as minority and 54 percent as non-Hispanic white alone (i.e., reporting no other race group) (U.S. EPA, 2015b). This compares to 59 percent minority and 41 percent non-Hispanic white alone in the City of Albuquerque, New Mexico. As shown in Table 3, the poverty rate of Portales is higher than the New Mexico average.

Given that the City of Portales minority population is not high, the Preferred Action would not disproportionately affect any minority and low income populations.

3.11 Other Resources

3.11.1 Public Health and Safety

3.11.1.1 Aquifer Storage and Recovery

The AWT facility, upon receiving treated wastewater from the WWTP, would be designed to include membrane filtration or advanced oxidation, followed by ultraviolet or chemical disinfection. The treated water released for injection to the aquifer would meet New Mexico

Environment Department drinking water standards. In addition, treatment for unregulated trace constituents, or micro-constituents, including endocrine disrupting compounds (EDCs) and pharmaceuticals and personal care products (PPCPs) would be implemented

All permits and required approvals from the NMED would be obtained. With the measures in place for treated water used for aquifer storage, no effect on public health and safety would result from implementation of the Preferred Action.

There would be a temporary direct effect during construction for lane closures that may be required for the pipe installation within existing roadways. Traffic control plans would be developed and work permits would be coordinated with and obtained from the NMDOT and county during construction for any temporary roadway lane closures that may be necessary within the right-of-ways.

3.11.1.2 Rehabilitation/Re-drilling of Groundwater Wells

There would be a temporary direct effect during construction for lane closures that may be required for the pipe installation within existing roadways. Traffic control plans would be developed and work permits would be obtained from the NMDOT and county during construction for any temporary roadway lane closures that may be necessary within the right-of-ways.

3.11.2 Energy

Efficiency standards would be met for all energy required for the operation of the AWT facility and other infrastructure requiring a power source; therefore, energy consumption effects would be negligible.

3.11.3 Transportation

Project construction would have a temporary direct effect due to lane closures that may be required for the pipe installation within existing roadways. Traffic control plans would be developed and work permits would be obtained from the NMDOT and county during

construction for any temporary roadway lane closures that may be necessary within the right-of-ways. No long-term effects to traffic would result from the Preferred Action.

3.11.4 Visual Impacts

The landscape character of the project study area has changed over time from vacant land and rural residential areas to increased agricultural and residential development. The existing Blackwater Well Fields are rural in nature, surrounded by agricultural and scattered rural development as well as access roads and wells.

Implementation of the Preferred Action would consist primarily of development that would be at ground level; pipelines would be buried and wells would be built to the existing grade. Some of the infrastructure, such as pump stations and the AWT facility, would be above ground, and any new wells constructed may require new access roads. Because there is development in the area of similar nature, any direct adverse effects to the visual resources would minimal.

3.11.5 Noise

The City of Portales has established in the municipal Code of Ordinances (16-41) a noise ordinance that addresses nuisance noise (*Portales Code of Ordinances 16-41*). The project area for the Preferred Action would be near sensitive noise receptors, including residences along parts of the alignment.

Noise within the city is associated with roadway traffic, residential, light industrial, and commercial activities. The nearest activity in the vicinity of the Preferred Action is primarily residential land uses. The land of the Blackwater Well Field would not be considered disruptive to the quiet or serene value of the area. The AWT facility operations would be confined to the building; therefore, noise effects from the operations would be less than significant.

Increased noise would occur during construction of the water supply project, resulting in short-term, direct adverse effects. No construction activities will occur during the hours of 10 p.m. to 6 a.m. on weekdays and 10 p.m. to 8 a.m. on weekends or holidays. With the implementation

of this noise BMP during construction, no significant increase in the existing noise level would occur that would be considered a nuisance noise. Following construction completion, no significant direct or indirect noise increase would continue; thus the Preferred Action would have no long-term direct effect to noise.

3.12 Cumulative Impacts

The City is currently constructing a wastewater effluent reuse system for the purpose of irrigating public parks and other designated properties. Construction is scheduled for completion in the summer of 2016. The Preferred Action would not interfere with this project but rather would enhance and build on the overall plan of the City to conserve their water supply. Predicted growth for the City of Portales would be aided by the sustainable 20-year water supply that the Preferred Action would provide. This would result in a positive cumulative effect.

By providing a 20-year sustainable water supply, this action would have a cumulative economic effect, both in supporting a viable regional population to sustain the goals and objectives of CAFB and aiding in the stability of operations of ENMU for the next 20 years.

4. Summary of Mitigation Measures

4.1 Physical Resources Measures

Environmental Setting. Water line construction will be designed such that temporarily disturbed areas would be returned to pre-construction elevations and native vegetation would be reseeded as needed. BMPs will be in place for construction impacts such as erosion, traffic control, and waste management. Effects therefore would be reduced to less than significant.

Land Use. Access permits, easements and lease agreements for State Land Office (SLO) lands or right-of-ways will be obtained from the SLO. If the water line alignment crosses any private property, the City will coordinate with the affected landowner(s) to obtain permission and access to any private property and negotiate any purchase of private lands with the property owners. Coordination with the SLO and any affected landowners will be continued as necessary so that effects would be reduced to less than significant.

Soils. Erosion control measures will be taken as part of construction BMPs; therefore, any direct effects would be minimized and temporary, resulting in less than significant effects to soils.

Water. All permits and required approvals from the NMED will be obtained to meet the required water quality standards for the ASR system.

4.2 Biological Resource Measures

Areas cleared of vegetation will be reseeded with native seed as necessary. BMPs will be implemented to deter the spread of noxious weeds.

If construction activities begin during the migratory bird breeding season (March 15 through September 15), a pre-construction nesting bird survey of the project area will be completed, and if occupied nests are found, they must be avoided until the young have fledged.

To minimize effects on wildlife, New Mexico Department of Game and Fish trenching guidelines will be implemented during construction. Those measures will include:

- Trenching and backfilling crews will be kept close together, to minimize the amount of open trenches at any given time.

- Trenches will not be left open overnight. Where trenches cannot be backfilled immediately, escape ramps should be constructed at least every 90 meters. Escape ramps would be short lateral trenches or wooden planks sloping to the surface at less than 45 degrees (1:1). Trenches that have been left open overnight will be inspected and animals removed prior to backfilling.

4.3 Threatened and Endangered Species Measures

The Blackwater Well Field may contain suitable habitat for the lesser prairie-chicken (Figure 7). Prior to the start of construction, further evaluation of potential habitats and coordination with the USFWS will be conducted.

4.4 Socioeconomic/Environmental Justice Measures

Implementation of the water supply project is not anticipated to have any negative impacts on no socioeconomic or environmental justice issues; therefore, no mitigation measures were identified.

4.5 Archaeological, Cultural, and Historic Resources Measures

Cultural resources will be further assessed and a more detailed cultural resources evaluation conducted to determine the significance of the effect on cultural resources. Class III cultural resource surveys will be conducted when the Preferred Alternative is further designed. The Historical Preservation Department and SHPO will be consulted as part of the detailed cultural resources evaluation.

4.6 Environmentally Sensitive Areas

Important Farmlands. Water lines would be installed in existing road right-of-ways that are adjacent to important farmlands, resulting in effects that are less than significant.

Formally Classified Lands. Prior to any construction, cultural resources will be further assessed and a more detailed cultural resources evaluation conducted to determine the significance of the effect on cultural resources. Class III cultural resource surveys will be conducted when the Preferred Alternative is further designed. The APE will be defined in consultation with the SHPO and other agencies (depending on funding sources) and in compliance with any applicable statutes for cultural resources.

Floodplains. No significant effects to the floodplain are anticipated as a result of the Preferred Action; however, much of the project area is undetermined (Figure 6). The floodplain coordinator was contacted for input on the Preferred Action.

4.7 Other Resources

Transportation. Traffic control plans would be developed and work permits would be coordinated with and obtained from the NMDOT and Roosevelt County during construction for any temporary roadway lane closures that may be necessary within the right-of-ways.

Noise. No construction activities will occur during the hours of 10 p.m. to 6 a.m. on weekdays and 10 p.m. to 8 a.m. on weekends or holidays.

4.8 Cumulative Impact Measures

No cumulative negative impacts resulting from implementation of the Preferred Action are expected; therefore, no mitigation measures were identified.

5. Consultation, Coordination, and Public Involvement

5.1 Agencies Consulted

See Appendix A for the complete list of agencies contacted.

5.2 Public Involvement

A meeting will be held after the release of the Draft PER and EID. The meeting will be conducted by the City.

5.3 Responsiveness Summary

Relevant comments received from the public during the public involvement process and information received from the agencies contacted will be incorporated into the final PER and EID as necessary.

6. References

Brown, D.E. 1994. *Biotic communities, Southwestern United States and northwestern Mexico*. University of Utah Press.

Bureau of Labor Statistics (BLS). 2015. The employment situation – July 2015. Accessed August 20, 2015 <http://www.bls.gov/>.

Chronic, H. 1987. *Roadside geology of New Mexico.* Mountain Press Publishing Company, Missoula, Montana.

Federal Emergency Management Agency (FEMA). 2010. Flood insurance rate map, Roosevelt County, New Mexico and incorporated areas. Panel 480 of 1375, Map Number 35041C0480E. October 6, 2010.

Google Earth. 2014. Imagery of Portales, NM. January 17, 2014.

Griffith, G.E., J.M. Omernik, M.M. McGraw, G.Z. Jacobi, C.M. Canavan, T.S. Schrader, D. Mercer, R. Hill, and B.C. Moran. 2006. Ecoregions of New Mexico (color poster with map, descriptive text, summary tables, and photographs). U.S. Geological Survey. Scale 1:1,400,000.

Kansas Applied Remote Sensing (KARS). 2013. Southern Great Plains crucial habitat assessment tool. August 2013. <kars.ku.edu/maps/sgpchat/>.

Mitchell, Jeffrey. 2007. *Portales Mainstreet: Community economic assessment.* University of New Mexico Bureau of Business and Economic Research.

New Mexico Avian Conservation Partners. 2015. Species account for lesser prairie-chicken (*Tympanuchus pallidicinctus*). <http://www.nmpartnersinflight.org/lesserprairiechicken.html> Accessed August 20, 2015.

New Mexico Department of Game and Fish (NMDGF). 2003. Trenching guidelines. September 2003. Available at <http://www.wildlife.state.nm.us/download/conservation/habitat-handbook/project-guidelines/Trenching-Project-Guidelines.pdf>.

NMDGF. 2015a. Biota information system of New Mexico (BISON-M), Species reports for Roosevelt County. <http://www.bison-m.org> Accessed August 7, 2015.

NMDGF. 2015b. Biota information system of New Mexico (BISON-M), Species report for Baird's Sparrow. Updated April 30, 2015. <http://www.bison-m.org/booklet.aspx?id=041785> Accessed August 25, 2015.

New Mexico Energy Minerals and Natural Resources Department (NMEMNRD). 2015. *New Mexico State Endangered Plant Species (19.21.2.8 NMAC)*. The New Mexico Endangered Plant Program (EMNRD - Forestry Division) <http://www.emnrd.state.nm.us/SFD/ForestMgt/Endangered.html> Accessed August 25, 2015.

New Mexico Rare Plant Technical Council. 2015. New Mexico rare plants. <http://nmrareplants.unm.edu> Updated April 20, 2015.

Okun Consulting Solutions. 2015. *Results of a Class I cultural resource survey for the City of Portales well field project, Roosevelt County, New Mexico.* Prepared for Daniel B. Stephens & Associates and The City of Portales. August 2015.

U.S. Census Bureau. 2015. 2011-2013 Quick Facts Beta, Portales, New Mexico. <http://quickfacts.census.gov/qfd/> Accessed August 14, 2015.

U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS). 2014. Custom soil resource report for Roosevelt County, New Mexico, Portales Water Supply. Report generated August 18, 2015 at <http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>.

USDA NRCS. 2015. Land use, Farmland Protection Policy Act. <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/> Accessed August 26, 2015.

U.S. Environmental Protection Agency (EPA). 2015a. *Green book current nonattainment counties for all criteria pollutants*. <http://www.epa.gov/oaqps001/greenbk/ancl.html> Accessed August 18, 2015.

U.S. EPA. 2015b. *EJ View ACS summary report.* <http://www.epamap14.epa.gov/ejmap/entry.html> Accessed August 20, 2015.

U.S. Fish and Wildlife Service (USFWS). 2015a. *National wetlands inventory wetlands mapper*. <http://www.fws.gov/wetlands/data/mapper.HTML> Accessed August 14, 2015

USFWS. 2015b. New Mexico Ecological Services. Information, Planning, and Conservation System (IPaC). Environmental Conservation Online System. Report for Portales Water Supply generated August 14, 2015. <http://ecos.fws.gov/ipac/>.

USFWS. 2015c. Critical habitat portal. Accessed August 7, 2015. <http://ecos.fws.gov/crithab/>.

Wilson, C.R. 2014. *2014 City of Portales water conservation plan.* Prepared for City of Portales, December 2014.

Attachment 1

Agency Correspondence

Agency letters will be included in the final EID.
The agency contact list is attached.

Resendo Trevino III, State Conservationist
USDA-Natural Resources Conservation Service
6200 Jefferson NE, Room 305
Albuquerque, NM 87109

Sandy Chancey
Eastern Plains Council of Government
418 N Main
Clovis NM 88101

Charlene Webb
Roosevelt County Manager
Roosevelt County
109 West 1st St
Portales, NM 88130

Michelle Ensey
NM State Historic Preservation Officer
Historic Preservation Division
407 Galisteo St., Suite 236
Santa Fe, NM 87501

Crystal Salas
U.S. National Park Service
NEPA/ Section 106 Specialist
12795 Alameda Parkway
Denver, CO. 80225

Chris M. Parrish
Regulatory Specialist
U.S. Army Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109-3435

Tom Blaine, P.E.
State Engineer
NM Office of the State Engineer
P.O. Box 25102
Santa Fe, NM 87504

Julie Roybal, Environmental Impact Review Coordinator
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502

CC the Environmental Impact Coordinator letter:

Chief
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, NM 87502-5469

Chief
New Mexico Environment Department
Ground Water Quality Bureau
P.O. Box 5469
Santa Fe, NM 87502-5469

Chief
New Mexico Environment Department
Drinking Water Bureau
525 Camino de Los Marquez, Suite #4
Santa Fe, NM 87505

Chief
New Mexico Environment Department
Air Quality Bureau
1301 Siler Road
Santa Fe, NM 87507

Linda Delamare Flood Plain Management & Insurance Branch
Federal Emergency Management Agency
800 North Loop 288
Denton, TX 76209-3698

Wally Murphy, Field Supervisor
U.S. Fish & Wildlife Service
New Mexico Ecological Services Field Office
2105 Osuna Rd NE
Albuquerque, NM 87113

Matt Wunder, Chief
Conservation Services
New Mexico Department of Game & Fish
P.O. Box 25112
Santa Fe, NM 87504

Daniela Roth, Botany Program Coordinator
NM Energy, Minerals, & Natural Resource Dept.
1220 St. Francis Dr.
Santa Fe, NM 87505

U.S. Environmental Protection Agency
Source Water Protection Branch/Groundwater
Section
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Erik Nelson
New Mexico State Land Office
Clovis Field Office
105 E. 6th Street
Clovis, NM 88101

Sammy Sandefer, Roosevelt County Floodplain
Administrator
City of Portales
100 W 1st St
Portales, NM 88130

Tribal entities:

Henry Kostzuta, Chairman
Apache Tribe of Oklahoma
P.O. Box 1220
Anadarko, OK 73005

Michael Burgess, Chairman
Comanche Indian Tribe
P.O. Box 908
Lawton, OK 73502

Ronald D. Twohatchet, Chairman
Kiowa Tribe of Oklahoma
PO Box 369
Carnegie, OK 73015

Mark Chino, President
Mescalero Apache Tribe
PO Box 227
Mescalero, NM 88340

Only include in the mailing list for NEPA
decision documents:

U.S. Environmental Protection Agency
Office of Planning and Coordination
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Attachment 2

Threatened and Endangered Species

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 OSUNA ROAD NE
ALBUQUERQUE, NM 87113
PHONE: (505)346-2525 FAX: (505)346-2542
URL: www.fws.gov/southwest/es/NewMexico/;
www.fws.gov/southwest/es/ES_Lists_Main2.html

Consultation Code: 02ENNM00-2015-SLI-0622 August 21, 2015
Event Code: 02ENNM00-2015-E-00740
Project Name: Portales Water Supply

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

Thank you for your recent request for information on federally listed species and important wildlife habitats that may occur in your project area. The U.S. Fish and Wildlife Service (Service) has responsibility for certain species of New Mexico wildlife under the Endangered Species Act (ESA) of 1973 as amended (16 USC 1531 et seq.), the Migratory Bird Treaty Act (MBTA) as amended (16 USC 701-715), and the Bald and Golden Eagle Protection Act (BGEPA) as amended (16 USC 668-668c). We are providing the following guidance to assist you in determining which federally imperiled species may or may not occur within your project area and to recommend some conservation measures that can be included in your project design.

FEDERALLY-LISTED SPECIES AND DESIGNATED CRITICAL HABITAT

Attached is a list of endangered, threatened, and proposed species that may occur in your project area. Your project area may not necessarily include all or any of these species. Under the ESA, it is the responsibility of the Federal action agency or its designated representative to determine if a proposed action "may affect" endangered, threatened, or proposed species, or designated critical habitat, and if so, to consult with the Service further. Similarly, it is the responsibility of the Federal action agency or project proponent, not the Service, to make "no effect" determinations. If you determine that your proposed action will have "no effect" on threatened or endangered species or their respective critical habitat, you do not need to seek concurrence with the Service. Nevertheless, it is a violation of Federal law to harm or harass any federally-listed threatened or endangered fish or wildlife species without the appropriate permit.

If you determine that your proposed action may affect federally-listed species, consultation with the Service will be necessary. Through the consultation process, we will analyze information

contained in a biological assessment that you provide. If your proposed action is associated with Federal funding or permitting, consultation will occur with the Federal agency under section 7(a)(2) of the ESA. Otherwise, an incidental take permit pursuant to section 10(a)(1)(B) of the ESA (also known as a habitat conservation plan) is necessary to harm or harass federally listed threatened or endangered fish or wildlife species. In either case, there is no mechanism for authorizing incidental take "after-the-fact." For more information regarding formal consultation and HCPs, please see the Service's Consultation Handbook and Habitat Conservation Plans at www.fws.gov/endangered/esa-library/index.html#consultations.

The scope of federally listed species compliance not only includes direct effects, but also any interrelated or interdependent project activities (e.g., equipment staging areas, offsite borrow material areas, or utility relocations) and any indirect or cumulative effects that may occur in the action area. The action area includes all areas to be affected, not merely the immediate area involved in the action. Large projects may have effects outside the immediate area to species not listed here that should be addressed. If your action area has suitable habitat for any of the attached species, we recommend that species-specific surveys be conducted during the flowering season for plants and at the appropriate time for wildlife to evaluate any possible project-related impacts.

Candidate Species and Other Sensitive Species

A list of candidate and other sensitive species in your area is also attached. Candidate species and other sensitive species are species that have no legal protection under the ESA, although we recommend that candidate and other sensitive species be included in your surveys and considered for planning purposes. The Service monitors the status of these species. If significant declines occur, these species could potentially be listed. Therefore, actions that may contribute to their decline should be avoided.

Lists of sensitive species including State-listed endangered and threatened species are compiled by New Mexico state agencies. These lists, along with species information, can be found at the following websites:

Biota Information System of New Mexico (BISON-M): www.bison-m.org

New Mexico State Forestry. The New Mexico Endangered Plant Program: www.emnrd.state.nm.us/SFD/ForestMgt/Endangered.html

New Mexico Rare Plant Technical Council, New Mexico Rare Plants: nmrareplants.unm.edu

Natural Heritage New Mexico, online species database: nhnm.unm.edu

WETLANDS AND FLOODPLAINS

Under Executive Orders 11988 and 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and floodplains, and preserve and enhance their natural and beneficial values. These habitats should be conserved through avoidance, or mitigated to ensure that there would be no net loss of wetlands function and value.

We encourage you to use the National Wetland Inventory (NWI) maps in conjunction with ground-truthing to identify wetlands occurring in your project area. The Service's NWI program website, www.fws.gov/wetlands/Data/Mapper.html integrates digital map data with other resource information. We also recommend you contact the U.S. Army Corps of Engineers for permitting requirements under section 404 of the Clean Water Act if your proposed action could impact floodplains or wetlands.

MIGRATORY BIRDS

The MBTA prohibits the taking of migratory birds, nests, and eggs, except as permitted by the Service's Migratory Bird Office. To minimize the likelihood of adverse impacts to migratory birds, we recommend construction activities occur outside the general bird nesting season from March through August, or that areas proposed for construction during the nesting season be surveyed, and when occupied, avoided until the young have fledged.

We recommend review of Birds of Conservation Concern at website www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BCC.html to fully evaluate the effects to the birds at your site. This list identifies birds that are potentially threatened by disturbance and construction.

BALD AND GOLDEN EAGLES

The bald eagle (*Haliaeetus leucocephalus*) was delisted under the ESA on August 9, 2007. Both the bald eagle and golden eagle (*Aquila chrysaetos*) are still protected under the MBTA and BGEPA. The BGEPA affords both eagles protection in addition to that provided by the MBTA, in particular, by making it unlawful to "disturb" eagles. Under the BGEPA, the Service may issue limited permits to incidentally "take" eagles (e.g., injury, interfering with normal breeding, feeding, or sheltering behavior nest abandonment). For information on bald and golden eagle management guidelines, we recommend you review information provided at www.fws.gov/midwest/eagle/guidelines/bgepa.html.

On our web site www.fws.gov/southwest/es/NewMexico/SBC_intro.cfm, we have included conservation measures that can minimize impacts to federally listed and other sensitive species. These include measures for communication towers, power line safety for raptors, road and highway improvements, spring developments and livestock watering facilities, wastewater facilities, and trenching operations.

We also suggest you contact the New Mexico Department of Game and Fish, and the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division for information regarding State fish, wildlife, and plants.

Thank you for your concern for endangered and threatened species and New Mexico's wildlife habitats. We appreciate your efforts to identify and avoid impacts to listed and sensitive species in your project area. For further consultation on your proposed activity, please call 505-346-2525 or email nmesfo@fws.gov and reference your Service Consultation Tracking Number.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Portales Water Supply

Official Species List

Provided by:

New Mexico Ecological Services Field Office
2105 OSUNA ROAD NE
ALBUQUERQUE, NM 87113
(505) 346-2525
http://www.fws.gov/southwest/es/NewMexico/
http://www.fws.gov/southwest/es/ES_Lists_Main2.html

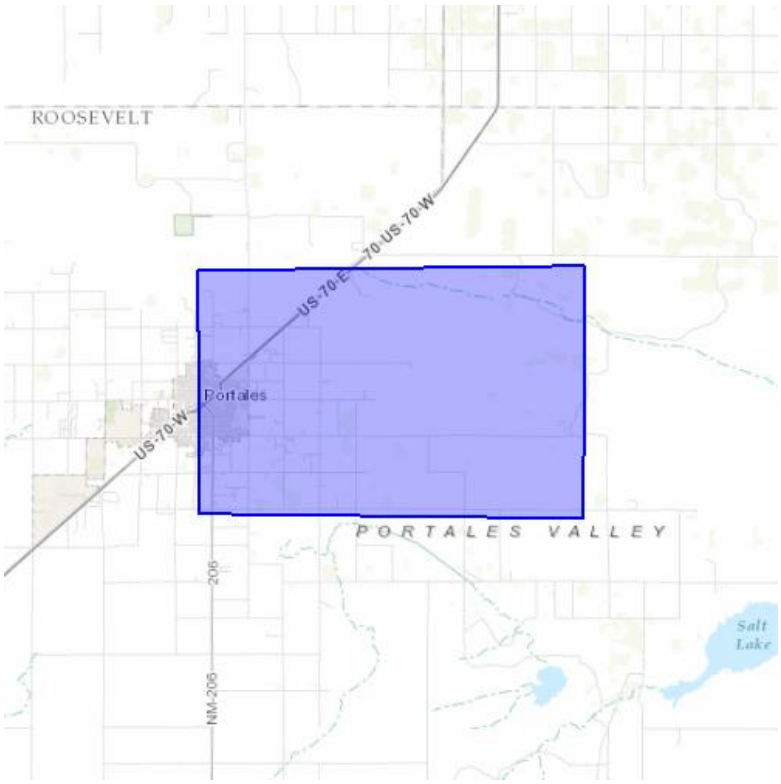
Consultation Code: 02ENNM00-2015-SLI-0622
Event Code: 02ENNM00-2015-E-00740

Project Type: WATER SUPPLY / DELIVERY

Project Name: Portales Water Supply
Project Description: Two alternatives are being studied 1) Aquifer Storage Reuse within 2 wellfields, Sandhill and Blackwater near Portales and 2) Rehabilitate and install new water wells in Blackwater Wellfield

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-103.3425521850586 34.23820219227295, -103.34152221679688 34.14079331968436, -103.15544128417969 34.138520050378574, -103.15509796142578 34.239621314560885, -103.3425521850586 34.23820219227295)))

Project Counties: Roosevelt, NM

United States Department of Interior
Fish and Wildlife Service

Project name: Portales Water Supply

Endangered Species Act Species List

There are a total of 3 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Lesser prairie-chicken *(Tympanuchus pallidicinctus)*	Threatened		
Sprague's Pipit *(Anthus spragueii)*	Candidate		
Whooping crane *(Grus americana)* Population: U.S.A. (CO, ID, FL, NM, UT, and the western half of Wyoming)	Experimental Population, Non-Essential		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

Biota Information System of New Mexico

Maintained by:

Close Window

Disclaimer Policy

Print Page

Database Query

Your search terms were as follows:

County Name	Status
Roosevelt	State NM: Endangered State NM: Threatened

9 species returned.

Taxonomic Group	# Species	Taxonomic Group	# Species
Reptiles	1	Mammals	1
Birds	7		

Export to Excel

Species ID	NewSortOrder	Common Name	Scientific Name	Habitat Map	Photo	County	Status
030086		**Dunes Sagebrush Lizard**	Sceloporus arenicolus	Yes		Roosevelt	State NM: Endangered
040125		**Varied Bunting**	Passerina versicolor			Roosevelt	State NM: Threatened
040220		**Whooping Crane**	Grus americana	Yes	no photo	Roosevelt	State NM: Endangered
040370		**Bald Eagle**	Haliaeetus leucocephalus	Yes		Roosevelt	State NM: Threatened
040384		**Peregrine Falcon**	Falco peregrinus	Yes		Roosevelt	State NM: Threatened
040385		**Arctic Peregrine Falcon**	Falco peregrinus tundrius	Yes	no photo	Roosevelt	State NM: Threatened
041785		**Baird's Sparrow**	Ammodramus bairdii	Yes		Roosevelt	State NM: Threatened
042070		**Least Tern**	Sternula antillarum	Yes		Roosevelt	

							State NM: Endangered
050705		**Least Shrew**	Cryptotis parva			Roosevelt	State NM: Threatened

Close Window

Attachment 3

Archaeological, Cultural, and Historic Resources

RESULTS OF A CLASS I CULTURAL RESOURCE SURVEY FOR THE CITY OF PORTALES WELL FIELD PROJECT, ROOSEVELT COUNTY, NEW MEXICO

PREPARED FOR
Daniel B. Stephens and Associates, Inc.
and
The City of Portales

PREPARED AND SUBMITTED BY
Okun Consulting Solutions

AUGUST 2015

Okun Consulting Solutions

RESULTS OF A CLASS I CULTURAL RESOURCE SURVEY FOR THE CITY OF PORTALES WELL FIELD PROJECT, ROOSEVELT COUNTY, NEW MEXICO

Prepared for
Daniel B. Stephens and Associates, Inc.
6020 Academy Road NE, Suite 100
Albuquerque, NM

and

The City of Portales

Prepared and Submitted by
Adam Okun, Principal Investigator
Okun Consulting Solutions
441 Morningside Dr NE
Albuquerque, NM 87108

Reviewing Agencies
New Mexico Historic Preservation Division
New Mexico Environment Department

Okun Consulting Solutions Report Number: OCS-2015-15

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INTRODUCTION AND PROJECT DESCRIPTION

This report presents the results of a cultural resource literature review (Class I Survey) conducted for a proposed City of Portales (City) water supply project located in Roosevelt County, approximately 16 miles from the Texas border (Figure 1). The City is developing alternatives for expanding its water supply in order to meet its future water needs. It currently relies exclusively on groundwater wells, which draw from the Ogallala aquifer. However, the Ogallala aquifer is being depleted, causing the production of groundwater wells to decline. In addition to serving City residents, the water system serves Eastern New Mexico University and rural users in the surrounding area.

The proposed water supply project is in the early stage of alternatives evaluation and does not yet have a specific funding source. However, state and/or federal funding sources are anticipated, and the project will ultimately have to comply with state and federal laws outlining the identification and treatment of cultural resources, possibly including the New Mexico Cultural Properties Act (CPA) and Section 106 of the National Historic Preservation Act (NHPA). As a result, Okun Consulting Solutions completed a Class I survey to assist the City with cultural resource planning and future compliance with cultural resource laws. A summary of the results presented in this Class I report will also be included in a Preliminary Engineering Report (PER) and Environmental Information Document (EID).

The study area includes two alternatives. One would involve use of the Sandhill Well Field located approximately 2.5 miles north of the City and include a new pipeline extending south to Portales and a wastewater treatment facility north of town (Figure 2). We refer to this option as the Sandhill Alternative in this document. The second alternative would use the Blackwater Well Field located approximately 8 miles northeast of Portales and would connect to the City through pipelines running either west and then southwest along US Highway 70 (US 70) or south from the well field and then west along South Roosevelt Road. This option is referred to herein as the Blackwater Alternative. The project could ultimately use either alternative or combine elements of the two alternatives. A variety of supporting infrastructure may also be needed.

The two alternatives appear on the *Portales, New Mexico* (34103-B3) and *Arch NW, New Mexico* (34103-B2) United States Geological Survey (USGS) quadrangles. The Sandhill Alternative is located in Sections 13, 24, 25, and 26 of Township (T) 1 South (S), Range 34 East (E). The Blackwater Alternative is located within Sections 25 and 36 of T1S, R34E; Sections 14-20 of T1S, 35E; Sections 8-10, 15-17, 20-21, and 29-32 of T1S, R36E; Section 1 of T2S, R34E; Sections 1-6 of T2S, R35E; and Sections 5 and 6 of T2S, R36E.

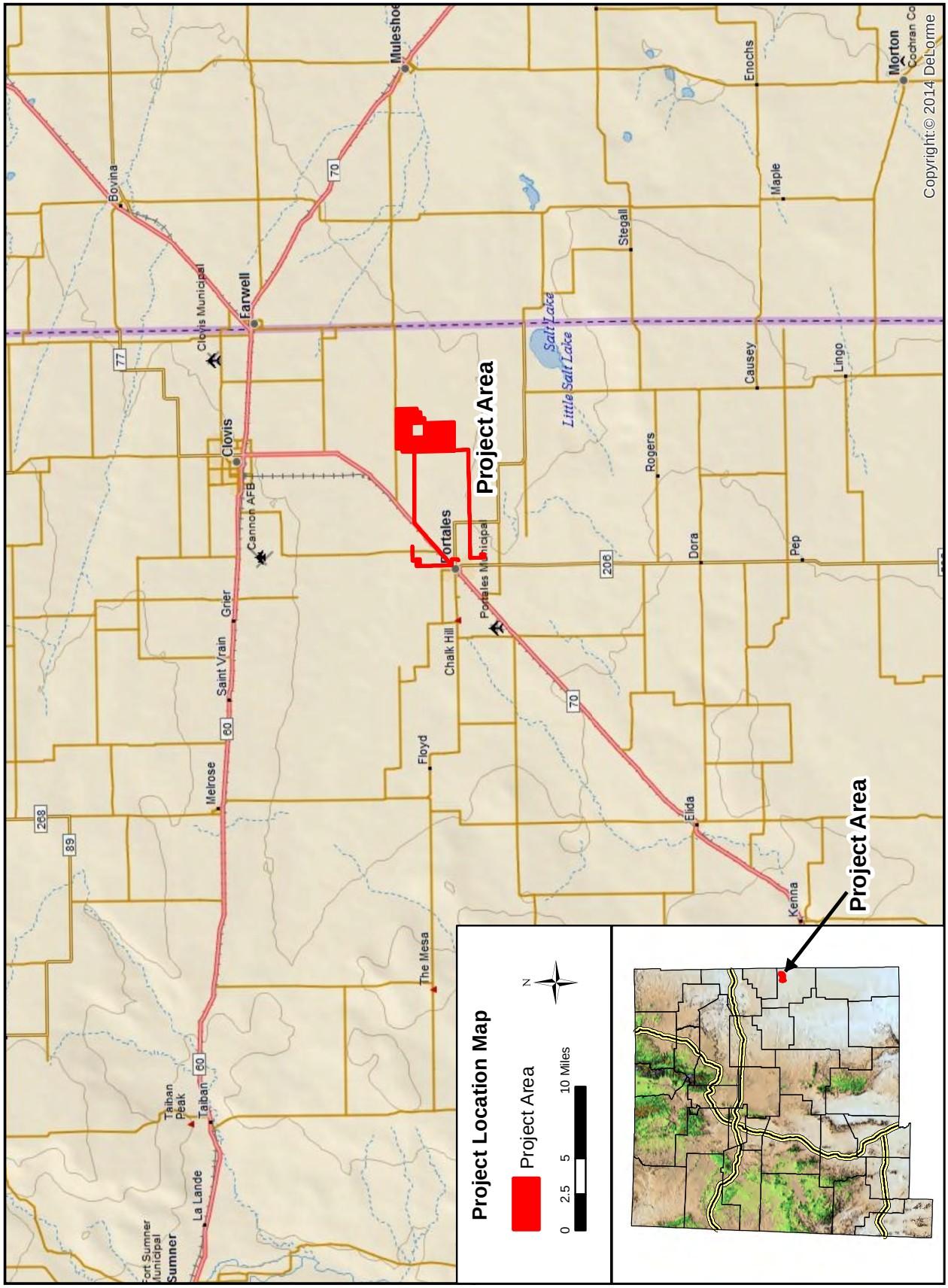

Figure 1. Overview of the Project Location

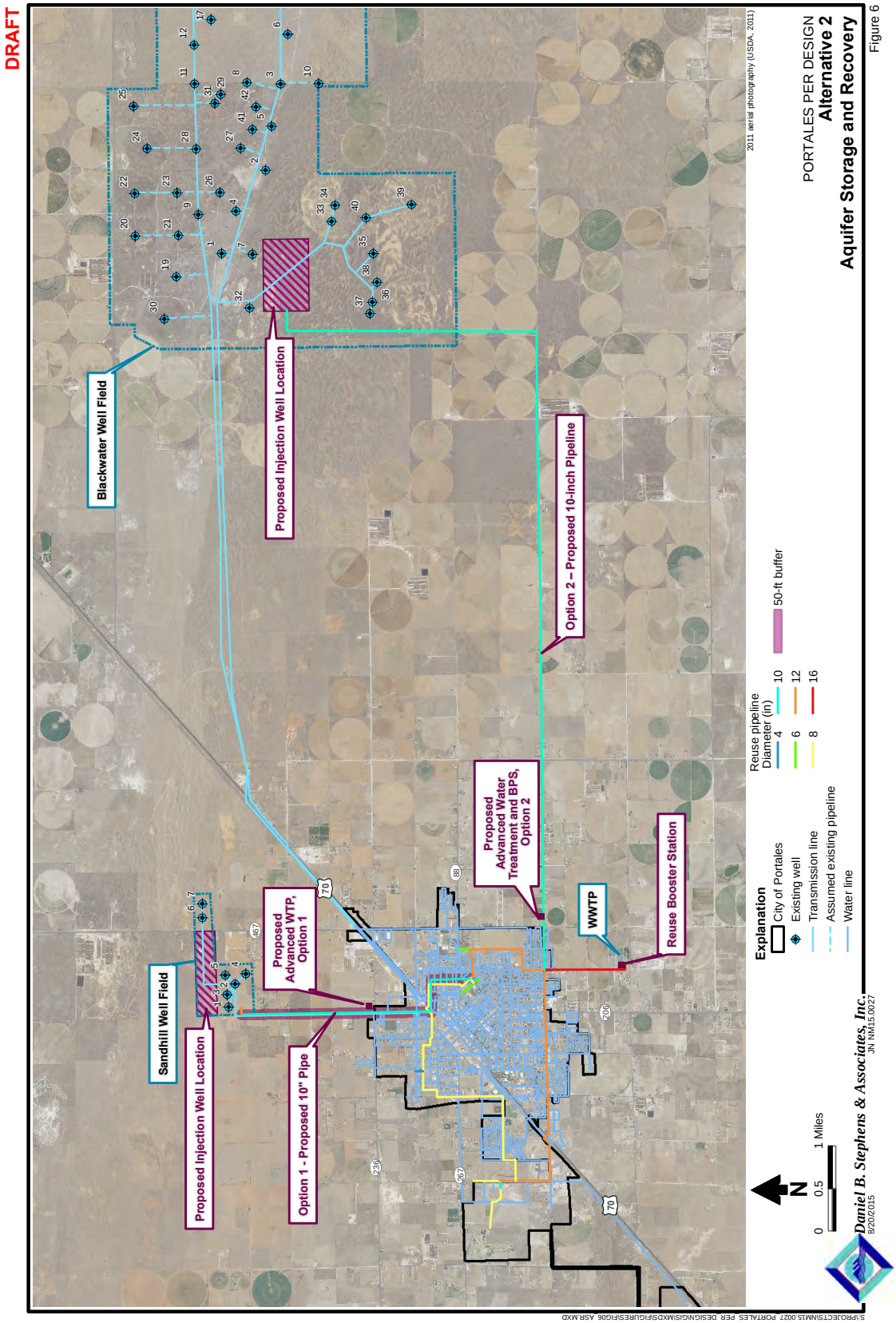

Figure 2. Daniel B. Stephens Map showing Overview of the Sandhill and Blackwater Project Alternatives

CLASS I SURVEY RESULTS

The Class I Survey was conducted by defining a hypothetical area of potential effects (APE) or study area for each alternative and consulting the New Mexico Cultural Resource Information System (NMCRIS) database to obtain information on all previously conducted cultural resource inventories and documented archaeological sites and historic built environment resources in the project vicinity. Current listings of the NRHP and New Mexico State Register of Cultural Properties (NMSRCP) were also consulted to determine the presence of any registered properties or districts near project alternatives. The Class I Survey had several goals: (1) to determine the degree to which the potential project area has been previously investigated for the presence of cultural resources and identify gaps in the available data; (2) to determine the specific locations of cultural resources that could be affected by the proposed undertaking; (3) to assess whether one of the two alternatives has a greater likelihood of impacting cultural resources; (4) to derive expectations regarding the nature and frequency of resources that might be encountered if field survey is conducted; and (5) to assist the City with environmental planning for the project.

The potential APEs (study areas) were defined by including the entire well field for each alternative and then assuming a 100-foot (ft) corridor for proposed pipelines associated with each well field. The proposed pipelines follow existing roads for most of their length, and in these cases the study area was defined as the entire right-of-way from fence to fence. The same assumptions were made for portions of pipelines that will follow city streets in Portales. In areas where the proposed pipelines cross open terrain, the location was estimated based on aerial photographs and other maps and then buffered by 50 ft on both sides to create a 100-ft-wide corridor. The official APE will be determined after project plans are finalized and in consultation with the New Mexico State Historic Preservation Officer (SHPO) and other agencies and it, therefore, may ultimately vary from the study areas presented in this document.

The record searches indicated that most of the study area has not been previously surveyed for the presence of cultural resources. Fifteen previous cultural resource investigations intersect with one of the two potential alternatives, and four additional investigations are within 500 meters (m) (1640 ft) of one of the alternatives (Figures 3 and 4). One archaeological site (LA 181338) intersects with one of the two alternatives, and seven additional sites and four register-listed properties are located within 500 m (1640 ft) of one of the project alternatives. Most of the buildings within Portales have been assessed during previous cultural resource surveys, and 468 historic buildings are located within 500 m (1640 ft) of one of the two project alternatives. The results for each alternative are discussed in more detail below.

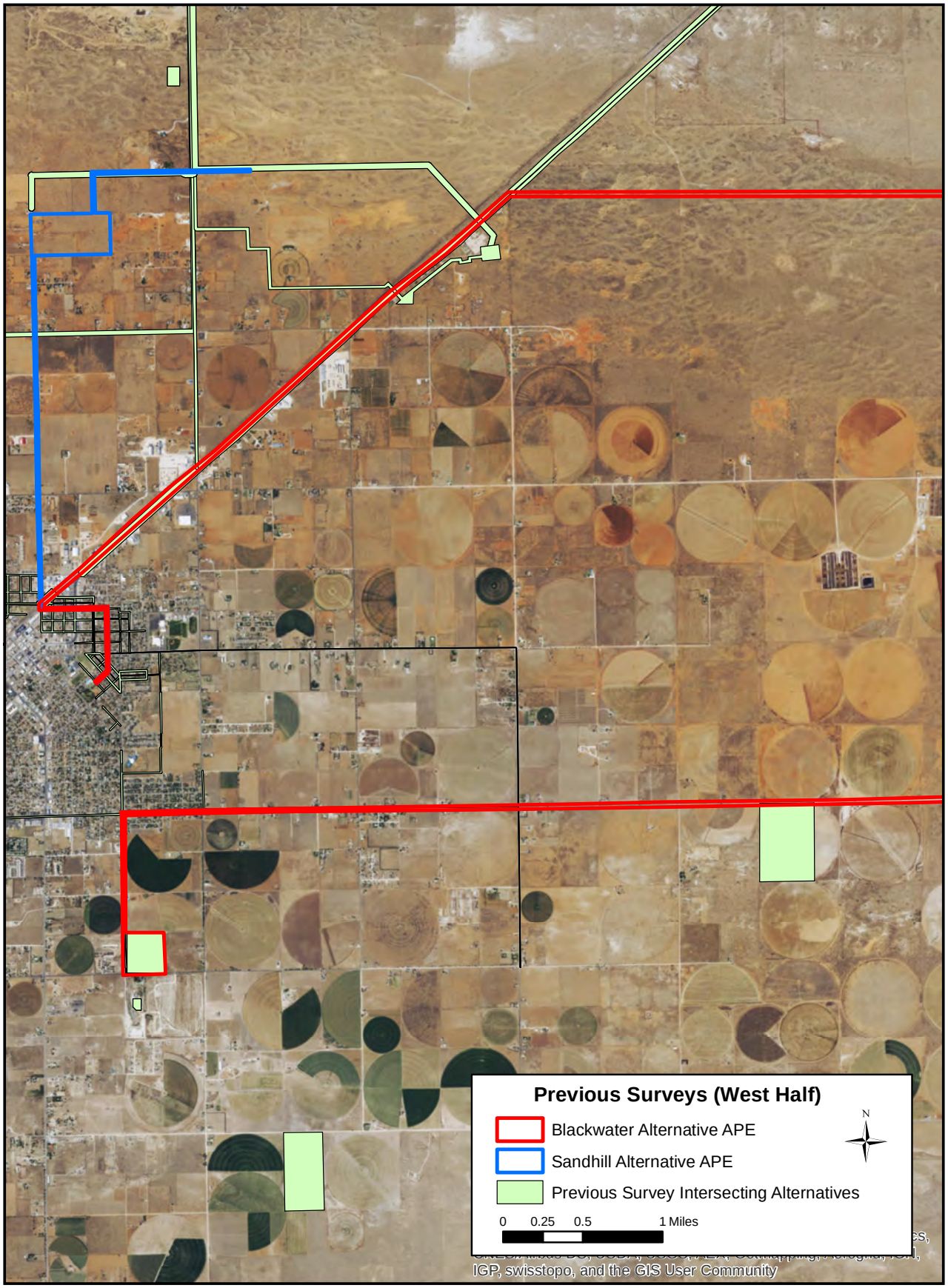

Figure 3. Previous Cultural Resource Surveys that Intersect with a Project Alternative Study Area (West Half)

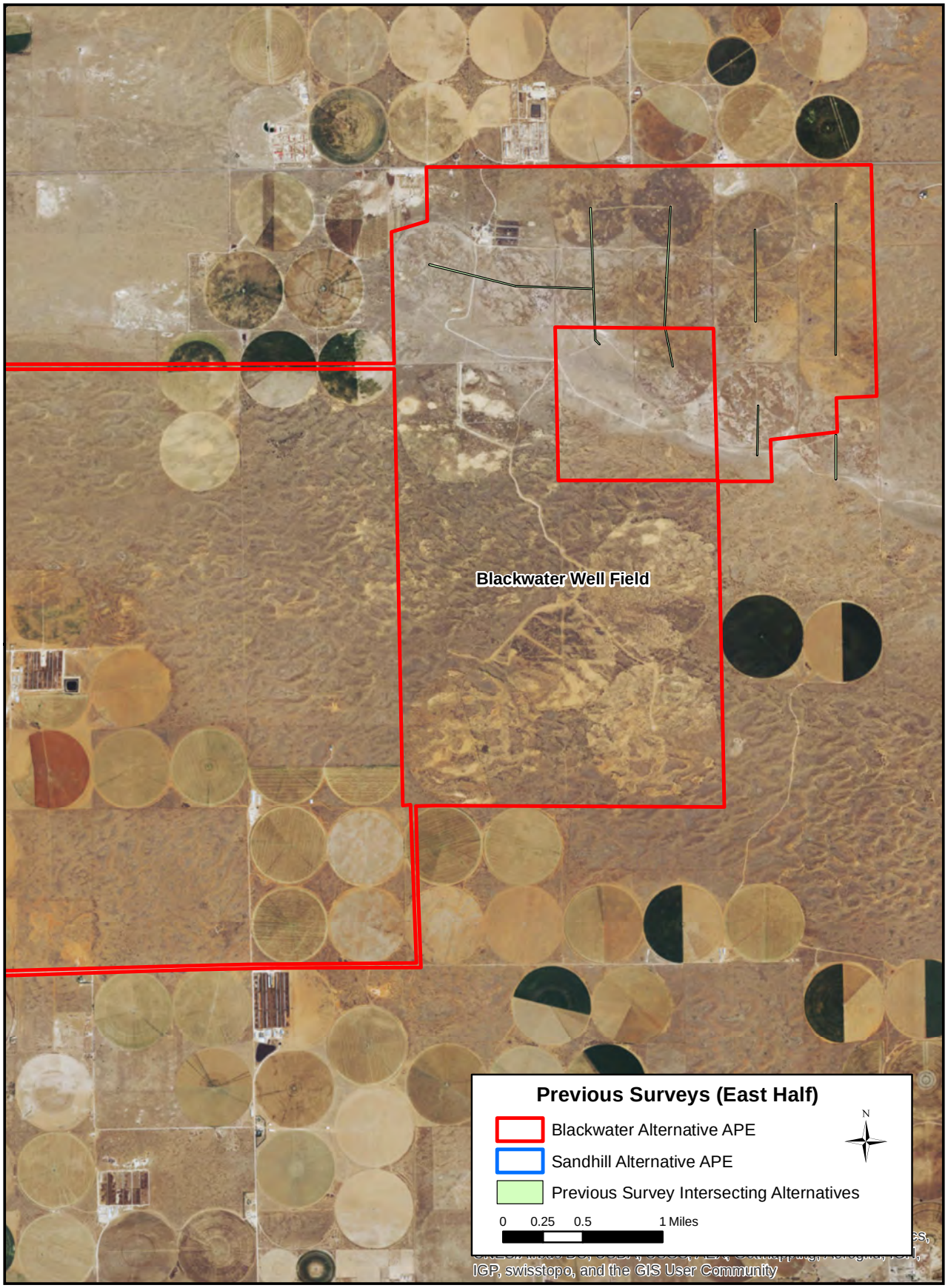

Figure 4. Previous Cultural Resource Surveys that Intersect with a Project Alternative Study Area (East Half)

SANDHILL ALTERNATIVE

A total of nine previous cultural resource investigations intersect with the Sandhill Alternative (Table 1). These surveys have been conducted for water-related projects (NMCRIS 37507, 112198, and 129772), utilities (NMCRIS 37507), highway projects along NM 467 (NMCRIS 25445), and residential projects for the City of Portales (NMCRIS 86489, 93348, 101780, and 112071). Small portions of the study area were surveyed during Bureau of Reclamation (BOR)/Eastern New Mexico Water Utility Authority projects in 1992 and 2008. SWCA Environmental Consultants (SWCA) conducted a large survey of streets in Portales and the surrounding area for the City's proposed effluent reuse system in 2014 (NMCRIS 129772). Several surveys within Portales were completed by the Agency for Conservation Archaeology at Eastern New Mexico University (ENMU) and by Don Clifton Consulting between 2003 and 2008, resulting in the documentation of most of the buildings along the streets followed by the Sandhill Alternative study area within Portales. Despite these previous investigations, the entire Sandhill Well Field and the proposed pipeline between the well field and the City have never been previously investigated for the presence of cultural resources.

Table 1. Summary of Previous Cultural Resource Investigations that Intersect with the Sandhill Alternative Study Area

NMCRIS	Performing Agency	Date	Description
25445	NM State Highway and Transportation Department	1989	Survey along NM 467
37507	Complete Archaeological Service Association	1992	Eastern New Mexico water alignment survey for the BOR
54888	Agency for Conservation Archaeology Eastern New Mexico University (ACAENMU)	1996	Survey for Fiber-optic improvement locations for the Roosevelt County Telephone Cooperative
86489	ACAENMU	2003-2004	Survey of the Eastern Bogard Addition, east of Main Street for the City of Portales
93348	Don Clifton Consulting	2005	Survey of portions of 6th, 7th, 8th, 9th and 12th Streets and Boulder Avenue for the City of Portales
101780	Don Clifton Consulting	2006	Survey of nine streets for the City of Portales
112071	ACAENMU	2008	Survey along East Brazos, East Amazon, East 1st, and East 2nd Streets and Elgin, Fargo, Globe and Houston Avenues in Portales
112198	ERO Resources Corporation	2008-2010	Survey for the Eastern New Mexico Water Utility Authority Project for the BOR
129772	SWCA	2014	Survey of the City of Portales effluent reuse system for Smith Engineering/City

Three register-listed properties and one previously documented archaeological site are located within 500 m (1640 ft) of the Sandhill Alternative study area (Figure 5). The register-listed properties include the Portales Main Post Office (SR 106), Bank of Portales (SR 1111), and Roosevelt County Courthouse (SR 1278) buildings located in the center of Portales along the main square, southwest of the study area. These buildings were constructed in the 1930s as part of New Deal construction programs. They are more than 350 m (1150 ft) from the Sandhill Alternative and would not have to be assessed for the project. The single archaeological site located near the Sandhill Alternative is LA 181335, which contains features but has an unknown cultural/temporal affiliation and is approximately 200 m (650 m) south of the eastern extension of the Sandhill Well Field.

In addition to archaeological sites and register-listed properties, 457 historic built environment resources (historic buildings and structures) have been documented within 500 m (1640 ft) of the Sandhill Alternative study area during the previous cultural resource surveys conducted along streets within Portales (discussed above; also see Figure 5). However, only 100 of these buildings are within 100 m (328 ft) and 39 are within

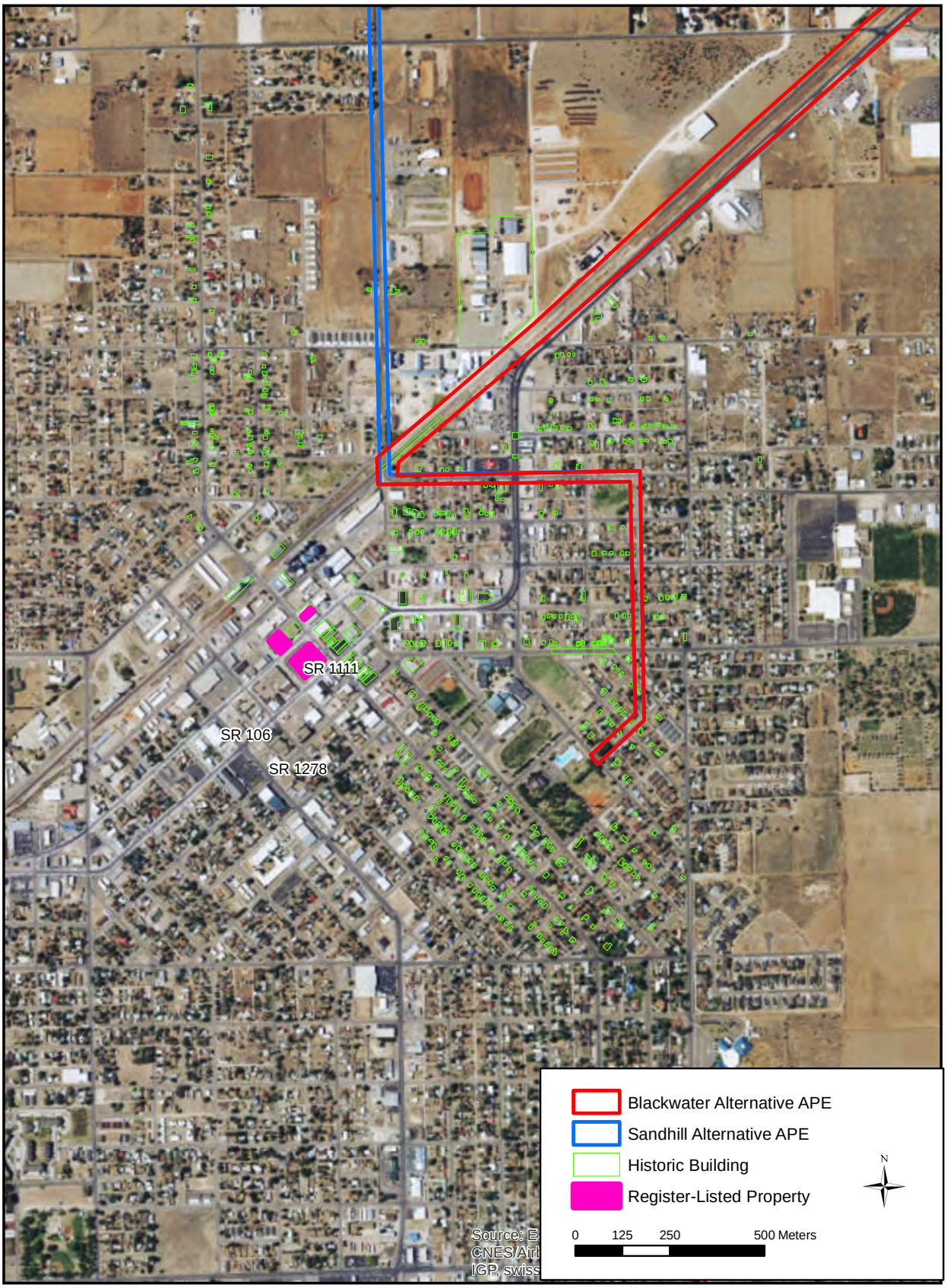

Figure 5. Historic Buildings and Register-Listed Properties in Portales within 500 m of the Study Areas

30 m (100 ft) of the study area. Based on our analysis, approximately 30 historic buildings along Boston Avenue, East Brazos Street, South Fargo Avenue and 8th Street would likely have to be reassessed in relation to the current project if the Sandhill Alternative is selected.

THE BLACKWATER ALTERNATIVE

A total of 14 previous cultural resource investigations intersect with the study for the Blackwater Alternative (Table 2; see Figures 4 and 5). Eight of these also intersect the Sandhill Alternative and are discussed above. In addition, US 70 between Portales and Clovis was surveyed by the NM State Highway and Transportation Department (now NMDOT) in 2001, and additional water-related projects have been recently conducted by Don Clifton Consulting, the Agency for Conservation Archaeology at ENMU, and Taschek Environmental Consulting, including a portion of South Roosevelt Road and the wastewater treatment plant that may be used for this alternative. The Blackwater Well Field has not been previously inventoried, however, and this area would require large-scale Class III cultural resource survey if the Blackwater Alternative is selected.

Table 2. Summary of Previous Cultural Resource Investigations that Intersect with the Blackwater Alternative Study Area

NMCRIS	Performing Agency	Date	Description
25445*	NM State Highway and Transportation Department	1989	Survey along NM 467
54888*	Agency for Conservation Archaeology Eastern New Mexico University (ACAENMU)	1996	Survey for Fiber-optic improvement locations for Roosevelt County Telephone Cooperative
75670	NM State Highway and Transportation Department	2001	Survey of 16 miles along US 70 between Portales and Clovis
84690	ACAENMU	2003	Survey along Roosevelt Road and Kilgore Avenue for a County pumping station and water line
85045	Don Clifton Consulting	2003	Survey for a location for Sandy Land Dairy
86489*	ACAENMU	2003-2004	Survey of the Eastern Bogard Addition, east of Main Street for the City of Portales
90507	Don Clifton Consulting	2004	Survey for the City of Portales Emergency Water Supply project
93348*	Don Clifton Consulting	2005	Survey of portions of 6th, 7th, 8th, 9th and 12th Streets and Boulder Avenue for the City
101780*	Don Clifton Consulting	2006	Survey of nine streets for the City
104431	Taschek Environmental Consulting	2007	Survey for the Portales Wastewater Treatment Plant
112071*	ACAENMU	2008	Survey along East Brazos, East Amazon, East 1st, and East 2nd Streets and Elgin, Fargo, Globe and Houston Avenues in Portales
112198*	ERO Resources Corporation	2008-2010	Survey for the Eastern New Mexico Water Utility Authority Project for the BOR
129772*	SWCA Environmental Consultants	2014	Survey of the City of Portales Effluent Reuse System for Smith Engineering/City
132941	ERO Resources Corp	2014-2015	No data available

*Also intersects the Sandhill Alternative

Four register-listed properties and seven previously documented archaeological site are located within 500 m (1640 ft) of the Blackwater Alternative study area (Figures 6 and 7). The register-listed properties include the Portales Main Post Office (SR 106), Bank of Portales (SR 1111), and Roosevelt County Courthouse (SR 1278) buildings discussed above. In addition, a large portion of the Blackwater Well Field is within the register-listed Blackwater Draw District (SR 2), which contains the Clovis type-site, one of the earliest and most well-known Paleoindian sites in North America. The Clovis site—with its stratified Clovis and Folsom remains—are located in Blackwater Locality Number (No.) 1, northwest of the current study area. However, the study area overlaps with Anderson Basin/Blackwater Draw Locality No. 2, which also contains a series of Paleoindian sites and preserved Pleistocene deposits containing the remains of extinct animals (Weiss 1975). If the Blackwater Alternative is selected, the potential effects of developing the Blackwater Well Field on this important register-listed property would have to be assessed.

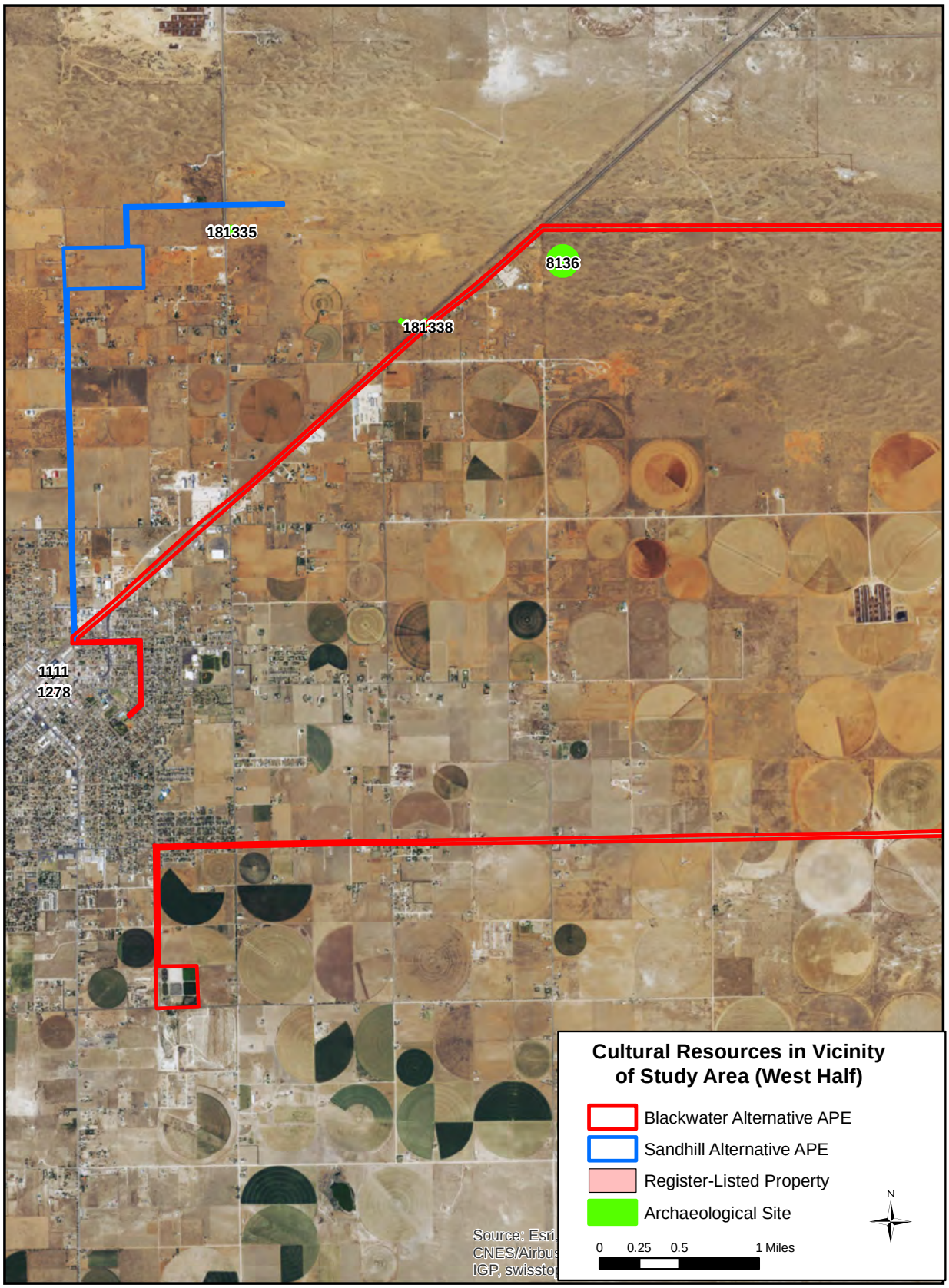

Figure 6. Previously Documented Cultural Resources within 500 m (1640 ft) of the Study Areas (West Half)

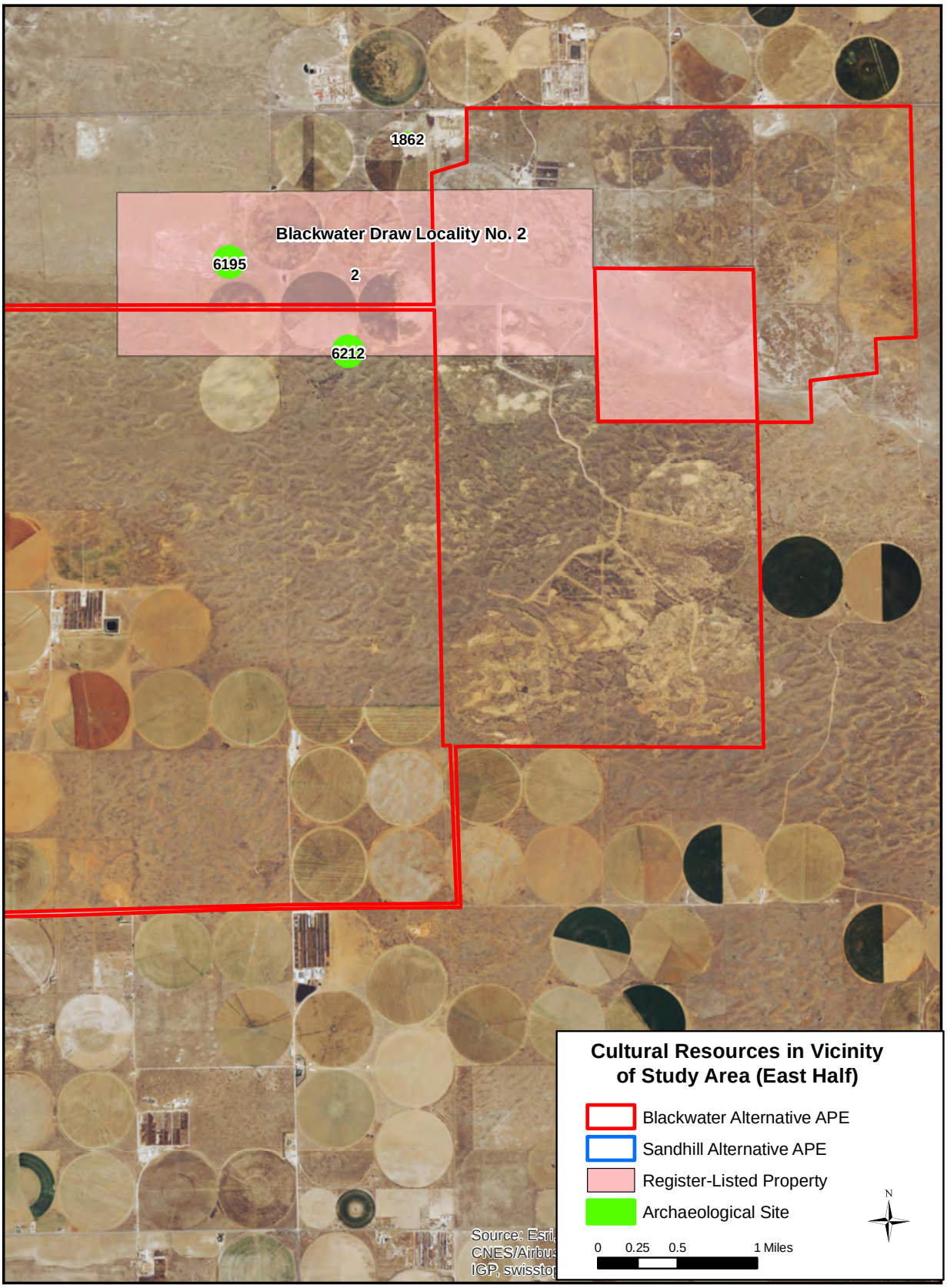

Figure 7. Previously Documented Cultural Resources within 500 m (1640 ft) of the Study Areas (East Half)

Of the seven previously documented archaeological sites in the vicinity of the Blackwater Alternative study area, one (LA 181338) is located within an option for the pipeline corridor (along US 70), and three more are located very close to the pipeline corridor and could ultimately extend into the APE when it is defined (Table 3). These sites have been recently documented, and little data is available in the NMCRIS database regarding their characteristics. Other sites located farther from the study area are prehistoric locations likely associated with Blackwater Draw Locality No. 2.

Table 3. Summary of Archaeological Sites within 500 m (1640 ft) of the Blackwater Alternative Study Area

LA No.	Site Type	Location
1862	Prehistoric; No Features	~ 375 m northeast of the Blackwater Well Field portion of study area
6195	Unknown; No Features	~ 200 m north of possible pipeline location within study area
6212	Prehistoric; No Features	~ 250 m south of possible pipeline location within study area
8136	Unknown; No Features	~ 100 m south of likely pipeline location near intersection with US 70
181336	Unknown; Features	~ 100 m northwest of US 70 (possible pipeline route)
181337	No Data Available	Immediately outside US 70 right-of-way (possible pipeline corridor)
181338	No Data Available	Within US 70 right-of-way (possible pipeline corridor)

In addition to archaeological sites and register-listed properties, 454 historic built environment resources (historic buildings and structures) have been documented within 500 m (1640 ft) of the Blackwater Alternative study area during the previous cultural resource surveys conducted along streets within Portales (see Figure 5 above). However, only 107 of these buildings are within 100 m (328 ft) and 42 are within 30 m (100 ft) of the study area. Based on our analysis, approximately 30 historic buildings along Boston Avenue, East Brazos Street, South Fargo Avenue, 8th Street, and South Roosevelt Road would likely have to be reassessed in relation to the current project if the Blackwater Alternative is selected.

SUMMARY

This Class I report summarizes a cultural resources literature review conducted by Okun Consulting Solutions for a proposed City of Portales water supply project located in Roosevelt County. The City is developing alternatives for expanding its water supply in order to meet future water needs. Two alternatives have been defined and were analyzed for this study. The Blackwater Alternative covers a larger area and intersects or is located near a larger number of archaeological sites than the Sandhill Alternative. Most importantly, this alternative intersects with a large portion of the Anderson Basin/Blackwater Draw Locality No. 2 portion of the register-listed Blackwater Draw District (SR 2). If the Blackwater Alternative is selected, the potential effects on this important register-listed property would have to be assessed and could be a significant concern. The Sandhill Alternative does not intersect with any previously documented archaeological sites or register-listed properties. However, little of either alternative has been previous surveyed for the presence of cultural resources.

This documented is designed to assist the City with environmental planning and compliance as it develops its water supply project, and the study areas presented here have not been finalized and may not be consistent with final design plans. Most of the project area will likely require Class III cultural resource survey when an alternative is selected. The APE for this Class III survey must be defined in consultation with the SHPO and other agencies (depending on funding sources) and in compliance with any applicable statutes for cultural resources.

REFERENCES

Weiss, Francine
1975 *Blackwater Draw (Clovis Site and Anderson Basin) National Register of Historic Places Nomination Form.* On file at Laboratory of Anthropology. Santa Fe.

Attachment 4

Environmental Justice Summary Report

EJView ACS Summary Report

Location: -103.338432,34.185897

Study Area: 4 miles around the point location

Summary of ACS Estimates	2006 - 2010
Population	15,342
Population Density (per sq. mile)	85
Minority Population	7,107
% Minority	46%
Households	5,329
Housing Units	6,295
Housing Units Built Before 1950	1,276
Per Capita Income	16,559
Land Area (sq. miles) (Source: SF1)	181.14
% Land Area	100%
Water Area (sq. miles) (Source: SF1)	0.14
% Water Area	0%

	2006 - 2010 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	15,342	100%	447
Population Reporting One Race	14,939	97%	1,416
White	11,052	72%	479
Black	243	2%	144
American Indian	147	1%	127
Asian	139	1%	151
Pacific Islander	0	0%	127
Some Other Race	3,358	22%	388
Population Reporting Two or More Races	403	3%	142
Total Hispanic Population	6,581	43%	444
Total Non-Hispanic Population	8,761		
White Alone	8,235	54%	469
Black Alone	207	1%	144
American Indian Alone	88	1%	127
Non-Hispanic Asian Alone	41	0%	127
Pacific Islander Alone	0	0%	127
Other Race Alone	33	0%	127
Two or More Races Alone	157	1%	127
Population by Sex			
Male	7,732	50%	288
Female	7,610	50%	285
Population by Age			
Age 0-4	1,212	8%	131
Age 0-17	4,074	27%	211
Age 18+	11,268	73%	361
Age 65+	1,633	11%	157

Data Note: Detail may not sum to totals dues to rounding. Hispanic population can be of any race. N/A means not available.
Source: U.S. Census Bureau, American Community Survey (ACS) 2006 - 2010.

EJView ACS Summary Report

Location: -103.338432,34.185897

Study Area: 4 miles around the point location

	2006 - 2010 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	8,408	100%	257
Less than 9th Grade	790	9%	148
9th - 12th Grade, No Diploma	1,057	13%	172
High School Graduate	2,463	29%	171
Some College, No Degree	2,300	27%	175
Associate Degree	584	7%	145
Bachelor's Degree or more	1,799	21%	167
POPULATION AGE 5+ YEARS BY ABILITY TO SPEAK ENGLISH			
Total	14,130	100%	445
Speak only English	10,121	72%	334
Non-English at Home[1+2+3+4]	4,009	28%	270
[1]Speak English "very well"	3,058	22%	248
[2]Speak English "well"	490	3%	151
[3]Speak English "not well"	231	2%	155
[4]Speak English "not at all"	231	2%	139
[3+4]Speak English "less than well"	462	3%	165
[2+3+4]Speak English "less than very well"	951	7%	189
POPULATION AGE 5+ YEARS BY LANGUAGE SPOKEN AT HOME			
Total	N/A	N/A	N/A
Speak only English	N/A	N/A	N/A
Non-English Speaking	N/A	N/A	N/A
Population by Place of Birth for the Foreign-Born			
Total	N/A	N/A	N/A
Europe	N/A	N/A	N/A
Asia	N/A	N/A	N/A
Africa	N/A	N/A	N/A
Oceania	N/A	N/A	N/A
Americas	N/A	N/A	N/A
Households by Household Income in 1999			
Household Income Base	5,329	100%	142
< $15,000	1,235	23%	135
$15,000 - $25,000	727	14%	138
$25,000 - $50,000	1,677	31%	166
$50,000 - $75,000	793	15%	128
$75,000 +	896	17%	149
Occupied Housing Units by Tenure			
Total	5,329	100%	142
Owner Occupied	3,117	58%	112
Renter Occupied	2,212	42%	135

Data Note: Detail may not sum to totals dues to rounding. Hispanic population can be of any race. N/A means not avialable.
2006-2010 ACS 5-year Estimates: The American Community Survey (ACS) summary files provide nation-wide population and housing characteristic data at all Census summary levels down to the Block Group level. This data was collected between January 1, 2006 and December 31, 2010. ACS replaces the decennial census sample data, and is not the 2010 Census population counts data. (http://www.census.gov/acs/www/#fragment-3)
Margin of error (MOE): The MOE provides a measure of the uncertainty in the estimate due to sampling error in the ACS survey. Applying the MOE value yields the confidence interval for the estimate. For example, an estimate value of 50 and +/- MOE of 5 means the true value is between 45 and 55 with a 90 percenet certainty (http://www.census.gov/acs/www/Downloads/data_documentation/Accuracy/MultiyearACSAccuracyofData2010.pdf). Maximum MOE is shown for each value within study area.
Source: U.S. Census Bureau, American Community Survey (ACS) 2006 - 2010.

Appendix B

City of Portales
2014 Financial Statements

STATE OF NEW MEXICO
CITY OF PORTALES

WATER AND SEWER ENTERPRISE FUND
STATEMENT OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
BUDGET (NON-GAAP BUDGETARY BASIS) AND ACTUAL
FOR THE YEAR ENDED JUNE 30, 2014

	Original Budget	Final Budget	Actual on Budgetary Basis	Variance with Final Budget Positive (Negative)
OPERATING REVENUES:				
Charges for services	$ 5,009,600	$ 5,009,600	$ 4,494,458	$ (515,142)
Tapping and reconnect fees	-	-	78,416	78,416
Rentals	-	8,812	20,293	11,481
Late fees	-	-	99,508	99,508
Interest income	151,200	151,200	-	(151,200)
Grants	558,987	558,987	-	(558,987)
Other grants	(9,200)	(9,200)	-	9,200
Miscellaneous income	-	-	1,605	1,605
Total revenues	5,710,587	5,719,399	4,694,280	(1,025,119)
OPERATING EXPENSES:				
Salaries and wages	-	-	631,430	(631,430)
Employee benefits	-	-	205,949	(205,949)
Maintenance	-	-	464,453	(464,453)
Contracted and purchased services	-	-	458,133	(458,133)
Supplies	-	-	42,352	(42,352)
Operating costs	4,915,227	4,915,227	736,207	4,179,020
Total operating expenses	4,915,227	4,915,227	2,538,524	2,376,703
Operating loss	795,360	804,172	2,155,756	1,351,584
NON-OPERATING REVENUE (EXPENSES):				
Investment income (expense)	-	-	54,450	54,450
Water conservation fees	-	-	280,093	280,093
Grant proceeds	-	-	203,086	203,086
Interest expense	-	-	(67,500)	(67,500)
Total non-operating revenues (expenses)	-	-	470,129	470,129
Net loss before transfers	795,360	804,172	2,625,885	1,821,713
Transfers:				
Transfers in	696,500	696,500	551,820	(144,680)
Transfers out	(1,396,500)	(1,396,500)	(1,251,822)	144,678
Total operating transfers	(700,000)	(700,000)	(700,002)	(2)
Total net income (loss)	95,360	104,172	1,925,883	1,821,711
Fund balance - beginning of the year, as previously states	13,215,754	13,215,754	13,215,754	-
Restatement	-	-	966,430	966,430
Fund balance - beginning of year, as restated	13,215,754	13,215,754	14,182,184	966,430
Fund balance - end of the year	$ 13,311,114	$ 13,319,926	$ 16,108,067	$ 2,788,141

Continued

See independent auditors' report and accompanying notes to financial statements.

STATE OF NEW MEXICO
CITY OF PORTALES

WATER AND SEWER ENTERPRISE FUND
STATEMENT OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
BUDGET (NON-GAAP BUDGETARY BASIS) AND ACTUAL
FOR THE YEAR ENDED JUNE 30, 2014

Reconciliation of net income for budgetary basis to statement of activities for proprietary funds:	
Net income after transfers - budgetary basis	$ 1,925,883
Depreciation is reported in the proprietary funds statement of activities but is not a budget expenditure item	(188,449)
Net income after transfers-financial statement basis	$ 1,737,434

Concluded

See independent auditors' report and accompanying notes to financial statements.

Appendix C

Cost Estimates

APPENDIX C
PORTALES WATER SUPPLY PER

Alternative Cost Summary Table

	C	USPW (O&M)	SPPW (S)	NPV
Alternative	**Capital Cost**	**O&M Cost**	**Salvage Value**	**Net Present Value**
2-Opt 1	$ 17,439,000	$ 10,016,000	$ 4,539,000	$ 22,916,000
2- Opt 2	$ 20,387,000	$ 9,923,000	$ 5,391,000	$ 24,919,000
3	$ 32,689,000	$ 31,245,000	$ 1,410,000	$ 62,524,000
4	$ 7,844,000	NA	NA	$ 7,844,000

All values rounded to the nearest $1,000

NPV = C +USPW (O&M) - SPPW (S)

NPV = Net Present Value
C = Capital Cost of Alternative
USPW (O&M) = Present Worth of the Uniform Series of Annual O&M
SPPW(S) = Single Payment Present Worth of Salvage Value

APPENDIX C
PORTALES WATER SUPPLY PER

Alternative 2 - Option 1
ASR at Sandhill Well Field

Item #	Description	Qty	Unit	Unit Price	Amount	Asset Life (years)	Salvage Value ($)	Replacement Cost ($)	Annual Payment Amount ($)
Construction									
1	Construction Surveying and Staking	2%	%		$ 184,000				
2	Mobilization/demobilization	8%	%		$ 735,000				
3	Site Clearing and Grubbing	8	LS	$ 2,000	$ 16,000				
4	Extend Power to Injection Wells, AWT, and Booster Station	1	LS	$ 40,000	$ 40,000	50	$ 24,000	$72,625	$ 1,452
5	Advanced Water Treatment - 1,200 gpm	1,728,000	gpd	$ 3.50	$ 6,100,000	50	$ 3,660,000	$11,075,299	$ 221,506
6	Direct Injection Well - drill, construct and equip with backwash pump	7	EA	$ 228,000	$ 1,596,000	20		$2,026,017	$ 101,301
7	Booster Pump Station - 1,200 gpm	50	HP	$ 20,000	$ 1,000,000	50	$ 600,000	$1,815,623	$ 36,312
8	Waterline Pipe & Fittings, 10-inch PVC, including valves (1 per 1/2 mile), trenching, and compacted backfill, cip.	17,000	LF	$ 25	$ 425,000	50	$ 255,000	$771,640	$ 15,433
9	Pavement Replacement, 5' wide, over piping in City	4,444	SY	$ 17	$ 76,000	20		$96,477	$ 4,824
10	Gravel Access Road, 20 ft wide, for all new wells and booster station, includes grading and gravel surface	6,667	SY	$ 9.20	$ 62,000	10		$148,560	$ 14,856
				SUBTOTAL	**$ 10,234,000**		**$ 4,539,000**	**$16,006,240**	**$ 395,684**
Non-Construction									
11	Feasibility Study for ASR	1	LS	$ 95,000	$ 95,000				
12	Engineering Design	8%	%	$ 10,234,000	$ 819,000				
13	Pilot Test AWTF	1	LS	$ 500,000	$ 500,000				
14	Pilot Test Injection Well with Potable Water	1	LS	$ 125,000	$ 125,000				
15	Land Acquisition for AWTF and BPS	0.5	AC	$ 50,000	$ 25,000				
16	Easement Acquisition	8	AC	$ 3,000	$ 23,416				
17	Permitting, Environmental, Geotechnical Investigations	0.5%	%	$ 10,234,000	$ 51,170				
18	Construction Administration	10%	%	$ 10,234,000	$ 1,023,000				
				SUBTOTAL	**$ 2,661,586**				
	Total All Items				$ 12,895,586				
	Contingency	25%	%		$ 3,223,896				
	NMGRT	8.1875%	%		$ 1,319,783				
				GRAND TOTAL	**$ 17,439,265**				

Notes: *Waterline pipe and fittings assumes installation outside of paved surface.*

Planning period of	20	years
Real interest rate (from OMB Circular A-94 Appendix C)	1.2%	
(https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c)		
Injection rate	1200	gpm

Salvage value based on straight line depreciation over the life of the asset.
Replacement cost is the cost at the end of the asset life. Annual Payment amount is the Replacement Cost/Asset Life in years
Assets with 10 or 20 year life are replaced at the beginning of Year 21; salvage value is $0.

Length of reuse line within Portales city limits	8000	ft
Width of pavement replacement for waterline	5	ft
Width of gravel access road	20	ft
Length of road associated with new injection wells and the booster station installation	3000	ft
Length of water line from connection to 12" reuse line to the Sandhill Well Field	17,000	ft
Costs provided by Roosevelt County Electric Co-op:		
Cost to hook up a well to power lines	$ 1,800	per well
Cost to extend power	$ 27,000	per mile
Assumed length of power extension from existing production wells to the proposed injection well plot	1	miles

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PORTALES WATER SUPPLY PER

Alternative 2 - Option 2
ASR at the Blackwater Well Field

Item #	Description	Qty	Unit	Unit Price	Amount	Asset Life (years)	Salvage Value ($)	Replacement Cost ($)	Annual Payment Amount ($)
Construction									
1	Construction Surveying and Staking	2%	%		$ 219,000				
2	Mobilization/demobilization	8%	%		$ 876,000				
3	Site Clearing and Grubbing	5	LS	$ 2,000	$ 10,000				
4	Extend Power to Injection Wells, AWT, and Booster Station	1	LS	$ 61,200	$ 61,200	50	$ 36,720	$61,200	$ 1,224
5	Advanced Water Treatment - 1,200 gpm	1,728,000	gpd	$ 3.50	$ 6,100,000	50	$ 3,660,000	$11,075,299	$ 221,506
6	Direct Injection Well - drill, construct and equip with backwash pump	4	EA	$ 228,000	$ 912,000	20		$1,157,724	$ 57,886
7	Booster Pump Station - 1,200 gpm at 75 HP	75	HP	$ 20,000	$ 1,500,000	50	$ 1,132,800	$2,723,434	$ 54,469
8	Waterline Pipe & Fittings, 10-inch PVC, including valves (1 per 1/2 mile) incl. trenching, and compacted backfill, cip.	59,000	LF	$ 32	$ 1,888,000	50	$ 561,000	$3,427,896	$ 33,952
9	Pavement Replacement, 5' wide, over piping in City	1,500	SY	$ 17	$ 26,000	20		$33,005	$ 1,650
10	Gravel Access Road, 20 ft wide, for all new wells and booster station, includes grading and gravel surface	49,000	SY	$ 9.20	$ 451,000	10		$508,138	$ 15,431
				SUBTOTAL	**$ 12,043,000**		**$ 5,390,520**	**$18,986,696**	**$ 386,118**
Non-Construction									
11	Feasibility Study for ASR	1	LS	$ 95,000	$ 95,000				
12	Engineering Design	8%	%	$ 12,043,000	$ 964,000				
13	Pilot Test AWTF	1	LS	$ 500,000	$ 500,000				
14	Pilot Test Injection Well with Potable Water	1	LS	$ 125,000	$ 125,000				
15	Land Acquisition for AWTF and BPS within City Limits	2	AC	$ 35,000	$ 70,000				
16	Easement Acquisition	27	AC	$ 500	$ 14,000				
17	Permitting, Environmental, Geotechnical Investigations	0.50%	%	$ 12,043,000	$ 60,215				
18	Construction Administration	10%	%	$ 12,043,000	$ 1,204,000				
				SUBTOTAL	**$ 3,032,000**				
	Total All Items				$ 15,075,000				
	Contingency	25%	%		$ 3,768,750				
	NMGRT	8.1875%	%		$ 1,542,832				
				GRAND TOTAL	**$ 20,386,582**				

Notes:

Waterline pipe and fittings assumes installation outside of paved surface.
Planning period of 20 years
Real interest rate (from OMB Circular A-94 Appendix C)
(https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c) 1.2%
Injection rate 1200 gpm
Salvage value based on straight line depreciation over the life of the asset.
Replacement cost is the cost at the end of the asset life. Annual Payment amount is the Replacement Cost/Asset Life in years
Assets with 10 or 20 year life are replaced at the beginning of Year 21; salvage value is $0.
Length of reuse line within Portales city limits 2640 ft
Width of pavement replacement for waterline 5 ft
Width of gravel access road 20 ft
Length of piping associated with new injection well installation 3000 ft
Length of water line from connection at 16" reuse line to proposed injection area at the Blackwater Well Field 59,000 ft
Length of gravel access road for water pipeline from existing road to proposed injection area 22,000 ft

Costs provided by Roosevelt County Electric Co-op:
Cost to hook up a well to power lines $ 1,800 per well
Cost to extend power $ 27,000 per mile
Assumed length of power extension from existing production wells to proposed injection well plot 2 miles

APPENDIX C
PORTALES WATER SUPPLY PER

Alternative 3
Rehabilitation and New Well Installation

Item #	Description	Qty	Unit	Unit Price	Amount	Asset Life (years)	Salvage Value ($)	Replacement Cost ($)	Annual Payment Amount ($)
Construction									
1	Construction Surveying and Staking	2%	%		$ 311,000				
2	Mobilization/demobilization	8%	%		$ 1,243,000				
3	Test Hole Drilling	54	EA	$ 10,000	$ 540,000				
4	Site Clearing and Grubbing	49	LS	$ 2,000	$ 98,000				
5	Extend Power to Wells	1	LS	$ 749,700	$ 749,700	50	$ 449,820	$1,361,172	$ 27,223
6	Full Well Rehabilitation - includes well inspection, acid washing, and screen replacement	8	EA	$ 79,000	$ 632,000	20		$802,283	$ 40,114
7	New Well Installation - includes drilling, casing, screen, well development, pump, building, and site improvements	49	EA	$ 228,000	$ 11,172,000	20		$14,182,121	$ 709,106
8	Waterline Pipe & Fittings, 8-inch PVC, including valves (1 per 1/4 mile), trenching, and compacted backfill, cip.	94,000	LF	$ 25	$ 2,350,000	50	$ 1,410,000	$4,266,714	$ 85,334
9	Waterline Pipe & Fittings, 6-inch PVC, including valves (1 per 1/4 mile), trenching, and compacted backfill, cip.	20,000	LF	$ 18	$ 350,000	50	$ 210,000	$635,468	$ 12,709
10	Gravel Access Road, 20 ft wide, for all new wells, includes grading and gravel surface	208,900	SY	$ 9.20	$ 1,922,000	10		$4,087,502	$ 408,750
				SUBTOTAL	**$ 19,367,700**		**$ 1,410,000**	**$19,251,117**	**$ 1,283,237**
Non-Construction									
11	Hydrogeologic Investigation and Well Completion report	1	LS	$ 100,000	$ 100,000				
12	Engineering Design	8%	%	$ 19,367,700	$ 1,550,000				
13	Annual Leasing Fee for the 8 proposed wells on State Land, 20 yr period	160	LS	$ 1,000	$ 160,000				
14	Land Acquisition for Wells	1920	AC	$ 500	$ 960,000				
15	Easement Acquisition	0	AC	$ 500	$ -				
16	Permitting, Environmental, Geotechnical Investigations	0.50%	%	$ 19,367,700	$ 97,000				
17	Construction Administration	10%	%	$ 19,367,700	$ 1,937,000				
				SUBTOTAL	**$ 4,804,000**				
	Total All Items				$ 24,171,700				
	Contingency	25%	%		$ 6,042,925				
	NMGRT	8.1875%	%		$ 2,474,000				
				GRAND TOTAL	**$ 32,688,625**				

Notes:

Waterline pipe and fittings assumes installation outside of paved surface.
Planning period of 20 years
Real interest rate (from OMB Circular A-94 Appendix C) 1.2%
(https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c)
Injection rate 1200 gpm
Salvage value based on straight line depreciation over the life of the asset.
Replacement cost is the cost at the end of the asset life. Annual Payment amount is the Replacement Cost/Asset Life in years
Assets with 10 or 20 year life are replaced at the beginning of Year 21; salvage value is $0.
Length of reuse line within Portales city limits 2640 ft
Width of pavement replacement for waterline 5 ft
Width of gravel access road 20 ft
Length of 8" water line associated with the connections between the existing transmission line and the new wells 43,084 ft
Length of 6" water line associated with the connections between the existing transmission line and the new wells 19,345 ft
Length of water line associated with the connections between the existing transmission line and the 20 new wells to be installed once the property has been aquired 50,000 ft
The city will own the land and therefore no easements are included.
Leasing fees for wells on state land are assumed to apply for the entire 20 yr planning period

Costs provided by Roosevelt County Electric Co-op:
Cost to hook up a well to power lines $ 1,800 per well
Cost to extend power $ 27,000 per mile

APPENDIX C
PORTALES WATER SUPPLY PER

Alternative 4
Conservation

Item #	Description	Qty	Unit	Unit Price	Amount	Asset Life (years)	Salvage Value ($)	Replacement Cost ($)	Annual Payment Amount ($)
Construction									
				SUBTOTAL	**$ -**			**$ -**	**$ -**
Non-Construction									
1	Update water conservation plan (every 5 years)	4	EA	$ 50,000	$ 200,000				
2	Yearly water audits	20	EA	$ 15,000	$ 300,000				
3	Customer rebates and incentives	20	EA	$ 100,000	$ 2,000,000				
4	Public education/outreach	20	EA	$ 25,000	$ 500,000				
5	Enforcement	20	EA	$ 40,000	$ 800,000				
6	Leak detection and repair program	20	EA	$ 100,000	$ 2,000,000				
				SUBTOTAL	**$ 5,800,000**				
	Total All Items				$ 5,800,000				
	Contingency	25%	%		$ 1,450,000				
	NMGRT	8.1875%	%		$ 593,594				
				GRAND TOTAL	**$ 7,843,594**				

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative

Item #	Description	Qty	Unit	Unit Price	Amount	Asset Life (years)	Salvage Value ($)	Replacement Cost ($)	Annual Payment Amount ($)
Construction									
1	Construction Surveying and Staking	2%	%		$ 576,000				
2	Mobilization/demobilization	8%	%		$ 2,301,000				
3	Site Clearing and Grubbing	54	LS	$ 2,000	$ 108,000				
4	Extend Power to Injection Wells, AWT, and Booster Station	1	LS	$ 810,900	$ 810,900	50	$ 486,540	$1,472,289	$ 29,446
5	Test Hole Drilling - Rehabilitation and Exploratory	54	EA	$ 10,000	$ 540,000			$540,000	
6	Advanced Water Treatment - 1,200 gpm	1,728,000	gpd	$ 3.50	$ 6,100,000	50	$ 3,660,000	$11,075,299	$ 221,506
7	Direct Injection Well - drill, construct and equip with backwash pump	4	EA	$ 228,000	$ 912,000	20		$1,157,724	$ 57,886
8	Booster Pump Station - 1,200 gpm at 50 HP	75	HP	$ 20,000	$ 1,500,000	50	$ 1,132,800	$2,723,434	$ 54,469
9	Waterline Pipe & Fittings, 10-inch PVC, incl. trenching, and compacted backfill, cip.	59,000	LF	$ 32	$ 1,888,000	50	$ 324,000	$3,427,896	$ 68,558
10	Full Well Rehabilitation - includes well inspection, acid washing, and screen replacement	8	EA	$ 79,000	$ 632,000	20		$802,283	$ 40,114
11	New Well Installation - includes drilling, casing, screen, well development, pump, building, and site improvements	49	EA	$ 228,000	$ 11,172,000	20		$14,182,121	$ 709,106
12	Waterline Pipe & Fittings, 8-inch PVC, including valves (1 per 1/4 mile) incl. trenching, and compacted backfill, cip.	94,000	LF	$ 25	$ 2,350,000	50	$ 1,410,000	$4,266,714	$ 85,334
13	Waterline Pipe & Fittings, 6-inch PVC, including valves (1 per 1/4 mile) incl. trenching, and compacted backfill, cip.	20,000	LF	$ 18	$ 350,000	50	$ 210,000	$635,468	$ 12,709
14	Pavement Replacement, 5' wide, over piping in City	1,500	SY	$ 17	$ 26,000	20		$33,005	$ 1,650
15	Gravel Access Road, 20 ft wide, for all new wells, includes grading and gravel surface	257,900	SY	$ 9.20	$ 2,373,000	10		$2,673,640	$ 267,364
	SUBTOTALS				**$ 31,639,000**		**$ 7,013,340**	**$42,989,871**	**$ 1,548,143**

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative

Item #	Description	Qty	Unit	Unit Price	Amount	Asset Life (years)	Salvage Value ($)	Replacement Cost ($)	Annual Payment Amount ($)
Non-Construction									
16	Feasibility Study for ASR	1	LS	$ 95,000	$ 95,000				
17	Hydrogeologic Investigation and Well Completion reports (Phase 1, 2, and 3)	1	LS	$ 100,000	$ 100,000				
18	Land Acquisition for AWTF and BPS within City Limits	2	AC	$ 35,000	$ 70,000				
19	Land Acquisition for wells outside of Portales city limits	1920	AC	$ 500	$ 960,000				
20	Annual Leasing Fee for the 8 proposed wells on State Land, 20 yr period	160	LS	$ 1,000	$ 160,000				
21	Engineering Design	8%	%	$ 31,639,000	$ 2,532,000				
22	Pilot Test AWTF	1	LS	$ 500,000	$ 500,000				
23	Pilot Test Injection Well with Potable Water	1	LS	$ 125,000	$ 125,000				
24	Easement Acquisition	27	AC	$ 500	$ 13,545				
25	Right-of-Way Easements	0	AC	$ 500	$ -				
26	Permitting, Environmental, Geotechnical Investigations	0.50%	LS	$ 31,639,000	$ 158,195				
27	Construction Administration	10%	%	$ 31,639,000	$ 3,164,000				
28	Update water conservation plan (every 5 years)	4	EA	$ 50,000	$ 200,000				
29	Yearly water audits	20	EA	$ 15,000	$ 300,000				
30	Customer rebates and incentives	20	AC	$ 100,000	$ 2,000,000				
31	Public education/outreach	20	AC	$ 25,000	$ 500,000				
32	Enforcement	20	LS	$ 40,000	$ 800,000				
33	Leak detection and repair program	20	LS	$ 100,000	$ 2,000,000				
	SUBTOTAL				**$ 13,678,000**				
	Total All Items				$ 45,317,000				
	Contingency	25%	%		$ 11,329,250				
	NMGRT	8.1875%	%		$ 4,637,912				
	GRAND TOTAL				**$ 61,284,162**				

Notes:

Waterline pipe and fittings assumes installation outside of paved surface.

Planning period of	20	years
Real interest rate (from OMB Circular A-94 Appendix C)	1.2%	
(https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c)		
Injection rate	1200	gpm

Salvage value based on straight line depreciation over the life of the asset.
Replacement cost is the cost at the end of the asset life. Annual Payment amount is the Replacement Cost/Asset Life in years
Assets with 10 or 20 year life are replaced at the beginning of Year 21; salvage value is $0.

Length of reuse line within Portales city limits	2640	
Width of excavation for 8" & 10" water lines	5	
Width of gravel access road	20	
Length of piping associated with new well installation	25000	
Length of water line associated with the connections between the existing transmission line and the 20 new wells to be installed once the property has been aquired	50,000	ft
Length of water line from connection to 16" reuse line to the Blackwater Well Field	59,000	
Length of gravel access road for water pipeline from existing road to proposed injection area	22,000	ft

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative
Phase 1

Item #	Description	Qty	Unit	Unit Price	Amount	Asset Life (years)	Salvage Value ($)	Replacement Cost ($)	Annual Payment Amount ($)
Construction									
1	Construction Surveying and Staking	2%	%		$ 111,000				
2	Mobilization/demobilization	8%	%		$ 442,000				
3	Site Clearing and Grubbing	15	LS	$ 2,000	$ 30,000				
4	Extend Power to Injection Wells, AWT, and Booster Station	1	LS	$ 229,500	$ 229,500	50	$ 137,700	$416,685	$ 8,334
5	Test Hole Drilling - Rehabilitation and Exploratory	19	EA	$ 10,000	$ 190,000			$190,000	
6	Advanced Water Treatment - 1,200 gpm	0	gpd	$ 3.50	$ -	50	$ -	$0	$ -
7	Direct Injection Well - drill, construct and equip with backwash pump	1	EA	$ 228,000	$ 228,000	20		$289,431	$ 14,472
8	Booster Pump Station - 1,200 gpm at 50 HP	0	HP	$ 20,000	$ -	50	$ -	$0	$ -
9	Waterline Pipe & Fittings, 10-inch PVC, incl. trenching, and compacted backfill, cip.	0	LF	$ 32	$ -	50	$ 114,000	$0	$ -
10	Full Well Rehabilitation - includes well inspection, acid washing, and screen replacement	8	EA	$ 79,000	$ 632,000	20		$802,283	$ 40,114
11	New Well Installation - includes drilling, casing, screen, well development, pump, building, and site improvements	14	EA	$ 228,000	$ 3,192,000	20		$4,052,034	$ 202,602
12	Waterline Pipe & Fittings, 8-inch PVC, including valves (1 per 1/4 mile) incl. trenching, and compacted backfill, cip.	10,500	LF	$ 25	$ 262,500	50	$ 157,500	$476,601	$ 9,532
13	Waterline Pipe & Fittings, 6-inch PVC, including valves (1 per 1/4 mile) incl. trenching, and compacted backfill, cip.	30,500	LF	$ 18	$ 533,750	50	$ 320,250	$969,089	$ 19,382
14	Pavement Replacement, 5' wide, over piping in City	0	SY	$ 17	$ -	20		$0	$ -
15	Gravel Access Road, 20 ft wide, for all new wells, includes grading and gravel surface	24,000	SY	$ 9.20	$ 221,000	10		$248,999	$ 24,900
	SUBTOTALS				**$ 6,072,000**		**$ 271,500**	**$6,838,437**	**$ 319,335**
Non-Construction									
16	Feasibility Study for ASR	1	LS	$ 95,000	$ 95,000				
17	Hydrogeologic Investigation and Well Completion report	1	LS	$ 30,000	$ 30,000				
18	Land Acquisition for AWTF and BPS within City Limits	2	AC	$ 35,000	$ 70,000				
19	Land Acquisition for wells outside of Portales city limits	0	AC	$ 500	$ -				
20	Annual Leasing Fee for the 8 proposed wells on State Land, 20 yr period	40	LS	$ 1,000	$ 40,000				
21	Engineering Design	8%	%	$ 6,072,000	$ 486,000				
22	Pilot Test AWTF	1	LS	$ 500,000	$ 500,000				
23	Pilot Test Injection Well with Potable Water	1	LS	$ 50,000	$ 50,000				
24	Easement Acquisition	60	AC	$ 500	$ 30,000				
25	Right-of-Way Easements	0	AC	$ 500	$ -				
26	Permitting, Environmental, Geotechnical Investigations	0.50%	LS	$ 10,234,000	$ 51,170				
27	Construction Administration	10%	%	$ 6,072,000	$ 608,000				
28	Update water conservation plan (every 5 years)	1	EA	$ 50,000	$ 50,000				
29	Yearly water audits	5	EA	$ 15,000	$ 75,000				
30	Customer rebates and incentives	5	EA	$ 100,000	$ 500,000				
31	Public education/outreach	5	EA	$ 25,000	$ 125,000				
32	Enforcement	5	EA	$ 40,000	$ 200,000				
33	Leak detection and repair program	5	EA	$ 100,000	$ 500,000				
	SUBTOTAL				**$ 3,411,000**				
	Total All Items				$ 9,483,000				
	Contingency	25%	%		$ 2,370,750				
	NMGRT	8.1875%	%		$ 970,526				
	GRAND TOTAL				**$ 12,824,276**				

Notes:

Waterline pipe and fittings assumes installation outside of paved surface.

Planning period of	20	years
Real interest rate (from OMB Circular A-94 Appendix C)	1.2%	
(https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c)		
Injection rate	1200	gpm

Salvage value based on straight line depreciation over the life of the asset.
Replacement cost is the cost at the end of the asset life. Annual Payment amount is the Replacement Cost/Asset Life in years
Assets with 10 or 20 year life are replaced at the beginning of Year 21; salvage value is $0.

Length of reuse line within Portales city limits	2640	
Width of pavement replacemetn for water lines	5	
Width of gravel access road	20	
Length of piping associated with new well installation	30500	
Length of water line from connection to 16" reuse line to the Blackwater Well Field	59,000	
Length of gravel access road for water pipeline from existing road to proposed injection area	22,000	ft

Costs provided by Roosevelt County Electric Co-op:

Cost to hook up a well to power lines	$ 1,800	per well
Cost to extend power	$ 27,000	per mile

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative
Phase 2

Item #	Description	Qty	Unit	Unit Price	Amount	Asset Life (years)	Salvage Value ($)	Replacement Cost ($)	Annual Payment Amount ($)
Construction									
1	Construction Surveying and Staking	2%	%		$ 283,000				
2	Mobilization/demobilization	8%	%		$ 1,129,000				
3	Site Clearing and Grubbing	16	LS	$ 2,000	$ 32,000				
4	Extend Power to Injection Wells, AWT, and Booster Station	1	LS	$ 244,800	$ 244,800	50	$ 146,880	$444,464	$ 8,889
5	Test Hole Drilling - Rehabilitation and Exploratory	15	EA	$ 10,000	$ 150,000			$150,000	
6	Advanced Water Treatment - 1,200 gpm	1,728,000	gpd	$ 3.50	$ 6,100,000	50	$ 3,660,000	$11,075,299	$ 221,506
7	Direct Injection Well - drill, construct and equip with backwash pump	1	EA	$ 228,000	$ 228,000	20		$289,431	$ 14,472
8	Booster Pump Station - 1,200 gpm at 50 HP	75	HP	$ 20,000	$ 1,500,000	50	$ 288,000	$2,723,434	$ 54,469
9	Waterline Pipe & Fittings, 10-inch PVC, incl. trenching, and compacted backfill, cip.	15,000	LF	$ 32	$ 480,000	50	$ 90,000	$871,499	$ 17,430
10	Full Well Rehabilitation - includes well inspection, acid washing, and screen replacement	0	EA	$ 79,000	$ -	20		$0	$ -
11	New Well Installation - includes drilling, casing, screen, well development, pump, building, and site improvements	15	EA	$ 228,000	$ 3,420,000	20		$4,341,466	$ 217,073
12	Waterline Pipe & Fittings, 8-inch PVC, including valves (1 per 1/4 mile) incl. trenching, and compacted backfill, cip.	32,500	LF	$ 25	$ 812,500	50	$ 487,500	$1,475,194	$ 29,504
13	Waterline Pipe & Fittings, 6-inch PVC, including valves (1 per 1/4 mile) incl. trenching, and compacted backfill, cip.	-	LF	$ 18	$ -	50	$ -	$0	$ -
14	Pavement Replacement, 5' wide, over piping in City	1,500	SY	$ 17	$ 26,000	20		$33,005	$ 1,650
15	Gravel Access Road, 20 ft wide, for all new wells, includes grading and gravel surface	121,111	SY	$ 9.20	$ 1,115,000	10		$1,256,261	$ 125,626
	SUBTOTALS				**$ 15,521,000**		**$ 4,525,500**	**$22,065,589**	**$ 681,730**
Non-Construction									
16	Feasibility Study for ASR	0	LS	$ 95,000	$ -				
17	Hydrogeologic Investigation and Well Completion report	1	LS	$ 30,000	$ 30,000				
18	Land Acquisition for AWTF and BPS	0	AC	$ 35,000	$ -				
19	Land Acquisition for wells outside of Portales city limits	1920	AC	$ 500	$ 960,000				
20	Annual Leasing Fee for the 8 proposed wells on State Land, 20 yr period	40	LS	$ 1,000	$ 40,000				
21	Engineering Design	8%	%	$ 15,521,000	$ 1,242,000				
22	Pilot Test AWTF	0	LS	$ 500,000	$ -				
23	Pilot Test Injection Well with Potable Water	0	LS	$ 125,000	$ -				
24	Easement Acquisition	27	AC	$ 500	$ 14,000				
25	Right-of-Way Easements and Survey	0.0	AC	$ 500	$ -				
26	Permitting, Environmental, Geotechnical Investigations	0.00%	%	$ 10,234,000	$ -				
27	Construction Administration	10%	%	$ 15,521,000	$ 1,553,000				
28	Update water conservation plan (every 5 years)	1	EA	$ 50,000	$ 50,000				
29	Yearly water audits	5	EA	$ 15,000	$ 75,000				
30	Customer rebates and incentives	5	EA	$ 100,000	$ 500,000				
31	Public education/outreach	5	EA	$ 25,000	$ 125,000				
32	Enforcement	5	EA	$ 40,000	$ 200,000				
33	Leak detection and repair program	5	EA	$ 100,000	$ 500,000				
	SUBTOTAL				**$ 5,289,000**				
	Total All Items				$ 20,810,000				
	Contingency	25%	%		$ 5,202,500				
	NMGRT	8.1875%	%		$ 2,129,773				
	GRAND TOTAL				**$ 28,142,273**				

Notes:

Waterline pipe and fittings assumes installation outside of paved surface.
Planning period of 20 years
Real interest rate (from OMB Circular A-94 Appendix C) 1.2%
(https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c)
Injection rate 1200 gpm
Salvage value based on straight line depreciation over the life of the asset.
Replacement cost is the cost at the end of the asset life. Annual Payment amount is the Replacement Cost/Asset Life in years
Assets with 10 or 20 year life are replaced at the beginning of Year 21; salvage value is $0.
Length of reuse line within Portales city limits 2640
Width of excavation for 8" & 10" water lines 5
Width of gravel access road 20
Length of piping associated with new well installation 32500
Length of water line from connection to 16" reuse line to the Blackwater Well Field 59,000
Length of gravel access road for water pipeline from existing road to proposed injection area 22,000 ft

Costs provided by Roosevelt County Electric Co-op:
Cost to hook up a well to power lines $ 1,800 per well
Cost to extend power $ 27,000 per mile

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative
Phase 3

Item #	Description	Qty	Unit	Unit Price	Amount	Asset Life (years)	Salvage Value ($)	Replacement Cost ($)	Annual Payment Amount ($)
Construction									
1	Construction Surveying and Staking	2%	%		$ 186,000				
2	Mobilization/demobilization	8%	%		$ 742,000				
3	Site Clearing and Grubbing	22	LS	$ 2,000	$ 44,000				
4	Extend Power to Injection Wells, AWT, and Booster Station	1	LS	$ 336,600	$ 336,600	50	$ 201,960	$611,139	$ 12,223
5	Test Hole Drilling - Rehabilitation and Exploratory	20	EA	$ 10,000	$ 200,000			$200,000	
6	Advanced Water Treatment - 1,200 gpm	0	gpd	$ 3.50	$ -	50	$ -	$0	$ -
7	Direct Injection Well - drill, construct and equip with backwash pump	2	EA	$ 228,000	$ 456,000	20		$578,862	$ 28,943
8	Booster Pump Station - 1,200 gpm at 50 HP	0	HP	$ 20,000	$ -	50	$ 844,800	$0	$ -
9	Waterline Pipe & Fittings, 10-inch PVC, incl. trenching, and compacted backfill, cip.	44,000	LF	$ 32	$ 1,408,000	50	$ 120,000	$2,556,397	$ 51,128
10	Full Well Rehabilitation - includes well inspection, acid washing, and screen replacement	0	EA	$ 79,000	$ -	20		$0	$ -
11	New Well Installation - includes drilling, casing, screen, well development, pump, building, and site improvements	20	EA	$ 228,000	$ 4,560,000	20		$5,788,621	$ 289,431
12	Waterline Pipe & Fittings, 8-inch PVC, including valves (1 per 1/4 mile) incl. trenching, and compacted backfill, cip.	50,000	LF	$ 25	$ 1,250,000	50	$ 750,000	$2,269,528	$ 45,391
13	Waterline Pipe & Fittings, 6-inch PVC, including valves (1 per 1/4 mile) incl. trenching, and compacted backfill, cip.	-	LF	$ 18	$ -	50	$ -	$0	$ -
14	Pavement Replacement, 5' wide, over piping in City	-	SY	$ 17	$ -	20		$0	$ -
15	Gravel Access Road, 20 ft wide, for all new wells, includes grading and gravel surface	111,111	SY	$ 9.20	$ 1,023,000	10		$1,152,606	$ 115,261
	SUBTOTALS				**$ 10,206,000**		**$ 1,714,800**	**$12,346,014**	**$ 542,376**
Non-Construction									
16	Feasibility Study/Hydrogeologic Investigation	0	LS	$ 95,000	$ -				
17	Hydrogeologic Investigation and Well Completion report	1	LS	$ 40,000	$ 40,000				
18	Land Acquisition for AWTF and BPS	0	AC	$ 35,000	$ -				
19	Land Acquisition for wells outside of Portales city limits	0	AC	$ 500	$ -				
20	Annual Leasing Fee for the 8 proposed wells on State Land, 20 yr period	80	LS	$ 1,000	$ 80,000				
21	Engineering Design	8%	%	$ 10,206,000	$ 817,000				
22	Pilot Test AWTF	0	LS	$ 500,000	$ -				
23	Pilot Test Injection Well with Potable Water	0	LS	$ 125,000	$ -				
24	Easement Acquisition	0.0	AC	$ 500	$ -				
25	Right-of-Way Easements and Survey	0.0	AC	$ 500	$ -				
26	Permitting, Environmental, Geotechnical Investigations	0.00%	%	$ 10,234,000	$ -				
27	Construction Administration	10%	%	$ 10,206,000	$ 1,021,000				
28	Update water conservation plan (every 5 years)	2	EA	$ 50,000	$ 100,000				
29	Yearly water audits	10	EA	$ 15,000	$ 150,000				
30	Customer rebates and incentives	10	EA	$ 100,000	$ 1,000,000				
31	Public education/outreach	10	EA	$ 25,000	$ 250,000				
32	Enforcement	10	EA	$ 40,000	$ 400,000				
33	Leak detection and repair program	10	EA	$ 100,000	$ 1,000,000				
	SUBTOTAL				**$ 4,858,000**				
	Total All Items				$ 15,064,000				
	Contingency	25%	%		$ 3,766,000				
	NMGRT	8.1875%	%		$ 1,541,706				
	GRAND TOTAL				**$ 20,371,706**				

Notes:

Waterline pipe and fittings assumes installation outside of paved surface.

Planning period of	20	years
Real interest rate (from OMB Circular A-94 Appendix C)	1.2%	
(https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c)		
Injection rate	1200	gpm

Salvage value based on straight line depreciation over the life of the asset.
Replacement cost is the cost at the end of the asset life. Annual Payment amount is the Replacement Cost/Asset Life in years
Assets with 10 or 20 year life are replaced at the beginning of Year 21; salvage value is $0.

Length of reuse line within Portales city limits	2640	
Width of excavation for 8" & 10" water lines	5	
Width of gravel access road	20	
1/2 mile of piping associated with each new well for wells on land to be acquired.	26400	
Length of water line from connection to 16" reuse line to the Blackwater Well Field	59,000	
Length of gravel access road for water pipeline from existing road to proposed injection area	22,000	ft

Costs provided by Roosevelt County Electric Co-op:

Cost to hook up a well to power lines	$ 1,800	per well
Cost to extend power	$ 27,000	per mile

APPENDIX C
PORTALES WATER SUPPLY PER

Alternative 2 - Option 1
Annual Operating and Maintenance

Item #	Description	Quantity	Unit	Unit Price	Amount
1	Parts and Repairs (0.1% of Construction Costs)	0.1%	%	$ 10,234,000	$ 11,000
2	Annualized Equipment Replacement Costs	1	LS	$ 395,684	$ 396,000
3	Labor (2 full time operators)	2	EA	$ 40,000	$ 80,000
4	Miscellaneous training, insurance, etc.	1	LS	$ 10,000	$ 10,000
5	Electricity	1	LS	$ 38,336	$ 39,000
				Total	**$ 536,000**

APPENDIX C
PORTALES WATER SUPPLY PER

Alternative 2 - Option 2
Annual Operating and Maintenance

Item #	Description	Quantity	Unit	Unit Price	Amount
1	Parts and Repairs (0.1% of Construction Costs)	0.1%	%	$ 12,043,000	$ 13,000
2	Annualized Equipment Replacement Costs	1	LS	$ 386,118	$ 386,000
3	Labor (2 full time operators)	2	EA	$ 40,000	$ 80,000
4	Miscellaneous training, insurance, etc.	1	LS	$ 10,000	$ 10,000
5	Electricity	1	LS	$ 41,994	$ 42,000
				Total	**$ 531,000**

APPENDIX C
PORTALES WATER SUPPLY PER

Alternative 3
Annual Operating and Maintenance

Item#	Description	Quantity	Unit	Unit Price	Amount
1	Parts and Repairs (0.1% of Construction Costs)	0.1%	%	$ 19,367,700	$ 20,000
2	Annualized Equipment Replacement Costs	1	LS	$ 1,283,000	$ 1,283,000
2	Labor (2 full time operators)	4	EA	$ 40,000	$ 160,000
3	Miscellaneous training, insurance, etc.	1	LS	$ 10,000	$ 10,000
3	Electricity	1	LS	$ 199,000	$ 199,000
				Total	**$ 1,672,000**

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative
Annual Operating and Maintenance

Item #	Description	Quantity	Unit	Unit Price	Amount
1	Parts and Repairs (0.1% of Construction Costs)	0.1%	%	$ 31,639,000	$ 32,000
2	Annualized Equipment Replacement Costs	1	LS	$ 386,118	$ 386,000
3	Labor (2 full time operators)	2	EA	$ 40,000	$ 80,000
4	Miscellaneous training, insurance, etc.	1	LS	$ 10,000	$ 10,000
5	Electricity	1	LS	$ 240,233	$ 240,000
				Total	**$ 748,000**

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative - Phase 1
Annual Operating and Maintenance

Item #	Description	Quantity	Unit	Unit Price	Amount
1	Parts and Repairs (0.1% of Construction Costs)	0.1%	%	$ 6,072,000	$ 7,000
2	Annualized Equipment Replacement Costs	1	LS	$ 319,335	$ 319,000
3	Labor (2 full time operators)	2	EA	$ 40,000	$ 80,000
4	Miscellaneous training, insurance, etc.	1	LS	$ 10,000	$ 10,000
5	Electricity	1	LS	$ 57,131	$ 57,000
				Total	**$ 473,000**

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative - Phase 2
Annual Operating and Maintenance

Item #	Description	Quantity	Unit	Unit Price	Amount
1	Parts and Repairs (0.1% of Construction Costs)	0.1%	%	$ 15,521,000	$ 16,000
2	Annualized Equipment Replacement Costs	1	LS	$ 386,118	$ 386,000
3	Labor (2 full time operators)	2	EA	$ 40,000	$ 80,000
4	Miscellaneous training, insurance, etc.	1	LS	$ 10,000	$ 10,000
5	Electricity	1	LS	$ 41,994	$ 42,000
				Total	**$ 534,000**

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative - Phase 3
Annual Operating and Maintenance

Item #	Description	Quantity	Unit	Unit Price	Amount
1	Parts and Repairs (0.1% of Construction Costs)	0.1%	%	$ 10,206,000	$ 11,000
2	Annualized Equipment Replacement Costs	1	LS	$ 542,376	$ 542,000
3	Labor (2 full time operators)	2	EA	$ 40,000	$ 80,000
4	Miscellaneous training, insurance, etc.	1	LS	$ 10,000	$ 10,000
5	Electricity	1	LS	$ 261,346	$ 261,000
				Total	**$ 904,000**

APPENDIX C
PORTALES WATER SUPPLY PER

Alternative 2 - Option 1
Electrical Costs

Injection Wells - Backwash Pumping	
7	**# Wells**
200	**gpm**
150	**estimated feet of TDH**
0.65	**efficiency**
12	**hp**
9	**kW**
104	**hrs per year (assumes 4 hrs/week), 6 mos per yr**
1,212	**hp hr**
903	**kWH**
$ 0.12	**cost per kWH**
$ 780	**Total annual cost for wells**
Booster Pump Station	
1200	**gpm**
50	**estimated feet of TDH**
0.65	**efficiency**
23	**hp**
17	**kW**
4380	**hrs per year (assumes 24 hrs/day, 6 mos per year)**
102,098	**hp hr**
76,134	**kWH**
$ 0.0789	**cost per kWH**
$ 6,005	**Total annual cost for BPS**
Advanced Water Treatment	
400,000	**kWH**
$ 0.0789	**cost per kWH**
$ 31,551	**Total annual cost for treatment**
$ 38,336	**Total Annual Electric Cost**

Electric costs for BPS and AWTF are based on rate structure from Xcel Energy for power provided within the city limits as follows.

1. A flat rate of $23.60
2. A charge for usage of $0.037140 per kWh
3. A demand charge based on the required load. The rate varies based on time of year
   a. Winter months - $12.76 per kW of demand Oct-May
   b. Summer months - $15.44 per kW of demand June - Sep

Electric costs for wellfields (outside of City limits) are based on Roosevelt Electric Co-Op.

1. A flat rate of $28.00
2. First 500kWh/month $0.085900
3. Additional kWh/month $0.0809

APPENDIX C
PORTALES WATER SUPPLY PER

Alternative 2 - Option 2
Electrical Costs

Injection Wells - Backwash Pumping	
4	**# Wells**
400	**gpm**
175	**estimated feet of TDH**
0.65	**efficiency**
27	**hp**
20	**kW**
104	**hrs per year (assumes 4 hrs/week), 6 mos per yr**
2,828	**hp hr**
2,110	**kWH**
$ 0.0988	**cost per kWH**
$ 834	**Total annual cost for wells**
Booster Pump Station	
1200	**gpm**
80	**estimated feet of TDH**
0.65	**efficiency**
37	**hp**
4380	**hrs per year (assumes 24 hrs/day, 6 mos per year)**
163,357	**hp hr**
121,815	**kWH**
$ 0.0789	**cost per kWH**
$ 9,609	**Total annual cost for BPS**
Advanced Water Treatment	
400,000	**kWH**
$ 0.0789	**cost per kWH**
$ 31,551	**Total annual cost for treatment**
$ 41,994	**Total Annual Electric Cost**

Electric costs for BPS and AWTF are based on rate structure from Xcel Energy for power provided within the city limits as follows.

1. A flat rate of $23.60
2. A charge for usage of $0.037140 per kWh
3. A demand charge based on the required load. The rate varies based on time of year
   a. Winter n Oct-May
   b. Summer June - Sep

Electric costs for wellfields (outside of City limits) are based on Roosevelt Electric Co-Op.

1. A flat rate of $28.00
2. First 500kWh/month $0.085900
3. Additional kWh/month $0.0809

APPENDIX C
PORTALES WATER SUPPLY PER

Alternative 3
Electrical Costs

New Well Installation	
49	**# Wells**
160	**gpm**
220	**estimated feet of TDH**
0.65	**efficiency**
14	**hp**
10	**kW**
4380	**hours in a year**
59,897	**hp hr**
44,683	**kWH**
$ 0.0908	**cost per kWH**
$ 198,697	**annual costs for all wells**

$ 333.88	
$ 0.0896	**Calculated kWh rate**

Electric costs for BPS and AWTF are based on rate structure from Xcel Energy for power provided within the city limits as follows.

1. A flat rate of $23.60
2. A charge for usage of $0.037140 per kWh
3. A demand charge based on the required load. The rate varies based on time of year
   a. Winter months - $ Oct-May
   b. Summer months - June - Sep

Electric costs for wellfields (outside of City limits) are based on Roosevelt Electric Co-Op.

1. A flat rate of $28.00
2. First 500kWh/month $0.085900
3. Additional kWh/month $0.0809

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative
Electrical Costs

Production Wells	
49	**# Wells**
160	**gpm**
220	**estimated feet of TDH**
0.65	**efficiency**
14	**hp**
4380	**hours in a year**
59897	**hp hr**
44683	**kWH**
$ 0.0908	**cost per kWH**
$ 198,697	**annual costs for all wells**
Injection Wells - Backwash Pumping	
4	**# Wells**
400	**gpm**
175	**estimated feet of TDH**
0.65	**efficiency**
27.2	**hp**
104	**hrs per year (assumes 4 hrs/week), 6 mos per yr**
2,828	**hp hr**
2,109	**kWH**
0.13	**cost per kWH**
$ 1,097	**Total annual cost for wells**
Booster Pump Station	
1200	**gpm**
80	**estimated feet of TDH**
0.65	**efficiency**
37.3	**hp**
4380	**hrs per year (assumes 24 hrs/day, 6 mos per year)**
163,357	**hp hr**
121,815	**kWH**
0.0775	**cost per kWH**
$ 9,440	**Total annual cost for BPS**
Advanced Water Treatment	
400,000	**kWH**
0.077498403	**cost per kWH**
$ 30,999	**Total annual cost for treatment**
$ 240,233	**Total Annual Electric Cost**

Electric costs for BPS and AWTF are based on rate structure from Xcel Energy for power provided within the city limits as follows.

1. A flat rate of $23.60
2. A charge for usage of $0.037140 per kWh
3. A demand charge based on the required load. The rate varies based on time of year
   a. Winter months Oct-May
   b. Summer mont June - Sep

Electric costs for wellfields (outside of City limits) are based on Roosevelt Electric Co-Op.

1. A flat rate of $28.00
2. First 500kWh/month $0.085900
3. Additional kWh/month $0.0809

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative -Phase 1
Electrical Costs

Production Wells	
14	**# Wells**
170	**gpm**
220	**estimated feet of TDH**
0.65	**efficiency**
15	**hp**
11	**kW**
4380	**hours in a year**
63641	**hp hr**
47476	**kWH**
$ 0.0854	**cost per kWH**
$ 56,771	**annual costs for all wells**
Injection Wells - Backwash Pumping	
2	**# Wells**
400	**gpm**
175	**estimated feet of TDH**
0.65	**efficiency**
27	**hp**
104	**hrs per year (assumes 4 hrs/week), 6 mos per yr**
2,828	**hp hr**
2,109	**kWH**
$ 0.0854	**cost per kWH**
$ 360	**Total annual cost for wells**
Booster Pump Station	
0	**gpm**
80	**estimated feet of TDH**
0.65	**efficiency**
0.0	**hp**
4380	**hrs per year (assumes 24 hrs/day, 6 mos per year)**
-	**hp hr**
-	**kWH**
$ 0.0789	**cost per kWH**
$ -	**Total annual cost for BPS**
Advanced Water Treatment	
-	**kWH**
0.0789	**cost per kWH**
$ -	**Total annual cost for treatment**
$ 57,131	**Total Annual Electric Cost**

Electric costs for BPS and AWTF are based on rate structure from Xcel Energy for power provided within the city limits as follows.

1. A flat rate of $23.60
2. A charge for usage of $0.037140 per kWh
3. A demand charge based on the required load. The rate varies based on time of year
   a. Winter months - $1: Oct-May
   b. Summer months - $ June - Sep

Electric costs for wellfields (outside of City limits) are based on Roosevelt Electric Co-Op.

1. A flat rate of $28.00
2. First 500kWh/month $0.085900
3. Additional kWh/month $0.0809

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative - Phase 2
Electrical Costs

Production Wells	
29	**# Wells**
170	**gpm**
220	**estimated feet of TDH**
0.65	**efficiency**
15	**hp**
11	**kW**
4380	**hours in a year**
63641	**hp hr**
47476	**kWH**
0.0908	**cost per kWH**
$ 124,946	**annual costs for all wells**
Injection Wells - Backwash Pumping	
1	**# Wells**
400	**gpm**
175	**estimated feet of TDH**
0.65	**efficiency**
27.2	**hp**
104	**hrs per year (assumes 4 hrs/week), 6 mos per yr**
2,828	**hp hr**
2,109	**kWH**
$ 0.12	**cost per kWH**
$ 260	**Total annual cost for wells**
Booster Pump Station	
1200	**gpm**
80	**estimated feet of TDH**
0.65	**efficiency**
37.3	**hp**
4380	**hrs per year (assumes 24 hrs/day, 6 mos per year)**
163,357	**hp hr**
121,815	**kWH**
$ 0.0789	**cost per kWH**
$ 9,609	**Total annual cost for BPS**
Advanced Water Treatment	
400,000	**kWH**
0.13	**cost per kWH**
$ 52,000	**Total annual cost for treatment**
$ 186,815	**Total Annual Electric Cost**

Electric costs for BPS and AWTF are based on rate structure from Xcel Energy for power provided within the city limits as follows.

1. A flat rate of $23.60
2. A charge for usage of $0.037140 per kWh
3. A demand charge based on the required load. The rate varies based on time of year
   a. Winter mc Oct-May
   b. Summer n June - Sep

Electric costs for wellfields (outside of City limits) are based on Roosevelt Electric Co-Op.

1. A flat rate of $28.00
2. First 500kWh/month $0.085900
3. Additional kWh/month $0.0809

APPENDIX C
PORTALES WATER SUPPLY PER

Recommended Alternative - Phase 3
Electrical Costs

Production Wells	
49	**# Wells**
160	**gpm**
220	**estimated feet of TDH**
0.65	**efficiency**
14	**hp**
10	**kW**
4,380	**hours in a year**
59,897	**hp hr**
44,683	**kWH**
0.0908	**cost per kWH**
$ 198,697	**annual costs for all wells**
Injection Wells - Backwash Pumping	
4	**# Wells**
400	**gpm**
175	**estimated feet of TDH**
0.65	**efficiency**
27.2	**hp**
104	**hrs per year (assumes 4 hrs/week), 6 mos per yr**
2,828	**hp hr**
2,109	**kWH**
$ 0.12	**cost per kWH**
$ 1,041	**Total annual cost for wells**
Booster Pump Station	
1200	**gpm**
80	**estimated feet of TDH**
0.65	**efficiency**
37.3	**hp**
4380	**hrs per year (assumes 24 hrs/day, 6 mos per year)**
163,357	**hp hr**
121,815	**kWH**
$ 0.0789	**cost per kWH**
$ 9,609	**Total annual cost for BPS**
Advanced Water Treatment	
400,000	**kWH**
0.13	**cost per kWH**
$ 52,000	**Total annual cost for treatment**
$ 261,346	**Total Annual Electric Cost**

Electric costs for BPS and AWTF are based on rate structure from Xcel Energy for power provided within the city limits as follows.

1. A flat rate of $23.60
2. A charge for usage of $0.037140 per kWh
3. A demand charge based on the required load. The rate varies based on time of year
   a. Winter mont Oct-May
   b. Summer mor June - Sep

Electric costs for wellfields (outside of City limits) are based on Roosevelt Electric Co-Op.

1. A flat rate of $28.00
2. First 500kWh/month $0.085900
3. Additional kWh/month $0.0809

APPENDIX C
PORTALES WATER SUPPLY PER

Test Hole Bid Tab

Vista Sand Bids - July 2014

	Total bid	Total/FT	
Layne	$227,395.00	$45.48	
Stewart Brothers	$336,500.00	$67.30	
Associated Well Services	$136,500.00	$27.30	
Whisenant and Lyle	$153,018.50	$30.60	
Talon LPE	$197,000.00	$39.40	
	Avg per ft	$42.02	
Total Estimate		$42.02	per ft
Assumed avg depth		220	ft
Estimated cost per test hole		**$9,243.64**	Assuming that drilling occurs in 2016

APPENDIX C
PORTALES WATER SUPPLY PER

Well Rehabilitation Cost Estimate

Item	Description	Qty	Unit	Unit Price	Cost
1	Mob/Demob	1	LS	$ 7,800	$7,800.00
2	Pull existing pump & equipment	1	LS	$ 5,800	$5,800.00
3	Brush well and remove debris	1	LS	$ 2,795	$2,795.00
4	Acidize well and purge after acidizing	1	LS	$ 11,480	$11,480.00
5	Chlorinate well and purge after chlorination	1	LS	$ 3,560	$3,560.00
6	Provide/Install/Remove/Test pump and appurtenances	1	LS	$ 9,500	$9,500.00
7	Screen replacement	1	LS	$ 23,250	$23,250.00
8	Develop and test pumping	24	HR	$ 250	$6,000.00
9	Video survey	1	LS	$ 2,250	$2,250.00
				Subtotal	$72,435.00
				w/ inflation	**$ 79,000.00**

APPENDIX C
PORTALES WATER SUPPLY PER

Estimated Blackwater Well Field Well costs

Based on assumed 2011 costs and escalated by 2%/yr

Estimated per well cost in 2015 for 10" diameter wells

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL
1	Mobilization / Demobilization	1	LS	$ 25,438	$ 25,438
2	Drill 24-inch diameter hole for surface casing, complete in place	20	LF	$ 158	$ 3,161
3	Surface casing, 20-inch diameter, furnished and installed	20	LF	$ 158	$ 3,161
4	Slush pit digging, complete in place	1	LS	$ 812	$ 812
5	Drilling of bore hole, 18-inch diameter, complete in place	190	LF	$ 70	$ 13,276
6	Schedule 40 ASTM A-53 Grade B well casing, 10.75-inch diameter, furnished and installed	160	LF	$ 75	$ 12,040
7	Stainless steel wire-wrapped screen, 10.75-inch diameter, 0.050" slots, furnished and installed	40	LF	$ 215	$ 8,600
8	Stainless steel blank and bull nose, 10.75-inch diameter, furnished and installed	10	LF	$ 225	$ 2,250
9	10" diameter dielectric coupling	1	LS	$ 5,500	$ 5,500
10	Silica Sand Filter Pack, complete in place	60	LF	$ 53	$ 3,161
11	2-in I.D. sounding Tube, furnished and installed	203	LF	$ 4	$ 812
12	3-in I.D. gravel feed tube, furnished and installed	203	LF	$ 7	$ 1,421
13	Bentonite seal/plug, furnished and installed	20	LF	$ 41	$ 817
14	Pea Gravel annulus fill, furnished and installed	105	LF	$ 24	$ 2,483
15	Cement-Bentonite grout, furnished and installed	25	LF	$ 41	$ 1,021
16	Well development- Swabbing/Airlifting	24	HR	$ 542	$ 13,008
17	Well development - Pumping	24	HR	$ 379	$ 9,096
18	Disinfection	2	LS	$ 1,299	$ 2,598
19	Test pumping	40	HR	$ 212	$ 8,480
20	Coliform testing	1	LS	$ 109	$ 109
21	Water quality testing	1	LS	$ 2,977	$ 2,977
22	Video inspection	1	LS	$ 1,191	$ 1,191
23	Submersible deep well pumping unit, furnished and installed	1	LS	$ 31,229	$ 31,229
24	Well head improvements, furnished and installed	1	LS	$ 5,954	$ 5,954
25	Well head piping and valving assembly, furnished and installed	1	LS	$ 12,232	$ 12,232
26	Electrical work	1	LS	$ 13,531	$ 13,531
27	Metering, electrical and controls building and foundation	1		$ 27,061	$ 27,061
28	Chain link fence and gates, furnished and installed	200	LF	$ 57	$ 11,400
29	Well discharge pipeline, furnished and installed	100	LF	$ 22	$ 2,200
30	Connection to existing collection pipeline	1	LS	$ 2,707	$ 2,707
		Total Construction Cost:			**$ 227,725**