

**Recommended Alternative for
Long-Term Water Supply
Gamerco Water and Sanitation District**

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

June 23, 2015



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Recommended Alternative for Long-Term Water Supply Gamerco Water and Sanitation District

1. Background and Overview

This document summarizes the recommendations for providing long-term public water service to the Gamerco Water and Sanitation District (Gamerco) in McKinley County, New Mexico (Figure 1). (Figure 1). Water service for a number of existing or potential small rural water systems in McKinley County was examined in the report *McKinley County Small Rural Water Systems Appraisal Level Investigation*, prepared by Daniel B. Stephens & Associates, Inc. (DBS&A) in partnership with DePauli Engineering and Surveying Co. The report was published June 9, 2015. The Appraisal Level Investigation was prepared for McKinley County, through the Northwest New Mexico Council of Governments (NWNMCOG) pursuant to the Reclamation Rural Water Supply Act of 2006 (43 USC §§ 2401-2409 (Supp. 2011)) and appraisal criteria included in the U.S. Bureau of Reclamation's (USBR's) Rural Water Supply Program interim final rule (43 CFR Part 404).

2. Existing Conditions

Located just north of Gallup's municipal boundary, the Gamerco Townsite subdivision is the largest water system in the study, with more than 484 connections (Figure 1). Gamerco was organized as a water and sanitation district (W&SD) in 1982 (NM District Court, 1982) and initially operated its own well. Gamerco's system consists of two storage tanks and a distribution network using polyvinyl chloride (PVC) piping (NMED, 2010). The storage tanks are designed for direct pumping on the distribution system.

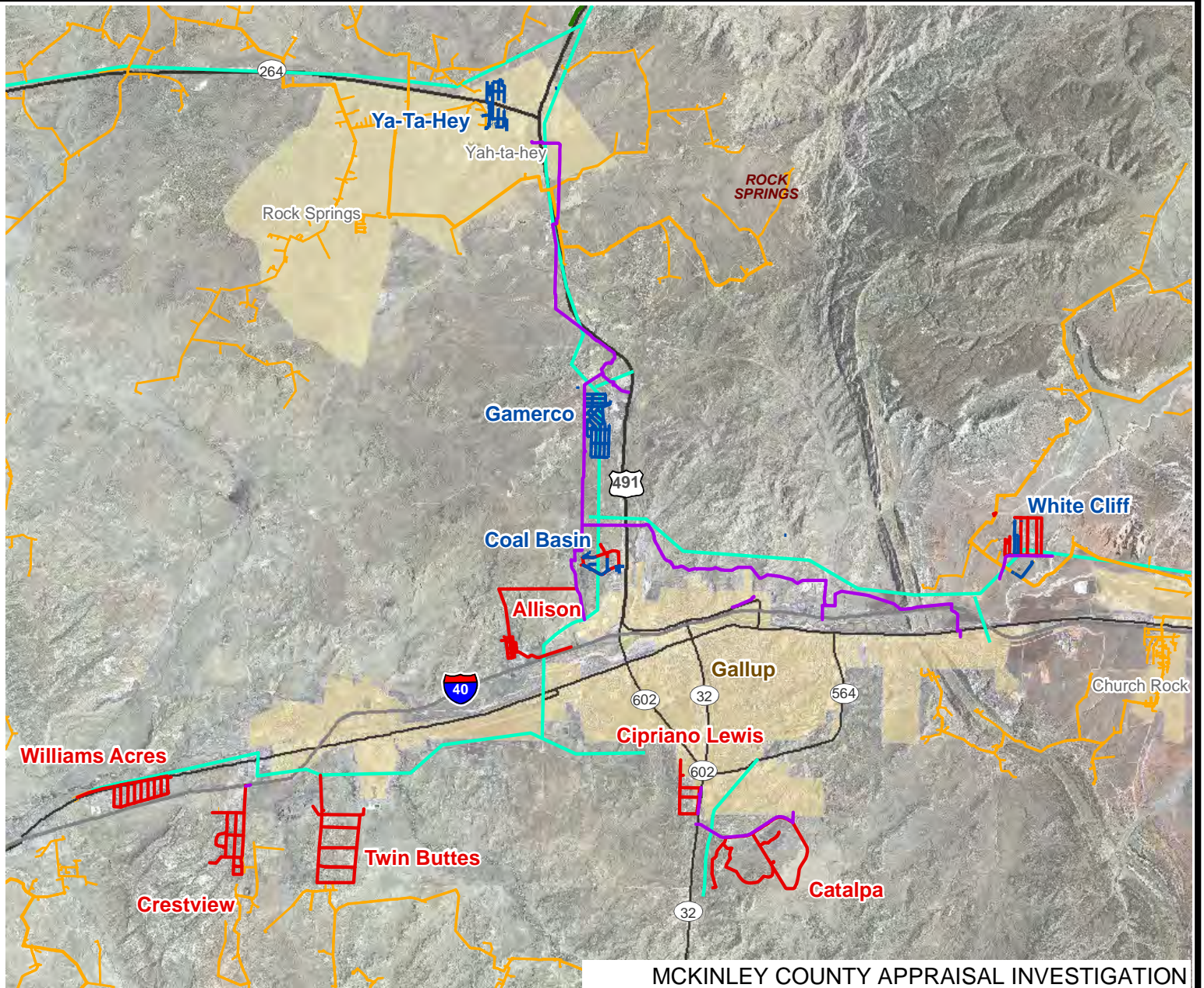
Gamerco currently purchases potable water from the City of Gallup. In 2005, Gamerco submitted an application to drill a replacement well, which was approved by the New Mexico Office of the State Engineer (OSE); since that time, Gamerco has been actively pursuing funding to drill this well. The replacement 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.



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



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

Figure 1





Gamerco is a member of the Mariposa Domestic Water Alliance. Gamerco's existing distribution system consists of service connections, valves, and fire hydrants.

As currently subdivided, Gamerco only has 484 lots.

3. Alternatives Examined

Three alternatives were examined for sustainable domestic water service to homes in the Gamerco Townsite subdivision: (1) No Action (Groundwater), (2) Connection to the Navajo Gallup Regional Water Supply Project (NGWSP) with a Master Meter, and (3) Connection to the NGWSP with individual meters.

To evaluate future infrastructure needs, population and water demand projections were calculated. It is estimated that in 2060 the Gamerco subdivision will include 598 households (an additional 114 households compared to existing conditions), with an average demand of 118,958 gallons per day (gpd), or 133.2 acre-feet per year (ac-ft/yr).

The designs for all three alternatives include the addition of 114 new connections.

3.1 No Action Alternative

The well replacement project mentioned in Section 2 is considered the no action alternative for the purpose of this study. The new well is assumed to be 2,700 feet deep with a 40-horsepower pump providing 110 gallons per minute (gpm), and is proposed to be installed on the east side of the system. An associated 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.



3.2 Connection with Master Meter Alternative

Under the Master Meter Alternative, the emergency connection would be replaced with a master meter with an 8-inch totalizing flow meter and vault in the far northeast connection point to the NGWSP transmission line.

3.3 Connection with Individual Meters Alternative

Under the Individual Meters Alternative, the system would be connected to the City of Gallup with individual meters.

4. Preferred Alternative

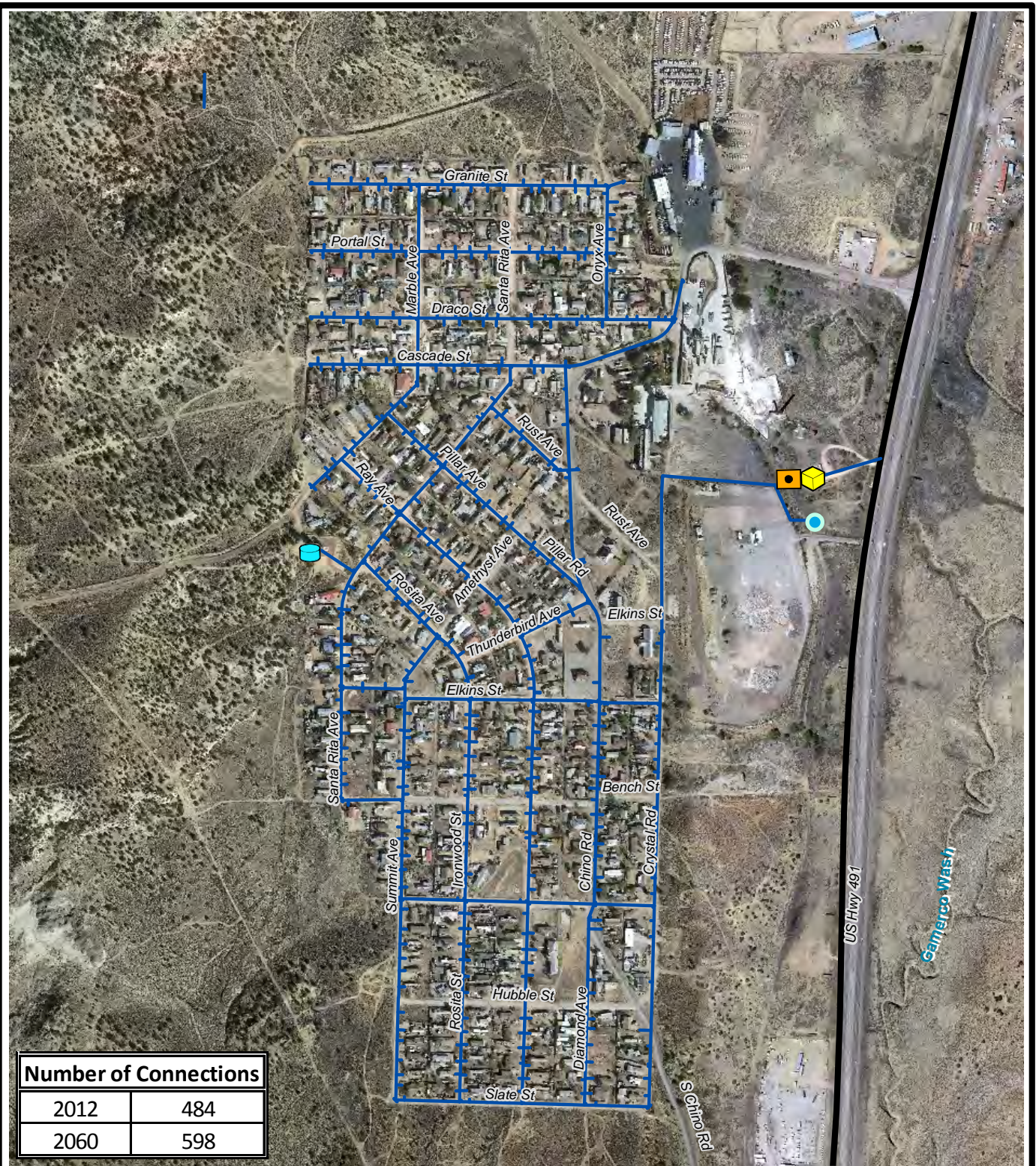
The alternatives described above were scored based on performance goals that were associated with performance measures and attributes. Scores were assigned from 1 to 100, and criteria were weighted from 1 to 5. The scores for Gamerco alternatives are provided in Appendix A and summarized in Table 1. Based on the community's preference, rather than the scores, the no action alternative is the preferred alternative, as shown in Figure 2.

Table 1. Alternative Scores

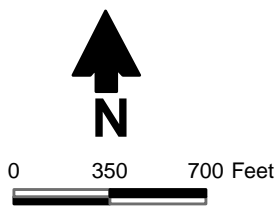
Alternative	Score
No action (groundwater)	1,970
Connection with master meter	2,545
Connection with individual meters	2,850

5. Costs

The estimated capital cost of the preferred alternative is \$2,823,000. The annual household water cost is \$243. The annual operating and maintenance cost would total \$146,000. Gamerco would bill its individual customers based on Gamerco rates. The detailed cost estimates are provided as Appendix B.



Number of Connections	
2012	484
2060	598



- 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

MCKINLEY COUNTY
APPRAISAL INVESTIGATION
Gamero Water System
Preferred Alternative

Figure 2



6. Permitting and Environmental Compliance

6.1 Biological Setting

The Southwest Regional Gap Analysis Project (SWReGAP) maps the Gamerco subdivision as Colorado Plateau pinyon-juniper woodland, developed (medium-high intensity), developed (open space-low intensity), inter-mountain basins greasewood flat, and inter-mountain basins mixed salt desert scrub. These vegetation categories (termed “ecological systems”), together with typical wildlife of McKinley County, are described in Appendix C.

6.2 Special-Status Species

Federally listed 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*), the southwestern willow flycatcher (*Empidonax traillii extimus*), the least tern (*Sternula antillarum athalassos*), and the 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.

Some of the above species, along with others, also receive protection under New Mexico’s Wildlife Conservation Act [17-2-37 to 17-2-46 NMSA 1978] or at the Navajo Nation level. All of these species, including the bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), Costa’s hummingbird (*Calypte costae*), and gray vireo (*Vireo vicinior*) must be considered for planning purposes.

6.3 Permitting and Compliance

Prior to construction of the preferred alternative, the contractor would be required to address applicable state and federal requirements for construction, including right-of-way for water lines. Additionally, this project falls within the project area of the NGWSP. Key requirements for that project are included here for reference. The *Record of Decision for the Navajo-Gallup Water Supply Project Planning Report and Final Environmental Impact Statement* (USBR, 2009)



indicates steps needed for meeting all environmental compliance regarding final designs. Construction of water lines is expected to create temporary turbidity and other water quality concerns, and USBR is tasked with obtaining required permits under Section 404 of the Clean Water Act (CWA) for impacts associated with jurisdictional waters of the United States. Nationwide permits authorization under Nationwide Permits (NWP) No. 12 (Utility Line Activities) will be requested for temporary construction disturbances to perennial and intermittent stream pipeline crossings. Compliance with General Condition 18, Endangered Species, is required for all NWPs.

The New Mexico Wildlife Conservation Act (WCA) (NMSA 17-2-37) authorizes the New Mexico Department of Game and Fish to create a list of endangered or threatened wildlife within the state, and to take steps to protect and restore populations of species on the list. Actions causing the death of a state listed endangered animal are in violation of the WCA. For all of these reasons, in addition to other federal and state regulations and guidelines, the planning phase for any proposed new water line should include a biological survey with the following objectives:

- Determination of the ordinary high water mark at each stream crossing, in order to determine disturbance acreages for jurisdictional waters
- Wetland delineations, as needed
- Identification of noxious weeds along the route of the proposed water line
- Assessment of habitat for federal and state threatened and endangered species, as well as any additional species listed by the Navajo Nation, as needed

The Migratory Bird Treaty Act makes it unlawful to hunt, take, capture, kill, possess, import, or export any migratory birds, their nests, and eggs. Construction of the new water line should therefore occur outside the nesting season or be preceded by nest surveys to locate and protect any active nest at risk from construction activities.

Archaeological surveys are also needed along the route of the proposed new water line to avoid or mitigate losses of cultural resources that could be affected by the construction and operation



of the water line. Native American human remains, funerary objects, or objects of cultural patrimony may also be encountered during the construction of new water lines of the NGWSP. Therefore, prior to issuing any approvals or permits for activities related to the NGWSP, USBR is tasked with not just the implementation of a program to avoid and mitigate the loss of cultural resources, but also full compliance with the relevant sections of the Native American Graves Protection and Repatriation Act (NAGPRA) and 43 CFR 10.3 (USBR, 2009).

As no new water line would need to be installed, no archaeological or biological surveys would be needed, and no NWP would be required.

References

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

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

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>>.

Appendix A
Alternative Scoring

Alternative Evaluation

Name of System: Gamerco

Alternative:

No Connection 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	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 benefits	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 Connection 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 benefits	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 Connection 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 benefits	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

Appendix B

**Preliminary
Cost Estimate for
Preferred Alternative**

COST ESTIMATE SUMMARY

FEATURE: Gamarco W&SD - No action alternative - Redrill permitted 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	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:		

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

Appendix C
Vegetation and Wildlife



Appendix C. Vegetation and Wildlife

C.1 Vegetation

The Southwest Regional Gap Analysis Project (SWReGAP) maps the Gamerco subdivision as Colorado Plateau pinyon-juniper woodland, developed (medium-high intensity), developed (open space-low intensity), inter-mountain basins greasewood flat, and inter-mountain basins mixed salt desert scrub. These vegetation categories (termed “ecological systems”) are described in the following subsections.

C.1.1 Colorado Plateau Pinyon-Juniper Woodland

The Colorado Plateau pinyon-juniper woodland 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 to 8,000 feet above mean sea level (feet msl). Woodlands of this ecological system 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.

C.1.2 Developed, Medium-High Intensity

This land cover type includes areas with a mixture of constructed materials and vegetation. Impervious surface accounts for 50 to 79 percent of the total cover. These areas most commonly include single-family housing units.

C.1.3 Developed, Open Space-Low Intensity

This land cover type includes areas with a mixture of some construction materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.

C.1.4 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.



C.1.5 Inter-Mountain Basins Mixed Salt Desert Scrub

This extensive ecological system includes open-canopied shrublands of typically saline desert basins, alluvial slopes, and plains across the Intermountain western United States. This type also extends in limited distribution into the southern Great Plains. Substrates are often saline and calcareous, medium- to fine-textured, alkaline soils, but include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more *Atriplex* species such as *Atriplex confertifolia*, *Atriplex canescens*, *Atriplex polycarpa*, or *Atriplex spinifera*. Other shrubs present to co-dominant may include *Artemisia tridentata* ssp. *wyomingensis*, *Chrysothamnus viscidiflorus*, *Ericameria nauseosa*, *Ephedra nevadensis*, *Grayia spinosa*, *Krascheninnikovia lanata*, *Lycium* spp., *Picrothamnus desertorum*, or *Tetradymia* spp. *Sarcobatus vermiculatus* is generally absent, but if present does not co-dominate. The herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids such as *Achnatherum hymenoides*, *Bouteloua gracilis*, *Elymus lanceolatus* ssp. *lanceolatus*, *Pascopyrum smithii*, *Pleuraphis jamesii*, *Pleuraphis rigida*, *Poa secunda*, or *Sporobolus airoides*. Various forbs are also present.

C.2 Wildlife

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.

References

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.