Design Memorandum

Placitas Library and Fire Station
Water System Improvements Project

December 2015

Prepared for:
Sandoval County, New Mexico

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LETTER OF TRANSMITTAL

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To:	Sandoval County Planning and Zoning Attention: Michael Springfield 1500 Idalia Road Bernalillo, NM 87004

Date: 12/28/2015	Job No.: 6241284
RE: Placitas Library Water System Design Memorandum	

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☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

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3	December 2015	Design Memorandum, Placitas Library and Fire Station Water System Improvements Project

These are transmitted as checked below:

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Design Memorandum
Placitas Library Water System Improvements Project
for
Sandoval County, New Mexico

December 2015

Submitted to:
Sandoval County Public Works Division
Public Works
1500 Idalia Road, Building D
Bernalillo, New Mexico 87004

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1. EXECUTIVE SUMMARY

Souder, Miller and Associates was contracted to write this Design Memorandum for Sandoval County to evaluate alternatives for improving the existing water supply and storage system for the Placitas Community Library (Library) and Fire Station.

The Owner, Sandoval County, is seeking a recommendation for the best way to address several concerns with the existing water system for the Library and Fire Station. These concerns include: address concerns about the reliability of the existing water supply well, install two (2) recently donated 15,000 gallon storage tanks to provide water storage for fire protection, relocate the existing hydro-pneumatic tank and chlorination system from the Fire Station to a separate structure, and install a larger water line from the storage tanks to a fire hydrant located at the Library.

This report evaluated three alternatives for the water system improvements: 1) Rehabilitate Existing Well with Storage Tanks at the Fire Station, 2) New Well with Storage Tanks at the Fire Station, 3) New Well with Storage Tanks at the Cemetery. The three alternatives were evaluated and scored against four (4) criteria: Life Cycle Cost, Owner Preference, Ease of O&M, and Water Source Redundancy. Each alternative's score was then multiplied by a weighting factor that represents the relative importance of the criterion. The scores were summed and then each alternative was ranked in order of preference.

Alternative 1 and Alternative 3 were ranked as equivalent and preferred over alternative 2. Both Alternative 1 and Alternative 3 will provide a suitable solution to the Owner's stated objectives for the project. Alternative 1 has the lowest life-cycle costs, but does not provide a redundant water source. Alternative 3 has a higher life-cycle cost but provides a redundant water supply and has significantly lower O&M requirements.

The decision to proceed with either Alternative 1 or Alternative 3 will be made by Sandoval County based on factors including: available funding, the importance assigned to a redundant water supply, ease of O&M.

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2. PROJECT PLANNING

The purpose of this report is to evaluate alternatives for improving the existing water supply system for the Placitas Community Library and Fire Station. The improvements are intended to address issues experienced with the current water system, including shortage of water availability, sporadic water quality issues, and access issues associated with the equipment within the Fire Department building. The County has indicated an interest in potentially incorporating a new well. Additionally, the project will incorporate two 15,000 gallon tanks that were recently donated to the County.

A. Location

Placitas is a Census-Designated Place (CDP) within Sandoval County. The Placitas Community Library (Library) is located along NM 165 approximately 4.75 miles east of Interstate 25 (I-25). The Placitas Fire Station is approximately 0.15 miles east of the Library. The proposed well site is near a Cemetery that is located approximately 0.9 miles east of the Library on Camino De La Buena Vista. The project planning area (PPA) encompasses these sites and a corridor along NM 165 between the sites. The entire PPA is shown in Exhibit 1.

B. Environmental Resources Present

The purpose of an evaluation of environmental resources is to assess the expected environmental impacts associated with the proposed project. The following sections describe the environmental resources in the Project Planning Area.

Farmland

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) provides detailed soil maps and identifies soils as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland as a part of the National Cooperative Soil Survey (NCSS). The complete NRCS custom soil report and maps are included as Appendix A. The NCSS classifies the soils of the PPA as Not Prime Farmland. No existing farmland will be impacted by the proposed project.

Rangeland

The primary soil classification for soils within the PPA is rangeland soils. Exhibit 2 illustrates the dominant soil classifications in the area. The complete NRCS custom soil report and maps are included in Appendix A. However, the PPA is designated as rural residential and there is no grazing or free roaming animals in the area.

Forestland

The NCSS does not identify any Forestland Soils within the PPA. The complete NRCS custom soil report and maps are included in Appendix A.

Wetlands

The US Fish and Wildlife Service (FWS) “Wetlands Mapper” online database was searched for wetland classifications within the PPA. There are no wetlands, or riparian habitat, within the PPA. A map of the area is included as Exhibit 3.

100- / 500-Year Floodplains

Data regarding flood hazard areas for the PPA were compiled from Federal Emergency Management Agency (FEMA) flood map number 35043C1950D. A custom map showing the flood hazard areas (FIRMette) is included as Exhibit 4. The entire PPA is designated as Zone X, an area of minimal flood hazard.

Endangered Species / Critical Habitats

The Biota Information System of New Mexico (BISON-M) and the US Fish and Wildlife Service- New Mexico Ecological Services Field Office identify Federal and State species listed as endangered, threatened, candidate, and/or species of concern within the state of New Mexico. The BISON-M database provides information at the County level. The database indicates there are 24 identified species listed as endangered, threatened, candidate, and/or species of concern within Sandoval County. The reports are included in Appendix B.

The majority of the proposed system is to be constructed in established roadway corridors and areas of prior disturbance where no habitat is present. Impacts to endangered species and critical habitat are not anticipated as a result of the proposed project(s).

3. EXISTING FACILITIES

A. Location Map

A map showing the layout of the existing water system is included as Exhibit 5 of this report.

B. History

The Placitas Community Library and Volunteer Fire Station are facilities maintained and operated by the County of Sandoval, New Mexico. These facilities utilize a shared domestic well for the facility water needs, including sinks, bathrooms, and drinking water.

The Placitas Fire Station is manned by volunteers, and, with the exceptions of meetings, is usually vacant. The station has a small kitchen, several sinks and two bathrooms with standard tank-filled toilets.

The Placitas Community Library is open five days per week during the daytime, and utilizes the supply well for bathrooms, sinks, and drinking water.

The Placitas Fire Station and Community Library utilize a shared domestic supply well for water needs. The supply well is located approximately 100 feet east of the Fire Station Building, and is contained within a chain-link fence enclosure. Table 1 is a summary of well information, including information obtained from the New Mexico Office of the State Engineer (NMOSE) database as well as physical information obtained by Mr. Marvin Martinez of SMA on December 11, 2014, is included below.

Table 1: Placitas Fire Station and Library Supply Well

NMOSE File Number	RG 55346
Year Completed	1992
Well Size, Completion	5-inch PVC, Pitless Adapter
Total Depth of Well (from NMOSE Log)	220 feet Below Ground Surface (bgs)
Measured Total Depth (12/11/2014)	208 feet bgs
Static Water Level (05/1992)	140 feet bgs
Static Water Level (12/11/2014)	177 feet bgs
Static Water Level (08/10/2015)	124 feet bgs
Pumping Water Level (12/11/2014)	190 feet bgs
Pumping Water Level (08/10/2015)	168 feet bgs
Top of Pump Depth	190 feet bgs
Pump Size	4" ½ Horsepower Pump
Pumping Rate	3-5 Gallons Per Minute

The well pump is operated by a pressure actuator that turns the pump on when the system pressure decreases to 40 psi, and turns the pump off when pressure reaches 60 psi.

Water from the well is pumped through a 2-inch diameter pipe from the well head approximately 100 feet to the fire station. At the fire station the raw water is chlorinated using sodium hypochlorite. The water then flows into a 30-gallon pressure tank which regulates the system pressure between 40 and 60 psi at the tank outlet. After the pressure tank, a tee provides water to the Fire Station itself, and then diverts flow through a 600-foot length of 2" copper pipe to the Community Library.

The water line to the Library has a connection to an irrigation system before it enters the building. The water line enters the Library where it connects to a water-softening system that supplies water to facility sinks and bathrooms. A reverse-osmosis system is also used to purify water for facility drinking fountains.

In early December, 2014, the Fire Station and Community Library began to experience pressure drops in the water supply system. TLC Plumbing was called out to the facility to investigate the problem. TLC's initial diagnosis was a faulty pressure tank; this equipment was replaced, but no change in pressure was noted. Following replacement of the pressure tank, TLC isolated the transmission line between the Fire Station and Library, and determined that no leaks were present in the line between the facilities. TLC also pressure tested the line between the well and the Fire Station and determined there was

a pressure drop in the line. TLC attempted to excavate the line utilizing facility as-built drawings, but were unable to locate the pipe after several attempts. At that time TLC was not able to locate the line or address the potential leak and abandoned the search.

On December 11, 2014, Mr. Marvin Martinez of SMA visited the facility and inspected the water system equipment. Mr. Martinez measured depth to water in the supply well and performed a limited pump test to determine pumping levels in the well. During pumping, the water column in the well was being pulled down to the top of the pump, which suggests that the well was being pumped at a rate that exceeded local recharge in the subsurface. The draw-down in the well was likely causing the exposure of the pump intake screen, which can result in air entering water supply lines, and could have been a factor in pressure problems experienced by the facility.

In February of 2015 a leak in the water line between the well and the Fire Station was located and repaired. Since the time of the repair the pressure problems have been resolved and the static water level in the well has recovered, as described below.

C. Condition of Existing Facilities

SUPPLY:
The existing water supply well is permitted with the NM OSE as RG-55346. The permit from the OSE is approved for up to 3 acre-feet per year consumptive use. The well meter readings indicated the water use summarized in Table 2:

Table 2: Placitas Fire Station Water Supply Well Production

Year	Acre Feet per Year	Gallons per Year	Gallons per Day
2011	0.335	109,160	299
2012	0.391	127,408	349
2013	0.572	186,387	511
2014	0.538	175,308	480
2015*	0.218	71,000	195

* 2015 water usage is annualized based on actual usage for the first 6 months of the year.

The water use is the combined total usage for the Fire Station and Library.

SMA measured the static water level in the well on August 10th, 2015 at 124 feet bgs and the pumping water level at 168 feet bgs. The static water level in the well was observed to recover quickly, reaching 130 feet bgs within 15 minutes of the well shutdown. The significantly higher water levels in the well, combined with the total water consumption data, indicate that the water line between the well and Fire Station was likely leaking for approximately two years (2013-2014). These factors indicate that the well is most likely capable of producing the typical demand for the facilities (approximately 350 gallons per day) without experiencing the excessive drawdown, and subsequent issues, that were caused by the leaking water line.

STORAGE:
The only storage for potable water is the 30 gallon pressure tank.

There is an existing 10,000 gallon steel water storage tank that is used by the Fire Station for firefighting activities. The tank is not connected to the water supply system and has no piping outlet. The tank is filled, and drained, from a fire truck via a 2-inch outlet on the side of the tank.

TREATMENT:
The existing water treatment equipment consists of a hypochlorite injection system located in the fire station building that serves both buildings. In addition, there is a reverse osmosis filtration system and water softener system that serves just the Library. These systems are currently operating as intended and appear suitable for continued use; however, the treatment does not appear to be necessary and does require regular maintenance.

DISTRIBUTION:
The existing line from the well to the Fire Station suffered a break and was repaired in February 2015. The leak went undetected for an unknown period of time until the users noticed fluctuating water pressure in the system. When the leak was discovered, and repaired, the well recovered and has continued to provide sufficient water to the facilities with no complaints of pressure fluctuations. The existing distributions system is considered acceptable for continued use.

4. NEED FOR PROJECT

A primary objective for this project is to provide a level of fire protection for the Library and Fire Station Buildings. The Placitas Community Library does not currently have any fire protection system available. There are no hydrants within 400 feet and no internal sprinkler systems. James Maxon, the Sandoval County Fire Chief, has indicated that the minimum requirements for providing fire protection to the Library is 250 gallons per minute (gpm) for 2 hours. This is equal to 30,000 gallons of water storage required. This will also require appropriately sized waterlines, a fire hydrant and possibly a pump to deliver the water to the Library site.

The reliable, continuous delivery of potable water to the Fire Station and Library is another important need for the project. Because of the recent problems with the existing well there is a need to improve the current water supply. A reliable water source capable of providing water to the system at a rate that meets or exceeds the maximum demand is critical for the facilities. Such a system should provide additional storage or a redundant water supply to enable the system to operate normally during operation and maintenance or emergency events.

Currently the chlorination system for the water supply is located within the Fire Station building. This presents a concern for fire department personnel safety and proper safeguards for the system. The existing chlorination system should be relocated to an appropriately designed, and constructed, structure that is separate from the Fire Station and Library buildings, thereby minimizing the risk of accidental exposure to staff and the public.

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5. ALTERNATIVES CONSIDERED

This report considers three alternatives. These alternatives consist of a variety of configurations for the water supply, storage tank placement, and location of the water treatment system and building.

An additional alternative that does not meet industry standard design criteria could be a possible solution for the County, but was not considered in this report. The alternative would include having water delivered from water tanks installed at the Fire Station to a new fire hydrant located at the Library by gravity, without the need for a fire booster pump system; however, this configuration would result in the residual water pressure within the system dropping below 20 psi. Because this alternative does not meet recommended design criteria, it is not considered in this report.

All of the alternatives considered were developed using the planning level, design criteria shown in Table 3.

Table 3: Design Criteria for Alternatives Considered

Design Element	Parameter
Water Quality	Meet or Exceed US EPA Safe Drinking Water Regulations
Water Quantity	Provide a minimum of 1.0 acre-feet per year
Fire Flow	250 gpm
Fire Flow Duration	minimum of 2 hours
Residual Pressure	20 psi
Water Storage Volume	Minimum of 30,000 gallons for fire protection (2 hours at 250 gpm)
Water Pipelines and Appurtenances	Meet or exceed American Water Works Association (AWWA) standards

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A. Alternative #1: Rehabilitate Existing Well

i. Description

This alternative considers the rehabilitation of the existing well, placement of the water storage tanks on the Fire Station property, and the construction of a new building to house the chlorination system, hydro-pneumatic tank and a fire booster pump, and the installation of approximately 900 feet of 6-inch PVC waterline connected to a new fire hydrant at the Library.

As outlined in the December 2014 report titled “Placitas Fire Station and Community Library Water Supply Investigation Letter Report” by SMA, the existing well could be rehabilitated by the removal of accumulated sediment in the bore, and the lowering of the existing pump approximately 20 feet further into the well. These measures can be expected to increase the reliability of the existing well and extend its useful life. As described above, SMA believes that the previous issues with the well had to do with the leak in the distribution system and not long-term well performance as evidenced by the recovery of the well once the leak was fixed.

The two (2) 15,000 gallon water storage tanks that have been donated to Sandoval County would be installed on a newly constructed foundation behind the Fire Station on the north side of the property. The newly installed tanks would be inter-connected with new 6-inch PVC pipe. The pipe would connect to a new fire protection booster pump which would provide the designated fire flow to a hydrant located at the Library. The tanks would have a separate 2-inch PVC inlet pipe, located at the top of the tank with an air-gap to prevent possible backflow into the system. The tank water levels would be controlled by an altitude valve installed on the inlet piping which would open or close based on the level within the tanks.

This alternative includes the installation of a fire booster pump that would deliver water to a new fire hydrant located near the Library. The booster pump will be a new, skid-mounted NFPA rated, diesel engine powered pump capable of delivering water at 250 gallons per minute (gpm) at a pressure of 40 psi.

A new, pre-engineered building would be constructed to house chlorination equipment, the hydro-pneumatic tank, fire booster pump, and all system controls. The existing chlorination system and pressure tank would be relocated from their current sites, within the Fire Station, and installed within the new building. The chlorination equipment would be housed in a separate room within the building. The new, skid-mounted fire pump would also be installed within the building.

ii. Map

Exhibit 6 of this report shows the conceptual layout for Alternative 1.

iii. Environmental Impacts

The preliminary review of the environmental resources within the project planning area indicate that there are no areas of environmental concern. This alternative is proposed to be constructed within areas of prior disturbance. There are no negative environmental impacts anticipated for this alternative during the planning phase.

iv. Land Requirements

This alternative would be constructed entirely within the limits of the Library and Fire Station properties. No new land will need to be acquired. The new treatment and pump house building and the two water storage tanks will occupy approximately 650 square feet of land within the existing Fire Station parcel.

v. Potential Construction Problems

The potential construction problems for this alternative are related to the unknown sub-surface conditions. These potential problems include excessive rock or high groundwater hindering excavation and construction. These conditions are not anticipated however a geotechnical investigation will need to be completed during the design phase.

vi. Cost Estimates

Construction	$ 256,000
Design, Bidding and Construction Administration	$ 115,000
Construction Observation	$ 24,000
Total Project Cost (incl. NMGRT)	$ 395,000

vii. Advantages and Disadvantages

<u>Advantages</u>

- No additional land is needed
- Lower capital costs
- No water rights & permitting needed
- No NM DOT permitting required

<u>Disadvantages</u>

- Requires fire booster pump (maintenance)
- Doesn't provide a second water supply source

B. Alternative #2: New Well with Storage Tanks at the Fire Station

i. Description

This alternative considers the construction of a new water supply well located at the cemetery site. The new well would provide an additional source of water for the Fire Station and Library.

The two donated 15,000 gallon water storage tanks would be installed near the Fire Station and would be filled from the water supply well. The tanks would provide fire protection storage for the Fire Station and Library, as well as raw water storage for the potable water system.

This alternative includes the installation of a fire booster pump that would deliver water to a new fire hydrant located near the Library. The booster pump will be a new, skid-mounted NFPA rated, diesel engine powered pump capable of delivering water at 250 gallons per minute (gpm) at a pressure of 40 psi.

A new, pre-engineered building would be constructed to house the chlorination equipment, the hydro-pneumatic tank, the new, skid-mounted fire pump, and the system controls. The existing chlorination system and pressure tank would be relocated from their current sites, within the Fire Station, and installed within the new building. The chlorination equipment would be housed in a separate room within the new building.

A new 2-inch waterline would be installed from the cemetery site to the Fire Station site. A new 6-inch waterline would connect the storage tanks to a fire hydrant located at the Library. A new 2-inch waterline would connect the water treatment plant to the potable water systems at the Fire Station and Library. The existing well would be connected to the system to provide a redundant water supply.

ii. Map

Exhibit 7 of this report shows the conceptual layout for Alternative 2.

iii. Environmental Impacts

The preliminary review of the environmental resources within the project planning area indicate that there are no areas of environmental concern. This alternative is proposed to be constructed within areas of prior disturbance. There are no negative environmental impacts anticipated for this alternative during the planning phase.

iv. Land Requirements

This alternative would require the acquisition of a portion of land within the cemetery site for the construction of a new well. The area required for the new well is estimated at 100 square feet. There appears to be sufficient open space located in the southwestern corner

of the cemetery property for this amount of land to be appropriated. The proposed alignment also crosses a parcel of land directly south of the cemetery prior to entering the ROW. Available Sandoval County tax records do not identify the owner of this parcel. During the design phase, further research will need to be done to determine how to acquire access rights for this portion of the alignment. Sandoval County staff have indicated that the cemetery is willing to donate land for the water system, so land acquisition costs were not included in the cost estimates.

The new treatment and pump house building, and the two water storage tanks will occupy approximately 650 square feet of land within the existing Fire Station parcel. No new land will need to be acquired for these structures.

This alternative will also require permission to construct the proposed waterline within the NM DOT ROW along NM 165 from the Cemetery to the Fire Station. This permission is expected to be acquired through the standard permitting process.

v. Potential Construction Problems

This alternative includes construction of a new waterline within the Right-of-Way (ROW) along NM 165. The construction activities would require traffic control and other safety considerations when working in the ROW. This alternative also includes the construction within the parking area of the Cemetery. Care will need to be taken during the design and construction of the well to ensure that no portion of the cemetery is disturbed during the construction activities.

The depth and production of domestic wells in the area is highly varied. The unique and highly varied geology of the area introduces a level of uncertainty about the success of a new well that is not insignificant.

Additional potential construction problems for this alternative are related to the unknown sub-surface conditions. These potential problems include excessive rock or high groundwater hindering excavation and construction. These conditions are not anticipated however a geotechnical investigation will need to be completed during the design phase.

vi. Cost Estimates

Construction	$ 436,000
Design, Bidding and Construction Administration	$ 142,000
Construction Observation	$ 63,000
Total Project Cost (incl. NMGRT)	$ 641,000

vii. Advantages and Disadvantages

Advantages	Disadvantages
• Provides a second water source	• Requires fire booster pump (maintenance) • Requires acquisition of additional land • Requires water rights acquisition & permitting • Requires NM DOT permitting • Uncertainty with development of new well

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C. Alternative #3: New Well with Storage Tanks at Cemetery

i. Description

This alternative considers the construction of a new water supply well located at the cemetery site. The new well would provide an additional source of water for the Fire Station and Library. The existing well would be interconnected with the system to provide a redundant supply.

The two donated 15,000 gallon water storage tanks would be installed near the new water supply well at the cemetery. The tanks would provide 30,000 gallons of water storage for fire protection.

A new, pre-engineered building would be constructed near the Fire Station to house chlorination equipment, the hydro-pneumatic tank, and all system controls. The existing chlorination system and pressure tank would be relocated from their current sites, within the Fire Station, and installed within the new building. The chlorination equipment would be housed in a separate room within the building.

A new waterline would be installed from the water storage tanks to the Library site. A new 6-inch waterline would connect the storage tanks to the Library fire hydrant without the use of a booster pump. A significant length of the waterline from the cemetery to the Library will need to be installed by horizontal directional boring to stay below the tank elevation through a high point in the topography in order to provide gravity flow. The 6-inch waterline would have a 2-inch connection near the Fire Station to deliver water to the new treatment building to supply the potable water systems.

ii. Map

Exhibit 8 of this report shows the conceptual layout for Alternative 3.

iii. Environmental Impacts

The preliminary review of the environmental resources within the project planning area indicate that there are no areas of environmental concern. This alternative is proposed to be constructed within areas of prior disturbance. There are no negative environmental impacts considered for this alternative during the planning phase.

iv. Land Requirements

This alternative would require the acquisition of a portion of land within the cemetery site for the construction of a new well and water storage tank site. The area required is estimated at 550 square feet. There appears to be sufficient open space located in the southwestern corner of the cemetery property for this amount of land to be appropriated. Sandoval County staff have indicated that the cemetery is willing to donate land for the water system, so land acquisition costs were not included in the cost estimates.

The new treatment and pump house building will occupy approximately 200 square feet of land within the existing Fire Station parcel. No new land will need to be acquired for the building.

This alternative will also require permission to construct the proposed waterline within the NM DOT ROW along NM 165 from the Cemetery to the Fire Station. This permission is expected to be acquired through the standard permitting process.

v. Potential Construction Problems

This alternative considers construction of a new waterline within the Right-of-Way (ROW) along NM 165. The construction activities would require traffic control and other safety considerations when working in the ROW. This alternative also considers the construction within the parking area of the Cemetery. Care will need to be taken during the design and construction of the well to ensure that no portion of the cemetery is disturbed during the construction activities.

The depth and production of domestic wells in the area is highly varied. The unique and highly varied geology of the area introduces a level of uncertainty about the success of a new well that is not insignificant.

Approximately 2,000 linear feet of the 6-inch pipeline will need to be installed by horizontal directional drilling (HDD). The pipeline will be installed at depths ranging from 4-feet to 25 feet below the surface. HDD installations of this kind are a common, and proven, construction method; however, it is possible to encounter unknown obstacles during drilling that could make the process more costly and/or require realignment.

Additional potential construction problems for this alternative are related to the unknown sub-surface conditions. These potential problems include excessive rock or high groundwater hindering excavation and construction. These conditions are not anticipated however a geotechnical investigation will need to be completed during the design phase. The results of the geotechnical investigation may significantly impact the cost and feasibility of the directional boring portion of the alternative.

vi. Cost Estimates

Construction	$	560,000
Design, Bidding and Construction Administration	$	142,000
Construction Observation	$	63,000
Total Project Cost (incl. NMGRT)	$	765,000

vii. Advantages and Disadvantages

Advantages	Disadvantages
• Provides a second water source • Doesn't require a fire booster pump	• Higher capital cost • Requires acquisition of additional land • Requires water rights acquisition & permitting • Requires NM DOT permitting • Uncertainty with development of new well • Uncertainty with directional boring of pipeline

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6. SELECTION OF AN ALTERNATIVE

The selection of an alternative will consider several factors, including: Life Cycle Cost of the alternative, Owner Preference, and Operational Simplicity.

A. Life Cycle Cost Analysis

The life cycle costs for the alternatives considered were estimated for a 20-year period. The present value of capital costs includes the cost of construction, engineering and design, and construction administration services for the alternative.

The present value of total annual O&M (O&M) was calculated by estimating the current annual O&M expenses for each alternative. The annual O&M expenses included an estimated cost for a certified water system operator based on a total hourly rate of $125. The O&M also includes the estimated cost of replacing short-term assets associated with the alternative. Short-term assets are assets with an expected useful life of less than the 20-year planning period. The total estimated annual O&M costs for the 20-year period are converted to present day dollars using a uniform series present worth calculation.

The present value of the Salvage value (S) is an estimate of the value of the assets associated with the alternative at the end of the 20-year planning period. The salvage value is estimated using straight line depreciation. The salvage value is then converted to present day dollars.

The Net Present Value (NPV) equation is:

$$NPV = C + O\&M - S$$

Table 4 shows the life cycle cost estimates for each of the three alternatives considered in this report.

Table 4: Life Cycle Cost Calculations

	Alternate 1 Rehab Well	**Alternate 2 New Well/Tanks at F.S.**	**Alternate 3 New Well/Tanks at Cemetery**
Present Value of Capital Cost (C)	$ 395,000	$ 641,000	$ 765,000
Present Value of Total Annual O&M Costs (O&M)	$ 210,000	$ 218,000	$ 38,000
Present Value of Salvage Value (S)	$ 23,000	$ 82,000	$ 82,000
Net Present Value (NPV)	**$ 582,000**	**$ 777,000**	**$ 721,000**
Discount Rate 20-year (%)	1.2 %		
Planning Period (years)	20		

B. Non-Monetary Factors

Non-monetary factors, including Owner preference and operational simplicity will also be considered.

C. Selection Matrix

The selection matrix for the alternatives is shown in Table 5. The selection matrix ranks the alternatives by evaluating each alternative against four criterion: Life Cycle Cost, Owner Preference, Ease of O&M, and Water Source Redundancy. Each alternative is ranked from 1 to 3 according to how it satisfies each criterion, with 1 being the best and 3 being the worst. If alternatives are considered equal they are given the same rank.

Each criterion is given a weighting factor that indicates the relative importance/value of that particular criterion in the selection of a preferred alternative. The life cycle cost of an alternative is given a weighting factor of 4 to indicate that it is the most important criterion. The remaining criterion are weighted to reflect their relative importance to the selection.

The alternative rank is then multiplied by the weighting factor to find the weighted rank for each criterion. The weighted ranks are summed and shown as the overall weighted score. The lowest overall score is the preferred alternative. The overall rank of alternatives from most preferred alternative (1) to least preferred (3) is shown in the final column of Table 5.

Table 5: Selection Matrix

Alternative		Criterion / Weighting Factor				Overall Weighted Score	Overall Rank
		Life Cycle Cost	Owner Preference	Ease of O&M	Water Source Redundancy		
		4	3	2	1		
1. Rehab well	Rank	1	1	2	3	14	1
	Weighted Rank	4	3	4	3		
2. New Well with Storage Tanks at the Fire Station	Rank	3	3	3	1	28	3
	Weighted Rank	12	9	6	1		
3. New Well with Storage Tanks at the Cemetery	Rank	2	1	1	1	14	1
	Weighted Rank	8	3	2	1		

7. PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

SMA's evaluation indicates that Sandoval County should move forward with either Alternative 1: Rehabilitate the Existing Water Supply Well or Alternative 3: New Well with Storage tanks at Cemetery.

The two alternatives are functionally equivalent, but Alternative 3 adds water supply redundancy and eliminates the need for a fire booster pump at an additional cost of $370,000. Both alternatives address the primary concerns with the existing water system; however, only Alternative 3 provides a redundant water supply. Sandoval County officials will determine if a redundant water supply for the two buildings is important enough to warrant the additional expense of Alternative 3 over Alternative 1.

Conceptual layouts of each alternative are included as Exhibit 6 (Alternative 1) and Exhibit 8 (Alternative 3).

A. Preliminary Project Design for Alternative 1

i. Water Supply

The project includes the rehabilitation of the existing water supply well located near the Fire Station. The existing well would be rehabilitated by a qualified well contractor. The rehabilitation would include the testing of the existing well pump and motor, removal of accumulated sediment and debris from the well by bailing or air lifting, adding approximately 20 feet of drop pipe and pump wiring, re-installation of the pump to a depth 20 feet lower than the current installation, and disinfection and re-commissioning of the well.

ii. Treatment

The project includes the construction of a new treatment and pump house building near the Fire Station. The existing chlorination system would be relocated from the current location within the Fire Station and installed in a separate room within the new building. No new treatment systems are included in the project. The treatment system in the Library will be removed and salvaged.

iii. Storage

The project includes the installation of the two donated 15,000 gallon water storage tanks at a location near the Fire Station. The design phase of the project should include a geotechnical investigation and report to determine the suitability and requirements for constructing a foundation for the storage tanks. The foundation for the tanks, contingent on a satisfactory geotechnical investigation, would be constructed of engineered fill with steel rings for support. The tanks would have inlet and outlet piping installed and water level controls. The tanks would provide storage for the fire protection system only.

The 30 gallon hydro-pneumatic tank would be relocated from the current location within the Fire Station to the newly constructed treatment and pump house building. The existing hydro-pneumatic tank would continue to provide the only water storage for the potable water systems.

iv. Pumping Stations

The project includes the installation of a NFPA certified, fire protection booster pump in the new treatment and pump house building. The pump will have a diesel driven motor and be capable of delivering water to a new fire hydrant located at the Library at a rate of 250 gpm with a pressure of 50 psi. The pump, motor and all controls would be installed in the new building, separate from the chlorination system.

v. Distribution Layout

The project includes the installation of approximately 1,000 linear feet of new 6-inch PVC waterline. The waterline will connect to the outlet of the water storage tanks and run along the north side of the Fire Station and Library buildings to a new fire hydrant at the southwest corner of the Library.

vi. Project Schedule

The proposed project schedule is based on the estimated time required to complete the various tasks required for Design and Construction of the completed project. The estimated project timeline is shown in Table 6.

Table 6: Proposed Project Schedule for Alternative 1

Task	Time to Complete
Design (including Geotechnical Investigation)	6 months
Bidding and Award	2 months
Construction	4 months

vii. Permit Requirements

The proposed project will require permits from the New Mexico Environment Department's Drinking Water Bureau and Construction Programs Bureau for work involving modification of a public water system.

viii. Total Project Cost Estimate (Engineer's Opinion of Probable Cost)

The estimated total capital cost of the proposed project is $ 394,234.25. The Engineer's Opinion of Probable Construction Cost (EOPCC) is shown in Table 7. The estimated cost of engineering services for the proposed project are summarized in Table 8.

Table 7: Engineer's Opinion of Probable Construction Cost for Alternative 1

ITEM	ITEM DESCRIPTION	UNIT	EST QTY	UNIT PRICE	AMOUNT
1	Furnish and install 2-inch ASTM D2241 SDR-21 PVC IPS gasketed waterline, including all material, labor, fittings, joint restraints, warning tape, tracer wire, trenching, bedding, backfill and site restoration, (CIP)	LF	350	$ 20.00	$ 7,000.00
2	Furnish and Install 6-inch C-900 DR25 PVC Water Pipeline, (incl. all materials, fittings, labor, trenching, bedding, backfill, testing, warning tape, tracer wire and site restoration), CIP	LF	1,000	$ 25.00	$ 25,000.00
3	2-inch Gate Valve Assembly, (incl. all materials and labor, trenching, bedding, backfill, site restoration and all other appurtenances) CIP	EA	1	$ 1,000.00	$ 1,000.00
4	6-inch Gate Valve Assembly, (incl. all materials and labor, trenching, bedding, backfill, site restoration and all other appurtenances) CIP	EA	1	$ 1,750.00	$ 1,750.00
5	Furnish and install New Three-Way Fire Hydrant Assembly (incl. tee, 6-inch lateral, 6-inch gate valve and riser pipe) CIP	EA	1	$ 5,500.00	$ 5,500.00
6	Locate and Connect to existing system (incl. all labor and materials, excavation, bedding, backfill, and appurtenances) CIP	EA	1	$ 2,000.00	$ 2,000.00
7	Furnish and install NFPA Rated, Diesel powered, fire booster pump station capable of delivering at least 250 gpm at 40 psi (incl. Factory assembled Skid Mounted unit, wiring, piping, controls, and all appurtenances, CIP)	EA	1	$ 100,000.00	$ 100,000.00
8	Furnish and install concrete foundation for 150 square-foot pre-engineered structure, CIP	LS	1	$ 8,000.00	$ 8,000.00
9	Furnish and install pre-engineered 150 square-foot pump house, including 2-inch master meter, pressure gauges, valves, sample cock, 2-inch ductile iron piping to 5-feet outside of structure, pipe supports, well house electrical, fittings and appurtenances, CIP	EA	1	$ 37,500.00	$ 37,500.00
10	Rehabilitate existing well (incl. rig up, pull pump, sound water level and well depth, clean by bailing, reinstall pump, Supplemental Well Development by Air Lift Pumping w/ Supply Water Truck and Operator, Supply Well Dole Valve to Reduce Pump Rate (3 gpm Rating), 1 1/4" Galvanized Drop Pipe and 12/3 Wire to Set Pump 20 feet Deeper, CIP)	LS	1	$ 5,000.00	$ 5,000.00
11	Furnish and install 2-inch Altitude Valve and all appurtenances, CIP	EA	1	$ 4,500.00	$ 4,500.00
12	Power to Well and to pump house, CIP	LS	1	$ 4,750.00	$ 4,750.00
13	Clear and grade pad area for installation of water storage tanks	EA	2	$ 1,500.00	$ 3,000.00
14	Prepare Tank foundation (incl. excavation, steel ring, engineered fill material, compaction and testing per Geotechnical Report)	EA	2	$ 7,500.00	$ 15,000.00
15	Furnish and install new chain link fence, CIP	LF	50	$ 32.50	$ 1,625.00
16	Furnish and install new 10-foot double leaf chain link fence gate and new tubular gate (per plans), CIP	LS	1	$ 2,250.00	$ 2,250.00

ITEM	ITEM DESCRIPTION	UNIT	EST QTY	UNIT PRICE	AMOUNT
17	Remove and salvage to owner the existing water softener system, carbon filter, and two (2) reverse osmosis filters from the Library waters system (incl. labor, materials, pipe, fittings and reconnection of piping) CIP	LS	1	$ 2,500.00	$ 2,500.00
Allowances and Miscellaneous					
18	Mobilization/Demobilization	LS	1	$ 10,000.00	$ 10,000.00
19	Contractor Surveyed As-Builts	LF	1,500	$ 1.50	$ 2,250.00
20	Materials Testing Allowance	ALLOW	1	$ 2,500.00	$ 2,500.00
TOTAL OF BASE BID .					**$ 241,125.00**
		TAX (6.250%)			**$ 15,070.31**
		GRAND TOTAL OF BID			**$ 256,195.31**

Table 8: Estimated Cost of Professional Services for Alternative 1

Services	Cost	Cost including NM GRT
Engineering Design	$ 77,573.00	$ 82,421.31
Construction Administration and Part-time Observation	$ 52,346.00	$ 55,617.63

B. Preliminary Project Design for Alternative 3

i. Water Supply

This alternative considers the construction of a new water supply well located at the cemetery site. The new well would provide an additional source of water for the Fire Station and Library. The existing well would be interconnected with the system to provide a redundant supply.

Due to the challenging, and highly variable, geology of the area this alternative would be constructed in phases. The first phase would consist of the drilling and construction of an exploratory water supply well to an approximate depth of 300-feet; performing a pump test of the exploratory well to determine the expected sustainable production, collecting and submitting water samples for analysis from water bearing zones determined by the Engineer; and, upon receiving the water quality reports from the lab illustrating water within safe drinking water standards, completing the exploratory water supply well to a production water supply well. If the exploratory well was unsuccessful the County would either consider a different location for a second exploratory well, or decide to abandon this alternative.

ii. Treatment

It is anticipated that the only treatment required would be chlorination. Treatment for other constituents would likely make this alternative undesirable due to significant additional treatment costs. A new, pre-engineered building would be constructed near the Fire Station to house chlorination equipment, the hydro-pneumatic tank, and all system controls. The existing chlorination system and pressure tank would be relocated from their current sites, within the Fire Station, and installed within the new building. The chlorination equipment would be housed in a separate room within the building.

iii. Storage

The project includes the installation of the two donated 15,000 gallon water storage tanks at the cemetery near the new well site. The design phase of the project will include a geotechnical investigation and report to determine the suitability and requirements for constructing a foundation for the storage tanks. The foundation for the tanks, contingent on a satisfactory geotechnical investigation, would be constructed of engineered fill with steel rings for support. The tanks would have inlet and outlet piping installed and water level controls. The tanks would provide storage for the fire protection system only.

The 30 gallon hydro-pneumatic tank would be relocated from the current location within the Fire Station to the newly constructed treatment and pump house building. The existing hydro-pneumatic tank would continue to provide the only water storage for the potable water systems.

iv. Distribution Layout

The project includes the installation of approximately 5,000 linear feet of new 6-inch PVC waterline. A new 6-inch waterline would be installed from the water storage tanks at the cemetery to the Library. The new 6-inch waterline would connect the storage tanks to the Library fire hydrant without the use of a booster pump. Approximately 2,000 feet of the waterline from the cemetery to the Library will need to be installed by horizontal directional boring to stay below the tank elevation through a high point in the topography in order to provide gravity flow.

The 6-inch waterline would have a 2-inch connection near the Fire Station to deliver water to the new treatment building to supply the potable water systems.

v. Project Schedule

The proposed project schedule is based on the estimated time required to complete the various tasks required for Design and Construction of the completed project. The estimated project timeline is shown in Table 6.

Table 9: Proposed Project Schedule for Alternative 3

Task	Time to Complete
Design (including Geotechnical Investigation)	6 months
Bidding and Award	2 months
Construction	4 months

vi. Permit Requirements

The proposed project will require permits from the New Mexico Environment Department's Drinking Water Bureau, New Mexico Department of Transportation, and Construction Programs Bureau for work involving modification of a public water system.

vii. Total Project Cost Estimate (Engineer's Opinion of Probable Cost)

The estimated total capital cost of the proposed project is $ 763,154.69. The Engineer's Opinion of Probable Construction Cost (EOPCC) is shown in Table 10. The estimated cost of engineering services for the proposed project are summarized in Table 11.

Table 10: Engineer's Opinion of Probable Construction Costs for Alternative 3

ITEM	ITEM DESCRIPTION	UNIT	EST QTY	UNIT PRICE	AMOUNT
1	Complete installation of new water supply well (incl. drilling to depth of 300 feet, 5-inch diameter casing pipe, 40 feet of screened casing, 2-inch drop pipe, pump, gravel packing, grout and concrete cased well head, CIP)	EA	1	$ 13,500.00	$ 13,500.00
2	Furnish and install well pump: submersible pump including cable and wiring, installation and start-up, CIP and operable	EA	1	$ 5,000.00	$ 5,000.00

ITEM	ITEM DESCRIPTION	UNIT	EST QTY	UNIT PRICE	AMOUNT
3	Furnish and install 2-inch ASTM D2241 SDR-21 PVC IPS gasketed waterline, including all material, labor, fittings, joint restraints, warning tape, tracer wire, trenching, bedding, backfill and site restoration, (CIP)	LF	350	$ 20.00	$ 7,000.00
4	Furnish and Install 6-inch C-900 DR25 PVC Water Pipeline, (incl. all materials, fittings, labor, trenching, bedding, backfill, testing, warning tape, tracer wire and site restoration), CIP	LF	3,000	$ 25.00	$ 75,000.00
5	6-inch HDPE Waterline installed via directional boring (incl. all materials, fittings, transition couplings, bore pit excavation, backfill, site restoration) CIP	LF	2,000	$ 125.00	$ 250,000.00
6	Combination Air/Vacuum Valve assembly (incl. all materials and labor, trenching, bedding, backfill, site restoration and all other appurtenances) CIP	EA	1	$ 4,500.00	$ 4,500.00
7	2-inch Gate Valve Assembly, (incl. all materials and labor, trenching, bedding, backfill, site restoration and all other appurtenances) CIP	EA	1	$ 1,000.00	$ 1,000.00
8	6-inch Gate Valve Assembly, (incl. all materials and labor, trenching, bedding, backfill, site restoration and all other appurtenances) CIP	EA	1	$ 1,750.00	$ 1,750.00
9	Furnish and install New Three-Way Fire Hydrant Assembly (incl. tee, 6-inch lateral, 6-inch gate valve and riser pipe) CIP	EA	1	$ 5,500.00	$ 5,500.00
10	Locate and Connect to existing system (incl. all labor and materials, excavation, bedding, backfill, and appurtenances) CIP	EA	1	$ 2,000.00	$ 2,000.00
11	Furnish and install 2-inch Altitude Valve and all appurtenances, CIP	EA	1	$ 4,500.00	$ 4,500.00
12	Liquid level controller for 2 wells, W/Telemetry option (incl. Radio Path Survey, and two (2) slave units) CIP	LS	1	$ 45,000.00	$ 45,000.00
	Furnish and install concrete foundation for 150 square-foot pre-engineered structure, CIP	LS	1	$ 8,000.00	$ 8,000.00
	Furnish and install pre-engineered 150 square-foot pump house, including 2-inch master meter, pressure gauges, valves, sample cock, 2-inch ductile iron piping to 5-feet outside of structure, pipe supports, well house electrical, fittings and appurtenances, CIP	EA	1	$ 37,500.00	$ 37,500.00
16	Power to Well and to pump house, CIP	LS	1	$ 4,750.00	$ 4,750.00
18	Clear and grade pad area for installation of water storage tanks	EA	2	$ 1,500.00	$ 3,000.00
19	Prepare Tank foundation (incl. excavation, steel ring, engineered fill material, compaction and testing per Geotechnical Report)	EA	2	$ 7,500.00	$ 15,000.00
20	Furnish and install new chain link fence, CIP	LF	50	$ 32.50	$ 1,625.00
21	Furnish and install new 10-foot double leaf chain link fence gate and new tubular gate (per plans), CIP	LS	1	$ 2,250.00	$ 2,250.00
22	Remove and salvage to owner the existing water softener system, carbon filter, and two (2) reverse osmosis filters from the Library waters system (incl. labor, materials, pipe, fittings and reconnection of piping) CIP	LS	1	$ 2,500.00	$ 2,500.00
	Allowances and Miscellaneous				

ITEM	ITEM DESCRIPTION	UNIT	EST QTY	UNIT PRICE	AMOUNT
23	Mobilization/Demobilization	LS	1	$ 15,000.00	$ 15,000.00
24	Traffic Control	LS	1	$ 10,000.00	$ 10,000.00
25	Contractor Surveyed As-Builts	LF	5,000	$ 1.50	$ 7,500.00
26	Materials Testing Allowance	ALLOW	1	$ 5,000.00	$ 5,000.00
	TOTAL OF BASE BID				**$ 526,875.00**
			TAX (6.250%)		**$ 32,929.69**
			GRAND TOTAL OF BID		**$ 559,804.69**

Table 11: Estimated Cost of Professional Service for Alternative 3

Services	Cost	Cost including NM GRT
Engineering Design	$ 103,043.00	$ 109,483.19
Construction Administration and Observation	$ 58,520.00	$ 62,177.50

8. CONCLUSIONS AND RECOMMENDATIONS

The existing water system for the Placitas Community Library and Fire Station doesn't provide water storage for fire protection, fire hydrants and the chlorination system is not properly separated from the work areas of the Fire Station. These deficiencies should be addressed in order to protect both the physical structures and the people that use those facilities.

SMA evaluated three alternatives for improving the existing water system. These three alternatives were evaluated based on the life cycle cost, owner preference, ease of O&M, and providing a redundant water supply. The evaluation determined that Alternative1 and Alternative 3 are both viable solutions. Both alternatives provide fire protection storage and a reliable water supply for the Library and Fire Station; however, only Alternative 3 provides a redundant water source. The decision regarding which alternative is constructed will be determined by Sandoval County's prioritization of lower capital cost or a redundant water source.

If Alternative 1 is the selected project, it will include: rehabilitate the existing water supply well, install two 15,000 gallon water storage tanks, construct a treatment and pump house building, relocate existing system equipment into the new building and install a new Fire booster pump to provide adequate fire protection for the Placitas Community Library. The total capital cost for Alternative 1 are approximately $395,000. Alternative 1 is a cost-effective and sustainable solution that addresses the system's primary deficiencies.

If Alternative 3 is the selected project, it will include: development of a new water supply well at the cemetery site, install two 15,000 gallon water storage tanks, construct a treatment building, relocate existing system equipment into the new building and install approximately 5,000 linear feet of 6-inch waterline. The total capital costs for Alternative 3 are approximately $765,000. Alternative 3 is a sustainable solution that addresses the system's primary deficiencies and provides for lower O&M and a redundant water source.

Sandoval County will need to determine which project to construct based on available funding, desire for lower O&M, and the desire for a redundant water source. Both alternatives will provide fire protection and a reliable water supply for the Library and Fire Station.

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APPENDIX A

EXHIBITS

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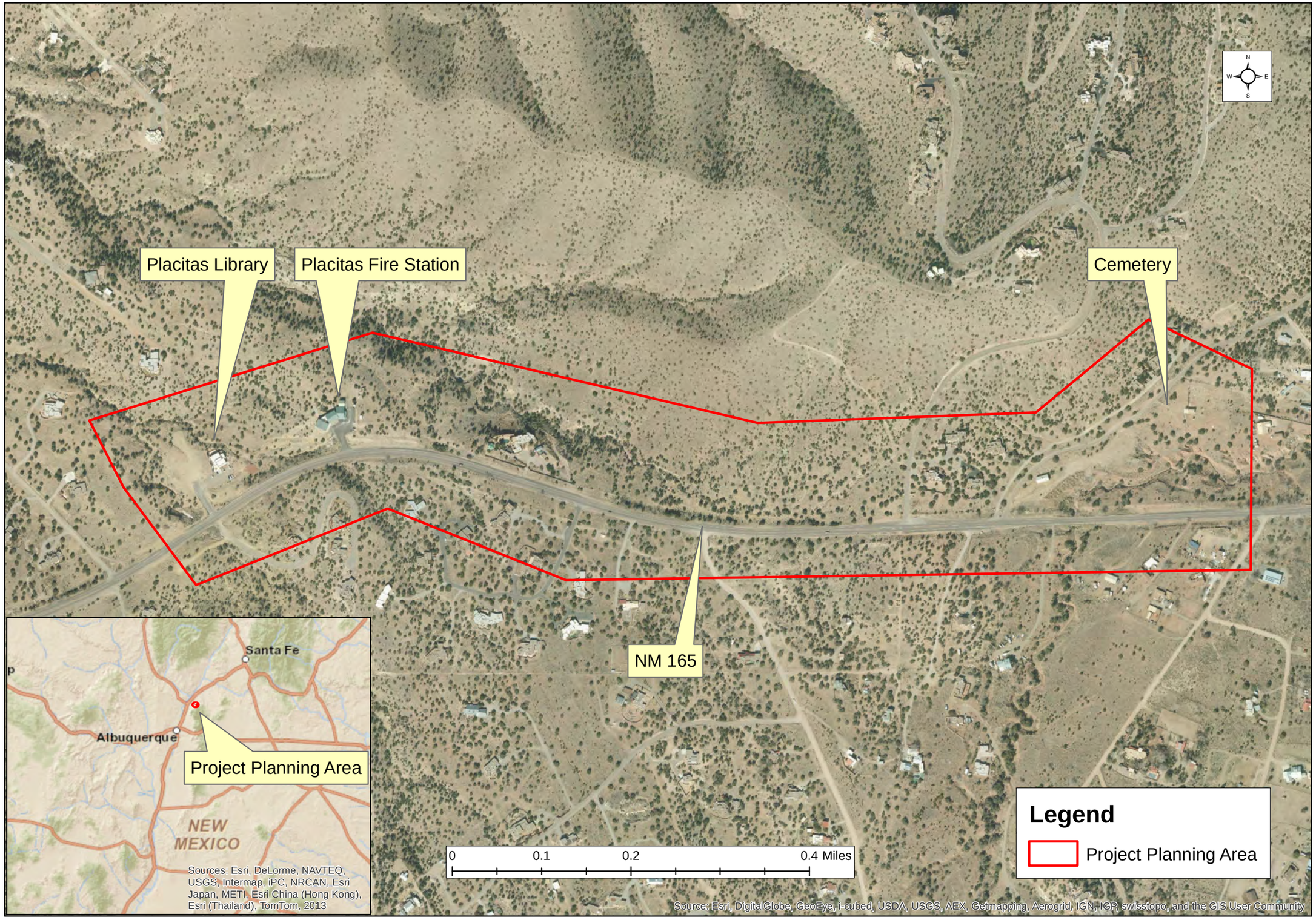

Document: P:\6-Sandoval County-Placitas Library Water System Planning (6241284)\CAD\GIS\Placitas Library Water Project Boundary.mxd Placitas Library Water Project Boundary

Exhibit 1

Project Planning Area
Placitas Library Water System Improvements Project
Sandoval County, New Mexico

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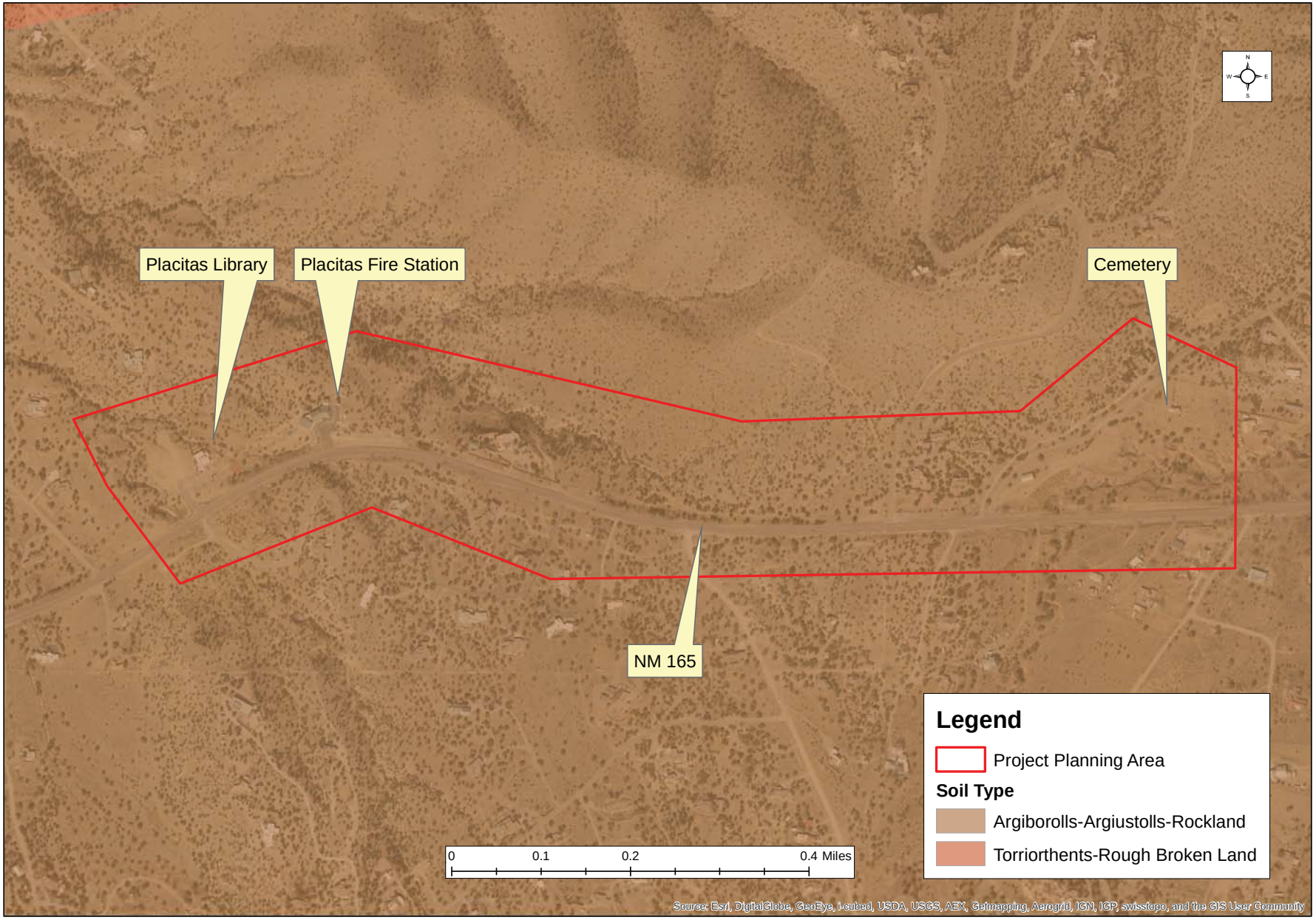

Exhibit 2

Project Planning Area Soil Map
Placitas Library Water System Improvements Project
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Document: P:\6-Sandoval County-Placitas Library Water System Planning (6241284)\CAD\GIS\Placitas Library Water Project Soil Map.mxd Placitas Library Water Project Soil Map

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EXHIBIT 3: Wetlands Area Map

U.S. Fish and Wildlife Service

National Wetlands Inventory

Placitas Library
PPA

Jul 8, 2015

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

Riparian

- Herbaceous
- Forested/Shrub

Riparian Status

- Digital Data

User Remarks:

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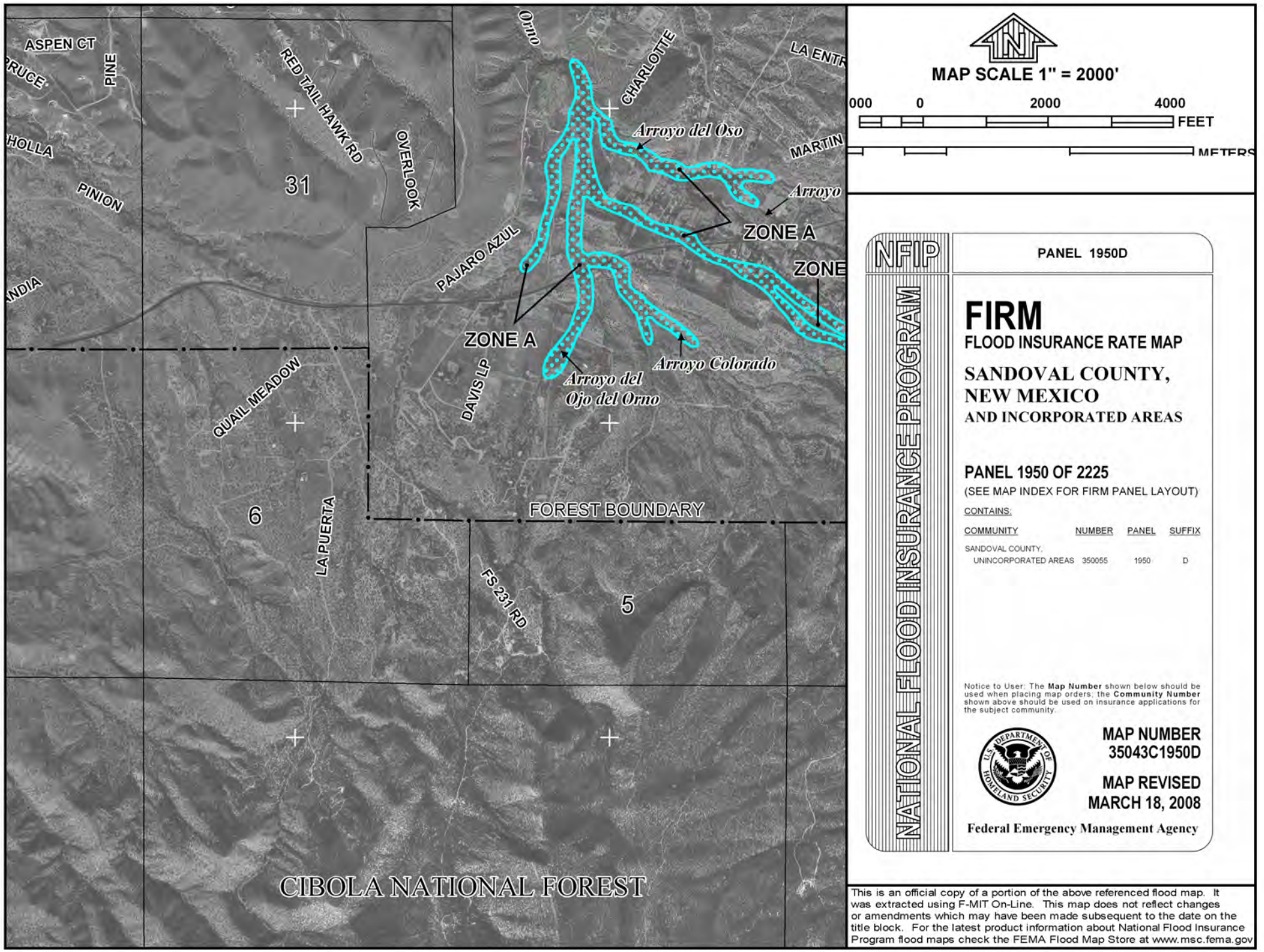
EXHIBIT 4: FEMA Flood Hazard Map



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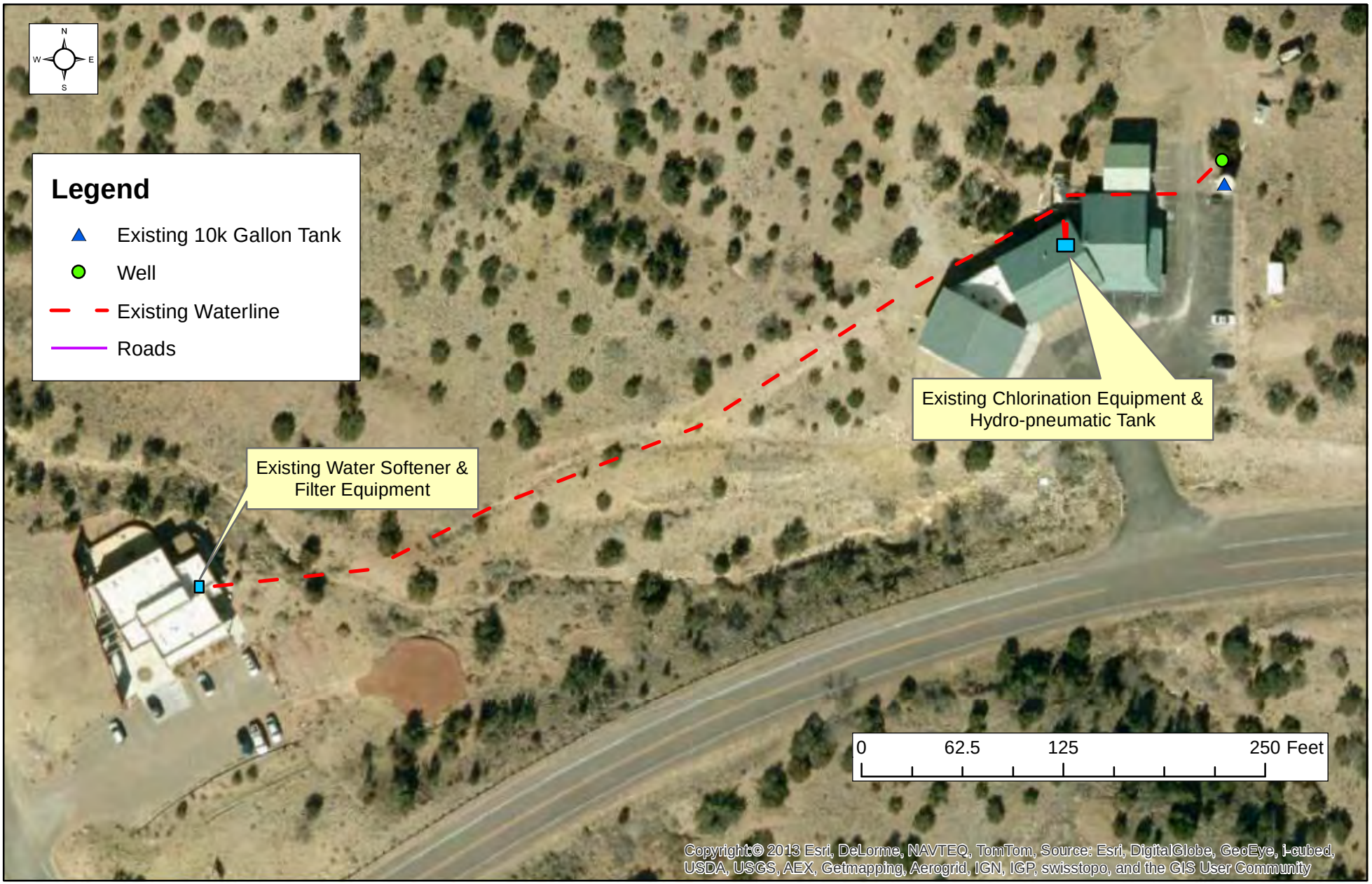

Existing Water System Layout
Placitas Library Water System Improvements Project
Sandoval County, New Mexico

Exhibit 5

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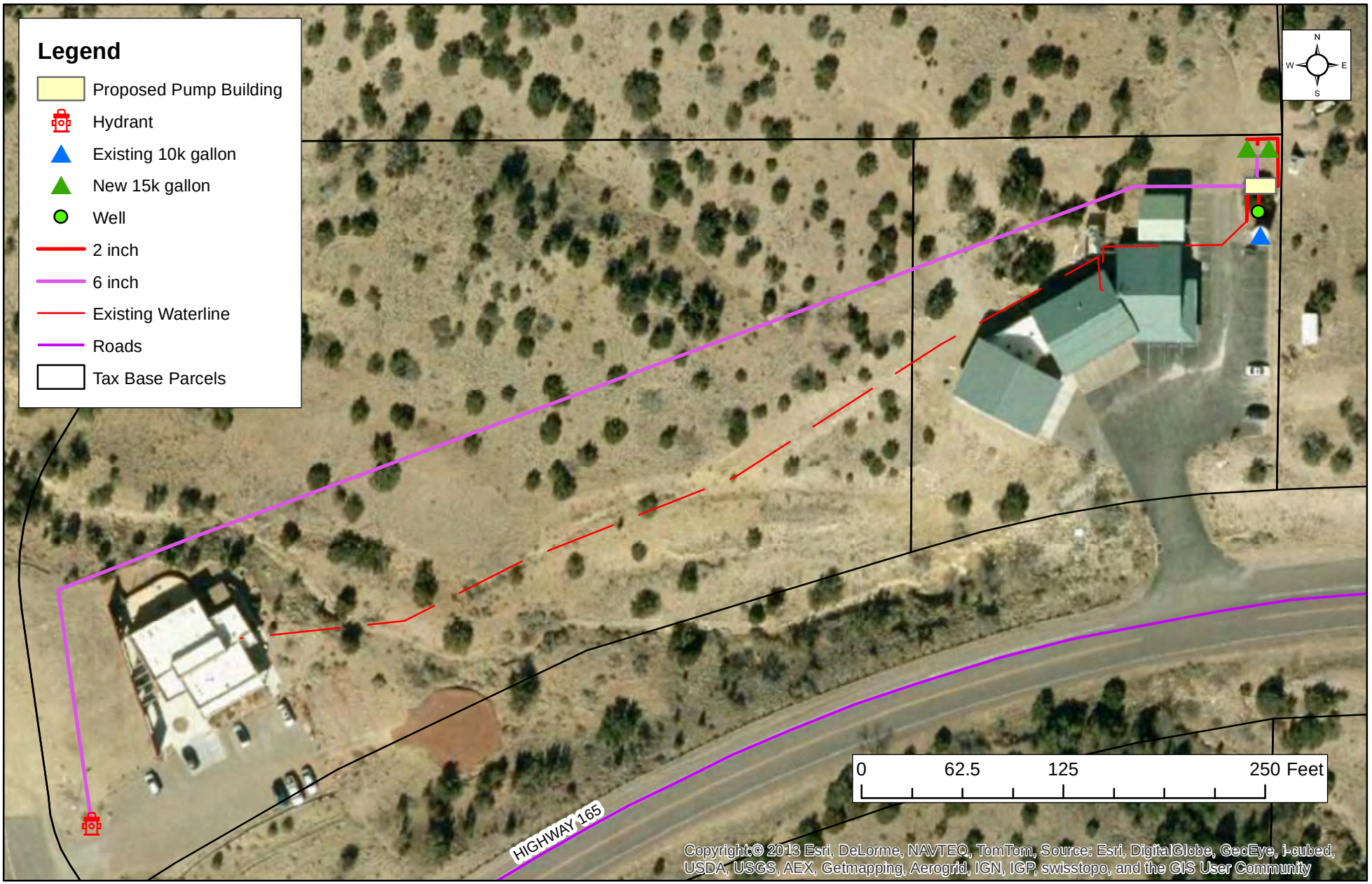

Alternative 1 - Conceptual System Layout
Placitas Library Water System Improvements Project
Sandoval County, New Mexico

Exhibit 6

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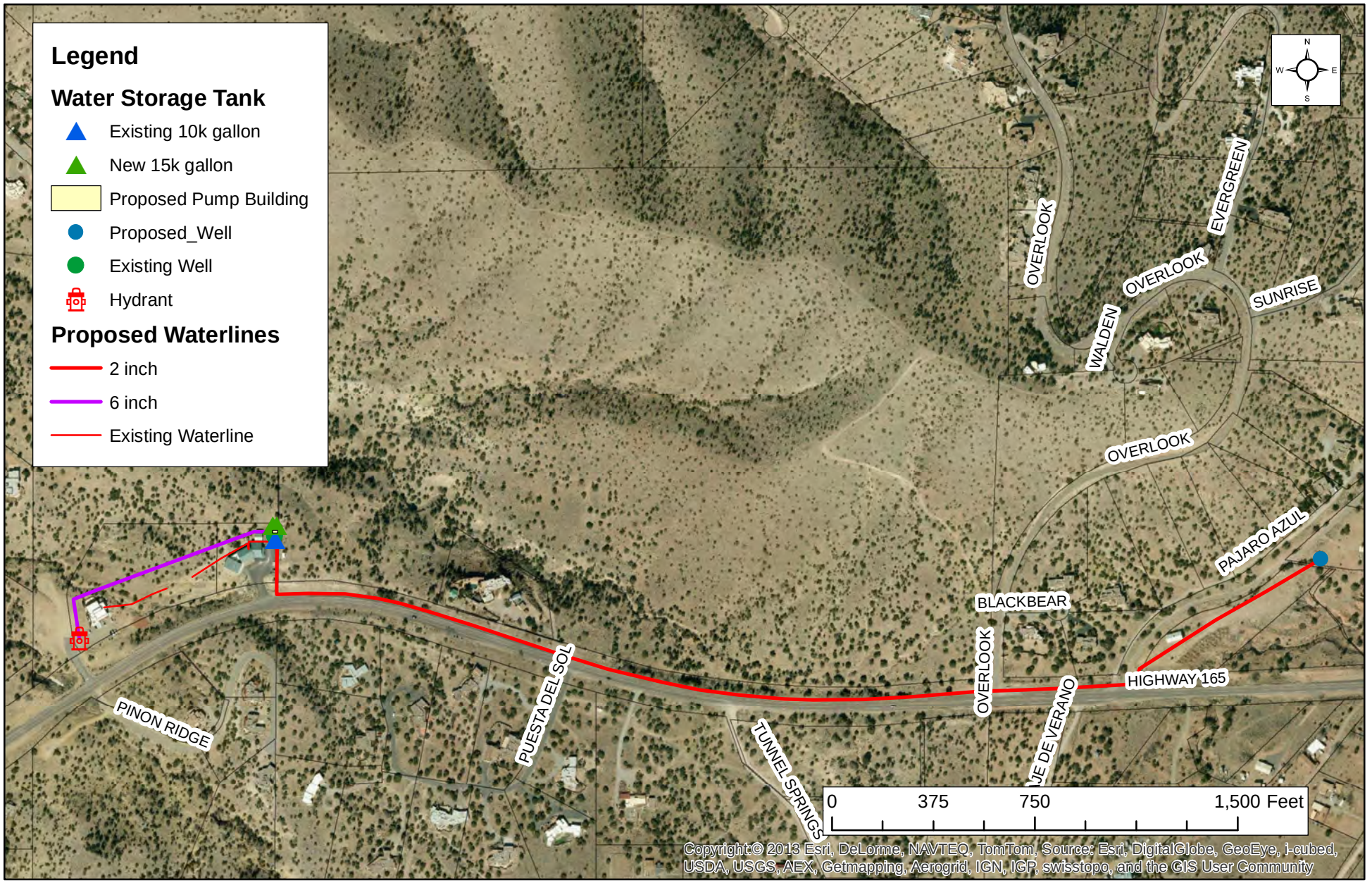

Alternative 2 - Conceptual System Layout
Placitas Library Water System Improvements Project
Sandoval County, New Mexico

Exhibit 7

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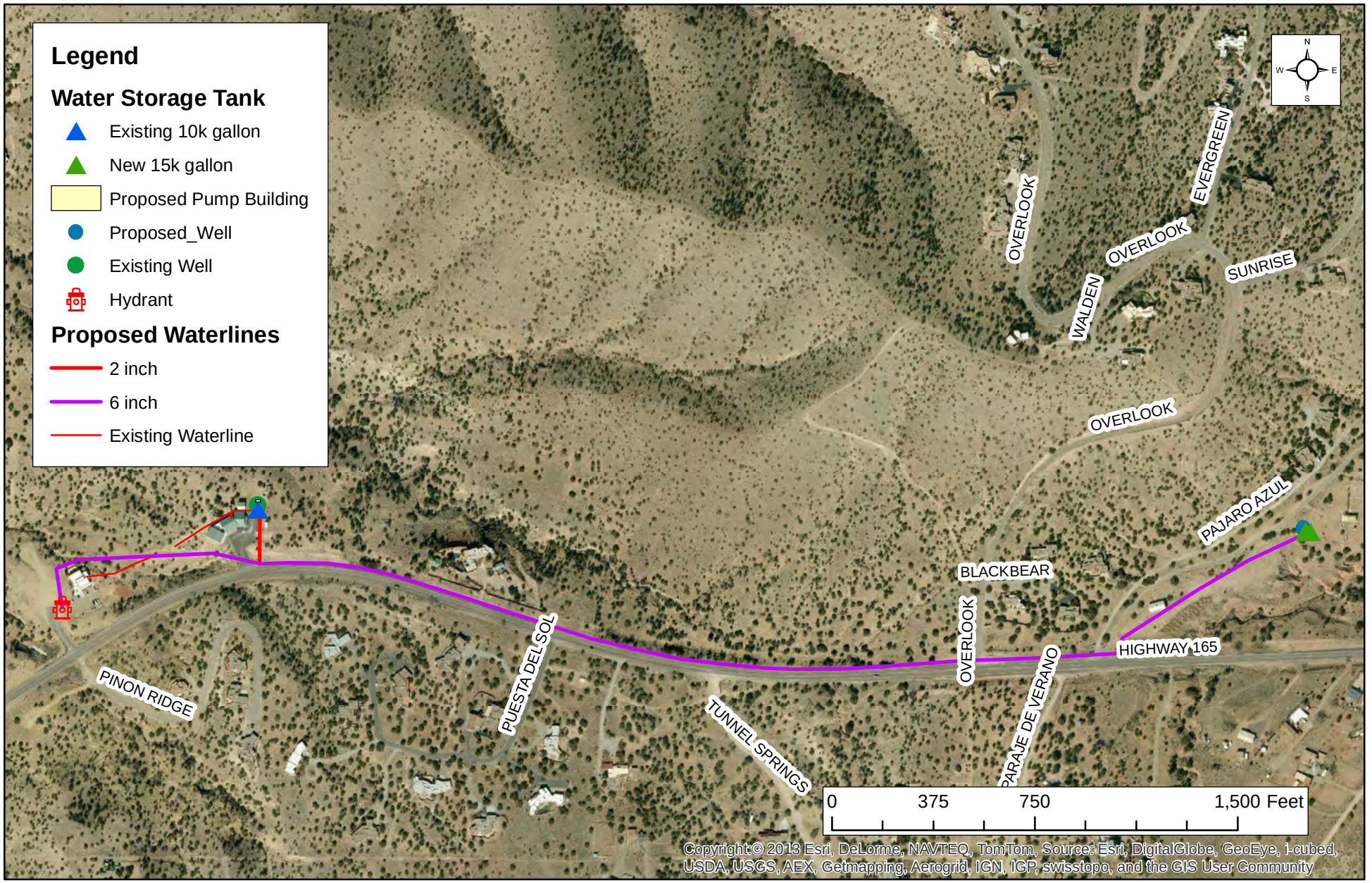

Alternative 3 - Conceptual System Layout
Placitas Library Water System Improvements Project
Sandoval County, New Mexico

Exhibit 8

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APPENDIX B

NRCS CUSTOM SOIL REPORT

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United States Department of Agriculture

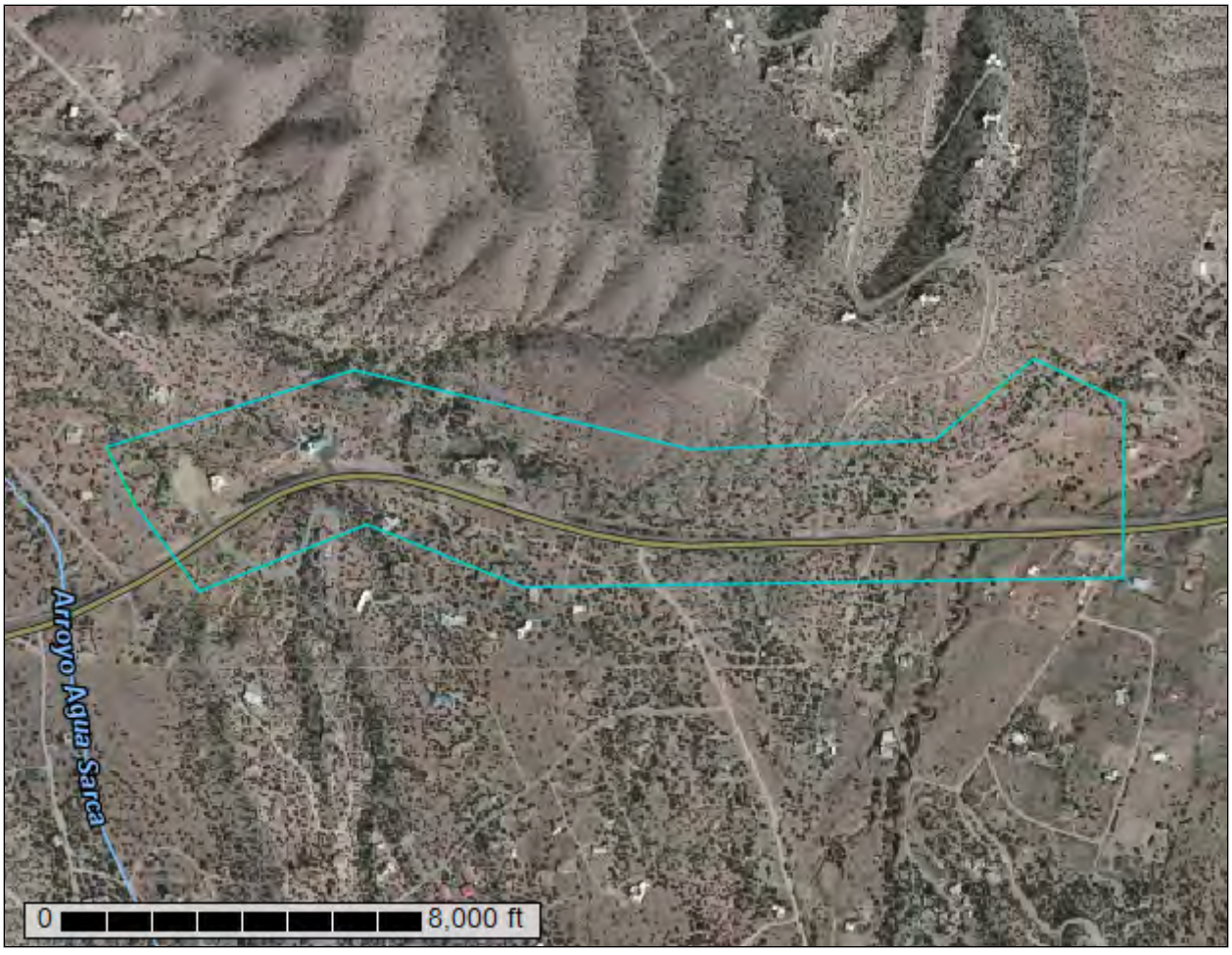
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties

Placitas Library Water System Improvements Project



July 8, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

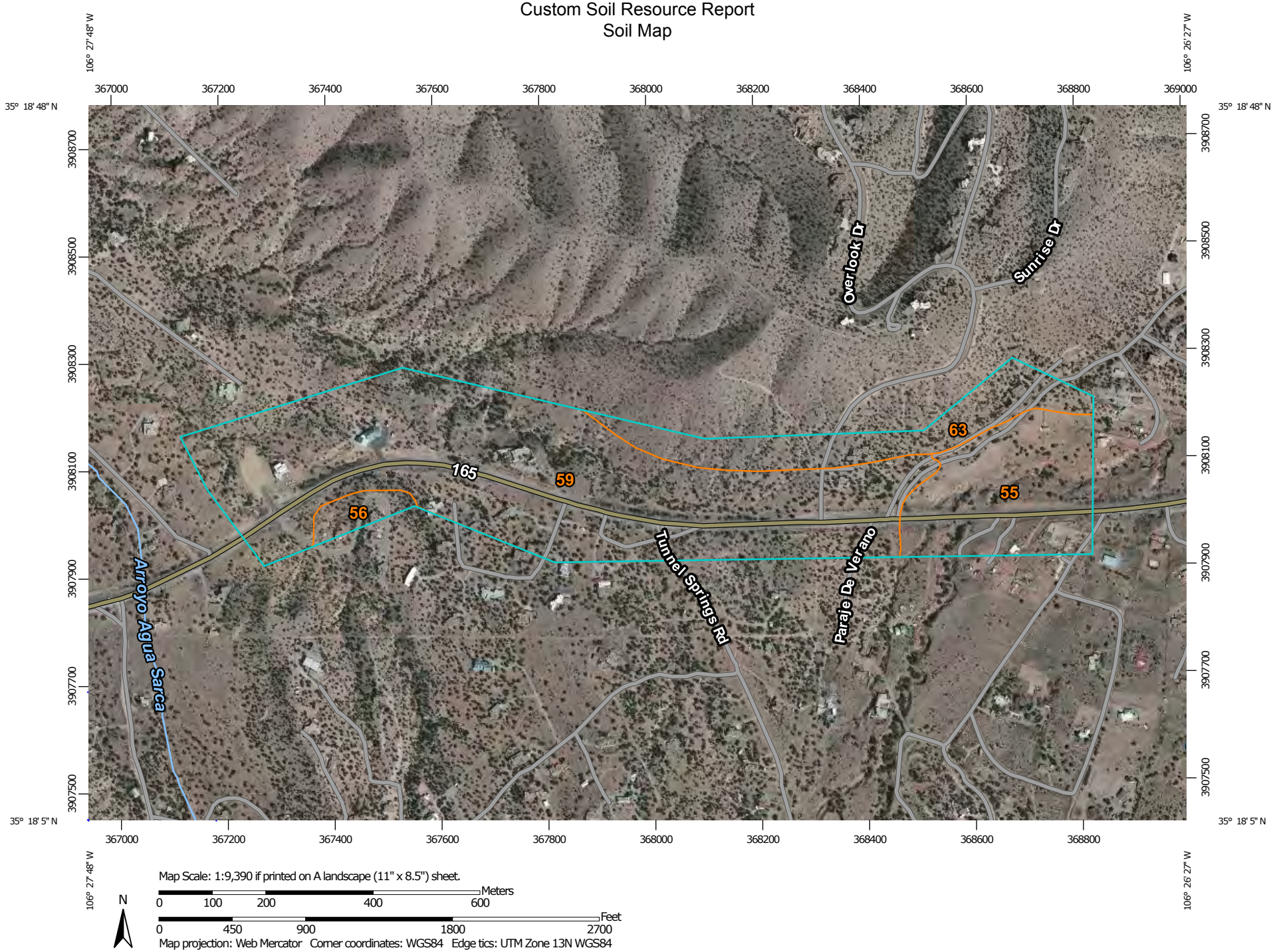
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties
Survey Area Data: Version 9, Sep 25, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 23, 2011—Mar 24, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties (NM656)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
55	La Fonda loam, 1 to 5 percent slopes	19.9	18.2%
56	Ildefonso cobbly loam, 15 to 35 percent slopes	2.7	2.5%
59	Harvey-Ildefonso-La Fonda association, 3 to 15 percent slopes	72.7	66.3%
63	Placitas gravelly loam, 8 to 40 percent slopes	14.3	13.0%
Totals for Area of Interest		**109.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties

55—La Fonda loam, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1wqs
Elevation: 6,000 to 6,500 feet
Mean annual precipitation: 10 to 13 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 120 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

La fonda and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of La Fonda

Setting

Landform: Fan remnants, fan piedmonts
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Fan alluvium derived from igneous and sedimentary rock

Typical profile

A - 0 to 4 inches: loam
Bw - 4 to 26 inches: loam
Bk - 26 to 60 inches: loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: B
Ecological site: Loamy (R070CY109NM)

56—Ildefonso cobbly loam, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: 1wqt
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 10 to 13 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 120 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Ildefonso and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ildefonso

Setting

Landform: Fan remnants, mesas, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 3 inches: cobbly loam
Bw - 3 to 9 inches: cobbly loam
Bk - 9 to 15 inches: very gravelly loam
C - 15 to 60 inches: very cobbly loam

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Breaks (R070CY115NM)

59—Harvey-Ildefonso-La Fonda association, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 1wqx
Elevation: 6,200 to 6,800 feet
Mean annual precipitation: 10 to 13 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 120 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Harvey and similar soils: 35 percent
Ildefonso and similar soils: 35 percent
La fonda and similar soils: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ildefonso

Setting

Landform: Mesas, hills, fan remnants
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fan alluvium and/or colluvium derived from igneous and sedimentary rock

Typical profile

A - 0 to 2 inches: cobbly loam
Bw1 - 2 to 8 inches: very gravelly loam
Bw2 - 8 to 13 inches: very gravelly loam
Bk1 - 13 to 32 inches: very cobbly sandy loam
Bk2 - 32 to 40 inches: very cobbly sandy loam
C - 40 to 60 inches: extremely cobbly sand

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: Breaks (R070CY115NM)

Description of Harvey

Setting

Landform: Mesas, bajadas, plateaus
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian deposits derived from sandstone over fan alluvium and colluvium derived from igneous and sedimentary rock

Typical profile

A - 0 to 4 inches: loam
Bw - 4 to 10 inches: loam
Bk1 - 10 to 18 inches: clay loam
Bk2 - 18 to 41 inches: clay loam
C - 41 to 60 inches: sandy clay loam

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: Limy (R070CY108NM)

Description of La Fonda

Setting

Landform: Fan piedmonts, fan remnants
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Fan alluvium derived from igneous and sedimentary rock

Typical profile

A - 0 to 3 inches: loam
Bw1 - 3 to 7 inches: loam
Bw2 - 7 to 14 inches: clay loam
Bw3 - 14 to 26 inches: loam

Bk1 - 26 to 42 inches: loam
Bk2 - 42 to 60 inches: loam

Properties and qualities

Slope: 3 to 7 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: C
Ecological site: Loamy (R070CY109NM)

63—Placitas gravelly loam, 8 to 40 percent slopes

Map Unit Setting

National map unit symbol: 1wr3
Elevation: 5,700 to 6,300 feet
Mean annual precipitation: 10 to 13 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 120 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Placitas and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Placitas

Setting

Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fan alluvium derived from conglomerate

Typical profile

A - 0 to 5 inches: gravelly loam

Bw - 5 to 10 inches: very gravelly sandy loam
Bk - 10 to 27 inches: very gravelly sandy loam
R - 27 to 60 inches: bedrock

Properties and qualities

Slope: 8 to 40 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: Gravelly (R070CY119NM)

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

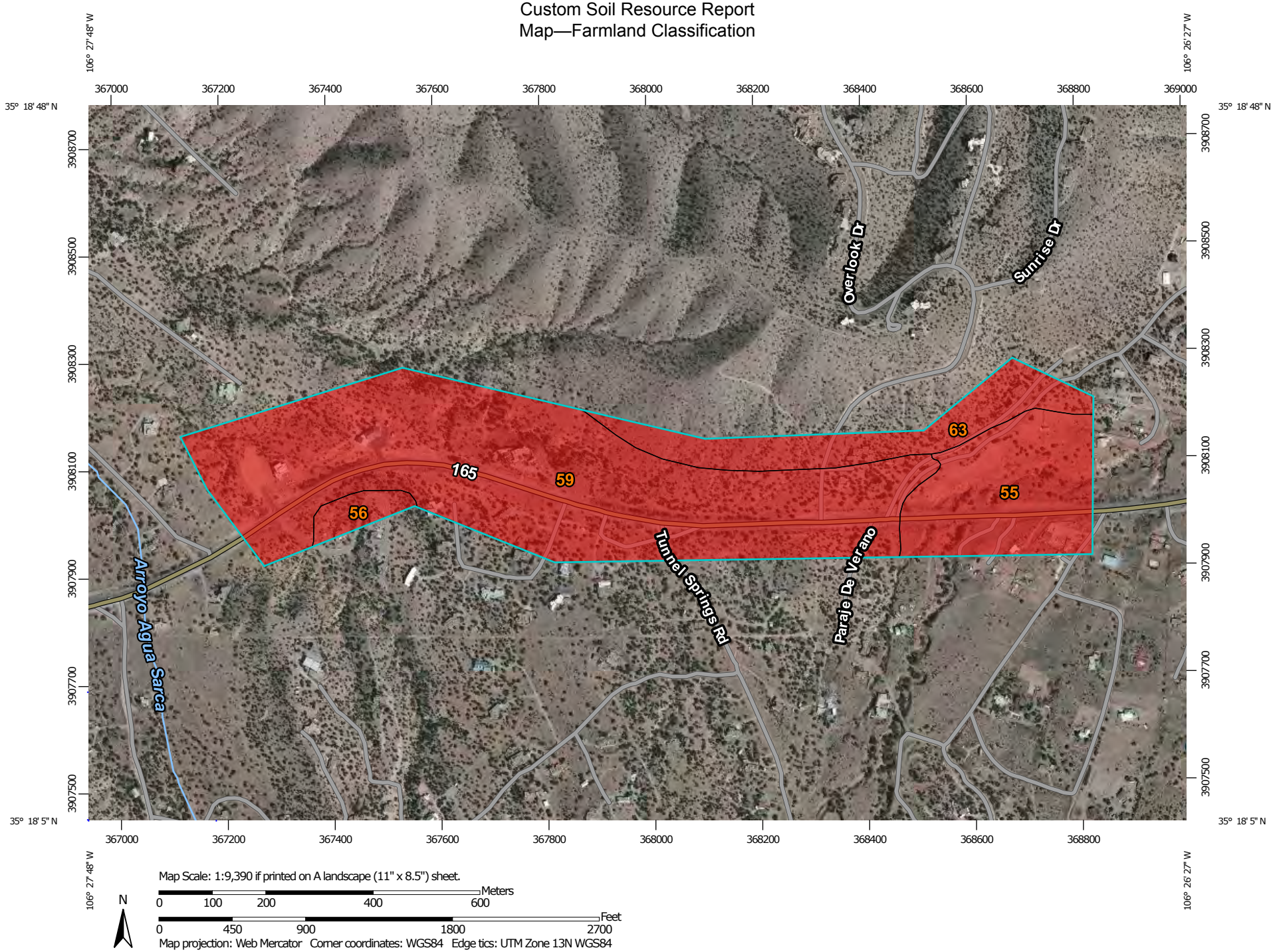
Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Map—Farmland Classification



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties
Survey Area Data: Version 9, Sep 25, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 23, 2011—Mar 24, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Farmland Classification

Farmland Classification— Summary by Map Unit — Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties (NM656)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
55	La Fonda loam, 1 to 5 percent slopes	Not prime farmland	19.9	18.2%
56	Ildefonso cobbly loam, 15 to 35 percent slopes	Not prime farmland	2.7	2.5%
59	Harvey-Ildefonso-La Fonda association, 3 to 15 percent slopes	Not prime farmland	72.7	66.3%
63	Placitas gravelly loam, 8 to 40 percent slopes	Not prime farmland	14.3	13.0%
Totals for Area of Interest			**109.6**	**100.0%**

Rating Options—Farmland Classification

Aggregation Method: No Aggregation Necessary

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The majority of soil attributes are associated with a component of a map unit, and such an attribute has to be aggregated to the map unit level before a thematic map can be rendered. Map units, however, also have their own attributes. An attribute of a map unit does not have to be aggregated in order to render a corresponding thematic map. Therefore, the "aggregation method" for any attribute of a map unit is referred to as "No Aggregation Necessary".

Tie-break Rule: Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Ecological Site Assessment

Individual soil map unit components can be correlated to a particular ecological site. The Ecological Site Assessment section includes ecological site descriptions, plant growth curves, state and transition models, and selected National Plants database information.

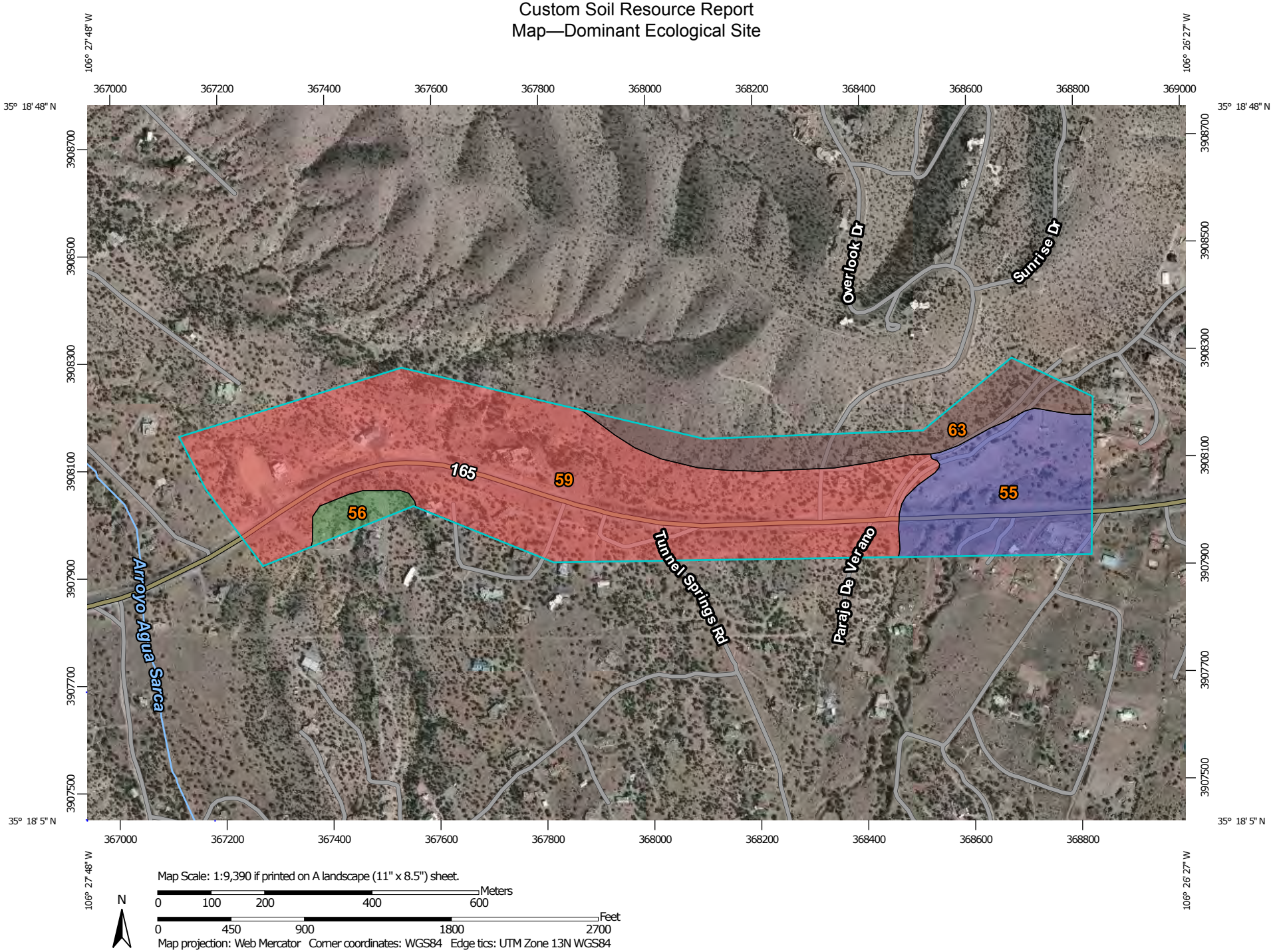
All Ecological Sites — Rangeland

An "ecological site" is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. For example, the hydrology of the site is influenced by development of the soil and plant community. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production.

An ecological site name provides a general description of a particular ecological site. For example, "Loamy Upland" is the name of a rangeland ecological site. An "ecological site ID" is the symbol assigned to a particular ecological site.

The map identifies the dominant ecological site for each map unit, aggregated by dominant condition. Other ecological sites may occur within each map unit. Each map unit typically consists of one or more components (soils and/or miscellaneous areas). Each soil component is associated with an ecological site. Miscellaneous areas, such as rock outcrop, sand dunes, and badlands, have little or no soil material and support little or no vegetation and therefore are not linked to an ecological site. The table below the map lists all of the ecological sites for each map unit component in your area of interest.

Custom Soil Resource Report
Map—Dominant Ecological Site



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- R070CY108NM
- R070CY109NM
- R070CY115NM
- R070CY119NM
- Not rated or not available

Soil Rating Lines
- R070CY108NM
- R070CY109NM
- R070CY115NM
- R070CY119NM
- Not rated or not available

Soil Rating Points
- R070CY108NM
- R070CY109NM
- R070CY115NM
- R070CY119NM
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties
Survey Area Data: Version 9, Sep 25, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 23, 2011—Mar 24, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Ecological Sites by Map Unit Component

Sandoval County Area, New Mexico, Parts of Los Alamos, Sandoval, and Rio Arriba Counties					
Map unit symbol	**Map unit name**	**Component name (percent)**	**Ecological site**	**Acres in AOI**	**Percent of AOI**
55	La Fonda loam, 1 to 5 percent slopes	La Fonda (85%)	R070CY109NM — Loamy	19.9	18.2%
56	Ildefonso cobbly loam, 15 to 35 percent slopes	Ildefonso (85%)	R070CY115NM — Breaks	2.7	2.5%
59	Harvey-Ildefonso-La Fonda association, 3 to 15 percent slopes	Harvey (35%)	R070CY108NM — Limy	72.7	66.3%
		Ildefonso (35%)	R070CY115NM — Breaks		
		La Fonda (15%)	R070CY109NM — Loamy		
63	Placitas gravelly loam, 8 to 40 percent slopes	Placitas (85%)	R070CY119NM — Gravelly	14.3	13.0%
Totals for Area of Interest				**109.6**	**100.0%**

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APPENDIX C

BIOLOGICAL REPORTS

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Biota Information System of New Mexico

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Report County Federal/State Species Status for

Sandoval

40 species returned.

Taxonomic Group	# Species	Taxonomic Group	# Species
Fish	3	Birds	18
Amphibians	1	Mammals	14
Reptiles	1	Molluscs	3

Export to Excel

Species ID	SpeciesLink	Common Name	Scientific Name	Habitat Map	Photo	Status
050025	**Pale Townsend's Big-eared Bat**	Pale Townsend's Big-eared Bat	Corynorhinus townsendii	Yes		Federal: FWS Species of Concern (no longer maintained) State NM: Sensitive taxa (informal)
050032	**Arizona Myotis**	Arizona Myotis	Myotis occultus	Yes	no photo	State NM: Sensitive taxa (informal)
050047	**Fringed Myotis**	Fringed Myotis	Myotis thysanodes	Yes	no photo	State NM: Sensitive taxa (informal)
050057	**Long-eared Myotis**	Long-eared Myotis	Myotis evotis	Yes	no photo	State NM: Sensitive taxa (informal)
050059	**Long-legged Myotis**	Long-legged Myotis	Myotis volans	Yes		State NM: Sensitive taxa (informal)
050093	**Western Small-footed Myotis**	Western Small-footed Myotis	Myotis ciliolabrum	Yes		State NM: Sensitive taxa (informal)
050095	**Spotted Bat**	Spotted Bat	Euderma maculatum	Yes		State NM: Threatened
050103	**Yuma Myotis**	Yuma Myotis	Myotis yumanensis	Yes		State NM: Sensitive taxa (informal)
050037	**Big Free-tailed Bat**	Big Free-tailed Bat	Nyctinomops macrotis	Yes	no photo	State NM: Sensitive taxa (informal)

050335	**American Marten**	American Marten	Martes americana	Yes		State NM: Threatened
050670	**Ringtail**	Ringtail	Bassariscus astutus			State NM: Sensitive taxa (informal)
050205	**Gunnison's prairie dog (prairie subspecies)**	Gunnison's prairie dog (prairie subspecies)	Cynomys gunnisoni zuniensis	Yes		State NM: Sensitive taxa (informal)
050410	**Meadow Jumping Mouse**	Meadow Jumping Mouse	Zapus hudsonius luteus	Yes		Federal: Endangered State NM: Endangered
050566	**Goat Peak Pika**	Goat Peak Pika	Ochotona princeps nigrescens	Yes	no photo	Federal: FWS Species of Concern (no longer maintained) State NM: Sensitive taxa (informal)
041400	**Brown Pelican**	Brown Pelican	Pelecanus occidentalis	Yes		State NM: Endangered
040040	**Common Black Hawk**	Common Black Hawk	Buteogallus anthracinus	Yes		Federal: FWS Species of Concern (no longer maintained) State NM: Threatened
040370	**Bald Eagle**	Bald Eagle	Haliaeetus leucocephalus	Yes		State NM: Threatened
040610	**Northern Goshawk**	Northern Goshawk	Accipiter gentilis		no photo	Federal: FWS Species of Concern (no longer maintained) State NM: Sensitive taxa (informal)
040384	**Peregrine Falcon**	Peregrine Falcon	Falco peregrinus	Yes		Federal: FWS Species of Concern (no longer maintained) State NM: Threatened
040385	**Arctic Peregrine Falcon**	Arctic Peregrine Falcon	Falco peregrinus tundrius	Yes	no photo	Federal: FWS Species of Concern (no longer maintained) State NM: Threatened
041500	**Mountain Plover**	Mountain Plover	Charadrius montanus	Yes		State NM: Sensitive taxa (informal)
040195	**Neotropic Cormorant**	Neotropic Cormorant	Phalacrocorax brasilianus	Yes		State NM: Threatened
040250	**Yellow-billed Cuckoo (western pop)**	Yellow-billed Cuckoo (western pop)	Coccyzus americanus occidentalis			Federal: Threatened State NM: Sensitive taxa (informal)
041320	**Burrowing Owl**	Burrowing Owl	Athene cunicularia	Yes		

						Federal: FWS Species of Concern (no longer maintained)
041375	**Mexican Spotted Owl**	Mexican Spotted Owl	Strix occidentalis lucida	Yes		Federal: Critical Hab. Designated (NM) Federal: Threatened State NM: Sensitive taxa (informal)
041990	**Black Swift**	Black Swift	Cypseloides niger	Yes		State NM: Sensitive taxa (informal)
040905	**Broad-billed Hummingbird**	Broad-billed Hummingbird	Cynanthus latirostris	Yes		State NM: Threatened
040925	**Costa's Hummingbird**	Costa's Hummingbird	Calypte costae	Yes		State NM: Threatened
040521	**Southwestern Willow Flycatcher**	Southwestern Willow Flycatcher	Empidonax traillii extimus	Yes		Federal: Critical Hab. Designated (NM) Federal: Endangered State NM: Endangered
041750	**Loggerhead Shrike**	Loggerhead Shrike	Lanius ludovicianus			State NM: Sensitive taxa (informal)
042200	**Gray Vireo**	Gray Vireo	Vireo vicinior	Yes		State NM: Threatened
041785	**Baird's Sparrow**	Baird's Sparrow	Ammodramus bairdii	Yes		Federal: FWS Species of Concern (no longer maintained) State NM: Threatened
030056	**Southwestern Fence Lizard**	Southwestern Fence Lizard	Sceloporus cowlesi	Yes		State NM: Sensitive taxa (informal)
020060	**Jemez Mtns. Salamander**	Jemez Mtns. Salamander	Plethodon neomexicanus	Yes		Federal: Critical Hab. Designated (NM) Federal: Endangered State NM: Endangered
010140	**Rio Grande Chub**	Rio Grande Chub	Gila pandora	Yes		State NM: Sensitive taxa (informal)
010310	**Rio Grande Silvery Minnow**	Rio Grande Silvery Minnow	Hybognathus amarus	Yes		Federal: Critical Hab. Designated (NM) Federal: Endangered State NM: Endangered
010585	**Rio Grande Cutthroat Trout**	Rio Grande Cutthroat Trout	Oncorhynchus clarkii virginalis	Yes		State NM: Sensitive taxa (informal)
060200	**Wrinkled Marshsnail**	Wrinkled Marshsnail		Yes	no photo	State NM: Endangered

			Stagnicola caperata			
060076	**Socorro Mountainsnail**	Socorro Mountainsnail	Oreohelix neomexicana		no photo	State NM: Sensitive taxa (informal)
060040	**Paper Pondshell**	Paper Pondshell	Utterbackia imbecillis	Yes	no photo	State NM: Endangered

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Report County TES Table for

Sandoval

NEW MEXICO WILDLIFE OF CONCERN

For complete up-dated information on federal-listed species, including plants, see the US Fish & Wildlife Service website at http://ecos.fws.gov/ipac/wizard/chooseLocation!prepare.action. For information on state-listed plants, contact the NM Energy, Minerals and Natural Resources Department, Division of Forestry, or go to http://nmrareplants.unm.edu/. If your project is on Bureau of Land Management, contact the local BLM Field Office for information on species of particular concern. If your project is on a National Forest, contact the Forest Supervisor's office for species information. E = Endangered; T = Threatened; s = sensitive; SOC = Species of Concern; C = Candidate; Exp = Experimental non-essential population; P = Proposed

Export to Excel

Common Name	Scientific Name	NMGF	US FWS	Critical Habitat
Spotted Bat	Euderma maculatum	T		
American Marten	Martes americana	T		
Meadow Jumping Mouse	Zapus hudsonius luteus	E	E	
Brown Pelican	Pelecanus occidentalis	E		
Common Black Hawk	Buteogallus anthracinus	T		
Bald Eagle	Haliaeetus leucocephalus	T		
Peregrine Falcon	Falco peregrinus	T		
Arctic Peregrine Falcon	Falco peregrinus tundrius	T		
Neotropic Cormorant	Phalacrocorax brasilianus	T		
Yellow-billed Cuckoo (western pop)	Coccyzus americanus occidentalis		T	
Mexican Spotted Owl	Strix occidentalis lucida		T	Y
Broad-billed Hummingbird	Cynanthus latirostris	T		
Costa's Hummingbird	Calypte costae	T		
Southwestern Willow Flycatcher	Empidonax traillii extimus	E	E	Y
Gray Vireo	Vireo vicinior	T		
Baird's Sparrow	Ammodramus bairdii	T		
Jemez Mtns. Salamander	Plethodon neomexicanus	E	E	Y
Rio Grande Silvery Minnow	Hybognathus amarus	E	E	Y
Wrinkled Marshsnail	Stagnicola caperata	E		
Paper Pondshell	Utterbackia imbecillis	E		

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Biota Information System of New Mexico

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Report County TES Table for

Sandoval

70 species returned.

Taxonomic Group	# Species	Taxonomic Group	# Species
Fish	4	Mammals	27
Amphibians	2	Molluscs	3
Reptiles	1	Lepidoptera; moths and butterflies	1
Birds	32		

Export to Excel

Species ID	SpeciesLink	Common Name	Scientific Name	Habitat Map	Photo	Status
050687	**Preble's Shrew**	Preble's Shrew	Sorex preblei	Yes	no photo	Heritage Global: Apparently Secure (G4) Heritage NM: Critically Imperiled in NM (S1) State NM: Not a Game Species State NM: Provides limited protection State NM: Species of Greatest Conservation Need (SGCN) USFS Sensitive: Region 3 (NM,AZ)
050690	**Crawford's Desert Shrew**	Crawford's Desert Shrew	Notiosorex crawfordi			Heritage AZ: Apparently Secure in AZ (S4) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Mexico: Threatened State NM: Not a Game Species State NM: Provides limited protection State OK: Category 2: Special Concern Species State UT: Special Concern/Conservation Taxa USFS Sensitive: Region 3 (NM,AZ)
050700	**Dwarf Shrew**	Dwarf Shrew	Sorex nanus	Yes	no photo	Heritage AZ: Very Rare/Critically Imperiled

						in AZ (S1) Heritage Global: Apparently Secure (G4) Heritage NM: Imperiled in NM (S2) Heritage Ranking: Taxon Tracked by Heritage Program See Comments State NM: Not a Game Species State NM: Provides limited protection State UT: Special Concern/Conservation Taxa USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
050710	**Masked Shrew**	Masked Shrew	Sorex cinereus	Yes	no photo	Heritage Global: Demonstrably Secure (G5) Heritage NM: Imperiled in NM (S2) Heritage Ranking: Taxon Tracked by Heritage Program State NM: Not a Game Species State NM: Provides limited protection USFS Sensitive: Region 3 (NM,AZ)
050715	**Merriam's Shrew**	Merriam's Shrew	Sorex merriami		no photo	Heritage AZ: Vulnerable in AZ (S3) Heritage Global: Demonstrably Secure (G5) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program State NM: Not a Game Species State NM: Provides limited protection USFS Sensitive: Region 3 (NM,AZ)
050730	**Western Water Shrew**	Western Water Shrew	Sorex navigator	Yes	no photo	Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global: Demonstrably Secure (G5) Heritage NM: Imperiled in NM (S2) Heritage Ranking: Taxon Tracked by Heritage Program See Comments State AZ: FORMER STATUS; Endangered State AZ: Species of Special Concern State NM: Not a Game Species State NM: Provides limited protection USFS Sensitive: Region 3 (NM,AZ)

050025	**Pale Townsend's Big-eared Bat**	Pale Townsend's Big-eared Bat	Corynorhinus townsendii	Yes		BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern (no longer maintained) Heritage AZ: Vulnerable to Apparently Secure (S3S4) Heritage Global (subspecies): Vulnerable (T3) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program State NM: Not a Game Species State NM: Provides limited protection State NM: Sensitive taxa (informal) State OK: Category 2: Special Concern Species State UT: See Comments State UT: Special Concern/Conservation Taxa USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
050032	**Arizona Myotis**	Arizona Myotis	Myotis occultus	Yes	no photo	BLM Sensitive: NM State Office (NMSO) Heritage AZ: Vulnerable in AZ (S3) Heritage Global: Apparently Secure (G4) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement See Comments State NM: Not a Game Species State NM: Provides limited protection State NM: Sensitive taxa (informal) State NM: Species of Greatest Conservation Need (SGCN) USFS Sensitive: Region 3 (NM,AZ)
050047	**Fringed Myotis**	Fringed Myotis	Myotis thysanodes	Yes	no photo	BLM Sensitive: NM State Office (NMSO) Heritage AZ: Vulnerable to Apparently Secure (S3S4) Heritage Global: Apparently Secure (G4) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program

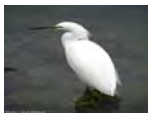
						See Comments State NM: Not a Game Species State NM: Provides limited protection State NM: Sensitive taxa (informal) State UT: Special Concern/Conservation Taxa
050057	**Long-eared Myotis**	Long-eared Myotis	Myotis evotis	Yes	no photo	BLM Sensitive: NM State Office (NMSO) Heritage AZ: Vulnerable in AZ (S3) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments Migratory: Seasonal movement See Comments State NM: Not a Game Species State NM: Provides limited protection State NM: Sensitive taxa (informal)
050059	**Long-legged Myotis**	Long-legged Myotis	Myotis volans	Yes		BLM Sensitive: NM State Office (NMSO) Heritage AZ: Vulnerable to Apparently Secure (S3S4) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement See Comments State NM: Not a Game Species State NM: Provides limited protection State NM: Sensitive taxa (informal)
050093	**Western Small-footed Myotis**	Western Small-footed Myotis	Myotis ciliolabrum	Yes		BLM Sensitive: NM State Office (NMSO) Heritage AZ: Vulnerable to Apparently Secure (S3S4) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program See Comments State NM: Not a Game Species State NM: Provides limited protection

						State NM: Sensitive taxa (informal)
050095	**Spotted Bat**	Spotted Bat	Euderma maculatum	Yes		BLM Sensitive: NM State Office (NMSO) Heritage AZ: Rare/Imperiled in AZ (S2) Heritage Global: Apparently Secure (G4) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: Taxon Tracked by Heritage Program Mexico: See Comments See Comments State AZ: FORMER STATUS; Candidate State AZ: Species of Special Concern State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened State TX: State Threatened Species State UT: Special Concern/Conservation Taxa USFS Sensitive: Region 3 (NM,AZ)
050103	**Yuma Myotis**	Yuma Myotis	Myotis yumanensis	Yes		BLM Sensitive: NM State Office (NMSO) Heritage AZ: Vulnerable to Apparently Secure (S3S4) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program See Comments State NM: Not a Game Species State NM: Provides limited protection State NM: Sensitive taxa (informal)
050037	**Big Free-tailed Bat**	Big Free-tailed Bat	Nyctinomops macrotis	Yes	no photo	BLM Sensitive: NM State Office (NMSO) Heritage AZ: Vulnerable in AZ (S3) Heritage Global: Demonstrably Secure (G5) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement See Comments State NM: Not a Game

						Species State NM: Provides limited protection State NM: Sensitive taxa (informal) State UT: Special Concern/Conservation Taxa
050335	**American Marten**	American Marten	Martes americana	Yes		Heritage Global: Demonstrably Secure (G5) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program See Comments State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened State UT: Special Concern/Conservation Taxa USFS Sensitive: Region 3 (NM,AZ)
050858	**Ermine Weasel**	Ermine Weasel	Mustela erminea	Yes	no photo	Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global: Demonstrably Secure (G5) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments State NM: Harvested furbearers State NM: Provides full protection USFS Sensitive: Region 3 (NM,AZ)
050670	**Ringtail**	Ringtail	Bassariscus astutus			Heritage AZ: Demonstrably Secure in AZ (S5) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments State NM: Harvested furbearers State NM: Provides full protection State NM: Sensitive taxa (informal) State OK: Category 2: Special Concern Species State UT: Special Concern/Conservation Taxa USFS Sensitive: Region 3 (NM,AZ)
050205	**Gunnison's prairie dog**	Gunnison's prairie dog	Cynomys gunnisoni zuniensis	Yes		BLM Sensitive: NM State Office (NMSO) Heritage AZ: Apparently

	(prairie subspecies)	(prairie subspecies)				Secure in AZ (S4) Heritage Global: Demonstrably Secure (G5) Heritage NM: Imperiled in NM (S2) Heritage Ranking: Taxon Tracked by Heritage Program See Comments State NM: Not a Game Species State NM: Provides limited protection State NM: Sensitive taxa (informal) State NM: Species of Greatest Conservation Need (SGCN) USFS Sensitive: Region 3 (NM,AZ)
050255	**Botta's Pocket Gopher**	Botta's Pocket Gopher	Thomomys bottae actuosus; alienus; aureus; collis; connectens; cultellus; fulvus; guadalupensis; lachuguilla; mearnsi; morulus; opulentus; paguatae; pectoralis; peramplus; pervagus; planorum; rufidulus; ruidosae; tol	Yes	no photo	Heritage AZ: Demonstrably Secure in AZ (S5) Heritage Global: Demonstrably Secure (G5) Heritage NM: Demonstrably Secure in NM (S5) Heritage Ranking: See comments State NM: Not a Game Species State NM: Provides limited protection USFS Sensitive: Region 3 (NM,AZ)
050265	**Northern Pocket Gopher**	Northern Pocket Gopher	Thomomys talpoides fossor; kaibabensis		no photo	Heritage AZ: Apparently Secure in AZ (S4) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments See Comments State NM: Not a Game Species State NM: Provides limited protection USFS Sensitive: Region 3 (NM,AZ)
050410	**Meadow Jumping Mouse**	Meadow Jumping Mouse	Zapus hudsonius luteus	Yes		BLM Sensitive: NM State Office (NMSO) Federal: Endangered Heritage AZ: Rare/Imperiled in AZ (S2) Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global (subspecies): Imperiled (T2) Heritage NM: Critically Imperiled in NM (S1) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program State AZ: FORMER STATUS; Threatened

						State AZ: Species of Special Concern State CO: See Comments State NM: Endangered State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State OK: Category 2: Special Concern Species USFS Sensitive: Region 3 (NM,AZ)
050395	**Plains Harvest Mouse**	Plains Harvest Mouse	Reithrodontomys montanus		no photo	Heritage AZ: Vulnerable in AZ (S3) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) State NM: Not a Game Species State NM: Provides limited protection USFS Sensitive: Region 3 (NM,AZ)
050825	**Long-tailed Vole**	Long-tailed Vole	Microtus longicaudus longicaudus; alticola; baileyi; mordax		no photo	Heritage AZ: Apparently Secure in AZ (S4) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments State NM: Not a Game Species State NM: Provides limited protection USFS Sensitive: Region 3 (NM,AZ)
050855	**Southern Red-backed Vole**	Southern Red-backed Vole	Myodes gapperi	Yes	no photo	Heritage AZ: Vulnerable in AZ (S3) Heritage Global: Demonstrably Secure (G5) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments State NM: Not a Game Species State NM: Provides limited protection USFS Sensitive: Region 3 (NM,AZ)
050566	**Goat Peak Pika**	Goat Peak Pika	Ochotona princeps nigrescens	Yes	no photo	BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern (no longer maintained) Heritage Global (subspecies): Critically Imperiled (T1) Heritage NM: Critically Imperiled in NM (S1) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program

						State NM: Endemic to New Mexico State NM: Provides limited protection State NM: Sensitive taxa (informal) State NM: Species of Greatest Conservation Need (SGCN) USFS Sensitive: Region 3 (NM,AZ)
050590	**Snowshoe Hare**	Snowshoe Hare	Lepus americanus	Yes		Heritage Global: Demonstrably Secure (G5) Heritage NM: Imperiled in NM (S2) State NM: Not a Game Species State NM: Provides limited protection State NM: Species of Greatest Conservation Need (SGCN) USFS Sensitive: Region 3 (NM,AZ)
041400	**Brown Pelican**	Brown Pelican	Pelecanus occidentalis	Yes		Federal: Delisted Federal: Migratory Bird Treaty Act Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global: Apparently Secure (G4) Heritage NM: Status Not Applicable in NM (SNA) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program State NM: Endangered State NM: Not a Game Species State NM: Provides full protection State TX: State Endangered Species USFS Sensitive: Region 3 (NM,AZ)
040378	**Snowy Egret**	Snowy Egret	Egretta thula	Yes		Federal: Migratory Bird Treaty Act Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global: Demonstrably Secure (G5) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement State AZ: FORMER STATUS; Threatened State AZ: Species of Special Concern State NM: Not a Game Species State NM: Provides limited protection

						USFS Sensitive: Region 3 (NM,AZ)
040970	**White-faced Ibis**	White-faced Ibis	Plegadis chihi	Yes		BLM Sensitive: NM State Office (NMSO) Federal: Migratory Bird Treaty Act Heritage AZ: Rare/Imperiled in AZ (S2) Heritage Global: Demonstrably Secure (G5) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement State NM: Not a Game Species State NM: Provides limited protection State NM: Species of Greatest Conservation Need (SGCN) State TX: State Threatened Species USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
040040	**Common Black Hawk**	Common Black Hawk	Buteogallus anthracinus	Yes		Federal: FWS Species of Concern (no longer maintained) Federal: Migratory Bird Treaty Act Heritage AZ: Vulnerable in AZ (S3) Heritage Global: Apparently Secure (G4) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Mexico: Threatened Migratory: Seasonal movement Neotropical Migrant: All Winter S. of U.S. State AZ: FORMER STATUS; Candidate State AZ: Species of Special Concern State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened State TX: State Threatened Species USFS Sensitive: Region 3 (NM,AZ)
040370	**Bald Eagle**	Bald Eagle	Haliaeetus leucocephalus	Yes		BLM Sensitive: NM State Office (NMSO) CITES Appendix I (Import & Export

						Permit) Federal: Delisted Federal: Migratory Bird Treaty Act Federal: Recovery Plan Approved Heritage AZ: Rare/Imperiled in AZ (S2) Heritage Global: Demonstrably Secure (G5) Heritage NM: Critically Imperiled in NM (S1) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Mexico: Endangered Migratory: Seasonal movement Navajo Tribes: Threatened (G3) Pueblo Tribes: Cultural Importance See Comments State AZ: FORMER STATUS; Endangered State AZ: Species of Special Concern State CO: Threatened State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened State OK: State Threatened Species State TX: State Endangered Species State UT: Threatened TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 3 (NM,AZ)
040610	**Northern Goshawk**	Northern Goshawk	Accipiter gentilis		no photo	BLM Sensitive: NM State Office (NMSO) CITES Appendix II (Export Permit Req.) Federal: FWS Species of Concern (no longer maintained) Federal: Migratory Bird Treaty Act Heritage AZ: Vulnerable in AZ (S3) Heritage Global: Demonstrably Secure (G5) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Mexico: Threatened Migratory: Seasonal movement Navajo Tribes: Candidate (G4) Neotropical Migrant: Some Winter S. of U.S.

						See Comments State AZ: FORMER STATUS; Candidate State AZ: Species of Special Concern State NM: Not a Game Species State NM: Provides full protection State NM: Regulated - Falconry State NM: Sensitive taxa (informal) State NM: Species of Greatest Conservation Need (SGCN) State UT: Special Concern/Conservation Taxa TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
040805	**Ferruginous Hawk**	Ferruginous Hawk	Buteo regalis	Yes		BLM Sensitive: NM State Office (NMSO) CITES Appendix II (Export Permit Req.) Federal: Migratory Bird Treaty Act Heritage AZ: Rare/Imperiled in AZ (S2) Heritage Global: Apparently Secure (G4) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement Neotropical Migrant: Some Winter S. of U.S. See Comments State AZ: FORMER STATUS; Threatened State AZ: Species of Special Concern State CO: Special Concern Species State NM: Not a Game Species State NM: Provides full protection State NM: Regulated - Falconry State NM: Species of Greatest Conservation Need (SGCN) State OK: Category 1: Special Concern Species State UT: Threatened TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
040840	**Swainson's Hawk**	Swainson's Hawk	Buteo swainsoni	Yes		CITES Appendix II (Export Permit Req.) Federal: FORMER Candidate (C3)

						Federal: Migratory Bird Treaty Act Heritage AZ: Vulnerable in AZ (S3) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments Migratory: Seasonal movement Neotropical Migrant: All Winter S. of U.S. See Comments State AZ: Species of Special Concern State NM: Not a Game Species State NM: Provides full protection State OK: Category 2: Special Concern Species State UT: Special Concern/Conservation Taxa USFS Sensitive: Region 3 (NM,AZ)
040850	**Zone-tailed Hawk**	Zone-tailed Hawk	Buteo albonotatus	Yes		CITES Appendix II (Export Permit Req.) Federal: Migratory Bird Treaty Act Heritage AZ: Apparently Secure in AZ (S4) Heritage Global: Apparently Secure (G4) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments Migratory: Seasonal movement Navajo Tribes: Extirpated (G1) Neotropical Migrant: All Winter S. of U.S. State NM: Not a Game Species State NM: Provides full protection State TX: State Threatened Species TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 3 (NM,AZ)
041105	**Mississippi Kite**	Mississippi Kite	Ictinia mississippiensis	Yes		CITES Appendix II (Export Permit Req.) Federal: Migratory Bird Treaty Act Heritage AZ: Vulnerable in AZ (S3) Heritage Global: Demonstrably Secure (G5) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Mexico: Threatened Neotropical Migrant: All Winter S. of U.S.

						Neotropical Migrant: Winters in mature tropical forests See Comments State AZ: FORMER STATUS; Candidate State AZ: Species of Special Concern State NM: Not a Game Species State NM: Provides full protection USFS Sensitive: Region 3 (NM,AZ)
040384	**Peregrine Falcon**	Peregrine Falcon	Falco peregrinus	Yes		CITES Appendix I (Import & Export Permit) Federal: Delisted Federal: FWS Species of Concern (no longer maintained) Federal: Migratory Bird Treaty Act Federal: Recovery Plan Approved Heritage AZ: Apparently Secure in AZ (S4) Heritage Global (subspecies): Apparently Secure (T4) Heritage Global: Apparently Secure (G4) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Mexico: See Comments Mexico: Threatened Migratory: Seasonal movement Navajo Tribes: Threatened (G3) Neotropical Migrant: All Winter S. of U.S. State AZ: FORMER STATUS; Candidate State AZ: Species of Special Concern State CO: Threatened State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened State OK: State Endangered Species State TX: State Endangered Species State UT: Endangered TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 3 (NM,AZ)
040385	**Arctic Peregrine Falcon**	Arctic Peregrine Falcon	Falco peregrinus tundrius	Yes	no photo	CITES Appendix I (Import & Export Permit) Federal: Delisted Federal: FWS Species of Concern (no longer maintained)

						Federal: Migratory Bird Treaty Act Heritage Global (subspecies): Vulnerable (T3) Heritage NM: Status Not Applicable in NM (SNA) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement Neotropical Migrant: All Winter S. of U.S. State AZ: FORMER STATUS; Candidate State AZ: Species of Special Concern State CO: Threatened State NM: Not a Game Species State NM: Provides full protection State NM: Threatened State OK: State Threatened Species State TX: State Threatened Species USFS Sensitive: Region 3 (NM,AZ)
041300	**Osprey**	Osprey	Pandion haliaetus	Yes		CITES Appendix II (Export Permit Req.) Federal: Migratory Bird Treaty Act Heritage AZ: Rare/Imperiled in AZ (S2) Heritage Global: Demonstrably Secure (G5) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Mexico: See Comments Mexico: Threatened Migratory: Seasonal movement Neotropical Migrant: Some Winter S. of U.S. State AZ: FORMER STATUS; Threatened State AZ: Species of Special Concern State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State UT: Special Concern/Conservation Taxa USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
041780	**Sora**	Sora	Porzana carolina	Yes	no photo	Federal: Migratory Bird Treaty Act Heritage AZ: Apparently

						Secure in AZ (S4) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments Migratory: Seasonal movement Navajo Tribes: Candidate (G4) State NM: Harvest: Fed. Mig. Bird Permit State NM: Harvested Small Game & Waterfowl State NM: Provides full protection TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 3 (NM,AZ)
041500	**Mountain Plover**	Mountain Plover	Charadrius montanus	Yes		Federal: Migratory Bird Treaty Act Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global: Vulnerable (G3) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Mexico: Threatened Migratory: Seasonal movement Navajo Tribes: Candidate (G4) Neotropical Migrant: Some Winter S. of U.S. State CO: Special Concern Species State NM: Provides full protection State NM: Sensitive taxa (informal) State NM: Species of Greatest Conservation Need (SGCN) State OK: Category 1: Special Concern Species State UT: Special Concern/Conservation Taxa TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
041515	**Snowy Plover**	Snowy Plover	Charadrius nivosus	Yes		Federal: FORMER Candidate (C3) Federal: Migratory Bird Treaty Act Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global (subspecies): Vulnerable (T3) Heritage NM: Vulnerable in NM (S3)

						Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement State AZ: FORMER STATUS; Candidate State AZ: Species of Special Concern State CO: Special Concern Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State OK: Category 2: Special Concern Species USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
040255	**Long-billed Curlew**	Long-billed Curlew	Numenius americanus	Yes		Federal: Migratory Bird Treaty Act Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global: Demonstrably Secure (G5) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments Migratory: Seasonal movement Neotropical Migrant: All Winter S. of U.S. State CO: Special Concern Species State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State OK: Category 1: Special Concern Species State UT: Special Concern/Conservation Taxa USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
040195	**Neotropic Cormorant**	Neotropic Cormorant	Phalacrocorax brasilianus	Yes		Federal: Migratory Bird Treaty Act Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global: Demonstrably Secure (G5) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program State NM: Not a Game Species State NM: Provides full

						protection State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened USFS Sensitive: Region 3 (NM,AZ)
040250	**Yellow-billed Cuckoo (western pop)**	Yellow-billed Cuckoo (western pop)	Coccyzus americanus occidentalis			Federal: Migratory Bird Treaty Act Federal: Threatened Heritage AZ: Vulnerable in AZ (S3) Heritage Global (subspecies): Vulnerable (T3) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments Migratory: Seasonal movement Navajo Tribes: Candidate (G4) Neotropical Migrant: All Winter S. of U.S. Neotropical Migrant: Winters in mature tropical forests See Comments State AZ: FORMER STATUS; Threatened State AZ: Species of Special Concern State CO: Endangered State NM: Not a Game Species State NM: Provides full protection State NM: Sensitive taxa (informal) State NM: Species of Greatest Conservation Need (SGCN) State UT: Threatened TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
041320	**Burrowing Owl**	Burrowing Owl	Athene cunicularia	Yes		BLM Sensitive: NM State Office (NMSO) CITES Appendix II (Export Permit Req.) Federal: FWS Species of Concern (no longer maintained) Federal: Migratory Bird Treaty Act Heritage AZ: Vulnerable in AZ (S3) Heritage Global (subspecies): Apparently Secure (T4) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments Migratory: Seasonal movement Neotropical Migrant: All Winter S. of U.S. State NM: Not a Game Species State NM: Provides full protection

						State NM: Species of Greatest Conservation Need (SGCN) State OK: Category 2: Special Concern Species State UT: Special Concern/Conservation Taxa USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
041330	**Flammulated Owl**	Flammulated Owl	Psiloscops flammeolus	Yes		CITES Appendix II (Export Permit Req.) Federal: Migratory Bird Treaty Act Heritage AZ: Apparently Secure in AZ (S4) Heritage Global: Apparently Secure (G4) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments Migratory: Seasonal movement Navajo Tribes: Candidate (G4) Neotropical Migrant: All Winter S. of U.S. See Comments State NM: Not a Game Species State NM: Provides full protection TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 3 (NM,AZ)
041375	**Mexican Spotted Owl**	Mexican Spotted Owl	Strix occidentalis lucida	Yes		CITES Appendix II (Export Permit Req.) Federal: Critical Hab. Designated (NM) Federal: Migratory Bird Treaty Act Federal: Recovery Plan Approved Federal: Threatened Heritage AZ: Vulnerable to Apparently Secure (S3S4) Heritage Global (subspecies): Vulnerable (T3) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Mexico: See Comments Navajo Tribes: Threatened (G3) State AZ: FORMER STATUS; Threatened State AZ: Species of Special Concern State CO: Threatened State NM: Not a Game Species State NM: Provides full protection State NM: Sensitive taxa (informal) State NM: Species of

						Greatest Conservation Need (SGCN) State TX: State Threatened Species State UT: Threatened TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 3 (NM,AZ)
041990	**Black Swift**	Black Swift	Cypseloides niger	Yes		Federal: Migratory Bird Treaty Act Heritage Global: Apparently Secure (G4) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement Neotropical Migrant: All Winter S. of U.S. State NM: Not a Game Species State NM: Provides full protection State NM: Sensitive taxa (informal) State NM: Species of Greatest Conservation Need (SGCN) State UT: Special Concern/Conservation Taxa USFS Sensitive: Region 2 (CO)
040905	**Broad-billed Hummingbird**	Broad-billed Hummingbird	Cynanthus latirostris	Yes		CITES Appendix II (Export Permit Req.) Federal: Migratory Bird Treaty Act Heritage AZ: Vulnerable in AZ (S3) Heritage Global: Apparently Secure (G4) Heritage NM: Critically Imperiled in NM (S1) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Neotropical Migrant: All Winter S. of U.S. See Comments State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened USFS Sensitive: Region 3 (NM,AZ)
040925	**Costa's Hummingbird**	Costa's Hummingbird	Calypte costae	Yes		CITES Appendix II (Export Permit Req.) Federal: Migratory Bird Treaty Act Heritage AZ: Demonstrably Secure in AZ (S5) Heritage Global: Demonstrably Secure

						(G5) Heritage NM: Critically Imperiled in NM (S1) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Neotropical Migrant: All Winter S. of U.S. See Comments State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened USFS Sensitive: Region 3 (NM,AZ)
040521	**Southwestern Willow Flycatcher**	Southwestern Willow Flycatcher	Empidonax traillii extimus	Yes		Federal: Critical Hab. Designated (AZ) Federal: Critical Hab. Designated (NM) Federal: Endangered Federal: Migratory Bird Treaty Act Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global (subspecies): Critically Imperiled (T1) Heritage NM: Critically Imperiled in NM (S1) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement Navajo Tribes: Endangered (G2) Neotropical Migrant: All Winter S. of U.S. State AZ: FORMER STATUS; Endangered State AZ: Species of Special Concern State NM: Endangered State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State UT: Endangered TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
041750	**Loggerhead Shrike**	Loggerhead Shrike	Lanius ludovicianus			BLM Sensitive: NM State Office (NMSO) Federal: Migratory Bird Treaty Act Heritage AZ: Apparently Secure in AZ (S4) Heritage Global: Apparently Secure (G4) Heritage NM: Vulnerable in NM (S3)

						Heritage Ranking: See comments Neotropical Migrant: Some Winter S. of U.S. See Comments State NM: Not a Game Species State NM: Provides full protection State NM: Sensitive taxa (informal) State NM: Species of Greatest Conservation Need (SGCN) State OK: Category 2: Special Concern Species USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
042200	**Gray Vireo**	Gray Vireo	Vireo vicinior	Yes		Federal: Migratory Bird Treaty Act Heritage AZ: Apparently Secure in AZ (S4) Heritage Global: Apparently Secure (G4) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement Neotropical Migrant: All Winter S. of U.S. See Comments State NM: Not a Game Species State NM: Provides full protection State NM: Recovery Plan Approved State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened USFS Sensitive: Region 3 (NM,AZ)
040150	**Gray Catbird**	Gray Catbird	Dumetella carolinensis			Federal: Migratory Bird Treaty Act Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global: Demonstrably Secure (G5) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement Neotropical Migrant: All Winter S. of U.S. See Comments State AZ: FORMER STATUS; Threatened State AZ: Species of Special Concern State NM: Not a Game Species

						State NM: Provides full protection USFS Sensitive: Region 3 (NM,AZ)
041595	**American Redstart**	American Redstart	Setophaga ruticilla	Yes		Federal: Migratory Bird Treaty Act Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement Neotropical Migrant: All Winter S. of U.S. Neotropical Migrant: Winters in mature tropical forests See Comments State AZ: FORMER STATUS; Threatened State AZ: Species of Special Concern State NM: Not a Game Species State NM: Provides full protection USFS Sensitive: Region 3 (NM,AZ)
041785	**Baird's Sparrow**	Baird's Sparrow	Ammodramus bairdii	Yes		BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern (no longer maintained) Federal: Migratory Bird Treaty Act Heritage AZ: Rare/Imperiled in AZ (S2) Heritage Global: Apparently Secure (G4) Heritage NM: Critically Imperiled in NM (S1) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement Neotropical Migrant: All Winter S. of U.S. See Comments State AZ: FORMER STATUS; Threatened State AZ: Species of Special Concern State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) State NM: Threatened USFS Sensitive: Region 3 (NM,AZ)

041070	**Belted Kingfisher**	Belted Kingfisher	Megaceryle alcyon	Yes		Federal: Migratory Bird Treaty Act Heritage AZ: Rare/Imperiled in AZ (S2) Heritage Global: Demonstrably Secure (G5) Heritage NM: Apparently Secure in NM (S4) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program Migratory: Seasonal movement Navajo Tribes: Candidate (G4) Neotropical Migrant: Some Winter S. of U.S. State AZ: FORMER STATUS; Candidate State AZ: Species of Special Concern State NM: Not a Game Species State NM: Provides limited protection TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 3 (NM,AZ)
030056	**Southwestern Fence Lizard**	Southwestern Fence Lizard	Sceloporus cowlesi	Yes		Heritage AZ: Rare/Imperiled in AZ (S2) Heritage Ranking: See comments State NM: Endemic to New Mexico State NM: Not a Game Species State NM: Provides limited protection State NM: Sensitive taxa (informal)
020035	**Northern Leopard Frog**	Northern Leopard Frog	Lithobates pipiens	Yes		Heritage AZ: Rare/Imperiled in AZ (S2) Heritage Global: Demonstrably Secure (G5) Heritage NM: Critically Imperiled in NM (S1) Heritage Ranking: Taxon Tracked by Heritage Program Navajo Tribes: Threatened (G3) State AZ: FORMER STATUS; Candidate State AZ: Species of Special Concern State CO: Special Concern Species State NM: Not a Game Species State NM: Provides limited protection State NM: Species of Greatest Conservation Need (SGCN) TRADITIONAL CULTURAL IMPORTANCE USFS Sensitive: Region 2 (CO)

						USFS Sensitive: Region 3 (NM,AZ)
020060	**Jemez Mtns. Salamander**	Jemez Mtns. Salamander	Plethodon neomexicanus	Yes		BLM Sensitive: NM State Office (NMSO) Federal: Critical Hab. Designated (NM) Federal: Endangered Heritage Global: Rare/Imperiled (G2) Heritage NM: Imperiled in NM (S2) Heritage Ranking: Taxon Tracked by Heritage Program State NM: Endangered State NM: Endemic to New Mexico State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) USFS Sensitive: Region 3 (NM,AZ)
010140	**Rio Grande Chub**	Rio Grande Chub	Gila pandora	Yes		BLM Sensitive: NM State Office (NMSO) Heritage Global: Vulnerable (G3) Heritage NM: Vulnerable in NM (S3) Heritage Ranking: Taxon Tracked by Heritage Program See Comments State CO: Special Concern Species State NM: Not a Game Species State NM: Provides limited protection State NM: Sensitive taxa (informal) State NM: Species of Greatest Conservation Need (SGCN) State TX: State Threatened Species USFS Sensitive: Region 3 (NM,AZ)
010310	**Rio Grande Silvery Minnow**	Rio Grande Silvery Minnow	Hybognathus amarus	Yes		Federal: Conservation Agreement Exists Federal: Critical Hab. Designated (NM) Federal: Endangered Heritage Global: Very Rare/Critically Imperiled (G1) Heritage NM: Critically Imperiled in NM (S1) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program See Comments State NM: Endangered State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN)

						USFS Sensitive: Region 3 (NM,AZ)
010515	**Rio Grande Sucker**	Rio Grande Sucker	Catostomus plebeius	Yes		BLM Sensitive: NM State Office (NMSO) Heritage Global: Vulnerable (G3) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments State CO: Endangered State NM: Not a Game Species State NM: Provides limited protection State NM: Species of Greatest Conservation Need (SGCN) USFS Sensitive: Region 3 (NM,AZ)
010585	**Rio Grande Cutthroat Trout**	Rio Grande Cutthroat Trout	Oncorhynchus clarkii virginalis	Yes		BLM Sensitive: NM State Office (NMSO) Heritage Global (subspecies): Vulnerable (T3) Heritage NM: Imperiled in NM (S2) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program State CO: Special Concern Species State NM: Harvested Fish State NM: Provides full protection State NM: Sensitive taxa (informal) State NM: Species of Greatest Conservation Need (SGCN) USFS Sensitive: Region 2 (CO) USFS Sensitive: Region 3 (NM,AZ)
060200	**Wrinkled Marshsnail**	Wrinkled Marshsnail	Stagnicola caperata	Yes	no photo	Heritage Global: Demonstrably Secure (G5) Heritage NM: Critically Imperiled in NM (S1) Heritage Ranking: Taxon Tracked by Heritage Program State NM: Endangered State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) USFS Sensitive: Region 3 (NM,AZ)
060076	**Socorro Mountainsnail**	Socorro Mountainsnail	Oreohelix neomexicana		no photo	Heritage Global: Rare/Imperiled (G2) Heritage NM: Critically Imperiled in NM (S1) Heritage Ranking: See comments Heritage Ranking: Taxon Tracked by Heritage Program

						State NM: Endemic to New Mexico State NM: Provides limited protection State NM: Sensitive taxa (informal) State NM: Species of Greatest Conservation Need (SGCN)
060040	**Paper Pondshell**	Paper Pondshell	Utterbackia imbecillis	Yes	no photo	Heritage Global: Demonstrably Secure (G5) Heritage NM: Imperiled in NM (S2) Heritage Ranking: Taxon Tracked by Heritage Program State NM: Endangered State NM: Not a Game Species State NM: Provides full protection State NM: Species of Greatest Conservation Need (SGCN) TRADITIONAL CULTURAL IMPORTANCE
215590	**Chuska Mountains Checkerspot Butterfly**	Chuska Mountains Checkerspot Butterfly	Euphydryas anicia chuskae		no photo	Federal: FWS Species of Concern (no longer maintained) Heritage AZ: Unranked (SNR) Heritage AZ: Very Rare/Critically Imperiled in AZ (S1) Heritage NM: Unranked (SNR) Heritage Ranking: See comments

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