

**McKinley County
Small Rural Water Systems
Appraisal Level Investigation**

**Prepared for Northwest New Mexico Council of Governments
Gallup, New Mexico**

June 9, 2015



Daniel B. Stephens & Associates, Inc.

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



Table of Contents

Section	Page
1. Introduction	1
2. Project Purpose, Location, and Scope of Study.....	2
2.1 Study Authority	8
2.2 Project Sponsor, Partners, and Other Participants.....	9
2.3 Public Involvement and Consultation and Coordination	9
2.4 Study Area Location and Description	13
2.5 Planning Scope	13
2.6 Relationship to Other Activities.....	13
2.7 Current and Previous Studies.....	14
2.7.1 McKinley County Small Water Systems Regionalization Plan	14
2.7.2 Northwest New Mexico Regional Water Plan.....	15
2.7.3 Navajo-Gallup Water Supply Project and Gallup Regional Water System.....	16
2.7.4 Gallup Town Hall on Water.....	16
2.7.5 McKinley County Comprehensive Plan	17
2.7.6 McKinley County Water Conservation Plan.....	17
2.7.7 Sanitary Surveys	17
3. Problems, Needs, and Opportunities	19
3.1 Groundwater.....	20
3.2 Water Quality.....	23
3.3 Water Rights.....	24
3.4 Water Supply Infrastructure.....	27
3.5 Renewable Energy Resources.....	27
3.6 Environmental and Biological Resources	28
3.6.1 Vegetation	28
3.6.2 Wildlife Resources.....	30
3.7 Special-Status Species.....	31
3.8 Cultural and Historic Resources	31
3.9 Socio-Economic Conditions.....	33
4. Population and Demand Estimates.....	35
5. Identification of Future Water Supply Alternatives	40
5.1 Alternative Assumptions	40
5.1.1 Population and Demand	40
5.1.2 System Design	41
5.1.3 Water Service Provider and Cost of Service	45
5.2 No Action Alternative	46
5.3 Master Meter Alternative	47
5.4 Connection Alternative	47
5.5 Description of Alternatives for Water Systems	47
5.5.1 Coal Basin	48
5.5.2 Gamarco.....	51



Table of Contents (Continued)

Section	Page
5.5.3 White Cliffs	56
5.5.4 Williams Acres	56
5.5.5 Ya-Ta-Hey	60
5.6 Description of Alternatives for Non-System Communities	67
5.6.1 Allison	67
5.6.2 Catalpa	71
5.6.3 Cipriano Lewis	71
5.6.4 Crestview	75
5.6.5 Twin Buttes	82
6. Cost Analysis	86
7. Evaluation of Alternatives	93
7.1 Ability to Pay	98
7.1.1 Ability to Pay	98
7.1.2 Ability to Pay vs. Estimated Water Bills	100
7.2 Preferred Alternative	102
References	105

List of Figures

Figure	Page
1 McKinley County Rural Water Systems and Navajo Gallup Water Supply Project	3
2 Domestic Wells Near Proposed Water System Alternatives	5
3 Other Rural Water Systems Outside Study Area	7
4 Surface Geology Map	21
5 Geologic Cross Section A-A'	22
6 Median Income in Census Block Groups Near Gallup	34
7 McKinley County Historical and Projected Population, 1990 to 2060	36
8a Coal Basin Water System, No Action Alternative	49
8b Coal Basin Water System, Master Meter Alternative	50



List of Figures (Continued)

Figure	Page
8c Coal Basin Water System, Connection Alternative.....	52
9a Gamerco Water System, No Action Alternative	53
9b Gamerco Water System, Master Meter Alternative	54
9c Gamerco Water System, Connection Alternative	55
10a White Cliffs Water System, No Action Alternative.....	57
10b White Cliffs Water System, Master Meter Alternative	58
10c White Cliffs Water System, Connection Alternative	59
11a Williams Acres Proposed Water System, No Action Alternative.....	61
11b Williams Acres Proposed Water System, Master Meter Alternative	62
11c Williams Acres Proposed Water System, Connection Alternative	63
12a Yah-ta-hey Water System, No Action Alternative	64
12b Yah-ta-hey Water System, Master Meter Alternative.....	65
12c Yah-ta-hey Water System, Connection Alternative.....	66
13a Allison Proposed Water System, No Action Alternative.....	68
13b Allison Proposed Water System, Master Meter Alternative	69
13c Allison Proposed Water System, Connection Alternative	70
14a Catalpa Proposed Water System, No Action Alternative	72
14b Catalpa Proposed Water System, Master Meter Alternative	73
14c Catalpa Proposed Water System, Connection Alternative	74
15a Cipriano Lewis Proposed Water System, No Action Alternative.....	76
15b Cipriano Lewis Proposed Water System, Master Meter Alternative	77
15c Cipriano Lewis Proposed Water System, Connection Alternative	78
16a Crestview Proposed Water System, No Action Alternative.....	79



List of Figures (Continued)

Figure	Page
16b Crestview Proposed Water System, Master Meter Alternative	80
16c Crestview Proposed Water System, Connection Alternative	81
17a Twin Buttes Proposed Water System, No Action Alternative.....	83
17b Twin Buttes Proposed Water System, Master Meter Alternative	84
17c Twin Buttes Proposed Water System, Connection Alternative	85

List of Tables

Table	Page
1 Status of Small Water Systems Included in Study.....	8
2 Schedule of Meetings, McKinley County Appraisal Level Investigation.....	11
3 Water System Sanitary Survey Status.....	18
4 General Hydraulic Characteristics of Primary Aquifers near Gallup	23
5 Water Rights on File for Project Area Systems and Communities.....	25
6 Federally Listed Species Potentially Occurring in McKinley County, New Mexico	32
7 State-Listed Species Not Protected Under the Endangered Species Act and Occurring or Potentially Occurring in McKinley County	33
8 McKinley County Population Estimates	35
9 Current Estimated Demand	37
10 Estimated Demand in 2060.....	38
11 Estimated Demand at Full Build-Out.....	39
12 Alternative Development Assumptions	41
13 Electrical Costs for Groundwater Pumping	42
14 Storage Based on DBS&A Projected 2060 Population.....	45



List of Tables (Continued)

Table	Page
15 Community Information for Water Supply Alternatives	48
16 Summary of Costs for Small Systems Alternatives.....	87
17 Water Charges for Master Meter Alternative	91
18 Individual Dwelling Water Charges for Connection Alternative.....	92
19 Goals and Performance Measures	94
20 Summary of Priority Objectives Identified by Systems, McKinley Appraisal Investigation.....	96
21 McKinley County Small Systems Alternatives Evaluation.....	97
22 Ability to Pay	99
23 Comparison of Ability to Pay and Estimated Water Bills.....	101
24 Preferred Alternative by System or Community.....	103

List of Appendices

Appendix

- A Estimated Costs for Water Supply Alternatives
- B Evaluation of Water Supply Alternatives



McKinley County Small Rural Water Systems Appraisal Level Investigation

1. Introduction

McKinley County rural water systems are responsible for providing high-quality water and reliable service to their customers under challenging circumstances. Adequate and sustainable water supplies are limited, and many of the water suppliers are understaffed, volunteer organizations. Understanding the challenges faced by these systems and identifying future water supply alternatives for these organizations is an important goal of McKinley County and the Northwest New Mexico Council of Governments (NWNMCOG), especially now that the Navajo water rights settlement is final and a surface water supply will be available in the Gallup area (USBR, 2013). Through this legal agreement, the Navajo-Gallup Water Supply Project (NGWSP) will bring surface water supplies from the San Juan River to McKinley County through a large conveyance system.

To evaluate future water supply options for these systems, McKinley County is overseeing the completion of an appraisal-level investigation of small water systems in McKinley County. The U.S. Bureau of Reclamation (Reclamation) Rural Water Supply Program (RWSP) addresses rural water needs in 17 western states. McKinley County, through the NWNMCOG, retained Daniel B. Stephens & Associates, Inc. (DBS&A), teamed with DePauli Engineering and Surveying Co., to prepare this Appraisal Study pursuant to the Reclamation Rural Water Supply Act of 2006 (43 U.S.C. §§ 2401-2409 (Supp. 2011)) and appraisal criteria included in Reclamation's Rural Water Supply Program interim final rule (43 C.F.R. Part 404) (Rule) (Code of Federal Regulations [CFR], 2009).



2. Project Purpose, Location, and Scope of Study

The primary purpose for this Rural Water Supply Program Appraisal Study is to identify and analyze alternatives that will provide an adequate water supply of sufficient reliability and quality to support the current and anticipated population growth and associated water needs of the domestic water systems and communities within the study area. The study is focused solely on the small domestic water systems in McKinley County and does not include commercial entities.

The study area corresponds to the boundary of the NGWSP Service Area and includes systems within that area that would be eligible to receive water from the project. Systems that are not within the study area or that already receive service from the Navajo Tribal Utility Authority (NTUA) or have been annexed to Gallup (or are in annexation planning stages) are excluded from the study. However, it is recommended that this study be expanded to include the systems located outside, but near the study area boundary.

Objectives of the study are to:

- Meet with Stakeholders.
- Document present population, demand, and water supply.
- Project future population and demand.
- Identify potential future water supplies.
- Evaluate costs.
- Formulate water supply alternatives and establish evaluation criteria.
- Evaluate alternatives based on established criteria.
- Identify viable alternatives.
- Recommend next steps.

Figure 1 shows the 17 water systems and communities included in this study, which are as follows:



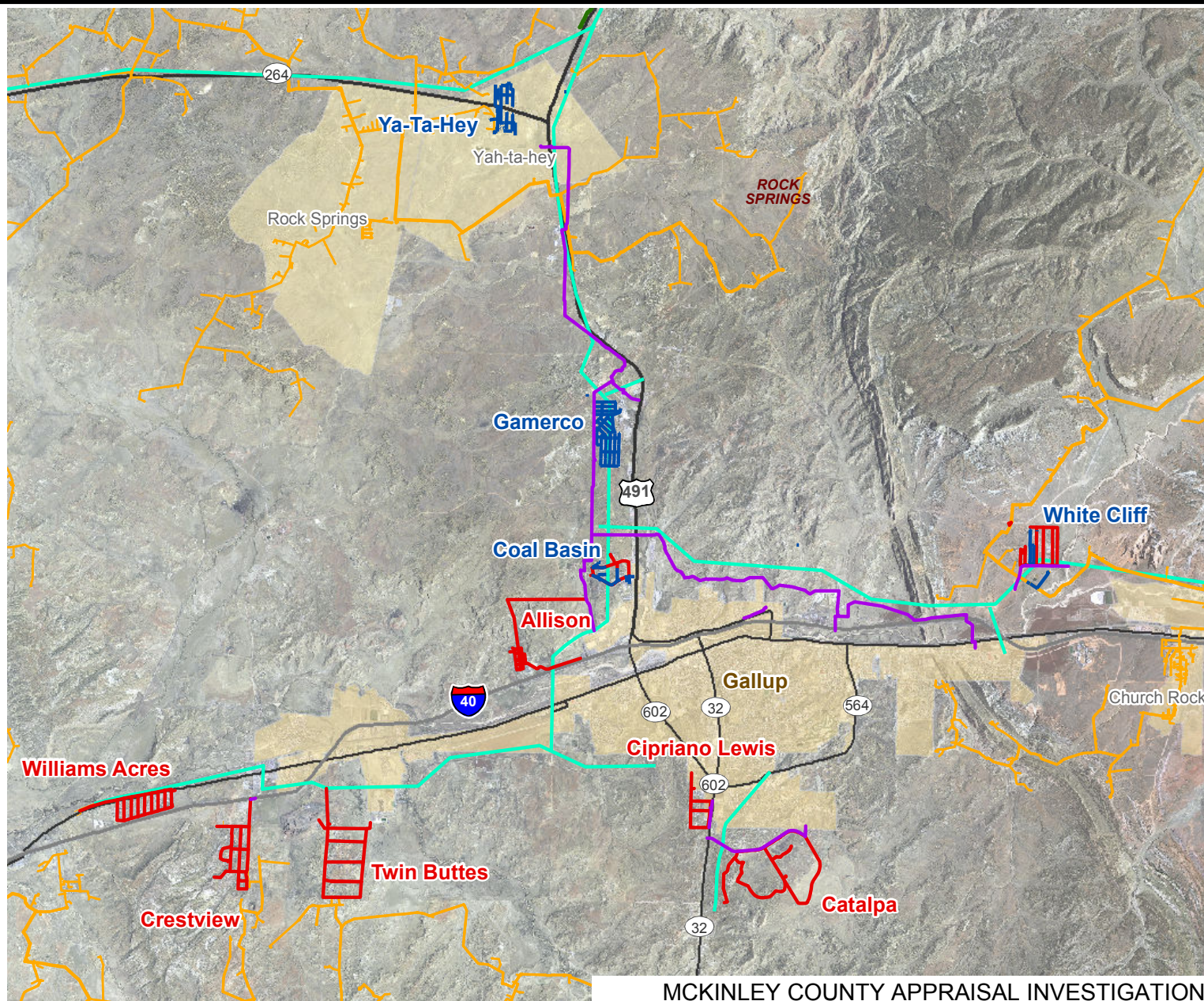
System	Number of Connections	
	2012	2060
Allison	31	38
Catalpa	97	120
Cipriano Lewis	27	33
Crestview	93	115
Coal Basin	34	42
Gamerco WSD	484	598
Twin Buttes	57	70
White Cliffs	48	59
Williams Acres	180	223
Yah ta hey	125	155
	1,176	1,453

Explanation

- Catalpa Proposed water lines
- Gamerco Existing water lines
- Proposed water line
- Existing water line
- San Juan Lateral
- Navajo Tribal Utility Authority pressurized main
- Navajo Gallup Water Supply Pipeline water line



0 1 2 Miles



MCKINLEY COUNTY APPRAISAL INVESTIGATION McKinley County Rural Water Systems and Navajo Gallup Water Supply Project



Daniel B. Stephens & Associates, Inc.
4/21/2015 JN WR12.0084

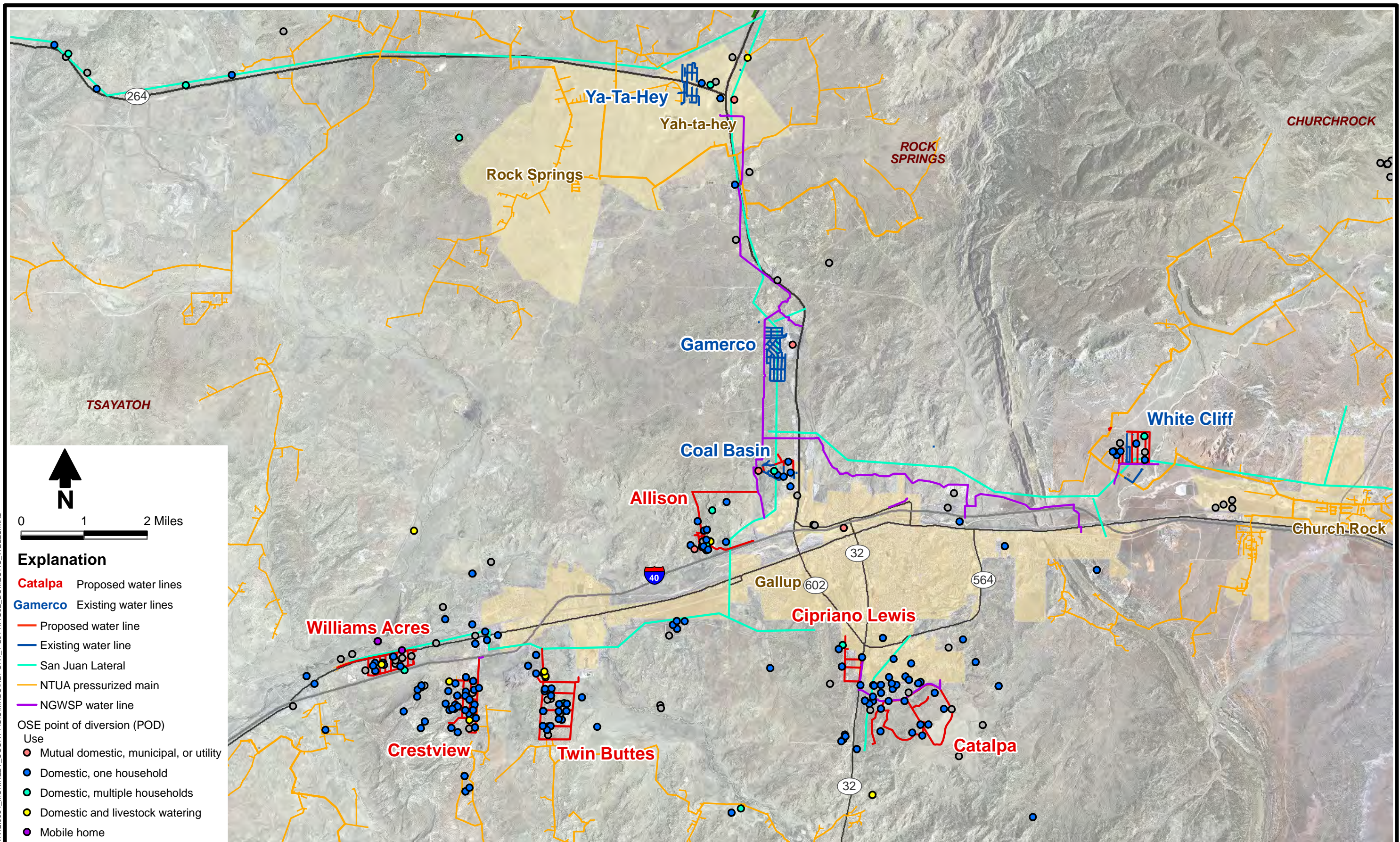


- Allison
- Catalpa Hills
- Cipriano Lewis
- Coal Basin Water Association
- Crestview
- Gamerco Water and Sanitation District (W&SD)
- Twin Buttes
- White Cliffs Mutual Domestic Water Users Association (WUA)
- William's Acres W&SD, which includes the following systems:
 - Block A Well Co-op
 - Caviggia's Trailer Park
 - Cedar Ridge Trailer Park
 - Manuelito Navajo Children's Home
 - Rob Roy Trailer Park
 - Sagebrush Water Co-op
 - St. Williams Mobile Home Park
- Yah-ta-hey W&SD

Of these 17 systems and communities, 16 actively provide water to residents with the exception of Williams Acres W&SD, which provides only sewer services at this time. Several small, independent water systems are located within the jurisdictional boundaries of Williams Acres W&SD and for purposes of the study are grouped as the Williams Acres systems.

Several of the communities included in the study are referred to herein as *non-system communities*, that is, areas without a water system in place, in which homes are supplied instead by privately owned domestic wells. The non-system communities were selected based on (1) proximity to Gallup and NGWSP transmission lines and (2) the concentration of domestic wells in those areas (Figure 2). These communities include Allison, Catalpa, Crestview Cipriano Lewis, and Twin Buttes.

S:\PROJECTS\WR12.0084_MCKINLEY_COUNTY\GIS\MXDS\REPORT_1-2014\FIG02_DOMESTIC_WELLS.MXD



Source: New Mexico Office of the State Engineer Water Rights Reporting System



Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION
Domestic Wells Near Proposed Water System Alternatives

Figure 2



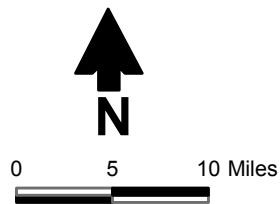
Several systems located within the study area have been connected to the NTUA or have been annexed or are in the process of being annexed by the City of Gallup (DePauli, 2013a) and were therefore excluded from the study. These systems are:

- D&S Trailer Ranch
- Noble Acres
- Pine Haven
- Rehoboth Christian School
- Spencer Valley

Several McKinley County systems are located outside the study area boundaries and are also currently excluded from the scope of the investigation (Figure 3):

- Bluewater Acres Domestic WUA
- Bluewater Lake Mutual Domestic Water Consumers Association (MDWCA)
- Greers Subdivision
- Juniper Trails Water Association
- Ramah W&SD
- San Mateo MDWCA
- Thoreau W&SD
- Thoreau High School
- Whispering Cedars Water Association

These systems are similar to the eligible systems in terms of size and the need to identify reliable future water supplies. They simply do not fall within the NGWSP service area boundaries and therefore would not be eligible to receive water under the Navajo Settlement. Also, these systems are not included in the current NGWSP Federal Environmental Impact Study approved under the National Environmental Policy Act (NEPA). Supplemental NEPA analysis would likely be required before water could be provided to these systems.





This study includes a total of 17 McKinley County water systems or communities, of which 10 are defined as “active” (Table 1), meaning that they serve at least 25 people or have at least 15 service connections for at least 60 days per year. Allison is no longer considered an active system by the NMED (2013). Two McKinley County water systems, Caviggia’s Trailer Park and Rob Roy Trailer Park, serve fewer than 25 people. These and four other McKinley County systems (Catalpa Hills, Cipriano Lewis, Crestview, and Twin Buttes) are not included on NMED’s list of McKinley County water systems (NMED, 2013).

Table 1. Status of Small Water Systems Included in Study

System Identification Number ^a	System Name	Status
NM3508117	Allison	Inactive
—	Catalpa Hills	Community has not set up a water system
—	Cipriano Lewis	Community has not set up a water system
NM3508217	Coal Basin Water Association	Active
—	Crestview	Community has not set up a water system
NM3508517	Gamerco W&SD	Active
—	Twin Buttes	Community has not set up a water system
NM3500117	White Cliffs Mutual Domestic WUA	Active
—	William's Acres W&SD	Active. Williams Acres is a water and sanitation district, but does not provide water service to its customers
NM3508117	Block A Well Co-op	Active
—	Caviggia’s Trailer Park	Community has not set up a water system
NM3559417	Cedar Ridge Trailer Park	Active
NM3560617	Manuelito Navajo Children’s Home	Active
—	Rob Roy Trailer Park	Community has not set up a water system
NM3561317	Sagebrush Water Co-op	Active
NM3500217	St. Williams Mobile Home Park	Active
NM3532717	Yah-ta-hey W&SD	Active

^a NMED, 2013

— = Not listed on NMED web page of McKinley County water systems.

2.1 Study Authority

Authority to conduct this study is found in the Reclamation Act (Act of June 17, 1902, ch. 1093, 32 Stat. 388), as amended. An appraisal investigation is a type of pre-design planning



document that provides a preliminary assessment of alternatives to address the identified water supply problems, needs, and opportunities, primarily using existing data (40 CFR 404.2). Its purpose is to determine if there is at least one viable alternative that should be more thoroughly evaluated and developed through a feasibility study (USBR, 2011).

2.2 Project Sponsor, Partners, and Other Participants

McKinley County and the NWNMCOG are the project sponsors and fiscal agents. Other project partners include systems in the study area and members of the Technical Advisory Team listed in Section 2.3.

2.3 Public Involvement and Consultation and Coordination

The public involvement component focused on two objectives: (1) communicate with local government and interested entities to properly scope the project and ensure consistency with other water planning projects in the area and (2) communicate with the systems and communities who would benefit from the infrastructure improvements. In the initial phases of the project, the Technical Advisory Team actively provided input on the project scope, location, and approach. The Technical Advisory Team consisted of the following individuals and entities.

- | | |
|--|--|
| • McKinley County Water Board: | Jeff Kiely
Evan Williams
Prestene Garnenez |
| • Navajo Tribal Utility Authority (NTUA): | Bruce McVicker
Clark Tallis Jr. |
| • Navajo Dept. of Water Resources: | Jason John |
| • McKinley Soil and Water Conservation District: | Larry Winn |
| • NMED Construction Programs Bureau: | David Bishop |
| • NMED Drinking Water Bureau: | Andy Edmondson |
| • U.S. Bureau of Reclamation: | Brent Uilenberg, Project Manager |



- McKinley County: Doug Decker
- Indian Health Service: Dave Schoultz
Roger Slape
- Contractors: Dominique Cartron, DBS&A
John Leeper, AMEC
Marc DePauli, DES

Technical Advisory Team meetings were held by conference call or in person in July, September, October 2012, and January 2013 (Table 2). Input from the Technical Advisory Team was used to finalize the project area and scope, including the determination of which systems should be included in the appraisal investigation. The Technical Advisory Team also provided valuable guidance regarding parity of costs from service providers, willingness to connect area systems, NGWSP conveyance structures and alignments, and issues regarding service to systems outside the project area.

The meetings held during the course of the study are summarized in Table 2. At project kickoff, letters were sent to all known system contacts. Neither the NWNMCOG nor the County had contact information for the non-system communities, and letters were therefore not sent to them. However, public service announcements were used to publicize meetings, and the Technical Advisory Team asked system representatives to communicate with their neighbors and friends about the project. All subsequent meetings were scheduled based on the preferences of the meeting participants. Reminder phone calls were made to the meeting participants to confirm meeting attendance. The NWNMCOG and the contractor called other system representatives to ensure that they were aware of the meetings and ascertain whether they would attend. Several stakeholders stated they were interested and would attend, but did not in fact attend the meetings. The COG also telephoned contacts to identify potential representatives from the non-system communities. The only non-system community that was represented at the meetings was Catalpa Hills.

Mariposa Water Alliance member systems within the project area (Yah-ta-hey W&SD, Coal Basin Water Association, Gamerco W&SD, White Cliffs MDWUA) met separately to continue working on regionalization activities. The study team attended two of the Mariposa meetings and provided limited technical support regarding specific questions raised at the meetings.



Table 2. Schedule of Meetings
McKinley County Appraisal Level Investigation
Page 1 of 2

Date ^a	Participants ^b	Purpose
May 13, 2012	Project Management Team NWNMCOG,	Project planning and scheduling.
July 25, 2012 July 30, 2012	Technical Advisory Team	Project kick-off.
August 27, 2012	Mariposa Meeting	Introduce project to the Mariposa systems included in the scope of the appraisal level investigation.
September 12, 2012	Technical Advisory Team	Review project purpose and goals, request data and information from Technical Advisory Team members regarding relevant technical studies.
October 4, 2012	General Participants Meetings Technical Advisory Team Meeting	Introduce project to participants and to the Technical Advisory Team.
October 17, 2012	Mariposa Systems Meeting	Identify goals and objectives of systems with respective regionalization; discuss regionalization alternative.
November 12, 2012	Ya Ta Hey W&SD Board Members NWNMCOG DBS&A DePauli	Present draft evaluation criteria and preliminary system data; present project to board members.
November 14, 2012	Gamerco W&SD Board Members NWNMCOG DBS&A DePauli	Present draft evaluation criteria and preliminary system data; present project to board members.
November 14, 2012	Rehoboth Utilities Supervisor	Present draft evaluation criteria and preliminary system data.
January 10, 2013	Technical Advisory Team	Discuss approach for water systems located outside the NGWSP service area.

^a Includes meetings held in person and by conference call.

^b NWNMCOG = Northwest New Mexico Council of Governments
 DBS&A = Daniel B. Stephens & Associates, Inc.
 W&SD = Water and sanitation district
 DePauli = DePauli Engineering & Surveying, LLC. 2012



Table 2. Schedule of Meetings
McKinley County Appraisal Level Investigation
Page 2 of 2

Date ^a	Participants ^b	Purpose
February 12, 2013	Mariposa System Meeting with Attorney	Evaluation of regionalization alternatives, identification of legal impediments to regionalization for each system. (Ya-ta-hey, Gamerco, White Cliffs in attendance).
July 23, 2013	General Participants Meeting NWNMCOG DBS&A DePauli	Brief project overview for new participants. Overview of potential alternatives for the water systems. Discussion of alternative evaluation criteria. Input from systems on alternative evaluation criteria. Mariposa Domestic Water Alliance update.
September 30, 2013	General Participants Meeting NWNMCOG DBS&A DePauli	Discussion of alternative development and capital cost estimates. Present alternative alignments and infrastructure, and capital costs. Discuss approach to increase involvement from non-participating systems and communities.
November 6, 2013	General Participants Meeting NWNMCOG DBS&A DePauli	Future demand estimates. Alternative evaluation criteria and operation and maintenance cost estimates. Obtain criteria ranking input from systems.
December 18, 2013	General Participants Meeting NWNMCOG DBS&A DePauli	Present alternative evaluation score sheets; hand out ability to pay data forms to systems.

^a Includes meetings held in person and by conference call.

^b NWNMCOG = Northwest New Mexico Council of Governments
 DBS&A = Daniel B. Stephens & Associates, Inc.
 W&SD = Water and sanitation district
 DePauli = DePauli Engineering & Surveying, LLC. 2012



2.4 Study Area Location and Description

McKinley County is located in western New Mexico and is bordered by San Juan County to the north, Sandoval County to the east, Cibola County to the south, and the state of Arizona to the west. The County encompasses 5,449 square miles of the San Juan Plateau, an arid high plateau of grasses, shrubs, and scattered trees, and is bisected by the Continental Divide (McKinley County, 2005). Annual rainfall averages 12 inches, and the County receives 10 to 15 inches of snow per year (McKinley County, 2005).

In 2010, the U.S. Census reported a population of 71,492 living in McKinley County, 27 percent of which lived in the City of Gallup (U.S. Census Bureau, 2013). Land ownership and jurisdiction in the county is complex, with tribal, federal, state, and private land ownership (McKinley County, 2012). During the 20th century, the McKinley County economy relied heavily on mineral extraction industries, in addition to significant farming and ranching sectors (McKinley County, 2012). These industries are no longer as significant, and the region is developing more retail business, light manufacturing, and tourism (McKinley County, 2012.).

Economic development is essential to the County, as 40 percent of its residents live below the poverty level (NNMCOG, 2009). The County has adopted a local economic development act (LEDA) ordinance (No. JAN 07 2008) and is currently updating the 2009 economic development plan (Garnanez, 2013).

2.5 Planning Scope

This appraisal investigation is based on a 50-year planning horizon to the year 2060. Infrastructure replacement costs provided herein are based on a 50-year life cycle for the infrastructure. The water demand forecast is based on a 50-year planning horizon.

2.6 Relationship to Other Activities

The Rural Water Supply Program Appraisal Investigation study area is common to two significant water development projects: the Navajo Gallup Water Supply Project and the Gallup



Regional Groundwater project (Section 2.7). The purpose of these projects is primarily to implement the terms of the Navajo Indian Water Rights Settlement documented in the recently approved settlement agreement and outlined in the Northwestern New Mexico Rural Water Projects Act (Public Law No. 111-11, Title X, Subtitle B 123 Stat 991) and to furnish a long-term sustainable supply to the project beneficiaries. This appraisal study identifies the infrastructure requirements and costs needed to connect small independent water systems and communities in the Gallup area to the water sources conveyed through NGWSP infrastructure to ensure a source of future supply for these systems that currently rely solely on groundwater. Neither the Act nor the settlement agreement directly addresses the infrastructure requirements for these systems.

2.7 Current and Previous Studies

To address the limited available water resources, McKinley County has a long history of planning to meet current and future water needs. The appraisal study builds on the multiple McKinley County water supply, water system, development, and planning studies that have been completed over the last 30 years. As a pre-planning document, this study focuses on the small rural water systems that have not been directly involved in the Navajo-Gallup water planning efforts. In developing this report, previously completed water planning studies were collected and reviewed. Existing studies include the McKinley County Small Water Systems Regionalization Plan, the Northwest New Mexico Regional Water Plan, the McKinley County Comprehensive Plan, New Mexico Environment Department (NMED) sanitary surveys, as well as the technical memorandum and draft final project plan for the NGWSP.

The appraisal study relates to and is consistent with several existing studies and initiatives to address water supply needs in McKinley County. The key studies and initiatives are briefly described in Sections 2.7.1 through 2.7.7.

2.7.1 McKinley County Small Water Systems Regionalization Plan

A small systems regionalization plan was completed in 2008 (DBS&A and DePauli, 2008). The purpose of the study was to identify opportunities for the system participants to improve water management through coordination and cooperation among the systems. The majority of the



participating systems are small, volunteer organizations with increasing difficulties in managing complex regulatory requirements, aging infrastructure, and limited and inadequate resources.

Participants identified numerous governance issues and alternatives for improving cooperation and mutual assistance among systems. Several water systems passed resolutions to work together to obtain funding for mutually beneficial projects, share resources where appropriate, and continue to identify opportunities to save costs and work toward a regional organization. Difficulties faced by the systems involve sharing or commingling assets, identifying the type of legal entity that would best suit their mutual needs, and ensuring parity among systems so that all participants receive the same relative benefits from a regionalization effort. The systems continue to work successfully to obtain funding and are currently identifying specific opportunities to share an operator and a backhoe.

One important outcome of the plan was the creation of the Mariposa Domestic Water Alliance. The Alliance generally meets quarterly, generally with participation from at least 3 of the member systems. Several systems in the Alliance are included in this study: Coal Basin Water Association, Gamarco W&SD, White Cliffs MDWUA, and Yah-ta-hey W&SD.

2.7.2 Northwest New Mexico Regional Water Plan

The regional plan, 1 of 16 completed in the state, provides a review of the region's background, climate, geology, water supply, water rights, water quality, water demand, and current regional issues, and discusses multiple potential alternatives and solutions to resolve water supply and management concerns (NWNMCOG, 1998). The NGWSP is the largest water infrastructure project featured in the plan and has been designed to meet future demand for the City of Gallup and the Navajo chapters.

The plan documents county-wide water demand and water supply issues, with some small water system data. The plan does not address how small independent systems should address dwindling groundwater resources or how the other large water supply development alternatives reviewed in the plan will provide water for these systems.



2.7.3 Navajo-Gallup Water Supply Project and Gallup Regional Water System

The NGWSP has been under development for the last 40 years as the major water supply development project in the County, and it is a significant feature of the Navajo Nation Water Rights Settlement Agreement. The project will deliver San Juan River water through a pipeline to the City of Gallup, the eastern portions of the Navajo Reservation, and the southwestern portion of the Jicarilla Apache Reservation. The estimated total cost of the project is more than \$990 million (DePauli, 2012). Under the settlement, the City of Gallup will have the right to 7,500 acre-feet of water conveyed through the project. Small water systems discussed in this report are indirect project beneficiaries and have not been included in project planning and development.

The Gallup/Rural Navajo Regional Water System is a short-term implementation phase of the NGWSP designed to establish infrastructure capacity in the Gallup area to ensure water delivery to rural Navajo residents in the short-term and to develop capacity in the Gallup system to convey water in the short and long term. The project involves developing water lines to connect with the Indian Health Service (IHS) / NTUA systems and includes installation of the Twin Lakes well north of Gallup near the Yah-ta-hey W&SD (DePauli, 2012).

2.7.4 Gallup Town Hall on Water

The Gallup Town Hall on Water was held May 29 through 31, 2003, and provided a forum for discussing the water supply and water management issues facing the City of Gallup. More than 80 Town Hall participants worked together, considering various management options. The group recognized the need and urgency for water planning and reached a consensus on their vision for the City, in addition to making recommendations for how best to achieve it going forward.

Documents were prepared in preparation for the Gallup Town Hall on Water (Kiely, 2003) and upon its completion (Winn et al., 2003). These documents provide an overview of Gallup's water resources (source, quality, constraints, and planning), water management (issues, alternatives, and new technologies), and the Gallup Town Hall on Water findings, and summarize options going forward.



2.7.5 McKinley County Comprehensive Plan

McKinley County recently updated the 2005 comprehensive plan (NWNMCOG/ARC, 2005), including the water element, which was originally based on the Region 6 regional water plan (NWNMCOG, 2004). The plan lists the following three key goals for the County:

- Promote a regional approach to water planning
- Develop a 40-year water plan
- Consider regionalization of County water districts

The original comprehensive plan also identified the need for county-wide planning and coordination of the water systems in the off-reservation unincorporated areas of the County. The update affirms and reiterates this county-wide goal (McKinley County, 2012).

The County has actively supported system-specific projects for many of the systems in this study, including Gamerco W&SD and Yah-ta-hey/White Cliffs water improvement projects (NMDFA, 2007) and Williams Acres water regionalization connections (NMDFA, 2014a).

2.7.6 McKinley County Water Conservation Plan

A comprehensive McKinley County water conservation plan was prepared by the NWNMCOG, and defines the County's water conservation goals while aiming to encourage voluntary participation from County residents. The plan outlines various water conservation strategies, including public education, system water audits, plumbing retrofit rebates, conversion to xeriscape, modifying system water rate structures, developing and enforcing water conservation ordinances, and decreasing non-revenue water. The County Water Board participated in drafting the document and recommending it to the County Commission for approval.

2.7.7 Sanitary Surveys

System-specific sanitary surveys were prepared by NMED and provided background information for the project. A list of the available surveys is provided in Table 3.



Table 3. Water System Sanitary Survey Status

Water System	Date of Most Recent Sanitary Survey
Allison	Not available
Catalpa Hills	Not available
Cipriano Lewis	Not available
Coal Basin Water Association	January 4, 2011
Crestview	Not available
Gamerco W&SD	June 1, 2010
Twin Buttes	Not available
White Cliffs Mutual Domestic Water Users Association (WUA)	August 19, 2010
William's Acres W&SD:	
Block A Well Co-op	December 15, 2010
Caviggia's Trailer Park	Not available
Cedar Ridge Trailer Park	October 25, 2010
Manuelito Navajo Children's Home	September 27, 2010
Rob Roy Trailer Park	Not available
Sagebrush Water Co-op	November 29, 2011
St. Williams Mobile Home Park	January 27, 2009
Yah-ta-hey W&SD	February 23, 2011



3. Problems, Needs, and Opportunities

McKinley County and the NNMCOG have worked diligently on water supply issues for many years, supporting development of the NGWSP and actively planning for future water supply for all residents through regional water planning efforts (NNMCOG, 2004). While water suppliers have understood for many years that groundwater supplies are not a reliable long-term source of supply, groundwater has been the only source of supply due to the lack of surface water in the County (NNMCOG, 2004). Hydrogeological studies for the City of Gallup have estimated that, as the aquifer level drops and in the absence of supplemental water supply, by 2015 the City will not have enough water to meet peak demand (McKinley County, 2012). Rural water systems in the vicinity of Gallup rely on the same aquifer for supply as the City does. A stable source of water supply is necessary to support the county's economic development plan (NNMCOG, 2009).

While recognizing the need for an additional source of water supply, the County has also focused on improving efficiency and cost-effectiveness for the small rural water suppliers, which generally operate on limited funds with volunteer staff. In 2008 and 2009, studies to evaluate the potential for regionalization of small water systems resulted in the creation of an alliance among certain several small water suppliers to identify opportunities to work together toward integration of certain operational components such as sharing an operator and joint billing (DBS&A and DePauli, 2008). This appraisal study is consistent with the regionalization effort because it identifies opportunities to regionalize certain infrastructure to develop a conjunctive water supply for the area systems and demonstrates the feasibility of interconnecting systems through the Gallup regional system that will convey water to project beneficiaries.

This section provides background information on the water resources, infrastructure, and management constraints that would be addressed by the alternatives evaluated in the investigation. This section is an overview of present and future resource conditions that have informed the formulation of the alternatives to meet the future needs of the McKinley County systems in the project area.



Declining groundwater levels, poor water quality, lack of nearby surface water, limited water rights, aging infrastructure, and governance and management issues all affect the study area systems. These issues are discussed in more detail in Sections 3.1 through 3.9.

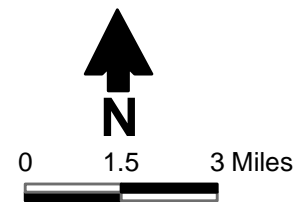
3.1 Groundwater

Groundwater from the San Juan, Gallup, Bluewater, and Rio Grande Underground Water Basins (UWBs) supply the water systems in McKinley County. Supply wells for the participating water systems are located within the Gallup UWB. Primary groundwater production in the Gallup UWB comes from the Gallup Sandstone aquifer, with smaller amounts contributed by the Dakota Sandstone and Westwater Canyon Member of the Morrison Formation (NWNMCOG, 1998). The Gallup Sandstone and Dakota-Westwater Canyon aquifers also provide the current water supply for the City of Gallup (USBR, 2009). For the Gallup area, aquifer recharge rates are estimated to be less than 1 percent of mean annual precipitation (Kiely, 2003).

A generalized surface geologic map for the Gallup area is provided as Figure 4. Figure 5 shows southwest to northeast cross section A–A', which crosses through the Gallup area (Figure 4). The general hydraulic characteristics of the primary aquifers near Gallup are summarized in Table 4.

In McKinley County, groundwater in the Gallup Sandstone occurs under both confined and unconfined conditions with unit thickness ranging from 180 to 526 feet (NWNMCOG, 1998). The Gallup Sandstone yields a few to several hundred gallons per minute (gpm), with the highest transmissivities found near the City of Gallup (NWNMCOG, 1998). Water also occurs in both confined and unconfined conditions in the Dakota Sandstone in McKinley County, with unit thickness ranging from 200 to 350 feet and median well yield estimated around 10 gpm (NWNMCOG, 1998). The Morrison Formation thickness ranges from 330 to 915 feet; the Westwater Canyon Member of the Morrison Formation contains most of the water available to wells from this formation, but is present only in the portion of McKinley County north of Gallup (Stone et al., 1983 and Welder and Klausing, 1990, as referenced in NWNMCOG, 1998). Morrison Formation well yields vary from several to approximately 500 gpm, with lower well yields found near the City of Gallup (Welder and Klausing, 1990, as referenced in NWNMCOG, 1998).

S:\PROJECTS\WR12.0084_MCKINLEY_COUNTY\GIS\MDX\REPORT 1-2014\FIG04_CROSS_SECTION_LINES_SURFACE_GEOLOGY.MXD 142401



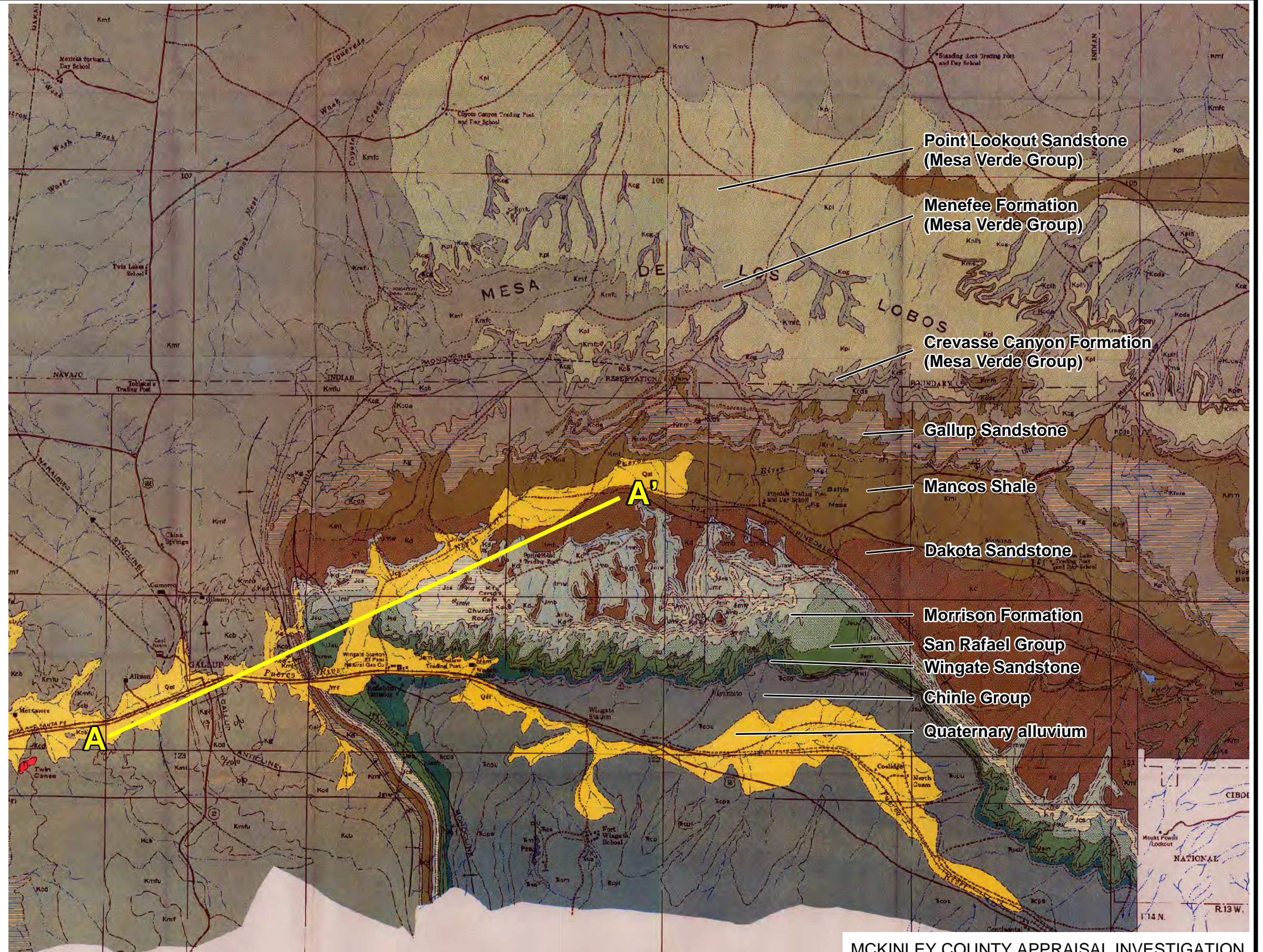
Explanation

— Cross section line

Source: Regional hydrogeology of the Navajo and Hopi Indian Reservations, Arizona, New Mexico, and Utah with a section on vegetation (Cooley, M.E., et al, 1969).



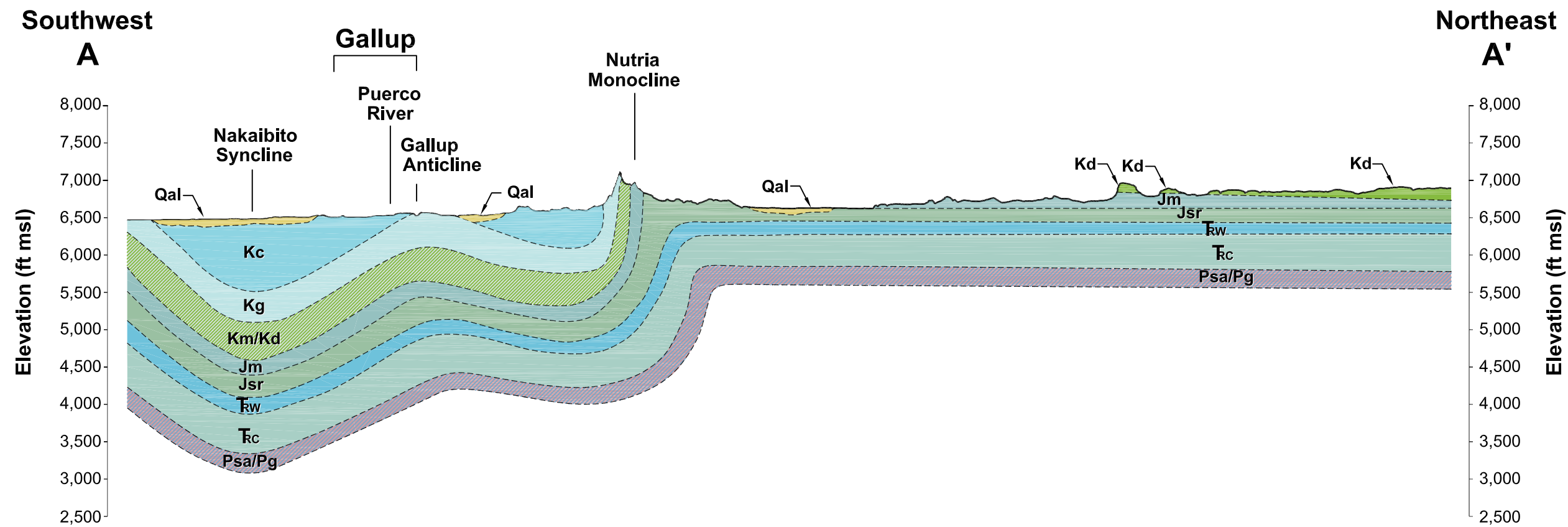
Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084



MCKINLEY COUNTY APPRAISAL INVESTIGATION
Surface Geology Map

Figure 4

S:\Projects\WR12.0084_McKinley_County\VR_Drawings\Fig05_Cross_Sec_A-A'.dwg



Explanation

- Permian**
- Psa San Andres Limestone
 - Pg Glorieta Sandstone

Triassic

- Tw Wingate Sandstone
- Tc Chinle Group (locally includes Moenkopi Formation)

Jurassic

- Jsr San Rafael Group (locally includes Entrada Sandstone, Cow Springs, Bluff Sandstone, Todilto Limestone, and Summerville Formation)
- Jm Morrison Formation (locally includes Recapture Member, Brushy Basin Member, and Westwater Canyon Member)

Cretaceous

- Mesa Verde Group**
- Kpl Point Lookout Sandstone
 - Kc Crevasse Canyon Formation
 - Kg Gallup Sandstone
 - Km Mancos Shale
 - Kd Dakota Sandstone

Quaternary

- Qal Quaternary alluvium





Table 4. General Hydraulic Characteristics of Primary Aquifers near Gallup

Geologic Unit	Yield (gpm)		Transmissivity (ft ² /d)
	Range	Median	
Gallup Sandstone of Mesaverde Group	1–645 ^{a,b}	30 ^b	5–930 ^{a,c}
Dakota Sandstone	1–200 ^b	13 ^b	44–85 ^{a,d}
Morrison Formation (includes Westwater Canyon Sandstone)	1–401 ^c	30 ^a	2–480 ^{a,d}

^a Kernodle, 1996

^b Dam, 1995

^c Risser and Lyford, 1983

^d Stone et al., 1983

gpm = Gallons per minute

ft²/d = Square feet per day

3.2 Water Quality

Water quality data were obtained from the NMED Drinking Water Bureau (<https://eidea.nmenv.state.nm.us/DWW/>) and were compared to national primary drinking water standards (primary standards) (U.S. EPA, 2007a), State of New Mexico human health standards (New Mexico Water Quality Control Commission [NMWQCC] standards) (NMWQCC, 2007), and national secondary drinking water standards (secondary standards) (U.S. EPA, 2007b). Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water (U.S. EPA, 2007b).

Water quality standard exceedances are summarized below.

- Water samples from three water systems (Manuelito Navajo Children's Home, Sagebrush Water Co-op, and St. Williams Mobile Home Park) have exceeded the NMWQCC standard for fluoride of 1.6 mg/L.
- Water samples from the Block A Well Co-op exceeded the U.S. EPA secondary standards for color, pH, and total dissolved solids (TDS) in October of 2010.
- Water samples from White Cliffs MDWUA have exceeded the NMWQCC standard of 600 mg/L for sulfate.



- Water samples from four water systems (Manuelito Navajo Children's Home, St. Williams Mobile Home Park, White Cliffs MDWUA, and Yah-ta-hey W&SD) have exceeded the secondary standard of 250 mg/L for sulfate. (The most recent available sulfate data for any of these systems are from 2001.)

3.3 Water Rights

The New Mexico Office of the State Engineer oversees water rights administration in the state. Water supply for the participating systems is supplied by groundwater from the Gallup Underground Water Basin, which was declared on March 5, 1980 (NMAC 19.27.33). Of the 17 participating water systems or communities, most have declared their water right with the New Mexico Office of the State Engineer (OSE) or have a water rights permit. However, the communities that are not organized into active water systems rely on domestic well permits, which are not transferable water rights (Table 5). Wells within the Gallup Underground Water Basin that have not been declared but were drilled before that basin was declared would have pre-basin water rights, which are transferable. The City of Gallup has ample water rights to meet its future needs (NM OSE, 2015).

The City of Gallup water use in 2010 was 3,211 acre-feet (Longworth et al., 2013). Gallup is entitled to up to 7,500 acre-feet of water annually under the Navajo Gallup Water Rights Settlement and has contracted for delivery of this water from the Jicarilla Apache Nation (City of Gallup and Jicarilla Apache Nation, 2011). This water will begin to be delivered to the City of Gallup in 2024 for distribution to customers within the Gallup regional area, which includes the rural communities participating in this study.

Treated wastewater is reused throughout the City for irrigation of the golf course and athletic fields pursuant to Discharge Permit DP-95. Treated wastewater that is not reused is discharged to the Rio Puerco of the West pursuant to National Pollutant Discharge Elimination System (NPDES) permit NM0020672 and Discharge Permit DP-1342 (NMED, undated). The City could potentially develop a return flow plan for the water discharged to the Rio Puerco; however, no such plan is listed in the Office of the State Engineer water rights database.



Table 5. Water Rights on File for Project Area Systems and Communities
Page 1 of 2

System/Community Name	File Number(s) ^a	Type of Use ^b	Water Right ^c (ac-ft/yr)	Priority Date	Comments
Allison	G-00200	MDW	12.93	1990	Declaration of well filed in 1990. However, water right not transferred to Allison. System now considered "inactive" and community is served by domestic wells. There are 17 water right records totaling 42.93 ac-ft in the Allison area.
Catalpa Hills	Community served by domestic wells in the Gallup Basin				Wells drilled between 1981 and 2009. There are 27 domestic water right records totaling 51 ac-ft in the Catalpa Hills area.
Cipriano Lewis	Community served by domestic wells in the Gallup Basin				Wells drilled between 1983 and 2012. There are 8 domestic water right records totaling 21 ac-ft in the Cipriano Lewis area.
Coal Basin Water Association	G-129	MDW	52	6/14/1917	Declaration filed in 1984.
Crestview	Community served by domestic wells				Wells drilled between 1982 and 2010. There are 35 domestic water right records totaling 82 ac-ft in the Crestview area.
Gamerco W&SD	G-9	MUN	289.93	3/3/1922	Application to change location of well was approved June 25, 2005. Therefore, Gamerco can proceed with drilling a replacement well.
Twin Buttes	Community served by domestic wells in the Gallup Basin				Wells drilled between 1981 and 2011. There are 22 domestic water right records totaling 51 ac-ft in the Twin Buttes area.
White Cliffs MDWUA	G-2390	MDW	44	1/1/1975	Declarations for four wells were filed in 2005.
Williams Acres Systems					There are 18 domestic or community water right records totaling 97.3 ac-ft in the Williams Acres area.
Block A Well Co-op	G-184	DOL	11.1	8/1969	Water right intended to serve Block A lots 1 through 10.
Caviggia's Trailer Park	G-142	MUL	3	NA	This is a 72-12-1 well with a June 5, 1985 file date.

^a G corresponds to the Gallup Underground water basin declared by the OSE on March 5, 1980.

^b MDW = Community type use (MDWCA, private, or commercial supplied)

MUN = Municipal use

^c Domestic, municipal, industrial, and commercial water rights are listed as consumptive use rights. Irrigation rights list the full diversion right.

ac-ft/yr = Acre-feet per year

ac-ft = Acre-feet

W&SD = Water and sanitation district

MDWUA = Mutual domestic water users association



Table 5. Water Rights on File for Project Area Systems and Communities
Page 2 of 2

System/Community Name	File Number(s) ^a	Type of Use ^b	Water Right ^c (ac-ft/yr)	Priority Date	Comments
<i>Williams Acres Systems (cont.)</i>					
Cedar Ridge Trailer Park	Undeclared Gallup Basin system		NA		This system has a pre-basin undeclared water right with a well drilled in the late 1970s.
Manuelito Navajo Children's Home	Undeclared Gallup Basin water right		1964		Pre-basin well drilled in 1964.
Rob Roy Trailer Park	G-352	MOB	20	5/10/1964	
Sagebrush Water Co-op	Undeclared Gallup Basin water right		1967		This system has a pre-basin undeclared water right. The well was drilled in 1967.
St. Williams Mobile Home Park	G-412	SAN	3	NA	This is a 72-12-1 domestic well with a July 7, 1996 file date.
Yah-ta-hey W&SD	G-13	MDW	364.37	9/20/1962	

^a G corresponds to the Gallup Underground water basin declared by the OSE on March 5, 1980.

^b DOL = Domestic and livestock use

MUL = 72-12-1 multiple domestic households

MOB = Mobile home parks

SAN = 72-12-1 sanitary in conjunction with a commercial use

MDW = Community type use (MDWCA, private, or commercial supplied)

^c Domestic, municipal, industrial, and commercial water rights are listed as consumptive use rights. Irrigation rights list the full diversion right.

ac-ft/yr = Acre-feet per year

ac-ft = Acre-feet

NA = Not applicable

W&SD = Water and sanitation district



The City of Gallup customer service agreement does not require that new customers transfer water rights to the City as a condition of service (City of Gallup, 2015c).

Water rights transactions can be time consuming and expensive. Projects that have water rights permits in place or merely require a change of ownership typically proceed more quickly. Projects requiring water rights transfers and acquisitions can be significantly delayed to address protests or claims of impairment by neighboring water rights owners. Once a transfer of a change of use is filed, protests may be filed. The OSE addresses protests through the administrative process, which often involves a hearing. Appeals to the OSE decisions are made to the District Court (NMSA Chapter 72-Water Law). Water right applications in McKinley County are frequently subject to protest (USBR, 2009).

3.4 Water Supply Infrastructure

Many of the study area water systems and wells in the communities were constructed in the last 40 years. Some of the older wells and infrastructure will require rehabilitation, upgrades or replacement. A detailed description of the systems and proposed infrastructure is included in Section 5.

3.5 Renewable Energy Resources

According to data presented by the National Renewable Energy Laboratory of the Department of Energy (NREL), solar energy is a viable alternative in western New Mexico (NREL, 2008). Based on the NREL solar maps, western New Mexico has an average solar resource for a tilted plate (or collector) in the range of 6.0 to 6.5 kilowatt-hours (kWh) per square meter per day. This allows systems of moderate area to provide adequate electrical energy for small to medium pumps that would be used in the groundwater supply wells with power needs of up to 180,000 kWh per year. However, this would not remove the need for the local power company to provide electrical power for each site.

Local power is provided by several companies, each of which includes some portion of renewable energy as part of the portfolio of power sources:



- The Navajo Tribal Utility Authority (NTUA) provides service to more than 39,000 users, mainly in the western portion of the Navajo Reservation. In some parts of the reservation where no grid service is available, NTUA provides remote photovoltaic installations for a fixed monthly fee (NTUA, 2015).
- The City of Gallup serves more than 20,000 customers. The City offers “net metering,” which measures the difference between the electricity that customers buy from the utility and the electricity they generate using their own renewable generating equipment (City of Gallup, 2015a). Net metering allows customers to accrue credit for energy they generate in excess of their own needs, providing a financial incentive to install solar power.
- Continental Divide Electric Cooperative (CDEC) serves more than 23,000 customers in western New Mexico. CDEC offers "green power" through Tri-State Generation and Transmission Association. The program is voluntary and consists of a one-year contract to purchase renewable resources in 100-kWh blocks at a market-based rate. The cost is "at a premium," meaning in addition to what CDEC charges the consumer monthly for coal-fired electricity (CDEC, 2015). The CDEC also offers net metering (described above).

The NMED Construction Programs Bureau Recommended Standards for Water Facilities (2006, Section 3.2.1.3) recommends a backup power supply for a groundwater well to ensure continuous service. Therefore, solar power could be used to decrease the annual electrical costs that would be incurred using only the electricity provided by the local power company, and the local power could be used as the backup. Preliminary footprints and costs for the solar systems are provided in Section 6.

3.6 Environmental and Biological Resources

3.6.1 Vegetation

The Southwest Regional Gap Analysis Project (SWReGAP) maps the majority of the project area as Colorado Plateau pinyon-juniper woodland, North American warm desert bedrock cliff



and outcrop, and inter-mountain basins greasewood flat. These vegetation categories are described in Sections 3.6.1.1 through 3.6.1.3.

3.6.1.1 Colorado Plateau Pinyon-Juniper Woodland

This ecological system occurs in dry mountains and foothills of the Colorado Plateau region, including the Western Slope of Colorado to the Wasatch Range, south to the Mogollon Rim, and east into the northwestern corner of New Mexico. It is typically found at lower elevations ranging from 4,900-8,000 feet above mean sea level (ft msl). These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system vary in texture, ranging from stony, cobbly, gravelly sandy loams to clay loam or clay.

Twoneedle pinyon (*Pinus edulis*) and/or Utah juniper (*Juniperus osteosperma*) dominate the tree canopy. In the southern portion of the Colorado Plateau in northern Arizona and northwestern New Mexico, oneseed juniper (*Juniperus monosperma*) and hybrids of juniper species (*Juniperus spp.*) may dominate or co-dominate the tree canopy. Rocky Mountain juniper (*Juniperus scopulorum*) may co-dominate or replace Utah juniper at higher elevations. Understory layers are variable and may be dominated by shrubs, graminoids, or be absent. Associated species include greenleaf manzanita (*Arctostaphylos patula*), big sagebrush (*Artemisia tridentata*), littleleaf mountain mahogany (*Cercocarpus intricatus*), alderleaf mountain mahogany (*Cercocarpus montanus*), blackbrush (*Coleogyne ramosissima*), Stansbury cliffrose (*Purshia stansburiana*), antelope bitterbrush (*Purshia tridentata*), Gambel oak (*Quercus gambelii*), blue grama (*Bouteloua gracilis*), James' galleta (*Pleuraphis jamesii*), or muttongrass (*Poa fendleriana*). The Colorado Plateau pinyon-juniper woodland occurs at higher elevations than the Great Basin pinyon-juniper woodland and Colorado Plateau shrubland systems (USGS, 2004).

3.6.1.2 North American Warm Desert Bedrock Cliff and Outcrop

This ecological system is found from subalpine to foothill elevations and includes barren and sparsely vegetated landscapes (generally less than 10 percent plant cover) of steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic



bedrock types. Also included are unstable scree and talus slopes that typically occur below cliff faces. Species present are diverse and may include elephant tree (*Bursera microphylla*), ocotillo (*Fouquieria splendens*), Bigelow's nolina (*Nolina bigelovii*), teddybear cholla (*Opuntia bigelovii*), and other desert species, especially succulents. Lichens are predominant life forms in some areas. This ecological system may include a variety of desert shrublands less than 2 hectares (5 acres) (USGS, 2004).

3.6.1.3 Inter-Mountain Basins Greasewood Flat

This ecological system occurs in intermountain basins throughout much of the western United States and extends onto the western Great Plains. It typically occurs near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. Sites typically have saline soils and a shallow water table and flood intermittently, but remain dry for most growing seasons. The water table remains high enough to maintain vegetation, despite salt accumulations. This system usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or co-dominated by greasewood (*Sarcobatus vermiculatus*). Fourwing saltbush (*Atriplex canescens*), shadscale saltbush (*Atriplex confertifolia*), or winterfat (*Krascheninnikovia lanata*) may be present to co-dominant. Occurrences are often surrounded by mixed salt desert scrub. The herbaceous layer, if present, is usually dominated by graminoids. There may be inclusions of alkali sacaton (*Sporobolus airoides*), saltgrass (*Distichlis spicata*) (where water remains ponded the longest), or common spikerush (*Eleocharis palustris*) herbaceous types.

3.6.2 Wildlife Resources

Mammals occurring in McKinley County and in the Great Basin Conifer Woodland biotic community (Brown and Lowe, 1977; Brown, 1982) typically include small mammals such as squirrels, mice, gophers, rats, rabbits, badgers, raccoon, and skunks as well as larger mammals such as gray, kit, and red foxes (*Urocyon cinereoargenteus*, *Vulpes macrotis*, *V. vulpes*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and mule deer (*Odocoileus hemionus*).

Resident and migratory birds expected in the area include western kingbird (*Tyrannus verticalis*), northern mockingbird (*Mimus polyglottos*), broad-tailed and rufous hummingbirds (*Selasphorus platycercus*, *S. rufus*), black-chinned hummingbird (*Archilochus alexandri*),



redheaded woodpecker (*Melanerpes erythrocephalus*), northern flicker (*Colaptes auratus*), dark-eyed junco (*Junco hyemalis*), red-breasted, white-breasted, and pygmy nuthatches (*Sitta canadensis*, *S. carolinensis*, *S. pygmaea*), western meadowlark (*Sturnella neglecta*), pinyon jay (*Gymnorhinus cyanocephalus*), common raven (*Corvus corax*), great horned owl (*Bubo virginianus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), northern harrier (*Circus cyaneus*), turkey vulture (*Cathartes aura*), several species of warblers, vireos, wrens, swallows, and sparrows, and numerous others.

3.7 Special-Status Species

Federally endangered and threatened plant and animal species receive protection under the Endangered Species Act (ESA) of 1973. In McKinley County the black-footed ferret (*Mustela nigripes*), southwestern willow flycatcher (*Empidonax traillii extimus*), least tern (*Sternula antillarum athalassos*), and Zuni bluehead sucker (*Catostomus discobolus yarrowi*) are all listed as endangered, and the Mexican spotted owl (*Strix occidentalis lucida*), yellow-billed cuckoo (*Coccyzus americanus*), and Zuni fleabane (*Erigeron rhizomatus*) are listed as threatened.

A total of seven species listed as threatened or endangered by the State of New Mexico may occur in McKinley County: the Zuni bluehead sucker, the southwestern willow flycatcher, and the least tern, all state-listed as endangered, and the bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), Costa's hummingbird (*Calypte costae*), and gray vireo (*Vireo vicinior*). Three of those species are also federally listed (Table 6); the other four are reviewed in Table 7.

3.8 Cultural and Historic Resources

No changes to the current conditions of cultural and historic resources in McKinley County are expected as a result of any contemplated water supply projects. The majority of the project alignments are located in existing utility easements or in areas that are already developed and therefore will not create new disturbances. To comply with tribal, state, and local regulations, additional cultural resource surveys will be needed for the feasibility study.



Table 6. Federally Listed Species Potentially Occurring in McKinley County, New Mexico

Common Name (Scientific Name)	USFWS Status	Range or Habitat Requirements
Black-footed ferret (<i>Mustela nigripes</i>)	Endangered	Found on grassland plains in mountain basins at elevations below 10,500 feet, almost exclusively in association with prairie dogs, which serve as a primary source of food and burrows. The only known population in New Mexico consists of ferrets reintroduced on Vermejo Park Ranch in Colfax County. Elsewhere the species is considered extirpated.
Least tern (<i>Sternula antillarum athalassos</i>)	Endangered	Migratory species occurring in North America during the breeding season, when it is associated with water (e.g., lakes, reservoirs, rivers). In New Mexico, least terns breed in the vicinity of Roswell, including regularly at Bitter Lake National Wildlife Refuge, which is this bird's habitat area in the state. They rarely breed at Bottomless Lake State Park and Wade's Bog. The least tern is found in migration in Eddy County and as a vagrant elsewhere.
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	Threatened	Found in mature, montane forests and woodlands and steep, shady, wooded canyons. Can also be found in mixed-conifer and pine-oak vegetation types. Generally nests in older forests of mixed conifers or ponderosa pine–Gambel oak (<i>Pinus ponderosa–Quercus gambelii</i>). Nests in live trees on natural platforms (e.g., dwarf mistletoe [<i>Arceuthobium</i> sp.] brooms), snags, and canyon walls at elevations between 4,100 and 9,000 feet.
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	Endangered	Found in dense riparian habitats along streams, rivers, and other wetlands where cottonwood (<i>Populus</i> sp.), willow (<i>Salix</i> sp.), boxelder (<i>Acer negundo</i>), saltcedar (<i>Tamarix</i> sp.), Russian olive (<i>Elaeagnus angustifolia</i>), buttonbush (<i>Cephalanthus occidentalis</i>), and arrowweed (<i>Pluchea sericea</i>) are present. Nests are found in thickets of trees and shrubs, primarily those that are 13 to 23 feet tall, among dense, homogeneous foliage. Habitat occurs at elevations below 8,500 feet.
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Threatened	Typically found in riparian woodland vegetation (cottonwood, willow, or saltcedar) at elevations below 6,600 feet. Dense understory foliage appears to be an important factor in nest site selection.
Zuni bluehead sucker (<i>Catostomus discobolus yarrowi</i>)	Endangered	Found in largely shaded, pool and riffle habitats, about 1 to 1.5 feet deep with water velocity less than 4 inches per second, with substrates from gravel and cobble to boulders and bedrock. Preferred spawning habitat is clean gravel beds.
Zuni fleabane (<i>Erigeron rhizomatus</i>)	Threatened	Grows in selenium-rich red or gray detrital clay soils derived from the Chinle and Baca formations. Plants are found at elevations from 7,300 to 8,000 feet in pinyon-juniper woodland. Prefers slopes of up to 40 degrees, usually with a north-facing aspect.

Source: USFWS, 2014



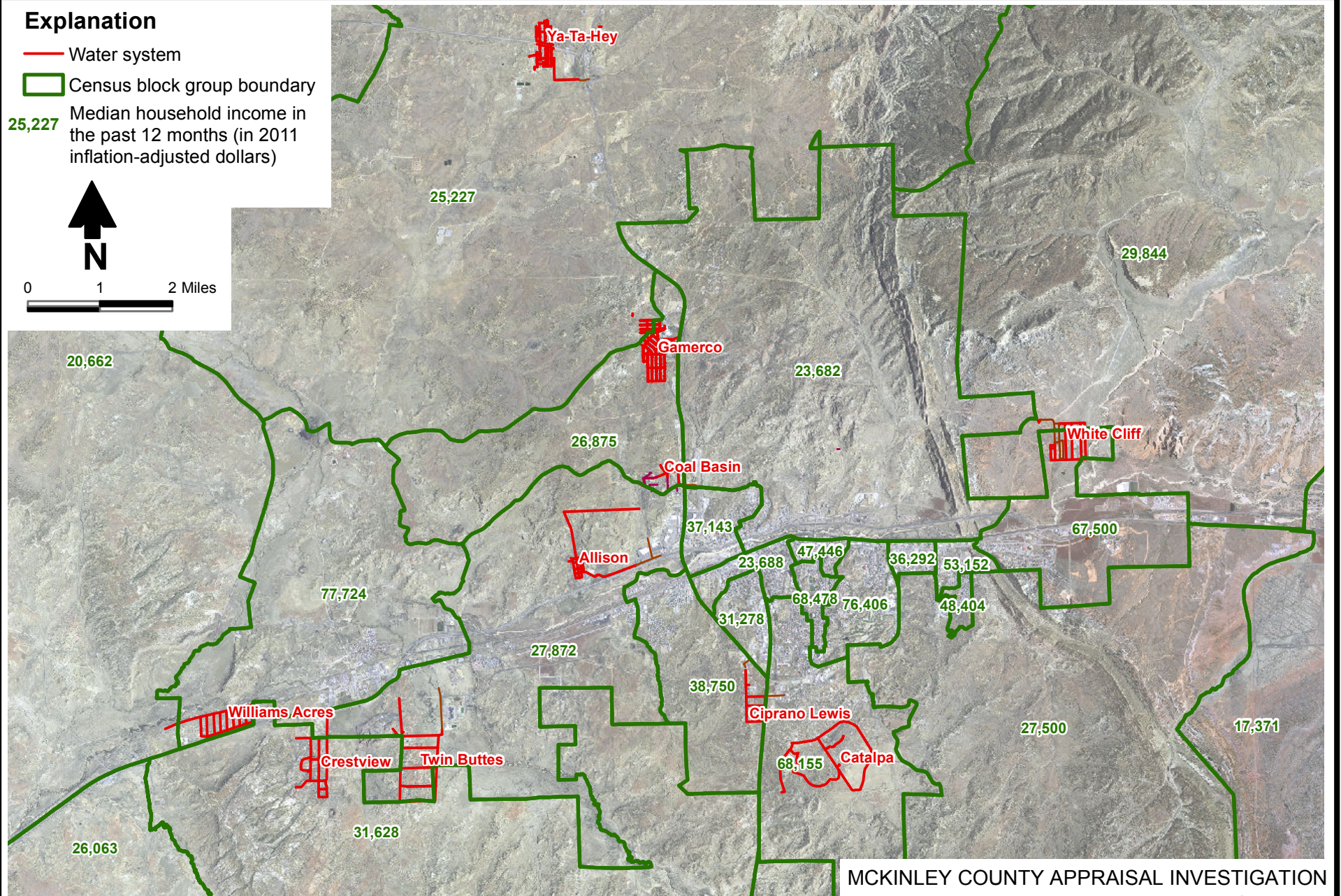
Table 7. State-Listed Species Not Protected Under the Endangered Species Act and Occurring or Potentially Occurring in McKinley County

Common Name (Scientific Name)	State Status	Range or Habitat Requirements
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Threatened	The species tends to be strongly associated with water. Most bald eagles in New Mexico are winter residents and occur near streams and lakes. New Mexico's small bald eagle population nests in trees near lakes surrounded by grasslands or slopes with coniferous trees. Bald eagles tend to be found in areas where prey are concentrated (waterfowl in winter, prairie dogs in spring and summer).
Peregrine falcon (<i>Falco peregrinus</i>)	Threatened	Breeds on cliffs near wooded/forested habitats, with available nearby updrafts for foraging and often water. Winters along the main rivers of the state, especially where extensive wetlands are present. Migrates primarily along mountains of the state.
Costa's hummingbird (<i>Calypte costae</i>)	Threatened	An arid-land species with its principal distribution in the Sonoran Desert region. Migrants have been recorded as far north as Nevada and southeastern Utah.
Gray vireo (<i>Vireo vicinior</i>)	Threatened	Occurs in chaparral-juniper, pinyon-juniper and pinyon-madrone associations. Also occurs in mid-elevation montane shrub habitats with rocky slopes and scattered conifers.

Source: NM Game and Fish, 2014

3.9 Socio-Economic Conditions

The water systems and communities in this study are generally rural, relatively low income areas in the Gallup Metro region (McKinley County, 2012). Certain communities have a mix of very nice homes on large lots while others feature mobile home parks. The average median household income for these communities is \$35,000 (Figure 6). However, because these systems and communities are close to Gallup, they benefit from economic growth and job opportunities that arise in the Gallup Metro area. The largest employers in McKinley County are located in Gallup, and the Gallup Metro region showed the highest amount of growth in the County between 1999 and 2000 (McKinley County, 2012).



MCKINLEY COUNTY APPRAISAL INVESTIGATION

Median Income in Census Block Groups Near Gallup

Source: 2007 - 2011 American Community Survey 5-Year Estimates Block Group Data (U.S. Census Bureau)

Daniel B. Stephens & Associates, Inc.
1/24/2014





4. Population and Demand Estimates

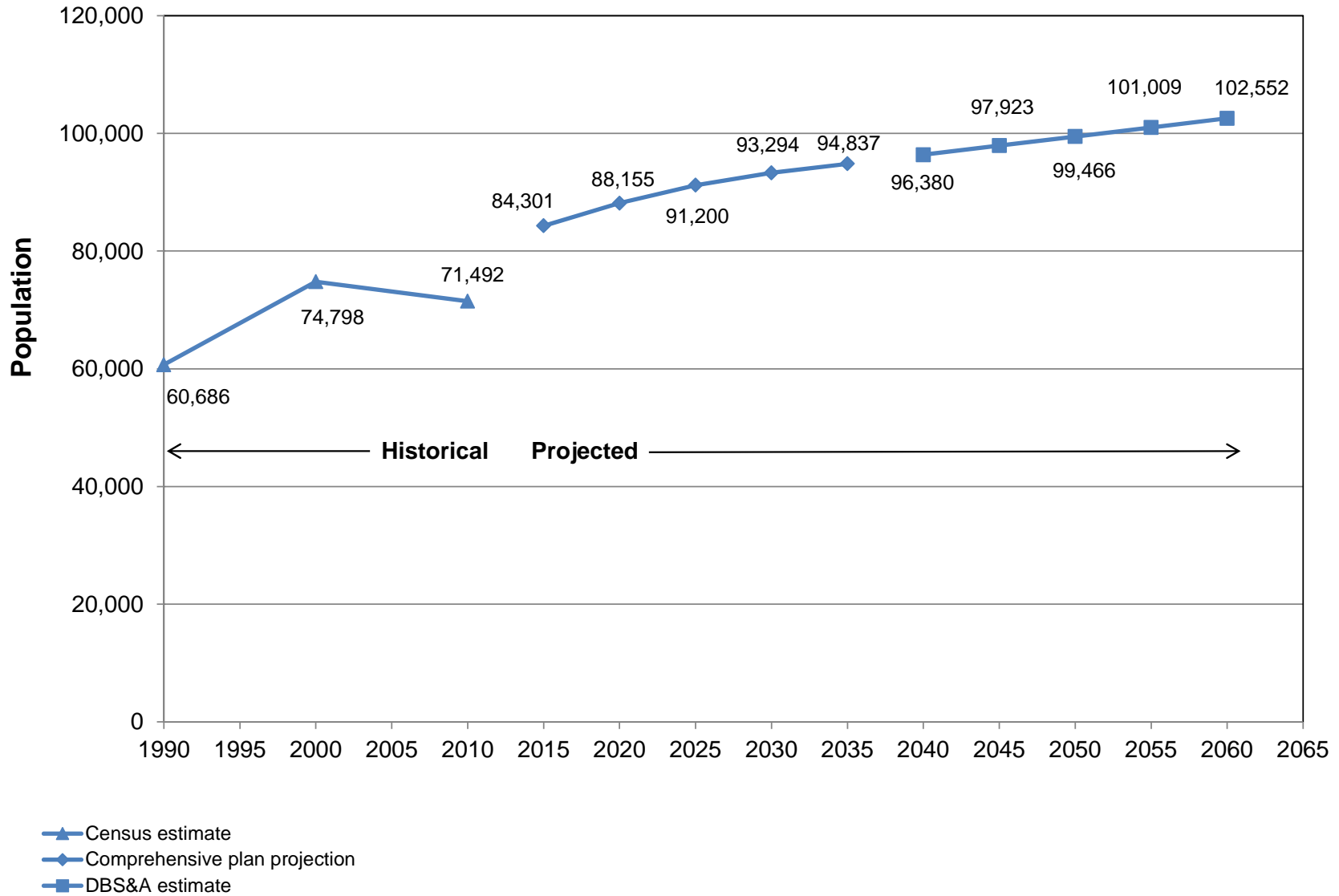
To develop population projections for the individual communities in the area surrounding the City of Gallup, the following data sources were reviewed:

- Northwest New Mexico Regional Water Plan (NNMCOG, 1998, 2004)
- San Juan Regional Water Plan (San Juan Water Commission, 2003)
- McKinley County, New Mexico Comprehensive Plan Update (McKinley County, 2012)
- Bureau of Business and Economic Research data (BBER, 2013)
- Land use projections for the Gallup regional water system (Diaz, 2013)

The Comprehensive Plan Update was selected as the best locally derived and most recent data source. It provides historical population for the City of Gallup and McKinley County through 2010 and estimates projected population in McKinley County through 2035. Housing characteristics are also provided, with an average household size of 2.84 people for the Gallup Metro area, which includes community sites discussed in this report. Table 8 and Figure 7 provide the Comprehensive Plan Update population estimates along with population estimates for 2040 through 2060 extrapolated based on the 2030 to 2035 growth rates. The extrapolation is consistent with the trend of moderate long-term growth in McKinley County (McKinley County, 2012).

Table 8. McKinley County Population Estimates

Year	Population	Growth Rate (%)	Data Source
2010	71,492	—	McKinley County, 2012
2015	84,301	0.86	McKinley County, 2012
2020	88,155	0.89	McKinley County, 2012
2025	91,200	0.68	McKinley County, 2012
2030	93,294	0.45	McKinley County, 2012
2035	94,837	0.33	McKinley County, 2012
2040	96,380	0.33	DBS&A estimate
2045	97,923	0.32	DBS&A estimate
2050	99,466	0.32	DBS&A estimate
2055	101,009	0.31	DBS&A estimate
2060	102,552	0.31	DBS&A estimate





The current estimate of households at each of the 10 community sites was provided by Diaz (2013) (Williams Acres was considered one site). Based on the average of 2.84 people per household, the 2013 population for each of the sites was calculated and demand was estimated (Table 9).

Table 9. Current Estimated Demand

Site	Current Connections	Current Estimated Population ^a	Current Demand	
			(gpy) ^b	(ac-ft/yr) ^c
Allison	31	88	2,249,422	6.9
Catalpa	97	275	7,038,514	21.6
Cipriano Lewis	27	76	1,959,174	6.0
Crestview	93	264	6,748,266	20.7
Coal Basin	34	96	2,467,108	7.6
Gamerco W&SD	484	1,374	35,120,008	107.8
Twin Buttes	57	161	4,136,034	12.7
White Cliffs	48	136	3,482,976	10.7
Williams Acres ^a	180	511	13,061,160	40.0
Yah-ta-hey	125	355	9,070,250	27.8
Total	1,176	3,336	85,332,912	261.1

^a Includes all Williams Acres area systems

^b Based on 2.84 people per household.

^c Based on 70 gpcd

gpy = Gallons per year

ac-ft/yr = Acre-feet per year

W&SD = Water and Sanitation District

Population projections from 2013 through 2060 are based on the growth rates provided in Table 8, applied to each of the 10 communities listed in Table 8. Water demand is based on current use as reported in the OSE *New Mexico Water Use by Categories* report for 2010 (Longworth et al., 2013). The report includes specific per capita use estimates only for Coal Basin, White Cliffs, and Gamerco. The OSE estimates the per capita use for the rural self-supplied domestic category to be 70 gallons per capita per day (gpcd) in McKinley County, and White Cliffs and Gamerco have similar per capita use (70 and 63 gpcd, respectively). Coal Basin has a significantly different per capita water use (153 gpcd) due to the many homes served by Coal Basin that use system water for irrigation of pastures. It is assumed that outdoor irrigation will be served by domestic wells and not by the City of Gallup water system.



Therefore, for this study the estimate of current and future low water demand for all systems is based on 70 gpcd, consistent with the OSE policy.

The number of additional connections and future water demand at each of the sites were estimated for year 2060 (Table 10, Appendix A). By 2060, an additional 277 connections will need to be added for a total of 1,453 connections and an estimated annual water demand of 740 acre-feet. This study relies on these estimates to develop the demand and cost analysis.

Table 10. Estimated Demand in 2060

Site	Current Connections	Additional Connections ^a	Total Estimated Connections ^a	Demand	
				(gpd) ^b	(ac-ft/yr)
Allison	31	7	38	7,619	8.5
Catalpa	97	23	120	23,841	26.7
Cipriano Lewis	27	6	33	6,636	7.4
Crestview	93	22	115	22,858	25.6
Coal Basin	34	8	42	8,357	9.4
Gamerco W&SD	484	114	598	118,958	133.2
Twin Buttes	57	13	70	14,010	15.7
White Cliffs	48	11	59	11,797	13.2
Williams Acres	180	43	223	44,241	49.6
Yah-ta-hey W&SD	125	30	155	30,723	34.4
Total	1,176	277	1,453	289,038	324

^a Based on 2060 population estimate.

^b Based on 2.84 people per household using 70 gpcd

gpd = Gallons per day

ac-ft/yr = Acre-feet per year

W&SD = Water and Sanitation District

A separate estimate of water demand was developed for DePauli Engineering as part of another study. This study evaluated the land base of McKinley County systems and communities and developed an estimate of water demand based on full build-out of these areas using the lot sizes in the approved subdivisions and the average lot size in the area (Diaz, 2013). The land-use study resulted in a higher estimate of the water demand that would likely be required at full build-out as compared to the population projections (Table 11). It is unknown when this growth would occur, and therefore, the appraisal study relies on the increase in population and demand as of 2060. Cost estimates based on demand for the full build-out are included in Appendix A.



Table 11. Estimated Demand at Full Build-Out

Site	Current Connections	Additional Connections ^a	Total Estimated Connections ^a	Demand	
				(gpd)	(ac-ft/yr)
Allison	31	83	114	22,663	25.4
Catalpa	97	109	206	40,953	45.9
Cipriano Lewis	27	57	84	16,699	18.7
Crestview	93	67	160	31,808	35.6
Coal Basin	34	134	168	33,398	37.4
Gamerco W&SD	484	0	484 ^b	96,219	107.8
Twin Buttes	57	110	167	33,200	37.2
White Cliffs	48	99	147	29,224	74.8
Williams Acres	180	381	561	111,527	285.5
Yah-ta-hey W&SD	125	37	162	32,206	82.5
Total	1,176	1,077	2,256	447,897	501.7

^a Based on full build-out (Diaz, 2013).

^b As currently subdivided, Gamerco has only 484 lots; therefore, full build-out is limited. Population estimates show that the Gamerco population will increase and 114 new connections will be needed, so Gamerco may increase its land base or serve customers outside its current boundaries. At this time, however, the estimated demand for this study is limited by the current subdivision plat.

gpd = Gallons per day
ac-ft/yr = Acre-feet per year
W&SD = Water and Sanitation District



5. Identification of Future Water Supply Alternatives

DBS&A identified three alternatives per water system and prepared cost estimates for each. The no action alternative assumes that the systems and communities continue operating their existing wells and at some point install a replacement well. A replacement well must be included in the no action alternative because it is a cost that the systems and communities will have if this alternative is pursued. For the communities relying on existing domestic wells for each home, it is assumed that the replacement well would consist of a new community well to replace the domestic well clusters.

The two remaining alternatives, described as master meter and connection, are similar in that they provide a mechanism to connect the systems to the NGWSP through either a project reach or existing NTUA or City of Gallup distribution network. The main difference is that under the master meter alternative, the water system remains in place, while under the connection alternative, the system is taken over by one of the existing utilities. This difference has implications for both cost and community preference, and therefore the two approaches are treated as separate alternatives. The major assumptions associated with these alternatives are outlined in Table 12. Each alternative includes improvements to the existing system with additional distribution lines, fire hydrants, and valves as needed for each community. .

5.1 Alternative Assumptions

5.1.1 Population and Demand

Section 4 details the population and demand estimates used for the sizing and storage requirements of the proposed infrastructure for each alternative. These estimates are conservative in two aspects. First, the number of persons per household is estimated to be 2.84 as reported in the Comprehensive Plan for the Gallup Metro area. However, the number of persons per household is actually significantly higher: 3.49 for the area north of Gallup (McKinley County, 2012). Secondly, the estimated per capita use for these systems is based on the rural self-supplied use reported by the OSE, which is 70 gpcd. OSE reported actual per capita use for several of the area systems, and while actual use reported for some of the



systems is indeed 70 gpcd, for others it was higher, and the average use reported for these systems was 89 gpcd. The City of Gallup reported use was 142 gpcd. Nevertheless, based on the rural nature of the majority of communities included in the study, the rate of 70 gpcd is assumed to be reflective of future water use.

Table 12. Alternative Development Assumptions

Alternative Parameter	Assumption	Reference
Demand:		
Population	Projected based on current growth rates out to 2060.	McKinley County Comprehensive Plan (2012)
Daily per capita use	Rural self-supplied based use reported for McKinley County.	OSE Water USE by Category 2010 (Longworth et al., 2013)
Individuals per home	2.84, based on Gallup metro area.	McKinley County Comprehensive Plan (2012)
System design	Designed to meet fire flow requirements with 8-inch distribution lines, fire hydrants, and emergency and fire storage.	DePauli (personal communication with McKinley County Fire Marshall, October 2013)
Water service provider	Not specified; assumes that either NTUA or Gallup could be the service provider.	Based on input from Technical Advisory Team
Type of agreement	Master Meter or Customer Service agreement with similar terms for both NTUA and Gallup.	Based on input from Technical Advisory Team
Cost of service	Based on Gallup rates; assumes Gallup and NTUA have the same rates.	Based on input from Technical Advisory Team
Connection from meter to home	Not included; individual homeowners will pay for connecting the home to a meter. Assumes that financial assistance will be made available to qualifying customers.	Standard utility and engineering practice

5.1.2 System Design

Each water system is comprised of a water supply, a distribution system, and storage. The basis for sizing the system in each design included the following components: average daily demand volumes, distribution piping layout, fire flow requirements, and storage requirements. Specific material and sizing requirements for each component were based on the New Mexico Environment Department, Construction Programs Bureau, *Recommended Standards for Water Facilities* (NMED, 2006).



Two water supplies were considered for each system: groundwater from a new supply well and surface water from the NGWSP existing or proposed reaches or existing NTUA and City of Gallup distribution systems. Both City of Gallup and NTUA will convey water through the NGWSP transmission lines (reaches) as well as their own existing distribution systems. The new supply well was sized based on an assumed pump diameter required to produce the average daily demand, with peak hourly demands met by the system storage. Each well was assumed to be 8 inches in diameter with up to a 6-inch-diameter pump installed. An assumed 800 feet of lift was assigned to each well.

This lift and the average daily demand divided by 18 hours of pumping per day were used to estimate the horsepower requirements for the groundwater well pump and estimate the overall power requirements for the no action alternative for each system (Table 13). A disinfection system with a metering pump and storage drum was included in this design.

Table 13. Electrical Costs for Groundwater Pumping

Service Area	Average Pumping Rate (gpm)	Horsepower ^a	Annual Kilowatt Hours ^b
Allison	7	2	9,664
Catalpa Hills	22	6	30,240
Cipriano Lewis	6	2	8,417
Crestview	21	6	28,994
Coal Basin	8	2	10,600
Gamerco WSD	110	31	150,889
Twin Buttes	13	4	17,771
White Cliffs	11	3	14,964
Williams Acres	41	11	56,116
Yah-ta-hey	28	8	38,970

^a Average pumping rate (gpm) * 800 feet / 3960 / 0.7225.

^b One horsepower = 745.699 watts; estimate assumes that pump operates 18 hours per day.

The NTUA and City of Gallup supplies were assumed to be taken from the nearest or most convenient reach or distribution line. It was further assumed that the demand of each system could be met by the existing capacity of the transmission and distribution systems.



To develop the appraisal-level cost estimate, the following assumptions were made:

- Distribution systems were drawn along existing roads and rights-of-way. No easements or property acquisition was considered in this design. The City of Gallup requires a permit for use of public rights-of-way (City of Gallup, 2015b). New Mexico has a utility accommodation policy for use of public road rights-of-way, the purpose of which is to ensure that “utility facilities may be accommodated on all public highway right-of-way under the jurisdiction of the New Mexico State Highway and Transportation Department” (New Mexico Administrative Code 17.4.2 [NMSHTD, 2001]). McKinley County has rights-of-way along many of the roads where the project alignments have been developed (McKinley County, 2015a). Permission for use of the County right of ways must be obtained prior to beginning construction (McKinley County, 2015b).
- Piping and other materials (valves, fittings, etc.) were assumed to meet AWWA and NSF standards for potable water distribution.
- A pipe diameter of 8 inches was required to allow water velocities below 5 feet per second under normal daily demands and less than 10 feet per second under fire flow demands (NMED, 2006).
- Fire hydrants were placed at radii of 400 feet separation within each distribution system.
- No design pressures were calculated for this appraisal level design. However, for further design the state standards for system pressure will have to be met, considering placement of storage tanks and pump sizing.
- This design includes the cost of installing an individual service connection and meter to each user. The cost of connection from the meter to the residence would be carried by the user. The connection and meter were assumed to be a single residence standard ¾-inch tap and meter.

The cost of connection to an available water system can be prohibitive for many low-income residents. There are some federal programs to which small systems residents can apply for



financial assistance, or McKinley County may consider implementing their own financial assistance program.

Examples of federal funding sources are the U.S. Department of Agriculture's Rural Repair and Rehabilitation Loan & Grant (Section 504) and Rural Housing Direct Loan (Section 502) Programs. The Section 504 program provides grants and loans to very low-income homeowners in eligible rural areas to remove health and safety hazards from homes, improve or modernize them, and make them accessible for people with disabilities. Grants are available for homeowners age 62 and older who cannot afford to repay a loan at a 1 percent interest rate. Section 502 loans are primarily used to help low-income individuals or households purchase homes in rural areas. Funds can be used to build, repair, renovate, or relocate a home, or to purchase and prepare sites, including providing water and sewage facilities.

An example of a county funding program is the Bernalillo PIPE program. The PIPE program may provide up to \$4,500 in assistance and covers plumbing costs for connecting to municipal water and sewer lines and abandoning a septic tank (Bernalillo County, 2015). Bernalillo County also conducted a pilot loan program, called CONNECT, that will assist county residents with financing the cost of connecting their homes to the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) water lines. It will be offered to residents throughout the county who are on well water systems where the groundwater quality does not meet federally mandated primary drinking water standards and where ABCWUA service lines are available. CONNECT loans will be made from the county to the resident in the form of direct payment to contractors and direct payment of various connection fees. The re-payment will be billed directly through the resident's ABCWUA water bill over a 10-year period of time at a 7 percent interest rate.

Fire flow and storage requirements for each system were based on the 2009 edition of the International Fire Code (IFC) and the Insurances Services Office (ISO) methodologies. The methodology is based on the needed fire flow times the required duration. The needed fire flow is 1,000 gpm based on the ISO requirements for one- and two-family dwellings from 11 to 30 feet apart, and the IFC required duration is 120 minutes. Therefore, the required fire storage volume is 120,000 gallons. These parameters were reviewed with the County Fire Marshall (DePauli, 2013b).



Storage reservoirs were sized for groundwater and master meter alternatives for each system based on the two hours of fire flow and two days of projected 2060 average daily demand for each system. No storage is needed for the connection alternatives. It was assumed that operational equalization for peak demands were included with this volume. The resulting storage volumes are presented in Table 14.

**Table 14. Storage Based on
DBS&A Projected 2060 Population**

Community	Storage Volume (gallons)
Allison	140,000
Catalpa	170,000
Cipriano Lewis	140,000
Crestview	170,000
Coal Basin	140,000
Gamerco W&SD	360,000
Twin Buttes	150,000
White Cliffs	150,000
Williams Acres	210,000
Yah-ta-hey	120,000

Power requirements for each alternative were based on the assumption that nearby power could be brought to the site with minimum new distribution length required. Also, each site would require a new power drop including a utility pole with meter and step down transformer. No analyses of phase or voltage requirements were made for this design.

5.1.3 Water Service Provider and Cost of Service

Both the City of Gallup and the NTUA are considered potential service providers to the water systems and communities. Existing water systems could continue to provide service to customers under the master meter alternative, and in cases where the system interconnects at an existing NGWSP reach, they would have the option to purchase bulk water either from Gallup or the NTUA. Although the City of Gallup is primarily responsible for reaches 13 and 27



of the project (Reclamation Financial Assistance Agreement No. R11AC40002), NGWSP facilities will be shared by both the City and the NTUA.

DBS&A used City of Gallup rates to determine the cost of service. Based on input from the Technical Advisory Team, it was assumed that the City of Gallup and NTUA would provide comparable rates and would not compete for customers by offering more advantageous rates. The City of Gallup and the NTUA are developing cooperative agreements to share in the costs of the project and will likely adjust their rate structures as the NGWSP comes on line. McKinley County is also supporting the development of the project through a contribution of matching funds equivalent to the amount of money raised by the City of Gallup through its 0.25 percent gross receipts tax for the purpose of repaying construction costs for the NGWSP (City of Gallup and County of McKinley, 2012). One key rationale for the County's participation is that the agreement would "benefit County citizens living both within the City limits and within County communities in the general vicinity of the City" (City of Gallup and County of McKinley, 2012). Additionally, the agreement specifies that City of Gallup will provide comparable residential and commercial rates to systems outside the service area, which is permitted under the current City Code Section 8-1-7 (City of Gallup, 2013)

5.2 No Action Alternative

For communities relying on domestic wells, it was assumed that they would be required to replace their domestic wells over time and would drill a replacement supply well into the deep aquifer to develop a new single point drinking water supply for the entire community. A new storage tank would accommodate fire flow and two days worth of storage for the community. Disinfection would occur by installing a dose-controlled chlorination system at the wellhead to inject a hypochlorite solution into the pumped groundwater to meet water quality requirements for the water delivered to the individual residences through the distribution lines. The community would organize into an active water system that would own the new infrastructure and oversee system operation and maintenance, billing, and administration.

For existing systems, this alternative assumes the need for a replacement well and adequate storage to meet fire flow and emergency requirements.



5.3 Master Meter Alternative

The master meter alternative includes installation of new water lines to connect the community or system to the nearest water supply line, either City of Gallup, NTUA, or an existing or proposed reach of the NGWSP. At the connection point, a master meter and tie-in would be installed to an 8-inch water line run to the system. Water service providers are not identified in this appraisal investigation since both the City of Gallup and NTUA will share the NGWSP transmission lines and will be able to move water through either City of Gallup or NTUA transmission and distribution lines to reach customers. It is also assumed that the cost of the water to the customers would be the same, so that the two service providers would not compete for customers through price differences.

5.4 Connection Alternative

The connection alternative includes installation of new water lines to tie in to the NGWSP through either the NTUA, City of Gallup, or one of the NGWSP reaches. If needed, new connections would be installed to each individual user with a residential metered service connection. The resident would be responsible for completing the connection from the meter to the residence. These connections would be serviced and billed on an individual, monthly basis by the NGWSP. This alternative assumes that no storage is required, as water would be provided either by the City of Gallup or NTUA.

The community area, distance from Gallup, and number of connections required for each community are outlined in Table 15.

5.5 Description of Alternatives for Water Systems

The specific details of the alternatives developed for each water system are provided in Sections 5.5.1 through 5.5.5.



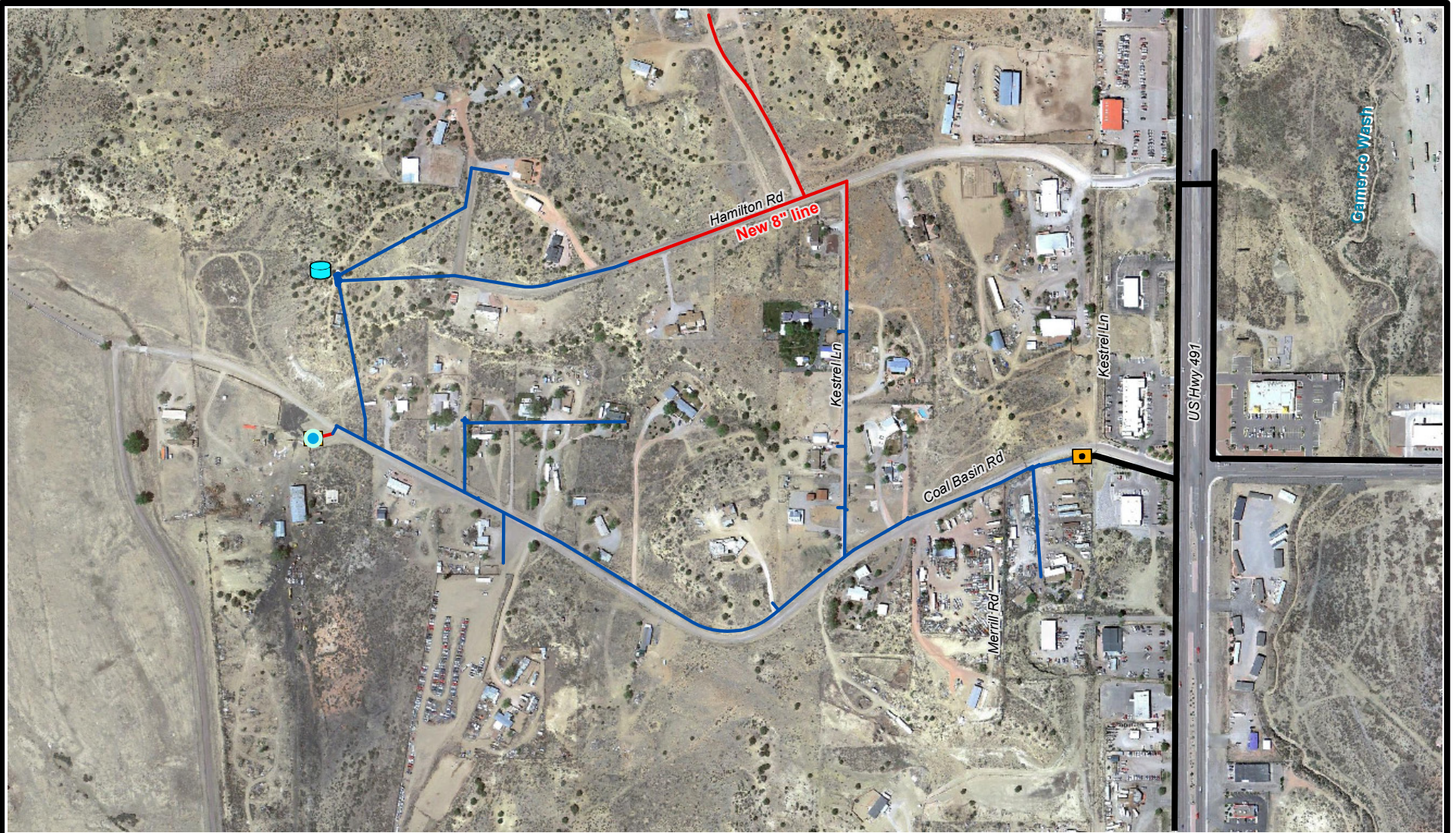
Table 15. Community Information for Water Supply Alternatives

Name	Distance to Gallup Boundary (miles)	Area (acres)	Approximate Area (square miles)	Number of Current Connections
Allison	0.5	26	0.04	31
Catalpa	0.6	589	0.92	97
Cipriano Lewis	0.1	104	0.16	27
Coal Basin	0.2	80	0.12	34
Crestview	1.0	199	0.31	93
Gamerco	1.6	186	0.29	484
Twin Buttes	0.8	344	0.54	57
White Cliffs	1.2	167	0.26	48
Williams Acres	1.7	158	0.25	180
Ya-Ta-Hey	6.0	134	0.21	125

5.5.1 Coal Basin

The Coal Basin Water Association provides water to approximately 34 customers within the system service area. The water supply system consists of one well, two water storage tanks, and a single chlorination station (NMED, 2011a). Coal Basin is very close to Gallup and has homes on 2.5- and 5.0-acre lots. Some parts of this community are upscale, with large, relatively expensive homes. On the larger lots, some residents have horses and pasture, which is likely the reason that water use reported for this area is much higher than for other systems (Longworth et al., 2013). Coal Basin is a member of the Mariposa Domestic Water Alliance.

For the community of Coal Basin the no action and master meter alternatives (Figures 8a and 8b) would require installation of only 2,000 feet of new 8-inch C-900 polyvinyl (PVC) line, with a connection to the City of Gallup distribution system off of U.S. Highway 491 for the master meter alternative. For the no action alternative, a 2,000-foot-deep supply well and 140,000-gallon storage tank would also be installed. The no action and master meter alternatives would both use the existing distribution system, with the addition of only 8 new service connections and two fire hydrants. The new well and tank are proposed to be placed at the west end of the system as shown in Figure 8a. A 3-horsepower pump would provide 10 gpm directly to the water system.



October 2012 aerial photograph from Google Earth



0 250 500 Feet

Explanation

- Proposed water system
(2,000 ft total pipe length)
- Existing water line
(8,212 ft total pipe length)
- City of Gallup water line

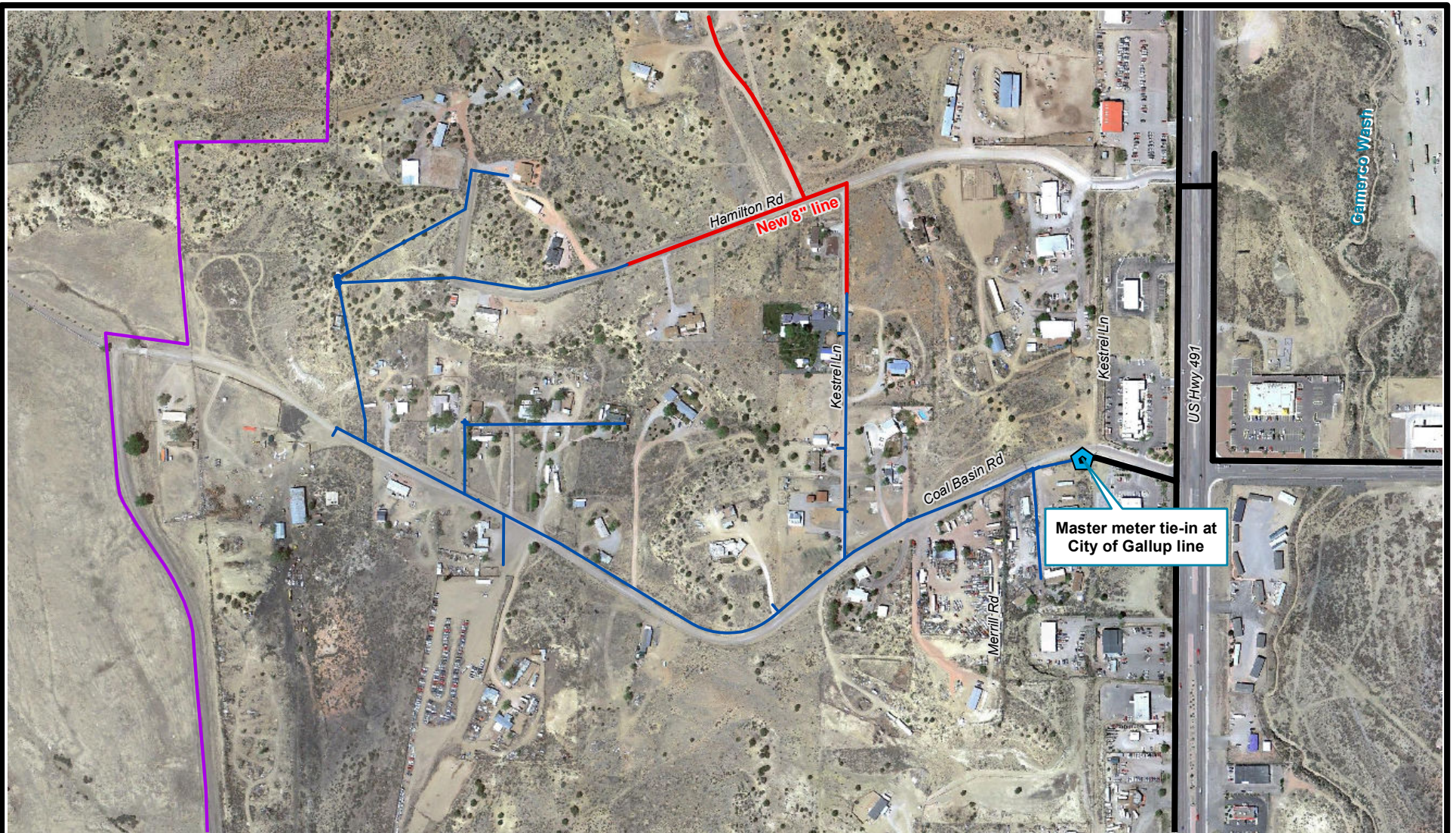
- Emergency connection
- Supplemental well
- Water tank



Daniel B. Stephens & Associates, Inc.
6/9/2015 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION Coal Basin Water System No Action Alternative

Figure 8a



October 2012 aerial photograph from Google Earth



0 250 500 Feet

Explanation

- Proposed water system (1,900 ft total pipe length)
- Existing water line (8,212 ft total pipe length)
- Proposed NGWSP water line (Reach 27.9)

- City of Gallup water line
- ⬠ Master meter



Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION Coal Basin Water System Master Meter Alternative

Figure 8b



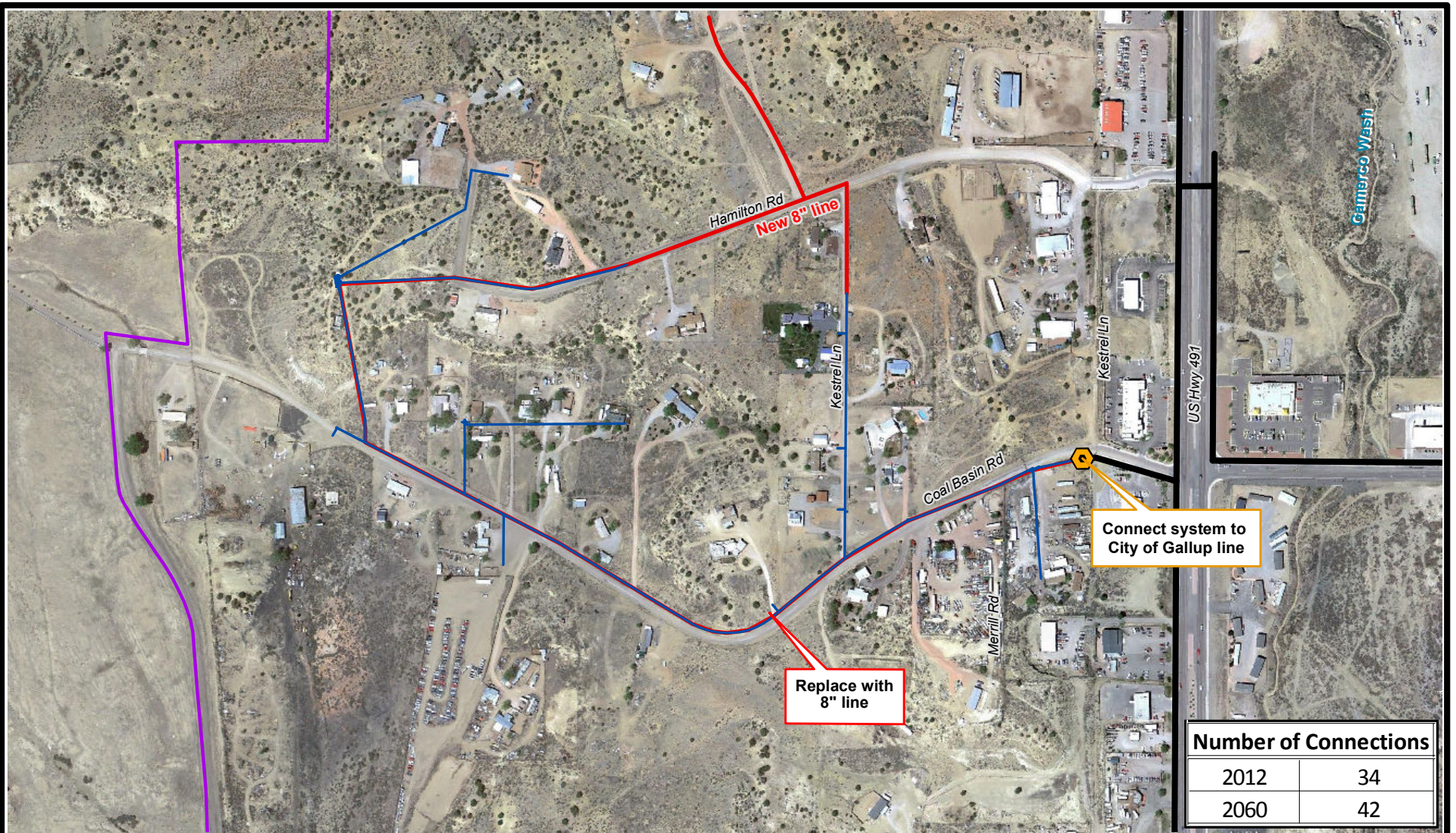
The connection alternative would require that the water system meet the City of Gallup standards for distribution; therefore the 4-inch distribution lines would need to be replaced with 8-inch C-900 PVC distribution lines (Figure 8c). This requirement increases the new water line installation to 6,300 feet. Isolation valves every 500 feet would require 13 new valves.

5.5.2 Gamerco

The Gamerco Townsite subdivision is the largest water system in the study, with more than 484 connections. Gamerco was organized as a water and sanitation district in the 1982 (NM District Court, 1982) and initially operated its own well. Gamerco's system consists of two storage tanks and distribution network using PVC piping (NMED, 2010a). The storage tanks are designed for direct pumping on the distribution system.

Currently, Gamerco purchases potable water from the City of Gallup. In 2005, Gamerco submitted an application to drill a replacement well, which was approved by the OSE, and since that time Gamerco has been actively pursuing funding to drill this well. This well project is considered the no action alternative for purposes of this study. The replacement well project has been listed on the McKinley County infrastructure capital improvement plan (ICIP) and is considered Phase 4 of the ongoing water system improvements. Gamerco is a member of the Mariposa Domestic Water Alliance.

Gamerco WS&D has an existing distribution system with service connections, valves, and fire hydrants. The design for all three alternatives (Figures 9a through 9c) includes the addition of 114 new connections, a new supply well and storage tank for the no action alternative, and installation of an 8-inch totalizing meter for the master meter alternative. The new well for the no action alternative is assumed to be 2,700 feet deep with a 40-horsepower pump providing 110 gpm and is proposed to be installed on the east side of the system. The new storage tank would increase the total system capacity by 360,000 gallons and would be installed on the west side of the community. This system would continue to use the existing booster pump station at the existing emergency supply connection to the City of Gallup distribution system near U.S. Highway 491 on the east side.

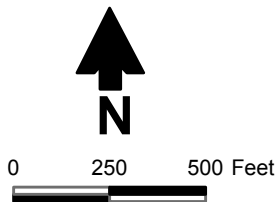


October 2012 aerial photograph from Google Earth

Explanation

- Proposed water system
(6,300 ft total pipe length)
- Existing water line
(8,212 ft total pipe length)
- Proposed Navajo Gallup Water Supply
Pipeline water line (Reach 27.9)

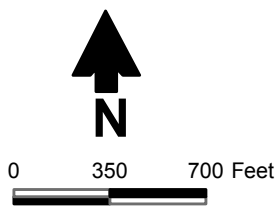
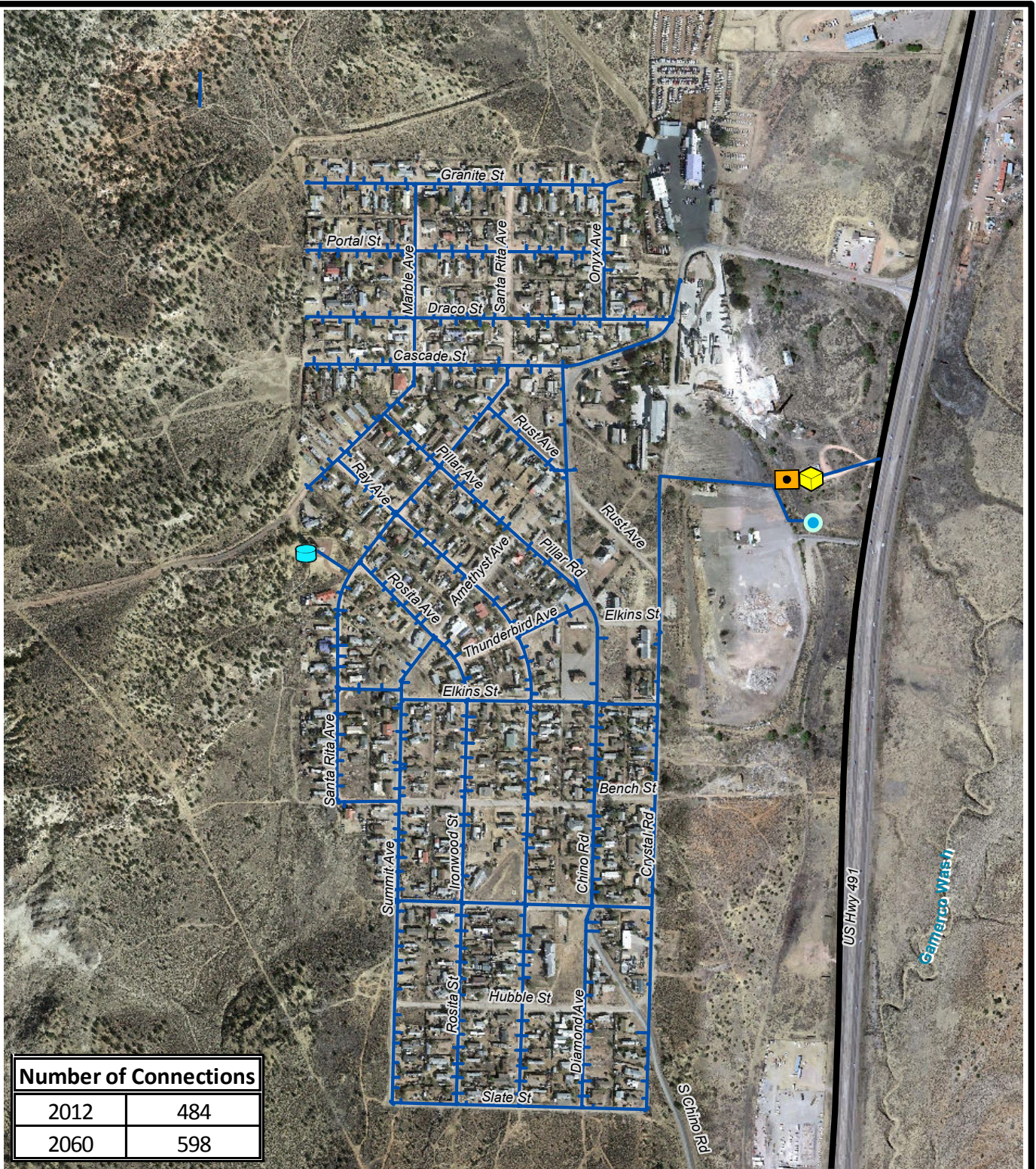
- City of Gallup water line
- ⬡ Tie-in



Daniel B. Stephens & Associates, Inc.
4/21/2015 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION Coal Basin Water System Preferred Alternative

Figure 8c



- Explanation**
- Existing water line
(48,323 ft total pipe length)
 - City of Gallup water line
 - Booster station
 - Emergency connection
 - Water tank
 - Supplemental well

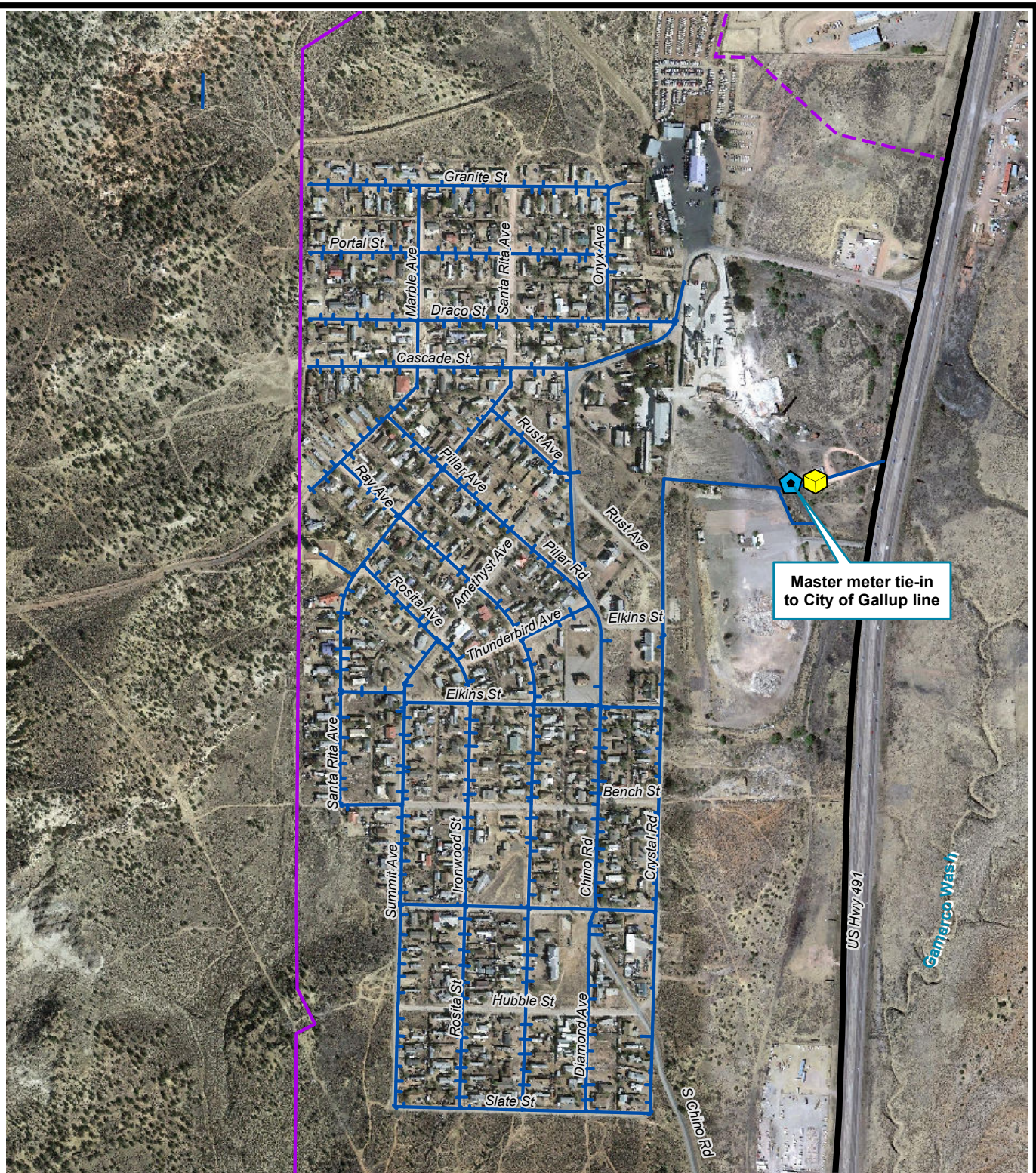
May 2012 aerial photograph from Google Earth



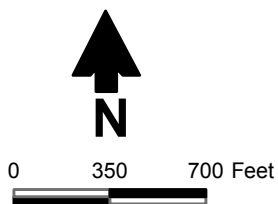
Daniel B. Stephens & Associates, Inc.
4/21/2015 JN WR12.0084

**MCKINLEY COUNTY
APPRAISAL INVESTIGATION
Gamerco Water System
Preferred Alternative**

Figure 9a



May 2012 aerial photograph from Google Earth



Explanation

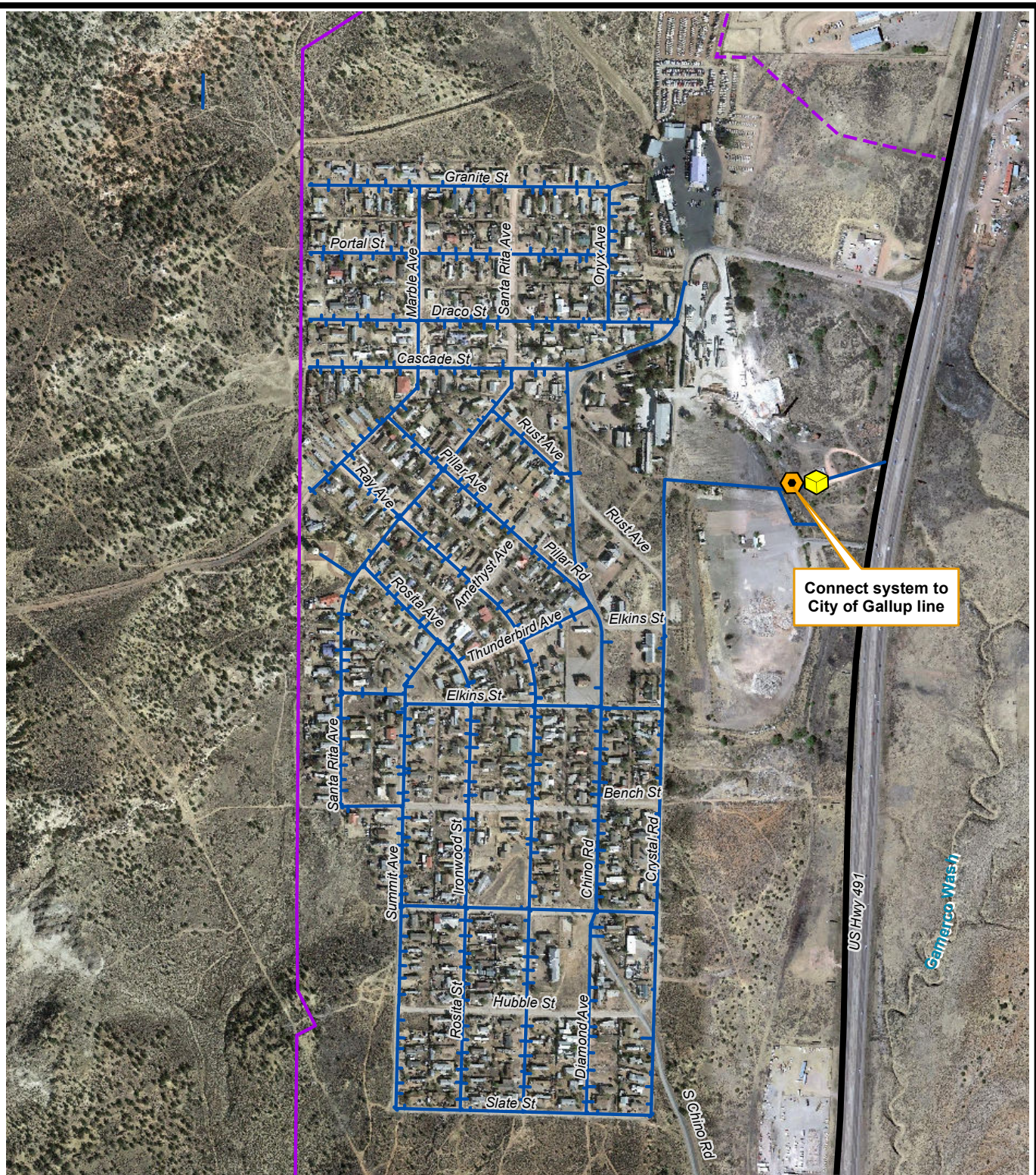
- Existing water line
(48,026 ft total pipe length)
- Proposed NGWSP water line (Reach 27.5)
- Proposed NGWSP water line (Reach 27.9)
- City of Gallup water line
- Booster station
- Master meter



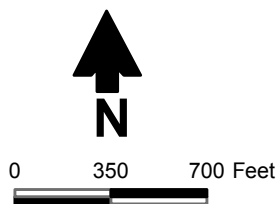
Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION **Gamerco Water System Master Meter Alternative**

Figure 9b



May 2012 aerial photograph from Google Earth



Explanation

- Existing water line
(48,026 ft total pipe length)
- Proposed NGWSP water line (Reach 27.5)
- Proposed NGWSP water line (Reach 27.9)
- City of Gallup water line
- Booster station
- Tie-in



Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

**MCKINLEY COUNTY
APPRAISAL INVESTIGATION
Gamerco Water System
Connection Alternative**

Figure 9c



5.5.3 White Cliffs

White Cliffs Mutual Domestic Water Users Association serves 48 customers in a 168-acre area. A significant number of its customers live in mobile homes. The system operates with two wells and a reverse osmosis water treatment system (Livingston, 2005). White Cliffs recently established an emergency connection to NTUA to serve as backup in case of well failure. This organization has participated in efforts to develop the Mariposa Domestic Water Alliance and work toward regionalization of the neighboring systems (DBS&A and DePauli, 2008).

The White Cliffs community has about 2,900 feet of water line under construction that will connect to the NTUA water line to the northwest of the community along County Road 43. To provide service to homes in the service area all three of the alternatives will include installation of additional buried 8-inch C-900 PVC water line and isolation valves (Figures 10a through 10c). A total of 18,600 feet of water line will be required for the no action alternative and 18,100 feet for the two connection alternatives; all three alternatives will include 36 isolation valves and 31 fire hydrants.

For the no action alternative, a new well would be installed to a depth of 2,500 feet with a 5-horsepower pump yielding 10 gpm to the system. The storage tank for this community is sized at 150,000 gallons.

Because White Cliffs already has an emergency connection, the master meter alternative consists of replacing the emergency meter with a master meter, which would consist of an 8-inch totalizing meter and vault installed at the connection point on County Road 43.

5.5.4 Williams Acres

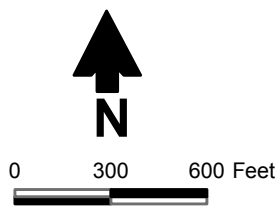
The Williams Acres Water and Sanitation District was established in 1975 and encompasses the service area for several water systems. Presently, the District offers no water supply services, but does provide wastewater treatment. The seven water systems within the W&SD include:

- Block A Well Co-op
- Caviggia's Trailer Park
- Cedar Ridge Trailer Park

S:\PROJECTS\WR12.0084 MCKINLEY COUNTY\GIS\MXD\REPORT 1-2014\FIG10A WHITE CLIFF NO CONNECTIONS.MXD



May 2012 aerial photograph from Google Earth



Explanation

- Proposed water line (18,600 ft total pipe length)
- Existing water line (4,910 ft)
- Water line under construction (2,895 ft)
- Supplemental well
- Water tank
- Emergency connection

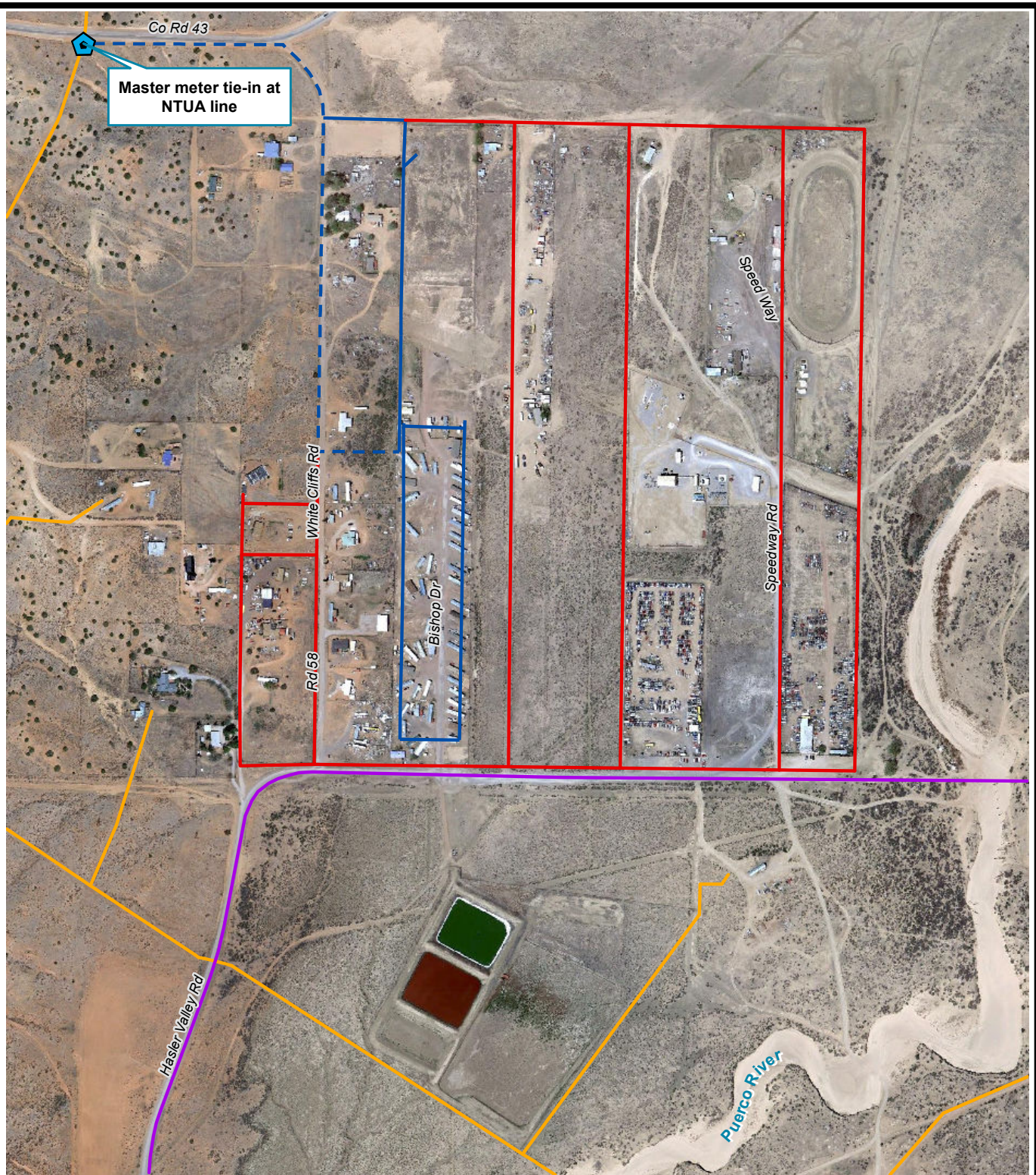


Daniel B. Stephens & Associates, Inc.
6/9/2015 JN WR12.0084

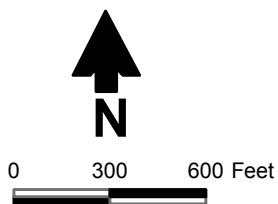
MCKINLEY COUNTY APPRAISAL INVESTIGATION White Cliffs Water System No Action Alternative

Figure 10a

S:\PROJECTS\WR12.0084 MCKINLEY COUNTY\GIS\MXD\REPORT 1-2014\FIG10B WHITE CLIFF MASTER METER.MXD



May 2012 aerial photograph from Google Earth



Explanation

- Proposed water line
(18,100 ft total pipe length)
- Existing water line (4,910 ft)
- Water line under construction (2,895 ft)
- NTUA water line
- Master meter

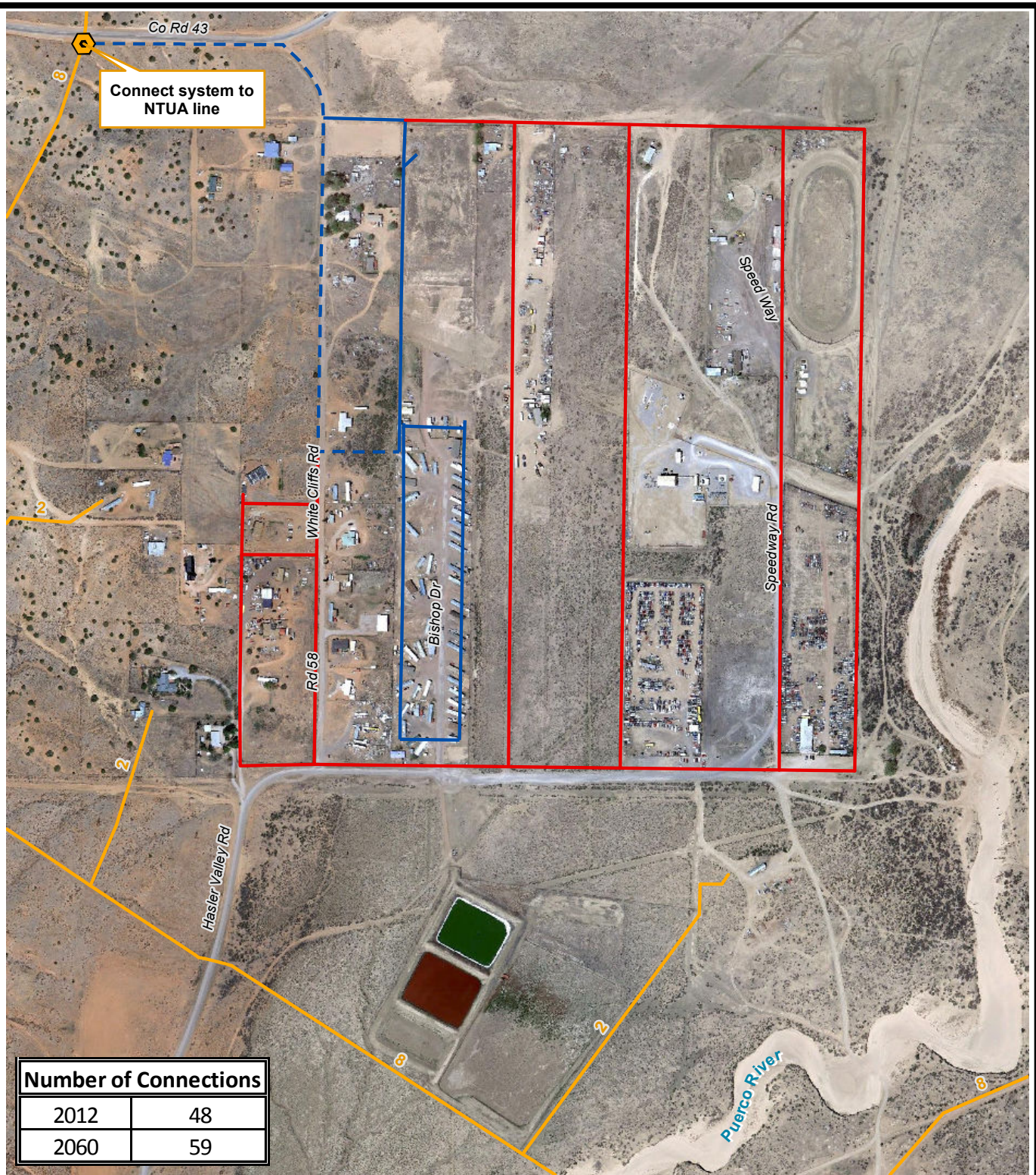


Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION **White Cliffs Water System Master Meter Alternative**

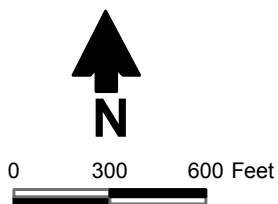
Figure 10b

S:\PROJECTS\WR12.0084 MCKINLEY COUNTY\GIS\MXD\APPRAISAL REPORT\FIG10C WHITE CLIFF CONNECTIONS.MXD



Number of Connections	
2012	48
2060	59

May 2012 aerial photograph from Google Earth



Explanation

- Proposed water line (18,100 ft total pipe length)
- Existing water line (4,910 ft)
- Water line under construction (2,895 ft)
- Navajo Tribal Utility Authority water line
- Tie-in



Daniel B. Stephens & Associates, Inc.
4/21/2015 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION White Cliffs Water System Preferred Alternative

Figure 10c



- Manuelito Navajo Children's Home
- Rob Roy Trailer Park
- Sagebrush Water Co-op
- St. Williams Mobile Home Park

The alternatives for William Acres will combine several independent water systems through a combination of 10-inch and 8-inch C-900 PVC water line (Figures 11a through 11c). The buried 10-inch lines will total about 9,600 feet, and the 8-inch lines will total 13,700 feet for the two connection alternatives and 11,100 feet for the no action alternative. These alternatives will also include installation of 27 fire hydrants and 27 isolation valves.

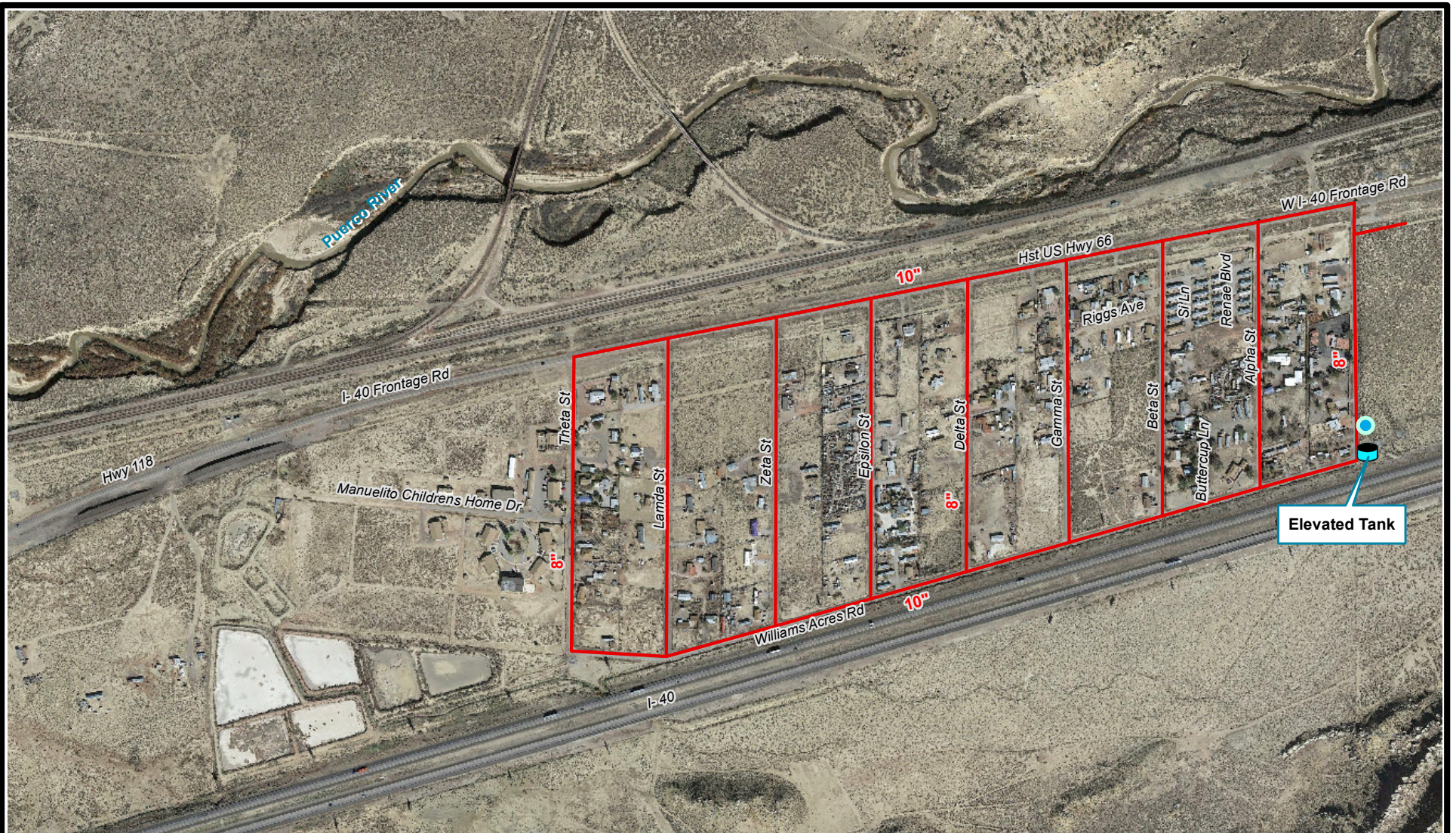
The storage tank and well for the no action alternative are proposed to be installed in the southeast corner of the system. The well will be completed to a depth of 1,800 feet with a 15-horsepower pump supplying 40 gpm. The storage tank will be 210,000 gallons.

The two connection alternatives are proposed to tap into the NTUA transmission line to the west of the community. For the master meter alternative an 8-inch flow meter and vault will be installed at that location. Both the master meter and connection alternatives include the infrastructure to supply water to all the homes in the service area.

5.5.5 Ya-Ta-Hey

The Ya-Ta-Hey Water and Sanitation District is located 4 miles north of Gallup and serves 125 households. This system relies on one well drilled in the 1970s when the system was established (NM District Court, 1975a; NM OSE, 2014). The well supplies water to the single chlorination station for disinfection prior to the storage tank and distribution (NMED, 2011b).

The Ya-ta-hey community has an existing distribution system, and therefore no installation of water lines is required for any of the three alternatives. The no action alternative includes a new supply well installed to 1,800 feet with a 10-horsepower pump to provide 30 gpm (Figure 12a). There are also existing storage tanks in the community, so only a new storage tank with 120,000-gallons capacity is needed, to provide fire flow. The connection alternatives will connect to a City of Gallup transmission line to the southeast of the community with an 8-inch master meter and vault for the master meter alternative (Figures 12b and 12c).



October 2012 aerial photograph from Google Earth



0 350 700 Feet

Explanation

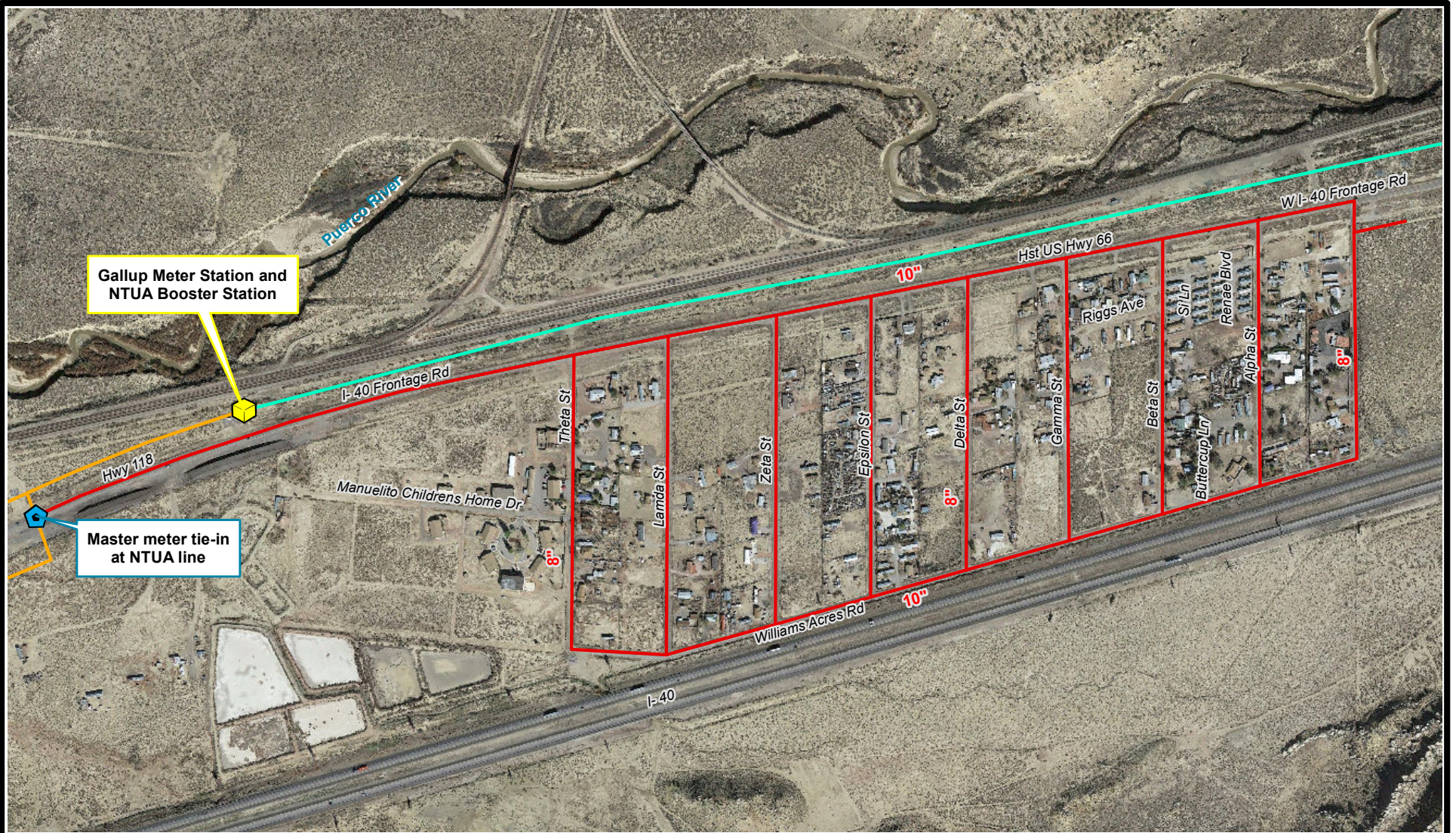
- Proposed water system
(20,700 ft total pipe length)
- Well
- Water tank



Daniel B. Stephens & Associates, Inc.
6/9/2015 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION William's Acres Proposed Water System No Action Alternative

Figure 11a



October 2012 aerial photograph from Google Earth



0 350 700 Feet

Explanation

- Proposed water system
(23,300 ft total pipe length)
- NGWSP water line (Reach 27.1)
- NTUA water line

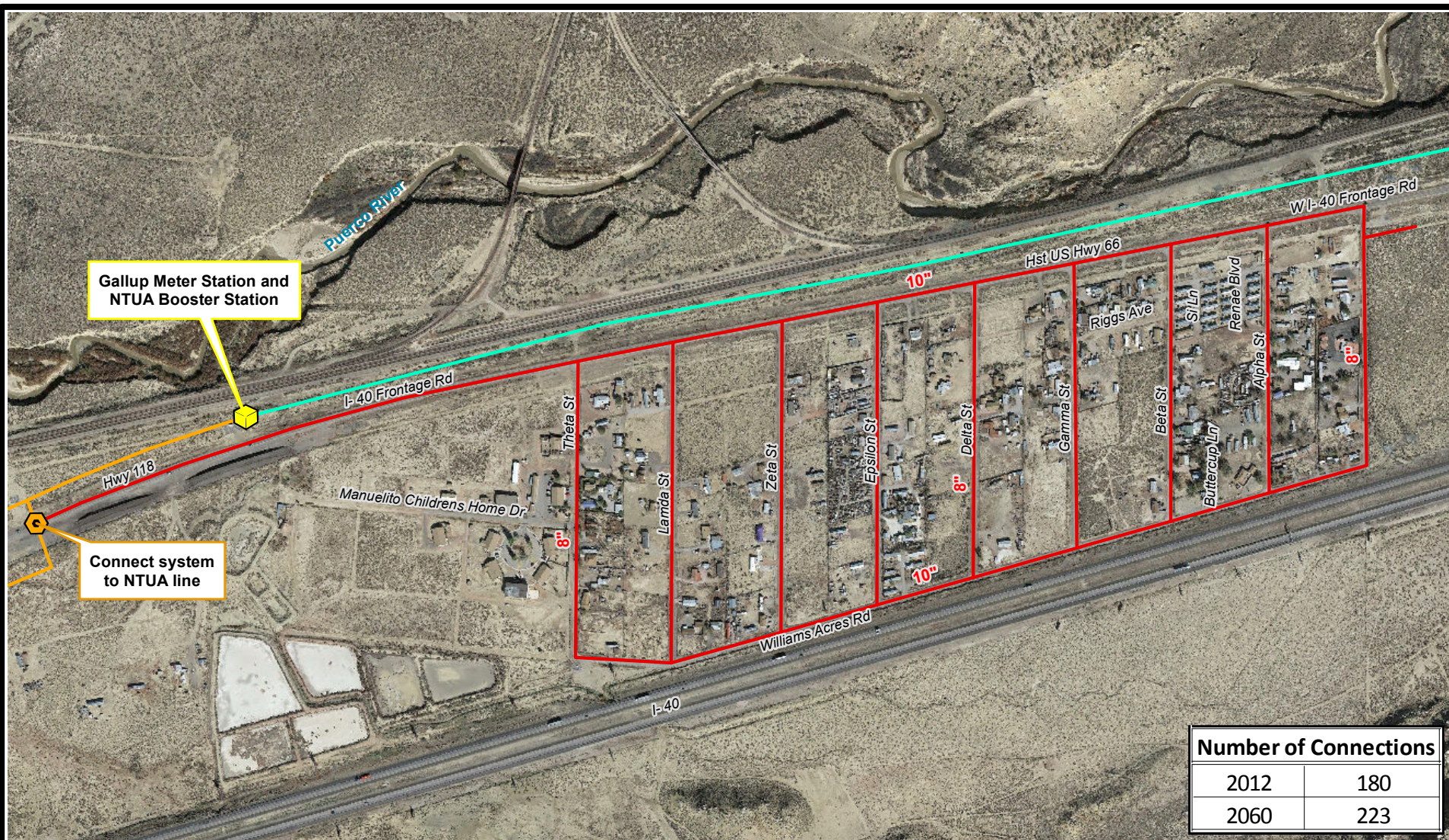
- ⬡ Booster station
- ⬡ Master meter



Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

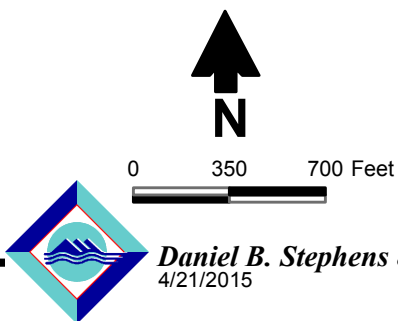
MCKINLEY COUNTY APPRAISAL INVESTIGATION William's Acres Proposed Water System Master Meter Alternative

Figure 11b



Number of Connections	
2012	180
2060	223

October 2012 aerial photograph from Google Earth



Explanation

- Proposed water system
(23,300 ft total pipe length)
- Navajo Gallup Water Supply Pipeline
water line (Reach 27.1)
- Navajo Tribal Utility Authority water
line

- Booster station
- Tie-in

Daniel B. Stephens & Associates, Inc.
4/21/2015 JN WR12.0084

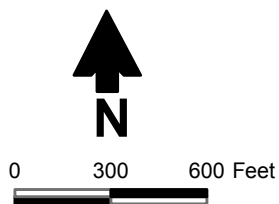
MCKINLEY COUNTY APPRAISAL INVESTIGATION Williams Acres Proposed Water System Preferred Alternative

Figure 11c

S:\PROJECTS\WR12.0084 MCKINLEY COUNTY\GIS\MXD\REPORT 1-2014\FIG12A YA TA HEY NO CONNECTIONS.MXD



October 2012 aerial photograph from Google Earth



Explanation

- Existing water line
(22,745 ft total pipe length)
- Emergency connection
- Supplemental well
- Water tank

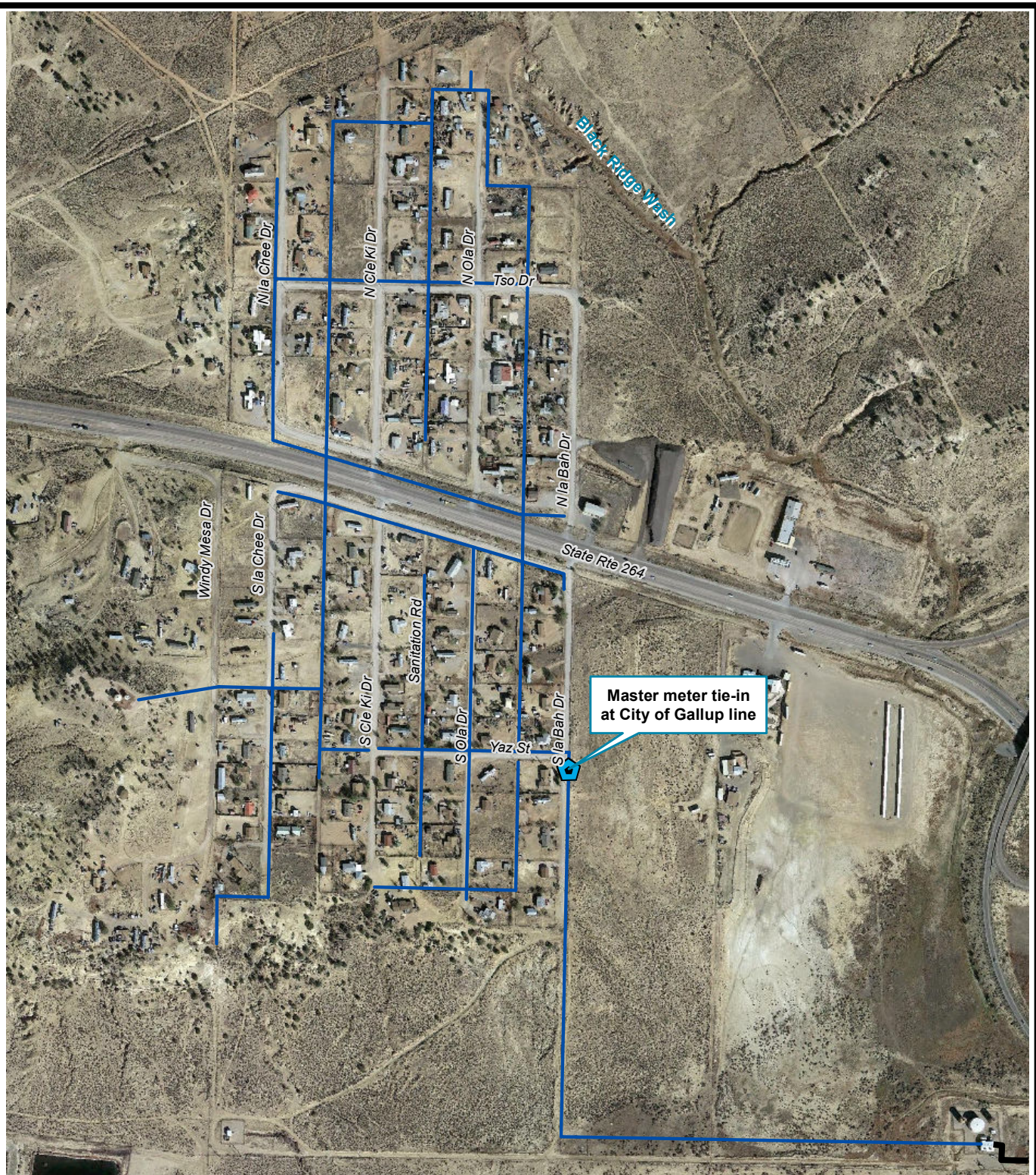


Daniel B. Stephens & Associates, Inc.
6/9/2015 JN WR12.0084

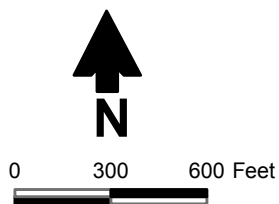
MCKINLEY COUNTY APPRAISAL INVESTIGATION Yah-Ta-Hey Water System No Action Alternative

Figure 12a

S:\PROJECTS\WR12.0084 MCKINLEY COUNTY\GIS\MXD\REPORT 1-2014\FIG12b YA TA HEY MASTER METER.MXD



October 2012 aerial photograph from Google Earth



Explanation

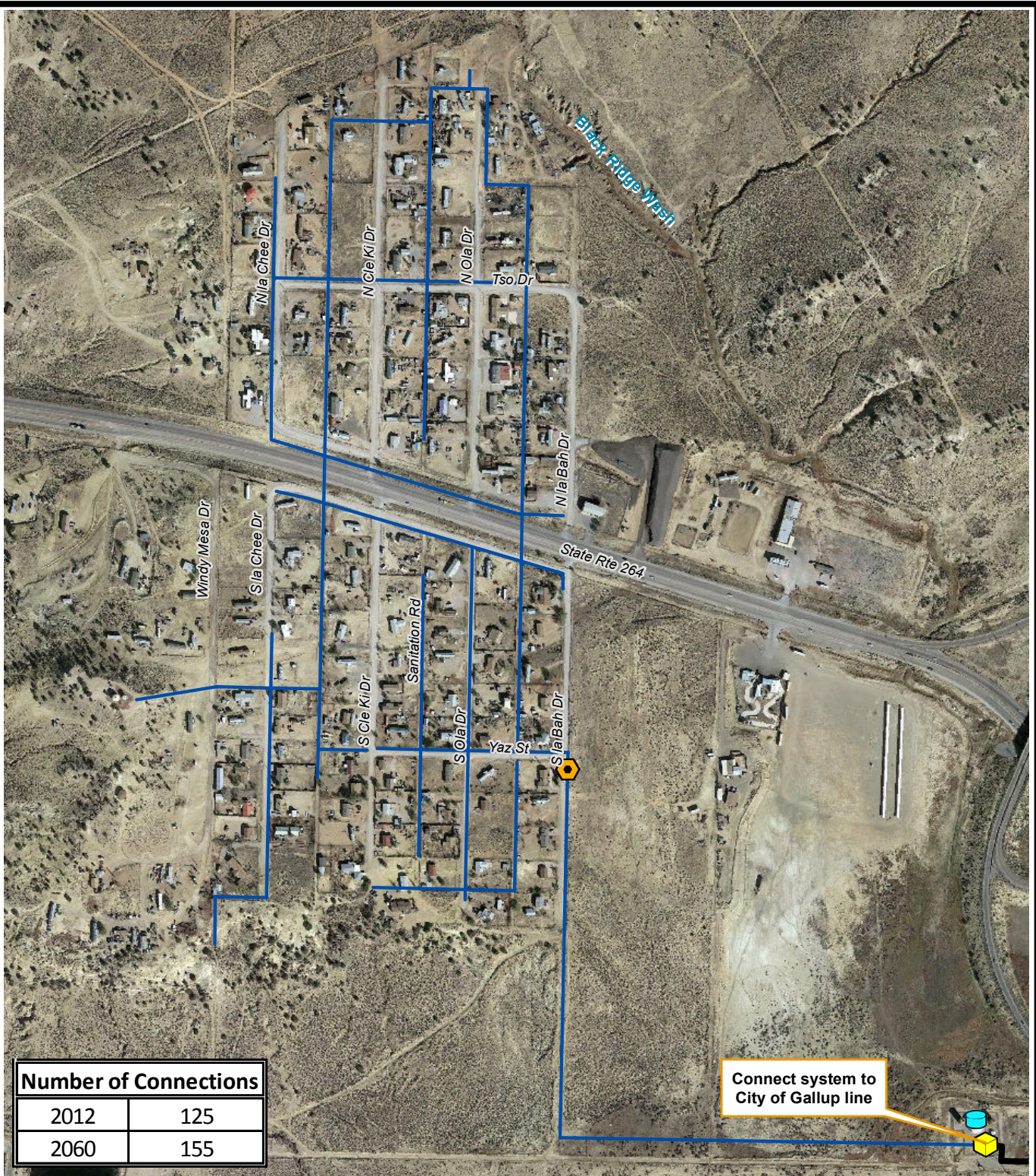
- Existing water line
(22,800 ft total pipe length)
- City of Gallup water line
- Master meter



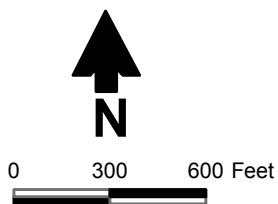
Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION Yah-Ta-Hey Water System Master Meter Alternative

Figure 12b



October 2012 aerial photograph from Google Earth



Explanation

- Existing water line
(22,800 ft total pipe length)
- City of Gallup water line
- ⬡ Tie-in
- ⬡ Booster station
- Water tank



Daniel B. Stephens & Associates, Inc.
4/21/2015 JN WR12.0084

**MCKINLEY COUNTY
APPRAISAL INVESTIGATION
Yah-Ta-Hey Water System
Preferred Alternative**

Figure 12c



5.6 Description of Alternatives for Non-System Communities

The specific details of the alternatives developed for each non-system community are provided in Sections 5.6.1 through 5.6.5.

5.6.1 Allison

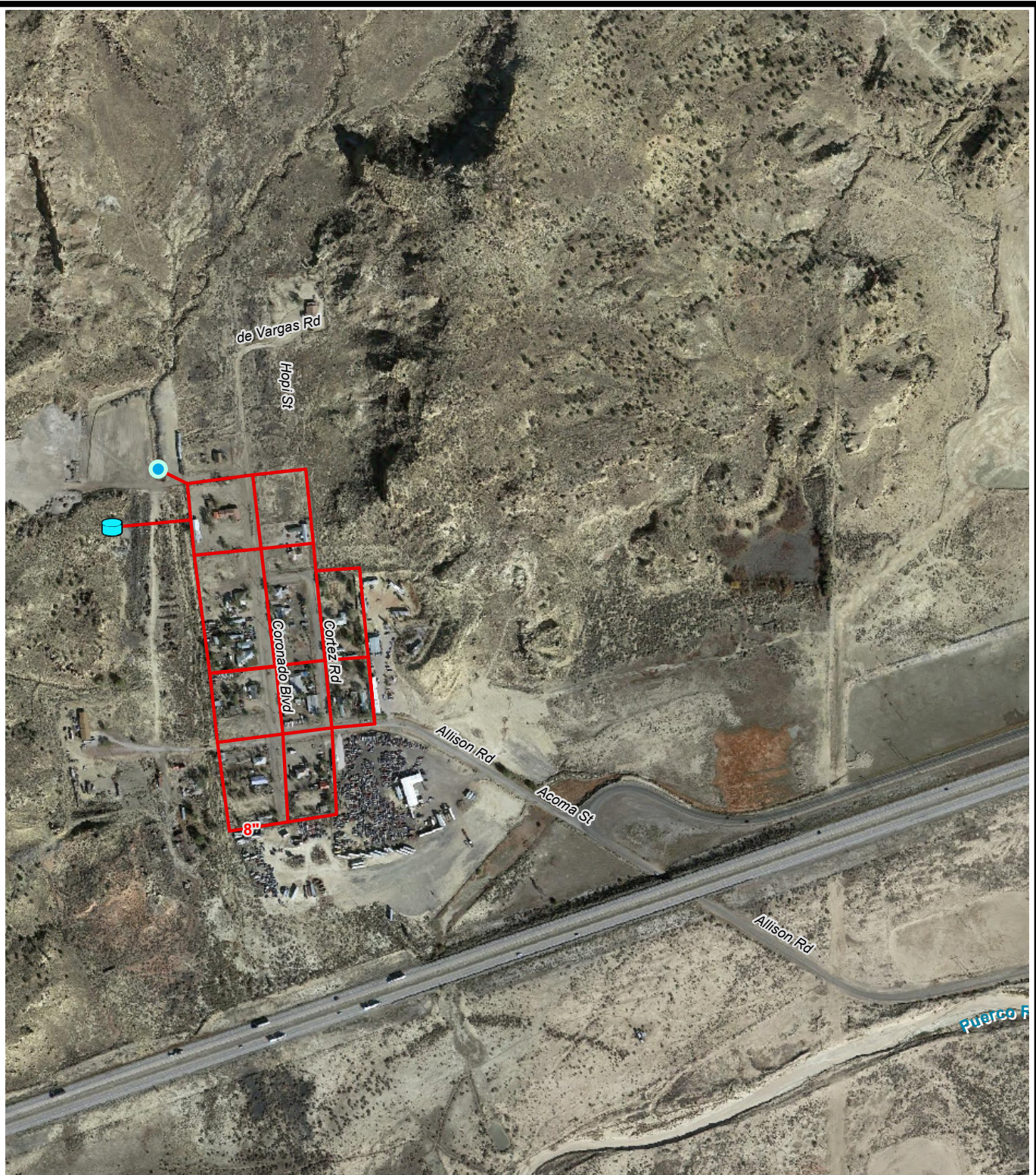
The community referred to as Alison is a 26-acre area located ½ mile from the City of Gallup municipal boundary. A survey conducted in 2013 identified approximately 31 existing homes that would require water service (DePauli, 2013b). Currently, these residences rely on domestic wells for water supply, some of which are likely shared by more than one home. OSE reports 17 domestic wells for the section that includes the Allison area (NM OSE, 2014).

In 1992 Allison residents had organized into the Allison Water Association (NMED, 2014), listing a total of 26 connections. A water right application was also filed in 1991, declaring 12 acre-feet for the water system and transferring the water rights into a new well that would be drilled. Supplemental documentation in the OSE files indicates that the transaction was canceled and that the owner had no intention of transferring the water rights to Allison (NM OSE, 2014). The NMED lists Allison as an inactive system (NMED, 2014).

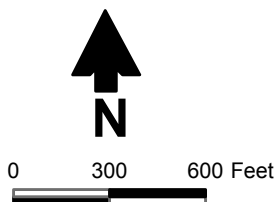
The installation for the no action (groundwater) alternative includes a new distribution system with 9,000 feet of 8-inch C-900 PVC water line to be buried in trenches 4 feet deep, a new water supply well to an assumed depth of 1,800 feet with a 3-horsepower pump to provide 10 gpm average supply, and a 170,000-gallon storage tank to provide a 2-day emergency supply, firefighting flows, and daily equalization for peak flows (Figure 13a). The distribution lines would be laid out along the existing roads with the new storage tank tentatively located on the hill to the west and the well on the lower ground nearby. Isolation valves were assumed to be placed every 500 feet of distribution line.

The master meter and connection alternatives (Figures 13b and 13c) use the same distribution system described above with an additional 1,600 feet of pipeline to the nearby NGWSP transmission line (Reach 27.3). Neither of these alternatives includes a storage tank, under the assumption that the supply from the NGWSP line is adequate for peak and fire flow demands.

S:\PROJECTS\WR12.0084 MCKINLEY COUNTY\GIS\MXD\REPORT 1-2014\FIG13a ALLISON NO CONNECTIONS.MXD



May 2012 aerial photograph from Google Earth



Explanation

- Proposed water system
(9,000 ft total pipe length)
- New well
- Water tank

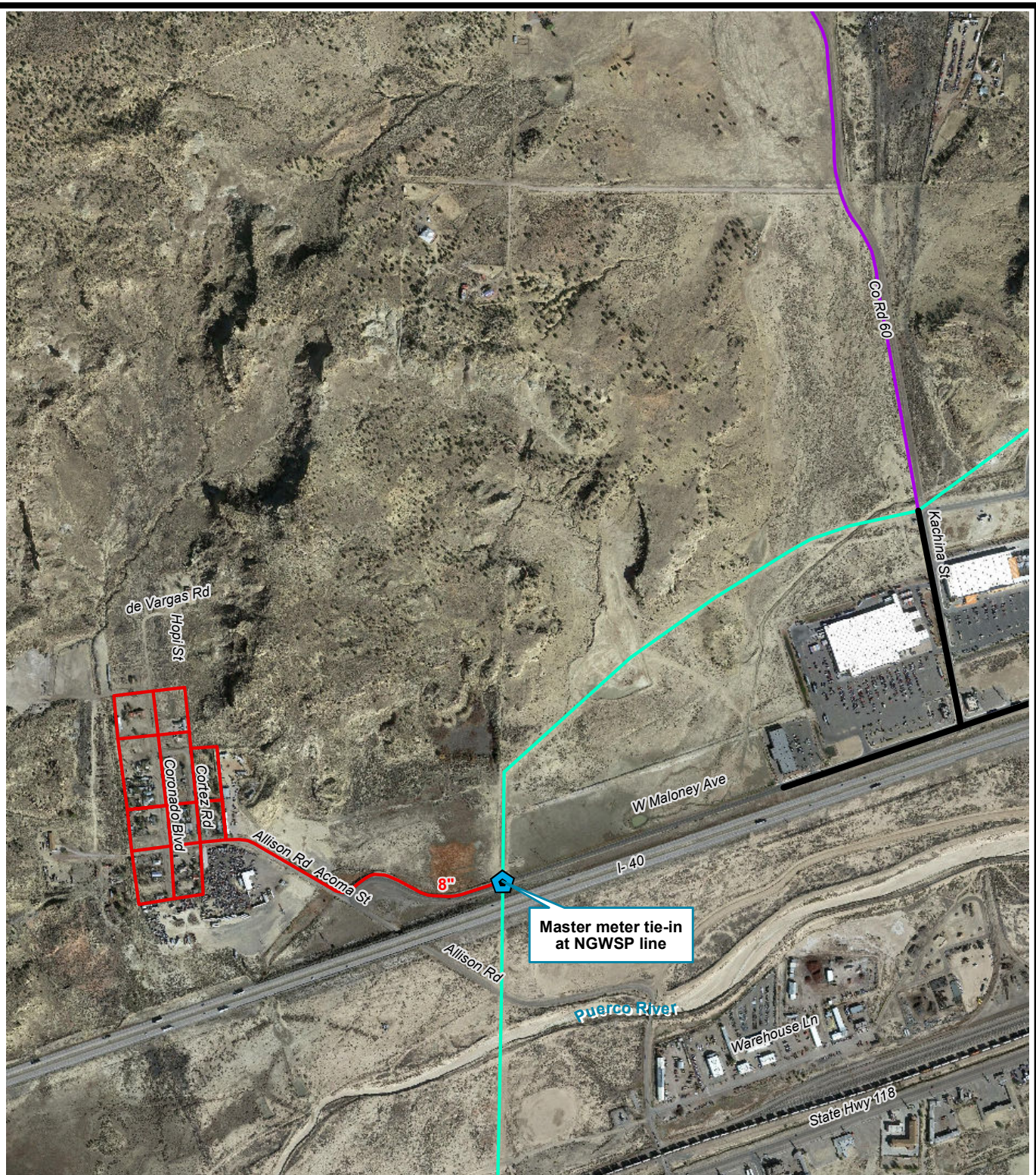


Daniel B. Stephens & Associates, Inc.
6/9/2015 JN WR12.0084

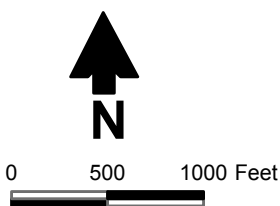
MCKINLEY COUNTY APPRAISAL INVESTIGATION **Allison Proposed Water System No Action Alternative**

Figure 13a

S:\PROJECTS\WR12.0084_MCKINLEY_COUNTY\GIS\MXD\REPORT_1-2014\FIG13b_ALLISON_MASTER_METER.MXD



May 2012 aerial photograph from Google Earth



Explanation

- Proposed water system
(10,600 ft total pipe length)
- NGWSP water line (Reach 27.3)
- Proposed NGWSP water line (Reach 27.9)
- City of Gallup water line
- Master meter

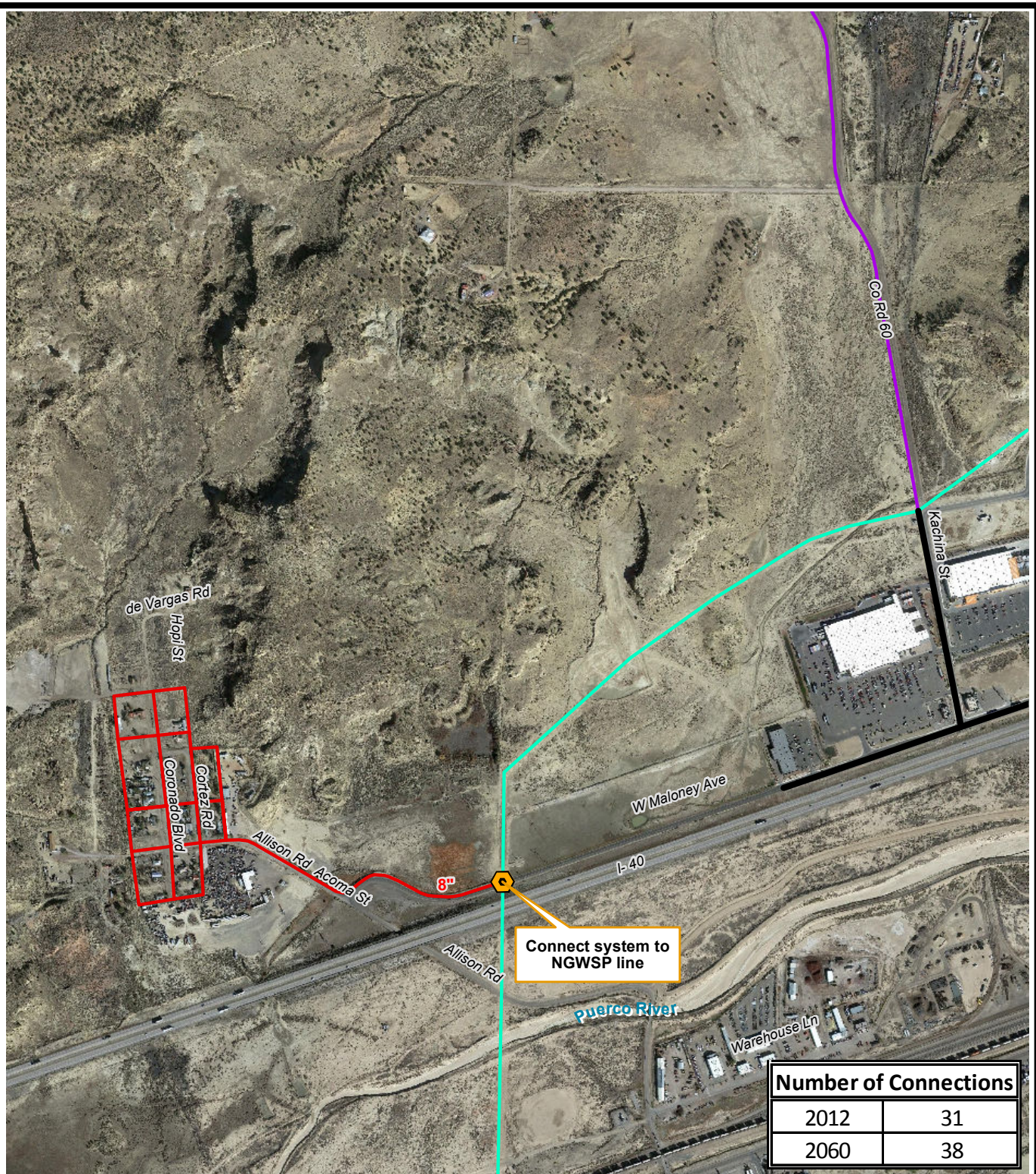


Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION Allison Proposed Water System Master Meter Alternative

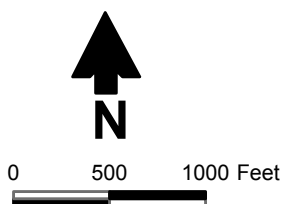
Figure 13b

S:\PROJECTS\WR12.0084 MCKINLEY COUNTY\GIS\MXD\APPRAISAL REPORT\FIG13C ALLISON CONNECTION.MXD



Number of Connections	
2012	31
2060	38

May 2012 aerial photograph from Google Earth



Explanation

- Proposed water system (10,600 ft total pipe length)
- Navajo Gallup Water Supply Pipeline water line (Reach 27.3)
- Proposed Navajo Gallup Water Supply Pipeline water line (Reach 27.9)

- City of Gallup water line
- Tie-in



Daniel B. Stephens & Associates, Inc.
4/21/2015 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION Allison Proposed Water System Preferred Alternative

Figure 13c



The master meter alternative would include an 8-inch totalizing meter and vault installed near the connection to the NGWSP line.

All three alternatives include a tap, meter, and vault for each service connection in the community. An estimated eight fire hydrants were also included for the Allison design based on a 400-foot radius between each hydrant.

5.6.2 Catalpa

The Catalpa area is located ½ mile south of the Gallup municipal boundary. The area includes an estimated 97 homes located on 4-acre lots within approximately a 1-square mile area. The OSE lists 27 domestic wells totaling 51 acre-feet in water rights drilled between 1981 and 2009.

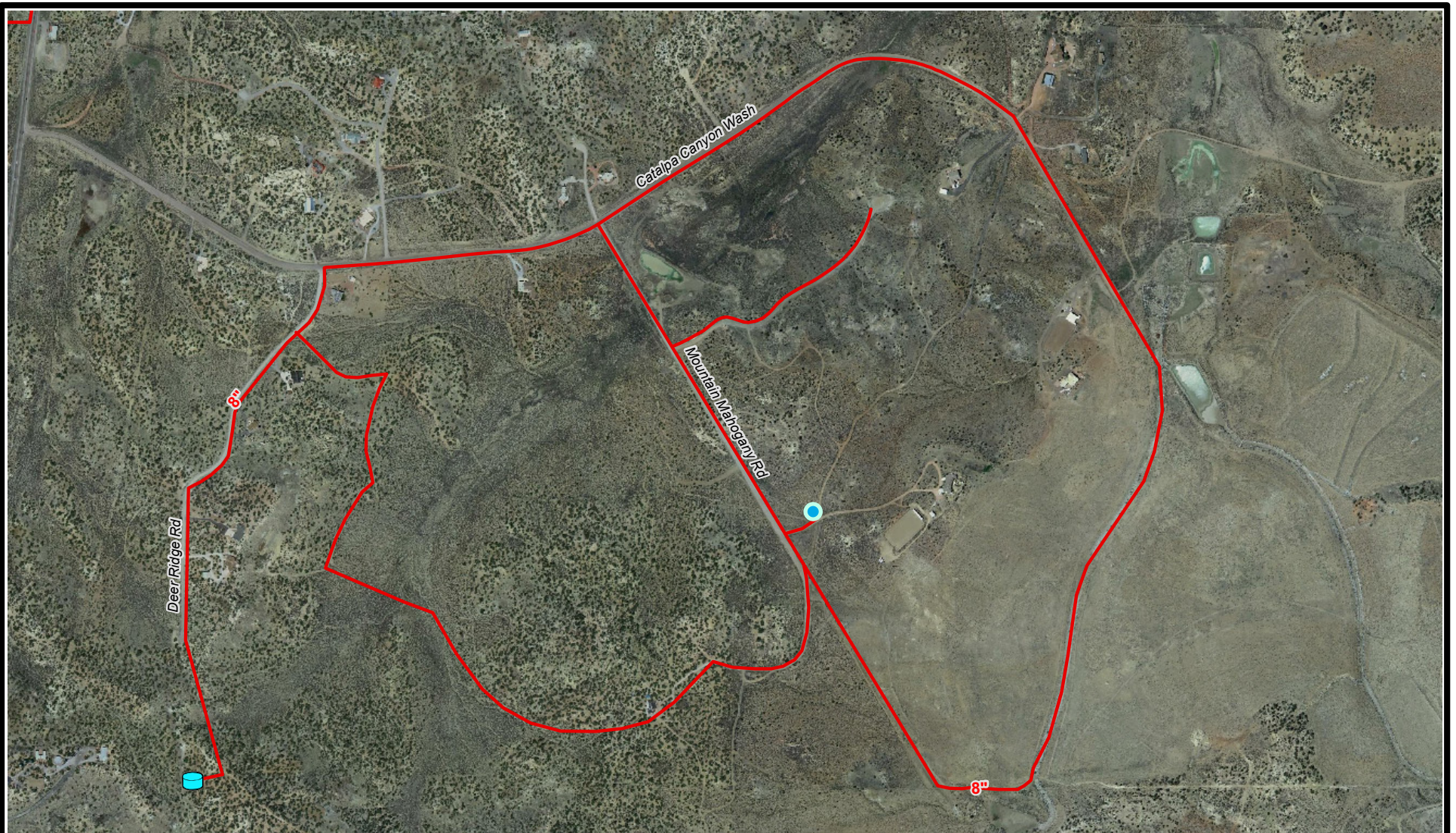
The Catalpa Hills community has the second longest distribution system design, with 28,500 feet of new 8-inch C-900 PVC pipeline to be installed for the no action alternative (Figure 14a). The length of new distribution line is slightly less for the master meter alternative (27,000 feet) and lowest for the connection alternative (21,000 feet) (Figures 14b and 14c).

The connection alternative would include three connection points to the proposed NGWSP Reach 27.12 along Catalpa Canyon Wash Road, reducing the necessary pipeline for this alternative compared to the other two alternatives. The distribution system for each alternative would include 23 fire hydrants, 120 service connections, and at least 44 isolation valves. The master meter alternative would also include an 8-inch totalizing flow meter and vault in the far northeast connection point to the NGWSP transmission line.

The storage tank for the no action alternative is designed to be 170,000 gallons and would be located at the far west end of the system. The 1,800-foot-deep well would be centrally located and would feed 22 gpm directly into the distribution system using a 10-horsepower pump.

5.6.3 Cipriano Lewis

The community referred to as Cipriano Lewis has 27 homes located within a 109-acre area close to the City of Gallup. OSE records show 8 domestic wells with 21 acre-feet of water rights for this community. The wells were drilled between 1983 and 2012 (NM OSE, 2014).



May 2012 aerial photograph from Google Earth



0 500 1000 Feet

Explanation

— Proposed water system
(28,500 ft total pipe length)

● New well

○ Water tank

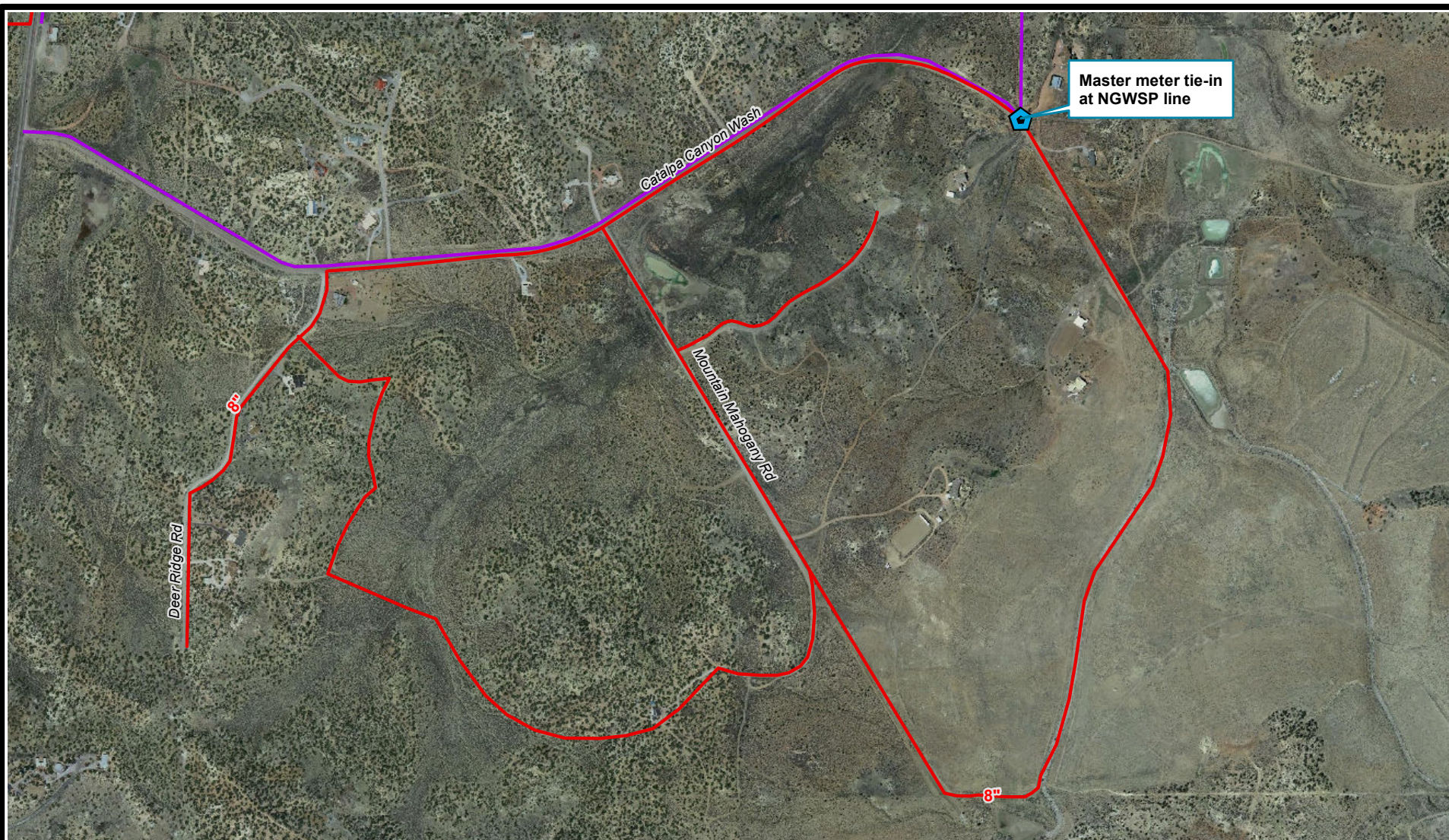


Daniel B. Stephens & Associates, Inc.
6/9/2015 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION

Catalpa Proposed Water System No Action Alternative

Figure 14a



May 2012 aerial photograph from Google Earth



0 500 1000 Feet

Explanation

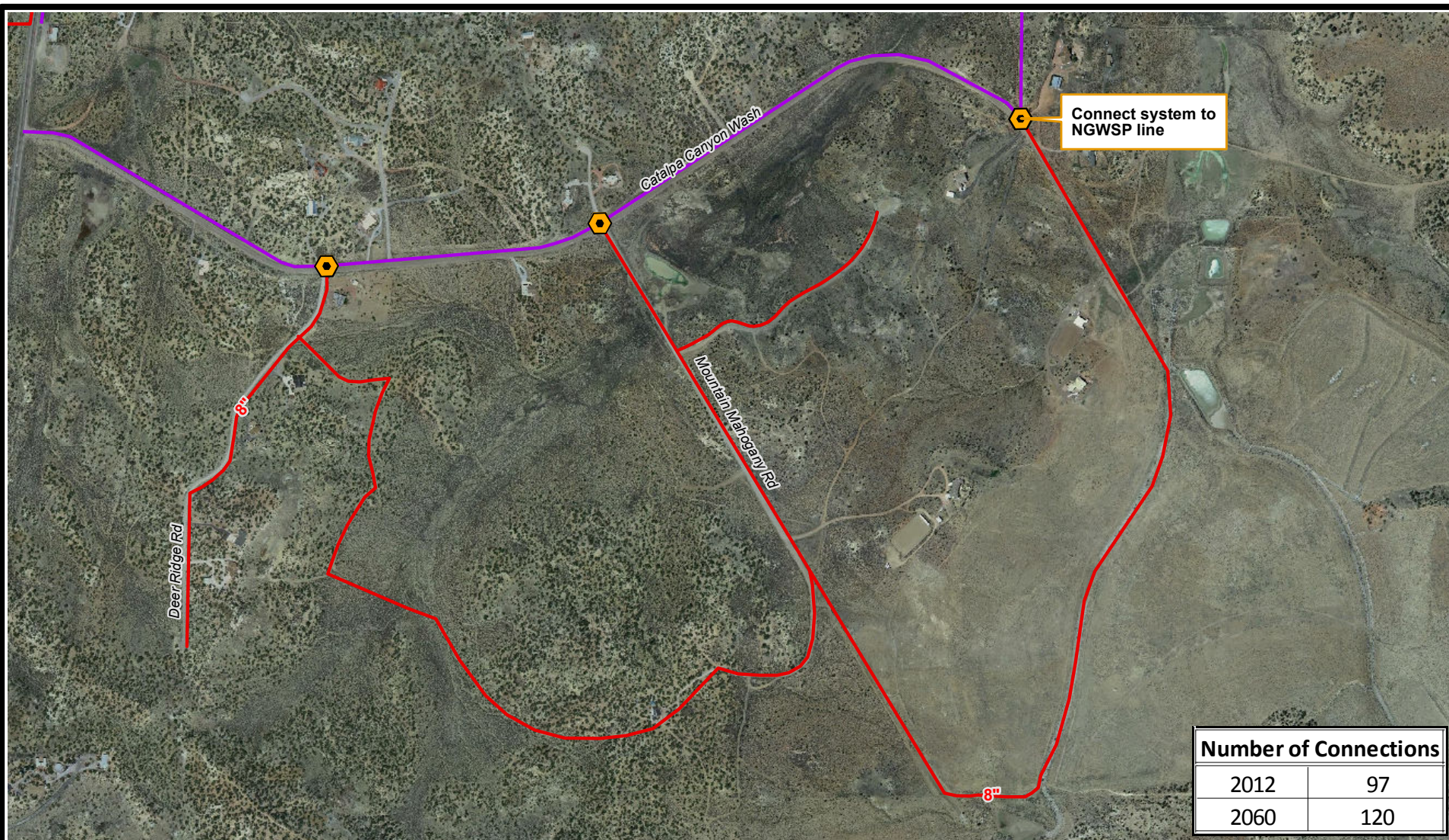
- Proposed water system
(27,000 ft total pipe length)
- Proposed NGWSP water line (Reach 27.12)
- ⬠ Master meter



Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION Catalpa Proposed Water System Master Meter Alternative

Figure 14b



Number of Connections	
2012	97
2060	120

May 2012 aerial photograph from Google Earth



0 500 1000 Feet

Explanation

- Proposed water system
(21,800 ft total pipe length)
- Proposed Navajo Gallup Water Supply
Pipeline water line (Reach 27.12)
- ⬡ Tie-in



Daniel B. Stephens & Associates, Inc.
4/21/2015 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION Catalpa Proposed Water System Preferred Alternative

Figure 14c



The no action alternative would involve installation of a new groundwater well to a depth of 1,800 feet and a 140,000-gallon storage tank, both located off the stretch of South Carat Street (Figure 15a). A 5-horsepower pump would be installed in the well to provide an average supply of about 10 gpm.

The proposed connection point for the master meter and connection alternatives for Cipriano Lewis is to the NGWSP Reach 27.12 distribution line shown on Figures 15b and 15c. For all three alternatives the distribution system would include 9,800 feet of buried C-900 PVC pipeline along with 17 fire hydrants and 33 service connections with meters and vaults. The preliminary layout includes up to 20 isolation valves. The master meter connection would consist of an 8-inch totalizing meter and vault.

5.6.4 Crestview

Domestic wells are the current source of water supply for the 97 homes located in the Crestview subdivision. This community, located 1 mile southwest of Gallup has ½ acre lots. The OSE lists 35 domestic wells with 82 acre-feet of water rights.

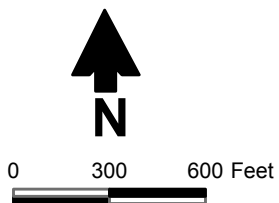
The no action alternative (Figure 16a) would require 21,200 feet of new distribution line. A new supply well in the west central part of the system with a 10-horsepower pump would provide 20 gpm to the community. The storage tank for the no action alternative is proposed to be placed to the southwest corner of the system and is sized at 170,000 gallons for the three required storage components of a 2-day emergency supply, daily equalization for peak flows, and fire flows.

For the master meter and connection alternatives the Crestview community would connect to existing NGWSP transmission line Reach 27.3, located north of the community along Crest View Road near I-40 (Figures 16b and 16c). This new line installation would total 21,700 feet of 8-inch C-900 PVC water line with 43 new isolation valves and 29 fire hydrants. The 8-inch totalizing meter and vault for the master meter alternative would be installed at the connection point near I-40.

S:\PROJECTS\WR12.0084_MCKINLEY_COUNTY\GIS\MXD\REPORT_1-2014\FIG15A_CIPRIANO_LEWIS_NO_CONNECTIONS.MXD



May 2012 aerial photograph from Google Earth



Explanation

- Proposed water system
(9,800 ft total pipe length)
- New well
- Water tank



Daniel B. Stephens & Associates, Inc.
6/9/2015 JN WR12.0084

**MCKINLEY COUNTY
APPRAISAL INVESTIGATION
Cipriano Lewis
Proposed Water System
No Action Alternative**

Figure 15a

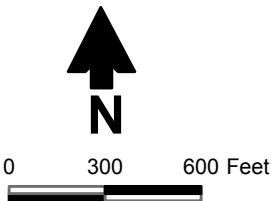
S:\PROJECTS\WR12.0084_MCKINLEY_COUNTY\GIS\MXDS\REPORT_1-2014\FIG15B_CIPRIANO_LEWIS_MASTER_METER.MXD



May 2012 aerial photograph from Google Earth

Explanation

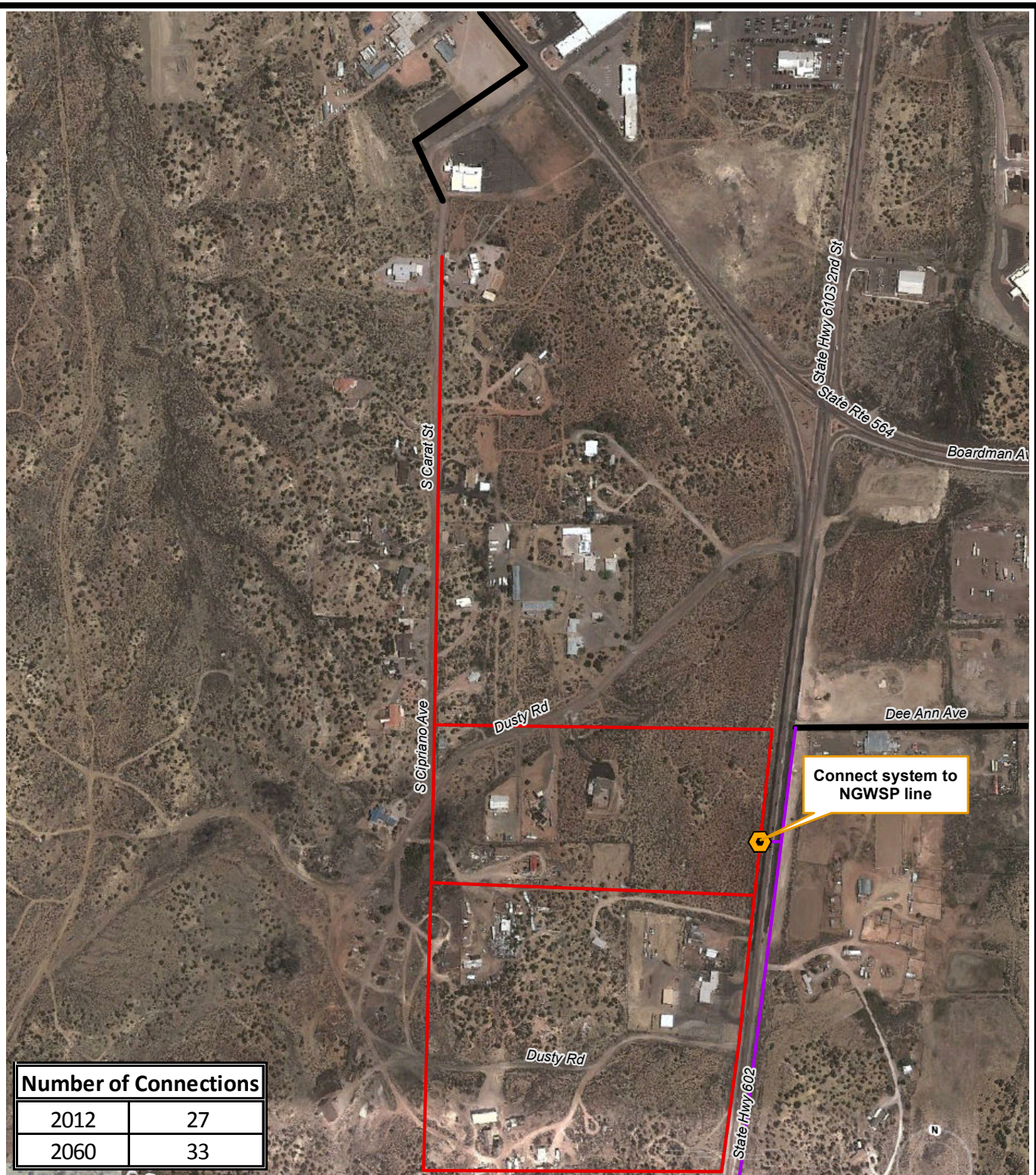
- Proposed water system
(9,800 ft total pipe length)
- City of Gallup water line
- Proposed NGWSP
water line (Reach 27.12)
- Master meter



Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

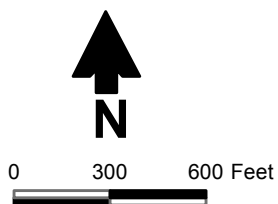
MCKINLEY COUNTY APPRAISAL INVESTIGATION **Cipriano Lewis** **Proposed Water System** **Master Meter Alternative**

Figure 15b



May 2012 aerial photograph from Google Earth

Number of Connections	
2012	27
2060	33



Explanation

- Proposed water system
(9,800 ft total pipe length)
- City of Gallup water line
- Proposed Navajo Gallup Water Supply Pipeline
water line (Reach 27.12)
- ⬡ Tie-in

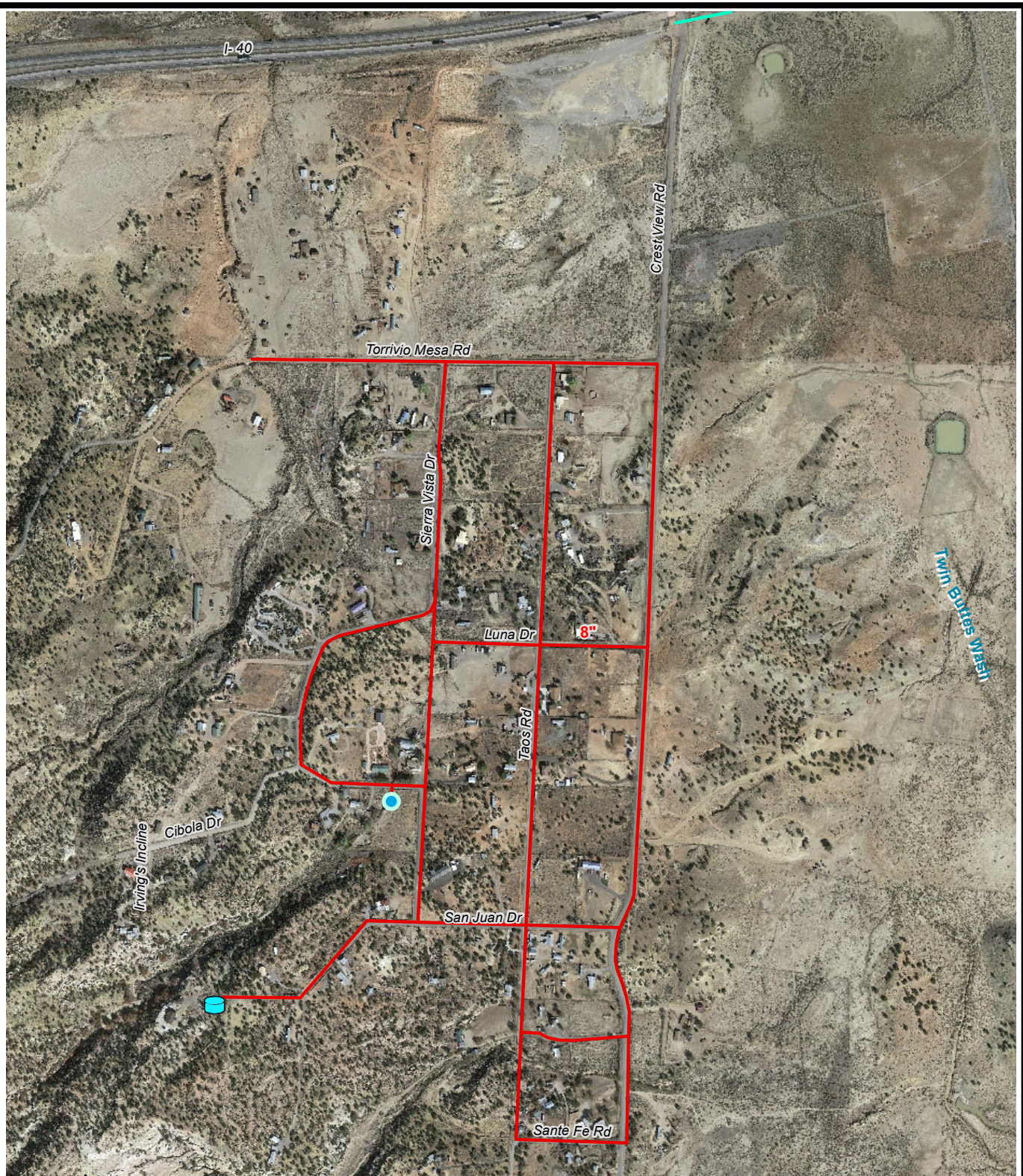


Daniel B. Stephens & Associates, Inc.
4/21/2015 JN WR12.0084

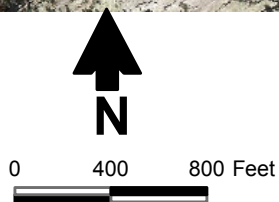
MCKINLEY COUNTY
APPRAISAL INVESTIGATION
Cipriano Lewis
Proposed Water System
Preferred Alternative

Figure 15c

S:\PROJECTS\WR12.0084 MCKINLEY COUNTY\GIS\MXD\REPORT 1-2014\FIG16a_CRESTVIEW_NO_CONNECTIONS.MXD



October 2012 aerial photograph from Google Earth



Explanation

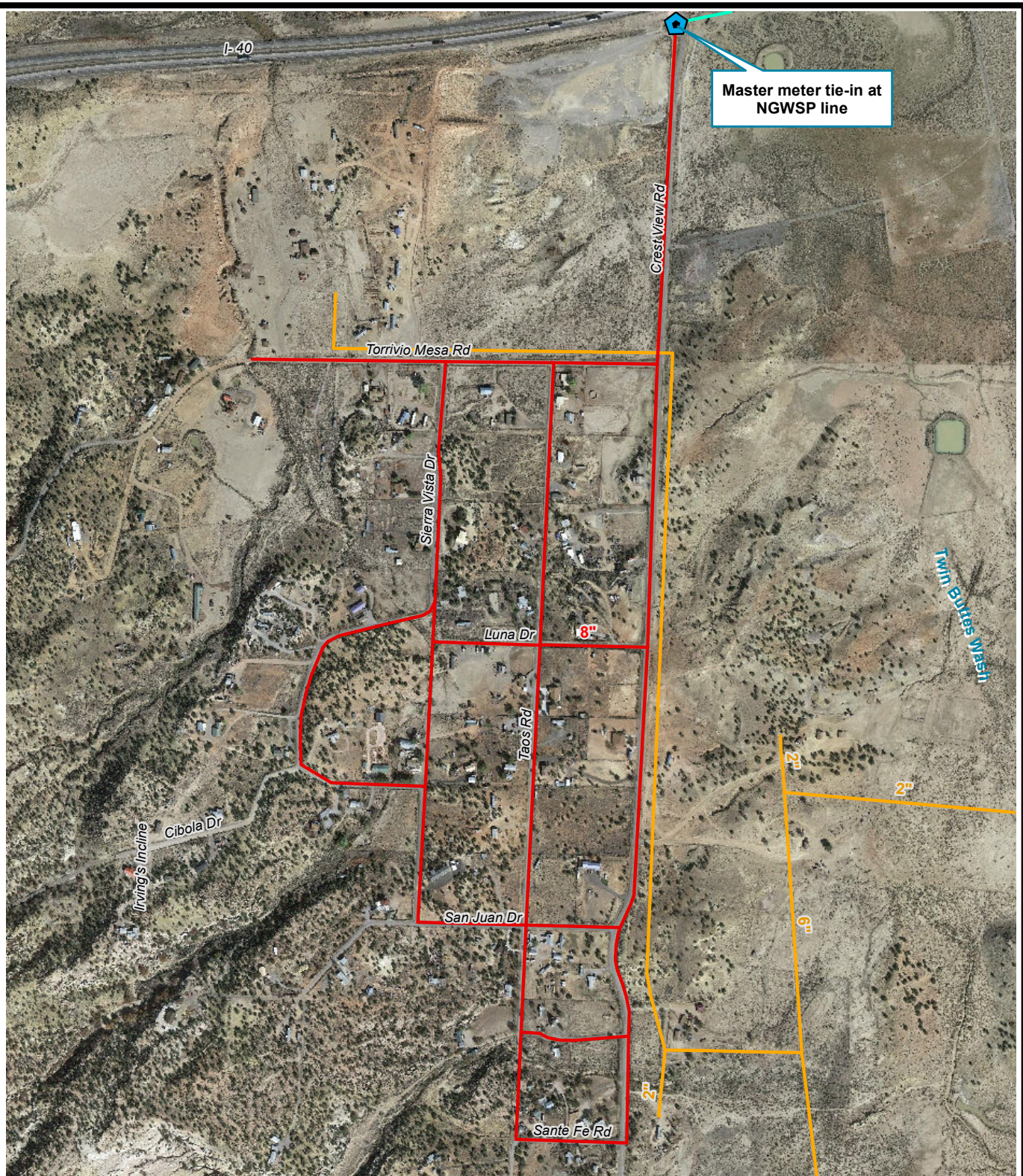
- Proposed water system
(21,200 ft total pipe length)
- Existing NGWSP water line (Reach 27.3)
- Well
- Water tank



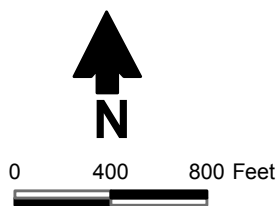
Daniel B. Stephens & Associates, Inc.
6/9/2015 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION **Crestview Proposed Water System No Action Alternative**

Figure 16a



October 2012 aerial photograph from Google Earth



Explanation

- Proposed water system
(21,700 ft total pipe length)
- Existing NGWSP water line (Reach 27.3)
- Existing NTUA water line
- ⬠ Master meter

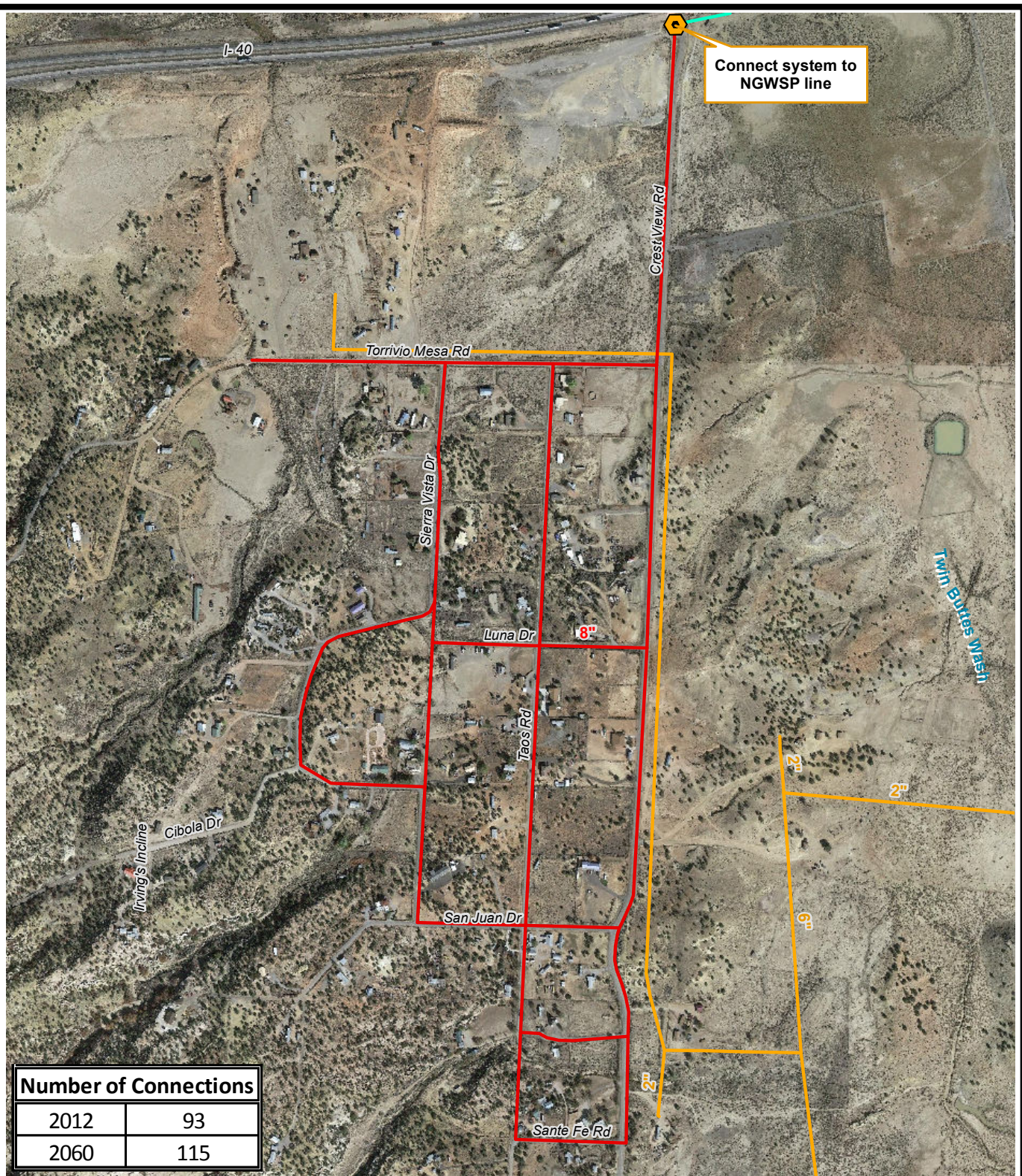


Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

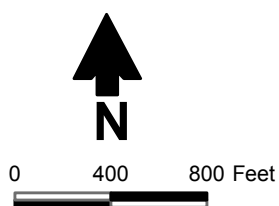
MCKINLEY COUNTY APPRAISAL INVESTIGATION **Crestview Proposed Water System Master Meter Alternative**

Figure 16b

S:\PROJECTS\WR12.0084 MCKINLEY COUNTY\GIS\MXDS\APPRAISAL_REPORT\FIG16C_CRESTVIEW_CONNECTIONS.MXD



October 2012 aerial photograph from Google Earth



Explanation

- Proposed water system (21,700 ft total pipe length)
- Existing Navajo Gallup Water Supply Pipeline water line (Reach 27.3)

- Existing Navajo Tribal Utility Authority water line



Tie-in



Daniel B. Stephens & Associates, Inc.
4/21/2015 JN WR12.0084

MCKINLEY COUNTY APPRAISAL INVESTIGATION Crestview Proposed Water System Preferred Alternative

Figure 16c



5.6.5 Twin Buttes

The community of Twin Buttes is located 1 mile southwest of Gallup not far from Crestview. Twin Buttes homes are located on ½-acre lots served by domestic wells. The OSE lists a total of 22 domestic wells with 51 acre-feet of water rights in this area.

The no action alternative for Twin Buttes (Figure 17a) would involve the largest installation of new 8-inch C-900 PVC pipeline (28,700 feet) among the ten communities and would include 57 isolation valves and 26 fire hydrants. The no action alternative includes a new 1,800-foot-deep well with a 5-horsepower pump to provide 15 gpm. The storage tank would be 150,000 gallons and is proposed to be installed near the northwest corner of the system.

The master meter and connection alternatives (Figures 17b and 17c) would involve installation of 27,700 feet of new pipeline that would connect to the existing NGWSP Reach 27.3 transmission line coming west off of Rollie Road. This installation would require 56 isolation valves and 26 fire hydrants.

S:\PROJECTS\WR12.0084_MCKINLEY_COUNTY\GIS\MXD\REPORT_1-2014\FIG17A_TWIN BUTTES_DS_NO_CONNECTIONS.MXD



0 500 1000 Feet

Explanation

Proposed water system
(28,700 ft total pipe length)

Well

Water tank



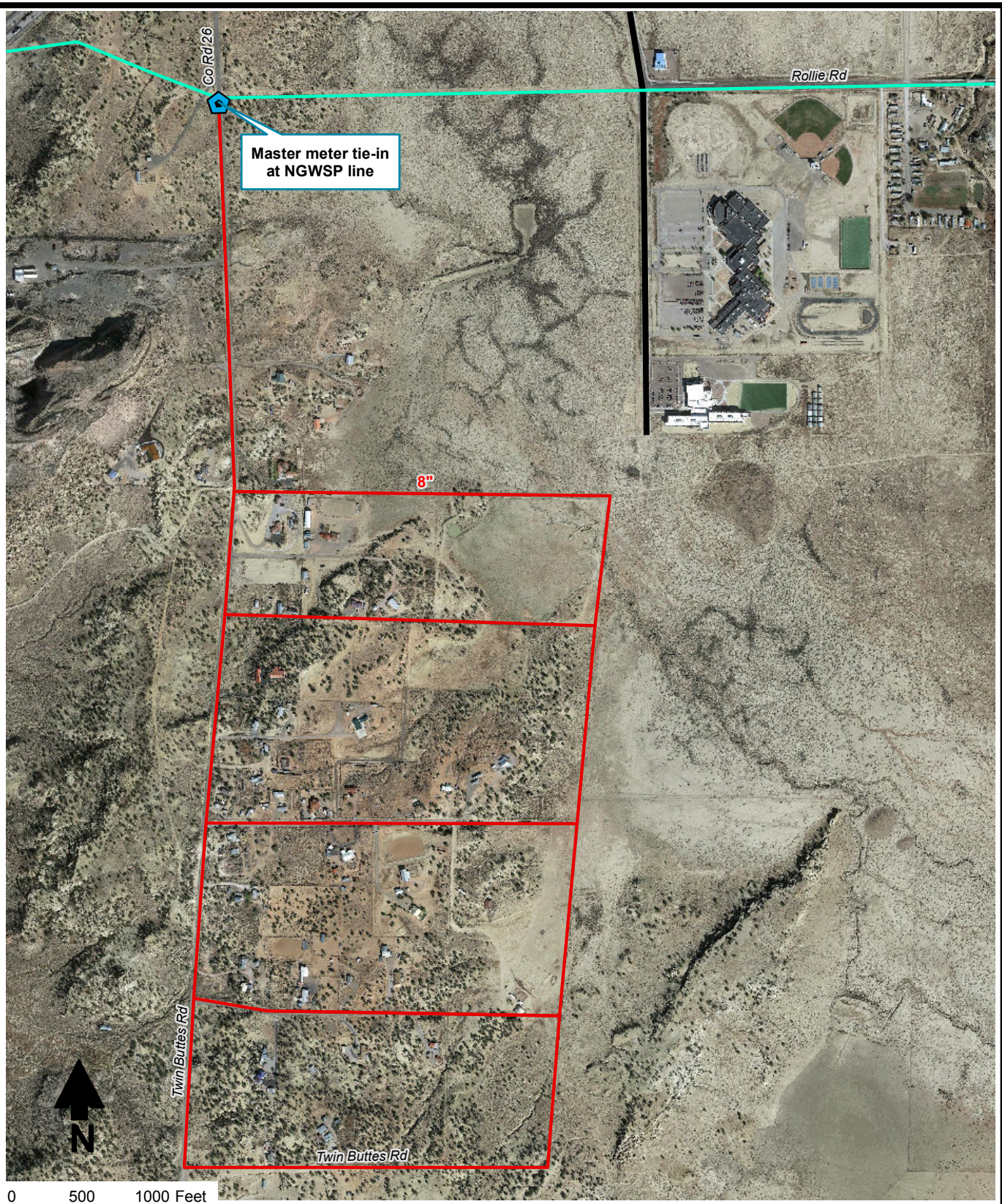
Daniel B. Stephens & Associates, Inc.
6/9/2015 JN WR12.0084

October 2012 aerial photograph from Google Earth

MCKINLEY COUNTY APPRAISAL INVESTIGATION **Twin Buttes** **Proposed Water System** **No Action Alternative**

Figure 17a

S:\PROJECTS\WR12.0084_MCKINLEY_COUNTY\GIS\MXD\REPORT_1-2014\FIG17b_TWIN BUTTES_DS_MASTER_METER.MXD



0 500 1000 Feet



Explanation

— Proposed water system (27,700)

NGWSP

water line (Reach 27.3)

— City of Gallup water line

Master meter

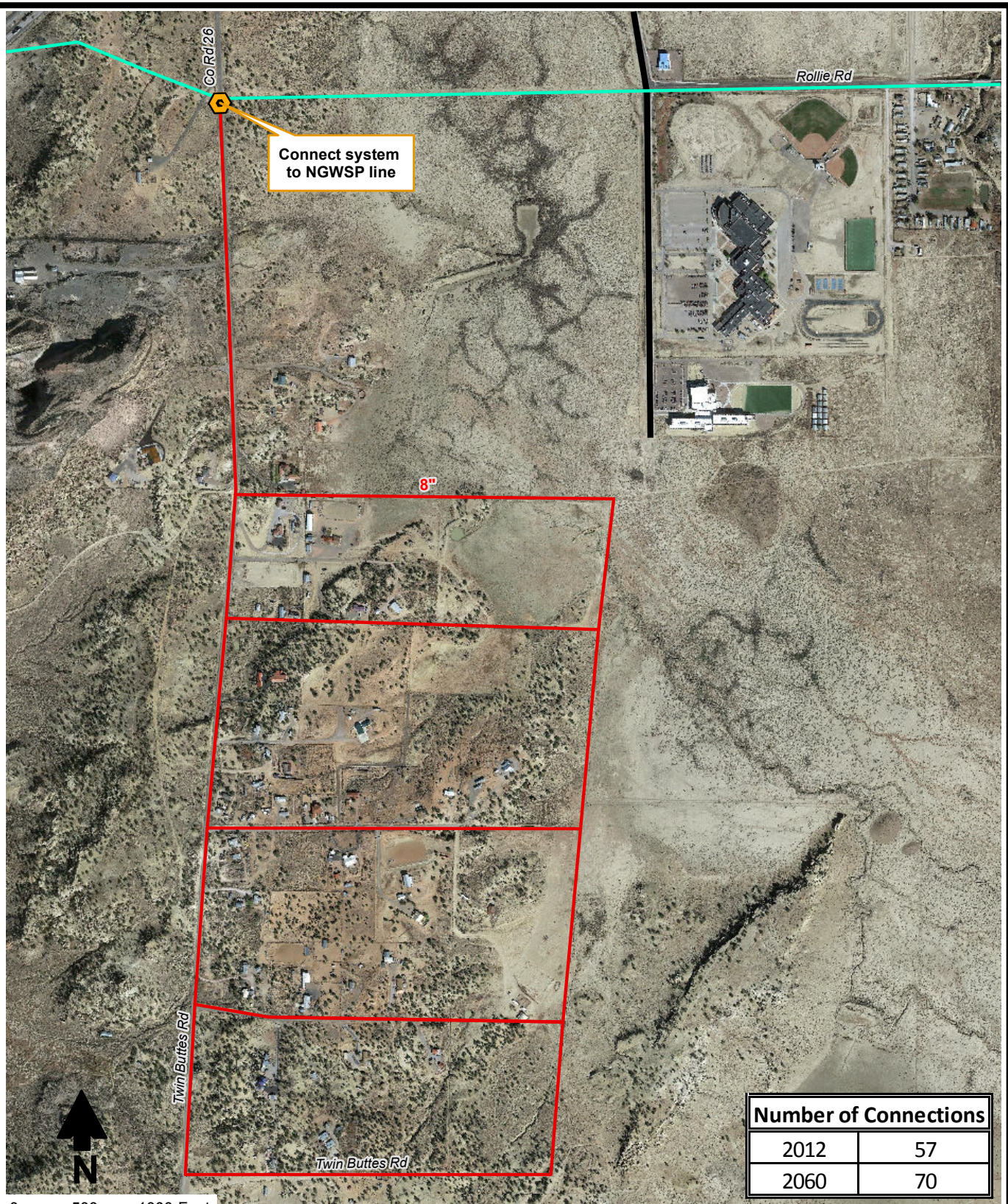
Daniel B. Stephens & Associates, Inc.
1/24/2014 JN WR12.0084

October 2012 aerial photograph from Google Earth

**MCKINLEY COUNTY
APPRAISAL INVESTIGATION
Twin Buttes
Proposed Water System
Master Meter Alternative**

Figure 17b

S:\PROJECTS\WR12.0084_MCKINLEY_COUNTY\GIS\MXDS\APPRAISAL_REPORT\FIG17C_TWIN_BUTTES_DS_CONNECTIONS.MXD



0 500 1000 Feet

Explanation

- Proposed water system (27,700)
- Navajo Gallup Water Supply Pipeline water line (Reach 27.3)

City of Gallup water line



Tie-in



Daniel B. Stephens & Associates, Inc.
4/21/2015 JN WR12.0084

October 2012 aerial photograph from Google Earth

**MCKINLEY COUNTY
APPRAISAL INVESTIGATION
Twin Buttes
Proposed Water System
Preferred Alternative**

Figure 17c



6. Cost Analysis

DBS&A developed a Level 4 (appraisal level) cost analysis guided by Reclamation and EPA costing guidelines for small, rural water systems (USBR, 2013; USACE and U.S. EPA, 2000). The cost estimates take into account recent bids for local projects, RS Means data (2013), budget-level quotes, City of Albuquerque Cost Guide, and professional judgment.

The costs estimates used for the project are based on the 2060 estimated future demand. However, costs were also developed for the full build-out demand as well and are included in Appendix A for reference.

Operations and maintenance cost data were developed using recent EPA data for small water systems (U.S. EPA, 2006) as well as input from the systems. Typical costs include those for chemicals, maintenance and replacement of different components, and electricity, costs for an operator, general administrative costs, and contingency costs. The recurring capital costs are based on the costs to replace well pumps and rehabilitate storage tanks as needed in the particular alternatives. Routine maintenance costs for pipe repair, valve replacement, and other routine items are not included in the present value calculation, but are included in the annual operations and maintenance estimates.

A present value calculation was completed to compare the alternatives. The capital costs are in 2013 dollars and a real discount rate from the Water Resources Development Act (WRDA) of 3.75 percent for 2013 (USACE, 2012) was carried out to 20 years. (Even though the population projections go to 2060, a present worth calculation beyond 20 years is not standard engineering practice.) No escalation factor was included and no adjustments were made for any delay between the time of this estimate and actual construction.

A summary of the completed estimates for capital costs and operation and maintenance costs for the 2060 population is provided in Table 16. Details of the completed cost estimates, for both 2060 population and full build-out, are provided in Appendix A.

A preliminary cost for a solar energy system was calculated for each system based on the annual kilowatt-hours needed for the groundwater well pump in the no action alternative.



Table 16. Summary of Costs for Small Systems Alternatives
Page 1 of 2

System	Category	Description	Initial Capital Cost (\$)	Annual O&M or Household Water Cost (\$)	Life Cycle Cost Period	Total Present Worth (\$)
Allison	No action	Continue relying on individual wells	—	—	—	—
	No connection	Drill community well and reactivate water system.	2,237,000	71,000	20	3,376,000
	Master meter	Connect to NGWSP line and master meter.	775,000	105,000	20	2,388,000
	Connection	Connect to NGWSP line and individual meters.	713,000	414	20	722,000
Catalpa Hills	No action	Continue relying on individual wells	—	—	—	—
	No connection	Drill community well and form water system.	3,534,000	99,000	20	5,110,000
	Master meter	Connect to proposed NGWSP line and master meter.	1,695,000	81,000	20	2,934,000
	Connection	Connect to proposed NGWSP line and individual meter.	1,647,000	414	20	1,656,000
Cipriano Lewis	No action	Continue relying on individual wells	—	—	—	—
	No connection	Drill community well and form water system.	2,326,000	72,000	20	3,475,000
	Master meter	Connect to City of Gallup and master meter.	1,307,000	113,000	20	3,047,000
	Connection	Connect to City of Gallup line and individual meters.	727,000	414	20	736,000
Coal Basin Water Association	No action	Continue relying on system wells	—	—	—	—
	No connection	Drill supplemental well.	1,832,000	63,000	20	2,845,000
	Master meter	Replace emergency connection with master meter.	195,000	55,000	20	1,039,000
	Connection	Connect to City of Gallup and individual meters.	355,000	414	20	364,000
Crestview	No action	Continue relying on individual wells	—	—	—	—
	No connection	Drill community well and form water system.	3,184,000	92,000	20	4,638,000
	Master meter	Connect with NTUA line and master meter.	1,712,000	113,000	20	3,047,000
	Connection	Connect with NTUA and individual meters.	1,651,000	414	20	1,660,000

^a Detailed costs for each system/alternative, along with assumptions and references, are provided in Appendix A.

O&M = Operation and maintenance
— = No new costs incurred
NGWSP = Navajo-Gallup Water Supply Project

NTUA = Navajo Tribal Utility Authority
W&SD = Water and sanitation district
MDWUA = Mutual domestic water users association



Table 16. Summary of Costs for Small Systems Alternatives
Page 2 of 2

System	Category	Description	Initial Capital Cost (\$)	Annual O&M or Household Water Cost (\$)	Life Cycle Cost Period	Total Present Worth (\$)
Gamerco W&SD	No action	Continue receiving service from City of Gallup under receivership	—	—	—	—
	No connection	Redrill permitted supplemental well.	2,823,000	146,000	20	5,120,000
	Master meter	Replace emergency connection with master meter.	385,000	102,000	20	1,951,000
	Connection	Connect to City of Gallup and individual meters.	366,152	414	20	374,000
Twin Buttes	No action	Continue relying on individual wells	—	—	—	—
	No connection	Drill community well and form system.	3,343,000	94,000	20	4,824,000
	Master meter	Connect to NGWSP line and master meter.	1,851,000	97,000	20	3,335,000
	Connection	Connect to NGWSP and individual meters.	1,790,000	414	20	1,799,000
White Cliffs MDWUA	No action	Continue relying on system wells	—	—	—	—
	No connection	Drill supplemental well.	3,092,000	98,000	20	4,641,000
	Master meter	Replace emergency connection with master meter.	1,204,000	165,000	20	3,731,000
	Connection	Connect to NTUA line and individual meters.	1,142,000	414	20	1,151,000
Williams Acres	No action	Continue relying on individual wells	—	—	—	—
	No connection	Drill community well.	3,590,000	102,000	20	5,283,000
	Master meter	Connect to NTUA line and master meter.	2,116,000	149,000	20	4,406,000
	Connection	Connect to NTUA and individual meters.	2,055,000	414	20	2,064,000
Yah-Ta-Hey W&SD	No action	Continue relying on system wells	—	—	—	—
	No connection	Drill supplemental well.	1,524,000	59,000	20	2,477,000
	Master meter	Replace emergency connection with master meter.	158,000	25,000	20	536,000
	Connection	Connect to City of Gallup and meter individually.	96,000	414	20	105,000

^a Detailed costs for each system/alternative, along with assumptions and references, are provided in Appendix A.

O&M = Operation and maintenance
— = No new costs incurred
NGWSP = Navajo-Gallup Water Supply Project

NTUA = Navajo Tribal Utility Authority
W&SD = Water and sanitation district
MDWUA = Mutual domestic water users association



Analysis of the power for each of the connection alternatives, which would come from the water provider, was not part of this study. The preliminary estimates are based on a grid system, which means that the wells are tied to the local electricity grid, such that when solar power is not available (i.e., on a rainy day), power is provided from the electric utility. This results in a less costly system than a stand-alone system, since batteries are not required and electrical peaks can be met by the electricity provider.

The total rated power for the solar system for this area can be estimated roughly (based on data provided by CST Solar) by dividing the annual estimated power usage by 1.9. Thus, for Gamerco, with a total annual power requirement of 150,889 kWh, the system would be sized for roughly 79,415 kilowatts (kW). The capital cost of the solar system can be estimated at \$3 to \$4 per kW.

The space requirements were estimated based on the estimated power output according to the following formula:

Total power output = Total area x Solar irradiance x Conversion efficiency, or

Total area = Total power output / Solar irradiance x Conversion efficiency

Using Gamerco as an example and assuming a solar irradiance of 1000 watts per square meter and a conversion efficiency of 16 percent, the space required would be:

Total area = 150,889 kWh / (1,000 x 0.16) = 943 square meters = 10,151 square feet

The estimated electrical space requirements and capital costs for the no action alternative for each system are included in the cost estimates provided in Appendix A.

In addition to the overall system costs for the three alternatives, a range of water use charges was developed for the master meter and connection alternatives using the City of Gallup utility rates for 2012, two daily per capita demand volumes (gallons per capita per day [gpcd]), and the projected demands based on the 2060 populations for each community (Tables 10 and 11). The City utility rates are based on a flat-rate meter charge plus the volume of water used during



the month. The meter charges used were based on an 8-inch meter for the master meter alternative and an individual residence ($\frac{5}{8}$ -inch) meter for the connection alternative.

The projected demands are based on two estimates of average daily per capita demands from the New Mexico OSE *New Mexico Water Use by Category 2010* report (Longworth et al., 2013). The calculation uses a lower range of 70 gpcd and an upper range of 142 gpcd. The lower range is a daily average for rural self-supplied homes, and the higher value is for average daily per capita use in the City of Gallup. Using 2.84 persons per dwelling yields a demand per dwelling of 6,136 gallons per month for the low range and 12,502 gallons per month for the higher range. These values apply to all the communities in the study, with this fixed number of persons and demands assumed for each household.

Because there are a different number of households in each community, the master meter charges (Table 17) for the two per capita demands, although the same for each household, are different for each community. The total monthly charges (times 12) for each community are included in the operation and maintenance annual costs for the master meter alternative since this bill will have to be paid to the provider by each community.

The individual monthly charge estimates for the connection alternative are \$51.95 and \$92.29 for the low and high per capita demand values, respectively (Table 18). Given the assumption of the same number of persons per household throughout the study area, the per-household monthly charges are the same for every household in all of the communities.



Table 17. Water Charges for Master Meter Alternative

Community	Number of Connections in 2060	Total Demand (gallons per month)		Master Meter Alternative Cost (\$)	
		Individual Connection	Total Community	Charges for Each Community	Cost per Connection
Based on Rural Self-Supplied Homes Demand					
Allison	38	6,163	236,195	3,769.42	60.35
Catalpa Hills	120	6,163	739,063	10,234.30	47.34
Cipriano Lewis	33	6,163	205,719	3,377.60	63.18
Crestview	115	6,163	708,586	9,842.49	47.60
Coal Basin	42	6,163	259,053	4,063.27	58.66
Gamerco WSD	598	6,163	3,687,695	48,142.02	42.49
Twin Buttes	70	6,163	434,295	6,316.19	51.63
White Cliffs	59	6,163	365,722	5,434.61	53.58
Williams Acres	223	6,163	1,371,457	18,364.38	44.56
Yah-ta-hey	155	6,163	952,401	12,976.98	46.01
Based on City of Gallup Demand					
Allison	38	12,502	479,139	6,892.71	102.76
Catalpa Hills	120	12,502	1,499,242	20,007.19	89.74
Cipriano Lewis	33	12,502	417,315	6,097.89	105.59
Crestview	115	12,502	1,437,417	19,212.37	90.01
Coal Basin	42	12,502	525,507	7,488.82	101.07
Gamerco WSD	598	12,502	7,480,753	96,905.71	84.94
Twin Buttes	70	12,502	880,998	12,059.02	94.03
White Cliffs	59	12,502	741,893	10,270.68	95.98
Williams Acres	223	12,502	2,782,098	36,499.63	87.01
Yah-ta-hey	155	12,502	1,932,013	25,570.90	88.46



Table 18. Individual Dwelling Water Charges for Connection Alternative

Community	Number of Connections in 2060	Total Individual Connection Demand (gallons per month)	Individual Charges (\$)
<i>Based on Rural Self-Supplied Homes Demand</i>			
Allison	38	6,163	34.47
Catalpa Hills	120	6,163	34.47
Cipriano Lewis	33	6,163	34.47
Crestview	115	6,163	34.47
Coal Basin	42	6,163	34.47
Gamerco WSD	598	6,163	34.47
Twin Buttes	70	6,163	34.47
White Cliffs	59	6,163	34.47
Williams Acres	223	6,163	34.47
Yah-ta-hey	155	6,163	34.47
<i>Based on City of Gallup Demand</i>			
Allison	38	12,502	96.29
Catalpa Hills	120	12,502	96.29
Cipriano Lewis	33	12,502	96.29
Crestview	115	12,502	96.29
Coal Basin	42	12,502	96.29
Gamerco WSD	598	12,502	96.29
Twin Buttes	70	12,502	96.29
White Cliffs	59	12,502	96.29
Williams Acres	223	12,502	96.29
Yah-ta-hey	155	12,502	96.29



7. Evaluation of Alternatives

To determine the viability of each water supply alternative for each water system, a series of criteria that reflect cost, health and safety, implementability, and community preference were developed based on engineering principles and input from the water system representatives. As described in Section 5, the alternatives are split into two groups based on whether the source of water is from groundwater or from a connection to the NGWSP through one of the project area utilities (NTUA or City of Gallup). Before one of the connection alternatives could become fully implementable, certain agreements and resolutions would need to be in place, and the communities, systems, and water providers themselves will need to make certain decisions about the future to develop the exact legal framework and agreements under which the alternatives would be developed.

The criteria for evaluating the alternatives consist of goals and performance measures to assess different aspects of the alternatives. Each performance measure is defined and given a scoring range of 1 to 100 points with 100 representing the highest score (Table 19). In addition, each criterion is weighted from 1 to 5 according to its importance relative to the project (rather than to the other criteria), with 5 being the most important criterion to the project (Table 20). Criteria weights are determined by engineering expertise and input from system representatives (Table 20). These criteria were applied to each community and scored separately based on the situation for that community. The goals and performance measures are detailed in Table 19. The evaluation results are summarized in Table 21; scoring sheets for the individual alternatives are provided in Appendix B.

Although the highest scoring alternative for Gamerco is the connection alternative, the system is still planning to pursue the drilling of a deep well. Gamerco has ample water rights and a permit to replace its well. The system prefers to develop and run its own water system and receive water from the City of Gallup only in case of emergency. The system is actively pursuing funding for the deep well.



Table 19. Goals and Performance Measures
Page 1 of 2

Goal / Performance Measure	Scoring Range		
	0	50	100
Goal: Long-Term Sustainable Supply			
Renewable water supply	Historically mining aquifer, finite (known limits) supply	Intermittent mining/recharge of aquifer, long term (>100 years) supply	Renewable source (surface)
Goal: Implementable			
Minimal project complexity	Complex project. Large area, complicated design, easements needed, rights of way, property acquisition, long construction period.	Standard construction, moderate to short-term construction period. Moderately complex operation and maintenance (O&M), requires part-time operator.	Minimal construction, very short- term construction or installation, no complications.
Water rights acquisition or transfer	New permits needed. No permits on record for any wells or system.	Separate private permits/rights but no consolidated system permit for total demand.	Already permitted to owner for place and purpose of use in sufficient amount for current and future demands.
Goal: Cost Effectiveness			
Projected capital and O&M costs	High projected cost	Moderate projected cost	Low projected cost
Goal: Local environmental/health/safety			
Environmental considerations	No FONSI (Finding of no significant impact under the National Environmental Policy Act [NEPA]) issued, requires environmental impact statement (EIS). Critical impact to area/species, heavy use of limited resource. Heavy impact with respect to traffic, chemicals, infrastructure, construction footprints. High energy use.	Environmental assessment (under NEPA) only, no critical area/species. Moderate use of limited resource. Moderate impact and energy use.	Environmental assessment (EA) already done, FONSI issued, light use of limited resource. Light construction impact, efficient energy use.
Health, safety, welfare	Poor water quality requiring additional treatment, volunteer staff responsible for quality, high traffic, safety risks during construction and after.	Moderate quality, moderate impact, part-time contract operator responsible for quality.	High quality, low impact, full-time staff responsible for quality.



Table 19. Goals and Performance Measures
Page 2 of 2

Goal / Performance Measure	Scoring Range		
	0	50	100
Goal: Local environmental/health/safety (cont.)			
Watershed and regional approach	Local water supply only, does not fulfill Navajo Gallup Water Supply (NGWSP) objectives.	Combination of local and regional water use, partial fulfillment of NGWSP objectives.	Complies with regional plan, fulfills NGWSP objectives.
Goal: Community Preferences			
Reliability of water service	Low technical/managerial ability of system or community, long response to outages, no operator on staff.	Part-time operator, moderate response to outages.	Efficient, responsive, professionally operated, fully staffed organization.
Complexity of managerial and O&M requirements for the community	Complex O&M and management, administration, and legal requirements requiring staff and full-time operator.	Moderately complex O&M, requires part-time managerial staff and responsibilities.	Minimal or no managerial oversight or O&M required for current users or system.



Table 20. Summary of Priority Objectives Identified by Systems
McKinley Appraisal Investigation

System	Objective															
	Reliable Water Source (Quality and Sustainability)	Community Pays Rates/ Raise Rates	Community Involvement/ Regionalization	Infrastructure/ Training	Cost	Decision Making	Professional Administration	Customer Service	Current Project Needs	Allow Existing Well to Be Included in Community Water Source	Continue Current Service as Long as Possible	Annexed by Gallup	Separate from Gallup	Property Value	Local Use of Special Assessment Districts	Utility Run or Individual Systems, no Co-ops
Block A	1	3	4							2						
Gamerco W&SD	1			2	3	4		5								
White Cliff	1				2		3		4							
Coal Basin Water Association									3		1	2				
											1		2			
Yah-ta-hey W&SD		3	2	4	4	5	1				2					
Rob Roy Trailer Park				3			1							2		
McKinley County				5			1		2						4	
Group Member	1															2



Table 21. McKinley County Small Systems Alternatives Evaluation

System	Alternative		Total Score ^a
	Category	Description	
Allison	No connection	Drill community well and reactivate water system.	1,565
	Master meter	Connect to NGWSP line and master meter.	2,320
	Connection	Connect to NGWSP line and individual meters.	2,830
Catalpa Hills	No connection	Drill community well and form water system.	1,485
	Master meter	Connect to proposed NGWSP line and master meter.	2,280
	Connection	Connect to proposed NGWSP line and individual meter.	2,860
Cipriano Lewis	No connection	Drill community well and form water system.	1,525
	Master meter	Connect to City of Gallup and master meter.	2,360
	Connection	Connect to City of Gallup line and individual meters.	2,900
Coal Basin Water Association	No connection	Drill supplemental well.	1,575
	Master meter	Replace emergency connection with master meter.	2,570
	Connection	Connect to City of Gallup and individual meters.	2,835
Crestview	No connection	Drill community well and form water system.	1,525
	Master meter	Connect with NTUA line and master meter.	2,430
	Connection	Connect with NTUA and individual meters.	2,830
Gamerco W&SD	No connection	Redrill permitted supplemental well.	1,970
	Master meter	Replace emergency connection with master meter.	2,545
	Connection	Connect to City of Gallup and individual meters.	2,850
Twin Buttes	No connection	Drill community well and form system.	1,500
	Master meter	Connect to NGWSP line and master meter.	2,335
	Connection	Connect to NGWSP and individual meters.	2,830
White Cliffs MDWUA	No connection	Drill supplemental well.	1,640
	Master meter	Replace emergency connection with master meter.	2,620
	Connection	Connect to NTUA line and individual meters.	2,815
Williams Acres	No connection	Drill community well.	1,480
	Master meter	Connect to NTUA line and master meter.	2,310
	Connection	Connect to NTUA and individual meters.	2,750
Yah-Ta-Hey W&SD	No connection	Drill supplemental well.	1,640
	Master meter	Replace emergency connection with master meter.	2,575
	Connection	Connect to City of Gallup and meter individually.	2,830

^a Detailed scoring sheets for each system/alternative are provided in Appendix B.

NGWSP = Navajo-Gallup Water Supply Project
 NTUA = Navajo Tribal Utility Authority
 W&SD = Water and sanitation district
 MDWUA = Mutual domestic water users association



7.1 Ability to Pay

The ability of project beneficiaries or potential customers to pay the true cost of water is an important factor in determining the viability of a proposed project. A minimal threshold is necessary in order for a project to receive federal and state funding. The ability to pay is also an important factor in calculating the cost share for a project. Many federal agencies use different ability to pay analyses to assess potential water supply projects. Although New Mexico water systems typically have very low rates compared to other states (Circle of Blue, 2014; NMED, 2012), customers for certain systems in this study are already paying water rates above what they should be able to afford based on the ability to pay analysis conducted for this study (Table 22). However, many water systems do not pay for infrastructure investments as these are often funded through legislative capital outlay requests or by grants funded through the New Mexico Environment Department, the New Mexico Water Trust Board, or other sources.

7.1.1 Ability to Pay

An analysis was conducted to estimate the amount an average household in each community can pay for a water bill. The methodology was taken from Piper and Martin (1999). This method is based on comparing financial and utility rate data from a nearby similar community to the community of concern. For this analysis, data for Grants, New Mexico was collected and used.

The Piper and Martin methodology uses an empirical mathematical relationship that calculates an ability to pay factor (factor) that is applied to the communities of concern to determine the amount that an average household can pay for a water bill:

- A residual income for the both the outside area and area of study is determined. Piper and Martin define residual income as the average household income for the area minus the average of the home payment (principal and interest only), non-water utilities, and property taxes and insurance (Equation 1).
- The average water bill for the outside area is divided by the residual income in thousand dollars (Equation 2).



Table 22. Ability to Pay

Community	Number of Connections in 2060	Monthly Utility Cost (excluding water) (\$)	Median Household Income In 2011, Inflation-Adjusted ^b (\$)	Insurance ^c (\$)	Property Taxes per Household ^d (\$)	Annual Housing Cost ^e (\$)	Residual Income (\$1,000)	Ability to Pay Factor ^f	Average Water Bill (\$) ^g	Ability to Pay (\$)
Outside Area ¹	NA	123.34	40,890	730	1,567	6,336	30.8	0.98	30.09	NA
Allison ²	38	123.34	27,872	730	1,583	5,688	18.4	—	54.68	18
Catalpa ²	120	123.34	68,155	730	1,583	5,688	58.7	—	54.68	57
Cipriano Lewis ²	33	123.34	38,750	730	1,583	5,688	29.3	—	54.68	29
Crestview ²	115	123.34	31,628	730	1,583	5,688	22.1	—	54.68	22
Coal Basin ³	42	123.34	37,143	730	1,583	5,688	27.7	—	37.00	27
Gamerco WSD	598	123.34	26,875	730	1,583	5,688	17.4	—	33.80	17
Twin Buttes ²	70	123.34	27,872	730	1,583	5,688	18.4	—	54.68	18
White Cliffs ³	59	123.34	29,844	730	1,583	5,688	20.4	—	21.00	20
Williams Acres ^{3,4}	223	123.34	31,628	730	1,583	5,688	22.1	—	27.50	22
Yah-ta-hey ⁵	155	123.34	25,227	730	1,583	5,688	15.7	—	9.66	15

Source: Estimation methodology taken from Piper and Martin (1999), unless otherwise noted.

^a Sources of data used in calculation:

¹ City-data.com, 2014b

² Bills for communities with individual wells were based on estimated individual demand, amortized well installation costs, and pumping costs.

³ Census income area adjusted to remove City of Gallup data, except for Coal Basin which was adjusted to include Gallup data.

⁴ Average of data from four of the individual water systems in the community.

⁵ Hathaway, 2014

^b 2010 Census database

^c eHealthInsuranceServices, Inc., 2014

^d New Mexico DFA, 2014b

^e City-data.com, 2014a

^f Methodology taken from Piper and Martin, 1999; calculated only for the outside area and used to develop the ability to pay for the systems.

^g Outside area (Grants, New Mexico) water bill data taken from NMED, 2012.

NA = Not applicable to this study

— = Calculated only for the outside area



- This ratio is then multiplied by the residual income for each of the communities to get the estimated amount each average household in each community can pay toward a water bill (Equation 3).

$$\text{Residual Income} = \text{Household income} - \text{Home payment} - \text{Non-water utilities} - \text{Property insurance and taxes} \quad (\text{Eq. 1})$$

$$\text{Ability to pay factor} = \text{Average water bill paid in outside area} / \text{Residual income } (\$1,000\text{s}) \quad (\text{Eq. 2})$$

$$\text{Ability to pay} = \text{Ability to pay factor} * \text{Residual income } (\$1,000\text{s}) \quad (\text{Eq. 3})$$

The results of these calculations for the water systems in this study are presented in Table 22.

The financial data were gathered from U.S. Census data, State of New Mexico databases and surveys, data from each of the communities, and various internet compilations of census data for each specific area. The specific sources for each set of data are provided in Table 22.

7.1.2 Ability to Pay vs. Estimated Water Bills

The monthly costs of water per connection for each of the communities for each of the alternatives was estimated based on the calculated annual costs to operate each system divided by 12 months. Each of the monthly costs are compared to the ability to pay (Section 7.1.1) in Table 23. As shown in Table 23, the ability to pay is much lower than both the estimated costs per connection to operate each of the systems and the monthly bills actually paid. The difference between the costs and ability to pay may be made up by the state grants and subsidies that rural water utilities receive or may just represent a greater willingness to pay for water.

Five communities are currently served by individual groundwater wells. The individual monthly costs for individual wells was estimated using the calculated monthly demand per connection of 6,163 gallons per month with a daily average pumping time of 2 hours, resulting in a pumping rate of about 1.7 gpm. An electrical cost was calculated assuming 0.4 horsepower for the pump based on an average well depth of 475 feet. An electric rate of \$0.085 per kilowatt-hour from



Daniel B. Stephens & Associates, Inc.

Table 23. Comparison of Ability to Pay and Estimated Water Bills

Community	Ability to Pay (\$)	Current Average Water Bill (\$)	Estimated Water Bill (\$)			Ability to Pay Minus Current Bill (\$)	Ability to Pay Minus Estimated Water Bill (\$)			Current Bill Connection Alternative (\$)
			No Action Alternative	Master Meter Alternative	Connection and Operation by Municipal Utility		No Action Alternative	Master Meter Alternative	Connection and Operation by Municipal Utility	
Allison	18.00	54.68	153.78	228.48	34.47	(16.47)	(135.78)	(210.48)	(16.47)	20.21
Catalpa	57.00	54.68	68.54	56.06	34.47	22.53	(11.54)	0.94	22.53	20.21
Cipriano Lewis	29.00	54.68	180.71	282.81	34.47	(5.47)	(151.71)	(253.81)	(5.47)	20.21
Crestview	22.00	54.68	66.33	261.53	34.47	(12.47)	(44.33)	(239.53)	(12.47)	20.21
Coal Basin	27.00	37.00	123.91	108.96	34.47	(7.47)	(96.91)	(81.96)	(7.47)	2.53
Gamerco WSD	17.00	33.80	20.28	14.20	34.47	(17.47)	(3.28)	2.80	(17.47)	(0.67)
Twin Buttes	18.00	54.68	110.71	114.28	34.47	(16.47)	(92.71)	(96.28)	(16.47)	20.21
White Cliffs	20.00	21.00	137.32	231.06	34.47	(14.47)	(117.32)	(211.06)	(14.47)	(13.47)
Williams Acres	22.00	27.50	38.28	55.84	34.47	(12.47)	(16.28)	(33.84)	(12.47)	(6.97)
Yah-ta-hey	15.00	9.66	31.95	13.28	34.47	(19.47)	(16.95)	1.72	(19.47)	(24.81)



the Continental Divide COOP web site was used to estimate the monthly cost of electricity. The monthly cost also includes an assumed well installation cost of \$10,000 amortized with the house mortgage at 5 percent over 30 years. These two components yielded a monthly cost for domestic well water of \$55. No recurring cost for well maintenance or pump replacement was included in this estimate as these would vary greatly from individual well to individual well. However this estimate can be used for relative comparison of the monthly cost of water from other sources of supply or suppliers.

7.2 Preferred Alternative

Based on the alternative evaluation score sheets, each system or community had one alternative that ranked higher than the others. Table 24 summarizes the preferred alternatives including the score, an explanation for the choice of the preferred alternative, capital, O&M, and household water costs, and expected monthly water bills.

The majority of the preferred alternatives received the highest score in the alternative evaluation score sheets (Appendix B). Although the connection alternative ranked higher for Gamerco, this system is actively pursuing funding to install a replacement well as its preferred alternative because Gamerco wishes to retain ownership and control of water supply and service capabilities.

Implementation of the preferred alternative for these systems and communities will require additional planning efforts to ensure that the water systems will undertake the obligations associated with moving forward to a feasibility study. McKinley County will continue to work with the water systems to secure an agreement to participate in further planning and implementation of the appraisal study preferred alternatives. This continued outreach to the communities will be completed by the end of Fiscal Year 2018 and will consist of the following tasks:

- Working with the Rural Water Association and other partners, provide basic water service and cost of water education to communities and project stakeholders through:



Table 24. Preferred Alternative by System or Community

System / Community	Number of Connections		Alternative		Cost (\$)		Monthly Utility Bill	Total Score ^a	Comment
	2012	2060	Category	Description	Capital	Annual O&M			
Allison	31	38	Connection	Connect to NGWSP line and individual meters.	713,400	—	34.47	2,830	No longer active system, requires no organization. Water provider could be City of Gallup or NTUA
Catalpa Hills	97	120	Connection	Connect to proposed NGWSP line and individual meter.	1,647,000	—	34.47	2,860	No system in place. Water provider could be City of Gallup or NTUA.
Cipriano Lewis	27	33	Connection	Connect to City of Gallup line and individual meters.	727,000	—	34.47	2,900	No system in place. Water provider could be City of Gallup or NTUA.
Coal Basin Water Association	93	115	Connection	Connect to City of Gallup and individual meters.	355,000	—	34.47	2,835	Coal Basin is very close to a City of Gallup line. System preference is to have Gallup take over water service.
Crestview	34	42	Connection	Connect with NTUA and individual meters.	1,651,000	—	34.47	2,830	No system in place. Water provider could be City of Gallup or NTUA.
Gamerco W&SD	484	598	No action	Re-drill permitted supplemental well.	2,823,000	146,000	20.28	1,970	Gamerco is actively pursuing funding to replace its well. Already receives water from Gallup. Could provide water to other Mariposa systems.
Twin Buttes	57	70	Connection	Connect to NGWSP line and individual meters.	1,790,000	—	34.47	2,830	No system in place. Water provider could be City of Gallup or NTUA.
White Cliffs MDWUA	48	59	Connection	Connect to NTUA line and individual meters.	1,142,000	—	34.47	2,815	White Cliffs has an emergency connection to NTUA. System preference is to be taken over either by NTUA or Mariposa.
Williams Acres	180	223	Connection	Connect to NTUA line and individual meters.	2,055,000	—	34.47	2,750	W&SD does not offer water service and has not operated a water delivery system. Individual systems and W&SD will need to determine how the W&SD can provide water service. Otherwise, NTUA could provide service to individual customers.
Yah-Ta-Hey W&SD	125	155	Connection	Connect to City of Gallup and meter individually.	96,000	—	34.47	2,830	Ya-Ta-Hey has an emergency connection to City of Gallup. System preference is to be taken over either by City of Gallup or Mariposa.

^a Detailed scoring sheets for each system/alternative are provided in Appendix B.

O&M = Operation and maintenance
NGWSP = Navajo-Gallup Water Supply Project
— = Not applicable

NTUA = Navajo Tribal Utility Authority
W&SD = Water and sanitation district
MDWUA = Mutual domestic water users association



- A website with materials and a series of videos that will provide a baseline of understanding where water comes, how it gets, what it really costs to get it there and make it safe, and what the future looks like; options are; and
- Provide a series of presentations that all communities can attend
- Conduct outreach to the communities and systems outside the project area to determine whether they would be interested in obtaining water from the Gallup Regional System if feasible.
- Conduct meetings with the systems included in the appraisal study to educate the board members regarding the scope and implementation of the preferred alternative.
- Develop memoranda of understanding between individual systems/Mariposa and water service providers (NTUA or Gallup) regarding provision of water service to the communities through customer service agreements.



References

Bernalillo County. 2015. Financial Assistance (Water, Sewer and Septic). <<http://www.bernco.gov/PIPE/>> Accessed May 2015.

Brown, D. E. 1982. *Desert plants: Biotic communities of the American Southwest-United States and Mexico*. University of Arizona, Superior, Arizona.

Brown, D.E., and C.H. Lowe. 1977. *Biotic communities of the Southwest map*. USDA Forest Service, Ft. Collins, Colorado.

Bureau of Business and Economic Research (BBER). 2013. Population Estimates and Projections. Available at <<http://bber.unm.edu/demograp2.htm>> Accessed September 20, 2013.

Circle of Blue. 2014. Circle of Blue's Urban Water Pricing Survey. <<http://www.circleofblue.org/waternews/wp-content/uploads/2010/04/allstats.pdf>>

City-data.com. 2014a. Gallup, NM (New Mexico) houses and residents. <<http://www.city-data.com/housing/houses-Gallup-New-Mexico.html>> Accessed January 2014.

City-data.com. 2014b. Grants, NM (New Mexico) houses and residents. <<http://www.city-data.com/housing/houses-Grants-New-Mexico.html#ixzz2qPVzYgNM>> Accessed January 2014.

City of Gallup. 2013. Gallup, New Mexico City Code: Section 8-1-7: Furnishing Outside City. Available at <http://sterlingcodifiers.com/codebook/index.php?book_id=635§ion_id=449755> Accessed January 2014.

City of Gallup. 2015a. Conservation, Recycling and Rebates. <<http://www.gallupnm.gov/index.aspx?NID=176>> Accessed May 2015.



City of Gallup. 2015b. Municipal Right-of-Way/Public Easement Work Permit. Available at <http://www.gallupnm.gov/DocumentCenter/View/84> Accessed May 2015.

City of Gallup. 2015c. Residential service application [form]. Available at <http://www.gallupnm.gov/DocumentCenter/View/5> Accessed May 2015.

City of Gallup and County of McKinley. 2012. A joint powers agreement between the City of Gallup and County of McKinley for payment of construction of the Navajo-Gallup Water Supply Project (NGWSP). September 2012.

City of Gallup and The Jicarilla Apache Nation. 2011. Water Supply Agreement Between the City of Gallup and The Jicarilla Apache Nation. November 22, 2011. Available at <http://www.usbr.gov/uc/rm/navajo/nav-gallup/agreements/WaterServiceAgrmt-GallupJicarilla.pdf>.

Continental Divide Electric Co-op, Inc. (CDEC). 2015. Renewable Resource Rate. <http://cdec.coop/content/renewable-resource-rate> Accessed May 2015.

Cooley, M.E., J.W. Harshbarger, J.P. Akers, and W.F. Hardt. 1969. *Regional hydrogeology of the Navajo and Hopi Indian Reservations, Arizona, New Mexico, and Utah*. USGS Professional Paper 521-A. 61 p.

Dam, W.L. 1995. *Geochemistry of ground water in the Gallup, Dakota, and Morrison aquifers, San Juan Basin, New Mexico*. USGS Water-Resources Investigations Report 94-4253.

Daniel B. Stephens & Associates, Inc. (DBS&A) and DePauli Engineering & Surveying LLC (DePauli). 2008. *McKinley County small water systems regionalization plan*. Prepared for Northwest New Mexico Council of Governments, Gallup, New Mexico. July 31, 2008.

DePauli Engineering & Surveying, LLC. 2012. *Gallup Rural Navajo Water Supply Project: Project status & funding summary*. Prepared for State of New Mexico Water Trust Board. December 2012.



DePauli, M. 2013a. Personal communication from Marc DePauli, DePauli Engineering and Surveying, LLC, to Dominique Cartron. September 2013.

DePauli, M. 2013b. Personal communication to Dominique Cartron, Daniel B. Stephens & Associates, Inc. November 2013.

Devlin, L. 2012. How much does it cost to install solar on an average US house? Solar Power Authority. April 20, 2012. <<http://solarpowerauthority.com/how-much-does-it-cost-to-install-solar-on-an-average-us-house/>> Accessed January 2014.

Diaz, L.B. 2013. *Gallup Regional Water System: Land use projections*. Prepared for DePauli Engineering and Surveying, LLC. October 2011, Revised October 2013.

eHealthInsuranceServices, Inc. 2014. Let's find the best Individual and family health plan for you. <<http://www.ehealthinsurance.com/individual-family-health-insurance>> Accessed January 2014.

Garnanez, P. 2013. Personal communication from Prestene Garnanez, McKinley County, to Dominique Cartron, Daniel B. Stephens & Associates, Inc. December 2013

Hathaway, L. 2014. E-mail from Loline Hathaway to Dominique Cartron, Daniel B. Stephens & Associates, Inc., regarding Cost of living statistics: Yah-ta-hey. January 3, 2014.

Kernodle, J.M. 1996. *Hydrogeology and steady-state simulation of ground-water flow in the San Juan Basin, New Mexico, Colorado, Arizona, and Utah*. USGS Water-Resources Investigations Report 95-4187. 117p.

Kiely, J.G. 2003. A sustainable water supply for Gallup: How do we get there from here? Final and Background Reports for the 2003 Gallup Town Hall on Water. May 2003.

Livingston, E. 2005. White Cliffs Mutual Domestic Water Users Association reverse osmosis water treatment. pp. 91-95 *In* Ortega Klett, C.T. (ed.), *Water Desalination and Reuse Strategies for New Mexico*. Proceedings, 49th Annual New Mexico Water Conference,



September 21-22, 2004. WRRRI Report No. 336. March 2005. Available at <http://wrrri.nmsu.edu/publish/watcon/proc49/livingston.pdf>.

Longworth, J.W., J.M. Valdez, M.L. Magnuson, and K. Richard. 2013. *New Mexico water use by categories, 2010*. Technical report 54, New Mexico Office of the State Engineer. October 2013.

McKinley County. 2005. *History of McKinley County*. <http://www.co.mckinley.nm.us/history.htm>. Last updated May 11, 2005.

McKinley County, New Mexico. 2012. *McKinley County, New Mexico, Comprehensive Plan Update*, Final review draft. September 2012.

McKinley County. 2015a. McKinley County Road Department. <http://www.co.mckinley.nm.us/roads.htm> Accessed May 2015.

McKinley County. 2015b. McKinley County, NM Road Inventory Map. <http://www.co.mckinley.nm.us/pdf/gisc%20pdf%20files/Road%20Map%20200.pdf> Accessed May 2015.

National Renewable Energy Laboratory (NREL). 2008. Photovoltaic solar resource: Flat plate tilted south at latitude: Annual. U.S. Department of Energy. November 2008. Available at http://www.nrel.gov/gis/images/map_pv_us_annual10km_dec2008.jpg Accessed January 2014.

National Renewable Energy Laboratory (NREL). 2014. PVWatts[®] calculator: Solar resource data. <http://pvwatts.nrel.gov/pvwatts.php> Accessed January 2014.

Navajo Tribal Utility Authority (NTUA). 2015. NTUA Solar Energy Program: FAQ's. <http://www.ntua.com/solar/FAQs.html> Accessed May 2015.

New Mexico Department of Finance & Administration (NMDFA). 2007. *Infrastructure capital improvement plan, FY 2009-2013* [for McKinley County]. October 9, 2007. Available at



<<http://cpi.nmdfa.state.nm.us/content.asp?CustComKey=257412&CategoryKey=300366&pn=Page&DomName=cpi.nmdfa.state.nm.us>>.

New Mexico Department of Finance & Administration (NMDFA). 2014a. 2015-2019 Infrastructure Capital Improvement Plan: Project Summary. ICIP-06. January 18, 2014. Available at <http://nmdfa.state.nm.us/uploads/FileLinks/2b7a0137a9fe48bcaa6298557dd0b5a1/Project_Summary_Counties.pdf>.

New Mexico Department of Finance & Administration (NMDFA). 2014b. Certificate of property tax rates in mills, McKinley County, Tax year 2013. <http://nmdfa.state.nm.us/Certificate_of_Property_Tax.aspx> Accessed January 2014.

New Mexico District Court, Eleventh Judicial District, McKinley County (NM District Court). 1975a. Decree, in the matter of the Petition for Organization of Yah-ta-hey Water and Sanitation District. Filed August 1, 1975.

New Mexico District Court, Eleventh Judicial District, McKinley County. 1975b. Decree, in the matter of the Petition for Organization of Williams Acres Water and Sanitation District. Filed September 2, 1975.

New Mexico District Court, McKinley County. 1982. Decree, in re the Gamerco Townsite Water and Sanitation District, No. CV-82-24. Filed November 30, 1982.

New Mexico District Court, Eleventh Judicial District, San Juan County, New Mexico (NM District Court). 2013. Order granting the settlement motion for entry of partial final decrees describing the water rights of the Navajo Nation. *State of New Mexico, ex rel. State Engineer v. The United States of America, et al.*, CV-75-184, San Juan River Adjudication, Claims of Navajo Nation, Case No. AB-07-1. Filed August 16, 2013.

New Mexico Environment Department (NMED). 2006. *Recommended standards for water facilities*. Construction Programs Bureau. Available at <<http://www.nmenv.state.nm.us/cpb/documents/RecommendedStandardsforWaterFacilities.pdf>> Accessed January 2014.



New Mexico Environment Department (NMED). 2009. Letter from Diane M. Barnes to Donna Ishmael, St. Williams Mobile Home Park (WSS# 002-17), regarding Water system sanitary survey. January 27, 2009.

New Mexico Environment Department (NMED). 2010a. *Sanitary survey report: Gameraco Water & Sanitation, WSS # 08517*. Drinking Water Bureau. May 4, 2010.

New Mexico Environment Department (NMED). 2010b. Letter from Diane Barnes to White Cliffs MDWUA, Michael Daly, regarding Sanitary survey report (WSSID NM3500117). August 19, 2010.

New Mexico Environment Department (NMED). 2010c. Letter from Diane Barnes to Manuelito Navajo Children's Home, Attn: Merle Roehr, regarding Sanitary survey report (WSSID NM35 606 17). September 27, 2010.

New Mexico Environment Department (NMED). 2010d. Letter from Diane Barnes to Cedar Ridge Trailer Park, Kim Christensen, regarding Sanitary survey report (WSSID NM35 594 17). October 25, 2010.

New Mexico Environment Department (NMED). 2010e. Letter from Diane Barnes to Block "A" Well Coop Williams Acres, Donna Ishmal, regarding Sanitary survey report (WSSID NM35 325 17). December 15, 2010.

New Mexico Environment Department (NMED). 2011a. Letter from Diane Barnes to Coal Basin Water Association, Jim Brown, regarding Sanitary survey report (WSSID NM35 082 17). January 4, 2011.

New Mexico Environment Department (NMED). 2011b. Letter from Diane Barnes to Yah ta hey Water & Sanitation District, Attn: Gene Burk, regarding Sanitary survey report (WSSID NM35 327 17). February 23, 2011.



New Mexico Environment Department (NMED). 2011c. Letter from Diane Barnes to Sagebrush Water Co-op, Attn: Marie Salosis, regarding Sanitary survey report (WSSID NM3561317). November 29, 2011.

New Mexico Environment Department (NMED). 2012. Municipal water and wastewater user charge survey for 2011 rates. Construction Programs Bureau. April 2012. Available at <<http://www.nmenv.state.nm.us/cpb/documents/2012WaterandSewerSurveyFinal.pdf>> Accessed January 2014.

New Mexico Environment Department (NMED). 2013. Water systems [McKinley County]. Drinking Water Branch. <https://eidea.nmenv.state.nm.us/DWW/JSP/SearchDispatch?number=&name=&county=MCKINLEY&WaterSystemType=All&SourceWaterType=All&PointOfContactType=None&SampleType=null&begin_date=11%2F15%2F2011&end_date=11%2F15%2F2013&action=Search+For+Water+Systems>.

New Mexico Environment Department (NMED). 2014. Water system details: Allison Water Association. Drinking Water Branch. https://eidea.nmenv.state.nm.us/DWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=40&tinwsys_st_code=NM&wsnumber=NM3508117 Accessed January 2014.

New Mexico Environment Department. Undated. Ground Water Discharge Permit Renewal and Modification: City of Gallup Wastewater Treatment Facility, DP-1342, Draft. Available at <https://www.env.nm.gov/gwb/documents/pn2_8-19-11/DP-1342_GallupWWTF.pdf> Accessed May 2015.

New Mexico Game & Fish. 2014. Biota information system of New Mexico. <<http://www.bison-m.org>> Accessed January 2014.

New Mexico Office of the State Engineer (NM OSE). 2014. New Mexico water rights reporting system. <<http://nmwrrs.ose.state.nm.us/nmwrrs/index.html>> Accessed January 2014.

New Mexico Office of the State Engineer (NM OSE). 2015. Water Right Summary: WR File Number G 0022. <<http://nmwrrs.ose.state.nm.us/nmwrrs/ReportProxy?queryData=%7B>



%22report%22%3A%22waterRightSummary%22%2C%0A%22WRFileDiv%22%3A%22true
%22%2C%0A%22WRFileBasin%22%3A%22G%22%2C%0A%22WRFileNbr%22%3A%222
2%22%2C%0A%22WRFileSuffix%22%3A%22%22%2C%0A%22ownerDiv%22%3A%22false%22%7D> Accessed May 5, 2015.

New Mexico State Highway and Transportation Department (NMSHTD). 2001. Requirements for Occupancy of State Highway System Right-of-Way by Utility Facilities. Title 17, Chapter 4, Part 2 of New Mexico Administrative Code.

New Mexico Water Quality Control Commission (NMWQCC). 2007. *State of New Mexico human health standards for Groundwater*. <<http://www.nmcpr.state.nm.us/nmac/parts/title20/20.006.0002.htm>>. Accessed August 22, 2007.

Northwest New Mexico Council of Governments (NWNMCOG). 1998. *Region 6 water plan: the 40-year regional water plan for Cibola County and the portion of McKinley County not in the San Juan Basin*. March 1998.

Northwest New Mexico Council of Governments (NWNMCOG). 2004. New Mexico Water Planning Region 6, Cibola/McKinley regional water plan. January 2004.

Northwest New Mexico Council of Governments (NNMCOG). 2009. *Northwest New Mexico comprehensive economic development strategy, five-year regional plan: 2009 -2014*. June 30, 2009. Available at <http://www.nwnmcog.com/uploads/2/7/9/8/2798127/ceds_nwnm_2009-2014_final.pdf>.

Northwest New Mexico Council of Governments (NNMCOG). 2014. High Plateau Vision 21: People. Place. Prosperity. <<http://www.theprosperitycollaborative.com/>> Accessed January 2014.

Northwest New Mexico Council of Governments and Architectural Research Consultants, Inc. (NWNMCOG/ARC). 2005. *McKinley County comprehensive plan, Phase 2*. December 2005.



- Piper, S. and W. Martin. 1999. Assessing the financial and economic feasibility of rural water system improvements. *Impact Assessment and Project Appraisal* 17(3):171-182. <<http://www.tandfonline.com/doi/abs/10.3152/147154699781767819>>.
- Risser, D.W. and F.P. Lyford. 1983. *Water resources on the Pueblo of Laguna, west-central New Mexico*. Prepared in cooperation with the U.S. Bureau of Indian Affairs. USGS Water-Resources Investigations Report 83-4038.
- RS Means. 2013. *RS Means Heavy Construction Cost Data, 2013*, 27th Annual edition.
- San Juan Water Commission. 2003. *San Juan Hydrologic Unit Regional Water Plan*, Draft final. October 4, 2003.
- Stone, W.J., F.P. Lyford, P.F. Frenzel, N.H. Mizell, and E.T. Padgett. 1983. *Hydrogeology and water resources of San Juan Basin, New Mexico*. New Mexico Bureau of Mines and Mineral Resources Hydrologic Report 6. 70p.
- U.S. Army Corps of Engineers (USACE). 2012. Memorandum for planning community of practice: Economic guidance memorandum, 13-01, Federal interest rates for Corps of Engineers projects for fiscal year 2013. October 26, 2012.
- U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (EPA). 2000. *A guide to developing and documenting cost estimates during the feasibility study*. EPA 540-R-00-002, OSWER 9355.0-75. July 2000. Available at <<http://www.epa.gov/superfund/policy/remedy/pdfs/finaldoc.pdf>>.
- U.S. Bureau of Reclamation (USBR). 2009. Planning report and final environmental impact statement, Navajo-Gallup Water Supply Project New Mexico – Arizona. July 2009. Available at <<http://www.usbr.gov/uc/envdocs/eis/navgallup/FEIS/index.html>>.
- U.S. Bureau of Reclamation (USBR). 2011. Reclamation Manual, Directives and Standards: Reclamation Rural Water Supply Program. CMP 09-03. November 10, 2011. Available at <<http://www.usbr.gov/recman/cmp/cmp09-03.pdf>> Accessed January 2014.



U.S. Bureau of Reclamation. 2012. Navajo-Gallup Water Supply Project, Colorado River Storage Project: Repayment contract between the United States and the City of Gallup, New Mexico. January 10, 2012. Available at <<https://www.usbr.gov/uc/rm/navajo/nav-gallup/contracts/NGWSP-FinalContract-Gallup-01-10-12.pdf>>.

U.S. Bureau of Reclamation (USBR). 2013a. *Draft Cost estimating guide, Rural Water Supply Program*. April 2013.

U.S. Bureau of Reclamation. 2013b. Navajo-Gallup Water Supply Project. <<http://www.usbr.gov/uc/rm/navajo/nav-gallup/>>. Last updated July 16, 2013.

U.S. Bureau of Reclamation. 2013c. Navajo-Gallup Water Supply Project: Project documents. <<http://www.usbr.gov/uc/rm/navajo/nav-gallup/docs.html#agr>>. Last updated August 9, 2013.

U.S. Census Bureau. 2013. United States Census 2010. <<http://www.census.gov/2010census/>> Accessed November 2013.

U.S. EPA. 2006. *System partnership solutions to improve public health protection: Volume II*. Office of Water (4606M), EPA 816-R-06-005. October 2006.

U.S. EPA. 2007a. *National primary drinking water regulations*. <<http://www.epa.gov/safewater/contaminants/index.html>>. Accessed August 22, 2007.

U.S. EPA. 2007b. *National secondary drinking water regulations*. <<http://www.epa.gov/safewater/contaminants/index.html>>. Accessed August 22, 2007.

U.S. Environmental Protection Agency (EPA). 2009. *2006 Community water system survey*. EPA 815-R-09-001 (February 2009) and EPA 815-R-09-002 (May 2009). <<http://water.epa.gov/infrastructure/drinkingwater/pws/cwssvr.cfm>>.

U.S. Fish & Wildlife Service (USFWS). 2014. New Mexico listed and sensitive species lists. <<http://www.fws.gov/southwest/es/NewMexico/IPAC.cfm>> Accessed January 2014.



U.S. Geological Survey (USGS). 2004. National Gap Analysis Program, Provisional Digital Land Cover Map for the Southwestern United States. Version 1.0. RS/GIS Laboratory, College of Natural Resources, Utah State University.

Welder, G.E. and R.L. Klausning. 1990. *Geohydrology of the Morrison Formation in the western San Juan Basin, New Mexico*. USGS Water-Resources Investigations Report 89-4069.

Winn, L., L. Allgood, B. Armijo, M.J. Christensen, M. Curley, J.G. Kiely, J. Austin-Manygoats, and R. Esquivel. 2003. *A sustainable water supply for Gallup: How do we get there from here?* Report from the 2003 Gallup Town Hall on Water. May 2003.

Appendix A

Estimated Costs for Water Supply Alternatives

Appendix A1
2060 Population

McKinley County

Item	Initial Capital Cost	Annual O&M or Household Water Cost	Life Cycle Cost Period	Total Present Worth
Allison - No action alternative - Drill community well and reactivate water system	\$2,237,000	\$71,000	20	\$3,376,000
Allison - Master meter alternative - Connect to NGWSP line and master meter	\$775,000	\$105,000	20	\$2,388,000
Allison - Connection alternative - Connect to NGWSP line and individual meters	\$713,000	\$414	20	\$722,000
Catalpa Hills - No action alternative - Drill community well and form water system	\$3,534,000	\$99,000	20	\$5,110,000
Catalpa Hills - Master meter alternative - Connect to proposed NGWSP line and master meter	\$1,695,000	\$81,000	20	\$2,934,000
Catalpa Hills - Connection alternative - Connect to proposed NGWSP line and individual meter	\$1,647,000	\$414	20	\$1,656,000
Cipriano Lewis - No action alternative - Drill community well and form water system	\$2,326,000	\$72,000	20	\$3,475,000
Cipriano Lewis - Master meter alternative - Connect to City of Gallup and master meter	\$1,307,000	\$113,000	20	\$3,047,000
Cipriano Lewis - Connection alternative - Connect to City of Gallup line and individual meters	\$727,000	\$414	20	\$736,000
Coal Basin Water Association - No action alternative - Drill supplemental well	\$1,832,000	\$63,000	20	\$2,845,000
Coal Basin Water Association - Master meter alternative - Replace emergency connection with master meter	\$195,000	\$55,000	20	\$1,039,000
Coal Basin Water Association - Connection alternative - City of Gallup and individual meters	\$355,000	\$414	20	\$364,000
Crestview - No action alternative - Drill community well and form water system	\$3,184,000	\$92,000	20	\$4,638,000
Crestview - Master meter alternative - Connect with NTUA line and master meter	\$1,712,000	\$113,000	20	\$3,047,000
Crestview - Connection alternative - Connect with NTUA and individual meters	\$1,651,000	\$414	20	\$1,660,000
Gamerco W&SD - No action alternative - Redrill permitted supplemental well	\$2,823,000	\$146,000	20	\$5,120,000
Gamerco W&SD - Master meter alternative - Replace emergency connection with master meter	\$385,000	\$102,000	20	\$1,951,000
Gamerco W&SD - Connection alternative - Connect to City of Gallup and individual meters	\$366,152	\$414	20	\$374,000
Twin Buttes - No action alternative - Drill community well and form system	\$3,343,000	\$94,000	20	\$4,824,000
Twin Buttes - Master meter alternative - Connect to NGWSP line and master meter	\$1,851,000	\$97,000	20	\$3,335,000
Twin Buttes - Connection Alternative - Connect to NGWSP and individual meters	\$1,790,000	\$414	20	\$1,799,000
White Cliffs - No action alternative - Drill supplemental well	\$3,092,000	\$98,000	20	\$4,641,000
White Cliffs - Master meter alternative - Replace emergency connection with master meter	\$1,204,000	\$165,000	20	\$3,731,000
White Cliffs - Connection alternative - Connect to NTUA line and individual meters	\$1,142,000	\$414	20	\$1,151,000
Williams Acres - No action alternative - Drill community well	\$3,590,000	\$102,000	20	\$5,283,000
Williams Acres - Master meter alternative - Connect to NTUA line and master meter	\$2,116,000	\$149,000	20	\$4,406,000
Williams Acres - Connection alternative - Connect to NTUA and individual meters	\$2,055,000	\$414	20	\$2,064,000
Ya ta hey - No action alternative - Drill supplemental well	\$1,524,000	\$59,000	20	\$2,477,000
Ya ta hey - Master meter alternative - Replace emergency connection with master meter	\$158,000	\$25,000	20	\$536,000
Ya ta hey - Connection alternative - Connect to City of Gallup and meter individually	\$96,000	\$414	20	\$105,000

Major Assumptions:

- Costs are in 2013 dollars.
- Pipeline lengths are plan distances only and have not been adjusted for site topography.
- No costs are included for property and/or right-of-way acquisition.
- There will be reasonable site access for all facilities.
- Summary costs have been rounded up to the nearest \$1,000.
- Costs are feasibility level estimates (+50%/-30% per EPA guidance).
- The connection alternative has no O&M costs; the amount shown reflects estimated City of Gallup water costs per household.

References

- US EPA "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (2000)
- COA 2009 Cost Data
- Environmental Remediation Cost Data (2006)
- Vendor Quotes

COST ESTIMATE SUMMARY

FEATURE: Allison - No action alternative - Drill community well and reactivate water system		PROJECT: McKinley County Regionalization Planning			
		WOID:		ESTIMATE LEVEL: Appraisal	
		REGION:		UNIT PRICE LEVEL: October 1, 2013	
		FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Drill well	1,800	LF	\$ 300	\$ 540,000
2	Waterline (8")	9,000	LF	\$ 22.24	\$ 200,160
3	Fittings	\$ 200,160	%	15%	\$ 30,024
4	Fire hydrants	8	EA	\$ 3,500	\$ 28,000
5	Water valves (8")	18	EA	\$ 875	\$ 15,751
6	Service connections, incl. tap	38	EA	\$ 1,750	\$ 67,070
7	Storage tank	140,000	GAL	\$ 2	\$ 280,000
8	Disinfection, including pumps, meters, and appurtenances	1	LS	\$ 10,000	\$ 10,000
					\$ -
					\$ -
					\$ -
					\$ -
	SUBTOTAL				\$ 1,171,006
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 1,171,006	\$ 141,340
	SUBTOTAL CONSTRUCTION				\$ 1,312,346
	Design Contingency	10.0%	(%)	\$ 1,312,346	\$ 131,235
	SUBTOTAL WITH DESIGN CONTINGENCY				\$ 1,443,581
	Permitting, Water Rights	1	LS	\$ 10,000	\$ 10,000
	Hydrogeological Services	12.0%	(%)	\$ 540,000	\$ 64,800
	Engineering Design	12.0%	(%)	\$ 1,443,581	\$ 173,230
	QA/QC	6.0%	(%)	\$ 1,443,581	\$ 86,615
	Construction Administration	6.0%	(%)	\$ 1,443,581	\$ 86,615
	Environmental Assessment	4.0%	(%)	\$ 1,443,581	\$ 57,743
	Archaeological Survey	4.0%	(%)	\$ 1,443,581	\$ 57,743
	Biological Survey	4.0%	(%)	\$ 1,443,581	\$ 57,743
	SUBTOTAL, PROFESSIONAL SERVICES				\$ 594,489
	SUBTOTAL, CAPITAL COSTS				\$ 1,906,835
	Tax	8.3125%	(%)	\$ 1,906,835	\$ 158,506
	Contingency, % of capital costs	9%	(%)	\$ 1,906,835	\$ 171,615
	TOTAL CAPITAL COST				\$ 2,236,956
QUANTITIES		PRICES			
BY:	M. Anderson	BY:	M. Anderson		
DATE:		DATE:			
CHECKED:		CHECKED:			
DATE:		DATE:			

Assumptions:

Assumes water rights are available

COST ESTIMATE SUMMARY

FEATURE: Allison - Master meter alternative - Connect to NGWSP line and master meter		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	10,600	LF	\$ 22.24	\$ 235,744
2	Fittings	\$ 235,744	%	15%	\$ 35,362
3	Fire hydrants	8	EA	\$ 3,500	\$ 28,000
4	Water valves (8")	21	EA	\$ 875	\$ 18,551
5	Service connections, incl. tap	38	EA	\$ 1,750	\$ 67,070
6	Storage tank	0	GAL	\$ 2.00	\$ -
7	Master meter	1	EA	\$ 33,500	\$ 33,500
8	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800
					\$ -
					\$ -
					\$ -
					\$ -
	SUBTOTAL				\$ 422,027
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 422,027	\$ 50,939
	SUBTOTAL CONSTRUCTION				\$ 472,966
	Design Contingency	10.0%	(%)	\$ 472,966	\$ 47,297
	SUBTOTAL WITH DESIGN CONTINGENCY				\$ 520,263
	Engineering Design	12.0%	(%)	\$ 520,263	\$ 62,432
	QA/QC	6.0%	(%)	\$ 520,263	\$ 31,216
	Construction Administration	6.0%	(%)	\$ 520,263	\$ 31,216
	Environmental Assessment	4.0%	(%)	\$ 520,263	\$ 20,811
	Archaeological Survey	4.0%	(%)	\$ 520,263	\$ 20,811
	Biological Survey	4.0%	(%)	\$ 520,263	\$ 20,811
	SUBTOTAL, PROFESSIONAL SERVICES				\$ 187,295
	SUBTOTAL, CAPITAL COSTS				\$ 660,261
	Tax	8.3125%	(%)	\$ 660,261	\$ 54,884
	Contingency, % of capital costs	9%	(%)	\$ 660,261	\$ 59,423
	TOTAL CAPITAL COST				\$ 774,568
QUANTITIES			PRICES		
BY:	M. Anderson		BY:	M. Anderson	
DATE:			DATE:		
CHECKED:			CHECKED:		
DATE:			DATE:		

COST ESTIMATE SUMMARY

FEATURE: Allison - Connection alternative - Connect to NGWSP line and individual meters		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
--	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	10,600	LF	\$ 22.24	\$ 235,744
2	Fittings	\$ 235,744	%	15%	\$ 35,362
3	Fire hydrants	8	EA	\$ 3,500	\$ 28,000
4	Water valves (8")	21	EA	\$ 875	\$ 18,551
5	Service connections, incl. tap	38	EA	\$ 1,750	\$ 67,070
6	Storage tank	0	GAL	\$ 2.00	\$ -
7	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 388,527
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 388,527	\$ 46,895
SUBTOTAL CONSTRUCTION					\$ 435,423
Design Contingency		10.0%	(%)	\$ 435,423	\$ 43,542
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 478,965
Engineering Design		12.0%	(%)	\$ 478,965	\$ 57,476
QA/QC		6.0%	(%)	\$ 478,965	\$ 28,738
Construction Administration		6.0%	(%)	\$ 478,965	\$ 28,738
Environmental Assessment		4.0%	(%)	\$ 478,965	\$ 19,159
Archaeological Survey		4.0%	(%)	\$ 478,965	\$ 19,159
Biological Survey		4.0%	(%)	\$ 478,965	\$ 19,159
SUBTOTAL, PROFESSIONAL SERVICES					\$ 172,427
SUBTOTAL, CAPITAL COSTS					\$ 607,850
Tax		8.3125%	(%)	\$ 607,850	\$ 50,528
Contingency, % of capital costs		9%	(%)	\$ 607,850	\$ 54,706
TOTAL CAPITAL COST					\$ 713,084

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

COST ESTIMATE SUMMARY

FEATURE: Catalpa Hills - No action alternative - Drill community well and form water system		PROJECT: McKinley County Regionalization Planning			
		WOID:		ESTIMATE LEVEL: Appraisal	
		REGION:		UNIT PRICE LEVEL: October 1, 2013	
		FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Drill well	1,800	LF	\$ 300	\$ 540,000
2	Waterline (8")	28,500	LF	\$ 22.24	\$ 633,840
3	Fittings	\$ 633,840	%	15%	\$ 95,076
4	Fire hydrants	23	EA	\$ 3,500	\$ 80,500
5	Water valves (8")	57	EA	\$ 875	\$ 49,878
6	Service connections, incl. tap	120	EA	\$ 1,750	\$ 209,866
7	Storage tank	170,000	GAL	\$ 1.50	\$ 255,000
8	Disinfection, including pumps, meters, and appurtenances	1	LS	\$ 10,000	\$ 10,000
9	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800
					\$ -
					\$ -
	SUBTOTAL				\$ 1,877,960
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 1,877,960	\$ 226,670
	SUBTOTAL CONSTRUCTION				\$ 2,104,630
	Design Contingency	10.0%	(%)	\$ 2,104,630	\$ 210,463
	SUBTOTAL WITH DESIGN CONTINGENCY				\$ 2,315,093
	Permitting, Water Rights	1	LS	\$ 10,000	\$ 10,000
	Hydrogeological Services	12.0%	(%)	\$ 540,000	\$ 64,800
	Engineering Design	12.0%	(%)	\$ 2,315,093	\$ 277,811
	QA/QC	6.0%	(%)	\$ 2,315,093	\$ 138,906
	Construction Administration	6.0%	(%)	\$ 2,315,093	\$ 138,906
	Environmental Assessment	4.0%	(%)	\$ 2,315,093	\$ 92,604
	Archaeological Survey	4.0%	(%)	\$ 2,315,093	\$ 92,604
	Biological Survey	4.0%	(%)	\$ 2,315,093	\$ 92,604
	SUBTOTAL, PROFESSIONAL SERVICES				\$ 908,233
	SUBTOTAL, CAPITAL COSTS				\$ 3,012,863
	Tax	8.3125%	(%)	\$ 3,012,863	\$ 250,444
	Contingency, % of capital costs	9%	(%)	\$ 3,012,863	\$ 271,158
	TOTAL CAPITAL COST				\$ 3,534,465
QUANTITIES		PRICES			
BY:	M. Anderson	BY:	M. Anderson		
DATE:		DATE:			
CHECKED:		CHECKED:			
DATE:		DATE:			

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

FEATURE:		Catalpa Hills - Connection alternative - Connect to proposed NGWSP line and individual meter	PROJECT: McKinley County Regionalization Planning					
			WOID:		ESTIMATE LEVEL: Appraisal			
			REGION:		UNIT PRICE LEVEL: October 1, 2013			
			FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx					
PAY ITEM	DESCRIPTION		QUANTITY	UNIT	UNIT PRICE		AMOUNT	
1	Waterline (8")		21,800	LF	\$	22.24	\$ 484,832	
2	Fittings		\$ 484,832	%		15%	\$ 72,725	
3	Fire hydrants		23	EA	\$	3,500.00	\$ 80,500	
4	Water valves (8")		44	EA	\$	875	\$ 38,153	
5	Service connections, incl. tap		120	EA	\$	1,750.00	\$ 209,866	
6	Storage tank		0	GAL	\$	1.50	\$ -	
7	Tie-in 18"		3	EA	\$	3,800	\$ 11,400	
							\$ -	
							\$ -	
							\$ -	
							\$ -	
							\$ -	
							\$ -	
							\$ -	
							\$ -	
							\$ -	
							\$ -	
							\$ -	
			SUBTOTAL				\$ 897,475	
	Contractor Overhead and Administration Costs		12.1%	(%)	\$	897,475	\$ 108,325	
			SUBTOTAL CONSTRUCTION				\$ 1,005,800	
	Design Contingency		10.0%	(%)	\$	1,005,800	\$ 100,580	
			SUBTOTAL WITH DESIGN CONTINGENCY				\$ 1,106,380	
	Engineering Design		12.0%	(%)	\$	1,106,380	\$ 132,766	
	QA/QC		6.0%	(%)	\$	1,106,380	\$ 66,383	
	Construction Administration		6.0%	(%)	\$	1,106,380	\$ 66,383	
	Environmental Assessment		4.0%	(%)	\$	1,106,380	\$ 44,255	
	Archaeological Survey		4.0%	(%)	\$	1,106,380	\$ 44,255	
	Biological Survey		4.0%	(%)	\$	1,106,380	\$ 44,255	
			SUBTOTAL, PROFESSIONAL SERVICES				\$ 398,297	
			SUBTOTAL, CAPITAL COSTS				\$ 1,404,097	
	Tax		8.3125%	(%)	\$	1,404,097	\$ 116,716	
	Contingency, % of capital costs		9%	(%)	\$	1,404,097	\$ 126,369	
			TOTAL CAPITAL COST				\$ 1,647,182	
QUANTITIES			PRICES					
BY:	M. Anderson		BY:	M. Anderson				
DATE:			DATE:					
CHECKED:			CHECKED:					
DATE:			DATE:					

COST ESTIMATE SUMMARY

FEATURE: Cipriano Lewis - No action alternative - Drill community well and form water system		PROJECT: McKinley County Regionalization Planning				
		WOID:		ESTIMATE LEVEL: Appraisal		
		REGION:		UNIT PRICE LEVEL: October 1, 2013		
		FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx				
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
1	Drill well	1,800	LF	\$ 300.00	\$ 540,000	
2	Waterline (8")	9,800	LF	\$ 22.24	\$ 217,952	
3	Fittings	\$ 217,952	%	15%	\$ 32,693	
4	Fire hydrants	17	EA	\$ 3,500.00	\$ 59,500	
5	Water valves (8")	20	EA	\$ 875	\$ 17,151	
6	Service connections, incl. tap	33	EA	\$ 1,750.00	\$ 58,416	
7	Storage tank	140,000	GAL	\$ 2.00	\$ 280,000	
8	Disinfection, including pumps, meters, and appurtenances	1	LS	\$ 10,000.00	\$ 10,000	
9	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800	
					\$ -	
					\$ -	
					\$ -	
					\$ -	
					\$ -	
					\$ -	
					\$ -	
					\$ -	
	SUBTOTAL				\$ 1,219,512	
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 1,219,512	\$ 147,195	
	SUBTOTAL CONSTRUCTION				\$ 1,366,707	
	Design Contingency	10.0%	(%)	\$ 1,366,707	\$ 136,671	
	SUBTOTAL WITH DESIGN CONTINGENCY				\$ 1,503,378	
	Permitting, Water Rights	1	LS	\$ 10,000	\$ 10,000	
	Hydrogeological Services	12.0%	(%)	\$ 540,000	\$ 64,800	
	Engineering Design	12.0%	(%)	\$ 1,503,378	\$ 180,405	
	QA/QC	6.0%	(%)	\$ 1,503,378	\$ 90,203	
	Construction Administration	6.0%	(%)	\$ 1,503,378	\$ 90,203	
	Environmental Assessment	4.0%	(%)	\$ 1,503,378	\$ 60,135	
	Archaeological Survey	4.0%	(%)	\$ 1,503,378	\$ 60,135	
	Biological Survey	4.0%	(%)	\$ 1,503,378	\$ 60,135	
	SUBTOTAL, PROFESSIONAL SERVICES				\$ 616,016	
	SUBTOTAL, CAPITAL COSTS				\$ 1,982,723	
	Tax	8.3125%	(%)	\$ 1,982,723	\$ 164,814	
	Contingency, % of capital costs	9%	(%)	\$ 1,982,723	\$ 178,445	
	TOTAL CAPITAL COST				\$ 2,325,982	
QUANTITIES		PRICES				
BY:	M. Anderson	BY:	M. Anderson			
DATE:		DATE:				
CHECKED:		CHECKED:				
DATE:		DATE:				

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

FEATURE: Cipriano Lewis - Connection alternative - Connect to City of Gallup line and individual meters		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
--	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	9,800	LF	\$ 22.24	\$ 217,952
2	Fittings	\$ 217,952	%	15%	\$ 32,693
3	Fire hydrants	20	EA	\$ 3,500.00	\$ 68,600
4	Water valves (8")	17	EA	\$ 875	\$ 14,876
5	Service connections, incl. tap	33	EA	\$ 1,750.00	\$ 58,416
6	Storage tank	0	GAL	\$ 2.00	\$ -
7	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 396,337
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 396,337	\$ 47,838
SUBTOTAL CONSTRUCTION					\$ 444,175
	Design Contingency	10.0%	(%)	\$ 444,175	\$ 44,417
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 488,592
	Engineering Design	12.0%	(%)	\$ 488,592	\$ 58,631
	QA/QC	6.0%	(%)	\$ 488,592	\$ 29,316
	Construction Administration	6.0%	(%)	\$ 488,592	\$ 29,316
	Environmental Assessment	4.0%	(%)	\$ 488,592	\$ 19,544
	Archaeological Survey	4.0%	(%)	\$ 488,592	\$ 19,544
	Biological Survey	4.0%	(%)	\$ 488,592	\$ 19,544
SUBTOTAL, PROFESSIONAL SERVICES					\$ 175,893
SUBTOTAL, CAPITAL COSTS					\$ 620,068
	Tax	8.3125%	(%)	\$ 620,068	\$ 51,543
	Contingency, % of capital costs	9%	(%)	\$ 620,068	\$ 55,806
TOTAL CAPITAL COST					\$ 727,417

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

FEATURE: Coal Basin Water Association - Connection alternative - City of Gallup and individual meters		PROJECT: McKinley County Regionalization Planning			
		WOID:		ESTIMATE LEVEL: Appraisal	
		REGION:		UNIT PRICE LEVEL: October 1, 2013	
		FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	6,300	LF	\$ 22.24	\$ 140,112
2	Fittings	\$ 140,112	%	15%	\$ 21,017
3	Fire hydrants	2	EA	\$ 3,500	\$ 7,000
4	Water valves (8")	13	EA	\$ 875	\$ 11,026
5	Service connections, incl. tap	8	EA	\$ 1,750	\$ 14,000
6	Storage tank	0	GAL	\$ 1.50	\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

FEATURE: Crestview - Connection alternative - Connect with NTUA and individual meters		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
--	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	21,700	LF	\$ 22.24	\$ 482,608
2	Fittings	\$ 482,608	%	15%	\$ 72,391
3	Fire hydrants	29	EA	\$ 3,500.00	\$ 101,500
4	Water valves (8")	43	EA	\$ 875.06	\$ 37,978
5	Service connections, incl. tap	115	EA	\$ 1,750.00	\$ 201,211
6	Storage tank	0	GAL	\$ 1.50	\$ -
7	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 899,488
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 899,488	\$ 108,568
SUBTOTAL CONSTRUCTION					\$ 1,008,056
Design Contingency		10.0%	(%)	\$ 1,008,056	\$ 100,806
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 1,108,862
Engineering Design		12.0%	(%)	\$ 1,108,862	\$ 133,063
QA/QC		6.0%	(%)	\$ 1,108,862	\$ 66,532
Construction Administration		6.0%	(%)	\$ 1,108,862	\$ 66,532
Environmental Assessment		4.0%	(%)	\$ 1,108,862	\$ 44,354
Archaeological Survey		4.0%	(%)	\$ 1,108,862	\$ 44,354
Biological Survey		4.0%	(%)	\$ 1,108,862	\$ 44,354
SUBTOTAL, PROFESSIONAL SERVICES					\$ 399,190
SUBTOTAL, CAPITAL COSTS					\$ 1,407,247
Tax		8.3125%	(%)	\$ 1,407,247	\$ 116,977
Contingency, % of capital costs		9%	(%)	\$ 1,407,247	\$ 126,652
TOTAL CAPITAL COST					\$ 1,650,876

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

COST ESTIMATE SUMMARY

FEATURE: Gamarco W&SD - No action alternative - Redrill permitted supplemental well		PROJECT: McKinley County Regionalizat on Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
--	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Drill well	2,700	LF	\$ 300.00	\$ 810,000
2	Disinfection, including pumps, meters, and appurtenances	1	LS	\$ 10,000.00	\$ 10,000
3	Storage tank	300,000	EA	\$ 1.50	\$ 450,000
4	Service connections, incl. tap	114	LF	\$ 1,750.00	\$ 199,500
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 1,469,500
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 1,469,500	\$ 177,369
SUBTOTAL CONSTRUCTION					\$ 1,646,869
Design Contingency		10.0%	(%)	\$ 1,646,869	\$ 164,687
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 1,811,556
Permitting, Water Rights		1	LS	\$ 10,000	\$ 10,000
Hydrogeological Services		12.0%	(%)	\$ 810,000	\$ 97,200
Engineering Design		12.0%	(%)	\$ 1,811,556	\$ 217,387
QA/QC		6.0%	(%)	\$ 1,811,556	\$ 108,693
Construction Administration		6.0%	(%)	\$ 1,811,556	\$ 108,693
Environmental Assessment		4.0%	(%)	\$ 1,811,556	\$ 72,462
Archaeological Survey		4.0%	(%)	\$ 1,811,556	\$ 72,462
Biological Survey		4.0%	(%)	\$ 1,811,556	\$ 72,462
SUBTOTAL, PROFESSIONAL SERVICES					\$ 759,360
SUBTOTAL, CAPITAL COSTS					\$ 2,406,229
Tax		8.3125%	(%)	\$ 2,406,229	\$ 200,018
Contingency, % of capital costs		9%	(%)	\$ 2,406,229	\$ 216,561
TOTAL CAPITAL COST					\$ 2,822,807

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

COST ESTIMATE SUMMARY

FEATURE: Gamarco W&SD - Master meter alternative - Replace emergency connection with master meter		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Storage tank	0	GAL	\$ 1.50	\$ -
2	Service connections, incl. tap	114	EA	\$ 1,750	\$ 199,500
3	Master meter	1	EA	\$ 10,000	\$ 10,000
SUBTOTAL					\$ 209,500
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 209,500	\$ 25,287
SUBTOTAL CONSTRUCTION					\$ 234,787
Design Contingency		10.0%	(%)	\$ 234,787	\$ 23,479
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 258,265
Engineering Design		12.0%	(%)	\$ 258,265	\$ 30,992
QA/QC		6.0%	(%)	\$ 258,265	\$ 15,496
Construction Administration		6.0%	(%)	\$ 258,265	\$ 15,496
Environmental Assessment		4.0%	(%)	\$ 258,265	\$ 10,331
Archaeological Survey		4.0%	(%)	\$ 258,265	\$ 10,331
Biological Survey		4.0%	(%)	\$ 258,265	\$ 10,331
SUBTOTAL, PROFESSIONAL SERVICES					\$ 92,976
SUBTOTAL, CAPITAL COSTS					\$ 327,762
Tax		8.3125%	(%)	\$ 327,762	\$ 27,245
Contingency, % of capital costs		9%	(%)	\$ 327,762	\$ 29,499
TOTAL CAPITAL COST					\$ 384,506
QUANTITIES			PRICES		
BY:	M. Anderson		BY:	M. Anderson	
DATE:			DATE:		
CHECKED:			CHECKED:		
DATE:			DATE:		

COST ESTIMATE SUMMARY

FEATURE: Gamarco W&SD - Connection alternative - Connect to City of Gallup and individual meters		PROJECT: McKinley County Regionalizatn Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Storage tank	0	GAL	\$ 1.50	\$ -
2	Service connections, incl. tap	114	EA	\$ 1,750	\$ 199,500
SUBTOTAL					\$ 199,500
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 199,500	\$ 24,080
SUBTOTAL CONSTRUCTION					\$ 223,580
Design Contingency		10.0%	(%)	\$ 223,580	\$ 22,358
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 245,938
Engineering Design		12.0%	(%)	\$ 245,938	\$ 29,513
QA/QC		6.0%	(%)	\$ 245,938	\$ 14,756
Construction Administration		6.0%	(%)	\$ 245,938	\$ 14,756
Environmental Assessment		4.0%	(%)	\$ 245,938	\$ 9,838
Archaeological Survey		4.0%	(%)	\$ 245,938	\$ 9,838
Biological Survey		4.0%	(%)	\$ 245,938	\$ 9,838
SUBTOTAL, PROFESSIONAL SERVICES					\$ 88,538
SUBTOTAL, CAPITAL COSTS					\$ 312,117
Tax		8.3125%	(%)	\$ 312,117	\$ 25,945
Contingency, % of capital costs		9%	(%)	\$ 312,117	\$ 28,091
TOTAL CAPITAL COST					\$ 366,152
QUANTITIES			PRICES		
BY:	M. Anderson		BY:	M. Anderson	
DATE:		DATE:			
CHECKED:		CHECKED:			
DATE:		DATE:			

COST ESTIMATE SUMMARY

FEATURE: Twin Buttes - No action alternative - Drill community well and form system		PROJECT: McKinley County Regionalization Planning			
		WOID:		ESTIMATE LEVEL: Appraisal	
		REGION:		UNIT PRICE LEVEL: October 1, 2013	
		FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Drill well	1,800	LF	\$ 300.00	\$ 540,000
2	Waterline (8")	28,700	LF	\$ 22.24	\$ 638,288
3	Fittings	\$ 638,288	%	15%	\$ 95,743
4	Fire hydrants	26	EA	\$ 3,500.00	\$ 91,000
5	Water valves (8")	57	EA	\$ 875.06	\$ 50,228
6	Service connections, incl. tap	70	EA	\$ 1,750.00	\$ 123,323
7	Storage tank	150,000	GAL	\$ 1.50	\$ 225,000
8	Chlorination system	1	LS	\$ 10,000.00	\$ 10,000
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

FEATURE: White Cliffs - Master meter alternative - Replace emergency connection with master meter		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
--	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	18,100	LF	\$ 22.24	\$ 402,544
2	Fittings	\$ 402,544	%	15%	\$ 60,382
3	Fire hydrants	31	EA	\$ 3,500.00	\$ 108,500
4	Water valves (8")	36	EA	\$ 875.06	\$ 31,677
5	Service connections, incl. tap	11	EA	\$ 1,750.00	\$ 19,250
6	Storage tank	0	GAL	\$ 1.50	\$ -
7	Master meter	1	EA	\$ 33,500	\$ 33,500
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 655,853
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 655,853	\$ 79,161
SUBTOTAL CONSTRUCTION					\$ 735,014
Design Contingency		10.0%	(%)	\$ 735,014	\$ 73,501
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 808,516
Engineering Design		12.0%	(%)	\$ 808,516	\$ 97,022
QA/QC		6.0%	(%)	\$ 808,516	\$ 48,511
Construction Administration		6.0%	(%)	\$ 808,516	\$ 48,511
Environmental Assessment		4.0%	(%)	\$ 808,516	\$ 32,341
Archaeological Survey		4.0%	(%)	\$ 808,516	\$ 32,341
Biological Survey		4.0%	(%)	\$ 808,516	\$ 32,341
SUBTOTAL, PROFESSIONAL SERVICES					\$ 291,066
SUBTOTAL, CAPITAL COSTS					\$ 1,026,080
Tax		8.3125%	(%)	\$ 1,026,080	\$ 85,293
Contingency, % of capital costs		9%	(%)	\$ 1,026,080	\$ 92,347
TOTAL CAPITAL COST					\$ 1,203,720

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

FEATURE: Williams Acres - No action alternative - Drill community well		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Drill well	1,800	LF	\$ 300.00	\$ 540,000
2	Waterline (8")	11,100	LF	\$ 22.24	\$ 246,864
3	Waterline (10")	9,600	LF	\$ 26.66	\$ 255,936
4	Fittings	\$ 246,864	%	15%	\$ 37,030
5	Water valves (8")	22	EA	\$ 875	\$ 19,426
6	Service connections, incl. tap	223	EA	\$ 1,750	\$ 389,441
7	Storage tank	210,000	GAL	\$ 1.50	\$ 315,000
8	Disinfection, including pumps, meters, and appurtenances	1	LS	\$ 10,000	\$ 10,000
9	Fire hydrants	27	LS	\$ 3,500.00	\$ 94,500
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 1,908,197
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 1,908,197	\$ 230,319
		SUBTOTAL CONSTRUCTION			\$ 2,138,517
	Design Contingency	10.0%	(%)	\$ 2,138,517	\$ 213,852
		SUBTOTAL WITH DESIGN CONTINGENCY			\$ 2,352,368
	Permitting, Water Rights	1	LS	\$ 10,000	\$ 10,000
	Hydrogeological Services	12.0%	(%)	\$ 540,000	\$ 64,800
	Engineering Design	12.0%	(%)	\$ 2,352,368	\$ 282,284
	QA/QC	6.0%	(%)	\$ 2,352,368	\$ 141,142
	Construction Administration	6.0%	(%)	\$ 2,352,368	\$ 141,142
	Environmental Assessment	4.0%	(%)	\$ 2,352,368	\$ 94,095
	Archaeological Survey	4.0%	(%)	\$ 2,352,368	\$ 94,095
	Biological Survey	4.0%	(%)	\$ 2,352,368	\$ 94,095
		SUBTOTAL, PROFESSIONAL SERVICES			\$ 921,653
		SUBTOTAL, CAPITAL COSTS			\$ 3,060,169
	Tax	8.3125%	(%)	\$ 3,060,169	\$ 254,377
	Contingency, % of capital costs	9%	(%)	\$ 3,060,169	\$ 275,415
		TOTAL CAPITAL COST			\$ 3,589,961
QUANTITIES		PRICES			
BY:	M. Anderson	BY:	M. Anderson		
DATE:		DATE:			
CHECKED:		CHECKED:			
DATE:		DATE:			

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

[illegible]

COST ESTIMATE SUMMARY

FEATURE: Ya ta hey - No action alternative - Drill supplemental well		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Drill well	1,800	LF	\$ 300.00	\$ 540,000
2	Service connections, incl. tap	30	EA	\$ 1,750.00	\$ 52,500
3	Storage tank (fire flow)	120,000	GAL	\$ 1.50	\$ 180,000
4	Disinfection, including pumps, meters, and appurtenances	1	LS	\$ 10,000.00	\$ 10,000
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 782,500
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 782,500	\$ 94,448
SUBTOTAL CONSTRUCTION					\$ 876,948
Design Contingency		10.0%	(%)	\$ 876,948	\$ 87,695
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 964,643
Permitting, Water Rights		1	LS	\$ 10,000	\$ 10,000
Hydrogeological Services		12.0%	(%)	\$ 540,000	\$ 64,800
Engineering Design		12.0%	(%)	\$ 964,643	\$ 115,757
QA/QC		6.0%	(%)	\$ 964,643	\$ 57,879
Construction Administration		6.0%	(%)	\$ 964,643	\$ 57,879
Environmental Assessment		4.0%	(%)	\$ 964,643	\$ 38,586
Archaeological Survey		4.0%	(%)	\$ 964,643	\$ 38,586
Biological Survey		4.0%	(%)	\$ 964,643	\$ 38,586
SUBTOTAL, PROFESSIONAL SERVICES					\$ 422,071
SUBTOTAL, CAPITAL COSTS					\$ 1,299,019
Tax		8.3125%	(%)	\$ 1,299,019	\$ 107,981
Contingency, % of capital costs		9%	(%)	\$ 1,299,019	\$ 116,912
TOTAL CAPITAL COST					\$ 1,523,912
QUANTITIES			PRICES		
BY:	M. Anderson		BY:	M. Anderson	
DATE:			DATE:		
CHECKED:			CHECKED:		
DATE:			DATE:		

COST ESTIMATE SUMMARY

FEATURE: Ya ta hey - Master meter alternative - Replace emergency connection with master meter		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
---	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Service connections, incl. tap	30	EA	\$ 1,750.00	\$ 52,500
2	Storage tank	0	GAL	\$ 1.50	\$ -
3	Master meter	1	EA	\$ 33,500	\$ 33,500
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 86,000
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 86,000	\$ 10,380
SUBTOTAL CONSTRUCTION					\$ 96,380
Design Contingency		10.0%	(%)	\$ 96,380	\$ 9,638
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 106,018
Engineering Design		12.0%	(%)	\$ 106,018	\$ 12,722
QA/QC		6.0%	(%)	\$ 106,018	\$ 6,361
Construction Administration		6.0%	(%)	\$ 106,018	\$ 6,361
Environmental Assessment		4.0%	(%)	\$ 106,018	\$ 4,241
Archaeological Survey		4.0%	(%)	\$ 106,018	\$ 4,241
Biological Survey		4.0%	(%)	\$ 106,018	\$ 4,241
SUBTOTAL, PROFESSIONAL SERVICES					\$ 38,167
SUBTOTAL, CAPITAL COSTS					\$ 134,547
Tax		8.3125%	(%)	\$ 134,547	\$ 11,184
Contingency, % of capital costs		9%	(%)	\$ 134,547	\$ 12,109
TOTAL CAPITAL COST					\$ 157,840

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

COST ESTIMATE SUMMARY

FEATURE: Ya ta hey - Connection alternative - Connect to City of Gallup and meter individually		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Service connections, incl. tap	30	EA	\$ 1,750.00	\$ 52,500
2	Storage tank	0	GAL	\$ 1.50	\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 52,500
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 52,500	\$ 6,337
SUBTOTAL CONSTRUCTION					\$ 58,837
Design Contingency		10.0%	(%)	\$ 58,837	\$ 5,884
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 64,720
Engineering Design		12.0%	(%)	\$ 64,720	\$ 7,766
QA/QC		6.0%	(%)	\$ 64,720	\$ 3,883
Construction Administration		6.0%	(%)	\$ 64,720	\$ 3,883
Environmental Assessment		4.0%	(%)	\$ 64,720	\$ 2,589
Archaeological Survey		4.0%	(%)	\$ 64,720	\$ 2,589
Biological Survey		4.0%	(%)	\$ 64,720	\$ 2,589
SUBTOTAL, PROFESSIONAL SERVICES					\$ 23,299
SUBTOTAL, CAPITAL COSTS					\$ 82,136
Tax		8.3125%	(%)	\$ 82,136	\$ 6,828
Contingency, % of capital costs		9%	(%)	\$ 82,136	\$ 7,392
TOTAL CAPITAL COST					\$ 96,356
QUANTITIES			PRICES		
BY:	M. Anderson		BY:	M. Anderson	
DATE:			DATE:		
CHECKED:			CHECKED:		
DATE:			DATE:		

COST ESTIMATE SUMMARY

FEATURE: <div style="text-align: center; margin-top: 10px;">Wellhead Disinfection System</div>		PROJECT: McKinley County Regionalization Planning <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">WOID:</td> <td style="width: 50%;">ESTIMATE LEVEL: Appraisal</td> </tr> <tr> <td>REGION:</td> <td style="text-align: center;">5-May-15</td> </tr> <tr> <td colspan="2">FILE:</td> </tr> </table>				WOID:	ESTIMATE LEVEL: Appraisal	REGION:	5-May-15	FILE:	
WOID:	ESTIMATE LEVEL: Appraisal										
REGION:	5-May-15										
FILE:											
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT						
1	Sodium hypochlorite dosing equipment, including 55 gallon drum, 3 gpd dosing pump, level transmitter	1	EA	\$ 4,500.00	\$ 4,500						
2	Electrical connections	1	LS	\$ 1,500.00	\$ 1,500						
					\$ -						
					\$ -						
					\$ -						
					\$ -						
					\$ -						
					\$ -						
					\$ -						
					\$ -						
					\$ -						
SUBTOTAL					\$ 6,000						
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 6,000	\$ 724						
SUBTOTAL CONSTRUCTION					\$ 6,724						
	Design Contingency	10.0%	(%)	\$ 6,724	\$ 672						
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 7,397						
	Engineering Design	12.0%	(%)	\$ 7,397	\$ 888						
	QA/QC	6.0%	(%)	\$ 7,397	\$ 444						
	Construction Administration	6.0%	(%)	\$ 7,397	\$ 444						
	Environmental Assessment	0.0%	(%)	\$ 7,397	\$ -						
	Archaeological Survey	0.0%	(%)	\$ 7,397	\$ -						
	Biological Survey	0.0%	(%)	\$ 7,397	\$ -						
SUBTOTAL, PROFESSIONAL SERVICES					\$ 1,775						
SUBTOTAL, CAPITAL COSTS					\$ 8,499						
	Tax	8.3125%	(%)	\$ 8,499	\$ 707						
	Contingency, % of capital costs	9%	(%)	\$ 8,499	\$ 765						
TOTAL CAPITAL COST					\$ 9,971						
QUANTITIES		PRICES									
BY:		BY:	J. Hill								
DATE:		DATE:									
CHECKED:		CHECKED:									
DATE:		DATE:									

DESCRIPTION	UNIT	UNIT PRICE	SOURCE
6" waterline pipe, incl. trench & compacted backfill	LF	\$ 21.28	COA 2009 801.002
8" waterline pipe, incl. trench & compacted backfill	LF	\$ 22.24	COA 2009 801.003
10" waterline pipe, incl. trench & compacted backfill	LF	\$ 26.66	COA 2009 801.004
Fittings	%	\$ 15.00	Professional opinion
Fire hydrant 4' bury, MJ, incl. blocking and aggregate	EA	\$ 3,500.00	Professional opinion (DePauli Report)
6" Gate valve	EA	\$ 689.69	COA 2009 801.081
8" Gate valve	EA	\$ 875.06	COA 2009 801.082
100,000 + gallon steel storage tank and foundation	GAL	\$ 1.50	Adjusted from RS Means
Less than 100,000 gallon steel storage tank and foundation	GAL	\$ 2.00	Adjusted from RS Means
Disinfection, including pumps, meters, and appurtenances	LS	\$ 10,000.00	Professional opinion Newkirk water project
Drill well	LF	\$ 300.00	Professional opinion
Service connection including meter (typical household)	EA	\$ 1,750.00	Professional opinion (DePauli Report)
Service connection including meter (typical commercial)	EA	\$ 2,250.00	Professional opinion (DePauli Report)
12-inch master meter, installed with piping, power, and data connection	EA	\$ 33,500.00	Cost estimate from recent project
Tie-in to 10"	EA	\$ 2,600.00	Estimated from bid tabs (TLC costs)
Tie-in 18"	EA	\$ 3,800.00	Estimated from bid tabs (TLC costs)
Tie-in to 16"	EA	\$ 3,600.00	From bid tabs (TLC costs)

Givens

70 GPCD

2.84 Persons per household

1000 GPM fire flow

120 minutes of fire flow required

800 ft for housing

5280 ft for uninhabited areas

Includes well drilling, equipment, development, testing, well piping and improvements

Site	Plat with subdivisions?	Current Households	Population increase to 2060 by 2012 comprehensive plan (households)	Total houses 2012 plan	Demand (GPD)	Storage Tank Size (gal)
Allison	x	31	7	38	7,619	140,000
Catalpa	x	97	23	120	23,841	170,000
Cipriano	x	27	6	33	6,636	140,000
Crestview	x	93	22	115	22,858	170,000
Coal Basin		34	8	42	8,357	140,000
Gamerco WSD	x	484	114	598	118,958	360,000
Twin Buttes		57	13	70	14,010	150,000
White Cliffs		48	11	59	11,797	150,000
Williams Acres	x	180	43	223	44,241	210,000
Yah ta hey	x	125	30	155	30,723	190,000

The following items are percentages of construction cost:

§ Mobilization/Demobilization, per COA 2009 Item 6.05/6.06	5.07%
§ Construction Management, per EPA	10%
§ Engineering Services for Design and Construction, per EPA	12%
§ Project Management, per EPA	5%
§ General & Administrative (G&A), per EPA	14%
§ Overhead	5%
§ NMGRT for Gallup, NM	8.313%
§ Bonding and Insurance, per RS Means 01 31 13.30	2%
§ Contingency, per EPA	9%
§ Real Discount Rate (5-year), per OMB Sep 2013	0.8%

Givens

70 GPCD

2.84 Persons per household

1000 GPM fire flow

120 minutes of fire flow required

Site	Plat with subdivisions?	Current Households	Population increase to 2060 by 2012 comprehensive plan (households)	Total houses 2012 plan	Demand (GPD)	Storage Tank Size (gal)
Allison	x	31	7	38	7,619	140,000
Catalpa	x	97	23	120	23,841	170,000
Cipriano	x	27	6	33	6,636	140,000
Crestview	x	93	22	115	22,858	170,000
Coal Basin		34	8	42	8,357	140,000
Gamerco WSD	x	484	114	598	118,958	360,000
Twin Buttes		57	13	70	14,010	150,000
White Cliffs		48	11	59	11,797	150,000
Williams Acres	x	180	43	223	44,241	210,000
Yah ta hey	x	125	30	155	30,723	120,000

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Allison
 ALTERNATIVE: Allison- Groundwater Alternative- Drill community well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 2,236,956	\$ 70,726	\$ 2,307,682	\$ 2,236,956	\$ 70,726	\$ 2,307,682
1	2014	0.964		\$ 70,726	\$ 70,726	\$ -	\$ 68,170	\$ 68,170
2	2015	0.929		\$ 70,726	\$ 70,726	\$ -	\$ 65,706	\$ 65,706
3	2016	0.895		\$ 70,726	\$ 70,726	\$ -	\$ 63,331	\$ 63,331
4	2017	0.863		\$ 70,726	\$ 70,726	\$ -	\$ 61,042	\$ 61,042
5	2018	0.832		\$ 70,726	\$ 70,726	\$ -	\$ 58,836	\$ 58,836
6	2019	0.802	\$ 22,000	\$ 70,726	\$ 92,726	\$ 17,640	\$ 56,709	\$ 74,349
7	2020	0.773		\$ 70,726	\$ 70,726	\$ -	\$ 54,659	\$ 54,659
8	2021	0.745		\$ 70,726	\$ 70,726	\$ -	\$ 52,684	\$ 52,684
9	2022	0.718		\$ 70,726	\$ 70,726	\$ -	\$ 50,779	\$ 50,779
10	2023	0.692		\$ 70,726	\$ 70,726	\$ -	\$ 48,944	\$ 48,944
11	2024	0.667		\$ 70,726	\$ 70,726	\$ -	\$ 47,175	\$ 47,175
12	2025	0.643	\$ 22,000	\$ 70,726	\$ 92,726	\$ 14,144	\$ 45,470	\$ 59,614
13	2026	0.620		\$ 70,726	\$ 70,726	\$ -	\$ 43,826	\$ 43,826
14	2027	0.597		\$ 70,726	\$ 70,726	\$ -	\$ 42,242	\$ 42,242
15	2028	0.576		\$ 70,726	\$ 70,726	\$ -	\$ 40,715	\$ 40,715
16	2029	0.555		\$ 70,726	\$ 70,726	\$ -	\$ 39,244	\$ 39,244
17	2030	0.535		\$ 70,726	\$ 70,726	\$ -	\$ 37,825	\$ 37,825
18	2031	0.515	\$ 22,000	\$ 70,726	\$ 92,726	\$ 11,341	\$ 36,458	\$ 47,799
19	2032	0.497		\$ 70,726	\$ 70,726	\$ -	\$ 35,140	\$ 35,140
20	2033	0.479		\$ 70,726	\$ 70,726	\$ -	\$ 33,870	\$ 33,870
21	2034	0.462	\$ 22,000	\$ 70,726	\$ 92,726	\$ 10,155	\$ 32,646	\$ 42,801
Total Alternative Allison			\$ 2,324,956	\$ 1,555,979	\$ 3,880,935	\$ 2,290,235	\$ 1,086,200	\$ 3,376,435

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 22,370
Electricity	11520	KWH	\$ 0.08	\$ 921.61
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 22,370
Total Year 1 Operations and Maintenance				\$ 70,726

2060 HOUSEHOLDS
 ESTIMATE: 38

Monthly charge \$ 153.78

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Allison
 ALTERNATIVE: Allison-Connection Alternative- Connect to Reach 27.3 and master meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 774,568	\$ 105,081	\$ 879,649	\$ 774,568	\$ 105,081	\$ 879,649
1	2014	0.964		\$ 105,081	\$ 105,081	\$ -	\$ 101,283	\$ 101,283
2	2015	0.929		\$ 105,081	\$ 105,081	\$ -	\$ 97,622	\$ 97,622
3	2016	0.895		\$ 105,081	\$ 105,081	\$ -	\$ 94,094	\$ 94,094
4	2017	0.863		\$ 105,081	\$ 105,081	\$ -	\$ 90,693	\$ 90,693
5	2018	0.832		\$ 105,081	\$ 105,081	\$ -	\$ 87,415	\$ 87,415
6	2019	0.802		\$ 105,081	\$ 105,081	\$ -	\$ 84,255	\$ 84,255
7	2020	0.773		\$ 105,081	\$ 105,081	\$ -	\$ 81,210	\$ 81,210
8	2021	0.745		\$ 105,081	\$ 105,081	\$ -	\$ 78,275	\$ 78,275
9	2022	0.718		\$ 105,081	\$ 105,081	\$ -	\$ 75,445	\$ 75,445
10	2023	0.692		\$ 105,081	\$ 105,081	\$ -	\$ 72,718	\$ 72,718
11	2024	0.667		\$ 105,081	\$ 105,081	\$ -	\$ 70,090	\$ 70,090
12	2025	0.643		\$ 105,081	\$ 105,081	\$ -	\$ 67,557	\$ 67,557
13	2026	0.620		\$ 105,081	\$ 105,081	\$ -	\$ 65,115	\$ 65,115
14	2027	0.597		\$ 105,081	\$ 105,081	\$ -	\$ 62,761	\$ 62,761
15	2028	0.576		\$ 105,081	\$ 105,081	\$ -	\$ 60,493	\$ 60,493
16	2029	0.555		\$ 105,081	\$ 105,081	\$ -	\$ 58,306	\$ 58,306
17	2030	0.535		\$ 105,081	\$ 105,081	\$ -	\$ 56,199	\$ 56,199
18	2031	0.515		\$ 105,081	\$ 105,081	\$ -	\$ 54,168	\$ 54,168
19	2032	0.497		\$ 105,081	\$ 105,081	\$ -	\$ 52,210	\$ 52,210
20	2033	0.479		\$ 105,081	\$ 105,081	\$ -	\$ 50,323	\$ 50,323
21	2034	0.462		\$ 105,081	\$ 105,081	\$ -	\$ 48,504	\$ 48,504
Total Alternative Allison			\$ 774,568	\$ 2,311,788	\$ 3,086,356	\$ 774,568	\$ 1,613,816	\$ 2,388,384

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 5,677.02	\$ 68,124.29
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 7,746
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 7,746
Total Year 1 Operations and Maintenance				\$ 105,081

2060 HOUSEHOLDS
 ESTIMATE: 38
 Monthly charge \$ 228.48

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Captalpa Hills
 ALTERNATIVE: Catalpa Hills- Groundwater alternative- Drill community well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 3,534,465	\$ 98,639	\$ 3,633,104	\$ 3,534,465	\$ 98,639	\$ 3,633,104
1	2014	0.964		\$ 98,639	\$ 98,639	\$ -	\$ 95,073	\$ 95,073
2	2015	0.929		\$ 98,639	\$ 98,639	\$ -	\$ 91,637	\$ 91,637
3	2016	0.895		\$ 98,639	\$ 98,639	\$ -	\$ 88,325	\$ 88,325
4	2017	0.863		\$ 98,639	\$ 98,639	\$ -	\$ 85,132	\$ 85,132
5	2018	0.832		\$ 98,639	\$ 98,639	\$ -	\$ 82,055	\$ 82,055
6	2019	0.802	\$ 25,000	\$ 98,639	\$ 123,639	\$ 20,045	\$ 79,089	\$ 99,135
7	2020	0.773		\$ 98,639	\$ 98,639	\$ -	\$ 76,231	\$ 76,231
8	2021	0.745		\$ 98,639	\$ 98,639	\$ -	\$ 73,475	\$ 73,475
9	2022	0.718		\$ 98,639	\$ 98,639	\$ -	\$ 70,820	\$ 70,820
10	2023	0.692		\$ 98,639	\$ 98,639	\$ -	\$ 68,260	\$ 68,260
11	2024	0.667		\$ 98,639	\$ 98,639	\$ -	\$ 65,793	\$ 65,793
12	2025	0.643	\$ 25,000	\$ 98,639	\$ 123,639	\$ 16,072	\$ 63,415	\$ 79,487
13	2026	0.620		\$ 98,639	\$ 98,639	\$ -	\$ 61,123	\$ 61,123
14	2027	0.597		\$ 98,639	\$ 98,639	\$ -	\$ 58,913	\$ 58,913
15	2028	0.576		\$ 98,639	\$ 98,639	\$ -	\$ 56,784	\$ 56,784
16	2029	0.555		\$ 98,639	\$ 98,639	\$ -	\$ 54,732	\$ 54,732
17	2030	0.535		\$ 98,639	\$ 98,639	\$ -	\$ 52,753	\$ 52,753
18	2031	0.515	\$ 25,000	\$ 98,639	\$ 123,639	\$ 12,887	\$ 50,847	\$ 63,734
19	2032	0.497		\$ 98,639	\$ 98,639	\$ -	\$ 49,009	\$ 49,009
20	2033	0.479		\$ 98,639	\$ 98,639	\$ -	\$ 47,237	\$ 47,237
21	2034	0.462	\$ 25,000	\$ 98,639	\$ 123,639	\$ 11,540	\$ 45,530	\$ 57,069
Total Alternative Captalpa Hills			\$ 3,634,465	\$ 2,170,050	\$ 5,804,515	\$ 3,595,010	\$ 1,514,871	\$ 5,109,881

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 35,345
Electricity	36047	KWH	\$ 0.08	\$ 2,884
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 35,345
Total Year 1 Operations and Maintenance				\$ 98,639

2060 HOUSEHOLDS
 ESTIMATE: 120

Monthly charge \$ 68.54

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Captalpa Hills
 ALTERNATIVE: Catalpa Hills- Connection Alternative- Connect to Proposed Reach 27.12 and Master Meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 1,694,717	\$ 80,669	\$ 1,775,386	\$ 1,694,717	\$ 80,669	\$ 1,775,386
1	2014	0.964		\$ 80,669	\$ 80,669	\$ -	\$ 77,753	\$ 77,753
2	2015	0.929		\$ 80,669	\$ 80,669	\$ -	\$ 74,943	\$ 74,943
3	2016	0.895		\$ 80,669	\$ 80,669	\$ -	\$ 72,234	\$ 72,234
4	2017	0.863		\$ 80,669	\$ 80,669	\$ -	\$ 69,623	\$ 69,623
5	2018	0.832		\$ 80,669	\$ 80,669	\$ -	\$ 67,107	\$ 67,107
6	2019	0.802		\$ 80,669	\$ 80,669	\$ -	\$ 64,681	\$ 64,681
7	2020	0.773		\$ 80,669	\$ 80,669	\$ -	\$ 62,343	\$ 62,343
8	2021	0.745		\$ 80,669	\$ 80,669	\$ -	\$ 60,090	\$ 60,090
9	2022	0.718		\$ 80,669	\$ 80,669	\$ -	\$ 57,918	\$ 57,918
10	2023	0.692		\$ 80,669	\$ 80,669	\$ -	\$ 55,825	\$ 55,825
11	2024	0.667		\$ 80,669	\$ 80,669	\$ -	\$ 53,807	\$ 53,807
12	2025	0.643		\$ 80,669	\$ 80,669	\$ -	\$ 51,862	\$ 51,862
13	2026	0.620		\$ 80,669	\$ 80,669	\$ -	\$ 49,987	\$ 49,987
14	2027	0.597		\$ 80,669	\$ 80,669	\$ -	\$ 48,181	\$ 48,181
15	2028	0.576		\$ 80,669	\$ 80,669	\$ -	\$ 46,439	\$ 46,439
16	2029	0.555		\$ 80,669	\$ 80,669	\$ -	\$ 44,761	\$ 44,761
17	2030	0.535		\$ 80,669	\$ 80,669	\$ -	\$ 43,143	\$ 43,143
18	2031	0.515		\$ 80,669	\$ 80,669	\$ -	\$ 41,583	\$ 41,583
19	2032	0.497		\$ 80,669	\$ 80,669	\$ -	\$ 40,080	\$ 40,080
20	2033	0.479		\$ 80,669	\$ 80,669	\$ -	\$ 38,632	\$ 38,632
21	2034	0.462		\$ 80,669	\$ 80,669	\$ -	\$ 37,235	\$ 37,235
Total Alternative Captalpa Hills			\$ 1,694,717	\$ 1,774,717	\$ 3,469,434	\$ 1,694,717	\$ 1,238,897	\$ 2,933,614

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 2,109.09	\$ 25,309.02
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 16,947
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 16,947
Total Year 1 Operations and Maintenance				\$ 80,669

2060 HOUSEHOLDS
 ESTIMATE: 120
 Monthly charge \$ 56.06

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Cipriano Lewis
 ALTERNATIVE: Cipriano Lewis - Groundwater Alternative- Drill community well and form water system

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 2,325,982	\$ 72,388	\$ 2,398,370	\$ 2,325,982	\$ 72,388	\$ 2,398,370
1	2014	0.964		\$ 72,388	\$ 72,388	\$ -	\$ 69,772	\$ 69,772
2	2015	0.929		\$ 72,388	\$ 72,388	\$ -	\$ 67,250	\$ 67,250
3	2016	0.895		\$ 72,388	\$ 72,388	\$ -	\$ 64,819	\$ 64,819
4	2017	0.863		\$ 72,388	\$ 72,388	\$ -	\$ 62,476	\$ 62,476
5	2018	0.832		\$ 72,388	\$ 72,388	\$ -	\$ 60,218	\$ 60,218
6	2019	0.802	\$ 19,000	\$ 72,388	\$ 91,388	\$ 15,234	\$ 58,041	\$ 73,276
7	2020	0.773		\$ 72,388	\$ 72,388	\$ -	\$ 55,943	\$ 55,943
8	2021	0.745		\$ 72,388	\$ 72,388	\$ -	\$ 53,921	\$ 53,921
9	2022	0.718		\$ 72,388	\$ 72,388	\$ -	\$ 51,972	\$ 51,972
10	2023	0.692		\$ 72,388	\$ 72,388	\$ -	\$ 50,094	\$ 50,094
11	2024	0.667		\$ 72,388	\$ 72,388	\$ -	\$ 48,283	\$ 48,283
12	2025	0.643	\$ 19,000	\$ 72,388	\$ 91,388	\$ 12,215	\$ 46,538	\$ 58,753
13	2026	0.620		\$ 72,388	\$ 72,388	\$ -	\$ 44,856	\$ 44,856
14	2027	0.597		\$ 72,388	\$ 72,388	\$ -	\$ 43,235	\$ 43,235
15	2028	0.576		\$ 72,388	\$ 72,388	\$ -	\$ 41,672	\$ 41,672
16	2029	0.555		\$ 72,388	\$ 72,388	\$ -	\$ 40,166	\$ 40,166
17	2030	0.535	\$ 19,000	\$ 72,388	\$ 91,388	\$ 10,161	\$ 38,714	\$ 48,875
18	2031	0.515		\$ 72,388	\$ 72,388	\$ -	\$ 37,315	\$ 37,315
19	2032	0.497		\$ 72,388	\$ 72,388	\$ -	\$ 35,966	\$ 35,966
20	2033	0.479		\$ 72,388	\$ 72,388	\$ -	\$ 34,666	\$ 34,666
21	2034	0.462		\$ 72,388	\$ 72,388	\$ -	\$ 33,413	\$ 33,413
Total Alternative Cipriano Lewis			\$ 2,382,982	\$ 1,592,535	\$ 3,975,517	\$ 2,363,593	\$ 1,111,719	\$ 3,475,312

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 23,260
Electricity	10034	KWH	\$ 0.08	\$ 803
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 23,260
Total Year 1 Operations and Maintenance				\$ 72,388

2060 HOUSEHOLDS
 ESTIMATE: 33

Monthly charge \$ 180.71

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Cipriano Lewis
 ALTERNATIVE: Cipriano Lewis - Connection Alternative- Connect to City of Gallup and Master Meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 1,306,976	\$ 113,283	\$ 1,420,258	\$ 1,306,976	\$ 113,283	\$ 1,420,258
1	2014	0.964		\$ 113,283	\$ 113,283	\$ -	\$ 109,188	\$ 109,188
2	2015	0.929		\$ 113,283	\$ 113,283	\$ -	\$ 105,242	\$ 105,242
3	2016	0.895		\$ 113,283	\$ 113,283	\$ -	\$ 101,438	\$ 101,438
4	2017	0.863		\$ 113,283	\$ 113,283	\$ -	\$ 97,771	\$ 97,771
5	2018	0.832		\$ 113,283	\$ 113,283	\$ -	\$ 94,237	\$ 94,237
6	2019	0.802		\$ 113,283	\$ 113,283	\$ -	\$ 90,831	\$ 90,831
7	2020	0.773		\$ 113,283	\$ 113,283	\$ -	\$ 87,548	\$ 87,548
8	2021	0.745		\$ 113,283	\$ 113,283	\$ -	\$ 84,384	\$ 84,384
9	2022	0.718		\$ 113,283	\$ 113,283	\$ -	\$ 81,334	\$ 81,334
10	2023	0.692		\$ 113,283	\$ 113,283	\$ -	\$ 78,394	\$ 78,394
11	2024	0.667		\$ 113,283	\$ 113,283	\$ -	\$ 75,561	\$ 75,561
12	2025	0.643		\$ 113,283	\$ 113,283	\$ -	\$ 72,829	\$ 72,829
13	2026	0.620		\$ 113,283	\$ 113,283	\$ -	\$ 70,197	\$ 70,197
14	2027	0.597		\$ 113,283	\$ 113,283	\$ -	\$ 67,660	\$ 67,660
15	2028	0.576		\$ 113,283	\$ 113,283	\$ -	\$ 65,214	\$ 65,214
16	2029	0.555		\$ 113,283	\$ 113,283	\$ -	\$ 62,857	\$ 62,857
17	2030	0.535		\$ 113,283	\$ 113,283	\$ -	\$ 60,585	\$ 60,585
18	2031	0.515		\$ 113,283	\$ 113,283	\$ -	\$ 58,395	\$ 58,395
19	2032	0.497		\$ 113,283	\$ 113,283	\$ -	\$ 56,285	\$ 56,285
20	2033	0.479		\$ 113,283	\$ 113,283	\$ -	\$ 54,250	\$ 54,250
21	2034	0.462		\$ 113,283	\$ 113,283	\$ -	\$ 52,289	\$ 52,289
Total Alternative Cipriano Lewis			\$ 1,306,976	\$ 2,492,222	\$ 3,799,198	\$ 1,306,976	\$ 1,739,773	\$ 3,046,749

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 5,473.14	\$ 65,677.70
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 13,070
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 13,070
Total Year 1 Operations and Maintenance				\$ 113,283

2060 HOUSEHOLDS
 ESTIMATE: 33
 Monthly charge \$ 282.81

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Coal Basin Water
 ALTERNATIVE: Coal Basin Water Association -Groundwater Alternative- Drill supplemental well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 1,831,775	\$ 62,504	\$ 1,894,279	\$ 1,831,775	\$ 62,504	\$ 1,894,279
1	2014	0.964		\$ 62,504	\$ 62,504	\$ -	\$ 60,245	\$ 60,245
2	2015	0.929		\$ 62,504	\$ 62,504	\$ -	\$ 58,067	\$ 58,067
3	2016	0.895		\$ 62,504	\$ 62,504	\$ -	\$ 55,968	\$ 55,968
4	2017	0.863		\$ 62,504	\$ 62,504	\$ -	\$ 53,945	\$ 53,945
5	2018	0.832		\$ 62,504	\$ 62,504	\$ -	\$ 51,996	\$ 51,996
6	2019	0.802	\$ 22,000	\$ 62,504	\$ 84,504	\$ 17,640	\$ 50,116	\$ 67,756
7	2020	0.773		\$ 62,504	\$ 62,504	\$ -	\$ 48,305	\$ 48,305
8	2021	0.745		\$ 62,504	\$ 62,504	\$ -	\$ 46,559	\$ 46,559
9	2022	0.718		\$ 62,504	\$ 62,504	\$ -	\$ 44,876	\$ 44,876
10	2023	0.692		\$ 62,504	\$ 62,504	\$ -	\$ 43,254	\$ 43,254
11	2024	0.667		\$ 62,504	\$ 62,504	\$ -	\$ 41,691	\$ 41,691
12	2025	0.643	\$ 22,000	\$ 62,504	\$ 84,504	\$ 14,144	\$ 40,184	\$ 54,327
13	2026	0.620		\$ 62,504	\$ 62,504	\$ -	\$ 38,731	\$ 38,731
14	2027	0.597		\$ 62,504	\$ 62,504	\$ -	\$ 37,331	\$ 37,331
15	2028	0.576		\$ 62,504	\$ 62,504	\$ -	\$ 35,982	\$ 35,982
16	2029	0.555		\$ 62,504	\$ 62,504	\$ -	\$ 34,681	\$ 34,681
17	2030	0.535		\$ 62,504	\$ 62,504	\$ -	\$ 33,428	\$ 33,428
18	2031	0.515	\$ 22,000	\$ 62,504	\$ 84,504	\$ 11,341	\$ 32,220	\$ 43,560
19	2032	0.497		\$ 62,504	\$ 62,504	\$ -	\$ 31,055	\$ 31,055
20	2033	0.479		\$ 62,504	\$ 62,504	\$ -	\$ 29,933	\$ 29,933
21	2034	0.462	\$ 22,000	\$ 62,504	\$ 84,504	\$ 10,155	\$ 28,851	\$ 39,006
Total Alternative Coal Basin Water			\$ 1,919,775	\$ 1,375,084	\$ 3,294,859	\$ 1,885,054	\$ 959,920	\$ 2,844,974

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 18,318
Electricity	10034	KWH	\$ 0.08	\$ 803
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 18,318
Total Year 1 Operations and Maintenance				\$ 62,504

2060 HOUSEHOLDS
 ESTIMATE: 42

Monthly charge \$ 123.91

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Coal Basin Water
 ALTERNATIVE: Coal Basin Water Association -Connection Alternative- City of Gallup and master meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 195,317	\$ 54,962	\$ 250,280	\$ 195,317	\$ 54,962	\$ 250,280
1	2014	0.964		\$ 54,962	\$ 54,962	\$ -	\$ 52,976	\$ 52,976
2	2015	0.929		\$ 54,962	\$ 54,962	\$ -	\$ 51,061	\$ 51,061
3	2016	0.895		\$ 54,962	\$ 54,962	\$ -	\$ 49,216	\$ 49,216
4	2017	0.863		\$ 54,962	\$ 54,962	\$ -	\$ 47,437	\$ 47,437
5	2018	0.832		\$ 54,962	\$ 54,962	\$ -	\$ 45,722	\$ 45,722
6	2019	0.802		\$ 54,962	\$ 54,962	\$ -	\$ 44,069	\$ 44,069
7	2020	0.773		\$ 54,962	\$ 54,962	\$ -	\$ 42,477	\$ 42,477
8	2021	0.745		\$ 54,962	\$ 54,962	\$ -	\$ 40,941	\$ 40,941
9	2022	0.718		\$ 54,962	\$ 54,962	\$ -	\$ 39,461	\$ 39,461
10	2023	0.692		\$ 54,962	\$ 54,962	\$ -	\$ 38,035	\$ 38,035
11	2024	0.667		\$ 54,962	\$ 54,962	\$ -	\$ 36,660	\$ 36,660
12	2025	0.643		\$ 54,962	\$ 54,962	\$ -	\$ 35,335	\$ 35,335
13	2026	0.620		\$ 54,962	\$ 54,962	\$ -	\$ 34,058	\$ 34,058
14	2027	0.597		\$ 54,962	\$ 54,962	\$ -	\$ 32,827	\$ 32,827
15	2028	0.576		\$ 54,962	\$ 54,962	\$ -	\$ 31,641	\$ 31,641
16	2029	0.555		\$ 54,962	\$ 54,962	\$ -	\$ 30,497	\$ 30,497
17	2030	0.535		\$ 54,962	\$ 54,962	\$ -	\$ 29,395	\$ 29,395
18	2031	0.515		\$ 54,962	\$ 54,962	\$ -	\$ 28,332	\$ 28,332
19	2032	0.497		\$ 54,962	\$ 54,962	\$ -	\$ 27,308	\$ 27,308
20	2033	0.479		\$ 54,962	\$ 54,962	\$ -	\$ 26,321	\$ 26,321
21	2034	0.462		\$ 54,962	\$ 54,962	\$ -	\$ 25,370	\$ 25,370
Total Alternative Coal Basin Water			\$ 195,317	\$ 1,209,175	\$ 1,404,492	\$ 195,317	\$ 844,102	\$ 1,039,420

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 2,465.88	\$ 29,590.55
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 1,953
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 1,953
Total Year 1 Operations and Maintenance				\$ 54,962

2060 HOUSEHOLDS
 ESTIMATE: 42
 Monthly charge \$ 108.96

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Crestview
 ALTERNATIVE: Crestview -Groundwater Alternative- Drill community well and form water system

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 3,184,033	\$ 91,511	\$ 3,275,544	\$ 3,184,033	\$ 91,511	\$ 3,275,544
1	2014	0.964		\$ 91,511	\$ 91,511	\$ -	\$ 88,203	\$ 88,203
2	2015	0.929		\$ 91,511	\$ 91,511	\$ -	\$ 85,015	\$ 85,015
3	2016	0.895		\$ 91,511	\$ 91,511	\$ -	\$ 81,943	\$ 81,943
4	2017	0.863		\$ 91,511	\$ 91,511	\$ -	\$ 78,981	\$ 78,981
5	2018	0.832		\$ 91,511	\$ 91,511	\$ -	\$ 76,126	\$ 76,126
6	2019	0.802	\$ 25,000	\$ 91,511	\$ 116,511	\$ 20,045	\$ 73,374	\$ 93,420
7	2020	0.773		\$ 91,511	\$ 91,511	\$ -	\$ 70,722	\$ 70,722
8	2021	0.745		\$ 91,511	\$ 91,511	\$ -	\$ 68,166	\$ 68,166
9	2022	0.718		\$ 91,511	\$ 91,511	\$ -	\$ 65,702	\$ 65,702
10	2023	0.692		\$ 91,511	\$ 91,511	\$ -	\$ 63,328	\$ 63,328
11	2024	0.667		\$ 91,511	\$ 91,511	\$ -	\$ 61,039	\$ 61,039
12	2025	0.643	\$ 25,000	\$ 91,511	\$ 116,511	\$ 16,072	\$ 58,832	\$ 74,905
13	2026	0.620		\$ 91,511	\$ 91,511	\$ -	\$ 56,706	\$ 56,706
14	2027	0.597		\$ 91,511	\$ 91,511	\$ -	\$ 54,656	\$ 54,656
15	2028	0.576		\$ 91,511	\$ 91,511	\$ -	\$ 52,681	\$ 52,681
16	2029	0.555		\$ 91,511	\$ 91,511	\$ -	\$ 50,777	\$ 50,777
17	2030	0.535		\$ 91,511	\$ 91,511	\$ -	\$ 48,941	\$ 48,941
18	2031	0.515	\$ 25,000	\$ 91,511	\$ 116,511	\$ 12,887	\$ 47,172	\$ 60,059
19	2032	0.497		\$ 91,511	\$ 91,511	\$ -	\$ 45,467	\$ 45,467
20	2033	0.479		\$ 91,511	\$ 91,511	\$ -	\$ 43,824	\$ 43,824
21	2034	0.462		\$ 91,511	\$ 91,511	\$ -	\$ 42,240	\$ 42,240
Total Alternative Crestview			\$ 3,259,033	\$ 2,013,244	\$ 5,272,276	\$ 3,233,037	\$ 1,405,408	\$ 4,638,445

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 31,840
Electricity	34560	KWH	\$ 0.08	\$ 2,765
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 31,840
Total Year 1 Operations and Maintenance				\$ 91,511

2060 HOUSEHOLDS
 ESTIMATE: 115

Monthly charge \$ 66.33

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Crestview
 ALTERNATIVE: Crestview -Connection Alternative- Connect with NTUA line and master meter

PREPARED BY: MA

PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 1,712,361	\$ 360,846	\$ 2,073,207	\$ 1,712,361	\$ 360,846	\$ 2,073,207
1	2014	0.964		\$ 360,846	\$ 360,846	\$ -	\$ 347,803	\$ 347,803
2	2015	0.929		\$ 360,846	\$ 360,846	\$ -	\$ 335,232	\$ 335,232
3	2016	0.895		\$ 360,846	\$ 360,846	\$ -	\$ 323,115	\$ 323,115
4	2017	0.863		\$ 360,846	\$ 360,846	\$ -	\$ 311,437	\$ 311,437
5	2018	0.832		\$ 360,846	\$ 360,846	\$ -	\$ 300,180	\$ 300,180
6	2019	0.802		\$ 360,846	\$ 360,846	\$ -	\$ 289,330	\$ 289,330
7	2020	0.773		\$ 360,846	\$ 360,846	\$ -	\$ 278,872	\$ 278,872
8	2021	0.745		\$ 360,846	\$ 360,846	\$ -	\$ 268,792	\$ 268,792
9	2022	0.718		\$ 360,846	\$ 360,846	\$ -	\$ 259,077	\$ 259,077
10	2023	0.692		\$ 360,846	\$ 360,846	\$ -	\$ 249,713	\$ 249,713
11	2024	0.667		\$ 360,846	\$ 360,846	\$ -	\$ 240,687	\$ 240,687
12	2025	0.643		\$ 360,846	\$ 360,846	\$ -	\$ 231,988	\$ 231,988
13	2026	0.620		\$ 360,846	\$ 360,846	\$ -	\$ 223,602	\$ 223,602
14	2027	0.597		\$ 360,846	\$ 360,846	\$ -	\$ 215,520	\$ 215,520
15	2028	0.576		\$ 360,846	\$ 360,846	\$ -	\$ 207,731	\$ 207,731
16	2029	0.555		\$ 360,846	\$ 360,846	\$ -	\$ 200,222	\$ 200,222
17	2030	0.535		\$ 360,846	\$ 360,846	\$ -	\$ 192,985	\$ 192,985
18	2031	0.515		\$ 360,846	\$ 360,846	\$ -	\$ 186,010	\$ 186,010
19	2032	0.497		\$ 360,846	\$ 360,846	\$ -	\$ 179,287	\$ 179,287
20	2033	0.479		\$ 360,846	\$ 360,846	\$ -	\$ 172,806	\$ 172,806
21	2034	0.462		\$ 360,846	\$ 360,846	\$ -	\$ 166,560	\$ 166,560
Total Alternative Crestview			\$ 1,712,361	\$ 7,938,613	\$ 9,650,974	\$ 1,712,361	\$ 5,541,797	\$ 7,254,158

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 25,427.77	\$ 305,133.24
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 17,124
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 17,124
Total Year 1 Operations and Maintenance				\$ 360,846

2060 HOUSEHOLDS
 ESTIMATE: 115

Monthly charge \$ 261.53

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Gamarco
 ALTERNATIVE: Gamarco W&SD -Groundwater Alternative- Redrill permitted well.

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 2,822,807	\$ 145,604	\$ 2,968,411	\$ 2,822,807	\$ 145,604	\$ 2,968,411
1	2014	0.964		\$ 145,604	\$ 145,604	\$ -	\$ 140,342	\$ 140,342
2	2015	0.929		\$ 145,604	\$ 145,604	\$ -	\$ 135,269	\$ 135,269
3	2016	0.895		\$ 145,604	\$ 145,604	\$ -	\$ 130,380	\$ 130,380
4	2017	0.863		\$ 145,604	\$ 145,604	\$ -	\$ 125,667	\$ 125,667
5	2018	0.832		\$ 145,604	\$ 145,604	\$ -	\$ 121,125	\$ 121,125
6	2019	0.802	\$ 31,000	\$ 145,604	\$ 176,604	\$ 24,856	\$ 116,747	\$ 141,603
7	2020	0.773		\$ 145,604	\$ 145,604	\$ -	\$ 112,527	\$ 112,527
8	2021	0.745		\$ 145,604	\$ 145,604	\$ -	\$ 108,460	\$ 108,460
9	2022	0.718		\$ 145,604	\$ 145,604	\$ -	\$ 104,540	\$ 104,540
10	2023	0.692		\$ 145,604	\$ 145,604	\$ -	\$ 100,761	\$ 100,761
11	2024	0.667		\$ 145,604	\$ 145,604	\$ -	\$ 97,119	\$ 97,119
12	2025	0.643	\$ 31,000	\$ 145,604	\$ 176,604	\$ 19,930	\$ 93,609	\$ 113,539
13	2026	0.620		\$ 145,604	\$ 145,604	\$ -	\$ 90,225	\$ 90,225
14	2027	0.597		\$ 145,604	\$ 145,604	\$ -	\$ 86,964	\$ 86,964
15	2028	0.576		\$ 145,604	\$ 145,604	\$ -	\$ 83,821	\$ 83,821
16	2029	0.555		\$ 145,604	\$ 145,604	\$ -	\$ 80,791	\$ 80,791
17	2030	0.535		\$ 145,604	\$ 145,604	\$ -	\$ 77,871	\$ 77,871
18	2031	0.515	\$ 31,000	\$ 145,604	\$ 176,604	\$ 15,980	\$ 75,057	\$ 91,036
19	2032	0.497		\$ 145,604	\$ 145,604	\$ -	\$ 72,344	\$ 72,344
20	2033	0.479		\$ 145,604	\$ 145,604	\$ -	\$ 69,729	\$ 69,729
21	2034	0.462		\$ 145,604	\$ 145,604	\$ -	\$ 67,208	\$ 67,208
Total Alternative Gamarco			\$ 2,915,807	\$ 3,203,296	\$ 6,119,103	\$ 2,883,573	\$ 2,236,161	\$ 5,119,734

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	2.0%	\$ 56,456
Electricity	179862	KWH	\$ 0.08	\$ 14,389
Labor, Class 1 Operator	52	WK	\$ 825.60	\$ 42,931
G&A	1	%	1%	\$ 28,228
Total Year 1 Operations and Maintenance				\$ 145,604

2060 HOUSEHOLDS
 ESTIMATE: 598

Monthly charge \$ 20.28

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Gamarco
 ALTERNATIVE: Gamarco W&SD -Connection Alternative- Master meter at emergency connections

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 384,506	\$ 101,970	\$ 486,476	\$ 384,506	\$ 101,970	\$ 486,476
1	2014	0.964		\$ 101,970	\$ 101,970	\$ -	\$ 98,284	\$ 98,284
2	2015	0.929		\$ 101,970	\$ 101,970	\$ -	\$ 94,732	\$ 94,732
3	2016	0.895		\$ 101,970	\$ 101,970	\$ -	\$ 91,308	\$ 91,308
4	2017	0.863		\$ 101,970	\$ 101,970	\$ -	\$ 88,007	\$ 88,007
5	2018	0.832		\$ 101,970	\$ 101,970	\$ -	\$ 84,826	\$ 84,826
6	2019	0.802		\$ 101,970	\$ 101,970	\$ -	\$ 81,760	\$ 81,760
7	2020	0.773		\$ 101,970	\$ 101,970	\$ -	\$ 78,805	\$ 78,805
8	2021	0.745		\$ 101,970	\$ 101,970	\$ -	\$ 75,957	\$ 75,957
9	2022	0.718		\$ 101,970	\$ 101,970	\$ -	\$ 73,211	\$ 73,211
10	2023	0.692		\$ 101,970	\$ 101,970	\$ -	\$ 70,565	\$ 70,565
11	2024	0.667		\$ 101,970	\$ 101,970	\$ -	\$ 68,015	\$ 68,015
12	2025	0.643		\$ 101,970	\$ 101,970	\$ -	\$ 65,556	\$ 65,556
13	2026	0.620		\$ 101,970	\$ 101,970	\$ -	\$ 63,187	\$ 63,187
14	2027	0.597		\$ 101,970	\$ 101,970	\$ -	\$ 60,903	\$ 60,903
15	2028	0.576		\$ 101,970	\$ 101,970	\$ -	\$ 58,702	\$ 58,702
16	2029	0.555		\$ 101,970	\$ 101,970	\$ -	\$ 56,580	\$ 56,580
17	2030	0.535		\$ 101,970	\$ 101,970	\$ -	\$ 54,535	\$ 54,535
18	2031	0.515		\$ 101,970	\$ 101,970	\$ -	\$ 52,564	\$ 52,564
19	2032	0.497		\$ 101,970	\$ 101,970	\$ -	\$ 50,664	\$ 50,664
20	2033	0.479		\$ 101,970	\$ 101,970	\$ -	\$ 48,833	\$ 48,833
21	2034	0.462		\$ 101,970	\$ 101,970	\$ -	\$ 47,068	\$ 47,068
Total Alternative Gamarco			\$ 384,506	\$ 2,243,337	\$ 2,627,843	\$ 384,506	\$ 1,566,031	\$ 1,950,537

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 3,638.20	\$ 43,658.42
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	3.0%	\$ 11,535
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 825.60	\$ 42,931
G&A	1	%	1%	\$ 3,845
Total Year 1 Operations and Maintenance				\$ 101,970

2060 HOUSEHOLDS
 ESTIMATE: 598
 Monthly charge \$ 14.20

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Twin Buttes
 ALTERNATIVE: Twin Buttes -Groundwater Alternative- Drill community well and form system

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 3,342,896	\$ 93,618	\$ 3,436,514	\$ 3,342,896	\$ 93,618	\$ 3,436,514
1	2014	0.964		\$ 93,618	\$ 93,618	\$ -	\$ 90,234	\$ 90,234
2	2015	0.929		\$ 93,618	\$ 93,618	\$ -	\$ 86,973	\$ 86,973
3	2016	0.895		\$ 93,618	\$ 93,618	\$ -	\$ 83,829	\$ 83,829
4	2017	0.863		\$ 93,618	\$ 93,618	\$ -	\$ 80,799	\$ 80,799
5	2018	0.832		\$ 93,618	\$ 93,618	\$ -	\$ 77,879	\$ 77,879
6	2019	0.802	\$ 22,000	\$ 93,618	\$ 115,618	\$ 17,640	\$ 75,064	\$ 92,704
7	2020	0.773		\$ 93,618	\$ 93,618	\$ -	\$ 72,351	\$ 72,351
8	2021	0.745		\$ 93,618	\$ 93,618	\$ -	\$ 69,736	\$ 69,736
9	2022	0.718		\$ 93,618	\$ 93,618	\$ -	\$ 67,215	\$ 67,215
10	2023	0.692		\$ 93,618	\$ 93,618	\$ -	\$ 64,786	\$ 64,786
11	2024	0.667		\$ 93,618	\$ 93,618	\$ -	\$ 62,444	\$ 62,444
12	2025	0.643	\$ 22,000	\$ 93,618	\$ 115,618	\$ 14,144	\$ 60,187	\$ 74,331
13	2026	0.620		\$ 93,618	\$ 93,618	\$ -	\$ 58,012	\$ 58,012
14	2027	0.597		\$ 93,618	\$ 93,618	\$ -	\$ 55,915	\$ 55,915
15	2028	0.576		\$ 93,618	\$ 93,618	\$ -	\$ 53,894	\$ 53,894
16	2029	0.555		\$ 93,618	\$ 93,618	\$ -	\$ 51,946	\$ 51,946
17	2030	0.535		\$ 93,618	\$ 93,618	\$ -	\$ 50,068	\$ 50,068
18	2031	0.515	\$ 22,000	\$ 93,618	\$ 115,618	\$ 11,341	\$ 48,259	\$ 59,599
19	2032	0.497		\$ 93,618	\$ 93,618	\$ -	\$ 46,514	\$ 46,514
20	2033	0.479		\$ 93,618	\$ 93,618	\$ -	\$ 44,833	\$ 44,833
21	2034	0.462		\$ 93,618	\$ 93,618	\$ -	\$ 43,213	\$ 43,213
Total Alternative Twin Buttes			\$ 3,408,896	\$ 2,059,598	\$ 5,468,494	\$ 3,386,020	\$ 1,437,767	\$ 4,823,787

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 33,429
Electricity	21182	KWH	\$ 0.08	\$ 1,695
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 33,429
Total Year 1 Operations and Maintenance				\$ 93,618

2060 HOUSEHOLDS
 ESTIMATE: 70

Monthly charge \$ 110.71

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Twin Buttes
 ALTERNATIVE: Twin Buttes -Connection Alternative-Connect to NGWSP line and master meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 1,851,055	\$ 96,640	\$ 1,947,696	\$ 1,851,055	\$ 96,640	\$ 1,947,696
1	2014	0.964		\$ 96,640	\$ 96,640	\$ -	\$ 93,147	\$ 93,147
2	2015	0.929		\$ 96,640	\$ 96,640	\$ -	\$ 89,781	\$ 89,781
3	2016	0.895		\$ 96,640	\$ 96,640	\$ -	\$ 86,535	\$ 86,535
4	2017	0.863		\$ 96,640	\$ 96,640	\$ -	\$ 83,408	\$ 83,408
5	2018	0.832		\$ 96,640	\$ 96,640	\$ -	\$ 80,393	\$ 80,393
6	2019	0.802		\$ 96,640	\$ 96,640	\$ -	\$ 77,487	\$ 77,487
7	2020	0.773		\$ 96,640	\$ 96,640	\$ -	\$ 74,686	\$ 74,686
8	2021	0.745		\$ 96,640	\$ 96,640	\$ -	\$ 71,987	\$ 71,987
9	2022	0.718		\$ 96,640	\$ 96,640	\$ -	\$ 69,385	\$ 69,385
10	2023	0.692		\$ 96,640	\$ 96,640	\$ -	\$ 66,877	\$ 66,877
11	2024	0.667		\$ 96,640	\$ 96,640	\$ -	\$ 64,460	\$ 64,460
12	2025	0.643		\$ 96,640	\$ 96,640	\$ -	\$ 62,130	\$ 62,130
13	2026	0.620		\$ 96,640	\$ 96,640	\$ -	\$ 59,884	\$ 59,884
14	2027	0.597		\$ 96,640	\$ 96,640	\$ -	\$ 57,720	\$ 57,720
15	2028	0.576		\$ 96,640	\$ 96,640	\$ -	\$ 55,634	\$ 55,634
16	2029	0.555		\$ 96,640	\$ 96,640	\$ -	\$ 53,623	\$ 53,623
17	2030	0.535		\$ 96,640	\$ 96,640	\$ -	\$ 51,685	\$ 51,685
18	2031	0.515		\$ 96,640	\$ 96,640	\$ -	\$ 49,816	\$ 49,816
19	2032	0.497		\$ 96,640	\$ 96,640	\$ -	\$ 48,016	\$ 48,016
20	2033	0.479		\$ 96,640	\$ 96,640	\$ -	\$ 46,280	\$ 46,280
21	2034	0.462		\$ 96,640	\$ 96,640	\$ -	\$ 44,608	\$ 44,608
Total Alternative Twin Buttes			\$ 1,851,055	\$ 2,126,087	\$ 3,977,142	\$ 1,851,055	\$ 1,484,181	\$ 3,335,236

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 3,179.47	\$ 38,153.60
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 18,511
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 18,511
Total Year 1 Operations and Maintenance				\$ 96,640

2060 HOUSEHOLDS
 ESTIMATE: 70
 Monthly charge \$ 114.28

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: White Cliffs
 ALTERNATIVE: White Cliffs -Connection Alternative-Connect to NTUA line and master meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost	O&M Cost	Total Cost	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 3,092,445	\$ 97,790	\$ 3,190,235	\$ 3,092,445	\$ 97,790	\$ 3,190,235
1	2014	0.964		\$ 97,790	\$ 97,790	\$ -	\$ 94,255	\$ 94,255
2	2015	0.929		\$ 97,790	\$ 97,790	\$ -	\$ 90,848	\$ 90,848
3	2016	0.895		\$ 97,790	\$ 97,790	\$ -	\$ 87,565	\$ 87,565
4	2017	0.863		\$ 97,790	\$ 97,790	\$ -	\$ 84,400	\$ 84,400
5	2018	0.832		\$ 97,790	\$ 97,790	\$ -	\$ 81,349	\$ 81,349
6	2019	0.802	\$ 24,000	\$ 97,790	\$ 121,790	\$ 19,243	\$ 78,409	\$ 97,652
7	2020	0.773		\$ 97,790	\$ 97,790	\$ -	\$ 75,575	\$ 75,575
8	2021	0.745		\$ 97,790	\$ 97,790	\$ -	\$ 72,843	\$ 72,843
9	2022	0.718		\$ 97,790	\$ 97,790	\$ -	\$ 70,210	\$ 70,210
10	2023	0.692		\$ 97,790	\$ 97,790	\$ -	\$ 67,673	\$ 67,673
11	2024	0.667		\$ 97,790	\$ 97,790	\$ -	\$ 65,227	\$ 65,227
12	2025	0.643	\$ 24,000	\$ 97,790	\$ 121,790	\$ 15,430	\$ 62,869	\$ 78,299
13	2026	0.620		\$ 97,790	\$ 97,790	\$ -	\$ 60,597	\$ 60,597
14	2027	0.597		\$ 97,790	\$ 97,790	\$ -	\$ 58,406	\$ 58,406
15	2028	0.576		\$ 97,790	\$ 97,790	\$ -	\$ 56,295	\$ 56,295
16	2029	0.555		\$ 97,790	\$ 97,790	\$ -	\$ 54,261	\$ 54,261
17	2030	0.535		\$ 97,790	\$ 97,790	\$ -	\$ 52,299	\$ 52,299
18	2031	0.515	\$ 24,000	\$ 97,790	\$ 121,790	\$ 12,372	\$ 50,409	\$ 62,781
19	2032	0.497		\$ 97,790	\$ 97,790	\$ -	\$ 48,587	\$ 48,587
20	2033	0.479		\$ 97,790	\$ 97,790	\$ -	\$ 46,831	\$ 46,831
21	2034	0.462		\$ 97,790	\$ 97,790	\$ -	\$ 45,138	\$ 45,138
Total Alternative White Cliffs			\$ 3,164,445	\$ 2,151,377	\$ 5,315,822	\$ 3,139,490	\$ 1,501,836	\$ 4,641,326

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 30,924
Electricity	135942	KWH	\$ 0.08	\$ 10,875
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 30,924
Total Year 1 Operations and Maintenance				\$ 97,790

2060 HOUSEHOLDS
 ESTIMATE:

59

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: White Cliffs
 ALTERNATIVE: White Cliffs -Connection Alternative-Connect to NTUA line and master meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost	O&M Cost	Total Cost	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 1,203,720	\$ 164,543	\$ 1,368,263	\$ 1,203,720	\$ 164,543	\$ 1,368,263
1	2014	0.964		\$ 164,543	\$ 164,543	\$ -	\$ 158,596	\$ 158,596
2	2015	0.929		\$ 164,543	\$ 164,543	\$ -	\$ 152,863	\$ 152,863
3	2016	0.895		\$ 164,543	\$ 164,543	\$ -	\$ 147,338	\$ 147,338
4	2017	0.863		\$ 164,543	\$ 164,543	\$ -	\$ 142,013	\$ 142,013
5	2018	0.832		\$ 164,543	\$ 164,543	\$ -	\$ 136,880	\$ 136,880
6	2019	0.802		\$ 164,543	\$ 164,543	\$ -	\$ 131,932	\$ 131,932
7	2020	0.773		\$ 164,543	\$ 164,543	\$ -	\$ 127,164	\$ 127,164
8	2021	0.745		\$ 164,543	\$ 164,543	\$ -	\$ 122,567	\$ 122,567
9	2022	0.718		\$ 164,543	\$ 164,543	\$ -	\$ 118,137	\$ 118,137
10	2023	0.692		\$ 164,543	\$ 164,543	\$ -	\$ 113,867	\$ 113,867
11	2024	0.667		\$ 164,543	\$ 164,543	\$ -	\$ 109,752	\$ 109,752
12	2025	0.643		\$ 164,543	\$ 164,543	\$ -	\$ 105,785	\$ 105,785
13	2026	0.620		\$ 164,543	\$ 164,543	\$ -	\$ 101,961	\$ 101,961
14	2027	0.597		\$ 164,543	\$ 164,543	\$ -	\$ 98,276	\$ 98,276
15	2028	0.576		\$ 164,543	\$ 164,543	\$ -	\$ 94,724	\$ 94,724
16	2029	0.555		\$ 164,543	\$ 164,543	\$ -	\$ 91,300	\$ 91,300
17	2030	0.535		\$ 164,543	\$ 164,543	\$ -	\$ 88,000	\$ 88,000
18	2031	0.515		\$ 164,543	\$ 164,543	\$ -	\$ 84,819	\$ 84,819
19	2032	0.497		\$ 164,543	\$ 164,543	\$ -	\$ 81,753	\$ 81,753
20	2033	0.479		\$ 164,543	\$ 164,543	\$ -	\$ 78,798	\$ 78,798
21	2034	0.462		\$ 164,543	\$ 164,543	\$ -	\$ 75,950	\$ 75,950
Total Alternative White Cliffs			\$ 1,203,720	\$ 3,619,949	\$ 4,823,669	\$ 1,203,720	\$ 2,527,019	\$ 3,730,739

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 9,916.93	\$ 119,003.16
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 12,037
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 12,037
Total Year 1 Operations and Maintenance				\$ 164,543

2060 HOUSEHOLDS
 ESTIMATE: 59
 Monthly charge \$ 231.06

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Williams Acres
 ALTERNATIVE: Williams Acres-Groundwater Alternative- Drill Supplemental Well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 3,589,961	\$ 102,216	\$ 3,692,177	\$ 3,589,961	\$ 102,216	\$ 3,692,177
1	2014	0.964		\$ 102,216	\$ 102,216	\$ -	\$ 98,522	\$ 98,522
2	2015	0.929		\$ 102,216	\$ 102,216	\$ -	\$ 94,961	\$ 94,961
3	2016	0.895		\$ 102,216	\$ 102,216	\$ -	\$ 91,528	\$ 91,528
4	2017	0.863		\$ 102,216	\$ 102,216	\$ -	\$ 88,220	\$ 88,220
5	2018	0.832		\$ 102,216	\$ 102,216	\$ -	\$ 85,031	\$ 85,031
6	2019	0.802	\$ 51,000	\$ 102,216	\$ 153,216	\$ 40,892	\$ 81,958	\$ 122,850
7	2020	0.773		\$ 102,216	\$ 102,216	\$ -	\$ 78,996	\$ 78,996
8	2021	0.745		\$ 102,216	\$ 102,216	\$ -	\$ 76,140	\$ 76,140
9	2022	0.718		\$ 102,216	\$ 102,216	\$ -	\$ 73,388	\$ 73,388
10	2023	0.692		\$ 102,216	\$ 102,216	\$ -	\$ 70,736	\$ 70,736
11	2024	0.667		\$ 102,216	\$ 102,216	\$ -	\$ 68,179	\$ 68,179
12	2025	0.643	\$ 51,000	\$ 102,216	\$ 153,216	\$ 32,788	\$ 65,715	\$ 98,502
13	2026	0.620		\$ 102,216	\$ 102,216	\$ -	\$ 63,339	\$ 63,339
14	2027	0.597		\$ 102,216	\$ 102,216	\$ -	\$ 61,050	\$ 61,050
15	2028	0.576		\$ 102,216	\$ 102,216	\$ -	\$ 58,843	\$ 58,843
16	2029	0.555		\$ 102,216	\$ 102,216	\$ -	\$ 56,717	\$ 56,717
17	2030	0.535		\$ 102,216	\$ 102,216	\$ -	\$ 54,667	\$ 54,667
18	2031	0.515	\$ 51,000	\$ 102,216	\$ 153,216	\$ 26,290	\$ 52,691	\$ 78,980
19	2032	0.497		\$ 102,216	\$ 102,216	\$ -	\$ 50,786	\$ 50,786
20	2033	0.479		\$ 102,216	\$ 102,216	\$ -	\$ 48,951	\$ 48,951
21	2034	0.462	\$ 51,000	\$ 102,216	\$ 153,216	\$ 23,541	\$ 47,181	\$ 70,722
Total Alternative Williams Acres			\$ 3,793,961	\$ 2,248,754	\$ 6,042,715	\$ 3,713,472	\$ 1,569,813	\$ 5,283,285

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 35,900
Electricity	66891	KWH	\$ 0.08	\$ 5,351
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 35,900
Total Year 1 Operations and Maintenance				\$ 102,216

2060 HOUSEHOLDS
 ESTIMATE: 223

Monthly charge \$ 38.28

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Williams Acres
 ALTERNATIVE: Williams Acres-Connection Alternative- Connect to NTUA line and master meter

PREPARED BY: MA

PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 2,116,059	\$ 149,115	\$ 2,265,174	\$ 2,116,059	\$ 149,115	\$ 2,265,174
1	2014	0.964		\$ 149,115	\$ 149,115	\$ -	\$ 143,725	\$ 143,725
2	2015	0.929		\$ 149,115	\$ 149,115	\$ -	\$ 138,530	\$ 138,530
3	2016	0.895		\$ 149,115	\$ 149,115	\$ -	\$ 133,523	\$ 133,523
4	2017	0.863		\$ 149,115	\$ 149,115	\$ -	\$ 128,697	\$ 128,697
5	2018	0.832		\$ 149,115	\$ 149,115	\$ -	\$ 124,046	\$ 124,046
6	2019	0.802		\$ 149,115	\$ 149,115	\$ -	\$ 119,562	\$ 119,562
7	2020	0.773		\$ 149,115	\$ 149,115	\$ -	\$ 115,240	\$ 115,240
8	2021	0.745		\$ 149,115	\$ 149,115	\$ -	\$ 111,075	\$ 111,075
9	2022	0.718		\$ 149,115	\$ 149,115	\$ -	\$ 107,060	\$ 107,060
10	2023	0.692		\$ 149,115	\$ 149,115	\$ -	\$ 103,191	\$ 103,191
11	2024	0.667		\$ 149,115	\$ 149,115	\$ -	\$ 99,461	\$ 99,461
12	2025	0.643		\$ 149,115	\$ 149,115	\$ -	\$ 95,866	\$ 95,866
13	2026	0.620		\$ 149,115	\$ 149,115	\$ -	\$ 92,401	\$ 92,401
14	2027	0.597		\$ 149,115	\$ 149,115	\$ -	\$ 89,061	\$ 89,061
15	2028	0.576		\$ 149,115	\$ 149,115	\$ -	\$ 85,842	\$ 85,842
16	2029	0.555		\$ 149,115	\$ 149,115	\$ -	\$ 82,739	\$ 82,739
17	2030	0.535		\$ 149,115	\$ 149,115	\$ -	\$ 79,749	\$ 79,749
18	2031	0.515		\$ 149,115	\$ 149,115	\$ -	\$ 76,866	\$ 76,866
19	2032	0.497		\$ 149,115	\$ 149,115	\$ -	\$ 74,088	\$ 74,088
20	2033	0.479		\$ 149,115	\$ 149,115	\$ -	\$ 71,410	\$ 71,410
21	2034	0.462		\$ 149,115	\$ 149,115	\$ -	\$ 68,829	\$ 68,829
Total Alternative Williams Acres			\$ 2,116,059	\$ 3,280,532	\$ 5,396,591	\$ 2,116,059	\$ 2,290,078	\$ 4,406,137

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 7,110.69	\$ 85,328.31
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 21,161
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 21,161
Total Year 1 Operations and Maintenance				\$ 149,115

2060 HOUSEHOLDS
 ESTIMATE: 223

Monthly charge \$ 55.84

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Yah-Ta-Hey
 ALTERNATIVE: Ya-Ta-Hey-Groundwater Alternative- Drill additional well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 1,523,912	\$ 59,260	\$ 1,583,172	\$ 1,523,912	\$ 59,260	\$ 1,583,172
1	2014	0.964		\$ 59,260	\$ 59,260	\$ -	\$ 57,118	\$ 57,118
2	2015	0.929		\$ 59,260	\$ 59,260	\$ -	\$ 55,054	\$ 55,054
3	2016	0.895		\$ 59,260	\$ 59,260	\$ -	\$ 53,064	\$ 53,064
4	2017	0.863		\$ 59,260	\$ 59,260	\$ -	\$ 51,146	\$ 51,146
5	2018	0.832		\$ 59,260	\$ 59,260	\$ -	\$ 49,297	\$ 49,297
6	2019	0.802	\$ 22,000	\$ 59,260	\$ 81,260	\$ 17,640	\$ 47,515	\$ 65,155
7	2020	0.773		\$ 59,260	\$ 59,260	\$ -	\$ 45,798	\$ 45,798
8	2021	0.745		\$ 59,260	\$ 59,260	\$ -	\$ 44,142	\$ 44,142
9	2022	0.718		\$ 59,260	\$ 59,260	\$ -	\$ 42,547	\$ 42,547
10	2023	0.692		\$ 59,260	\$ 59,260	\$ -	\$ 41,009	\$ 41,009
11	2024	0.667		\$ 59,260	\$ 59,260	\$ -	\$ 39,527	\$ 39,527
12	2025	0.643	\$ 22,000	\$ 59,260	\$ 81,260	\$ 14,144	\$ 38,098	\$ 52,242
13	2026	0.620		\$ 59,260	\$ 59,260	\$ -	\$ 36,721	\$ 36,721
14	2027	0.597		\$ 59,260	\$ 59,260	\$ -	\$ 35,394	\$ 35,394
15	2028	0.576		\$ 59,260	\$ 59,260	\$ -	\$ 34,115	\$ 34,115
16	2029	0.555		\$ 59,260	\$ 59,260	\$ -	\$ 32,882	\$ 32,882
17	2030	0.535		\$ 59,260	\$ 59,260	\$ -	\$ 31,693	\$ 31,693
18	2031	0.515	\$ 22,000	\$ 59,260	\$ 81,260	\$ 11,341	\$ 30,548	\$ 41,888
19	2032	0.497		\$ 59,260	\$ 59,260	\$ -	\$ 29,443	\$ 29,443
20	2033	0.479		\$ 59,260	\$ 59,260	\$ -	\$ 28,379	\$ 28,379
21	2034	0.462		\$ 59,260	\$ 59,260	\$ -	\$ 27,353	\$ 27,353
Total Alternative Yah-Ta-Hey			\$ 1,589,912	\$ 1,303,720	\$ 2,893,632	\$ 1,567,036	\$ 910,102	\$ 2,477,138

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 15,239
Electricity	46452	KWH	\$ 0.08	\$ 3,716
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 15,239
Total Year 1 Operations and Maintenance				\$ 59,260

2060 HOUSEHOLDS
 ESTIMATE: 155

Monthly charge \$ 31.95

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Yah-Ta-Hey
 ALTERNATIVE: Ya-Ta-Hey-Groundwater Alternative- Drill additional well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 157,840	\$ 24,622	\$ 182,463	\$ 157,840	\$ 24,622	\$ 182,463
1	2014	0.964		\$ 24,622	\$ 24,622	\$ -	\$ 23,732	\$ 23,732
2	2015	0.929		\$ 24,622	\$ 24,622	\$ -	\$ 22,875	\$ 22,875
3	2016	0.895		\$ 24,622	\$ 24,622	\$ -	\$ 22,048	\$ 22,048
4	2017	0.863		\$ 24,622	\$ 24,622	\$ -	\$ 21,251	\$ 21,251
5	2018	0.832		\$ 24,622	\$ 24,622	\$ -	\$ 20,483	\$ 20,483
6	2019	0.802		\$ 24,622	\$ 24,622	\$ -	\$ 19,742	\$ 19,742
7	2020	0.773		\$ 24,622	\$ 24,622	\$ -	\$ 19,029	\$ 19,029
8	2021	0.745		\$ 24,622	\$ 24,622	\$ -	\$ 18,341	\$ 18,341
9	2022	0.718		\$ 24,622	\$ 24,622	\$ -	\$ 17,678	\$ 17,678
10	2023	0.692		\$ 24,622	\$ 24,622	\$ -	\$ 17,039	\$ 17,039
11	2024	0.667		\$ 24,622	\$ 24,622	\$ -	\$ 16,423	\$ 16,423
12	2025	0.643		\$ 24,622	\$ 24,622	\$ -	\$ 15,830	\$ 15,830
13	2026	0.620		\$ 24,622	\$ 24,622	\$ -	\$ 15,258	\$ 15,258
14	2027	0.597		\$ 24,622	\$ 24,622	\$ -	\$ 14,706	\$ 14,706
15	2028	0.576		\$ 24,622	\$ 24,622	\$ -	\$ 14,175	\$ 14,175
16	2029	0.555		\$ 24,622	\$ 24,622	\$ -	\$ 13,662	\$ 13,662
17	2030	0.535		\$ 24,622	\$ 24,622	\$ -	\$ 13,168	\$ 13,168
18	2031	0.515		\$ 24,622	\$ 24,622	\$ -	\$ 12,692	\$ 12,692
19	2032	0.497		\$ 24,622	\$ 24,622	\$ -	\$ 12,234	\$ 12,234
20	2033	0.479		\$ 24,622	\$ 24,622	\$ -	\$ 11,791	\$ 11,791
21	2034	0.462		\$ 24,622	\$ 24,622	\$ -	\$ 11,365	\$ 11,365
Total Alternative Yah-Ta-Hey			\$ 157,840	\$ 541,693	\$ 699,533	\$ 157,840	\$ 378,146	\$ 535,986

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ -	\$ -
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 1,578
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 1,578
Total Year 1 Operations and Maintenance				\$ 24,622

2060 HOUSEHOLDS
 ESTIMATE: 155
 Monthly charge \$ 13.28

DESCRIPTION	UNIT	UNIT PRICE	EXPLANATION	SOURCE
Chemicals	MO	300	From Chemdirect.com- cost of 55 gal drum of 12.5%	Vendor
Maintenance and Replacement	%	0.01	Annual- Repair and replacement	Professional opinion
Electricity	KWH	0.08	Gallup Electric	Gallup Electric Website
Clean Tank and Repaint (~100,000 gal)	LS	7000	Every 6 years per 2006 Community water System Survey table 46	Budget estimate from D&R Tank
Clean Tank and Repaint (+200,000 gal)	LS	9000	Every 6 years per 2006 Community water System Survey table 46	Budget estimate from D&R Tank
Labor, Class 1 Operator	WK	412.8	part time(20 hrs) includes overhead, insurance, medical etc	2006 Community Water System Survey EPA- Table 84
Labor, Class 1 Operator	WK	825.6	full time(40 hrs) includes overhead, insurance, medical etc	2006 Community Water System Survey EPA- Table 84
Overhead and Administration	%	0.01	General and Administration Annual Costs	Professional opinion

Well rehab and pump replacement costs

Allison	15000
Catalpa	18000
Cipriano	12000
Crestview	15000
Coal Basin	18000
Gamerco WSD	22000
Twin Buttes	15000
White Cliffs	15000
Williams Acres	42000
Yah ta hey	15000

KWH per site

Allison	11520
Catalpa	36047
Cipriano	10034
Crestview	34560
Coal Basin	12635
Gamerco WSD	179862
Twin Buttes	21182
White Cliffs	17838
Williams Acres	66891
Yah ta hey	46452

Givens

70 GPCD

2.84 Persons per household

1000 GPM fire flow

120 minutes of fire flow required

<http://pwwatts.nrel.gov/pwwatts.php>
For a system with 16% efficient PV modules, this corresponds to an array area of approximately 25 m2 (269 ft2): 4 kW ÷ 1 kW/ m2 ÷ 16% = 25 m2.

Current Estimated Demand

Site	Plat with subdivisions?	Current Households	Current Estimatede Population	Current Demand (GPD)	Current Demand (GPY)	Current Demand (ac-ft/yr)	Average GPM (pumping 18 hours/day)	Horsepower	KWH (annually)
Allison	x	31	88.04	6,163	2,249,422	6.9	5.7	2.1	9318
Catalpa	x	97	275.48	19,284	7,038,514	21.6	17.9	6.7	29156
Cipriano	x	27	76.68	5,368	1,959,174	6.0	5.0	1.9	8116
Crestview	x	93	264.12	18,488	6,748,266	20.7	17.1	6.4	27954
Coal Basin		34	96.56	6,759	2,467,108	7.6	6.3	2.3	10220
Gamerco WSD	x	484	1374.56	96,219	35,120,008	107.8	89.1	33.2	145482
Twin Buttes		57	161.88	11,332	4,136,034	12.7	10.5	3.9	17133
White Cliffs		48	136.32	9,542	3,482,976	10.7	8.8	3.3	14428
Williams Acres	x	180	511.2	35,784	13,061,160	40.1	33.1	12.4	54105
Yah ta hey	x	125	355	24,850	9,070,250	27.8	23.0	8.6	37573

1,1763,340233,78985,332,912262

Estimated Demand at Full Buildout

Site	Plat with subdivisions?	Current Households	Future houses (from DePauli)	Total houses full build-out	Demand (GPD)	Demand (GPY)	Demand (ac-ft/yr)	Storage Tank Size (gal)	Average GPM (pumping 18 hours/day)	Horsepower	KWH (annually)
Allison	x	31	83	114	22,663	8,272,068	25.4	170,000	21.0	7.8	34266
Catalpa	x	97	109	206	40,953	14,947,772	45.9	210,000	37.9	14.1	61920
Cipriano	x	27	57	84	16,699	6,095,208	18.7	160,000	15.5	5.8	25249
Crestview	x	93	67	160	31,808	11,609,920	35.6	190,000	29.5	11.0	48093
Coal Basin		34	134	168	33,398	12,190,416	37.4	190,000	30.9	11.5	50498
Gamerco WSD	x	484	0	484	96,219	35,120,008	107.8	320,000	89.1	33.2	145482
Twin Buttes		57	110	167	33,200	12,117,854	37.2	190,000	30.7	11.5	50197
White Cliffs		48	99	147	29,224	10,666,614	32.7	180,000	27.1	10.1	44185
Williams Acres	x	180	381	561	111,527	40,707,282	124.9	350,000	103.3	38.5	168626
Yah ta hey	x	125	37	162	32,206	11,755,044	36.1	190,000	29.8	11.1	48694

1,1761,0772,253447,896163,482,186502

Estimated Demand in 2060

Site	Plat with subdivisions?	Current Households	Population increase to 2060 by 2012 comprehensive plan (households)	Total houses 2012 plan	Demand (GPD)	Demand (GPY)	Demand (ac-ft/yr)	Storage Tank Size (gal)	Average GPM (pumping 18 hours/day)	Horsepower	KWH (annually)
Allison	x	31	7	38	7,619	2,781,009.92	8.5	140,000	7.1	2.6	11520
Catalpa	x	97	23	120	23,841	8,701,869.74	26.7	170,000	22.1	8.2	36047
Cipriano	x	27	6	33	6,636	2,422,169.93	7.4	140,000	6.1	2.3	10034
Crestview	x	93	22	115	22,858	8,343,029.75	25.6	170,000	21.2	7.9	34560
Coal Basin		34	8	42	8,357	3,050,139.91	9.4	140,000	7.7	2.9	12635
Gamerco WSD	x	484	114	598	118,958	43,419,638.68	133.2	360,000	110.1	41.1	179862
Twin Buttes		57	13	70	14,010	5,113,469.84	15.7	150,000	13.0	4.8	21182
White Cliffs		48	11	59	11,797	4,306,079.87	13.2	150,000	10.9	4.1	17838
Williams Acres	x	180	43	223	44,241	16,147,799.51	49.6	210,000	41.0	15.3	66891
Yah ta hey	x	125	30	155	30,723	11,213,749.66	34.4	120,000	28.4	10.6	46452

1,1762781,454289,038105,498,957324

7
23
6
22
8
114
13
11
43
30

Solar cost estimate

<http://www.nrel NREL>

<http://solarpowerauthority.com/how-much-does-it-cost-to-install-solar-on-an-average-us-house/>

kWh/day	kW/h	kWh/m ² /day	kW production per m ²	kWh/day production/ m2	ft ² of panels	\$7/watt
25.52884995	1.063702	6.5	16%	1.04	264	\$ 7,445.91
79.88059501	3.328358				826	\$ 23,298.51
22.2348048	0.92645				230	\$ 6,485.15
76.58654985	3.191106				792	\$ 22,337.74
27.99938382	1.166641				290	\$ 8,166.49
398.5794637	16.60748				4124	\$ 116,252.34
46.94014346	1.955839				486	\$ 13,690.88
39.52854186	1.647023				409	\$ 11,529.16
148.232032	6.176335				1534	\$ 43,234.34
102.9389111	4.289121				1065	\$ 30,023.85

236,195.36
739,062.91
205,718.54
708,586.09
259,052.98
3,687,695.34
434,294.70
365,721.85
1,371,456.94
952,400.66
8,960,185.37

Givens

142

GPCD

2.84 Persons per household

1000 GPM fire flow

120 minutes of fire flow required

<http://pvwatts.nrel.gov/pvwatts.php>
For a system with 16% efficient PV modules, this corresponds to an array area of approximately 25 m2 (269 ft2): 4 kW ÷ 1 kW/ m2 ÷ 16% = 25 m2.

Current Estimated Demand

Site	Plat with subdivisions?	Current Households	Current Estimatede Population	Current Demand (GPD)	Current Demand (GPY)	Current Demand (ac-ft/yr)	Average GPM (pumping 18 hours/day)	Horsepower	KWH (annually)
Allison	x	31	88.04	12,502	4,563,113	14.0	11.6	4.3	18902
Catalpa	x	97	275.48	39,118	14,278,128	43.8	36.2	13.5	59146
Cipriano	x	27	76.68	10,889	3,974,324	12.2	10.1	3.8	16463
Crestview	x	93	264.12	37,505	13,689,340	42.0	34.7	12.9	56707
Coal Basin		34	96.56	13,712	5,004,705	15.4	12.7	4.7	20732
Gamerco WSD	x	484	1374.56	195,188	71,243,445	218.6	180.7	67.4	295120
Twin Buttes		57	161.88	22,987	8,390,240	25.7	21.3	7.9	34756
White Cliffs		48	136.32	19,357	7,065,466	21.7	17.9	6.7	29268
Williams Acres	x	180	511.2	72,590	26,495,496	81.3	67.2	25.1	109755
Yah ta hey	x	125	355	50,410	18,399,650	56.5	46.7	17.4	76219

1,1763,340474,257173,103,907531

Estimated Demand at Full Buildout

Site	Plat with subdivisions?	Current Households	Future houses (from DePauli)	Total houses full build-out	Demand (GPD)	Demand (GPY)	Demand (ac-ft/yr)	Storage Tank Size (gal)	Average GPM (pumping 18 hours/day)	Horsepower	KWH (annually)
Allison	x	31	83	114	45,974	16,780,481	51.5	220,000	42.6	15.9	69512
Catalpa	x	97	109	206	83,076	30,322,623	93.1	290,000	76.9	28.7	125609
Cipriano	x	27	57	84	33,876	12,364,565	37.9	190,000	31.4	11.7	51219
Crestview	x	93	67	160	64,525	23,551,552	72.3	250,000	59.7	22.3	97560
Coal Basin		34	134	168	67,751	24,729,130	75.9	260,000	62.7	23.4	102438
Gamerco WSD	x	484	0	484	195,188	71,243,445	218.6	520,000	180.7	67.4	295120
Twin Buttes		57	110	167	67,348	24,581,932	75.4	260,000	62.4	23.2	101828
White Cliffs		48	99	147	59,282	21,637,988	66.4	240,000	54.9	20.5	89633
Williams Acres	x	180	381	561	226,240	82,577,629	253.4	580,000	209.5	78.1	342070
Yah ta hey	x	125	37	162	65,331	23,845,946	73.2	260,000	60.5	22.6	98780

1,1761,0772,253908,590331,635,2921,018

Estimated Demand in 2060

Site	Plat with subdivisions?	Current Households	Population increase to 2060 by 2012 comprehensive plan (households)	Total houses 2012 plan	Demand (GPD)	Demand (GPY)	Demand (ac-ft/yr)	Storage Tank Size (gal)	Average GPM (pumping 18 hours/day)	Horsepower	KWH (annually)
Allison	x	31	7	38	15,456	5,641,477.26	17.3	160,000	14.3	5.3	23369
Catalpa	x	97	23	120	48,363	17,652,364.32	54.2	220,000	44.8	16.7	73123
Cipriano	x	27	6	33	13,462	4,913,544.71	15.1	150,000	12.5	4.6	20354
Crestview	x	93	22	115	46,368	16,924,431.77	51.9	220,000	42.9	16.0	70108
Coal Basin		34	8	42	16,952	6,187,426.67	19.0	160,000	15.7	5.9	25631
Gamerco WSD	x	484	114	598	241,315	88,079,838.47	270.3	610,000	223.4	83.3	364863
Twin Buttes		57	13	70	28,419	10,373,038.83	31.8	180,000	26.3	9.8	42969
White Cliffs		48	11	59	23,932	8,735,190.59	26.8	170,000	22.2	8.3	36185
Williams Acres	x	180	43	223	89,745	32,756,964.72	100.5	300,000	83.1	31.0	135693
Yah ta hey	x	125	30	155	62,323	22,747,892.17	69.8	120,000	57.7	21.5	94231

1,1762781,454586,335214,012,170657

<http://solarpowerauthority.com/how-much-does-it-cost-to-install-solar-on-an-average-us-house/>

Solar cost estimate

<http://www.nrel> NREL

kWh/day	kW/h	kWh/m ² /day	kW production per m ²	kWh/day production/ m2	ft ² of panels	\$7/watt
51.78709561	2.157796	6.5	16%	1.04	536	\$ 15,104.57
162.0434927	6.751812				1677	\$ 47,262.69
45.10488973	1.87937				467	\$ 13,155.59
155.3612868	6.473387				1607	\$ 45,313.71
56.79875003	2.366615				588	\$ 16,566.30
808.5469122	33.68945				8365	\$ 235,826.18
95.22143387	3.96756				985	\$ 27,772.92
80.18647063	3.341103				830	\$ 23,387.72
300.6992649	12.52914				3111	\$ 87,703.95
208.8189339	8.700789				2160	\$ 60,905.52

479,139.16
1,499,241.90
417,314.76
1,437,417.49
525,507.47
7,480,753.40
880,997.82
741,892.90
2,782,098.37
1,932,012.76
18,176,376.04

7
23
6
22
8
114
13
11
43
30

Estimated Space Requirements and Capital Cost for Grid Connected Solar Systems

Community	Demands (2060) (gpd)	HP based on 800' lift	Annual Electric Usage (kWh)	Space Rqd (SF)	Capital Cost
Allison	7,619	2	9,664	650	\$18,000
Catalpa	23,841	6	30,240	2,034	\$56,000
Cipriano Lewis	6,636	2	8,417	566	\$16,000
Crestview	22,858	6	28,994	1,951	\$53,000
Coal Basin	8,357	2	10,600	713	\$20,000
Gamerco WSD	118,958	31	150,889	10,151	\$278,000
Twin Buttes	14,010	4	17,771	1,196	\$33,000
White Cliffs	11,797	3	14,964	1,007	\$28,000
Williams Acres	44,241	11	56,116	3,775	\$103,000
Yah-ta-hey	30,723	8	38,970	2,622	\$72,000

Estimated monthly water bill if connected to NTUA or City of Gallup

<http://www.gallupnm.gov/ArchiveCenter/ViewFile/Item/99>

From City of Gallup Joint Utility rates 2012

Monthly Meter Charge

Size	Charge
individual dwelling	8.84
8" meter- community	732.88
Per capita demand for rural self-supplied homes* (gpd)	70
Per capita demand for City of Gallup* (gpd)	142
Capita per household	2.84

* New Mexico Office of the State Engineer, Technical Report #54, New Mexico Water Use by Category 2010

	Cents/cubic foot	Maximum of Range for Residential Charge (cubic feet)	Commercial Charge	
Residential Charge				
0-500 cf	0.020973	500	0 to 1,000 cf	0.040953 \$/cf
501-1000 cf	0.031116	1000	1,001 to 2,000 cf	0.042064 \$/cf
1001- 2000 cf	0.052331	1500	2,001 to 4,000 cf	0.046329 \$/cf
2000-5000 cf	0.083447	2000	4,001 to 100,000 cf	0.050046 \$/cf
Over 5000 cf	0.096176	2500	Over 100,000 cf	0.050097 \$/cf

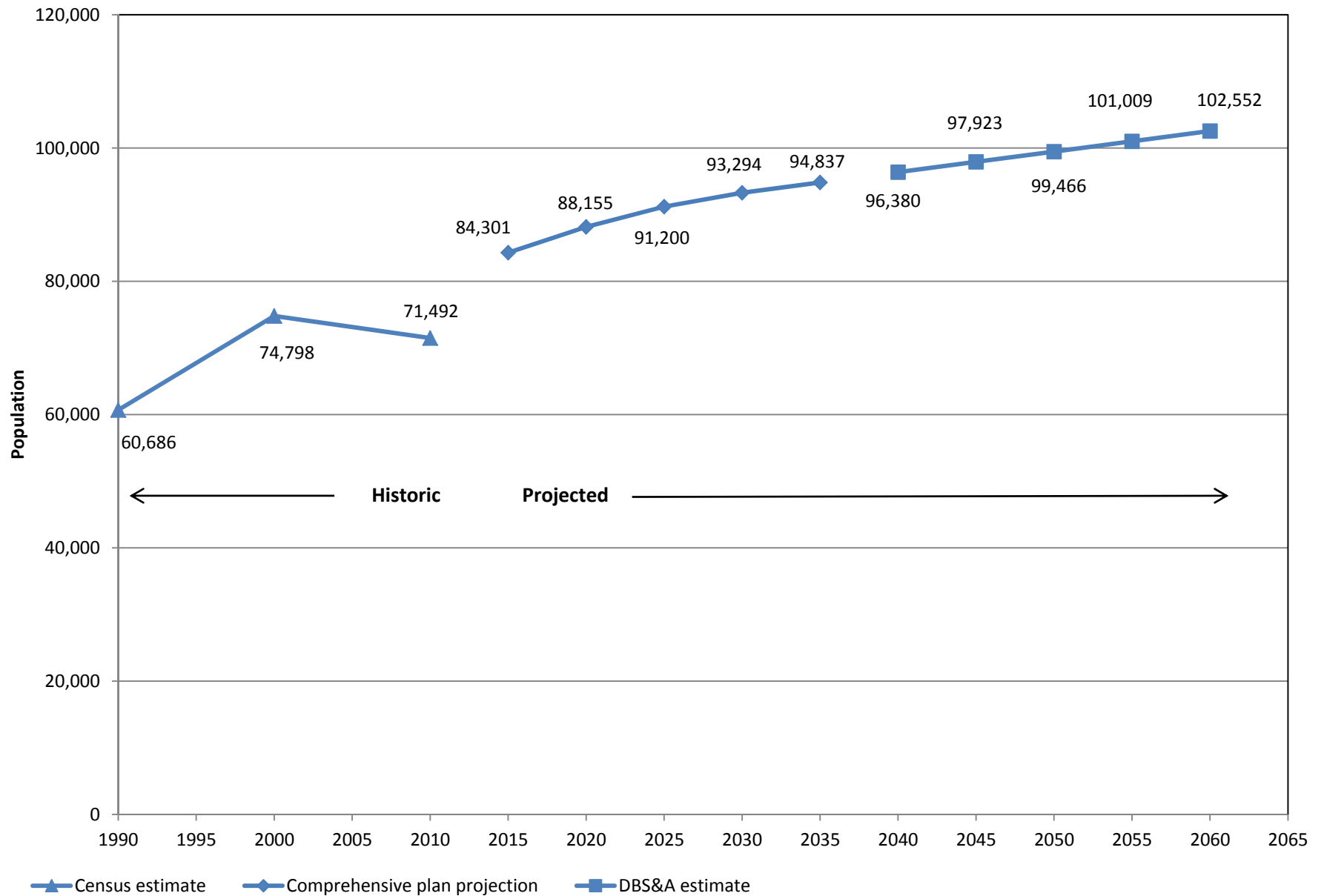
Individual Dwelling Water Charges for Connection Alternative based on Rural Self-supplied Homes demand			
Community	2060 Connections	Total Individual Connection Demand (gal/month)	Individual Charges
Allison	38	6,163	\$ 34.47
Catalpa Hills	120	6,163	\$ 34.47
Cipriano Lewis	33	6,163	\$ 34.47
Crestview	115	6,163	\$ 34.47
Coal Basin	42	6,163	\$ 34.47
Gamerco WSD	598	6,163	\$ 34.47
Twin Buttes	70	6,163	\$ 34.47
White Cliffs	59	6,163	\$ 34.47
Williams Acres	223	6,163	\$ 34.47
Yah ta hey	155	6,163	\$ 34.47

Individual Dwelling Water Charges for Connection Alternative based on City of Gallup			
Community	2060 Connections	Total Individual Connection Demand (gal/month)	Individual Charges
Allison	38	12,502	\$ 96.29
Catalpa Hills	120	12,502	\$ 96.29
Cipriano Lewis	33	12,502	\$ 96.29
Crestview	115	12,502	\$ 96.29
Coal Basin	42	12,502	\$ 96.29
Gamerco WSD	598	12,502	\$ 96.29
Twin Buttes	70	12,502	\$ 96.29
White Cliffs	59	12,502	\$ 96.29
Williams Acres	223	12,502	\$ 96.29
Yah ta hey	155	12,502	\$ 96.29

Water Charges for Master Meter Alternative based on Rural Self-Supplied Homes Demand					
Community	2060 Connections	Total Individual Connection Demand (gal/month)	Total Community Demand (gal/month)	Master Meter Charges for Each Community	Cost per Connection for Master Meter Alternative
Allison	38	6,163	236,195	\$ 2,312.97	\$ 60.35
Catalpa Hills	120	6,163	739,063	\$ 5,677.02	\$ 47.34
Cipriano Lewis	33	6,163	205,719	\$ 2,109.09	\$ 63.18
Crestview	115	6,163	708,586	\$ 5,473.14	\$ 47.60
Coal Basin	42	6,163	259,053	\$ 2,465.88	\$ 58.66
Gamerco WSD	598	6,163	3,687,695	\$ 25,427.77	\$ 42.49
Twin Buttes	70	6,163	434,295	\$ 3,638.20	\$ 51.63
White Cliffs	59	6,163	365,722	\$ 3,179.47	\$ 53.58
Williams Acres	223	6,163	1,371,457	\$ 9,916.93	\$ 44.56
Yah ta hey	155	6,163	952,401	\$ 7,110.69	\$ 46.01

Water Charges for Master Meter Alternative based on City of Gallup Demand					
Community	2060 Connections	Total Individual Connection Demand (gal/month)	Total Community Demand (gal/month)	Master Meter Charges for Each Community	Cost per Connection for Master Meter Alternative
Allison	38	12,502	479,139	\$ 3,938.20	\$ 102.76
Catalpa Hills	120	12,502	1,499,242	\$ 10,762.43	\$ 89.74
Cipriano Lewis	33	12,502	417,315	\$ 3,524.61	\$ 105.59
Crestview	115	12,502	1,437,417	\$ 10,348.84	\$ 90.01
Coal Basin	42	12,502	525,507	\$ 4,248.39	\$ 101.07
Gamerco WSD	598	12,502	7,480,753	\$ 50,828.23	\$ 84.94
Twin Buttes	70	12,502	880,998	\$ 6,626.53	\$ 94.03
White Cliffs	59	12,502	741,893	\$ 5,695.96	\$ 95.98
Williams Acres	223	12,502	2,782,098	\$ 19,363.38	\$ 87.01
Yah ta hey	155	12,502	1,932,013	\$ 13,670.73	\$ 88.46

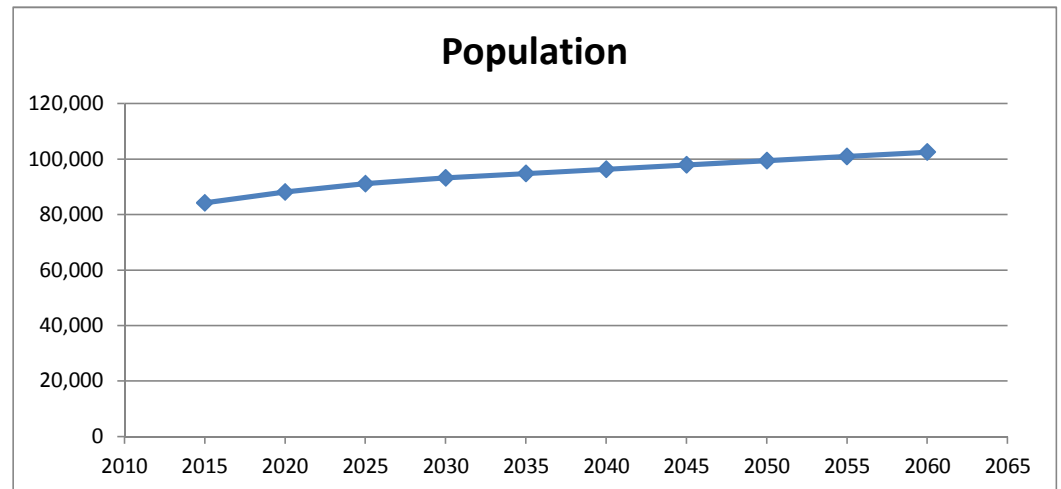
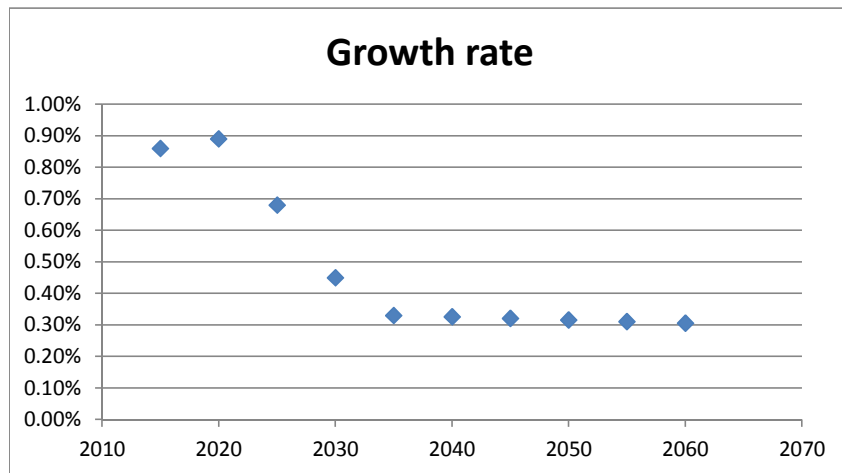
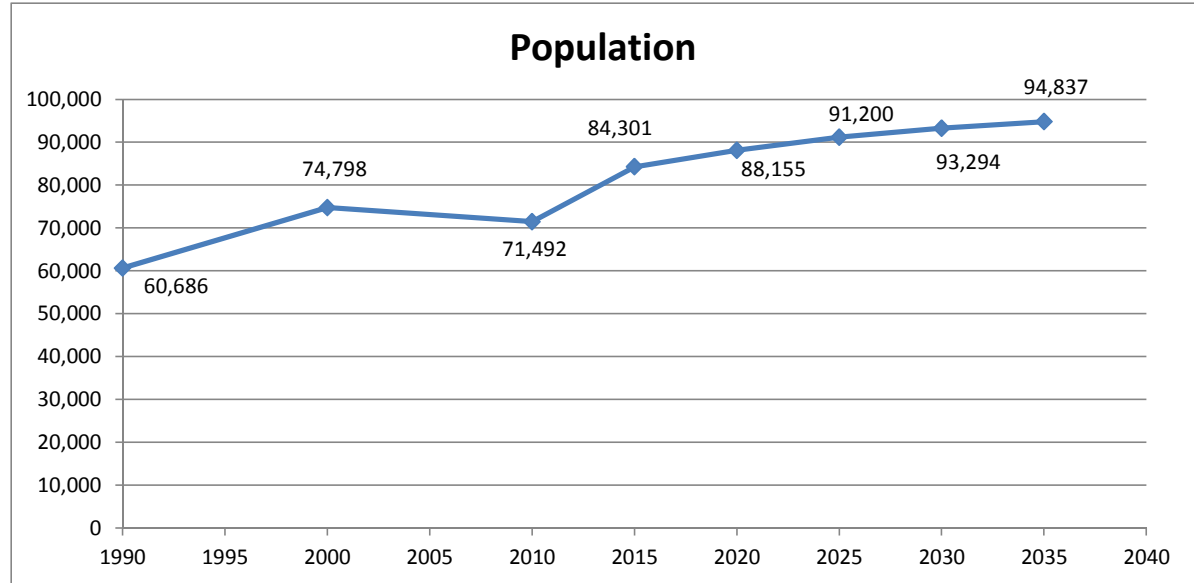
McKinley County Historic and Projected Population, 1990 to 2060



Comprehensive Plan

Year	Population	Growth Rate	% check
1990	60,686	0.70%	
2000	74,798	2.10%	2.3%
2010	71,492	-0.50%	-0.4%
2015	84,301	0.86%	3.58%
2020	88,155	0.89%	0.91%
2025	91,200	0.68%	0.69%
2030	93,294	0.45%	0.46%
2035	94,837	0.33%	0.33%
2040	96,380	0.33%	DBS&A estimate
2045	97,923	0.32%	DBS&A estimate
2050	99,466	0.32%	DBS&A estimate
2055	101,009	0.31%	DBS&A estimate
2060	102,552	0.31%	DBS&A estimate

Source: McKinley County, New Mexico Comprehensive Plan Update - September 2012
<http://www.theprosperitycollaborative.com/>



Site	2013		2014		2015		2016		2017		2018		2019	
	Households	Population	Households	Population	Households	Population	Households	Population	Households	Population	Households	Population	Households	Population
Allison	31	88	31	89	32	90	32	90	32	91	32	92	33	93
Catalpa	97	275	98	278	99	280	100	283	100	285	101	288	102	290
Cipriano	27	77	27	77	27	78	28	79	28	79	28	80	28	81
Crestview	93	264	94	266	95	269	95	271	96	273	97	276	98	278
Coal Basin	34	97	34	97	35	98	35	99	35	100	36	101	36	102
Gamerco WSD	484	1,375	488	1,386	492	1,398	497	1,411	501	1,423	506	1,436	510	1,449
Twin Buttes	57	162	57	163	58	165	59	166	59	168	60	169	60	171
White Cliffs	48	136	48	137	49	139	49	140	50	141	50	142	51	144
Williams Acres	180	511	182	516	183	520	185	525	186	529	188	534	190	539
Yah ta hey	125	355	126	358	127	361	128	364	129	368	131	371	132	374
Total	1,176	3,340	1,186	3,369	1,196	3,398	1,207	3,428	1,218	3,458	1,229	3,489	1,239	3,520

Assumptions: McKinley County Comprehensive Plan, 2012

Household size	2.84	Gallup Metro
Annual growth rate	0.86%	2013 to 2015
	0.89%	2015 to 2020
	0.68%	2020 to 2025
	0.45%	2025 to 2030
	0.33%	2030 to 2035
	0.33%	2035 to 2040 DBS&A estimate
	0.32%	2040 to 2045 DBS&A estimate
	0.32%	2045 to 2050 DBS&A estimate
	0.31%	2050 to 2055 DBS&A estimate
	0.31%	2055 to 2060 DBS&A estimate

Site	2020		2021		2022		2023		2024		2025		2030	
	Households	Population	Households	Population	Households	Population	Households	Population	Households	Population	Households	Population	Households	Population
Allison	33	94	33	94	33	95	34	96	34	96	34	97	35	99
Catalpa	103	293	104	295	105	297	105	299	106	301	107	303	109	310
Cipriano	29	82	29	82	29	83	29	83	29	84	30	84	30	86
Crestview	99	281	100	283	100	285	101	287	102	289	102	291	105	297
Coal Basin	36	103	36	103	37	104	37	105	37	105	37	106	38	109
Gamerco WSD	515	1,462	518	1,472	522	1,482	525	1,492	529	1,502	532	1,512	544	1,546
Twin Buttes	61	172	61	173	61	174	62	176	62	177	63	178	64	182
White Cliffs	51	145	51	146	52	147	52	148	52	149	53	150	54	153
Williams Acres	191	544	193	547	194	551	195	555	197	559	198	562	202	575
Yah ta hey	133	377	134	380	135	383	136	385	137	388	138	391	141	399
Total	1,251	3,551	1,259	3,576	1,268	3,600	1,276	3,624	1,285	3,649	1,294	3,674	1,323	3,757

Site	2035		2040		2045		2050		2055		2060		Total Increase From 2013 to 2060 in Households
	Households	Population	Households	Population	Households	Population	Households	Population	Households	Population	Households	Population	
Allison	35	101	36	102	37	104	37	106	38	107	38	109	7
Catalpa	111	315	113	320	115	325	116	330	118	335	120	341	23
Cipriano	31	88	31	89	32	91	32	92	33	93	33	95	6
Crestview	106	302	108	307	110	312	112	317	113	322	115	327	22
Coal Basin	39	110	40	112	40	114	41	116	41	118	42	119	8
Gamerco WSD	553	1,572	562	1,597	571	1,623	580	1,648	589	1,674	598	1,699	114
Twin Buttes	65	185	66	188	67	191	68	194	69	197	70	200	13
White Cliffs	55	156	56	158	57	161	58	163	58	166	59	169	11
Williams Acres	206	584	209	594	212	603	216	613	219	622	223	632	43
Yah ta hey	143	406	145	412	148	419	150	426	152	432	155	439	30
Total	1,345	3,818	1,366	3,881	1,388	3,943	1,410	4,005	1,432	4,067	1,454	4,129	278

This spreadsheet calculates the potential ability of water users to pay for water system improvements. The calculation is based on "Assessing the financial and economic feasibility of rural water system improvements", by Steven Piper and Wade Martin, from *Impact Assessment and Project Appraisal*, volume 17, number 3, September 1999, pages 171–182, Beech Tree Publishing, 10 Watford Close, Guildford, Surrey GU1 2EP, UK.

Equations

Residual Income (RI) = [(household income) - (home payment) - (non-water utilities) - (insurance and tax payments)]/1000

Ability to Pay Factor (ABF) = average water bill paid/RI

Ability to Pay = ABF / RI

Givens

Outside Study Area Household income	\$	16,000.00
Outside Study Area Average home payment	\$	525.00
Outside Study Area Non-water utilities	\$	60.00
Outside Study Area Insurance/Tax	\$	1,450.00
average water bill	\$	35.00

Calculations for Outside Study Area

Residual Income (\$1,000)	\$	13.97
Ability to Pay Factor		2.51

Inside study area

Study Area Household income ¹	\$	41,848.00
Study Area Average home payment ²	\$	903.25
Study Area Non-water utilities ³	\$	123.34
Study Area Insurance/Tax ⁴	\$	148.67

Calculations for Study Area

Residual Income (\$1,000)	\$	40.67
Ability to pay		101.9

1 Average of 2010 census data adjusted to 2011 inflation dollars

2 Average of Williams Acres, Coal Basin, Twin Buttes, Gallup rental cost for 1400 ft² family trailer

3 Based on collected information for Ya Ta Hey

4 Average of Williams Acres, Coal Basin, Twin Buttes, Gallup rental cost for 1400 ft² family trailer

Calculate Household Income for Study Area

average of ten communities	\$	41,848.00
Average home payment	\$	903.25
Non-water utilities (gas, electricity, sewer)	\$	123.34
Insurance/tax	\$	148.67

Ability to Pay^a

	Number of connections in 2060	Monthly Utility cost W/O water (\$)	Median Household Income In 2011 Inflation-Adjusted Dollars ²	Insurance ³ (\$)	Property Taxes per household ⁴ (\$)	Annual housing cost ⁵ (\$)	Residual income (\$1,000)	Ability to Pay Factor ⁶	Average Water Bill ⁷ (\$)	Ability to Pay (\$)
Community										
Outside Area ¹		\$ 123.34	\$ 40,890.00	\$ 730.00	\$ 1,567.00	\$ 6,336.00	\$ 30.8	0.98	\$ 30.09	-
Allison ¹⁰	38	\$ 123.34	\$ 27,872.00	\$ 730.00	\$ 1,583.00	\$ 5,688.00	\$ 18.4	-	\$ 54.68	\$ 18
Catalpa ¹⁰	120	\$ 123.34	\$ 68,155.00	\$ 730.00	\$ 1,583.00	\$ 5,688.00	\$ 58.7	-	\$ 54.68	\$ 57
Cipriano Lewis ¹⁰	33	\$ 123.34	\$ 38,750.00	\$ 730.00	\$ 1,583.00	\$ 5,688.00	\$ 29.3	-	\$ 54.68	\$ 29
Crestview ¹⁰	115	\$ 123.34	\$ 31,628.00	\$ 730.00	\$ 1,583.00	\$ 5,688.00	\$ 22.1	-	\$ 54.68	\$ 22
Coal Basin ⁸	42	\$ 123.34	\$ 37,143.00	\$ 730.00	\$ 1,583.00	\$ 5,688.00	\$ 27.7	-	\$ 37.00	\$ 27
Gamerco WSD	598	\$ 123.34	\$ 26,875.00	\$ 730.00	\$ 1,583.00	\$ 5,688.00	\$ 17.4	-	\$ 33.80	\$ 17
Twin Buttes ¹⁰	70	\$ 123.34	\$ 27,872.00	\$ 730.00	\$ 1,583.00	\$ 5,688.00	\$ 18.4	-	\$ 54.68	\$ 18
White Cliffs ⁸	59	\$ 123.34	\$ 29,844.00	\$ 730.00	\$ 1,583.00	\$ 5,688.00	\$ 20.4	-	\$ 21.00	\$ 20
Williams Acres ^{8,9}	223	\$ 123.34	\$ 31,628.00	\$ 730.00	\$ 1,583.00	\$ 5,688.00	\$ 22.1	-	\$ 27.50	\$ 22
Yah ta hey	155	\$ 123.34	\$ 25,227.00	\$ 730.00	\$ 1,583.00	\$ 5,688.00	\$ 15.7	-	\$ 9.66	\$ 15

¹<http://www.city-data.com/housing/houses-Grants-New-Mexico.html#ixzz2qPVzYgNM>

²2010 Census data base

³<http://www.ehealthinsurance.com/individual-family-health-insurance>

⁴http://nmdfa.state.nm.us/Certificate_of_Property_Tax.aspx

⁵<http://www.city-data.com/housing/houses-Gallup-New-Mexico.html>

⁶Methodology taken from "Assessing the financial and economic feasibility of ruralwater system improvements" Steven Piper & Wade Martin

⁷Outside area (Grants, New Mexico) water bill data taken from New Mexico Environment DepartmentConstruction Programs BureauMunicipal Water and Wastewater User Charge Survey for 2011 Rates

⁸Census income area adjusted to remove City of Gallup data

⁹Williams Acres is an average of data from 4 of the individual water systems in the community

¹⁰Bills for communities with individual wells were based on estimated individual demand, amortized well installation costs, and pumping costs

^a Steven Piper & Wade Martin (1999) Assessing the financial and economic feasibility of rural water system improvements, Impact Assessment and Project Appraisal, 17:3, 171-182, DOI: 10.3152/147154699781767819

Comparison of Ability to Pay and Estimated Water Bills

Community	Ability to Pay (\$)	Estimated Water Bill Groundwater Alternative	Estimated Water Bill Master Meter Alternative	Estimated Water Bill with Connection and Operation by Municipal Utility
Outside Area ¹				
Allison	18	\$ 153.78	\$ 228.48	\$ 34.47
Catalpa	57	\$ 68.54	\$ 56.06	\$ 34.47
Cipriano Lewis	29	\$ 180.71	\$ 282.81	\$ 34.47
Crestview	22	\$ 66.33	\$ 261.53	\$ 34.47
Coal Basin ⁸	27	\$ 123.91	\$ 108.96	\$ 34.47
Gamerco WSD	17	\$ 20.28	\$ 14.20	\$ 34.47
Twin Buttes	18	\$ 110.71	\$ 114.28	\$ 34.47
White Cliffs ⁸	20	\$ 137.32	\$ 231.06	\$ 34.47
Williams Acres ⁸	22	\$ 38.28	\$ 55.84	\$ 34.47
Yah ta hey	15	\$ 31.95	\$ 13.28	\$ 34.47

Average depth of wells (ft)		Amortize well costs included in a 30 year mortgage			Total monthly cost for individual well
474					
Average monthly demand (gal)		Well installation costs	Annual Interest	Number of monthly payments	\$54.68
6163		10000	0.05	360	
Average daily demand (gal)		Monthly payment			
199	1.65672	\$53.46			
Pumping horsepower (HP)					
0.31					
Pumping time (hours)					
2					
kWh per day					
0.5					
Cost per kWh* (\$)					
0.085					
Cost per month (\$)					
1.22					

*Continental divide rate per kWh from: <http://www.cdec.coop/content/residential-rate-general-service>



**James,
Cooke, &
Hobson, Inc.**

Sales Engineers

**To: Jennifer Hill
DBS&A**

**From: Bill Curb
JCH/ James, Cooke, and Hobson, Inc.**

**Re: JCH Budget Quote #126-ABQ-PULSA-15
McKinley County Chemical Feed**

Date: May 5, 2015

Jennifer

With more details, we can fine tune the selection etc. We can also provide as a skid mounted system – ref attached for some possibilities – skid mounted
Submittals issued 1 - 2 weeks after receipt of order.

Pump shipment 2 – 4 weeks after receipt of approved submittals and release to manufacture.
Please add 1 week to these for time in transit via overland truck.

This proposal does not include:

construction, installation, mounting hardware, air or liquid piping gaskets, flange bolt kits, connecting cables, any hardware and materials not specifically described.
Power connections, wiring, junction boxes, conduit, are not included in JCH scope of supply. Videotaping of training if required supplied by other than JCH

Tank and Pump System

One (1) 55 gallon HDPE tank with stand, bottom outlet, installed bulk head fitting, ball valve and Y strainer
One (1) Pulsafeeder Model DL-1001 ultrasonic transmitter (tank level indication)
One (1) Pulsafeeder E Plus Series Chemical Dosing Pump
3 gpd capacity/ 300 psig pressure rating
120VAC/1/60 power
Budget Cost this Equipment, Freight Allowed, FOB Factory.....\$3,921 per each

Skid Mounted Duplex Chem Feed System

One (1) Sodium Hypochlorite Skid - Duplex skid mounted peristaltic pumps, full redundant piping. Skid will include:

- Two (2) Peristaltic metering pumps with automatic flow pacing and remote START / STOP capable of pumping sodium hypochlorite at a maximum of 0.05 GPH and 50 psig.
- One (1) PVC y-strainer.

- Two (2) PVC calibration columns.
- Two (2) PVC pressure relief valves.
- Two (2) Discharge pressure gauges with PVC diaphragm seals.
- Two (2) PVC back pressure valves.
- One (1) Lot of SCH 80 PVC piping, vented ball valves, unions, etc..
- One (1) High density polyethylene skid base, deck, and backer.
- One (1) Lot of listed / required spare parts
- One (1) Quick disconnect dispenser
- One (1) Skid mounted junction box

Budget price, this equipment....\$15,675

If JCH start-up / training is required, add \$75 per hour and \$1 per mile billed portal to portal)

Please call or e-mail with any questions.

Thank you

Bill Curb

JCH, Inc.

Appendix A2
Full Build-Out

McKinley County

Item	Initial Capital Cost	Annual O&M Cost	Life Cycle Cost Period	Total Present Worth
Allison - Continue relying on individual wells	No Action Alternative			
Allison - Groundwater alternative - Drill community well	\$2,553,424	\$86,862	20	\$3,940,719
Allison - Connection alternative - Connect to Reach 27.3 and master meter	\$1,017,623	\$81,320	20	\$2,853,829
Allison - Connection alternative - Connect to Reach 27.3 and individual meters	\$956,139	\$34	20	\$956,829
Captalpa Hills - Continue relying on individual wells	No Action Alternative			
Catalpa Hills - Groundwater alternative - Drill community well	\$3,976,114	\$119,431	20	\$5,870,858
Catalpa Hills - Connection Aalternative - Connect to proposed Reach 27.12 and master meter	\$1,971,184	\$141,677	20	\$4,780,233
Catalpa Hills - Connection alternative - Connect to proposed Reach 27.12 and individual meter	\$1,923,648	\$34	20	\$1,924,338
Cipriano Lewis - Continue relying on individual wells	No Action Alternative			
Cipriano Lewis - Groundwater alternative - Drill community well and form water system	\$2,561,979	\$83,066	20	\$3,875,293
Cipriano Lewis - Connection alternative - Connect to City of Gallup and master meter	\$955,660	\$77,634	20	\$2,735,259
Cipriano Lewis - Connection alternative - Connect to City of Gallup line	\$890,000	\$34	20	\$890,690
Coal Basin Water Association - Continue relying on individual wells	No Action Alternative			
Coal Basin Water Association - Groundwater alternative - Drill supplemental well	\$2,163,056	\$83,380	20	\$3,496,866
Coal Basin Water Association - Connection alternative - City of Gallup and master meter	\$600,012	\$96,144	20	\$3,639,609
Coal Basin Water Association - Connection alternative - City of Gallup and individual meters	\$759,201	\$34	20	\$759,891
Crestview - Continue relying on individual wells	No Action Alternative			
Crestview - Groundwater alternative - Drill community well and form water system	\$3,704,884	\$108,569	20	\$5,421,269
Crestview - Connection alternative - Connect with NTUA line and master meter	\$1,856,965	\$141,168	20	\$4,869,252
Crestview - Connection alternative - Connect with NTUA and individual meters	\$1,795,481	\$34	20	\$1,796,171
Gamerco W&SD - Continue relying on individual wells	No Action Alternative			
Gamerco W&SD - Groundwater alternative - Redrill permitted well	\$5,338,155	\$256,255	20	\$9,334,431
Gamerco W&SD - Connection alternative - Master meter at emergency connections	\$384,506	\$434,837	20	\$7,779,341
Gamerco W&SD - Connection alternative - Individual meters	\$366,152	\$34	20	\$366,842
Twin Buttes - Continue relying on individual wells	No Action Alternative			
Twin Buttes - Groundwater alternative - Drill community well and form system	\$3,937,416	\$114,955	20	\$5,746,002
Twin Buttes - Connection alternative - Connect to NGWSP line and master meter	\$2,161,095	\$130,638	20	\$5,195,198
Twin Buttes - Connection alternative - Connect to NGWSP and individual meters	\$2,099,611	\$0	20	\$2,099,611
White Cliffs - Continue relying on individual wells	No Action Alternative			
White Cliffs - Connection alternative - Drill supplemental well	\$3,622,862	\$108,398	20	\$5,334,663
White Cliffs - Connection alternative - Connect to NTUA line and master meter	\$1,424,880	\$101,331	20	\$3,641,831
White Cliffs - Connection alternative - Connect to NTUA line and individual meters	\$1,424,880	\$34	20	\$1,425,570
Williams Acres - Continue relying on individual wells	No Action Alternative			
Williams Acres - Groundwater alternative - Drill supplemental well	\$4,833,978	\$159,662	20	\$7,409,543
Williams Acres - Connection alternative - Connect to NTUA line and master meter	\$3,141,669	\$203,302	20	\$6,263,940
Williams Acres - Connection alternative - Connect to NTUA and individual meters	\$3,141,669	\$34	20	\$3,142,359
Ya ta hey - Continue relying on individual wells	No Action Alternative			
Ya ta hey - Groundwater alternative - Drill additional well	\$1,959,349	\$78,414	20	\$3,206,739
Ya ta hey - Groundwater alternative - Master meter at emergency connection	\$118,839	\$128,499	20	\$2,835,614
Ya ta hey - Groundwater alternative - Connect to City of Gallup and meter individually	\$118,839	\$34	20	\$119,529

Major Assumptions:

- Costs are in 2013 dollars.
- Pipeline lengths are plan distances only and have not been adjusted for site topography.
- No costs are included for property and/or right-of-way acquisition.
- There will be reasonable site access for all facilities.
- Summary costs have been rounded up to the nearest \$1,000.
- Costs are feasibility level estimates (+50%/-30% per EPA guidance)

References

- US EPA "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (2000)
- COA 2009 Cost Data
- Environmental Remediation Cost Data (2006)
- Vendor Quotes

Capital Costs - Full Buildout

COST ESTIMATE SUMMARY

Sheet: 2 of 32

FEATURE: Allison - Groundwater alternative - Drill community well		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
---	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Drill well	1,800	LF	\$ 300	\$ 540,000
2	Waterline (8")	9,000	LF	\$ 22.24	\$ 200,160
3	Fittings	\$ 200,160	%	15%	\$ 30,024
4	Fire hydrants	8	EA	\$ 3,500	\$ 28,000
5	Water valves (8")	18	EA	\$ 875	\$ 15,751
6	Service connections, incl. tap	114	EA	\$ 1,750	\$ 199,500
7	Storage tank	160,000	GAL	\$ 2	\$ 320,000
8	Disinfection, including pumps, meters, and appurtenances	1	LS	\$ 10,000	\$ 10,000
					\$ -
					\$ -
					\$ -
					\$ -
	SUBTOTAL				\$ 1,343,435
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 1,343,435	\$ 162,153
	SUBTOTAL CONSTRUCTION				\$ 1,505,588
	Design Contingency	10.0%	(%)	\$ 1,505,588	\$ 150,559
	SUBTOTAL WITH DESIGN CONTINGENCY				\$ 1,656,146
	Permitting, Water Rights	1	LS	\$ 10,000	\$ 10,000
	Hydrogeological Services	12.0%	(%)	\$ 540,000	\$ 64,800
	Engineering Design	12.0%	(%)	\$ 1,656,146	\$ 198,738
	QA/QC	6.0%	(%)	\$ 1,656,146	\$ 99,369
	Construction Administration	6.0%	(%)	\$ 1,656,146	\$ 99,369
	Environmental Assessment	4.0%	(%)	\$ 1,656,146	\$ 66,246
	Archaeological Survey	4.0%	(%)	\$ 1,656,146	\$ 66,246
	Biological Survey	4.0%	(%)	\$ 1,656,146	\$ 66,246
	SUBTOTAL, PROFESSIONAL SERVICES				\$ 671,013
	SUBTOTAL, CAPITAL COSTS				\$ 2,176,600
	Tax	8.3125%	(%)	\$ 2,176,600	\$ 180,930
	Contingency, % of capital costs	9%	(%)	\$ 2,176,600	\$ 195,894
	TOTAL CAPITAL COST				\$ 2,553,424

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

Sheet: 3 of: 32

FEATURE: Allison - Connection alternative - Connect to Reach 27.3 and master meter		PROJECT: McKinley County Regionalization Planning			
		WOID:		ESTIMATE LEVEL: Appraisal	
		REGION:		UNIT PRICE LEVEL: October 1, 2013	
		FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	10,600	LF	\$ 22.24	\$ 235,744
2	Fittings	\$ 235,744	%	15%	\$ 35,362
3	Fire hydrants	8	EA	\$ 3,500	\$ 28,000
4	Water valves (8")	21	EA	\$ 875	\$ 18,551
5	Service connections, incl. tap	114	EA	\$ 1,750	\$ 199,500
6	Storage tank	0	GAL	\$ 2.00	\$ -
7	Master meter	1	EA	\$ 33,500	\$ 33,500
8	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800
					\$ -
					\$ -
					\$ -
					\$ -
		SUBTOTAL			\$ 554,457
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 554,457	\$ 66,923
		SUBTOTAL CONSTRUCTION			\$ 621,380
	Design Contingency	10.0%	(%)	\$ 621,380	\$ 62,138
		SUBTOTAL WITH DESIGN CONTINGENCY			\$ 683,518
	Engineering Design	12.0%	(%)	\$ 683,518	\$ 82,022
	QA/QC	6.0%	(%)	\$ 683,518	\$ 41,011
	Construction Administration	6.0%	(%)	\$ 683,518	\$ 41,011
	Environmental Assessment	4.0%	(%)	\$ 683,518	\$ 27,341
	Archaeological Survey	4.0%	(%)	\$ 683,518	\$ 27,341
	Biological Survey	4.0%	(%)	\$ 683,518	\$ 27,341
		SUBTOTAL, PROFESSIONAL SERVICES			\$ 246,066
		SUBTOTAL, CAPITAL COSTS			\$ 867,446
	Tax	8.3125%	(%)	\$ 867,446	\$ 72,106
	Contingency, % of capital costs	9%	(%)	\$ 867,446	\$ 78,070
		TOTAL CAPITAL COST			\$ 1,017,623
QUANTITIES		PRICES			
BY:	M. Anderson	BY:	M. Anderson		
DATE:		DATE:			
CHECKED:		CHECKED:			
DATE:		DATE:			

COST ESTIMATE SUMMARY

Sheet: 4 of 32

FEATURE: Allison - Connection alternative - Connect to Reach 27.3 and individual meters		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
--	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	10,600	LF	\$ 22.24	\$ 235,744
2	Fittings	\$ 235,744	%	15%	\$ 35,362
3	Fire hydrants	8	EA	\$ 3,500	\$ 28,000
4	Water valves (8")	21	EA	\$ 875	\$ 18,551
5	Service connections, incl. tap	114	EA	\$ 1,750	\$ 199,500
6	Storage tank	0	GAL	\$ 2.00	\$ -
7	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 520,957
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 520,957	\$ 62,879
SUBTOTAL CONSTRUCTION					\$ 583,836
Design Contingency		10.0%	(%)	\$ 583,836	\$ 58,384
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 642,220
Engineering Design		12.0%	(%)	\$ 642,220	\$ 77,066
QA/QC		6.0%	(%)	\$ 642,220	\$ 38,533
Construction Administration		6.0%	(%)	\$ 642,220	\$ 38,533
Environmental Assessment		4.0%	(%)	\$ 642,220	\$ 25,689
Archaeological Survey		4.0%	(%)	\$ 642,220	\$ 25,689
Biological Survey		4.0%	(%)	\$ 642,220	\$ 25,689
SUBTOTAL, PROFESSIONAL SERVICES					\$ 231,199
SUBTOTAL, CAPITAL COSTS					\$ 815,036
Tax		8.3125%	(%)	\$ 815,036	\$ 67,750
Contingency, % of capital costs		9%	(%)	\$ 815,036	\$ 73,353
TOTAL CAPITAL COST					\$ 956,139

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

COST ESTIMATE SUMMARY

Sheet: 5 of 32

FEATURE: Catalpa Hills - Groundwater alternative - Drill community well		PROJECT: McKinley County Regionalization Planning			
		WOID:		ESTIMATE LEVEL: Appraisal	
		REGION:		UNIT PRICE LEVEL: October 1, 2013	
		FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Drill well	1,800	LF	\$ 300	\$ 540,000
2	Waterline (8")	28,500	LF	\$ 22.24	\$ 633,840
3	Fittings	\$ 633,840	%	15%	\$ 95,076
4	Fire hydrants	23	EA	\$ 3,500	\$ 80,500
5	Water valves (8")	57	EA	\$ 875	\$ 49,878
6	Service connections, incl. tap	206	EA	\$ 1,750	\$ 360,500
7	Storage tank	230,000	GAL	\$ 1.50	\$ 345,000
8	Disinfection, including pumps, meters, and appurtenances	1	LS	\$ 10,000	\$ 10,000
9	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800
					\$ -
					\$ -
	SUBTOTAL				\$ 2,118,594
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 2,118,594	\$ 255,714
	SUBTOTAL CONSTRUCTION				\$ 2,374,309
	Design Contingency	10.0%	(%)	\$ 2,374,309	\$ 237,431
	SUBTOTAL WITH DESIGN CONTINGENCY				\$ 2,611,740
	Permitting, Water Rights	1	LS	\$ 10,000	\$ 10,000
	Hydrogeological Services	12.0%	(%)	\$ 540,000	\$ 64,800
	Engineering Design	12.0%	(%)	\$ 2,611,740	\$ 313,409
	QA/QC	6.0%	(%)	\$ 2,611,740	\$ 156,704
	Construction Administration	6.0%	(%)	\$ 2,611,740	\$ 156,704
	Environmental Assessment	4.0%	(%)	\$ 2,611,740	\$ 104,470
	Archaeological Survey	4.0%	(%)	\$ 2,611,740	\$ 104,470
	Biological Survey	4.0%	(%)	\$ 2,611,740	\$ 104,470
	SUBTOTAL, PROFESSIONAL SERVICES				\$ 1,015,026
	SUBTOTAL, CAPITAL COSTS				\$ 3,389,335
	Tax	8.3125%	(%)	\$ 3,389,335	\$ 281,738
	Contingency, % of capital costs	9%	(%)	\$ 3,389,335	\$ 305,040
	TOTAL CAPITAL COST				\$ 3,976,114
QUANTITIES		PRICES			
BY:	M. Anderson	BY:	M. Anderson		
DATE:		DATE:			
CHECKED:		CHECKED:			
DATE:		DATE:			

Sheet: 6 of: 32

[illegible]

COST ESTIMATE SUMMARY

Sheet: 7 of 32

FEATURE: Catalpa Hills - Connection alternative - Connect to proposed Reach 27.12 and individual meter		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
---	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	21,800	LF	\$ 22.24	\$ 484,832
2	Fittings	\$ 484,832	%	15%	\$ 72,725
3	Fire hydrants	23	EA	\$ 3,500.00	\$ 80,500
4	Water valves (8")	44	EA	\$ 875.06	\$ 38,153
5	Service connections, incl. tap	206	EA	\$ 1,750.00	\$ 360,500
6	Storage tank	0	GAL	\$ 1.50	\$ -
7	Tie-in 18"	3	EA	\$ 3,800	\$ 11,400
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 1,048,109
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 1,048,109	\$ 126,507
SUBTOTAL CONSTRUCTION					\$ 1,174,616
Design Contingency		10.0%	(%)	\$ 1,174,616	\$ 117,462
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 1,292,078
Engineering Design		12.0%	(%)	\$ 1,292,078	\$ 155,049
QA/QC		6.0%	(%)	\$ 1,292,078	\$ 77,525
Construction Administration		6.0%	(%)	\$ 1,292,078	\$ 77,525
Environmental Assessment		4.0%	(%)	\$ 1,292,078	\$ 51,683
Archaeological Survey		4.0%	(%)	\$ 1,292,078	\$ 51,683
Biological Survey		4.0%	(%)	\$ 1,292,078	\$ 51,683
SUBTOTAL, PROFESSIONAL SERVICES					\$ 465,148
SUBTOTAL, CAPITAL COSTS					\$ 1,639,764
Tax		8.3125%	(%)	\$ 1,639,764	\$ 136,305
Contingency, % of capital costs		9%	(%)	\$ 1,639,764	\$ 147,579
TOTAL CAPITAL COST					\$ 1,923,648

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

Sheet: 8 of: 32

[illegible]

Sheet: 9 of: 32

[illegible]

COST ESTIMATE SUMMARY

Sheet: 10 of 32

FEATURE: Cipriano Lewis - Connection alternative - Connect to City of Gallup line		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
---	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	9,800	LF	\$ 22.24	\$ 217,952
2	Fittings	\$ 217,952	%	15%	\$ 32,693
3	Fire hydrants	20	EA	\$ 3,500.00	\$ 68,600
4	Water valves (8")	17	EA	\$ 875.06	\$ 14,876
5	Service connections, incl. tap	84	EA	\$ 1,750.00	\$ 147,000
6	Storage tank	0	GAL	\$ 2.00	\$ -
7	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 484,921
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 484,921	\$ 58,530
SUBTOTAL CONSTRUCTION					\$ 543,451
	Design Contingency	10.0%	(%)	\$ 543,451	\$ 54,345
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 597,796
	Engineering Design	12.0%	(%)	\$ 597,796	\$ 71,736
	QA/QC	6.0%	(%)	\$ 597,796	\$ 35,868
	Construction Administration	6.0%	(%)	\$ 597,796	\$ 35,868
	Environmental Assessment	4.0%	(%)	\$ 597,796	\$ 23,912
	Archaeological Survey	4.0%	(%)	\$ 597,796	\$ 23,912
	Biological Survey	4.0%	(%)	\$ 597,796	\$ 23,912
SUBTOTAL, PROFESSIONAL SERVICES					\$ 215,207
SUBTOTAL, CAPITAL COSTS					\$ 758,657
	Tax	8.3125%	(%)	\$ 758,657	\$ 63,063
	Contingency, % of capital costs	9%	(%)	\$ 758,657	\$ 68,279
TOTAL CAPITAL COST					\$ 890,000

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

Sheet: 11 of: 32

[illegible]

Sheet: 12 of: 32

[illegible]

COST ESTIMATE SUMMARY

Sheet: 13 of 32

FEATURE: Coal Basin Water Association - Connection alternative - City of Gallup and individual meters		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
--	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	6,300	LF	\$ 22.24	\$ 140,112
2	Fittings	\$ 140,112	%	15%	\$ 21,017
3	Fire hydrants	2	EA	\$ 3,500.00	\$ 7,000
4	Water valves (8")	13	EA	\$ 875.06	\$ 11,026
5	Service connections, incl. tap	134	EA	\$ 1,750.00	\$ 234,500
6	Storage tank	0	GAL	\$ 1.50	\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 413,655
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 413,655	\$ 49,928
SUBTOTAL CONSTRUCTION					\$ 463,583
Design Contingency		10.0%	(%)	\$ 463,583	\$ 46,358
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 509,941
Engineering Design		12.0%	(%)	\$ 509,941	\$ 61,193
QA/QC		6.0%	(%)	\$ 509,941	\$ 30,596
Construction Administration		6.0%	(%)	\$ 509,941	\$ 30,596
Environmental Assessment		4.0%	(%)	\$ 509,941	\$ 20,398
Archaeological Survey		4.0%	(%)	\$ 509,941	\$ 20,398
Biological Survey		4.0%	(%)	\$ 509,941	\$ 20,398
SUBTOTAL, PROFESSIONAL SERVICES					\$ 183,579
SUBTOTAL, CAPITAL COSTS					\$ 647,161
Tax		8.3125%	(%)	\$ 647,161	\$ 53,795
Contingency, % of capital costs		9%	(%)	\$ 647,161	\$ 58,245
TOTAL CAPITAL COST					\$ 759,201

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

Sheet: 14 of: 32

[illegible]

Sheet: 15 of: 32

[illegible]

Sheet: 16 of: 32

[illegible]

COST ESTIMATE SUMMARY

Sheet: 17 of 32

FEATURE: Gamerco W&SD - Groundwater alternative - Redrill permitted well		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Drill well	2,700	LF	\$ 300.00	\$ 810,000
2	Disinfection, including pumps, meters, and appurtenances	1	LS	\$ 10,000.00	\$ 10,000
3	Storage tank	300,000	GAL	\$ 2.00	\$ 600,000
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 1,420,000
SUBTOTAL					\$ 2,840,000
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 2,840,000	\$ 342,788
SUBTOTAL CONSTRUCTION					\$ 3,182,788
Design Contingency		10.0%	(%)	\$ 3,182,788	\$ 318,279
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 3,501,067
Permitting, Water Rights		1	LS	\$ 10,000	\$ 10,000
Hydrogeological Services		12.0%	(%)	\$ 810,000	\$ 97,200
Engineering Design		12.0%	(%)	\$ 3,501,067	\$ 420,128
QA/QC		6.0%	(%)	\$ 3,501,067	\$ 210,064
Construction Administration		6.0%	(%)	\$ 3,501,067	\$ 210,064
Environmental Assessment		4.0%	(%)	\$ 3,501,067	\$ 140,043
Archaeological Survey		4.0%	(%)	\$ 3,501,067	\$ 140,043
Biological Survey		4.0%	(%)	\$ 3,501,067	\$ 140,043
SUBTOTAL, PROFESSIONAL SERVICES					\$ 1,367,584
SUBTOTAL, CAPITAL COSTS					\$ 4,550,372
Tax		8.3125%	(%)	\$ 4,550,372	\$ 378,250
Contingency, % of capital costs		9%	(%)	\$ 4,550,372	\$ 409,533
TOTAL CAPITAL COST					\$ 5,338,155
QUANTITIES			PRICES		
BY:	M. Anderson		BY:	M. Anderson	
DATE:			DATE:		
CHECKED:			CHECKED:		
DATE:			DATE:		

COST ESTIMATE SUMMARY

Sheet: 18 of 32

FEATURE: Gamarco W&SD - Connection alternative - Master meter at emergency connections		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
---	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Storage tank	0	GAL	\$ 2.00	\$ -
2	Service connections, incl. tap	114	EA	\$ 1,750	\$ 199,500
3	Master meter	1	EA	\$ 10,000	\$ 10,000
SUBTOTAL					\$ 209,500
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 209,500	\$ 25,287
SUBTOTAL CONSTRUCTION					\$ 234,787
Design Contingency		10.0%	(%)	\$ 234,787	\$ 23,479
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 258,265
Engineering Design		12.0%	(%)	\$ 258,265	\$ 30,992
QA/QC		6.0%	(%)	\$ 258,265	\$ 15,496
Construction Administration		6.0%	(%)	\$ 258,265	\$ 15,496
Environmental Assessment		4.0%	(%)	\$ 258,265	\$ 10,331
Archaeological Survey		4.0%	(%)	\$ 258,265	\$ 10,331
Biological Survey		4.0%	(%)	\$ 258,265	\$ 10,331
SUBTOTAL, PROFESSIONAL SERVICES					\$ 92,976
SUBTOTAL, CAPITAL COSTS					\$ 327,762
Tax		8.3125%	(%)	\$ 327,762	\$ 27,245
Contingency, % of capital costs		9%	(%)	\$ 327,762	\$ 29,499
TOTAL CAPITAL COST					\$ 384,506

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

COST ESTIMATE SUMMARY

Sheet: 19 of 32

FEATURE: Gamarco W&SD - Connection alternative - Individual meters		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Storage tank	0	GAL	\$ 2.00	\$ -
2	Service connections, incl. tap	114	EA	\$ 1,750	\$ 199,500
SUBTOTAL					\$ 199,500
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 199,500	\$ 24,080
SUBTOTAL CONSTRUCTION					\$ 223,580
Design Contingency		10.0%	(%)	\$ 223,580	\$ 22,358
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 245,938
Engineering Design		12.0%	(%)	\$ 245,938	\$ 29,513
QA/QC		6.0%	(%)	\$ 245,938	\$ 14,756
Construction Administration		6.0%	(%)	\$ 245,938	\$ 14,756
Environmental Assessment		4.0%	(%)	\$ 245,938	\$ 9,838
Archaeological Survey		4.0%	(%)	\$ 245,938	\$ 9,838
Biological Survey		4.0%	(%)	\$ 245,938	\$ 9,838
SUBTOTAL, PROFESSIONAL SERVICES					\$ 88,538
SUBTOTAL, CAPITAL COSTS					\$ 312,117
Tax		8.3125%	(%)	\$ 312,117	\$ 25,945
Contingency, % of capital costs		9%	(%)	\$ 312,117	\$ 28,091
TOTAL CAPITAL COST					\$ 366,152
QUANTITIES			PRICES		
BY:	M. Anderson		BY:	M. Anderson	
DATE:			DATE:		
CHECKED:			CHECKED:		
DATE:			DATE:		

Sheet: 20 of: 32

[illegible]

Sheet: 21 of: 32

[illegible]

COST ESTIMATE SUMMARY

Sheet: 22 of 32

FEATURE: Twin Buttes - Connection alternative - Connect to NGWSP and individual meters		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
---	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	27,700	LF	\$ 22.24	\$ 616,048
2	Fittings	\$ 616,048	%	15%	\$ 92,407
3	Fire hydrants	26	EA	\$ 3,500.00	\$ 91,000
4	Water valves (8")	55	EA	\$ 875.06	\$ 48,478
5	Service connections, incl. tap	167	EA	\$ 1,750.00	\$ 292,250
6	Storage tank	0	GAL	\$ 2.00	\$ -
7	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 1,143,984
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 1,143,984	\$ 138,079
SUBTOTAL CONSTRUCTION					\$ 1,282,062
	Design Contingency	10.0%	(%)	\$ 1,282,062	\$ 128,206
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 1,410,269
	Engineering Design	12.0%	(%)	\$ 1,410,269	\$ 169,232
	QA/QC	6.0%	(%)	\$ 1,410,269	\$ 84,616
	Construction Administration	6.0%	(%)	\$ 1,410,269	\$ 84,616
	Environmental Assessment	4.0%	(%)	\$ 1,410,269	\$ 56,411
	Archaeological Survey	4.0%	(%)	\$ 1,410,269	\$ 56,411
	Biological Survey	4.0%	(%)	\$ 1,410,269	\$ 56,411
SUBTOTAL, PROFESSIONAL SERVICES					\$ 507,697
SUBTOTAL, CAPITAL COSTS					\$ 1,789,759
	Tax	8.3125%	(%)	\$ 1,789,759	\$ 148,774
	Contingency, % of capital costs	9%	(%)	\$ 1,789,759	\$ 161,078
TOTAL CAPITAL COST					\$ 2,099,611

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

Sheet: 23 of: 32

Capital Costs - Full Buildout

COST ESTIMATE SUMMARY

Sheet: 24 of 32

FEATURE: White Cliffs - Connection alternative - Connect to NTUA line and master meter		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
---	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	18,100	LF	\$ 22.24	\$ 402,544
2	Fittings	\$ 402,544	%	15%	\$ 60,382
3	Fire hydrants	31	EA	\$ 3,500.00	\$ 108,500
4	Water valves (8")	36	EA	\$ 875.06	\$ 31,677
5	Service connections, incl. tap	99	EA	\$ 1,750.00	\$ 173,250
6	Storage tank	0	GAL	\$ 2.00	\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 776,353
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 776,353	\$ 93,706
SUBTOTAL CONSTRUCTION					\$ 870,059
Design Contingency		10.0%	(%)	\$ 870,059	\$ 87,006
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 957,064
Engineering Design		12.0%	(%)	\$ 957,064	\$ 114,848
QA/QC		6.0%	(%)	\$ 957,064	\$ 57,424
Construction Administration		6.0%	(%)	\$ 957,064	\$ 57,424
Environmental Assessment		4.0%	(%)	\$ 957,064	\$ 38,283
Archaeological Survey		4.0%	(%)	\$ 957,064	\$ 38,283
Biological Survey		4.0%	(%)	\$ 957,064	\$ 38,283
SUBTOTAL, PROFESSIONAL SERVICES					\$ 344,543
SUBTOTAL, CAPITAL COSTS					\$ 1,214,602
Tax		8.3125%	(%)	\$ 1,214,602	\$ 100,964
Contingency, % of capital costs		9%	(%)	\$ 1,214,602	\$ 109,314
TOTAL CAPITAL COST					\$ 1,424,880

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

Sheet: 25 of: 32

FEATURE: White Cliffs - Connection alternative - Connect to NTUA line and individual meters		PROJECT: McKinley County Regionalizatn Planning			
		WOID:		ESTIMATE LEVEL: Appraisal	
		REGION:		UNIT PRICE LEVEL: October 1, 2013	
		FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	18,100	LF	\$ 22.24	\$ 402,544
2	Fittings	\$ 402,544	%	15%	\$ 60,382
3	Fire hydrants	31	EA	\$ 3,500.00	\$ 108,500
4	Water valves (8")	36	EA	\$ 875.06	\$ 31,677
5	Service connections, incl. tap	99	EA	\$ 1,750.00	\$ 173,250
6	Storage tank	0	GAL	\$ 2.00	\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
	SUBTOTAL				\$ 776,353
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 776,353	\$ 93,706
	SUBTOTAL CONSTRUCTION				\$ 870,059
	Design Contingency	10.0%	(%)	\$ 870,059	\$ 87,006
	SUBTOTAL WITH DESIGN CONTINGENCY				\$ 957,064
	Engineering Design	12.0%	(%)	\$ 957,064	\$ 114,848
	QA/QC	6.0%	(%)	\$ 957,064	\$ 57,424
	Construction Administration	6.0%	(%)	\$ 957,064	\$ 57,424
	Environmental Assessment	4.0%	(%)	\$ 957,064	\$ 38,283
	Archaeological Survey	4.0%	(%)	\$ 957,064	\$ 38,283
	Biological Survey	4.0%	(%)	\$ 957,064	\$ 38,283
	SUBTOTAL, PROFESSIONAL SERVICES				\$ 344,543
	SUBTOTAL, CAPITAL COSTS				\$ 1,214,602
	Tax	8.3125%	(%)	\$ 1,214,602	\$ 100,964
	Contingency, % of capital costs	9%	(%)	\$ 1,214,602	\$ 109,314
	TOTAL CAPITAL COST				\$ 1,424,880
QUANTITIES		PRICES			
BY:	M. Anderson	BY:	M. Anderson		
DATE:		DATE:			
CHECKED:		CHECKED:			
DATE:		DATE:			

Sheet: 26 of: 32

Capital Costs - Full Buildout

Sheet: 27 of: 32

[illegible]

COST ESTIMATE SUMMARY

Sheet: 28 of 32

FEATURE: Williams Acres - Connection alternative - Connect to NTUA and individual meters		PROJECT: McKinley County Regionalization Planning			
		WOID:		ESTIMATE LEVEL: Appraisal	
		REGION:		UNIT PRICE LEVEL: October 1, 2013	
		FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Waterline (8")	13,700	LF	\$ 22.24	\$ 304,688
2	Waterline (10")	9,600	LF	\$ 26.66	\$ 255,936
3	Fittings	\$ 304,688	%	15%	\$ 45,703
4	Fire hydrants	27	EA	\$ 3,500.00	\$ 95,900
5	Water valves (8")	27	EA	\$ 875.06	\$ 23,977
6	Service connections, incl. tap	561	EA	\$ 1,750.00	\$ 981,750
7	Storage tank	0	GAL	\$ 1.50	\$ -
8	Tie-in 18"	1	EA	\$ 3,800	\$ 3,800
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 1,711,754
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 1,711,754	\$ 206,609
SUBTOTAL CONSTRUCTION					\$ 1,918,363
	Design Contingency	10.0%	(%)	\$ 1,918,363	\$ 191,836
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 2,110,199
	Engineering Design	12.0%	(%)	\$ 2,110,199	\$ 253,224
	QA/QC	6.0%	(%)	\$ 2,110,199	\$ 126,612
	Construction Administration	6.0%	(%)	\$ 2,110,199	\$ 126,612
	Environmental Assessment	4.0%	(%)	\$ 2,110,199	\$ 84,408
	Archaeological Survey	4.0%	(%)	\$ 2,110,199	\$ 84,408
	Biological Survey	4.0%	(%)	\$ 2,110,199	\$ 84,408
SUBTOTAL, PROFESSIONAL SERVICES					\$ 759,672
SUBTOTAL, CAPITAL COSTS					\$ 2,678,034
	Tax	8.3125%	(%)	\$ 2,678,034	\$ 222,612
	Contingency, % of capital costs	9%	(%)	\$ 2,678,034	\$ 241,023
TOTAL CAPITAL COST					\$ 3,141,669

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

COST ESTIMATE SUMMARY

Sheet: 29 of 32

FEATURE: Ya ta hey - Groundwater alternative - Drill additional well		PROJECT: McKinley County Regionalization Planning WOID: ESTIMATE LEVEL: Appraisal REGION: UNIT PRICE LEVEL: October 1, 2013 FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			
--	--	--	--	--	--

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Drill well	1,800	LF	300	\$ 540,000
2	Service connections, incl. tap	37	EA	1,750	\$ 64,750
3	Storage tank (fire flow)	270,000	GAL	1.5	\$ 405,000
4	Disinfection, including pumps, meters, and appurtenances	1	LS	10000	\$ 10,000
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
SUBTOTAL					\$ 1,019,750
Contractor Overhead and Administration Costs		12.1%	(%)	\$ 1,019,750	\$ 123,084
SUBTOTAL CONSTRUCTION					\$ 1,142,834
Design Contingency		10.0%	(%)	\$ 1,142,834	\$ 114,283
SUBTOTAL WITH DESIGN CONTINGENCY					\$ 1,257,117
Permitting, Water Rights		1	LS	\$ 10,000	\$ 10,000
Hydrogeological Services		12.0%	(%)	\$ 540,000	\$ 64,800
Engineering Design		12.0%	(%)	\$ 1,257,117	\$ 150,854
QA/QC		6.0%	(%)	\$ 1,257,117	\$ 75,427
Construction Administration		6.0%	(%)	\$ 1,257,117	\$ 75,427
Environmental Assessment		4.0%	(%)	\$ 1,257,117	\$ 50,285
Archaeological Survey		4.0%	(%)	\$ 1,257,117	\$ 50,285
Biological Survey		4.0%	(%)	\$ 1,257,117	\$ 50,285
SUBTOTAL, PROFESSIONAL SERVICES					\$ 527,362
SUBTOTAL, CAPITAL COSTS					\$ 1,670,196
Tax		8.3125%	(%)	\$ 1,670,196	\$ 138,835
Contingency, % of capital costs		9%	(%)	\$ 1,670,196	\$ 150,318
TOTAL CAPITAL COST					\$ 1,959,349

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

COST ESTIMATE SUMMARY

Sheet: 30 of 32

FEATURE: Ya ta hey - Groundwater alternative - Master meter at emergency connection		PROJECT: McKinley County Regionalization Planning			
		WOID:		ESTIMATE LEVEL: Appraisal	
		REGION:		UNIT PRICE LEVEL: October 1, 2013	
		FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Service connections, incl. tap	37	EA	\$ 1,750.00	\$ 64,750
2	Storage tank	0	GAL	\$ 1.50	\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
	SUBTOTAL				\$ 64,750
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 64,750	\$ 7,815
	SUBTOTAL CONSTRUCTION				\$ 72,565
	Design Contingency	10.0%	(%)	\$ 72,565	\$ 7,257
	SUBTOTAL WITH DESIGN CONTINGENCY				\$ 79,822
	Engineering Design	12.0%	(%)	\$ 79,822	\$ 9,579
	QA/QC	6.0%	(%)	\$ 79,822	\$ 4,789
	Construction Administration	6.0%	(%)	\$ 79,822	\$ 4,789
	Environmental Assessment	4.0%	(%)	\$ 79,822	\$ 3,193
	Archaeological Survey	4.0%	(%)	\$ 79,822	\$ 3,193
	Biological Survey	4.0%	(%)	\$ 79,822	\$ 3,193
	SUBTOTAL, PROFESSIONAL SERVICES				\$ 28,736
	SUBTOTAL, CAPITAL COSTS				\$ 101,301
	Tax	8.3125%	(%)	\$ 101,301	\$ 8,421
	Contingency, % of capital costs	9%	(%)	\$ 101,301	\$ 9,117
	TOTAL CAPITAL COST				\$ 118,839

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

COST ESTIMATE SUMMARY

Sheet: 31 of 32

FEATURE: Ya ta hey - Groundwater alternative - Connect to City of Gallup and meter individually		PROJECT: McKinley County Regionalization Planning			
		WOID:		ESTIMATE LEVEL: Appraisal	
		REGION:		UNIT PRICE LEVEL: October 1, 2013	
		FILE: S:\Projects\WR12.0084_McKinley_County\Engineering\Cost Estimates\Cost Estimate- Improvements.xlsx			

PAY ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Service connections, incl. tap	37	EA	\$ 1,750.00	\$ 64,750
2	Storage tank	0	GAL	\$ 1.50	\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
	SUBTOTAL				\$ 64,750
	Contractor Overhead and Administration Costs	12.1%	(%)	\$ 64,750	\$ 7,815
	SUBTOTAL CONSTRUCTION				\$ 72,565
	Design Contingency	10.0%	(%)	\$ 72,565	\$ 7,257
	SUBTOTAL WITH DESIGN CONTINGENCY				\$ 79,822
	Engineering Design	12.0%	(%)	\$ 79,822	\$ 9,579
	QA/QC	6.0%	(%)	\$ 79,822	\$ 4,789
	Construction Administration	6.0%	(%)	\$ 79,822	\$ 4,789
	Environmental Assessment	4.0%	(%)	\$ 79,822	\$ 3,193
	Archaeological Survey	4.0%	(%)	\$ 79,822	\$ 3,193
	Biological Survey	4.0%	(%)	\$ 79,822	\$ 3,193
	SUBTOTAL, PROFESSIONAL SERVICES				\$ 28,736
	SUBTOTAL, CAPITAL COSTS				\$ 101,301
	Tax	8.3125%	(%)	\$ 101,301	\$ 8,421
	Contingency, % of capital costs	9%	(%)	\$ 101,301	\$ 9,117
	TOTAL CAPITAL COST				\$ 118,839

QUANTITIES		PRICES	
BY:	M. Anderson	BY:	M. Anderson
DATE:		DATE:	
CHECKED:		CHECKED:	
DATE:		DATE:	

DESCRIPTION	UNIT	UNIT PRICE	SOURCE
6" waterline pipe incl. trench & compacted backfill	LF	\$ 21.28	COA 2009 801.002
8" waterline pipe incl. trench & compacted backfill	LF	\$ 22.24	COA 2009 801.003
10" waterline pipe incl. trench & compacted backfill	LF	\$ 26.66	COA 2009 801.004
Fittings	%	\$ 15.00	Professional opinion
Fire hydrant 4' bury, MJ, incl. blocking and aggregate	EA	\$ 3,500.00	Professional opinion (DePauli report)
6" Gate valve	EA	\$ 689.69	COA 2009 801.081
8" Gate valve	EA	\$ 875.06	COA 2009 801.082
100,000 + gallon steel storage tank and foundation	GAL	\$ 1.50	Adjusted from RS Means
Less than 100,000 gallon steel storage tank and foundation	GAL	\$ 2.00	Adjusted from RS Means
Disinfection, including pumps, meters, and appurtenances	LS	\$ 10,000.00	Professional opinion (Newkirk water project)
Drill well	LF	\$ 300.00	Professional opinion
Service connection including meter (typical household)	EA	\$ 1,750.00	Professional opinion (DePauli report)
Service connection including meter (typical commercial)	EA	\$ 2,250.00	Professional opinion (DePauli report)
12-inch master meter, installed with piping, power, and data connection	EA	\$ 33,500.00	Cost estimate from recent project
Tie-in to 10"	EA	\$ 2,600.00	Estimated from bid tabs (TLC costs)
Tie-in 18"	EA	\$ 3,800.00	Estimated from bid tabs (TLC costs)
Tie-in to 16"	EA	\$ 3,600.00	From bid tabs (TLC costs)

800 ft for housing
5280 ft for uninhabited areas

Includes well drilling, equipment, development, testing, well piping and improvements

The following items are percentages of construction cost:

\$ Mobilization/Demobilization, per COA 2009 Item 6.05/6.06	5.07%
\$ Construction Management, per EPA	10%
\$ Engineering Services for Design and Construction, per EPA	12%
\$ Project Management, per EPA	5%
\$ General & Administrative (G&A), per EPA	14%
\$ Overhead	5%
\$ NMGR for Gallup, NM	8.313%
\$ Bonding and Insurance, per RS Means 01 31 13.30	2%
\$ Contingency, per EPA	9%
\$ Real Discount Rate (5-year), per OMB Sep 2013	0.8%

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Allison
 ALTERNATIVE: Allison- Groundwater Alternative- Drill community well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 2,553,424	\$ 86,862	\$ 2,640,287	\$ 2,553,424	\$ 86,862	\$ 2,640,287
1	2014	0.964		\$ 86,862	\$ 86,862	\$ -	\$ 83,723	\$ 83,723
2	2015	0.929		\$ 86,862	\$ 86,862	\$ -	\$ 80,697	\$ 80,697
3	2016	0.895		\$ 86,862	\$ 86,862	\$ -	\$ 77,780	\$ 77,780
4	2017	0.863		\$ 86,862	\$ 86,862	\$ -	\$ 74,969	\$ 74,969
5	2018	0.832		\$ 86,862	\$ 86,862	\$ -	\$ 72,259	\$ 72,259
6	2019	0.802	\$ 22,000	\$ 86,862	\$ 108,862	\$ 17,640	\$ 69,647	\$ 87,287
7	2020	0.773		\$ 86,862	\$ 86,862	\$ -	\$ 67,130	\$ 67,130
8	2021	0.745		\$ 86,862	\$ 86,862	\$ -	\$ 64,703	\$ 64,703
9	2022	0.718		\$ 86,862	\$ 86,862	\$ -	\$ 62,365	\$ 62,365
10	2023	0.692		\$ 86,862	\$ 86,862	\$ -	\$ 60,111	\$ 60,111
11	2024	0.667		\$ 86,862	\$ 86,862	\$ -	\$ 57,938	\$ 57,938
12	2025	0.643	\$ 22,000	\$ 86,862	\$ 108,862	\$ 14,144	\$ 55,844	\$ 69,988
13	2026	0.620		\$ 86,862	\$ 86,862	\$ -	\$ 53,825	\$ 53,825
14	2027	0.597		\$ 86,862	\$ 86,862	\$ -	\$ 51,880	\$ 51,880
15	2028	0.576		\$ 86,862	\$ 86,862	\$ -	\$ 50,005	\$ 50,005
16	2029	0.555		\$ 86,862	\$ 86,862	\$ -	\$ 48,197	\$ 48,197
17	2030	0.535		\$ 86,862	\$ 86,862	\$ -	\$ 46,455	\$ 46,455
18	2031	0.515	\$ 22,000	\$ 86,862	\$ 108,862	\$ 11,341	\$ 44,776	\$ 56,117
19	2032	0.497		\$ 86,862	\$ 86,862	\$ -	\$ 43,158	\$ 43,158
20	2033	0.479		\$ 86,862	\$ 86,862	\$ -	\$ 41,598	\$ 41,598
21	2034	0.462	\$ 22,000	\$ 86,862	\$ 108,862	\$ 10,155	\$ 40,094	\$ 50,249
Total Alternative Allison			\$ 2,641,424	\$ 1,910,975	\$ 4,552,399	\$ 2,606,703	\$ 1,334,016	\$ 3,940,719

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 25,534
Electricity	134105	KWH	\$ 0.08	\$ 10,728.41
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 25,534
Total Year 1 Operations and Maintenance				\$ 86,862

CURRENT
 HOUSEHOLDS
 ESTIMATE:

31

Monthly charge \$ 233.50

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Allison
 ALTERNATIVE: Allison-Connection Alternative- Connect to Reach 27.3 and master meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 1,604,935	\$ 81,320	\$ 1,686,255	\$ 1,604,935	\$ 81,320	\$ 1,686,255
1	2014	0.964		\$ 81,320	\$ 81,320	\$ -	\$ 78,381	\$ 78,381
2	2015	0.929		\$ 81,320	\$ 81,320	\$ -	\$ 75,548	\$ 75,548
3	2016	0.895		\$ 81,320	\$ 81,320	\$ -	\$ 72,817	\$ 72,817
4	2017	0.863		\$ 81,320	\$ 81,320	\$ -	\$ 70,185	\$ 70,185
5	2018	0.832		\$ 81,320	\$ 81,320	\$ -	\$ 67,648	\$ 67,648
6	2019	0.802		\$ 81,320	\$ 81,320	\$ -	\$ 65,203	\$ 65,203
7	2020	0.773		\$ 81,320	\$ 81,320	\$ -	\$ 62,846	\$ 62,846
8	2021	0.745		\$ 81,320	\$ 81,320	\$ -	\$ 60,575	\$ 60,575
9	2022	0.718		\$ 81,320	\$ 81,320	\$ -	\$ 58,385	\$ 58,385
10	2023	0.692		\$ 81,320	\$ 81,320	\$ -	\$ 56,275	\$ 56,275
11	2024	0.667		\$ 81,320	\$ 81,320	\$ -	\$ 54,241	\$ 54,241
12	2025	0.643		\$ 81,320	\$ 81,320	\$ -	\$ 52,280	\$ 52,280
13	2026	0.620		\$ 81,320	\$ 81,320	\$ -	\$ 50,391	\$ 50,391
14	2027	0.597		\$ 81,320	\$ 81,320	\$ -	\$ 48,569	\$ 48,569
15	2028	0.576		\$ 81,320	\$ 81,320	\$ -	\$ 46,814	\$ 46,814
16	2029	0.555		\$ 81,320	\$ 81,320	\$ -	\$ 45,122	\$ 45,122
17	2030	0.535		\$ 81,320	\$ 81,320	\$ -	\$ 43,491	\$ 43,491
18	2031	0.515		\$ 81,320	\$ 81,320	\$ -	\$ 41,919	\$ 41,919
19	2032	0.497		\$ 81,320	\$ 81,320	\$ -	\$ 40,404	\$ 40,404
20	2033	0.479		\$ 81,320	\$ 81,320	\$ -	\$ 38,943	\$ 38,943
21	2034	0.462		\$ 81,320	\$ 81,320	\$ -	\$ 37,536	\$ 37,536
Total Alternative Allison			\$ 1,604,935	\$ 1,789,038	\$ 3,393,973	\$ 1,604,935	\$ 1,248,894	\$ 2,853,829

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 2,312.97	\$ 27,755.61
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 16,049
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 16,049
Total Year 1 Operations and Maintenance				\$ 81,320

CURRENT
 HOUSEHOLDS
 ESTIMATE: 31

Monthly charge \$ 218.60

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Captalpa Hills
 ALTERNATIVE: Catalpa Hills- Groundwater alternative- Drill community well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 3,976,114	\$ 119,431	\$ 4,095,545	\$ 3,976,114	\$ 119,431	\$ 4,095,545
1	2014	0.964		\$ 119,431	\$ 119,431	\$ -	\$ 115,114	\$ 115,114
2	2015	0.929		\$ 119,431	\$ 119,431	\$ -	\$ 110,954	\$ 110,954
3	2016	0.895		\$ 119,431	\$ 119,431	\$ -	\$ 106,943	\$ 106,943
4	2017	0.863		\$ 119,431	\$ 119,431	\$ -	\$ 103,078	\$ 103,078
5	2018	0.832		\$ 119,431	\$ 119,431	\$ -	\$ 99,352	\$ 99,352
6	2019	0.802	\$ 25,000	\$ 119,431	\$ 144,431	\$ 20,045	\$ 95,761	\$ 115,806
7	2020	0.773		\$ 119,431	\$ 119,431	\$ -	\$ 92,300	\$ 92,300
8	2021	0.745		\$ 119,431	\$ 119,431	\$ -	\$ 88,964	\$ 88,964
9	2022	0.718		\$ 119,431	\$ 119,431	\$ -	\$ 85,748	\$ 85,748
10	2023	0.692		\$ 119,431	\$ 119,431	\$ -	\$ 82,649	\$ 82,649
11	2024	0.667		\$ 119,431	\$ 119,431	\$ -	\$ 79,662	\$ 79,662
12	2025	0.643	\$ 25,000	\$ 119,431	\$ 144,431	\$ 16,072	\$ 76,782	\$ 92,855
13	2026	0.620		\$ 119,431	\$ 119,431	\$ -	\$ 74,007	\$ 74,007
14	2027	0.597		\$ 119,431	\$ 119,431	\$ -	\$ 71,332	\$ 71,332
15	2028	0.576		\$ 119,431	\$ 119,431	\$ -	\$ 68,754	\$ 68,754
16	2029	0.555		\$ 119,431	\$ 119,431	\$ -	\$ 66,269	\$ 66,269
17	2030	0.535		\$ 119,431	\$ 119,431	\$ -	\$ 63,873	\$ 63,873
18	2031	0.515	\$ 25,000	\$ 119,431	\$ 144,431	\$ 12,887	\$ 61,565	\$ 74,452
19	2032	0.497		\$ 119,431	\$ 119,431	\$ -	\$ 59,340	\$ 59,340
20	2033	0.479		\$ 119,431	\$ 119,431	\$ -	\$ 57,195	\$ 57,195
21	2034	0.462	\$ 25,000	\$ 119,431	\$ 144,431	\$ 11,540	\$ 55,127	\$ 66,667
Total Alternative Captalpa Hills			\$ 4,076,114	\$ 2,627,488	\$ 6,703,602	\$ 4,036,658	\$ 1,834,200	\$ 5,870,858

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 39,761
Electricity	185543	KWH	\$ 0.08	\$ 14,843
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 39,761
Total Year 1 Operations and Maintenance				\$ 119,431

CURRENT
 HOUSEHOLDS
 ESTIMATE: 97

Monthly charge \$ 102.60

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Captalpa Hills
 ALTERNATIVE: Catalpa Hills- Connection Alternative- Connect to Proposed Reach 27.12 and Master Meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 2,604,380	\$ 141,677	\$ 2,746,058	\$ 2,604,380	\$ 141,677	\$ 2,746,058
1	2014	0.964		\$ 141,677	\$ 141,677	\$ -	\$ 136,557	\$ 136,557
2	2015	0.929		\$ 141,677	\$ 141,677	\$ -	\$ 131,621	\$ 131,621
3	2016	0.895		\$ 141,677	\$ 141,677	\$ -	\$ 126,863	\$ 126,863
4	2017	0.863		\$ 141,677	\$ 141,677	\$ -	\$ 122,278	\$ 122,278
5	2018	0.832		\$ 141,677	\$ 141,677	\$ -	\$ 117,858	\$ 117,858
6	2019	0.802		\$ 141,677	\$ 141,677	\$ -	\$ 113,598	\$ 113,598
7	2020	0.773		\$ 141,677	\$ 141,677	\$ -	\$ 109,492	\$ 109,492
8	2021	0.745		\$ 141,677	\$ 141,677	\$ -	\$ 105,535	\$ 105,535
9	2022	0.718		\$ 141,677	\$ 141,677	\$ -	\$ 101,720	\$ 101,720
10	2023	0.692		\$ 141,677	\$ 141,677	\$ -	\$ 98,044	\$ 98,044
11	2024	0.667		\$ 141,677	\$ 141,677	\$ -	\$ 94,500	\$ 94,500
12	2025	0.643		\$ 141,677	\$ 141,677	\$ -	\$ 91,084	\$ 91,084
13	2026	0.620		\$ 141,677	\$ 141,677	\$ -	\$ 87,792	\$ 87,792
14	2027	0.597		\$ 141,677	\$ 141,677	\$ -	\$ 84,619	\$ 84,619
15	2028	0.576		\$ 141,677	\$ 141,677	\$ -	\$ 81,560	\$ 81,560
16	2029	0.555		\$ 141,677	\$ 141,677	\$ -	\$ 78,612	\$ 78,612
17	2030	0.535		\$ 141,677	\$ 141,677	\$ -	\$ 75,771	\$ 75,771
18	2031	0.515		\$ 141,677	\$ 141,677	\$ -	\$ 73,032	\$ 73,032
19	2032	0.497		\$ 141,677	\$ 141,677	\$ -	\$ 70,393	\$ 70,393
20	2033	0.479		\$ 141,677	\$ 141,677	\$ -	\$ 67,848	\$ 67,848
21	2034	0.462		\$ 141,677	\$ 141,677	\$ -	\$ 65,396	\$ 65,396
Total Alternative Captalpa Hills			\$ 2,604,380	\$ 3,116,905	\$ 5,721,285	\$ 2,604,380	\$ 2,175,853	\$ 4,780,233

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 5,677.02	\$ 68,124.29
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 26,044
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 26,044
Total Year 1 Operations and Maintenance				\$ 141,677

CURRENT
 HOUSEHOLDS
 ESTIMATE: 97

Monthly charge \$ 121.72

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Cipriano Lewis
 ALTERNATIVE: Cipriano Lewis - Groundwater Alternative- Drill community well and form water system

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 2,561,979	\$ 83,066	\$ 2,645,044	\$ 2,561,979	\$ 83,066	\$ 2,645,044
1	2014	0.964		\$ 83,066	\$ 83,066	\$ -	\$ 80,063	\$ 80,063
2	2015	0.929		\$ 83,066	\$ 83,066	\$ -	\$ 77,169	\$ 77,169
3	2016	0.895		\$ 83,066	\$ 83,066	\$ -	\$ 74,380	\$ 74,380
4	2017	0.863		\$ 83,066	\$ 83,066	\$ -	\$ 71,692	\$ 71,692
5	2018	0.832		\$ 83,066	\$ 83,066	\$ -	\$ 69,100	\$ 69,100
6	2019	0.802	\$ 19,000	\$ 83,066	\$ 102,066	\$ 15,234	\$ 66,603	\$ 81,837
7	2020	0.773		\$ 83,066	\$ 83,066	\$ -	\$ 64,195	\$ 64,195
8	2021	0.745		\$ 83,066	\$ 83,066	\$ -	\$ 61,875	\$ 61,875
9	2022	0.718		\$ 83,066	\$ 83,066	\$ -	\$ 59,639	\$ 59,639
10	2023	0.692		\$ 83,066	\$ 83,066	\$ -	\$ 57,483	\$ 57,483
11	2024	0.667		\$ 83,066	\$ 83,066	\$ -	\$ 55,405	\$ 55,405
12	2025	0.643	\$ 19,000	\$ 83,066	\$ 102,066	\$ 12,215	\$ 53,403	\$ 65,618
13	2026	0.620		\$ 83,066	\$ 83,066	\$ -	\$ 51,473	\$ 51,473
14	2027	0.597		\$ 83,066	\$ 83,066	\$ -	\$ 49,612	\$ 49,612
15	2028	0.576		\$ 83,066	\$ 83,066	\$ -	\$ 47,819	\$ 47,819
16	2029	0.555		\$ 83,066	\$ 83,066	\$ -	\$ 46,090	\$ 46,090
17	2030	0.535	\$ 19,000	\$ 83,066	\$ 102,066	\$ 10,161	\$ 44,425	\$ 54,586
18	2031	0.515		\$ 83,066	\$ 83,066	\$ -	\$ 42,819	\$ 42,819
19	2032	0.497		\$ 83,066	\$ 83,066	\$ -	\$ 41,271	\$ 41,271
20	2033	0.479		\$ 83,066	\$ 83,066	\$ -	\$ 39,779	\$ 39,779
21	2034	0.462		\$ 83,066	\$ 83,066	\$ -	\$ 38,342	\$ 38,342
Total Alternative Cipriano Lewis			\$ 2,618,979	\$ 1,827,442	\$ 4,446,421	\$ 2,599,590	\$ 1,275,703	\$ 3,875,293

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 25,620
Electricity	84505	KWH	\$ 0.08	\$ 6,760
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 25,620
Total Year 1 Operations and Maintenance				\$ 83,066

CURRENT
 HOUSEHOLDS
 ESTIMATE: 27

Monthly charge \$ 256.38

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Cipriano Lewis
 ALTERNATIVE: Cipriano Lewis - Connection Alternative- Connect to City of Gallup and Master Meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 1,542,972	\$ 77,634	\$ 1,620,606	\$ 1,542,972	\$ 77,634	\$ 1,620,606
1	2014	0.964		\$ 77,634	\$ 77,634	\$ -	\$ 74,828	\$ 74,828
2	2015	0.929		\$ 77,634	\$ 77,634	\$ -	\$ 72,123	\$ 72,123
3	2016	0.895		\$ 77,634	\$ 77,634	\$ -	\$ 69,517	\$ 69,517
4	2017	0.863		\$ 77,634	\$ 77,634	\$ -	\$ 67,004	\$ 67,004
5	2018	0.832		\$ 77,634	\$ 77,634	\$ -	\$ 64,582	\$ 64,582
6	2019	0.802		\$ 77,634	\$ 77,634	\$ -	\$ 62,248	\$ 62,248
7	2020	0.773		\$ 77,634	\$ 77,634	\$ -	\$ 59,998	\$ 59,998
8	2021	0.745		\$ 77,634	\$ 77,634	\$ -	\$ 57,829	\$ 57,829
9	2022	0.718		\$ 77,634	\$ 77,634	\$ -	\$ 55,739	\$ 55,739
10	2023	0.692		\$ 77,634	\$ 77,634	\$ -	\$ 53,724	\$ 53,724
11	2024	0.667		\$ 77,634	\$ 77,634	\$ -	\$ 51,783	\$ 51,783
12	2025	0.643		\$ 77,634	\$ 77,634	\$ -	\$ 49,911	\$ 49,911
13	2026	0.620		\$ 77,634	\$ 77,634	\$ -	\$ 48,107	\$ 48,107
14	2027	0.597		\$ 77,634	\$ 77,634	\$ -	\$ 46,368	\$ 46,368
15	2028	0.576		\$ 77,634	\$ 77,634	\$ -	\$ 44,692	\$ 44,692
16	2029	0.555		\$ 77,634	\$ 77,634	\$ -	\$ 43,077	\$ 43,077
17	2030	0.535		\$ 77,634	\$ 77,634	\$ -	\$ 41,520	\$ 41,520
18	2031	0.515		\$ 77,634	\$ 77,634	\$ -	\$ 40,019	\$ 40,019
19	2032	0.497		\$ 77,634	\$ 77,634	\$ -	\$ 38,573	\$ 38,573
20	2033	0.479		\$ 77,634	\$ 77,634	\$ -	\$ 37,178	\$ 37,178
21	2034	0.462		\$ 77,634	\$ 77,634	\$ -	\$ 35,835	\$ 35,835
Total Alternative Cipriano Lewis			\$ 1,542,972	\$ 1,707,949	\$ 3,250,921	\$ 1,542,972	\$ 1,192,287	\$ 2,735,259

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 2,109.09	\$ 25,309.02
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 15,430
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 15,430
Total Year 1 Operations and Maintenance				\$ 77,634

CURRENT
 HOUSEHOLDS
 ESTIMATE: 27

Monthly charge \$ 239.61

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Coal Basin Water
 ALTERNATIVE: Coal Basin Water Association -Groundwater Alternative- Drill supplemental well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 2,163,056	\$ 83,380	\$ 2,246,436	\$ 2,163,056	\$ 83,380	\$ 2,246,436
1	2014	0.964		\$ 83,380	\$ 83,380	\$ -	\$ 80,366	\$ 80,366
2	2015	0.929		\$ 83,380	\$ 83,380	\$ -	\$ 77,461	\$ 77,461
3	2016	0.895		\$ 83,380	\$ 83,380	\$ -	\$ 74,662	\$ 74,662
4	2017	0.863		\$ 83,380	\$ 83,380	\$ -	\$ 71,963	\$ 71,963
5	2018	0.832		\$ 83,380	\$ 83,380	\$ -	\$ 69,362	\$ 69,362
6	2019	0.802	\$ 22,000	\$ 83,380	\$ 105,380	\$ 17,640	\$ 66,855	\$ 84,495
7	2020	0.773		\$ 83,380	\$ 83,380	\$ -	\$ 64,438	\$ 64,438
8	2021	0.745		\$ 83,380	\$ 83,380	\$ -	\$ 62,109	\$ 62,109
9	2022	0.718		\$ 83,380	\$ 83,380	\$ -	\$ 59,864	\$ 59,864
10	2023	0.692		\$ 83,380	\$ 83,380	\$ -	\$ 57,701	\$ 57,701
11	2024	0.667		\$ 83,380	\$ 83,380	\$ -	\$ 55,615	\$ 55,615
12	2025	0.643	\$ 22,000	\$ 83,380	\$ 105,380	\$ 14,144	\$ 53,605	\$ 67,749
13	2026	0.620		\$ 83,380	\$ 83,380	\$ -	\$ 51,667	\$ 51,667
14	2027	0.597		\$ 83,380	\$ 83,380	\$ -	\$ 49,800	\$ 49,800
15	2028	0.576		\$ 83,380	\$ 83,380	\$ -	\$ 48,000	\$ 48,000
16	2029	0.555		\$ 83,380	\$ 83,380	\$ -	\$ 46,265	\$ 46,265
17	2030	0.535		\$ 83,380	\$ 83,380	\$ -	\$ 44,593	\$ 44,593
18	2031	0.515	\$ 22,000	\$ 83,380	\$ 105,380	\$ 11,341	\$ 42,981	\$ 54,322
19	2032	0.497		\$ 83,380	\$ 83,380	\$ -	\$ 41,427	\$ 41,427
20	2033	0.479		\$ 83,380	\$ 83,380	\$ -	\$ 39,930	\$ 39,930
21	2034	0.462	\$ 22,000	\$ 83,380	\$ 105,380	\$ 10,155	\$ 38,487	\$ 48,642
Total Alternative Coal Basin Water			\$ 2,251,056	\$ 1,834,357	\$ 4,085,413	\$ 2,216,335	\$ 1,280,530	\$ 3,496,866

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 23,457
Electricity	165335	KWH	\$ 0.08	\$ 13,227
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 21,631
Total Year 1 Operations and Maintenance				\$ 83,380

CURRENT
 HOUSEHOLDS
 ESTIMATE: 34

Monthly charge \$ 204.36

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Coal Basin Water
 ALTERNATIVE: Coal Basin Water Association -Connection Alternative- City of Gallup and master meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 2,163,056	\$ 96,144	\$ 2,259,200	\$ 2,163,056	\$ 96,144	\$ 2,259,200
1	2014	0.964		\$ 96,144	\$ 96,144	\$ -	\$ 92,669	\$ 92,669
2	2015	0.929		\$ 96,144	\$ 96,144	\$ -	\$ 89,319	\$ 89,319
3	2016	0.895		\$ 96,144	\$ 96,144	\$ -	\$ 86,091	\$ 86,091
4	2017	0.863		\$ 96,144	\$ 96,144	\$ -	\$ 82,979	\$ 82,979
5	2018	0.832		\$ 96,144	\$ 96,144	\$ -	\$ 79,980	\$ 79,980
6	2019	0.802		\$ 96,144	\$ 96,144	\$ -	\$ 77,089	\$ 77,089
7	2020	0.773		\$ 96,144	\$ 96,144	\$ -	\$ 74,303	\$ 74,303
8	2021	0.745		\$ 96,144	\$ 96,144	\$ -	\$ 71,617	\$ 71,617
9	2022	0.718		\$ 96,144	\$ 96,144	\$ -	\$ 69,028	\$ 69,028
10	2023	0.692		\$ 96,144	\$ 96,144	\$ -	\$ 66,533	\$ 66,533
11	2024	0.667		\$ 96,144	\$ 96,144	\$ -	\$ 64,129	\$ 64,129
12	2025	0.643		\$ 96,144	\$ 96,144	\$ -	\$ 61,811	\$ 61,811
13	2026	0.620		\$ 96,144	\$ 96,144	\$ -	\$ 59,577	\$ 59,577
14	2027	0.597		\$ 96,144	\$ 96,144	\$ -	\$ 57,423	\$ 57,423
15	2028	0.576		\$ 96,144	\$ 96,144	\$ -	\$ 55,348	\$ 55,348
16	2029	0.555		\$ 96,144	\$ 96,144	\$ -	\$ 53,347	\$ 53,347
17	2030	0.535		\$ 96,144	\$ 96,144	\$ -	\$ 51,419	\$ 51,419
18	2031	0.515		\$ 96,144	\$ 96,144	\$ -	\$ 49,560	\$ 49,560
19	2032	0.497		\$ 96,144	\$ 96,144	\$ -	\$ 47,769	\$ 47,769
20	2033	0.479		\$ 96,144	\$ 96,144	\$ -	\$ 46,042	\$ 46,042
21	2034	0.462		\$ 96,144	\$ 96,144	\$ -	\$ 44,378	\$ 44,378
Total Alternative Coal Basin Water			\$ 2,163,056	\$ 2,115,160	\$ 4,278,216	\$ 2,163,056	\$ 1,476,553	\$ 3,639,609

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 2,465.88	\$ 29,590.55
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 23,457
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 21,631
Total Year 1 Operations and Maintenance				\$ 96,144

CURRENT
 HOUSEHOLDS
 ESTIMATE: 34

Monthly charge \$ 235.65

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Crestview
 ALTERNATIVE: Crestview -Groundwater Alternative- Drill community well and form water system

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 3,704,884	\$ 108,569	\$ 3,813,453	\$ 3,704,884	\$ 108,569	\$ 3,813,453
1	2014	0.964		\$ 108,569	\$ 108,569	\$ -	\$ 104,645	\$ 104,645
2	2015	0.929		\$ 108,569	\$ 108,569	\$ -	\$ 100,862	\$ 100,862
3	2016	0.895		\$ 108,569	\$ 108,569	\$ -	\$ 97,217	\$ 97,217
4	2017	0.863		\$ 108,569	\$ 108,569	\$ -	\$ 93,703	\$ 93,703
5	2018	0.832		\$ 108,569	\$ 108,569	\$ -	\$ 90,316	\$ 90,316
6	2019	0.802	\$ 25,000	\$ 108,569	\$ 133,569	\$ 20,045	\$ 87,052	\$ 107,097
7	2020	0.773		\$ 108,569	\$ 108,569	\$ -	\$ 83,905	\$ 83,905
8	2021	0.745		\$ 108,569	\$ 108,569	\$ -	\$ 80,873	\$ 80,873
9	2022	0.718		\$ 108,569	\$ 108,569	\$ -	\$ 77,949	\$ 77,949
10	2023	0.692		\$ 108,569	\$ 108,569	\$ -	\$ 75,132	\$ 75,132
11	2024	0.667		\$ 108,569	\$ 108,569	\$ -	\$ 72,416	\$ 72,416
12	2025	0.643	\$ 25,000	\$ 108,569	\$ 133,569	\$ 16,072	\$ 69,799	\$ 85,871
13	2026	0.620		\$ 108,569	\$ 108,569	\$ -	\$ 67,276	\$ 67,276
14	2027	0.597		\$ 108,569	\$ 108,569	\$ -	\$ 64,844	\$ 64,844
15	2028	0.576		\$ 108,569	\$ 108,569	\$ -	\$ 62,501	\$ 62,501
16	2029	0.555		\$ 108,569	\$ 108,569	\$ -	\$ 60,242	\$ 60,242
17	2030	0.535		\$ 108,569	\$ 108,569	\$ -	\$ 58,064	\$ 58,064
18	2031	0.515	\$ 25,000	\$ 108,569	\$ 133,569	\$ 12,887	\$ 55,965	\$ 68,853
19	2032	0.497		\$ 108,569	\$ 108,569	\$ -	\$ 53,943	\$ 53,943
20	2033	0.479		\$ 108,569	\$ 108,569	\$ -	\$ 51,993	\$ 51,993
21	2034	0.462		\$ 108,569	\$ 108,569	\$ -	\$ 50,114	\$ 50,114
Total Alternative Crestview			\$ 3,779,884	\$ 2,388,518	\$ 6,168,403	\$ 3,753,889	\$ 1,667,380	\$ 5,421,269

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 37,049
Electricity	117572	KWH	\$ 0.08	\$ 9,406
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 37,049
Total Year 1 Operations and Maintenance				\$ 108,569

CURRENT
 HOUSEHOLDS
 ESTIMATE: 93

Monthly charge \$ 97.28

Operations and Maintenance Costs - Full Buildout

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Crestview
 ALTERNATIVE: Crestview -Connection Alternative- Connect with NTUA line and master meter

PREPARED BY: MA

PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 2,701,227	\$ 141,168	\$ 2,842,395	\$ 2,701,227	\$ 141,168	\$ 2,842,395
1	2014	0.964		\$ 141,168	\$ 141,168	\$ -	\$ 136,065	\$ 136,065
2	2015	0.929		\$ 141,168	\$ 141,168	\$ -	\$ 131,147	\$ 131,147
3	2016	0.895		\$ 141,168	\$ 141,168	\$ -	\$ 126,407	\$ 126,407
4	2017	0.863		\$ 141,168	\$ 141,168	\$ -	\$ 121,838	\$ 121,838
5	2018	0.832		\$ 141,168	\$ 141,168	\$ -	\$ 117,434	\$ 117,434
6	2019	0.802		\$ 141,168	\$ 141,168	\$ -	\$ 113,190	\$ 113,190
7	2020	0.773		\$ 141,168	\$ 141,168	\$ -	\$ 109,099	\$ 109,099
8	2021	0.745		\$ 141,168	\$ 141,168	\$ -	\$ 105,155	\$ 105,155
9	2022	0.718		\$ 141,168	\$ 141,168	\$ -	\$ 101,354	\$ 101,354
10	2023	0.692		\$ 141,168	\$ 141,168	\$ -	\$ 97,691	\$ 97,691
11	2024	0.667		\$ 141,168	\$ 141,168	\$ -	\$ 94,160	\$ 94,160
12	2025	0.643		\$ 141,168	\$ 141,168	\$ -	\$ 90,757	\$ 90,757
13	2026	0.620		\$ 141,168	\$ 141,168	\$ -	\$ 87,476	\$ 87,476
14	2027	0.597		\$ 141,168	\$ 141,168	\$ -	\$ 84,315	\$ 84,315
15	2028	0.576		\$ 141,168	\$ 141,168	\$ -	\$ 81,267	\$ 81,267
16	2029	0.555		\$ 141,168	\$ 141,168	\$ -	\$ 78,330	\$ 78,330
17	2030	0.535		\$ 141,168	\$ 141,168	\$ -	\$ 75,498	\$ 75,498
18	2031	0.515		\$ 141,168	\$ 141,168	\$ -	\$ 72,770	\$ 72,770
19	2032	0.497		\$ 141,168	\$ 141,168	\$ -	\$ 70,139	\$ 70,139
20	2033	0.479		\$ 141,168	\$ 141,168	\$ -	\$ 67,604	\$ 67,604
21	2034	0.462		\$ 141,168	\$ 141,168	\$ -	\$ 65,161	\$ 65,161
Total Alternative Crestview			\$ 2,701,227	\$ 3,105,692	\$ 5,806,919	\$ 2,701,227	\$ 2,168,026	\$ 4,869,252

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 5,473.14	\$ 65,677.70
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 27,012
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 27,012
Total Year 1 Operations and Maintenance				\$ 141,168

CURRENT
 HOUSEHOLDS
 ESTIMATE: 93

Monthly charge \$ 126.49

Operations and Maintenance Costs - Full Buildout

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Gamarco
 ALTERNATIVE: Gamarco W&SD -Groundwater Alternative- Redrill permitted well.

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate 3.75% Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 5,338,155	\$ 256,255	\$ 5,594,410	\$ 5,338,155	\$ 256,255	\$ 5,594,410
1	2014	0.964		\$ 256,255	\$ 256,255	\$ -	\$ 246,993	\$ 246,993
2	2015	0.929		\$ 256,255	\$ 256,255	\$ -	\$ 238,065	\$ 238,065
3	2016	0.895		\$ 256,255	\$ 256,255	\$ -	\$ 229,461	\$ 229,461
4	2017	0.863		\$ 256,255	\$ 256,255	\$ -	\$ 221,167	\$ 221,167
5	2018	0.832		\$ 256,255	\$ 256,255	\$ -	\$ 213,173	\$ 213,173
6	2019	0.802	\$ 31,000	\$ 256,255	\$ 287,255	\$ 24,856	\$ 205,468	\$ 230,324
7	2020	0.773		\$ 256,255	\$ 256,255	\$ -	\$ 198,041	\$ 198,041
8	2021	0.745		\$ 256,255	\$ 256,255	\$ -	\$ 190,883	\$ 190,883
9	2022	0.718		\$ 256,255	\$ 256,255	\$ -	\$ 183,984	\$ 183,984
10	2023	0.692		\$ 256,255	\$ 256,255	\$ -	\$ 177,334	\$ 177,334
11	2024	0.667		\$ 256,255	\$ 256,255	\$ -	\$ 170,924	\$ 170,924
12	2025	0.643	\$ 31,000	\$ 256,255	\$ 287,255	\$ 19,930	\$ 164,746	\$ 184,676
13	2026	0.620		\$ 256,255	\$ 256,255	\$ -	\$ 158,791	\$ 158,791
14	2027	0.597		\$ 256,255	\$ 256,255	\$ -	\$ 153,052	\$ 153,052
15	2028	0.576		\$ 256,255	\$ 256,255	\$ -	\$ 147,520	\$ 147,520
16	2029	0.555		\$ 256,255	\$ 256,255	\$ -	\$ 142,188	\$ 142,188
17	2030	0.535		\$ 256,255	\$ 256,255	\$ -	\$ 137,049	\$ 137,049
18	2031	0.515	\$ 31,000	\$ 256,255	\$ 287,255	\$ 15,980	\$ 132,095	\$ 148,075
19	2032	0.497		\$ 256,255	\$ 256,255	\$ -	\$ 127,321	\$ 127,321
20	2033	0.479		\$ 256,255	\$ 256,255	\$ -	\$ 122,719	\$ 122,719
21	2034	0.462		\$ 256,255	\$ 256,255	\$ -	\$ 118,283	\$ 118,283
Total Alternative Gamarco			\$ 5,431,155	\$ 5,637,610	\$ 11,068,765	\$ 5,398,921	\$ 3,935,510	\$ 9,334,431

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	2.0%	\$ 128,125
Electricity	352715	KWH	\$ 0.08	\$ 28,217
Labor, Class 1 Operator	52	WK	\$ 825.60	\$ 42,931
G&A	1	%	1%	\$ 53,382
Total Year 1 Operations and Maintenance				\$ 256,255

CURRENT
 HOUSEHOLDS
 ESTIMATE: 484

Monthly charge \$ 44.12

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Gamarco
 ALTERNATIVE: Gamarco W&SD -Connection Alternative- Master meter at emergency connections

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 1,101,210	\$ 434,837	\$ 1,536,047	\$ 1,101,210	\$ 434,837	\$ 1,536,047
1	2014	0.964		\$ 434,837	\$ 434,837	\$ -	\$ 419,120	\$ 419,120
2	2015	0.929		\$ 434,837	\$ 434,837	\$ -	\$ 403,971	\$ 403,971
3	2016	0.895		\$ 434,837	\$ 434,837	\$ -	\$ 389,370	\$ 389,370
4	2017	0.863		\$ 434,837	\$ 434,837	\$ -	\$ 375,296	\$ 375,296
5	2018	0.832		\$ 434,837	\$ 434,837	\$ -	\$ 361,731	\$ 361,731
6	2019	0.802		\$ 434,837	\$ 434,837	\$ -	\$ 348,656	\$ 348,656
7	2020	0.773		\$ 434,837	\$ 434,837	\$ -	\$ 336,054	\$ 336,054
8	2021	0.745		\$ 434,837	\$ 434,837	\$ -	\$ 323,908	\$ 323,908
9	2022	0.718		\$ 434,837	\$ 434,837	\$ -	\$ 312,200	\$ 312,200
10	2023	0.692		\$ 434,837	\$ 434,837	\$ -	\$ 300,916	\$ 300,916
11	2024	0.667		\$ 434,837	\$ 434,837	\$ -	\$ 290,039	\$ 290,039
12	2025	0.643		\$ 434,837	\$ 434,837	\$ -	\$ 279,556	\$ 279,556
13	2026	0.620		\$ 434,837	\$ 434,837	\$ -	\$ 269,452	\$ 269,452
14	2027	0.597		\$ 434,837	\$ 434,837	\$ -	\$ 259,712	\$ 259,712
15	2028	0.576		\$ 434,837	\$ 434,837	\$ -	\$ 250,325	\$ 250,325
16	2029	0.555		\$ 434,837	\$ 434,837	\$ -	\$ 241,277	\$ 241,277
17	2030	0.535		\$ 434,837	\$ 434,837	\$ -	\$ 232,557	\$ 232,557
18	2031	0.515		\$ 434,837	\$ 434,837	\$ -	\$ 224,151	\$ 224,151
19	2032	0.497		\$ 434,837	\$ 434,837	\$ -	\$ 216,049	\$ 216,049
20	2033	0.479		\$ 434,837	\$ 434,837	\$ -	\$ 208,240	\$ 208,240
21	2034	0.462		\$ 434,837	\$ 434,837	\$ -	\$ 200,713	\$ 200,713
Total Alternative Gamarco			\$ 1,101,210	\$ 9,566,409	\$ 10,667,620	\$ 1,101,210	\$ 6,678,131	\$ 7,779,341

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 25,427.77	\$ 305,133.24
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	3.0%	\$ 65,079
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 825.60	\$ 42,931
G&A	1	%	1%	\$ 21,693
Total Year 1 Operations and Maintenance				\$ 434,837

CURRENT
 HOUSEHOLDS
 ESTIMATE: 484

Monthly charge \$ 74.87

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Twin Buttes
 ALTERNATIVE: Twin Buttes -Groundwater Alternative- Drill community well and form system

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 3,937,416	\$ 114,955	\$ 4,052,371	\$ 3,937,416	\$ 114,955	\$ 4,052,371
1	2014	0.964		\$ 114,955	\$ 114,955	\$ -	\$ 110,800	\$ 110,800
2	2015	0.929		\$ 114,955	\$ 114,955	\$ -	\$ 106,796	\$ 106,796
3	2016	0.895		\$ 114,955	\$ 114,955	\$ -	\$ 102,936	\$ 102,936
4	2017	0.863		\$ 114,955	\$ 114,955	\$ -	\$ 99,215	\$ 99,215
5	2018	0.832		\$ 114,955	\$ 114,955	\$ -	\$ 95,629	\$ 95,629
6	2019	0.802	\$ 22,000	\$ 114,955	\$ 136,955	\$ 17,640	\$ 92,172	\$ 109,812
7	2020	0.773		\$ 114,955	\$ 114,955	\$ -	\$ 88,841	\$ 88,841
8	2021	0.745		\$ 114,955	\$ 114,955	\$ -	\$ 85,630	\$ 85,630
9	2022	0.718		\$ 114,955	\$ 114,955	\$ -	\$ 82,535	\$ 82,535
10	2023	0.692		\$ 114,955	\$ 114,955	\$ -	\$ 79,552	\$ 79,552
11	2024	0.667		\$ 114,955	\$ 114,955	\$ -	\$ 76,676	\$ 76,676
12	2025	0.643	\$ 22,000	\$ 114,955	\$ 136,955	\$ 14,144	\$ 73,905	\$ 88,049
13	2026	0.620		\$ 114,955	\$ 114,955	\$ -	\$ 71,233	\$ 71,233
14	2027	0.597		\$ 114,955	\$ 114,955	\$ -	\$ 68,659	\$ 68,659
15	2028	0.576		\$ 114,955	\$ 114,955	\$ -	\$ 66,177	\$ 66,177
16	2029	0.555		\$ 114,955	\$ 114,955	\$ -	\$ 63,785	\$ 63,785
17	2030	0.535		\$ 114,955	\$ 114,955	\$ -	\$ 61,480	\$ 61,480
18	2031	0.515	\$ 22,000	\$ 114,955	\$ 136,955	\$ 11,341	\$ 59,258	\$ 70,598
19	2032	0.497		\$ 114,955	\$ 114,955	\$ -	\$ 57,116	\$ 57,116
20	2033	0.479		\$ 114,955	\$ 114,955	\$ -	\$ 55,051	\$ 55,051
21	2034	0.462		\$ 114,955	\$ 114,955	\$ -	\$ 53,061	\$ 53,061
Total Alternative Twin Buttes			\$ 4,003,416	\$ 2,529,020	\$ 6,532,436	\$ 3,980,540	\$ 1,765,462	\$ 5,746,002

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 41,110
Electricity	117572	KWH	\$ 0.08	\$ 9,406
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 39,374
Total Year 1 Operations and Maintenance				\$ 114,955

CURRENT
 HOUSEHOLDS
 ESTIMATE: 57

Monthly charge \$ 168.06

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Twin Buttes
 ALTERNATIVE: Twin Buttes -Connection Alternative-Connect to NGWSP line and master meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 3,188,892	\$ 130,638	\$ 3,319,529	\$ 3,188,892	\$ 130,638	\$ 3,319,529
1	2014	0.964		\$ 130,638	\$ 130,638	\$ -	\$ 125,916	\$ 125,916
2	2015	0.929		\$ 130,638	\$ 130,638	\$ -	\$ 121,365	\$ 121,365
3	2016	0.895		\$ 130,638	\$ 130,638	\$ -	\$ 116,978	\$ 116,978
4	2017	0.863		\$ 130,638	\$ 130,638	\$ -	\$ 112,750	\$ 112,750
5	2018	0.832		\$ 130,638	\$ 130,638	\$ -	\$ 108,675	\$ 108,675
6	2019	0.802		\$ 130,638	\$ 130,638	\$ -	\$ 104,747	\$ 104,747
7	2020	0.773		\$ 130,638	\$ 130,638	\$ -	\$ 100,961	\$ 100,961
8	2021	0.745		\$ 130,638	\$ 130,638	\$ -	\$ 97,311	\$ 97,311
9	2022	0.718		\$ 130,638	\$ 130,638	\$ -	\$ 93,794	\$ 93,794
10	2023	0.692		\$ 130,638	\$ 130,638	\$ -	\$ 90,404	\$ 90,404
11	2024	0.667		\$ 130,638	\$ 130,638	\$ -	\$ 87,136	\$ 87,136
12	2025	0.643		\$ 130,638	\$ 130,638	\$ -	\$ 83,987	\$ 83,987
13	2026	0.620		\$ 130,638	\$ 130,638	\$ -	\$ 80,951	\$ 80,951
14	2027	0.597		\$ 130,638	\$ 130,638	\$ -	\$ 78,025	\$ 78,025
15	2028	0.576		\$ 130,638	\$ 130,638	\$ -	\$ 75,205	\$ 75,205
16	2029	0.555		\$ 130,638	\$ 130,638	\$ -	\$ 72,487	\$ 72,487
17	2030	0.535		\$ 130,638	\$ 130,638	\$ -	\$ 69,867	\$ 69,867
18	2031	0.515		\$ 130,638	\$ 130,638	\$ -	\$ 67,341	\$ 67,341
19	2032	0.497		\$ 130,638	\$ 130,638	\$ -	\$ 64,907	\$ 64,907
20	2033	0.479		\$ 130,638	\$ 130,638	\$ -	\$ 62,561	\$ 62,561
21	2034	0.462		\$ 130,638	\$ 130,638	\$ -	\$ 60,300	\$ 60,300
Total Alternative Twin Buttes			\$ 3,188,892	\$ 2,874,029	\$ 6,062,921	\$ 3,188,892	\$ 2,006,306	\$ 5,195,198

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 3,638.20	\$ 43,658.42
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 33,625
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 31,889
Total Year 1 Operations and Maintenance				\$ 130,638

CURRENT
 HOUSEHOLDS
 ESTIMATE: 57

Monthly charge \$ 190.99

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: White Cliffs
 ALTERNATIVE: White Cliffs -Connection Alternative-Connect to NTUA line and master meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost	O&M Cost	Total Cost	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 3,622,862	\$ 108,398	\$ 3,731,260	\$ 3,622,862	\$ 108,398	\$ 3,731,260
1	2014	0.964		\$ 108,398	\$ 108,398	\$ -	\$ 104,480	\$ 104,480
2	2015	0.929		\$ 108,398	\$ 108,398	\$ -	\$ 100,704	\$ 100,704
3	2016	0.895		\$ 108,398	\$ 108,398	\$ -	\$ 97,064	\$ 97,064
4	2017	0.863		\$ 108,398	\$ 108,398	\$ -	\$ 93,556	\$ 93,556
5	2018	0.832		\$ 108,398	\$ 108,398	\$ -	\$ 90,174	\$ 90,174
6	2019	0.802	\$ 24,000	\$ 108,398	\$ 132,398	\$ 19,243	\$ 86,915	\$ 106,158
7	2020	0.773		\$ 108,398	\$ 108,398	\$ -	\$ 83,773	\$ 83,773
8	2021	0.745		\$ 108,398	\$ 108,398	\$ -	\$ 80,745	\$ 80,745
9	2022	0.718		\$ 108,398	\$ 108,398	\$ -	\$ 77,827	\$ 77,827
10	2023	0.692		\$ 108,398	\$ 108,398	\$ -	\$ 75,014	\$ 75,014
11	2024	0.667		\$ 108,398	\$ 108,398	\$ -	\$ 72,302	\$ 72,302
12	2025	0.643	\$ 24,000	\$ 108,398	\$ 132,398	\$ 15,430	\$ 69,689	\$ 85,119
13	2026	0.620		\$ 108,398	\$ 108,398	\$ -	\$ 67,170	\$ 67,170
14	2027	0.597		\$ 108,398	\$ 108,398	\$ -	\$ 64,742	\$ 64,742
15	2028	0.576		\$ 108,398	\$ 108,398	\$ -	\$ 62,402	\$ 62,402
16	2029	0.555		\$ 108,398	\$ 108,398	\$ -	\$ 60,147	\$ 60,147
17	2030	0.535		\$ 108,398	\$ 108,398	\$ -	\$ 57,973	\$ 57,973
18	2031	0.515	\$ 24,000	\$ 108,398	\$ 132,398	\$ 12,372	\$ 55,877	\$ 68,249
19	2032	0.497		\$ 108,398	\$ 108,398	\$ -	\$ 53,858	\$ 53,858
20	2033	0.479		\$ 108,398	\$ 108,398	\$ -	\$ 51,911	\$ 51,911
21	2034	0.462		\$ 108,398	\$ 108,398	\$ -	\$ 50,035	\$ 50,035
Total Alternative White Cliffs			\$ 3,694,862	\$ 2,384,760	\$ 6,079,622	\$ 3,669,906	\$ 1,664,756	\$ 5,334,663

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 36,229
Electricity	135942	KWH	\$ 0.08	\$ 10,875
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 36,229
Total Year 1 Operations and Maintenance				\$ 108,398

CURRENT
 HOUSEHOLDS
 ESTIMATE: 48

Monthly charge \$ 188.19

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: White Cliffs
 ALTERNATIVE: White Cliffs -Connection Alternative-Connect to NTUA line and master meter

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost	O&M Cost	Total Cost	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 2,085,606	\$ 101,331	\$ 2,186,937	\$ 2,085,606	\$ 101,331	\$ 2,186,937
1	2014	0.964		\$ 101,331	\$ 101,331	\$ -	\$ 97,669	\$ 97,669
2	2015	0.929		\$ 101,331	\$ 101,331	\$ -	\$ 94,139	\$ 94,139
3	2016	0.895		\$ 101,331	\$ 101,331	\$ -	\$ 90,736	\$ 90,736
4	2017	0.863		\$ 101,331	\$ 101,331	\$ -	\$ 87,456	\$ 87,456
5	2018	0.832		\$ 101,331	\$ 101,331	\$ -	\$ 84,295	\$ 84,295
6	2019	0.802		\$ 101,331	\$ 101,331	\$ -	\$ 81,248	\$ 81,248
7	2020	0.773		\$ 101,331	\$ 101,331	\$ -	\$ 78,312	\$ 78,312
8	2021	0.745		\$ 101,331	\$ 101,331	\$ -	\$ 75,481	\$ 75,481
9	2022	0.718		\$ 101,331	\$ 101,331	\$ -	\$ 72,753	\$ 72,753
10	2023	0.692		\$ 101,331	\$ 101,331	\$ -	\$ 70,123	\$ 70,123
11	2024	0.667		\$ 101,331	\$ 101,331	\$ -	\$ 67,589	\$ 67,589
12	2025	0.643		\$ 101,331	\$ 101,331	\$ -	\$ 65,146	\$ 65,146
13	2026	0.620		\$ 101,331	\$ 101,331	\$ -	\$ 62,791	\$ 62,791
14	2027	0.597		\$ 101,331	\$ 101,331	\$ -	\$ 60,522	\$ 60,522
15	2028	0.576		\$ 101,331	\$ 101,331	\$ -	\$ 58,334	\$ 58,334
16	2029	0.555		\$ 101,331	\$ 101,331	\$ -	\$ 56,226	\$ 56,226
17	2030	0.535		\$ 101,331	\$ 101,331	\$ -	\$ 54,193	\$ 54,193
18	2031	0.515		\$ 101,331	\$ 101,331	\$ -	\$ 52,235	\$ 52,235
19	2032	0.497		\$ 101,331	\$ 101,331	\$ -	\$ 50,347	\$ 50,347
20	2033	0.479		\$ 101,331	\$ 101,331	\$ -	\$ 48,527	\$ 48,527
21	2034	0.462		\$ 101,331	\$ 101,331	\$ -	\$ 46,773	\$ 46,773
Total Alternative White Cliffs			\$ 2,085,606	\$ 2,229,289	\$ 4,314,895	\$ 2,085,606	\$ 1,556,225	\$ 3,641,831

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 3,179.47	\$ 38,153.60
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 20,856
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 20,856
Total Year 1 Operations and Maintenance				\$ 101,331

CURRENT
 HOUSEHOLDS
 ESTIMATE: 48

Monthly charge \$ 175.92

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Williams Acres
 ALTERNATIVE: Williams Acres-Groundwater Alternative- Drill Supplemental Well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 4,833,978	\$ 159,662	\$ 4,993,640	\$ 4,833,978	\$ 159,662	\$ 4,993,640
1	2014	0.964		\$ 159,662	\$ 159,662	\$ -	\$ 153,891	\$ 153,891
2	2015	0.929		\$ 159,662	\$ 159,662	\$ -	\$ 148,329	\$ 148,329
3	2016	0.895		\$ 159,662	\$ 159,662	\$ -	\$ 142,967	\$ 142,967
4	2017	0.863		\$ 159,662	\$ 159,662	\$ -	\$ 137,800	\$ 137,800
5	2018	0.832		\$ 159,662	\$ 159,662	\$ -	\$ 132,819	\$ 132,819
6	2019	0.802	\$ 51,000	\$ 159,662	\$ 210,662	\$ 40,892	\$ 128,019	\$ 168,911
7	2020	0.773		\$ 159,662	\$ 159,662	\$ -	\$ 123,391	\$ 123,391
8	2021	0.745		\$ 159,662	\$ 159,662	\$ -	\$ 118,931	\$ 118,931
9	2022	0.718		\$ 159,662	\$ 159,662	\$ -	\$ 114,633	\$ 114,633
10	2023	0.692		\$ 159,662	\$ 159,662	\$ -	\$ 110,489	\$ 110,489
11	2024	0.667		\$ 159,662	\$ 159,662	\$ -	\$ 106,496	\$ 106,496
12	2025	0.643	\$ 51,000	\$ 159,662	\$ 210,662	\$ 32,788	\$ 102,647	\$ 135,434
13	2026	0.620		\$ 159,662	\$ 159,662	\$ -	\$ 98,936	\$ 98,936
14	2027	0.597		\$ 159,662	\$ 159,662	\$ -	\$ 95,360	\$ 95,360
15	2028	0.576		\$ 159,662	\$ 159,662	\$ -	\$ 91,914	\$ 91,914
16	2029	0.555		\$ 159,662	\$ 159,662	\$ -	\$ 88,591	\$ 88,591
17	2030	0.535		\$ 159,662	\$ 159,662	\$ -	\$ 85,389	\$ 85,389
18	2031	0.515	\$ 51,000	\$ 159,662	\$ 210,662	\$ 26,290	\$ 82,303	\$ 108,593
19	2032	0.497		\$ 159,662	\$ 159,662	\$ -	\$ 79,328	\$ 79,328
20	2033	0.479		\$ 159,662	\$ 159,662	\$ -	\$ 76,461	\$ 76,461
21	2034	0.462	\$ 51,000	\$ 159,662	\$ 210,662	\$ 23,541	\$ 73,697	\$ 97,238
Total Alternative Williams Acres			\$ 5,037,978	\$ 3,512,564	\$ 8,550,541	\$ 4,957,488	\$ 2,452,055	\$ 7,409,543

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 48,340
Electricity	473960	KWH	\$ 0.08	\$ 37,917
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 48,340
Total Year 1 Operations and Maintenance				\$ 159,662

CURRENT
 HOUSEHOLDS
 ESTIMATE: 180

Monthly charge \$ 73.92

Operations and Maintenance Costs - Full Buildout

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Williams Acres
 ALTERNATIVE: Williams Acres-Connection Alternative- Connect to NTUA line and master meter

PREPARED BY: MA

PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 3,141,669	\$ 203,302	\$ 3,344,971	\$ 3,141,669	\$ 203,302	\$ 3,344,971
1	2014	0.964		\$ 203,302	\$ 203,302	\$ -	\$ 195,954	\$ 195,954
2	2015	0.929		\$ 203,302	\$ 203,302	\$ -	\$ 188,871	\$ 188,871
3	2016	0.895		\$ 203,302	\$ 203,302	\$ -	\$ 182,045	\$ 182,045
4	2017	0.863		\$ 203,302	\$ 203,302	\$ -	\$ 175,465	\$ 175,465
5	2018	0.832		\$ 203,302	\$ 203,302	\$ -	\$ 169,123	\$ 169,123
6	2019	0.802		\$ 203,302	\$ 203,302	\$ -	\$ 163,010	\$ 163,010
7	2020	0.773		\$ 203,302	\$ 203,302	\$ -	\$ 157,118	\$ 157,118
8	2021	0.745		\$ 203,302	\$ 203,302	\$ -	\$ 151,439	\$ 151,439
9	2022	0.718		\$ 203,302	\$ 203,302	\$ -	\$ 145,965	\$ 145,965
10	2023	0.692		\$ 203,302	\$ 203,302	\$ -	\$ 140,689	\$ 140,689
11	2024	0.667		\$ 203,302	\$ 203,302	\$ -	\$ 135,604	\$ 135,604
12	2025	0.643		\$ 203,302	\$ 203,302	\$ -	\$ 130,703	\$ 130,703
13	2026	0.620		\$ 203,302	\$ 203,302	\$ -	\$ 125,979	\$ 125,979
14	2027	0.597		\$ 203,302	\$ 203,302	\$ -	\$ 121,425	\$ 121,425
15	2028	0.576		\$ 203,302	\$ 203,302	\$ -	\$ 117,036	\$ 117,036
16	2029	0.555		\$ 203,302	\$ 203,302	\$ -	\$ 112,806	\$ 112,806
17	2030	0.535		\$ 203,302	\$ 203,302	\$ -	\$ 108,729	\$ 108,729
18	2031	0.515		\$ 203,302	\$ 203,302	\$ -	\$ 104,799	\$ 104,799
19	2032	0.497		\$ 203,302	\$ 203,302	\$ -	\$ 101,011	\$ 101,011
20	2033	0.479		\$ 203,302	\$ 203,302	\$ -	\$ 97,360	\$ 97,360
21	2034	0.462		\$ 203,302	\$ 203,302	\$ -	\$ 93,841	\$ 93,841
Total Alternative Williams Acres			\$ 3,141,669	\$ 4,472,647	\$ 7,614,316	\$ 3,141,669	\$ 3,122,271	\$ 6,263,940

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 9,916.93	\$ 119,003.16
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 31,417
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 31,417
Total Year 1 Operations and Maintenance				\$ 203,302

CURRENT
 HOUSEHOLDS
 ESTIMATE: 180

Monthly charge \$ 94.12

Operations and Maintenance Costs - Full Buildout

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Yah-Ta-Hey
 ALTERNATIVE: Ya-Ta-Hey-Groundwater Alternative- Drill additional well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A'E	B'E	C'E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 1,959,349	\$ 78,414	\$ 2,037,763	\$ 1,959,349	\$ 78,414	\$ 2,037,763
1	2014	0.964		\$ 78,414	\$ 78,414	\$ -	\$ 75,580	\$ 75,580
2	2015	0.929		\$ 78,414	\$ 78,414	\$ -	\$ 72,848	\$ 72,848
3	2016	0.895		\$ 78,414	\$ 78,414	\$ -	\$ 70,215	\$ 70,215
4	2017	0.863		\$ 78,414	\$ 78,414	\$ -	\$ 67,677	\$ 67,677
5	2018	0.832		\$ 78,414	\$ 78,414	\$ -	\$ 65,231	\$ 65,231
6	2019	0.802	\$ 22,000	\$ 78,414	\$ 100,414	\$ 17,640	\$ 62,873	\$ 80,513
7	2020	0.773		\$ 78,414	\$ 78,414	\$ -	\$ 60,601	\$ 60,601
8	2021	0.745		\$ 78,414	\$ 78,414	\$ -	\$ 58,410	\$ 58,410
9	2022	0.718		\$ 78,414	\$ 78,414	\$ -	\$ 56,299	\$ 56,299
10	2023	0.692		\$ 78,414	\$ 78,414	\$ -	\$ 54,264	\$ 54,264
11	2024	0.667		\$ 78,414	\$ 78,414	\$ -	\$ 52,303	\$ 52,303
12	2025	0.643	\$ 22,000	\$ 78,414	\$ 100,414	\$ 14,144	\$ 50,412	\$ 64,556
13	2026	0.620		\$ 78,414	\$ 78,414	\$ -	\$ 48,590	\$ 48,590
14	2027	0.597		\$ 78,414	\$ 78,414	\$ -	\$ 46,834	\$ 46,834
15	2028	0.576		\$ 78,414	\$ 78,414	\$ -	\$ 45,141	\$ 45,141
16	2029	0.555		\$ 78,414	\$ 78,414	\$ -	\$ 43,509	\$ 43,509
17	2030	0.535		\$ 78,414	\$ 78,414	\$ -	\$ 41,937	\$ 41,937
18	2031	0.515	\$ 22,000	\$ 78,414	\$ 100,414	\$ 11,341	\$ 40,421	\$ 51,762
19	2032	0.497		\$ 78,414	\$ 78,414	\$ -	\$ 38,960	\$ 38,960
20	2033	0.479		\$ 78,414	\$ 78,414	\$ -	\$ 37,552	\$ 37,552
21	2034	0.462		\$ 78,414	\$ 78,414	\$ -	\$ 36,195	\$ 36,195
Total Alternative Yah-Ta-Hey			\$ 2,025,349	\$ 1,725,108	\$ 3,750,457	\$ 2,002,473	\$ 1,204,266	\$ 3,206,739

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Chemicals	12	MO	\$ 300.00	\$ 3,600
Maintenance and Replacement	1	%	1.0%	\$ 24,055
Electricity	121246	KWH	\$ 0.08	\$ 9,700
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 19,593
Total Year 1 Operations and Maintenance				\$ 78,414

CURRENT
 HOUSEHOLDS
 ESTIMATE: 125

Monthly charge \$ 52.28

PRESENT WORTH ANALYSIS

PROJECT: McKinley County
 SITE: Yah-Ta-Hey
 ALTERNATIVE: Ya-Ta-Hey-Groundwater Alternative- Drill additional well

PREPARED BY: MA
 PROJECT NUMBER: WR12.0084

Assumptions

1. Real Discount Rate **3.75%** Source: Real Discount Rate of 2013 for the Section 80 of WRDA
2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

Present Worth Analysis

Elapsed Time	Year	E	A	B	C=A+B	A*E	B*E	C*E
		Discount Factor at 3.75%	Capital Cost (present dollars)	O&M Cost (present dollars)	Total Cost (present dollars)	Total PV Capital Costs at 3.75%	Total PV O&M Costs at 3.75%	Total PV Costs at 3.75%
0	2013	1.000	\$ 862,156	\$ 128,499	\$ 990,655	\$ 862,156	\$ 128,499	\$ 990,655
1	2014	0.964		\$ 128,499	\$ 128,499	\$ -	\$ 123,854	\$ 123,854
2	2015	0.929		\$ 128,499	\$ 128,499	\$ -	\$ 119,378	\$ 119,378
3	2016	0.895		\$ 128,499	\$ 128,499	\$ -	\$ 115,063	\$ 115,063
4	2017	0.863		\$ 128,499	\$ 128,499	\$ -	\$ 110,904	\$ 110,904
5	2018	0.832		\$ 128,499	\$ 128,499	\$ -	\$ 106,895	\$ 106,895
6	2019	0.802		\$ 128,499	\$ 128,499	\$ -	\$ 103,032	\$ 103,032
7	2020	0.773		\$ 128,499	\$ 128,499	\$ -	\$ 99,308	\$ 99,308
8	2021	0.745		\$ 128,499	\$ 128,499	\$ -	\$ 95,718	\$ 95,718
9	2022	0.718		\$ 128,499	\$ 128,499	\$ -	\$ 92,258	\$ 92,258
10	2023	0.692		\$ 128,499	\$ 128,499	\$ -	\$ 88,924	\$ 88,924
11	2024	0.667		\$ 128,499	\$ 128,499	\$ -	\$ 85,710	\$ 85,710
12	2025	0.643		\$ 128,499	\$ 128,499	\$ -	\$ 82,612	\$ 82,612
13	2026	0.620		\$ 128,499	\$ 128,499	\$ -	\$ 79,626	\$ 79,626
14	2027	0.597		\$ 128,499	\$ 128,499	\$ -	\$ 76,748	\$ 76,748
15	2028	0.576		\$ 128,499	\$ 128,499	\$ -	\$ 73,974	\$ 73,974
16	2029	0.555		\$ 128,499	\$ 128,499	\$ -	\$ 71,300	\$ 71,300
17	2030	0.535		\$ 128,499	\$ 128,499	\$ -	\$ 68,723	\$ 68,723
18	2031	0.515		\$ 128,499	\$ 128,499	\$ -	\$ 66,239	\$ 66,239
19	2032	0.497		\$ 128,499	\$ 128,499	\$ -	\$ 63,845	\$ 63,845
20	2033	0.479		\$ 128,499	\$ 128,499	\$ -	\$ 61,537	\$ 61,537
21	2034	0.462		\$ 128,499	\$ 128,499	\$ -	\$ 59,313	\$ 59,313
Total Alternative Yah-Ta-Hey			\$ 862,156	\$ 2,826,974	\$ 3,689,130	\$ 862,156	\$ 1,973,458	\$ 2,835,614

Operations and Maintenance	Quantity	Unit	Unit Price	Total
Estimated Annual Water Charges	1	12	\$ 7,110.69	\$ 85,328.31
Chemicals	0	MO	\$ 300.00	\$ -
Maintenance and Replacement	1	%	1.0%	\$ 13,083
Electricity		KWH		
Labor, Class 1 Operator	52	WK	\$ 412.80	\$ 21,466
G&A	1	%	1%	\$ 8,622
Total Year 1 Operations and Maintenance				\$ 128,499

CURRENT
 HOUSEHOLDS
 ESTIMATE: 125

Monthly charge \$ 85.67

Operations and Maintenance Costs - Full Buildout

DESCRIPTION	UNIT	UNIT PRICE	EXPLANATION	SOURCE
Chemicals	MO	300	From Chemdirect.com- cost of 55 gal drum of 12.5%	Vendor
Maintenance and Replacement	%	0.01	Annual- Repair and replacement	Professional opinion
Electricity	KWH	0.08	Gallup Electric	Gallup Electric Website
Clean Tank and Repaint (~100,000 gal)	LS	7000	Every 6 years per 2006 Community water System Survey table 46	Budget estimate from D&R Tank
Clean Tank and Repaint (+200,000 gal)	LS	9000	Every 6 years per 2006 Community water System Survey table 46	Budget estimate from D&R Tank
Labor, Class 1 Operator	WK	412.8	part time(20 hrs) includes overhead, insurance, medical etc	2006 Community Water System Survey EPA- Table 84
Labor, Class 1 Operator	WK	825.6	full time(40 hrs) includes overhead, insurance, medical etc	2007 Community Water System Survey EPA- Table 84
Overhead and Administration	%	0.01	General and Administration Annual Costs	Professional opinion

Well rehab and pump replacement costs

Allison	15000
Catalpa	18000
Cipriano	12000
Crestview	15000
Coal Basin	18000
Gamerco WSD	22000
Twin Buttes	15000
White Cliffs	15000
Williams Acres	42000
Yah ta hey	15000

Pipe Replacement costs

Site	Feet existing pipe* cost
Allison	0
Catalpa	0
Cipriano	0
Crestview	0
Coal Basin	\$ 182,634.88
Gamerco WSD	\$ 1,068,098.24
Twin Buttes	0
White Cliffs	\$ 173,583.20
Williams Acres	0
Yah ta hey	\$ 446,178.88

The following items are percentages of construction cost:

\$ Mobilization/Demobilization, per COA 2009 Item 6.05/6.06	5.07%
\$ Construction Management, per EPA	10%
\$ Engineering Services for Design and Construction, per EPA	12%
\$ Project Management, per EPA	5%
\$ General & Administrative (G&A), per EPA	14%
\$ Overhead	5%
\$ NMGRY for Gallup, NM	8.063%
\$ Bonding and Insurance, per RS Means 01 31 13.30	2%
\$ Contingency, per EPA	25%
\$ Real Discount Rate (5-year), per OMB Jan 2012	2.1%

Appendix B

**Evaluation of
Water Supply Alternatives**

McKinley County Small Systems Alternatives Evaluation

System - Alternative	Total Score
Allison - No action alternative - Drill community well and reactivate water system	1,565
Allison - Master meter alternative - Connect to NGWSP line and master meter	2,320
Allison - Connection alternative - Connect to NGWSP line and individual meters	2,830
Catalpa Hills - No action alternative - Drill community well and form water system	1,485
Catalpa Hills - Master meter alternative - Connect to proposed NGWSP line and master meter	2,280
Catalpa Hills - Connection alternative - Connect to proposed NGWSP line and individual meter	2,860
Cipriano Lewis - No action alternative - Drill community well and form water system	1,525
Cipriano Lewis - Master meter alternative - Connect to City of Gallup and master meter	2,360
Cipriano Lewis - Connection alternative - Connect to City of Gallup line and individual meters	2,900
Coal Basin Water Association - No action alternative - Drill supplemental well	1,575
Coal Basin Water Association - Master meter alternative - Replace emergency connection with mas	2,570
Coal Basin Water Association - Connection alternative - City of Gallup and individual meters	2,835
Crestview - No action alternative - Drill community well and form water system	1,525
Crestview - Master meter alternative - Connect with NTUA line and master meter	2,430
Crestview - Connection alternative - Connect with NTUA and individual meters	2,830
Gamerco W&SD - No action alternative - Redrill permitted supplemental well	1,970
Gamerco W&SD - Master meter alternative - Replace emergency connection with master meter	2,545
Gamerco W&SD - Connection alternative - Connect to City of Gallup and individual meters	2,850
Twin Buttes - No action alternative - Drill community well and form system	1,500
Twin Buttes - Master meter alternative - Connect to NGWSP line and master meter	2,335
Twin Buttes - Connection alternative - Connect to NGWSP and individual meters	2,830
White Cliffs - No action alternative - Drill supplemental well	1,640
White Cliffs - Master meter alternative - Replace emergency connection with master meter	2,620
White Cliffs - Connection alternative - Connect to NTUA line and individual meters	2,815
Williams Acres - No action alternative - Drill community well	1,480
Williams Acres - Master meter alternative - Connect to NTUA line and master meter	2,310
Williams Acres - Connection alternative - Connect to NTUA and individual meters	2,750
Ya ta hey - No action alternative - Drill supplemental well	1,640
Ya ta hey - Master meter alternative - Replace emergency connection with master meter	2,575
Ya ta hey - Connection alternative - Connect to City of Gallup and meter individually	2,830

Alternative Evaluation

Name of System: **Allison**

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

X

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☐

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☐

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	40	4	160
Implementable	Project complexity	35	3	105
	Water right acquisition or transfer	20	4	80
Cost	Projected capital and O&M costs	50	4	200
Local environmental and health and safety	Environmental considerations	50	4	200
	Health, safety, and welfare	60	4	240
	Watershed and regional approach	20	4	80
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	50	4	200
Total				1565

Alternative Evaluation

Name of System: Allison

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☒

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☐

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	60	3	180
	Water right acquisition or transfer	50	4	200
Cost	Projected capital and O&M costs	60	4	240
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	60	4	240
Total				2320

Alternative Evaluation

Name of System: **Allison**

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☐

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☒

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	70	3	210
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	80	4	320
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	80	5	400
	Complexity of managerial and operations and maintenance requirements for systems and communities	90	4	360
Total				2830

Alternative Evaluation

Name of System: Catalpa Hills

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

X

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	40	4	160
Implementable	Project complexity	35	3	105
	Water right acquisition or transfer	10	4	40
Cost	Projected capital and O&M costs	40	4	160
Local environmental and health and safety	Environmental considerations	50	4	200
	Health, safety, and welfare	60	4	240
	Watershed and regional approach	20	4	80
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	50	4	200
Total				1485

Alternative Evaluation

Name of System: Catalpa Hills

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☒

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☐

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	60	3	180
	Water right acquisition or transfer	50	4	200
Cost	Projected capital and O&M costs	50	4	200
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	60	4	240
Total				2280

Alternative Evaluation

Name of System: Catalpa Hills

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☐

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☒

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	80	3	240
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	80	4	320
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	80	5	400
	Complexity of managerial and operations and maintenance requirements for systems and communities	90	4	360
Total				2860

Alternative Evaluation

Name of System: Cipriano Lewis

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

X

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	40	4	160
Implementable	Project complexity	35	3	105
	Water right acquisition or transfer	10	4	40
Cost	Projected capital and O&M costs	50	4	200
Local environmental and health and safety	Environmental considerations	50	4	200
	Health, safety, and welfare	60	4	240
	Watershed and regional approach	20	4	80
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	50	4	200
Total				1525

Alternative Evaluation

Name of System: Cipriano Lewis

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☒

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☐

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	60	3	180
	Water right acquisition or transfer	50	4	200
Cost	Projected capital and O&M costs	70	4	280
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	60	4	240
Total				2360

Alternative Evaluation

Name of System: Cipriano Lewis

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☐

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☒

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	80	3	240
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	90	4	360
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	80	5	400
	Complexity of managerial and operations and maintenance requirements for systems and communities	90	4	360
Total				2900

Alternative Evaluation

Name of System: Coal Basin

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

X

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	40	4	160
Implementable	Project complexity	45	3	135
	Water right acquisition or transfer	25	4	100
Cost	Projected capital and O&M costs	40	4	160
Local environmental and health and safety	Environmental considerations	50	4	200
	Health, safety, and welfare	60	4	240
	Watershed and regional approach	20	4	80
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	50	4	200
Total				1575

Alternative Evaluation

Name of System: Coal Basin

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☒

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☐

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	60	3	180
	Water right acquisition or transfer	90	4	360
Cost	Projected capital and O&M costs	60	4	240
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	70	5	350
	Complexity of managerial and operations and maintenance requirements for systems and communities	70	4	280
Total				2570

Alternative Evaluation

Name of System: Coal Basin

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☐

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☒

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	65	3	195
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	85	4	340
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	80	5	400
	Complexity of managerial and operations and maintenance requirements for systems and communities	90	4	360
Total				2835

Alternative Evaluation

Name of System: **Crestview**

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

X

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	40	4	160
Implementable	Project complexity	35	3	105
	Water right acquisition or transfer	10	4	40
Cost	Projected capital and O&M costs	50	4	200
Local environmental and health and safety	Environmental considerations	50	4	200
	Health, safety, and welfare	60	4	240
	Watershed and regional approach	20	4	80
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	50	4	200
Total				1525

Alternative Evaluation

Name of System: **Crestview**

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☒

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☐

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	60	3	180
	Water right acquisition or transfer	50	4	200
Cost	Projected capital and O&M costs	65	4	260
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	70	5	350
	Complexity of managerial and operations and maintenance requirements for systems and communities	70	4	280
Total				2430

Alternative Evaluation

Name of System: **Crestview**

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☐

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☒

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	70	3	210
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	80	4	320
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	80	5	400
	Complexity of managerial and operations and maintenance requirements for systems and communities	90	4	360
Total				2830

Alternative Evaluation

Name of System: **Gamerco**

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

X

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	40	4	160
Implementable	Project complexity	55	3	165
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	45	4	180
Local environmental and health and safety	Environmental considerations	50	4	200
	Health, safety, and welfare	60	4	240
	Watershed and regional approach	20	4	80
Community preference	Reliability of service	65	5	325
	Complexity of managerial and operations and maintenance requirements for systems and communities	60	4	240
Total				1970

Alternative Evaluation

Name of System: **Gamerco**

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☒

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☐

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	60	3	180
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	60	4	240
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	65	5	325
	Complexity of managerial and operations and maintenance requirements for systems and communities	65	4	260
Total				2545

Alternative Evaluation

Name of System: **Gamerco**

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☐

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☒

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	70	3	210
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	85	4	340
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	80	5	400
	Complexity of managerial and operations and maintenance requirements for systems and communities	90	4	360
Total				2850

Alternative Evaluation

Name of System: **Twin Buttes**

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

X

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	40	4	160
Implementable	Project complexity	40	3	120
	Water right acquisition or transfer	10	4	40
Cost	Projected capital and O&M costs	40	4	160
Local environmental and health and safety	Environmental considerations	50	4	200
	Health, safety, and welfare	60	4	240
	Watershed and regional approach	20	4	80
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	50	4	200
Total				1500

Alternative Evaluation

Name of System: **Twin Buttes**

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☒

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☐

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	65	3	195
	Water right acquisition or transfer	50	4	200
Cost	Projected capital and O&M costs	60	4	240
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	60	4	240
Total				2335

Alternative Evaluation

Name of System: **Twin Buttes**

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☐

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☒

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	70	3	210
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	80	4	320
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	80	5	400
	Complexity of managerial and operations and maintenance requirements for systems and communities	90	4	360
Total				2830

Alternative Evaluation

Name of System: Williams Acres

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

X

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	35	4	140
Implementable	Project complexity	40	3	120
	Water right acquisition or transfer	10	4	40
Cost	Projected capital and O&M costs	40	4	160
Local environmental and health and safety	Environmental considerations	50	4	200
	Health, safety, and welfare	60	4	240
	Watershed and regional approach	20	4	80
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	50	4	200
Total				1480

Williams Acres W&SD has no water rights, Would need to appropriate rights or transfer water rights from resident owned domestic wells

Alternative Evaluation

Name of System: Williams Acres

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☒

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☐

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	70	3	210
	Water right acquisition or transfer	50	4	200
Cost	Projected capital and O&M costs	50	4	200
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	60	4	240
Total				2310

Alternative Evaluation

Name of System: Williams Acres

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☐

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☒

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	70	3	210
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	60	4	240
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	80	5	400
	Complexity of managerial and operations and maintenance requirements for systems and communities	90	4	360
Total				2750

Alternative Evaluation

Name of System: White Cliffs

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

X

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	35	4	140
Implementable	Project complexity	40	3	120
	Water right acquisition or transfer	50	4	200
Cost	Projected capital and O&M costs	40	4	160
Local environmental and health and safety	Environmental considerations	50	4	200
	Health, safety, and welfare	60	4	240
	Watershed and regional approach	20	4	80
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	50	4	200
Total				1640

Alternative Evaluation

Name of System: White Cliffs

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☒

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☐

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	70	3	210
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	60	4	240
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	70	5	350
	Complexity of managerial and operations and maintenance requirements for systems and communities	70	4	280
Total				2620

Alternative Evaluation

Name of System: White Cliffs

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☐

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☒

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	65	3	195
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	80	4	320
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	80	5	400
	Complexity of managerial and operations and maintenance requirements for systems and communities	90	4	360
95				2815

Alternative Evaluation

Name of System: Ya-Ta-Hey

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

X

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	35	4	140
Implementable	Project complexity	40	3	120
	Water right acquisition or transfer	50	4	200
Cost	Projected capital and O&M costs	40	4	160
Local environmental and health and safety	Environmental considerations	50	4	200
	Health, safety, and welfare	60	4	240
	Watershed and regional approach	20	4	80
Community preference	Reliability of service	60	5	300
	Complexity of managerial and operations and maintenance requirements for systems and communities	50	4	200
Total				1640

Alternative Evaluation

Name of System: Ya-Ta-Hey

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☒

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☐

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	70	3	210
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	60	4	240
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	65	5	325
	Complexity of managerial and operations and maintenance requirements for systems and communities	65	4	260
Total				2575

Alternative Evaluation

Name of System: Ya-Ta-Hey

Alternative:

No Action Alternative: Drill New or Supplemental well with service from small system

☐

Connection with master meter to Gallup or NTUA (Water system still responsible for service)

☐

Connection to Gallup or NTUA, who provides service to individual customers (water system no longer in place)

☒

Goals	Performance Measures/Attributes	Score (0–100)	Criteria Weight	Evaluation Total
Long-term sustainable supply	Renewable water supply	70	4	280
Implementable	Project complexity	70	3	210
	Water right acquisition or transfer	95	4	380
Cost	Projected capital and O&M costs	80	4	320
Local environmental and health and safety	Environmental considerations	60	4	240
	Health, safety, and welfare	70	4	280
	Watershed and regional approach	90	4	360
Community preference	Reliability of service	80	5	400
	Complexity of managerial and operations and maintenance requirements for systems and communities	90	4	360
Total				2830