PINE - STRAWBERRY ENVIRONMENTAL ASSESSMENT REPORT

ENVIRONMENTAL ASSESSMENT REPORT

September 2020

SEI Project #07485

Prepared for:

PINE - STRAWBERRY WATER IMPROVEMENT DISTRICT
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1.0 INTRODUCTION

Pine – Strawberry Water Improvement District (PSWID) is a non-transient community water system in the northwest region of Gila County, Arizona and provides potable water service to the unincorporated communities of Pine and Strawberry. The District's service area and the communities of Pine and Strawberry are located along Highway 87 (Arizona 260) approximately 16 miles northwest of the Town of Payson. The Pine and Strawberry Water System is located in a portion of Sections 20 through 29, 35, and 36, Township 12 North, Range 8 East and a portion of Sections 19, 30, and 31, Township 12 North, Range 9 East and a portion of Sections 19 and 20, Township 11.5 North, Range 9 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona.

This Environmental Assessment (EA) Report will assess the potential environmental impacts of the water system improvements proposed in PSWID's Preliminary Engineering Report (PER) by EPS Group dated September 2020. PSWID is seeking funding from U.S. Department of Agriculture - Rural Development (USDA - RD) for the proposed projects and this EA is meant to serve as one of the prerequisites for the funding application.

This report is prepared in general accordance with the "Guide for Preparing the Environmental Report for Water and Waste Projects" prepared by the USDA Rural Utilities Service and is based on the procedures of the National Environmental Policy Act (NEPA), as outlined in the Code of Federal Regulations (CFR), Title 40, Parts 6 and 25. See **Figure 1** for the project location and **Appendix A** for the district aerial and proposed water system.

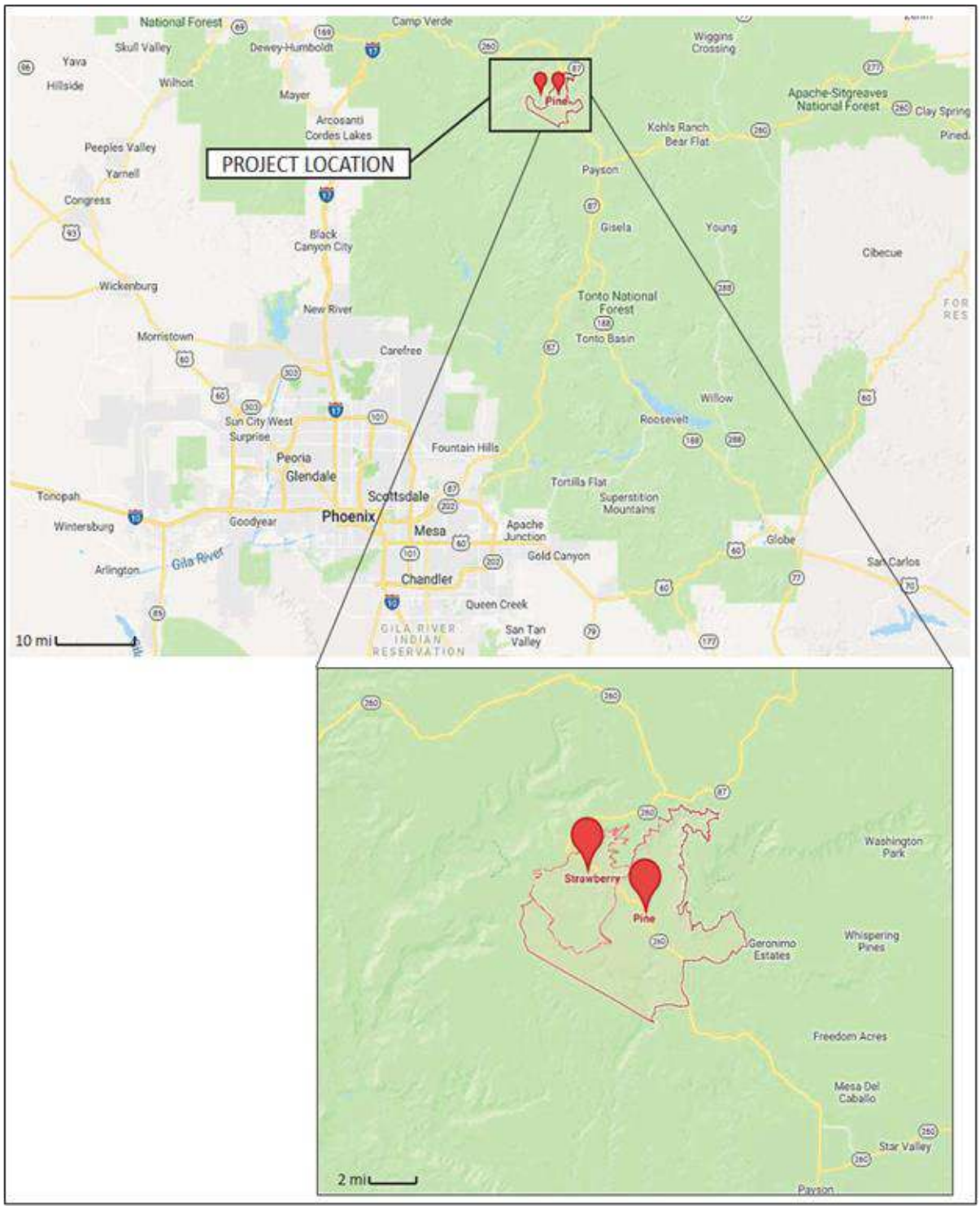

Figure 1 – General Location Map

2.0 PURPOSE AND NEED FOR THE PROJECT

2.1 PROJECT DESCRIPTION

All the projects identified in PSWID's PER are either located on community land or land in private holdings and will not involve any federal lands. After project construction is complete, the disturbed areas will be restored to current conditions or better. PSWID has proposed the following improvements to their water system as depicted in **Figure 2** and **Figure 3**.

Replacing Existing Pipelines

- P1: Strawberry Creek Foothills/Strawberry Pines - 19,358 LF 6" PVC
- P2: RW/MME1/MME2/SMH/Fitz - 27,619 LF 6" PVC
- P3: Strawberry View 3/Shady Lane - 18,851 LF 6" PVC
- P4: Strawberry View 1 & 2 - 19,847 LF 6" PVC
- P5: Portals 1, 2 & 3 - 28,565 LF 6" PVC
- P6: Whispering Pines - 2,245 LF 6" PVC
- P7: Cool Pines Phase A - 4,167 LF 6" PVC
- P8: Woodland Heights Phase A - 3,739 LF 6" PVC
- P9: Woodland Heights Phase B & C - 11,631 LF 6" PVC
- P10: Pine Mountain Acres/Pinion - 1,250 LF 6" PVC
- P11: White Oak/Cedar Meadows - 2,400 LF 6" PVC
- P12: Hidden Pines - 2,400 LF 6" PVC
- P13: Cimmaron Pines - 6,500 LF 6" PVC
- P14: Brookview Terrace 1 & 2 - 7,300 LF 6" PVC
- P15: Strawberry Mountain Shadows 1 & 2/Pine Cove - 25,000 LF 6" PVC
- P16: Strawberry Mountain Shadows 2 Service Corp Stop - 116 LF 6" PVC

Installing New Tank

- P17: Milk Ranch Tank

Administrative Projects

- P18: System Wide SCADA
- P19: System Wide Water Model

Installing New Well

- P20: Strawberry Ranch PZ Deep Well

PINE WATER SYSTEM (PIPES AND VALVES)

A PORTION OF SECTIONS 20 THRU 29, 35, AND 36, TOWNSHIP 12 NORTH, RANGE 8 EAST AND A PORTION OF SECTIONS 19, 30, AND 31, TOWNSHIP 12 NORTH, RANGE 9 EAST AND A PORTION OF SECTIONS 19 AND 20, TOWNSHIP 11.5 NORTH, RANGE 9 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

NORTH
0 500' 1000'
SCALE: 1"=500'

LEGEND

- PHASE 1
- PHASE 2
- PHASE 2.1
- PHASE 2.2
- PHASE 3
- TANK
- WELL
- PRV
- PUMP
- VALVE
- < 2" WATER LINE
- 3" WATER LINE
- 4" WATER LINE
- 6" WATER LINE
- 8" WATER LINE

BROOKVIEW TERRACE 1
P14
CIMMARON PINES
PINE MOUNTAIN ACRES
P10
WHISPERING PINE (2000' - 6")
P6
SCHEDULED HOMESITES
WHITE OAKS GLEN 1
P11
WHITE OAKS GLEN 2
SPRUCE DR WM REPLACEMENT
BROOKVIEW TERRACE 2
PORTAL 3
PORTAL 3 PRV REPLACEMENT
BERRY HILL
PORTAL 1
P5
PORTAL 2
P12
HIDDEN PINES
PINE CREEK EASEMENT (ELLISON TO NORTH RD)
OLD COUNTRY RD & BRADSHAW RD
OLD COUNTRY RD & TORRIES PINES LN
TALL PINES PIPELINE UPGRADE PHASE A (MP)
PINE COVE
P13
STRAWBERRY MOUNTAIN SHADOWS 2
P16
P15
TALL PINES PIPELINE UPGRADE PHASE B & C (McCLENDON EFFECT)
WOODLAND HEIGHTS
STRAWBERRY MOUNTAIN SHADOWS
P8
P9
P7
COOL PINES
STRAWBERRY HOLLOW WM REPLACEMENT
COOL PINES EST PIPE UPGRADE PHASE A :(MP)

SERVICE AREA

(OVER ALL PROJECT AREA)

NORTH

NOT TO SCALE

16-058 - PINE STRAWBERRY WATER IMPROVEMENT DISTRICT - WATER SYSTEM

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PINE STRAWBERRY WATER IMPROVEMENT DISTRICT
WATER SYSTEM - PROPOSED PROJECTS
PINE AND STRAWBERRY, ARIZONA

EXHIBIT 2: CAPITAL IMPROVEMENT PROGRAM

REVISIONS:

CONTACT ARIZONA811 AT LEAST TWO FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
ARIZONA811
CALL 811 OR CLICK ARIZONA811.COM

DESIGNER: EPS
DRAWN BY: EPS

NOT FOR CONSTRUCTION

JOB NO. 16-058
10-6-2017
SHEET NO. 2 OF 2

STRAWBERRY WATER SYSTEM (PIPES AND VALVES)

A PORTION OF SECTIONS 20 THRU 29, 35, AND 36, TOWNSHIP 12 NORTH, RANGE 8 EAST
AND A PORTION OF SECTIONS 19, 30, AND 31, TOWNSHIP 12 NORTH, RANGE 9 EAST AND A
PORTION OF SECTIONS 19 AND 20, TOWNSHIP 11.5 NORTH, RANGE 9 EAST OF THE GILA
AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

LEGEND

- TANK
- WELL
- PRV
- PUMP
- VALVE
- < 2" WATER LINE
- 3" WATER LINE
- 4" WATER LINE
- 6" WATER LINE
- 8" WATER LINE
- PHASE 1
- PHASE 2.2

NORTH
0 500' 1000'
SCALE: 1"=500'

SERVICE AREA

(OVER ALL PROJECT AREA)

NORTH

NOT TO SCALE

STRAWBERRY CREEK FOOTHILLS
STRAWBERRY PINES
STRAWBERRY VIEW 3 (SV3)
RW
MME1
MME2
FITZ
SMH
SHADY LANE ESTATES
STRAWBERRY RANCH 3 (CEDAR AND JUNIPER) PIPELINE UPGRADE (MP)
CIRCLE DRIVE WATERLINE REPLACEMENT
STRAWBERRY VIEW 1 (SV1)
STRAWBERRY VIEW 2 (SV2)
P1
P2
P3
P4
BOUNDARY
STRAWBERRY VALLEY
Strawberry
Creek
BM 5741
(INDEFINITE)

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PINE STRAWBERRY WATER IMPROVEMENT DISTRICT
WATER SYSTEM - PROPOSED PROJECTS
PINE AND STRAWBERRY, ARIZONA

EXHIBIT 1: CAPITAL IMPROVEMENT PROGRAM

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SHEET NO. 1 OF 2

16-058 - PINE STRAWBERRY WATER IMPROVEMENT DISTRICT - WATER SYSTEM

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2.2 PURPOSE AND NEED

As per PSWID'S PER, the overall system losses and unaccounted for water (UFW) amounted to 13.3 percent of the total water produced during April 2018. While the District has made great strides in reducing losses, there is still quite some room for improvements to the existing water system. Some of the factors contributing to deficiencies within the system are:

- The use of Acrylonitrile Butadiene Styrene (ABS) pipe for pressurized distribution system. This pipe material is typically recommended for drain, waste, and vent piping applications.
- The aging infrastructure including wells, pipelines, and other facilities is over 40 years old and is nearing the end of its useful life.
- As demand continues to grow, some of the pipelines are undersized and in need of upgrades.

Implementation of the proposed projects will address the deficiencies noted above to meet the current needs and support projected growth. The proposed projects are necessary to provide residents, businesses, and visitors with a safe and adequate drinking water system.

3.0 ALTERNATIVES CONSIDERED

3.1 NO ACTION

The first alternative is to not undertake any of the proposed projects, thereby avoiding all environmental impacts associated with the construction and operation of the proposed system. However, the advantages that come with upgrading the existing infrastructure outweigh the temporary disturbances to the surrounding environment in the area. The improved water system, if constructed, will prevent the distribution system from further deterioration and prevent any violations of the municipal, state, and federal regulations. The proposed projects will also allow PSWID to increase system capacity and create a sustainable water supply system to cater to the needs of current and future users. Therefore, this alternative does not meet the project objectives and therefore is not acceptable.

3.2 SOURCE WATER

Groundwater is the most viable source of water for PSWID to serve its customers apart from possibly using surface water from the C.C. Cragin Reservoir. Apart from the reservoir, the District does not have access to any surface water sources within a reasonable distance that have enough capacity to meet their demands. While the reservoir does have enough volume of unclaimed water that exceeds the District's current average groundwater production, the existing system is designed to operate from decentralized well sites and booster stations. A previous plan as per the PER explored the option of utilizing the water from the reservoir with entry into the system via a pipeline connecting to the easternmost end of the system on Highway 87. This will require upgrades to the transmission lines and booster stations to transport the water to 27 different service zones as the system is not capable of receiving all the water at one location, thereby further increasing economic and environmental

impacts. Due to the above-mentioned reasons, it was deemed suitable to only consider groundwater sources as a feasible option, including rehabilitating existing wells and drilling new ones as required.

3.3 DISTRIBUTION SYSTEM

As mentioned previously, the District's distribution system is aging and was constructed using pipe materials such as ABS and Polyvinyl Chloride (PVC) that are not intended for use in high-pressure public water systems. There have been reported incidents of pipe failure on a regular basis. During 2017, PSWID recorded a monthly average of more than 10 pipe breaks or leaks in the system. The locations of the deteriorating pipes have been identified by the District staff and were also noted in the 2014 Master Plan as per the PER.

Alternative projects for the distribution system are limited to upgrading sizes and materials of the pipes. However, many homes in Pine and Strawberry remain vacant for extended periods, contributing to low flow conditions. Unnecessarily upsizing pipes in such a scenario can lead to stagnant and stale water issues. Therefore, the District has decided that with the exception of a major deficiency in hydraulics, existing pipes that are six inches or larger in diameter will be replaced with the same size pipes, and smaller pipes will be upsized to six inches minimum.

4.0 AFFECTED ENVIRONMENT

The purpose of this EA was to determine if the proposed projects will have any significant impacts on the environment. To that effect, this section is organized by resource topics, with each resource discussion addressing the existing environmental setting as it relates to the proposed project. The order of the resource topics is in accordance with the "Guide for Preparing the Environmental Report for Water and Waste Projects" prepared by the USDA Rural Utilities Service.

4.1 LAND USE

4.1.1 GENERAL LAND USE

The proposed project will not involve any federal lands. The private land served by PSWID is surrounded by the Tonto National Forest (TNF). Water system improvements or ancillary facilities cannot be sited on national forest lands without prior approval. Most of the land that will be used for the proposed improvements generally consists of existing roads or areas that have been previously disturbed. Construction of the water system improvements is not in conflict with any federal, state, or local law, regulation, or zoning ordinance.

A site visit was conducted on August 12, 2020 to inspect the existing conditions of the project locations and it was concluded that all the projects are located on previously disturbed lands and within the community limits.

Construction of the proposed projects will result in a total surface disturbance of approximately 85 acres. Permanent disturbance of approximately 0.5 acres will occur at the Strawberry Ranch PZ Deep Well site. All other surface disturbances will be temporary. See **Table 1** for soil disturbance calculations. After construction work is complete, the temporarily disturbed surfaces will be restored to the existing contours to the extent practically possible. The impact of the minimal surface disturbance will be less than significant. Based on this analysis, the proposed projects will not significantly impact general land use and therefore no mitigation measures are required.

Project No.	Outer Diameter (OD) (Ft)	Length (LF)	Depth (LF) *	Width (LF) **	Surface (Ac)
P1	0.50	19358.00	5.00	20.50	9.11
P2	0.50	27619.00	5.00	20.50	13.00
P3	0.50	18510.00	5.00	20.50	8.71
P4	0.50	19847.00	5.00	20.50	9.34
P5	0.50	28565.00	5.00	20.50	13.44
P6	0.50	2245.00	5.00	20.50	1.06
P7	0.50	4167.00	5.00	20.50	1.96
P8	0.50	3739.00	5.00	20.50	1.76
P9	0.50	11631.00	5.00	20.50	5.47
P10	0.50	1250.00	5.00	20.50	0.59
P11	0.50	2400.00	5.00	20.50	1.13
P12	0.50	2400.00	5.00	20.50	1.13
P13	0.50	6500.00	5.00	20.50	3.06
P14	0.50	7300.00	5.00	20.50	3.44
P15	0.50	25000.00	5.00	20.50	11.77
P16	0.50	116.00	5.00	20.50	0.05

Table 1 – Soil Disturbance Calculations

*Depth: OD + 4’ Cover + 0.5’ below pipe, **Width: 20’ + OD

4.1.2 IMPORTANT FARMLAND AND PRIME RANGELAND

Prime farmland is land best suited for producing food, feed, forage, fiber, and oilseed crops as delineated by the USDA Natural Resource Conservation Service (NRCS). NRCS was contacted regarding the possible impacts of the proposed projects and the response confirmed that the proposed projects are exempt from National Farmland Protection Policy Act (FPPA). Therefore, they will not impact Prime or Statewide Important Farmlands and there is no need to complete the Farmland Conversion Impact Rating form. Hence, mitigation is not required for important farmland or prime rangeland. Correspondence with NRCS is provided in **Appendix B**.

4.1.3 FORMALLY CLASSIFIED LANDS

Pine and Strawberry are only located on public lands as shown in **Appendix C**. The TNF surrounds the District's service area and contains 4,489 square miles. An Arizona State Park, called Tonto Natural Bridge, is located less than eight miles south of the District on Highway 87.

Many ephemeral rivers and creeks surround the PSWID service area. However, the Verde River and the Salt River flow all year around. The Fossil Creek and East Verde rivers are tributaries of the Verde River and flow approximately 13 miles southwest of the District. The Verde River merges with the Salt River at a location approximately 70 miles south of the District.

The mentioned areas do not cross any of the proposed project locations. Therefore, none of the following Formally Classified Lands will be affected by the proposed projects and subsequently, mitigation is not required for Formally Classified Lands:

- National parks and monuments
- National forests and grasslands
- National natural landmarks
- National battlefield park sites
- National historic sites and parks
- Wilderness areas
- Wild, scenic, and recreational rivers
- Wildlife refuges
- National sea shores, lake shores and trails
- State Parks
- National forests and grasslands

4.2 FLOODPLAINS

Upon investigation of the Federal Emergency Management Agency (FEMA) website, the following Flood Insurance Rate Maps (FIRM) were found for the project locations:

- Pine – 04007C0064D, 04007C0062D, 04007C0202D, and 04007C0063D (FEMA, 2007)
- Strawberry – 04007C0044D, 04007C0045D, 04007C0061D, and 04007C0063D (FEMA, 2007)

While Pine and Strawberry are in Zones A, AE, X, and D, the proposed projects are situated in Zones X and D. These Zones are defined by FEMA as:

- Zone X (shaded) – Moderate risk areas within the 0.2% annual chance floodplain, areas of 1% annual chance flooding where average depths are less than 1 foot, areas of 1% annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from

the 1% annual chance flood by a levee. No Base Flood Elevations (BFE) or Base Flood Depths are shown within these zones.

- Zone D – Areas in which flood hazards are undetermined, but possible.

Some of the projects were identified to be located in a Floodway or crossing one. If a project location is found to be in a floodway or crossing one during the design/construction of the proposed projects, the contractor will perform a scour analysis and encase the pipeline to provide scouring protection. Refer to **Figure 4** and **Appendix D** for FEMA Maps of the area.

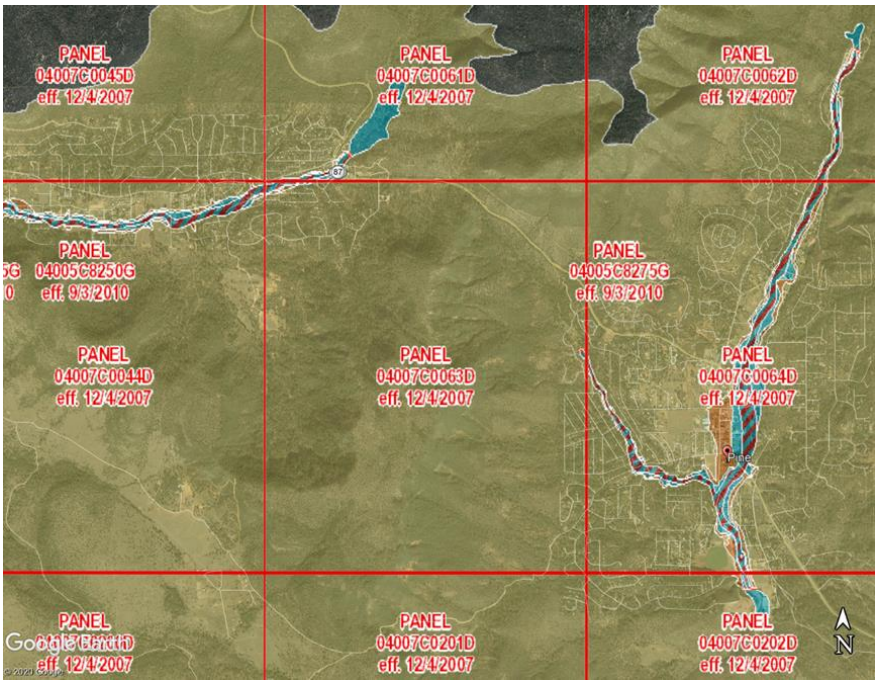


Figure 4 – FEMA Map

4.3 WETLANDS/WATER OF THE U.S.

Wetlands are defined as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3[b], 40 CFR 230.3). For a wetland to qualify as jurisdictional by the U.S. Army Corps of Engineers (USACE) and therefore be subject to regulation under Section 404 of the Clean Water Act, the site must support a prevalence of hydrophytic vegetation, hydric soils, and wetland hydrology. Other waters of the United States are sites that typically lack one or more of the three indicators.

According to NEPAssist (EPA, 2020), there are a few wetlands outside the project locations in Pine and Strawberry such as riverine, and freshwater pond. However, during the site visit conducted on August 12, 2020, wetlands were not observed within the project area. The project areas do not support a prevalence of hydrophytic vegetation either. Since there are no wetlands present in the project area,

there will be no impacts that warrant any mitigation measures. A map showing the wetlands location is provided in **Appendix E**.

4.4 WATER RESOURCES

4.4.1 SURFACE WATER

According to NEPA's website, there are no water features such as water bodies, wild and scenic rivers, and watersheds, going through the project area. Refer to **Appendix F** for more information. Therefore, mitigation measures are not required since surface water will not be impacted.

4.4.2 GROUND WATER

This project does not lie within a sole source aquifer recharge area as designated by the Environmental Protection Agency (EPA) – Region 9. Therefore, the proposed project will not have any impact on sole source aquifers and mitigation measures are not required. See **Appendix F**.

4.5 COASTAL RESOURCES

The project sites are not located in a coastal area. Coastal resources will not be impacted, and therefore mitigation measures will not be required.

4.6 BIOLOGICAL RESOURCES

4.6.1 FEDERALLY LISTED SPECIES

An official list of Federally Listed Threatened (T), Endangered (E), or Candidate (C) Species that that are native to the PSWID service area and the surrounding TNF, was obtained from the PER. Furthermore, U.S. Fish and Wildlife Service (USFWS) was contacted and an Information, Planning, and Consultation (IPaC) report was generated. Maps of Arizona's Species of Greatest Conservation Need (SGCN), Species of Economic Importance (SERI), Amphibians and Birds species were also obtained from the Arizona Game and Fish Department's (AZGFD) Online Environmental Review Tool. The IPaC report, along with the correspondence with USFWS and AZGFD's online list are provided in **Appendix G**.

Since the project locations are far enough from Pine and Fossil Creek, there will be no impacts on any listed or sensitive native fish and Chiricahua Leopard Frogs. Furthermore, AZGFD has advised to cover and/or backfill any trenching associated with the construction activities immediately to avoid any entrapment of wildlife. If these areas cannot be covered, escape ramps or fence can be installed around the site to prevent small mammals and herpetofauna from entering the area. Disturbance should be reseeded with a native, weed-free seed mix, and precautions to wash all equipment is necessary to avert the spread of invasive and

harmful weed species. Pre-construction surveys will inform the best practices and any further precautions required for these species.

TNF was also contacted to inquire about any potential impacts of the proposed projects on their lands as well as biological resources. According to their response, this project does not involve any federal lands, and the only special species adjacent to the TNF are Mexican Spotted Owls whose territories is over 1 mile away from the project area. Thus, there are no concerns or timing restrictions for the PSWID improvements, and no further action is required. Correspondence with TNF is provided in **Appendix G**.

4.6.2 CRITICAL HABITATS

According to USFWS IPaC and NEPAssist websites, there is one critical habitat wholly or partially within Pine and Strawberry. However, according to the exhibit illustrating the critical habitat in **Appendix G** and the project locations provided in **Appendix A,** this critical habitat is outside the project area. Therefore, no mitigation measures are required.

4.7 CULTURAL RESOURCES

Arizona State Museum (ASM) reviewed archaeological project and site records in support of the future improvements proposed by PSWID. Six archaeological sites were identified within a one-mile radius of the Pine and Strawberry. One site is within Strawberry (AZ AA:6:63[ASM]) and two sites are within Pine (AZ AA:6:63[ASM]; AZ O:11:58[ASM]). See **Appendix C** for more details.

4.7.1 RECOMMENDATIONS AND RESPONSIBILITIES

- The Arizona Antiquities Act (AAA; A.R.S. §41-841 et seq.) protects cultural resources and human remains on “lands owned or controlled by the state of Arizona, by any public agency or institution of the state, or by any county or municipal corporation within the state.” Should any of the proposed water improvement projects be conducted on such lands, a qualified archaeological contractor should be consulted before any ground-disturbance begins. A list of archaeological contractors is available on the ASM website.
- Pursuant to Arizona Revised Statute §41-865, if any human remains or funerary objects are discovered on privately owned lands during project work, all work will stop within the area of the remains and Dr. Claire Barker, ASM repatriation coordinator, will be contacted at 520-626-0320.
- City, county, or municipal governments may have additional requirements; therefore, ASM recommends that the relevant jurisdiction(s) be consulted.

As per **Appendix** C, there are no Indian Tribal Communities within or adjacent to the project areas. The nearest Tribe is Tonto Apache Reservation in Payson. Tonto Apache Tribe was still contacted but no response was received.

Furthermore, to address the inadvertent discovery of cultural resources, RD is requiring that the following condition be included in the terms of federal financial assistance and construction contract documents for the proposed project:

Historic Preservation – Any ground disturbance resulting from work performed by, or on behalf of the project owner or contractor(s) that uncovers an apparent or suspected historical or archaeological artifact shall be immediately reported to the Agency. Work in the area of the discovery shall be immediately and temporarily stopped pending the notification process and further directions issued by the Agency after consultation with State Historic Preservation Office (SHPO).

4.8 AESTHETICS

Construction activities and equipment for construction of the tank, well, pipeline installation, and other construction activities may be considered a temporary aesthetic nuisance for a short period of time by local residents. Given the short-term duration of construction activities, this impact is considered minor. This impact will not continue once the construction activities are complete.

Surface disturbance during the construction phase of the proposed projects will temporarily result in increased dust and haze, creating short-term impacts to visual resources. Completion of the proposed projects will ultimately lessen the amount of dust and haze through stabilization of the soil and restoration of plant cover. Re-vegetation, where necessary, and naturalization of the disturbed areas will also reduce the short-term project-related dust and haze over the long term. Therefore, mitigation is not required for the impacts to aesthetics.

4.9 AIR QUALITY

The proposed construction activities will temporarily generate a small amount of fugitive dust from excavation and backfilling activities. The quantities generated by the project will be relatively small and will only affect a localized area for a brief period. Violations of air quality standards will not occur during construction. Therefore, the impact associated with fugitive dust is considered less than significant.

Construction of the proposed projects will not require a permit from ADEQ since the project area is located in an attainment area for Particulate Matter 10 (PM10) micrometers and smaller, Sulfur Dioxide (SO_2), and Ozone (O_3) (ADEQ, 2020, See **Appendix H**).

However, the contractor hired by PSWID must comply with local and state standards for air quality during construction, and will also be required to implement the following environmental protection measures:

- Equipment shall be maintained in accordance with manufacturer's specifications to minimize carbon emissions.
- Heavy equipment shall not be allowed to idle in excess of 5 minutes.

- No ground shall be disturbed when wind speed is in excess of 15 mph due to silty soil conditions and the proximity to adjacent administration areas.
- Disturbed areas shall be treated (sprayed) with water, prior to construction and as needed, during construction to minimize fugitive dust emissions.

4.10 SOCIO-ECONOMIC/ENVIRONMENTAL JUSTICE

United Census Bureau recognizes Pine and Strawberry as Census-Designated Places (CDP). The census population for Pine in 2000 and 2010 was 1,931 and 1,963, respectively. The Arizona Office of Economic Opportunity (AOEO) expects the population to slightly decline to 1,971 by 2025 and to 1,861 by 2050. The census population for Strawberry in 2000 and 2010 was 1,028 and 961, respectively. AOEO expects the population to slightly decline to 965 by 2025 and to 911 by 2050. The information regarding the population density, minority, and low-income population obtained from EPA's Screening and Mapping Tool is provided in **Appendix I**.

According to Council on Environmental Quality (CEQ) guidelines, a minority population exists if the minority population of the affected area is greater than 50% of the affected area's population. Pine and Strawberry are not considered a minority population for this analysis. There will be no disproportionately high and adverse human health and environmental effects on minority and low-income populations as defined by environmental justice policies and directives. The reason for this is that the proposed projects will not involve major facility construction, population relocation, health hazards, hazardous waste, property takings, or substantial economic impacts.

Implementation of the proposed projects will have beneficial socio-economic impacts to the project area. The proposed projects will improve the water supply system to meet both current and future fire suppression, and indoor and outdoor water demand within PSWID's service area. The proposed projects could potentially have a short-term beneficial effect by creating jobs and increasing revenue to local business during the construction phase.

Moreover, all residents in PSWID's service area will be served and pay the same rate structure. All residents who live within the District will be permitted to hook-up to the system LOC. Therefore, the proposed project will not result in any significant adverse impacts associated with socio-economic/environmental justice and mitigation measures will not be required.

4.11 MISCELLANEOUS ISSUES

4.11.1 NOISE

Noise is a fundamental component of the human environment. High noise levels can be detrimental to the health and wellbeing of human and wildlife receptors located near the source of an obtrusive noise. While the physical intensity of a sound can be easily measured, the effect of a sound on a receptor is a complex and intangible value that must consider the combination of its intensity, duration, and time of day. Louder noises are perceived as

acceptable if they last for short periods of time. Noise, which may be acceptable during the day, can be annoying or intolerable during evening or nighttime periods.

Construction of the proposed projects will not generate much noise throughout the process. The noise effect will be short-term and will cease to occur after construction is complete. To minimize the noise impact during the construction phase, the following environmental protection measure, or mitigation measure will be implemented:

- Construction activities for the proposed projects will be mostly limited to normal daylight working hours and exclude holidays to minimize the effects of construction-related noise levels. However, PSWID allows construction during weekends with prior approval. Standard noise control devices will be required on all construction equipment.

4.11.2 TRANSPORTATION

Construction activities may cause temporary road closures. The following environmental protection measure, or mitigation measure will be executed:

- PSWID will require the Contractor to develop a Traffic Control Plan (TCP) for the District's review and approval before beginning construction. The Contractor will be required to follow standard traffic control procedures currently recommended by the Arizona Department of Transportation (ADOT).

The project construction activities will occur in small zones for short periods of time. While the construction activities will slow the traffic flow locally, implementation of the TCP will help reduce traffic accident risks. All the impacts will be local, for short periods of time, and will not continue once the construction activities are complete.

4.12 HUMAN HEALTH AND SAFETY

According to NEPAssist (EPA, 2020), there is no air pollution (ICIS-AIR), water discharges (NPDES), toxic releases (TRI), superfund (NPL), brownfields (ACRES), and Toxic Substances Control Act (TSCA) sites located at any of the proposed construction sites as shown in **Appendix J**.

Trenching and backfilling for pipeline installation, as well as well construction could result in human health and safety issues. To minimize potential issues, the following environmental protection measures will be implemented:

- The construction area will be clearly fenced, marked, or flagged at the outer boundaries to define the limits of construction activities. All construction workers will be instructed that their activities will be confined to locations within the fenced, flagged, or marked areas.
- Excavation of the pipeline trench, including the manner of supporting excavation and provisions for access to the trench, will be in strict compliance with the current provisions for access, as determined by regulations of the Occupational Safety and Health Administration (OSHA). The maximum amount of open trench in any location will be 500 feet or the amount necessary to accommodate the lineal feet of pipe that can be installed in a single day, whichever is greater.

- Local ordinances will be followed as they relate to public safety and could include a notice of closure of use in the area during the construction phase, barricades for open trenches, signing etc. These measures will be implemented on all project lands.

4.13 CORRIDOR ANALYSIS

For the proposed projects, the tank site, well site and the pipelines, construction work will be within local road corridors where Right-of-Way (ROW) will be utilized. The impacts of the implementation of the proposed projects which utilize private lands and existing road ROW, and the required environmental protection measures have been discussed in the previous Sections. Additional environmental protection measures are not required.

4.14 GEOTECHNICAL INVESTIGATION

A geotechnical analysis has not been completed at this time but will be completed as part of the design/construction of the improvement projects. In the absence of a geotechnical analysis, the USDA Natural Resources Conservation Service (NRCS) Soil Survey Tool was used to generate a soil report. The soil report is provided in **Appendix K**.

4.15 STATE ENVIRONMENTAL POLICY ACT

PSWID will obtain relevant ADEQ permits during design/construction of the proposed projects.

4.16 INTERGOVERNMENTAL REVIEW

PSWID will review the EA Report.

4.17 OTHER FEDERAL AGENCIES' REACTION TO PROJECT

This EA was prepared for PSWID. However, the proposed projects will be funded by USDA–RD, which constitutes a federal action. Hence, the proposed projects will need to be reviewed under NEPA and the lead agency for NEPA review is RD.

5.0 SUMMARY OF ENVIRONMENTAL PROTECTION MEASURES

5.1 LAND USE

The proposed project will not involve any federal lands. Therefore, mitigation measures or authorization for pipeline installation are not required.

5.2 FLOODPLAINS

Mitigation measures are not required since the proposed projects are not situated in any floodplains but are instead located in Zones X and D. However, some of the projects were identified to be located in a Floodway or crossing one. If a project location is found to be in a floodway or crossing one during

the design/construction of the proposed projects, the contractor will perform a scour analysis and encase the pipeline to provide scouring protection.

5.3 WETLANDS

Mitigation measures are not required since wetlands are not impacted.

5.4 WATER RESOURCES

Mitigation measures are not required since significant impacts to water resources were not identified.

5.5 COASTAL RESOURCES

Mitigation measures are not required since the project is not located within a coastal area.

5.6 BIOLOGICAL RESOURCES

There will be no impacts to listed or sensitive native fish and Chiricahua Leopard Frogs. The territories of Mexican Spotted Owls are over 1 mile away from the project area. There are no critical habitats in the project areas. Therefore, there are no concerns or timing restrictions for the PSWID improvements, and no further action is required.

5.6.1 RECOMMENDATIONS AND RESPONSIBILITIES

- Cover and/or backfill any trenching associated with the construction activities immediately to avoid any entrapment of wildlife. If these areas cannot be covered, escape ramps or fence can be installed around the site to prevent small mammals and herpetofauna from entering the area.
- Disturbance should be reseeded with a native, weed-free seed mix, and precautions to wash all equipment is necessary to avert the spread of invasive and harmful weed species.
- Pre-construction surveys would inform the best practices and any further precautions required for these species.

5.7 CULTURAL RESOURCES

5.7.1 RECOMMENDATIONS AND RESPONSIBILITIES

- The Arizona Antiquities Act (AAA; A.R.S. §41-841 et seq.) protects cultural resources and human remains on “lands owned or controlled by the state of Arizona, by any public agency or institution of the state, or by any county or municipal corporation within the state.” Should any of the proposed water improvement projects be conducted on such lands, a qualified archaeological contractor be consulted before any ground-disturbance begins. A list of archaeological contractors is available on the ASM website.
- Pursuant to Arizona Revised Statute §41-865, if any human remains or funerary objects are discovered on privately-owned lands during project work, all work will stop within the

area of the remains and Dr. Claire Barker, ASM repatriation coordinator, will be contacted at 520-626-0320.

- City, county, or municipal governments may have additional requirements; therefore, ASM recommends that the relevant jurisdiction(s) be consulted.
- Historic Preservation – Any ground disturbance resulting from work performed by, or on behalf of the project owner or contractor(s) that uncovers an apparent or suspected historical or archaeological artifact shall be immediately reported to the Agency. Work in the area of the discovery shall be immediately and temporarily stopped pending the notification process and further directions issued by the Agency after consultation with SHPO.

5.8 AESTHETICS

Mitigation measures are not required since no potential impacts were identified.

5.9 AIR QUALITY

5.9.1 RECOMMENDATIONS AND RESPONSIBILITIES

- Equipment shall be maintained in accordance with manufacturer's specifications to minimize carbon emissions.
- Heavy equipment shall not be allowed to idle in excess of 5 minutes.
- No ground shall be disturbed when wind speed is in excess of 15 mph due to silty soil conditions and the proximity to adjacent administration areas.
- Disturbed areas shall be treated (sprayed) with water, prior to construction and as needed, during construction to minimize fugitive dust emissions.

5.10 SOCIO-ECONOMIC/ENVIRONMENTAL JUSTICE

Mitigation measures are not required since potential impacts were not identified.

5.11 MISCELLANEOUS ISSUES

5.11.1 NOISE

- Construction activities for the proposed projects will be limited to normal daylight working hours and exclude weekends and holidays to minimize the effects of construction-related noise levels. Standard noise control devices will be required on all construction equipment. However, PSWID allows construction during weekends with prior approval. Standard noise control devices will be required on all construction equipment.

5.11.2 TRANSPORTATION

- PSWID will require the Contractor to develop a TCP for the District's review and approval before beginning construction. The Contractor will be required to follow standard traffic control procedures currently recommended by ADOT.

5.12 HUMAN HEALTH AND SAFETY

5.12.1 RECOMMENDATIONS AND RESPONSIBILITIES

- The construction area will be clearly fenced, marked, or flagged at the outer boundaries to define the limits of construction activities. All construction workers will be instructed that their activities will be confined to locations within the fenced, flagged, or marked areas.
- Excavation of the pipeline trench, including the manner of supporting excavation and provisions for access to the trench, will be in strict compliance with the current provisions for access, as determined by regulations of the OSHA. The maximum amount of open trench in any location will be 500 feet or the amount necessary to accommodate the lineal feet of pipe that can be installed in a single day, whichever is greater.
- Local ordinances will be followed as they relate to public safety and could include a notice of closure of use in the area during the construction phase, barricades for open trenches, signing, etc. These measures will be implemented on all project lands.

5.13 CORRIDOR ANALYSIS

Environmental protection measures are not required.

6.0 CUMULATIVE IMPACTS

Cumulative impacts are those effects to the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Past actions in and around the project area include farming, road improvements, water and wastewater system improvements, and residential and commercial development. Present activities include farming, road improvements, pipeline installation and residential development. Reasonably foreseeable future actions include farming, road improvements, water and wastewater improvements, residential and industrial development, and increased urbanization. Growth associated with community development will continue, thereby potentially impacting the small portion of open undeveloped land within the project area. Past and future impacts to the environment, when added to the potential impacts of implementing the proposed action, will be insignificant within the project area.

The project construction activities will not take place in all project areas at the same time but will instead be concentrated in small zones for short periods of time. Hence, the construction activities will disrupt economic activities due to inconvenient access to commercial areas and road-side parking conflicts. The construction activities will also slow the traffic flow locally, potentially resulting in traffic

accidents. The implementation of a TCP will help reduce traffic accident risks. All the impacts will be local, for a short period of time, and will no longer occur once the construction activities are complete. Therefore, this localized short-term impact will not have any significant cumulative impacts.

7.0 PUBLIC INVOLVEMENT

This EA will be listed for Public Comments on the PSWID website through an online advertisement for 20 days. All aspects of the proposed projects and associated issues will be presented, discussed, and voted on by the District during the Board meeting on 10-22-2020 to address public concerns. Due to COVID19 and social distancing guidelines, a public hearing will not be possible at this time.

8.0 CONSULTATION AND COORDINATION

8.1 LIST OF PREPARERS AND REVIEWERS

- Pine - Strawberry Water Improvement District
    - Cato Esquivel – District Manager
    - Sharon Hillman – Treasurer
- U.S. Department of Agriculture – Rural Development
    - Loretta Miller – Program Specialist
- Sunrise Engineering
    - Gregory Potter, PE – Project Principal
    - Siddharth Mazumdar, EIT – Project Manager
    - Sepideh Hakim Elahi, EIT – Engineer-In-Training

8.2 GROUPS AND AGENCIES CONSULTED

- U.S. Fish and Wildlife Services
- U.S. Department of Agriculture Natural Resources Conservation Services
- Arizona State Museum
- Arizona Game and Fish Department
- U.S. Army Corps of Engineers
- Tonto National Forest
- Tonto Apache Tribe

9.0 REFERENCES

- Preliminary Engineering Report for Water Distribution System Improvements for Pine – Strawberry. Prepared by EPS Group - April 2019.

- U.S. Fish and Wildlife Service IPaC Resource List: Find Location. Create Project. Available at https://ecos.fws.gov/ipac/location/index. Accessed on August 5, 2020.

- USDA Natural Resources Conservation Service Web Soil Survey: Search by Address. Available at https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed on July 22, 2020.

- Arizona Game and Fish Department Online Environmental Review Tool: Search by Address. Available at http://ert.azgfd.gov/content/map. Accessed on August 17, 2020.

- Federal Emergency Management Agency. 2020. FEMA Flood Map Service Center: Search by Address. Available at https://msc.fema.gov/portal/search?AddressQuery=pine%2C%20az#searchresultsanchor. Accessed on July 22, 2020.

- U.S. Environmental Protection Agency - Pacific Southwest, Region 9 - Sole Source Aquifer Designation. Available at https://archive.epa.gov/region9/water/archive/web/html/ssa.html. Accessed on July 22, 2020.

- Arizona Division of Air Quality. 2020. Available at https://adeq.maps.arcgis.com/apps/webappviewer/index.html?id=001f08fef6584b66b48ef256b0e84c8b. Accessed on July 22, 2020.

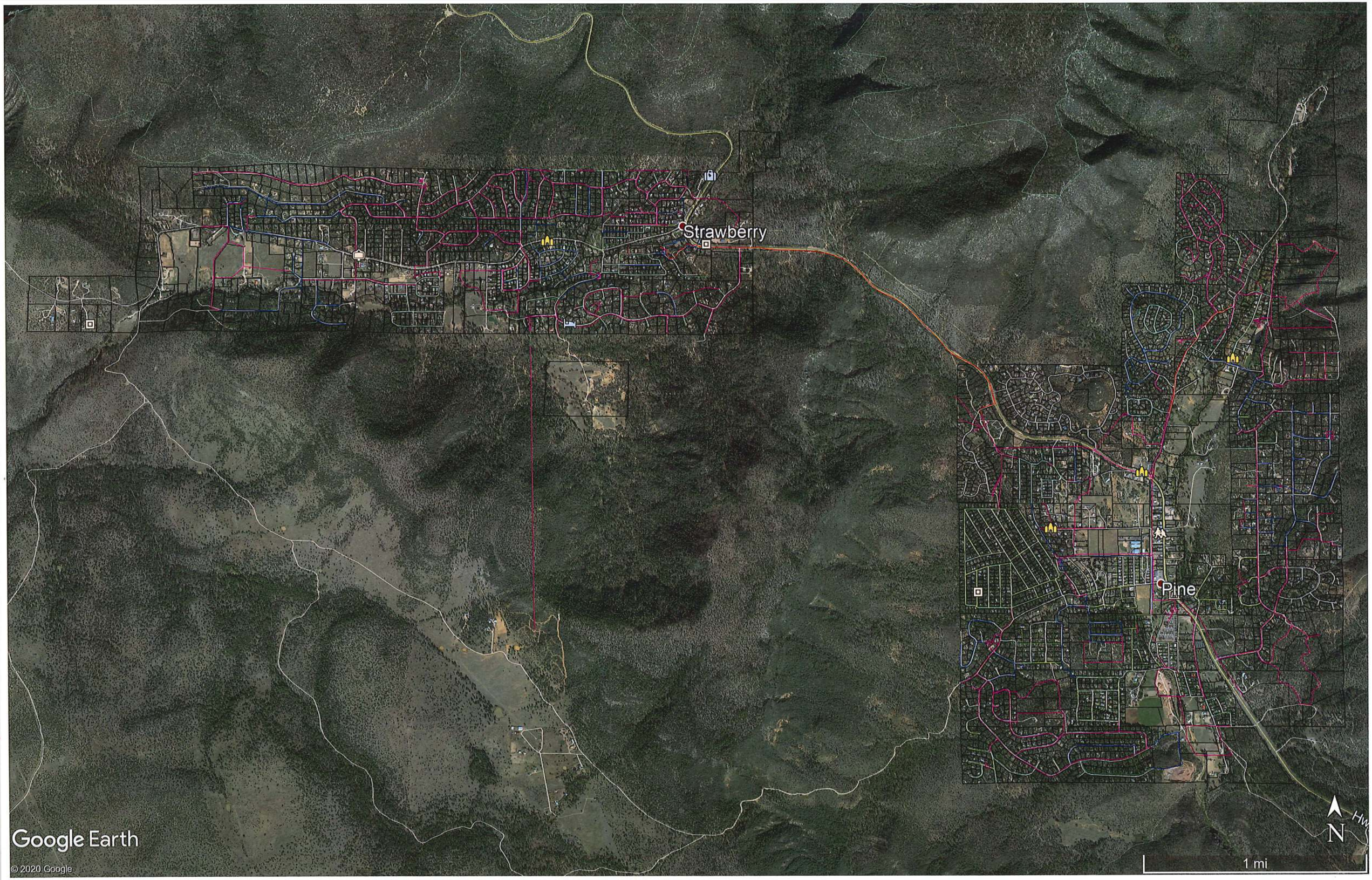
- U.S. Environmental Protection. 2020. NEPAssit. Available at https://nepassisttool.epa.gov/nepassist/nepamap.aspx?wherestr=pine%2C+arizona. Accessed on July & August 2020.

- EPA's Environmental Justice Screening and Mapping Tool (Version 2019). Population data - https://www.epa.gov/environmentaljustice. Accessed on August 17, 2020.

APPENDICES

APPENDIX A

District Aerial & Proposed Water System


Strawberry
Pine
Google Earth
© 2020 Google
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PINE WATER SYSTEM (PIPES AND VALVES)

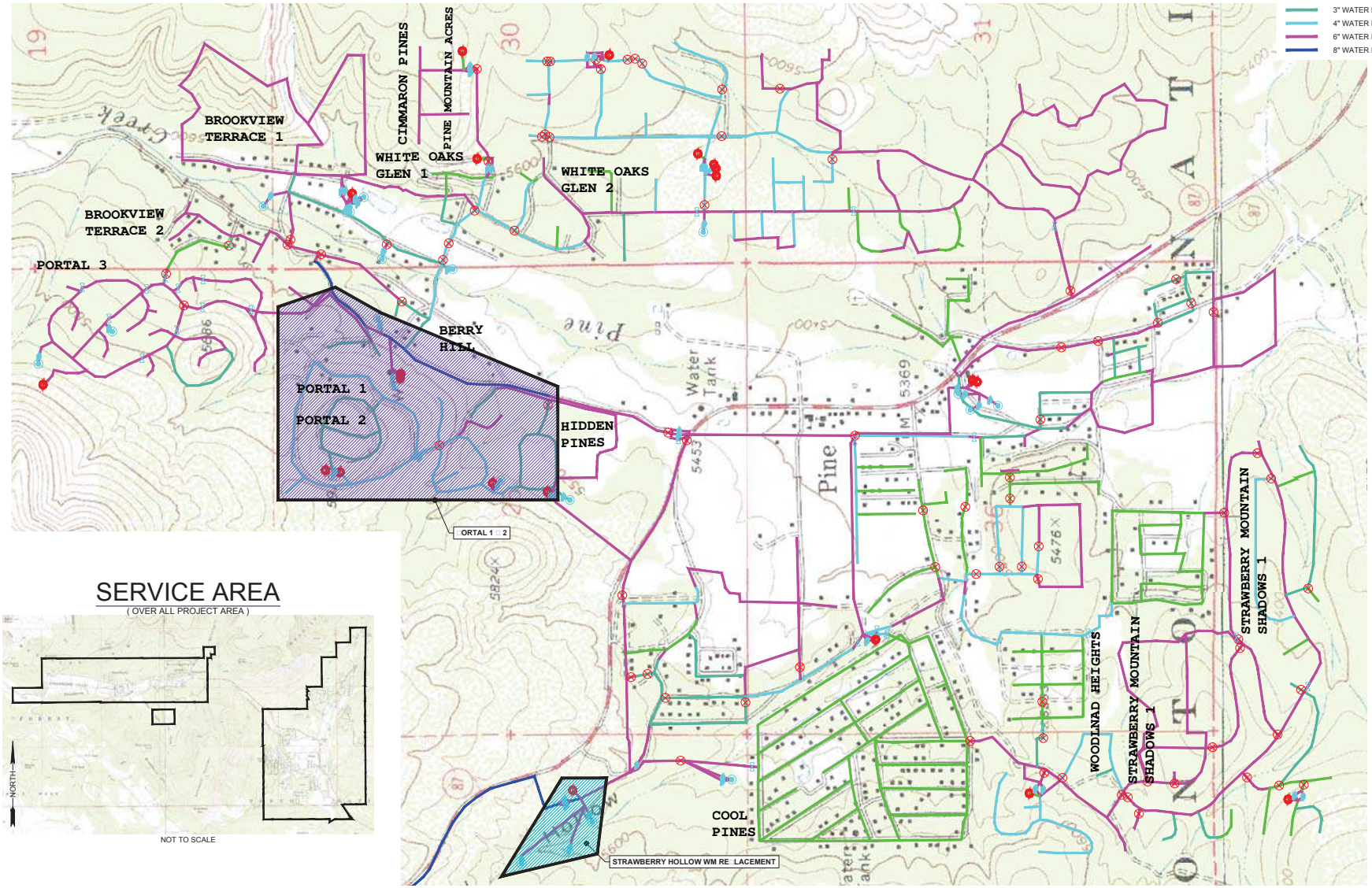
A PORTION OF SECTIONS 20 THRU 29, 35, AND 36, TOWNSHIP 12 NORTH, RANGE 8 EAST AND A PORTION OF SECTIONS 19, 30, AND 31, TOWNSHIP 12 NORTH, RANGE 9 EAST AND A PORTION OF SECTIONS 19 AND 20, TOWNSHIP 11.5 NORTH, RANGE 9 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

NORTH
0 500' 1000'
SCALE: 1"=500'

LEGEND

RURAL DEVELOPMENT FUNDED PROJECT

TANK
WELL
PRV
PUMP
VALVE
< 2" WATER LINE
3" WATER LINE
4" WATER LINE
6" WATER LINE
8" WATER LINE



SERVICE AREA

(OVER ALL PROJECT AREA)

NOT TO SCALE

16-058 - PINE STRAWBERRY WATER IMPROVEMENT DISTRICT - WATER SYSTEM

Apr 15, 2019 4:02pm V:\CAD\Pine Strawberry\16-058 Water System Map\Production Drawings\Proposed\PSWID Proposed Projects Pipes-Valves Exhibit.dwg

dsuarte

EPS GROUP
125 S. Arizona Blvd., Suite 115
Avondale, AZ 85323
T: 623.547.4661 | F: 623.547.4662
www.epsgroupinc.com

PINE STRAWBERRY WATER IMPROVEMENT DISTRICT
WATER SYSTEM - PROPOSED PROJECTS
PINE AND STRAWBERRY, ARIZONA

EXHIBIT 2: CAPITAL IMPROVEMENT PROGRAM

REVISIONS:

DESIGNER: EPS
DRAWN BY: EPS

NOT FOR CONSTRUCTION

JOB NO. 16-058
04-15-2019
SHEET NO. 2 OF 2

FIGURE 4.3

PINE WATER SYSTEM (WELLS)

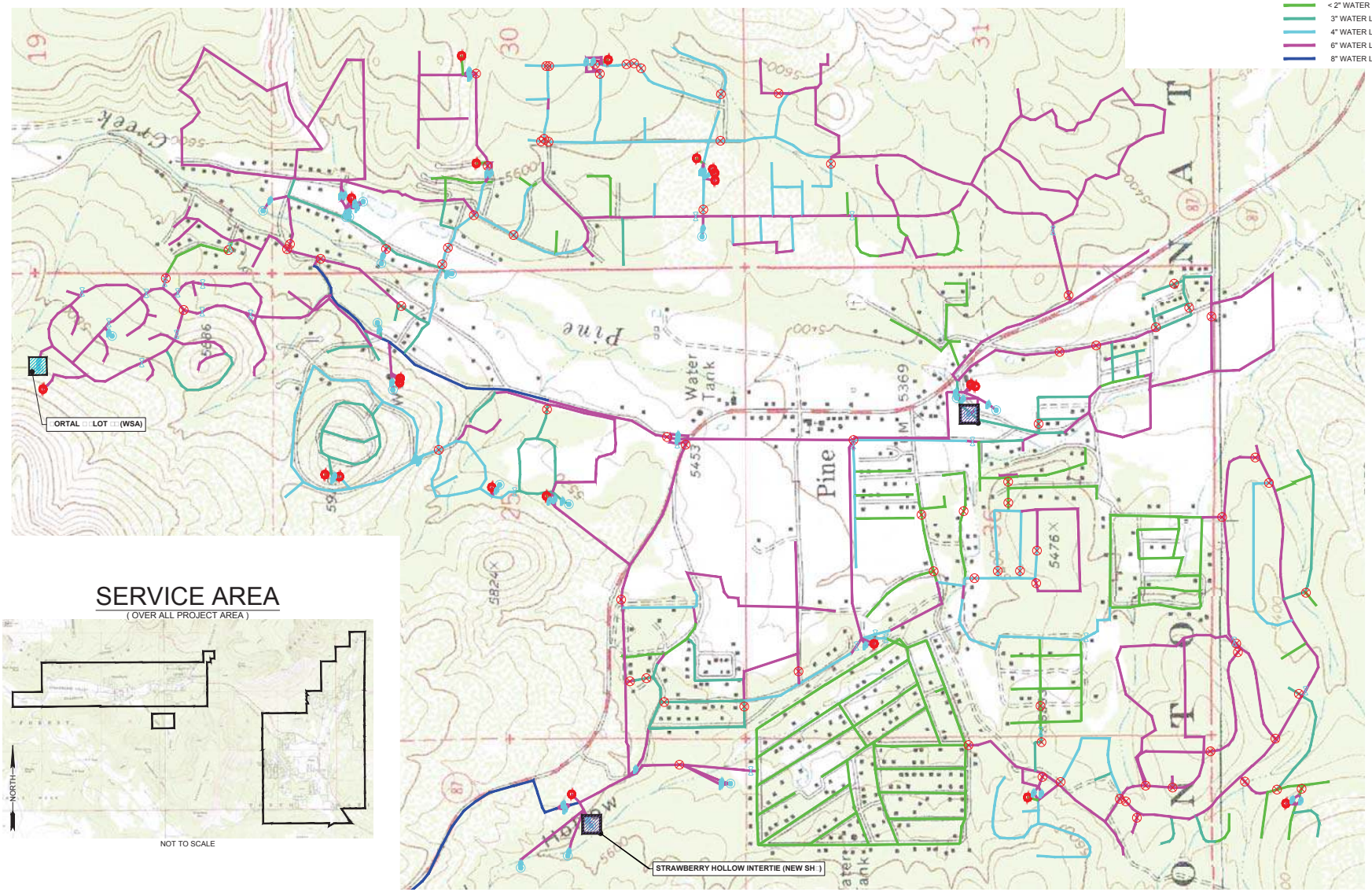
A PORTION OF SECTIONS 20 THRU 29, 35, AND 36, TOWNSHIP 12 NORTH, RANGE 8 EAST AND A PORTION OF SECTIONS 19, 30, AND 31, TOWNSHIP 12 NORTH, RANGE 9 EAST AND A PORTION OF SECTIONS 19 AND 20, TOWNSHIP 11.5 NORTH, RANGE 9 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

NORTH
0 500' 1000'
SCALE: 1"=500'

LEGEND

RURAL DEVELOPMENT FUNDED PROJECT

- TANK
- WELL
- PRV
- PUMP
- VALVE
- < 2" WATER LINE
- 3" WATER LINE
- 4" WATER LINE
- 6" WATER LINE
- 8" WATER LINE



SERVICE AREA

(OVER ALL PROJECT AREA)

NOT TO SCALE

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PINE STRAWBERRY WATER IMPROVEMENT DISTRICT
WATER SYSTEM - PROPOSED PROJECTS
PINE AND STRAWBERRY, ARIZONA

EXHIBIT 2: CAPITAL IMPROVEMENT PROGRAM

REVISIONS:

DESIGNER: EPS
DRAWN BY: EPS

NOT FOR CONSTRUCTION

JOB NO. 16-058
04-15-2019
SHEET NO. 2 OF 2

16-058 - PINE STRAWBERRY WATER IMPROVEMENT DISTRICT - WATER SYSTEM

tlequis Apr 23, 2019 3:42pm V:\CAD\Pine Strawberry\16-058 Water System Map\Production Drawings\Proposed\PSWID Proposed Projects Wells Exhibit.dwg

FIGURE 4.1

STRAWBERRY WATER SYSTEM (PIPES AND VALVES)

A PORTION OF SECTIONS 20 THRU 29, 35, AND 36, TOWNSHIP 12 NORTH, RANGE 8 EAST AND A PORTION OF SECTIONS 19, 30, AND 31, TOWNSHIP 12 NORTH, RANGE 9 EAST AND A PORTION OF SECTIONS 19 AND 20, TOWNSHIP 11.5 NORTH, RANGE 9 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

LEGEND

- TANK
- WELL
- PRV
- PUMP
- VALVE
- < 2" WATER LINE
- 3" WATER LINE
- 4" WATER LINE
- 6" WATER LINE
- 8" WATER LINE
- RURAL DEVELOPMENT FUNDED PROJECT

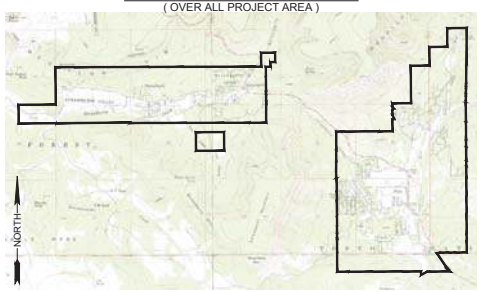
NORTH

0 500' 1000'

SCALE: 1"=500'

SERVICE AREA

(OVER ALL PROJECT AREA)



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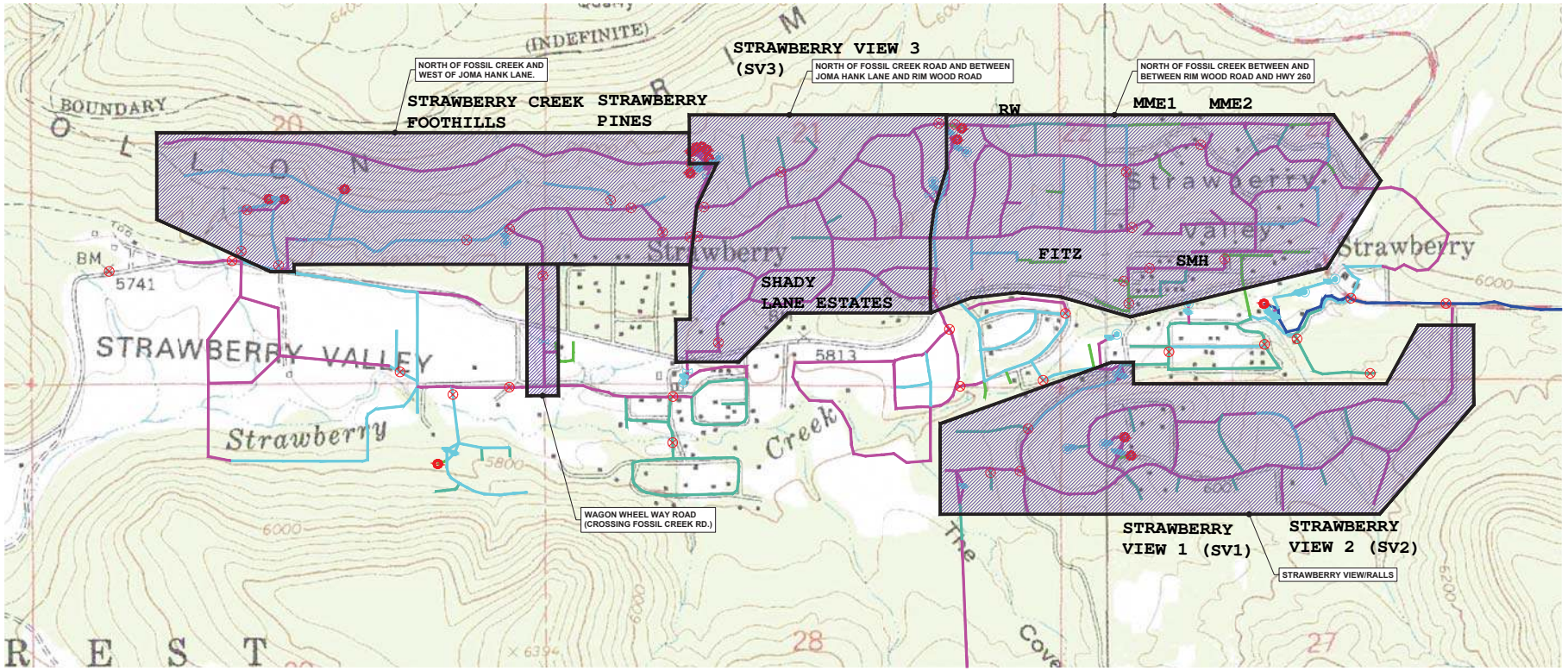

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PINE STRAWBERRY WATER IMPROVEMENT DISTRICT
WATER SYSTEM - PROPOSED PROJECTS
PINE AND STRAWBERRY, ARIZONA

EXHIBIT 1: CAPITAL IMPROVEMENT PROGRAM

REVISIONS:

DESIGNER: EPS
DRAWN BY: EPS

NOT FOR CONSTRUCTION

JOB NO. 16-058
04-15-2019
SHEET NO. 1 OF 2

16-058 - PINE STRAWBERRY WATER IMPROVEMENT DISTRICT - WATER SYSTEM

dduarte Apr 15, 2019 4:17pm V:\CAD\Pine Strawberry\16-058 Water System Map\Production Drawings\Proposed\PSWID Proposed Projects Pipes-Valves Exhibit.dwg

FIGURE 4.4

STRAWBERRY WATER SYSTEM (WELLS)

A PORTION OF SECTIONS 20 THRU 29, 35, AND 36, TOWNSHIP 12 NORTH, RANGE 8 EAST AND A PORTION OF SECTIONS 19, 30, AND 31, TOWNSHIP 12 NORTH, RANGE 9 EAST AND A PORTION OF SECTIONS 19 AND 20, TOWNSHIP 11.5 NORTH, RANGE 9 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

LEGEND

- TANK
- WELL
- PRV
- PUMP
- VALVE
- < 2" WATER LINE
- 3" WATER LINE
- 4" WATER LINE
- 6" WATER LINE
- 8" WATER LINE
- RURAL DEVELOPMENT FUNDED PROJECT

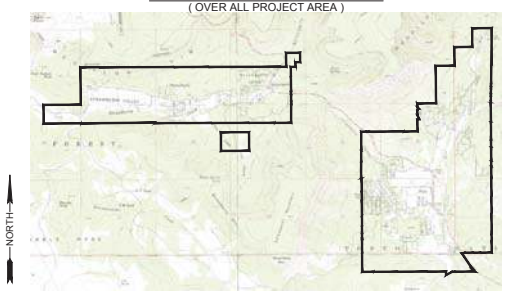
NORTH

0 500' 1000'

SCALE: 1"=500'

SERVICE AREA

(OVER ALL PROJECT AREA)



NORTH

NOT TO SCALE

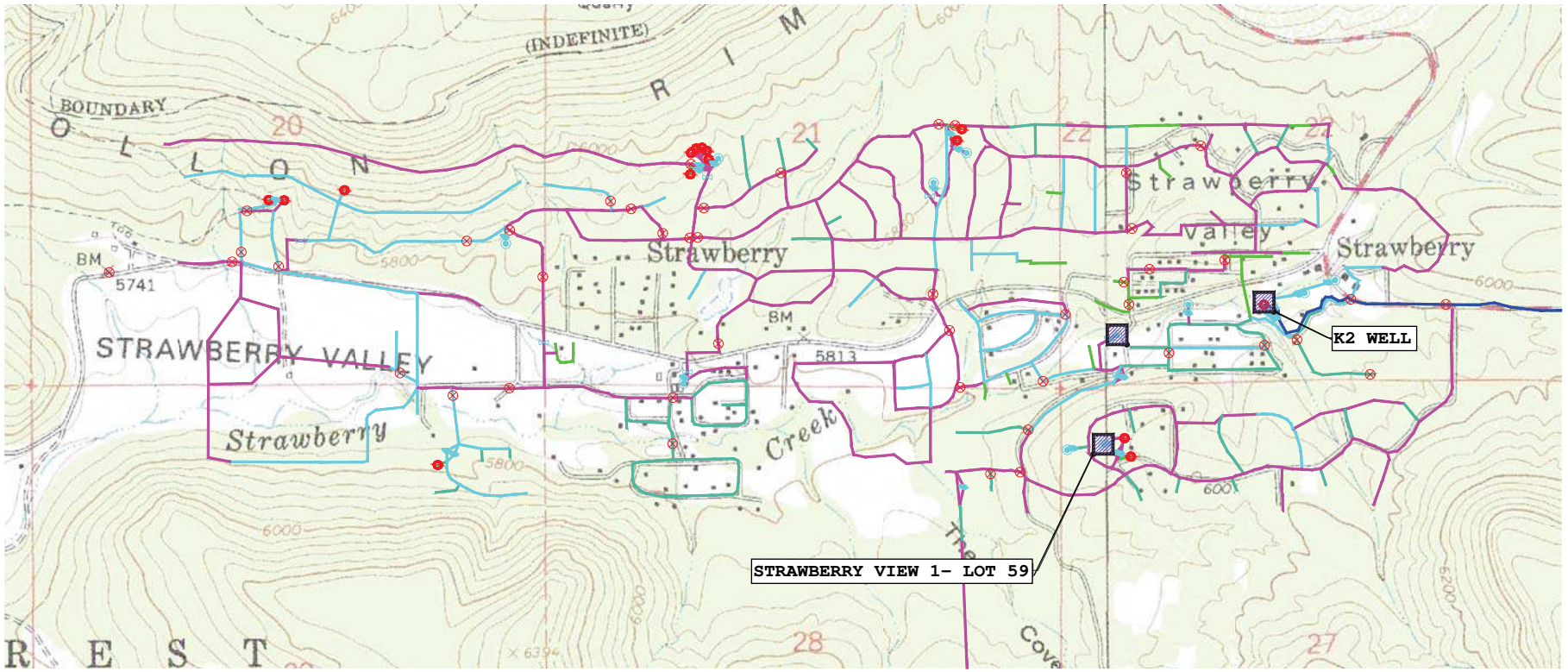


FIGURE 4.2

16-058 - PINE STRAWBERRY WATER IMPROVEMENT DISTRICT - WATER SYSTEM

Apr 15, 2019 3:10pm V:\CAD\Pine Strawberry\16-058 Water System Map\Production Drawings\Proposed\PSWID Proposed Projects Wells Exhibit.dwg

Iduarte

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PINE STRAWBERRY WATER IMPROVEMENT DISTRICT
WATER SYSTEM - PROPOSED PROJECTS
PINE AND STRAWBERRY, ARIZONA

EXHIBIT 1: CAPITAL IMPROVEMENT PROGRAM

REVISIONS:

DESIGNER: EPS
DRAWN BY: EPS

NOT FOR CONSTRUCTION

JOB NO. 16-058

04-15-2019

SHEET NO. 1 OF 2

APPENDIX B

Correspondence with NRCS

United States Department of Agriculture

Mr. Siddharth Mazumdar
Sunrise Engineering, Inc.
2045 S Vineyard, Suite 101
Mesa, AZ 85210

Date: August 13, 2020

Dear Mr. Siddharth Mazumdar:

The Natural Resources Conservation Service (NRCS) has reviewed your letter dated August 5, 2020, and acknowledge your request to determine whether your project has potential for environmental impacts that affect farmland as defined in Sec. (658.2 a) of the Code of Federal Regulations (CFR) dealing with the Farmland Protection Policy Act (FPPA).
The NRCS acts as the national Farmland Protection Policy Act (FPPA) steward in reviewing and documenting conversion of farmland (i.e., Prime, Statewide Importance, and /or Local Importance) to non-agricultural use when the project utilizes federal funds.

After reviewing your project proposal for Proposed Water Distribution Improvements, the following is noted:

The proposed project is exempt in FPPA; therefore, no further action is needed.
The project will not impact any NRCS leases or conservation practices.

If you have any questions, please contact me contact me at (602)-280-8817 or via email at DAndre.Yancey@az.usda.gov

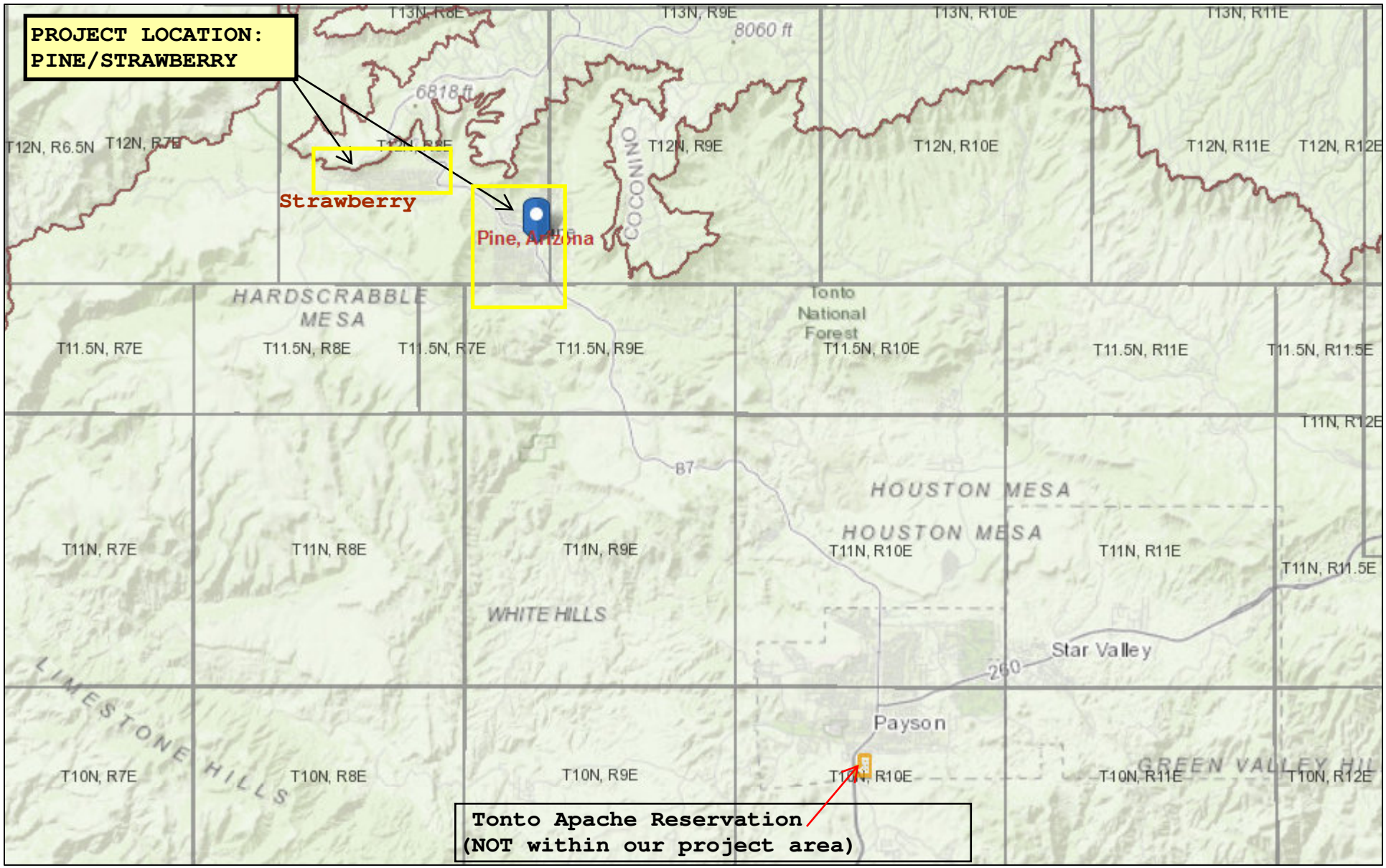
Sincerely,

D'ANDRE YANCEY
State Soil Scientist

APPENDIX C

Cultural Resources

Tribal Lands



August 6, 2020

- Tribal Lands
- Counties
- Townships

1:233,524

0 2 4 8 mi

0 3 6 12 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Land Ownership Map

GILA COUNTY SURFACE MANAGEMENT RESPONSIBILITY

Arizona State Land Department / U.S. Bureau of Land Management

State and Federal Government Working Together

PROJECT LOCATION: PINE/STRAWBERRY

Arizona State Land Department
1616 W Adams Street Phoenix, AZ 85007

Miles
0 1.25 2.5 5 7.5 10

Kilometers
0 2.5 5 10 15 20

1:300,000
1 in = 5 miles

Datum & Projection:
North American Datum 1983 HARN
Universal Transverse Mercator Zone 12 North
UTM Eastings and Northings (meters) in blue

The Arizona State Land Department and the U.S. Bureau of Land Management make no warranties, expressed or implied, with respect to the information shown on the map.

Roads indicated on this map are not designated for OHV travel.

ALRIS INDEX

MAP LOCATOR

LEGEND

Public Land Ownership

- State Trust
- B. L. M.
- US Forest Service
- National Park Service
- Fish and Wildlife Service
- Indian Reservations
- Military
- State Parks
- City or County Parks
- Private
- Other
- BLM National Monuments
- Wilderness Areas
- Cities
- Township Lines
- Section Lines
- Counties

Transportation

- Interstates
- US Highways
- Highways
- Arterials
- Railroads
- Powerlines
- Summits
- Arizona Cities
- ALRIS Tile Corners

Hydrology

- Intermittent Streams
- Perennial Streams
- Canals
- Rivers
- Ephemeral
- Lakes
- CAP Canal

PRINT DATE April, 2016

THE UNIVERSITY OF ARIZONA
ARIZONA STATE MUSEUM

Arizona State Museum
PO Box 210026
Tucson AZ 85721-0026
(520) 621-6281
www.statemuseum.arizona.edu

30 April 2020

Sharon Hillman
Pine-Strawberry Water Improvement District
P.O. Box 134
Pine, AZ 85544

RE: Project: replacement of various waterlines, well rehabilitations, installation of SCADA system, and an updated water model report

Dear Sharon,

Arizona State Museum (ASM) has reviewed archaeological project and site records in support of future replacement and improvement projects by Pine-Strawberry Water Improvement District. Correspondence indicates these projects will involve replacement of various waterlines; well rehabilitations; installation of a SCADA system and; an updated water model report. The project areas are located within Strawberry and Pine, Gila County, Arizona. The area investigated falls within Township 12 North, Range 08 East, Sections 21, 22, 25, 26, 35 and 36. Below are the results of ASM's research.

Search Results:

According to a search of the archaeological site files and records retained at ASM, four archaeological survey projects were conducted within a one-mile radius of the project areas between 1998 and 2014. Previous survey work was conducted in support of pullout lane extensions; road maintenance; tower construction; and pedestrian rest shelters. One survey crossed into both Strawberry and Pine (ASM Accession No. 2014-343). This project was conducted by Logan Simpson Design in support of the construction of 11 pedestrian shelters along SR 87 within and near Pine and Strawberry (Davis 2014). Two additional surveys crossed only into the Town of Pine (ASM Accession Numbers 1998-588; 2000-519). 1998-588 was conducted by Archaeological Research Services in support of the maintenance of SR 87 (Hathaway 1999). 2000-519 was conducted by SWCA in support of a proposed tower (Douglas et al. 2000).

Six archaeological sites have been identified within a one-mile radius of the two towns. One site is within Strawberry (AZ AA:6:63[ASM]) and two sites are within Pine (AZ AA:6:63[ASM]; AZ O:11:58[ASM]).

Recommendations and Responsibilities:

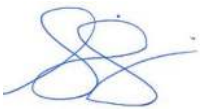
1. The Arizona Antiquities Act (AAA; A.R.S. §41-841 *et seq.*) protects cultural resources and human remains on "lands owned or controlled by the state of Arizona, by any public agency or institution of the state, or by any county or municipal corporation within the state." Should any of the proposed water improvement projects be conducted on such lands, a qualified archaeological contractor be consulted before any ground-disturbance begins. A list of archaeological contractors is available on the ASM website at: https://statemuseum.arizona.edu/crm

2. Pursuant to Arizona Revised Statute §41-865, if any human remains or funerary objects are discovered on privately-owned lands during project work, all work will stop within the area of the remains and Dr. Claire Barker, ASM repatriation coordinator, will be contacted at 520-626-0320.

3. City, county, or municipal governments may have additional requirements; therefore, ASM recommends that the relevant jurisdiction(s) be consulted.

If you have any questions about the results of this records search, please feel free to contact me twilling@email.arizona.edu or 520-621-4795.

Sincerely,



Shannon Twilling, M.A.
Arizona Antiquities Act Administrator
Arizona State Museum

References:

Davis, Erin
2014 *A Class III Cultural Resources survey of 0.63 Acre for 11 Pedestrian Shelters, In Pine and Strawberry, Gila County, Arizona*. Logan Simpson Design, Inc., Tempe, Arizona.

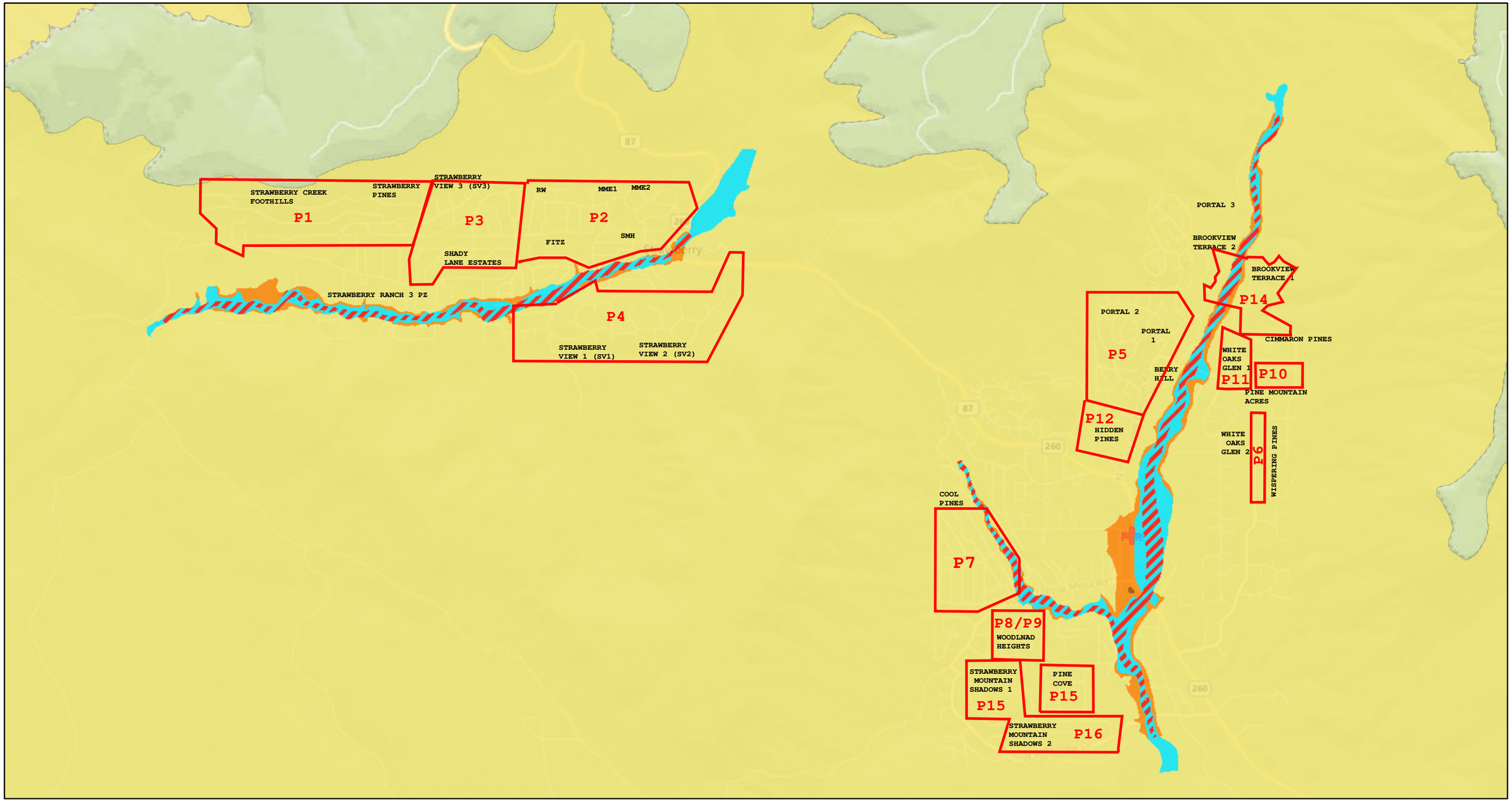
Hathaway, Jeffrey B.
1999 *Cultural resources surveys of four segments of State Route 87 (between mileposts 226 to 228.7 and mileposts 254.5 to 277.1) in the vicinity of Payson, Pine, and Strawberry, Tonto National Forest (Mesa and Payson Ranger Districts) and Coconino National Forest (Long Valley Ranger District), in Gila and Coconino Counties, Arizona*. Archaeological Research Services, Inc., Tempe, Arizona.

Mitchell, Douglas R., Michael Rizo, Ron F. Ryden
2000 *Archaeological survey of a proposed tower site, Pine, Gila County, Arizona*. SWCA Cultural Resource Report no. 00-258. SWCA Environmental Consultants, Phoenix, Arizona.

APPENDIX D

FEMA Maps

PINE/STRAWBERRY - FLOOD ZONES



July 22, 2020

Project 1

Flood Hazard Zones

1% Annual Chance Flood Hazard

Regulatory Floodway

Special Floodway

Area of Undetermined Flood Hazard

0.2% Annual Chance Flood Hazard

Future Conditions 1% Annual Chance Flood Hazard

Area with Reduced Risk Due to Levee

Search Result (point)

1:35,000

0 0.35 0.7 1.4 mi

0 0.5 1 2 km

FEMA MAPS - PINE

NOTES TO USERS

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Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

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Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

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National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

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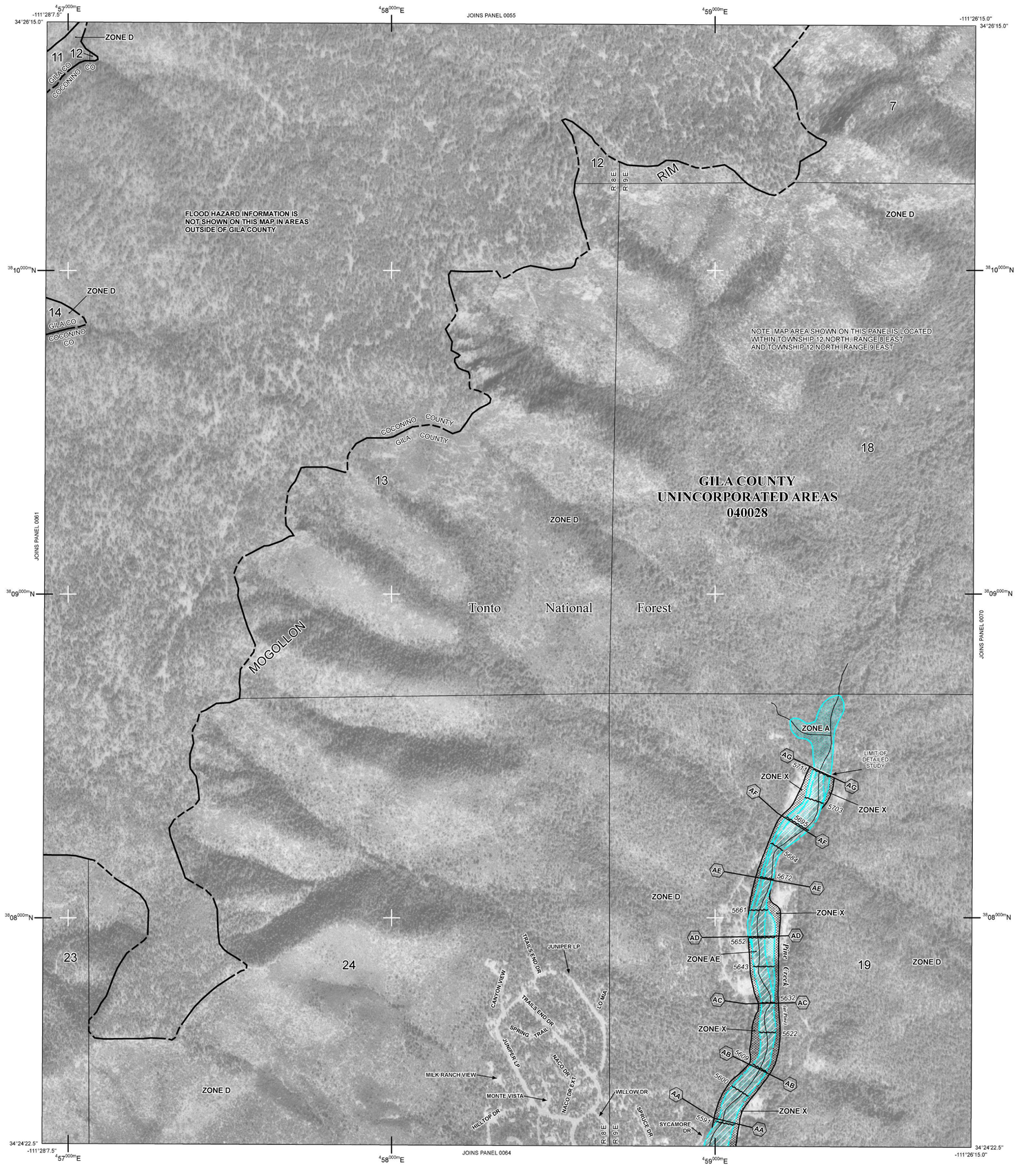

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
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ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
97° 07' 30", 32° 22' 30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000M	1000-meter Universal Transverse Mercator grid values, zone 12
600000 FT	5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 0202), Transverse Mercator
DX5510 x	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORIES
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
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December 4, 2007

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MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0062D

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

GILA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 62 OF 2595

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GILA COUNTY, UNINCORPORATED AREAS	040028	0062	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04007C0062D

EFFECTIVE DATE
DECEMBER 04, 2007

Federal Emergency Management Agency

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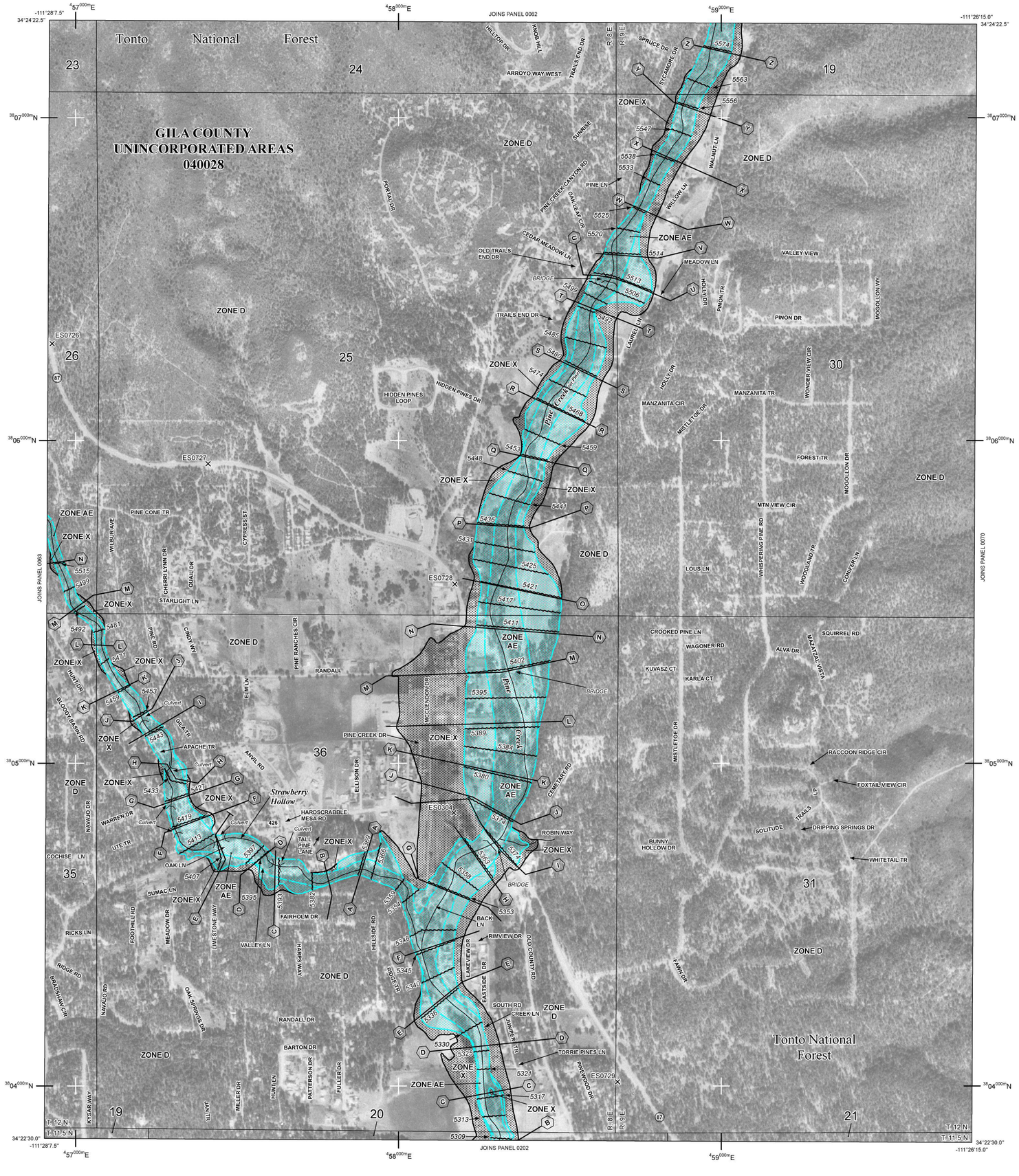

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

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FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
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	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
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(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*
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●M1.5	River Mile

MAP REPOSITORIES
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MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0064D

FIRM

FLOOD INSURANCE RATE MAP

GILA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 64 OF 2595

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GILA COUNTY: UNINCORPORATED AREAS	040028	0064	D

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04007C0064D

EFFECTIVE DATE
DECEMBER 04, 2007

Federal Emergency Management Agency

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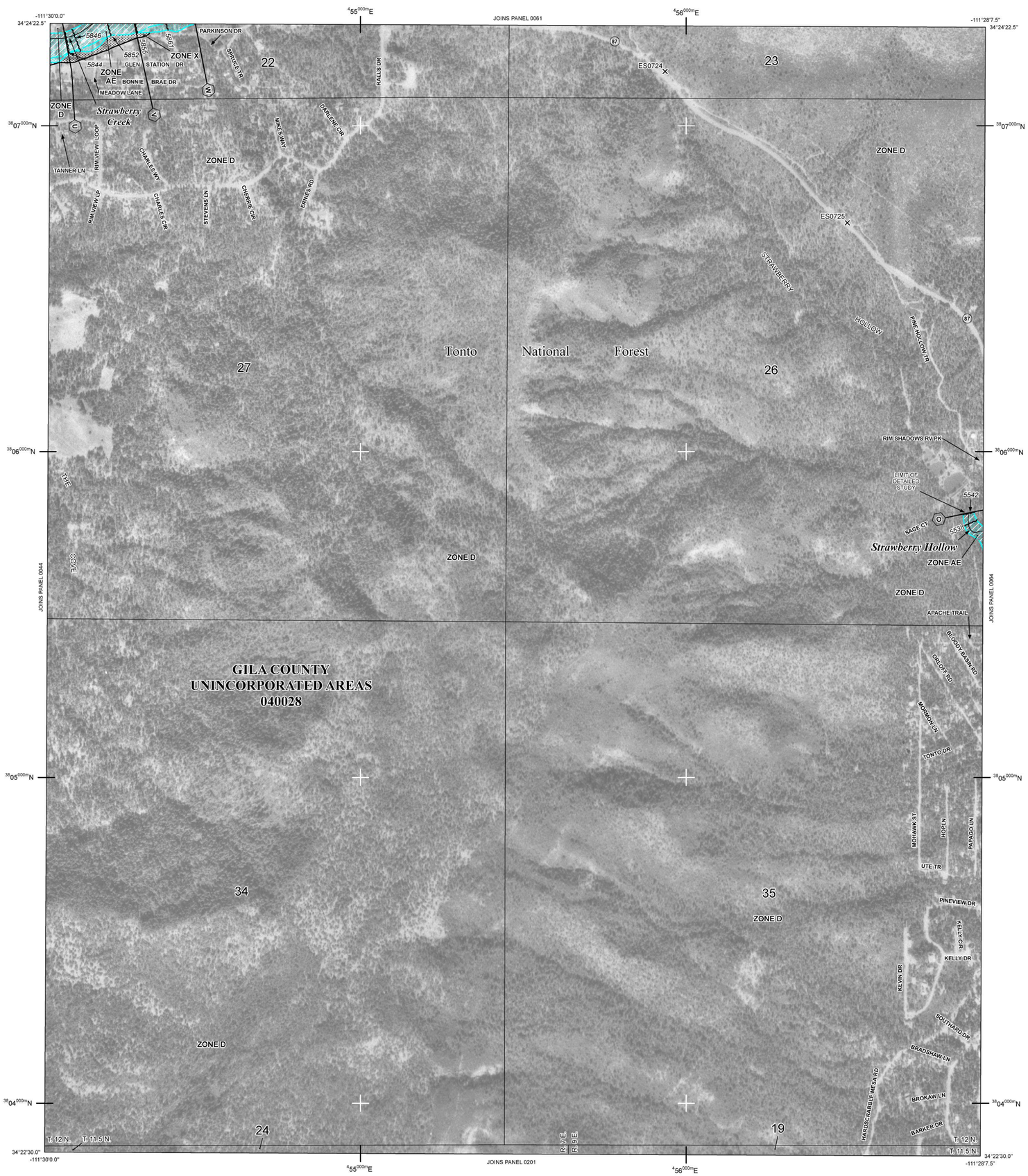

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150 0 150 300 METERS

NFIP

PANEL 0063D

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

GILA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 63 OF 2595

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GILA COUNTY, UNINCORPORATED AREAS	040028	0063	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04007C0063D

EFFECTIVE DATE
DECEMBER 04, 2007

Federal Emergency Management Agency

NOTES TO USERS

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD 88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations shown in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 12. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1992 or later.

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Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

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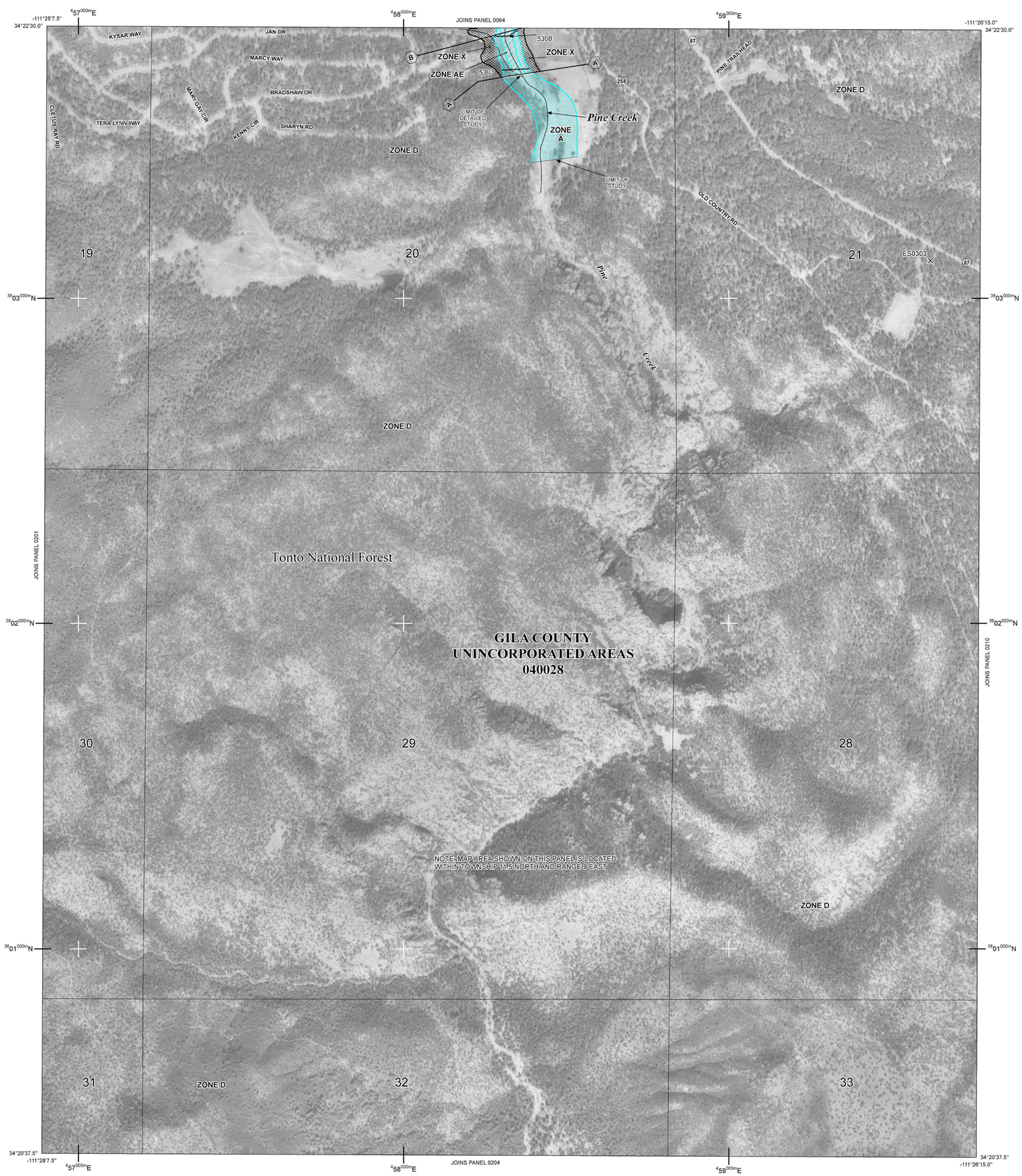

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Area of Special Flood Hazard formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
97° 07' 30", 32° 22' 30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000M	1000-meter Universal Transverse Mercator grid values, zone 12
600000 FT	5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 0202), Transverse Mercator
DX5510 x	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORIES
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 4, 2007

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0202D

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

GILA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 202 OF 2595

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GILA COUNTY, UNINCORPORATED AREAS	040028	0202	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04007C0202D

EFFECTIVE DATE
DECEMBER 04, 2007

Federal Emergency Management Agency

FEMA MAPS - STRAWBERRY

NOTES TO USERS

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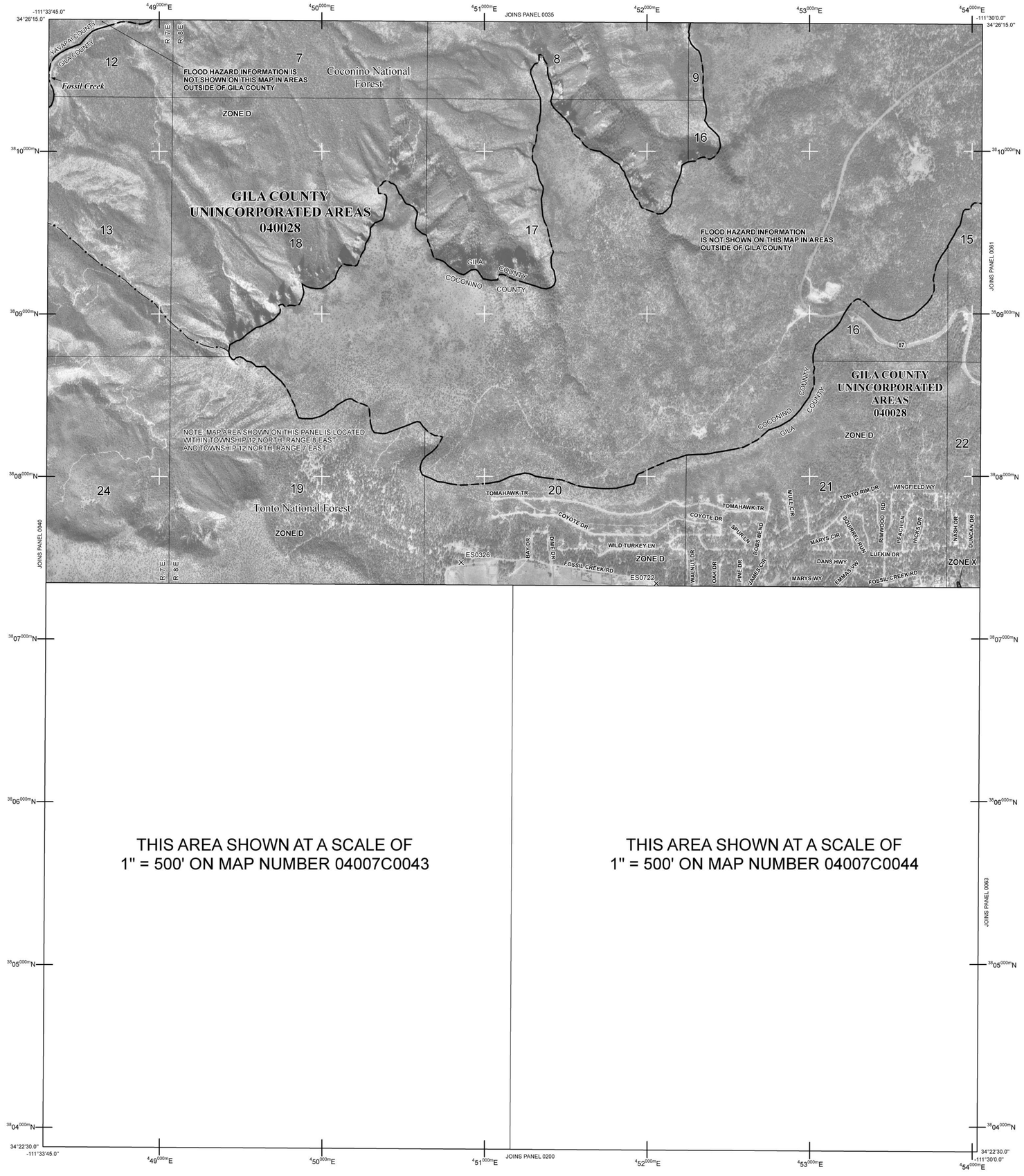

THIS AREA SHOWN AT A SCALE OF
1" = 500' ON MAP NUMBER 04007C0043

THIS AREA SHOWN AT A SCALE OF
1" = 500' ON MAP NUMBER 04007C0044

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
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ZONE V	Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
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FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

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	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A ——— A	Cross section line
23 - - - - - - 23	Transect line
97° 07' 30", 32° 22' 30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
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600000 FT	5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 0202), Transverse Mercator
DX5510 x	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORIES
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 4, 2007

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MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

PANEL 0045D

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

GILA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 45 OF 2595

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GILA COUNTY, UNINCORPORATED AREAS	040028	0045	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04007C0045D

EFFECTIVE DATE
DECEMBER 04, 2007

Federal Emergency Management Agency

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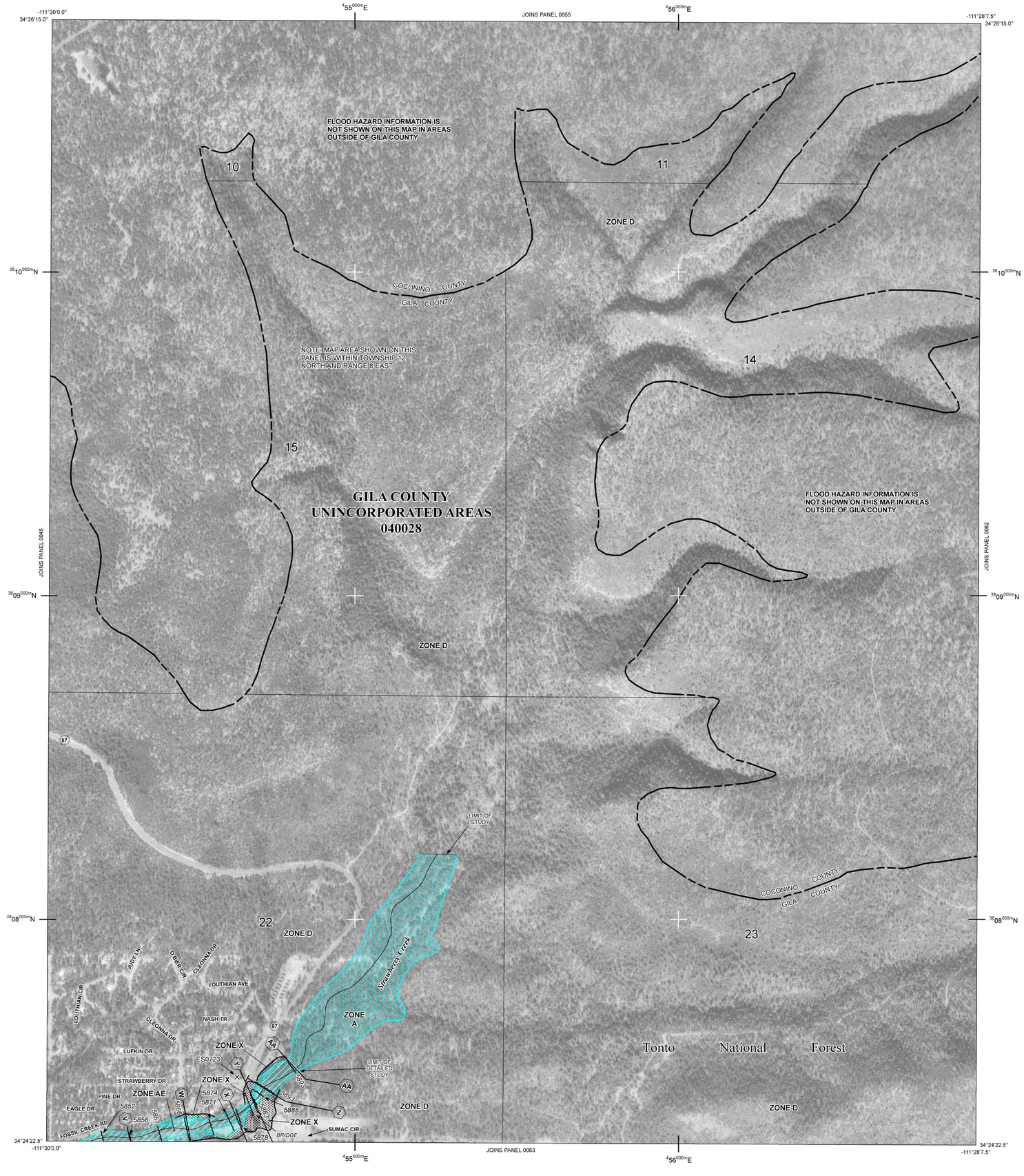

LEGEND

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FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

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MAP REPOSITORIES
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 4, 2007

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MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0061D

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

GILA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 61 OF 2595

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GILA COUNTY, UNINCORPORATED AREAS	040028	0061	D

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MAP NUMBER
04007C0061D

EFFECTIVE DATE
DECEMBER 04, 2007

Federal Emergency Management Agency

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Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

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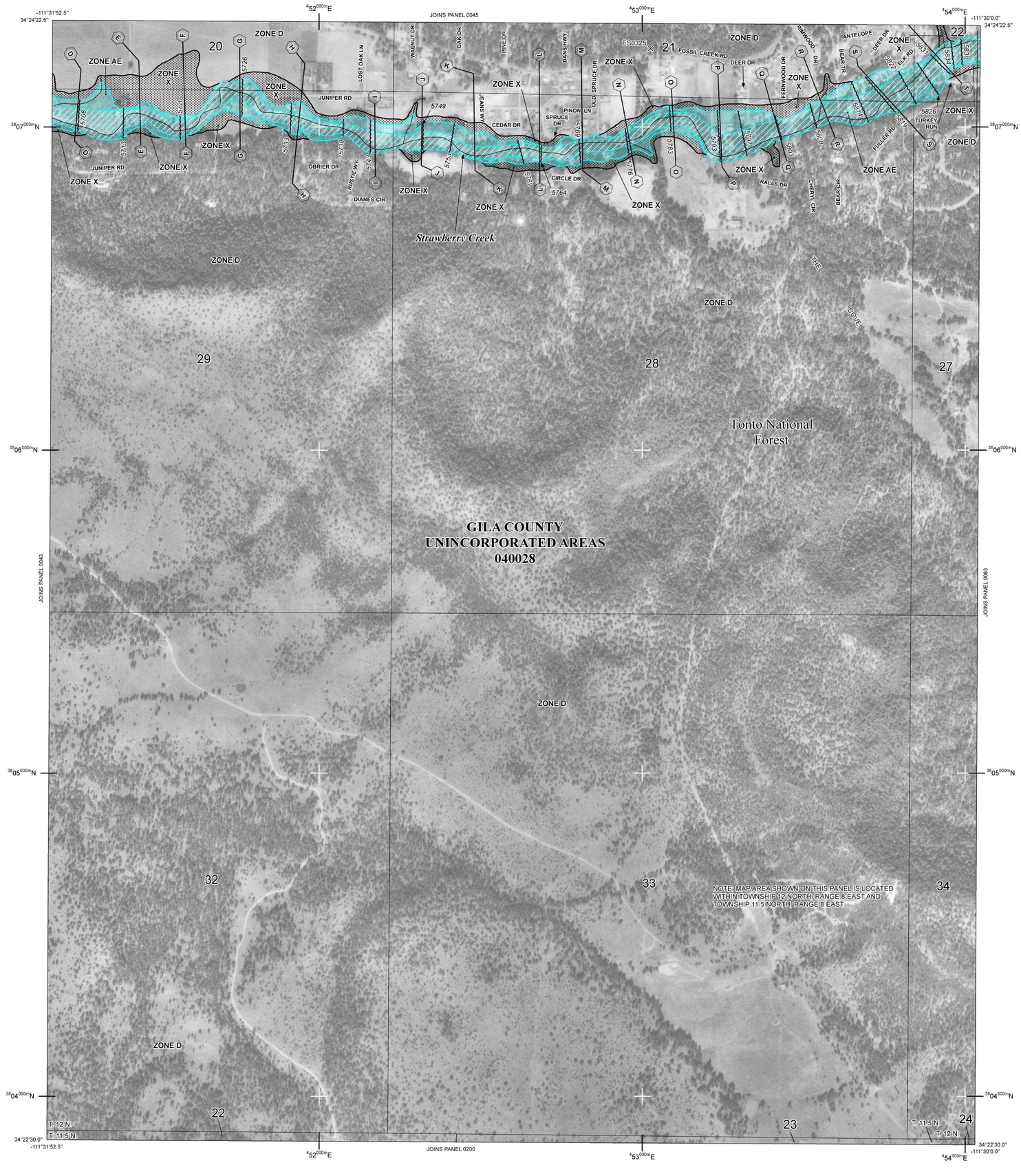
Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, an accompanying Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Area of Special Flood Hazard formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
97° 07' 30", 32° 22' 30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000M	1000-meter Universal Transverse Mercator grid values, zone 12
600000 FT	5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 0202), Transverse Mercator
DX5510 x	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORIES
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 4, 2007

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0044D

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

GILA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 44 OF 2595

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GILA COUNTY, UNINCORPORATED AREAS	040028	0044	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04007C0044D

EFFECTIVE DATE
DECEMBER 04, 2007

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD 88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations shown in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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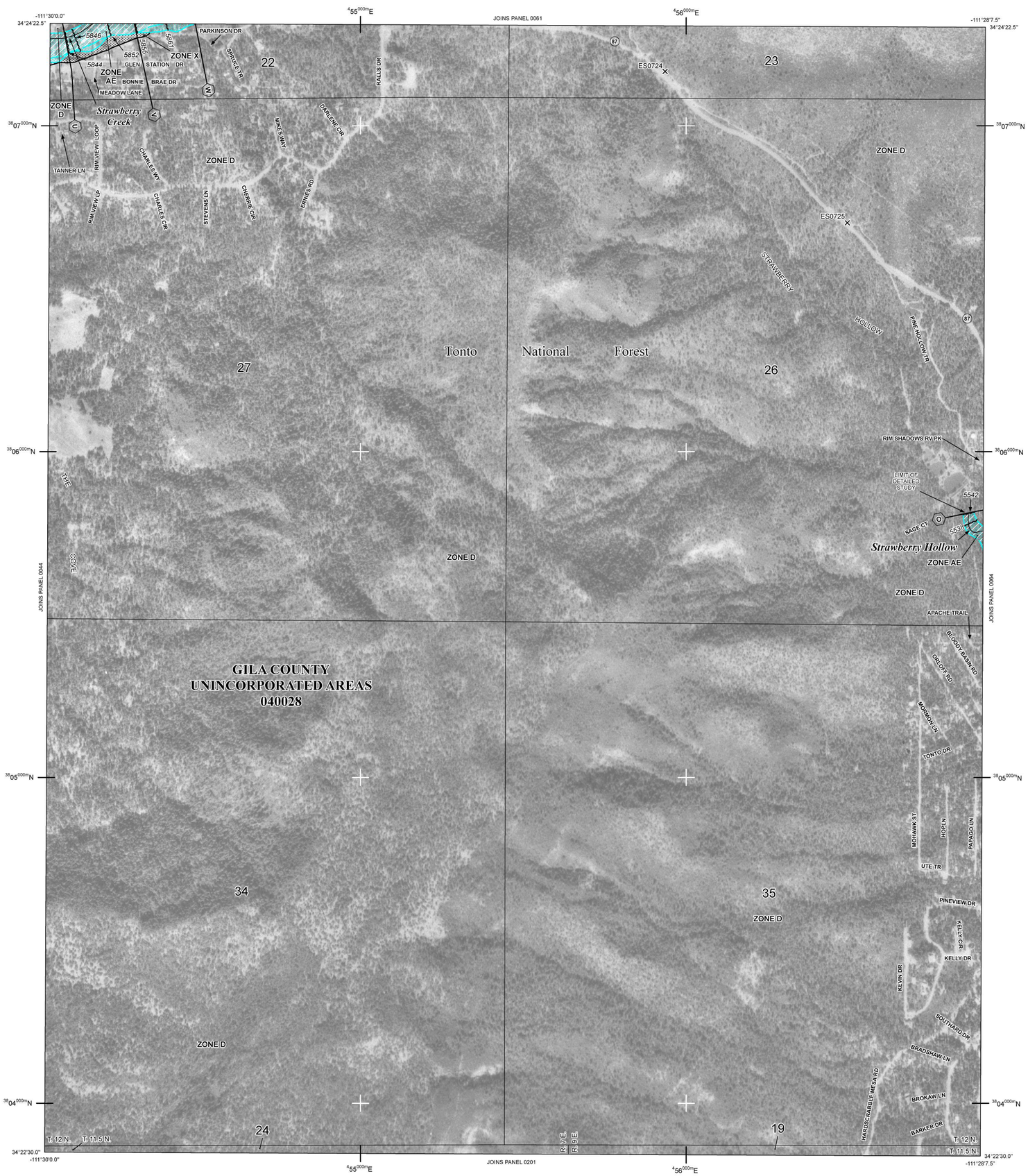

LEGEND

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	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
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(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*
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M1.5	River Mile

MAP REPOSITORIES
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 4, 2007

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MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0063D

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

GILA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 63 OF 2595

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GILA COUNTY, UNINCORPORATED AREAS	040028	0063	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04007C0063D

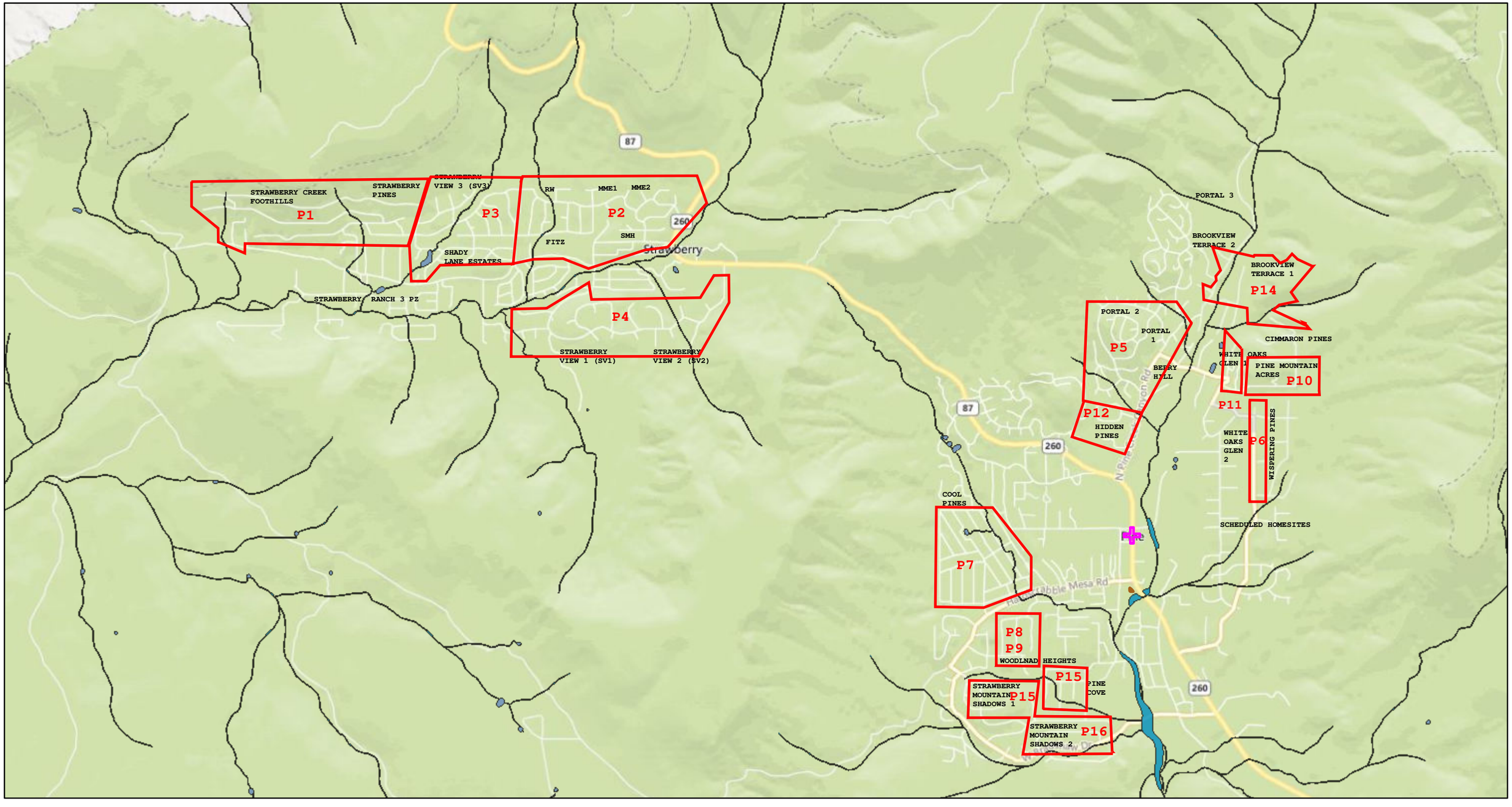
EFFECTIVE DATE
DECEMBER 04, 2007

Federal Emergency Management Agency

APPENDIX E

Wetlands and Correspondence with USACE

PINE/STRAWBERRY - WETLANDS



July 22, 2020

Project 1

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine
- Search Result (point)

1:35,000

0 0.35 0.7 1.4 mi

0 0.5 1 2 km

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
3636 N CENTAL AVENUE, SUITE 900
PHOENIX, ARIZONA 85012-1939

September 14, 2020

SUBJECT: Permit Application Request

Siddharth Mazumadar
Sunrise Engineering Inc.
2045 S. Vineyard Suite 101
Mesa, Arizona 85210

Dear Mr. Mazumadar:

It has come to my attention that you are planning Proposed Water Distribution Improvements. The project will include the rehabilitation for the following wells: Strawberry Hollow Intertie (New SH-3), Strawberry Ranch 5 Tract C (SR-5), Strawberry View 1 - Lot 59 (SV1), and Milk Ranch Well #1 (MR1). The overall goal of the well rehabilitation process is to clean and inspect each of the four wells and, if possible, to increase the pumping capacity and/or pumping depth as well as to attempt to solve any operational problems with the well. The overriding criteria for this work will be to not adversely affect the current quantity or quality of the water produced by the well. Project will include installation of a new well with two K2 booster pumps, near the location of K2 Tank Site, to provide better water and energy efficiency. Project includes installation of 101,099 feet of new PVC pipelines and valves in sizes of 4-inch through 8-inch to replace existing failing pipes. The specific projects are as listed: Wagon Wheel Way Road (crossing Fossil Creek Road) - 1,200 feet of new 6” waterline. North of Fossil Creek Rd & West of Tomahawk Lane - 19,358 feet total of new 4” and 6” waterline. North of Fossil Creek Rd (Tomahawk to Rimwood) - 18,510 feet total of new 4” and 6” waterline. North of Fossil Creek Rd (Rimwood to Hwy 87/260) - 27,619 feet total of new 4” and 6” waterline. Strawberry View/Ralls - 19,847 feet total of new 4” and 6” waterline. Portals 1 and 2 - 14,565 feet total of new 4”, 6Â”, and 8” waterline, in, Gila County, Arizona.

This activity may require a Department of Army (DA) permit from the U.S. Army Corps of Engineers. A DA permit is required for the discharge of dredged or fill material into, including any redeposit of dredged material other than incidental fallback within, "waters of the U.S.", including wetlands and adjacent wetlands pursuant to Section 404 of the Clean Water Act of 1972. Examples include, but are not limited to the following activities:

a. creating fills for residential or commercial development, placing bank protection, temporary or permanent stockpiling of excavated material, building road crossings, backfilling for utility line crossings and constructing outfall structures, dams, levees, groins, weirs, or other structures;
b. mechanized land clearing and grading which involve filling low areas or land leveling, ditching, channelizing and other excavation activities that would have the effect of destroying or degrading waters of the U.S.;

c. allowing runoff or overflow from a contained land or water disposal area to re-enter a water of the U.S.; and
d. placing pilings when such placement has or would have the effect of a discharge of fill material.

An application for a DA permit is available on our website: http://www.spl.usace.army.mil/Missions/Regulatory/PermitProcess.aspx. If you have any questions, please contact Lisa Robinson at (602) 230-6958 or via e-mail at Lisa.E.Robinson@usace.army.mil. Please refer to this letter and SPL-2020-00481 in your reply. Please help me to evaluate and improve the regulatory experience for others by completing the customer survey form at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey.

Sincerely,

Sallie Diebolt

Sallie Diebolt
Chief, Arizona Branch
Regulatory Division

Enclosure(s)

SUNRISE ENGINEERING
Phoenix Metro Office
2045 S. Vineyard, Suite 101, Mesa, Arizona 85210 | 480.768.8600

August 5, 2020

Dear Sir/Madam
U.S. Army Corps of Engineers
3636 N Central Ave, Suite 900
Phoenix, AZ 85012-1939

Subject: Proposed Water Distribution Improvements – Pine Strawberry, AZ

Dear Sir/Madam,

The PSWID is a non-transient community water system in the northwest region of Gila County, Arizona and provides potable water service to the unincorporated communities of Pine and Strawberry. PSWID is in the process of performing an environmental review pursuant to the National Environmental Policy Act (NEPA) for the U.S. Department of Agriculture (USDA) - Rural Development, in order to assess the potential environmental impacts of the City's proposed Water Distribution Improvements in Gila County, Arizona. Enclosed figures 1.1, 1.2, and 1.3 depict the area of the proposed construction activities as described below:

Rehabilitating Existing Wells: The Proposed Project will include the rehabilitation for the following wells: Strawberry Hollow Intertie (New SH-3), Strawberry Ranch 5 – Tract C (SR-5), Strawberry View 1 – Lot 59 (SV1), and Milk Ranch Well #1 (MR1). The overall goal of the well rehabilitation process is to clean and inspect each of the four wells and, if possible, to increase the pumping capacity and/or pumping depth as well as to attempt to solve any operational problems with the well. The overriding criteria for this work will be to not adversely affect the current quantity or quality of the water produced by the well.

Install New Wells: The Proposed Project will include installation of a new well with two K2 booster pumps, near the location of K2 Tank Site, to provide better water and energy efficiency.

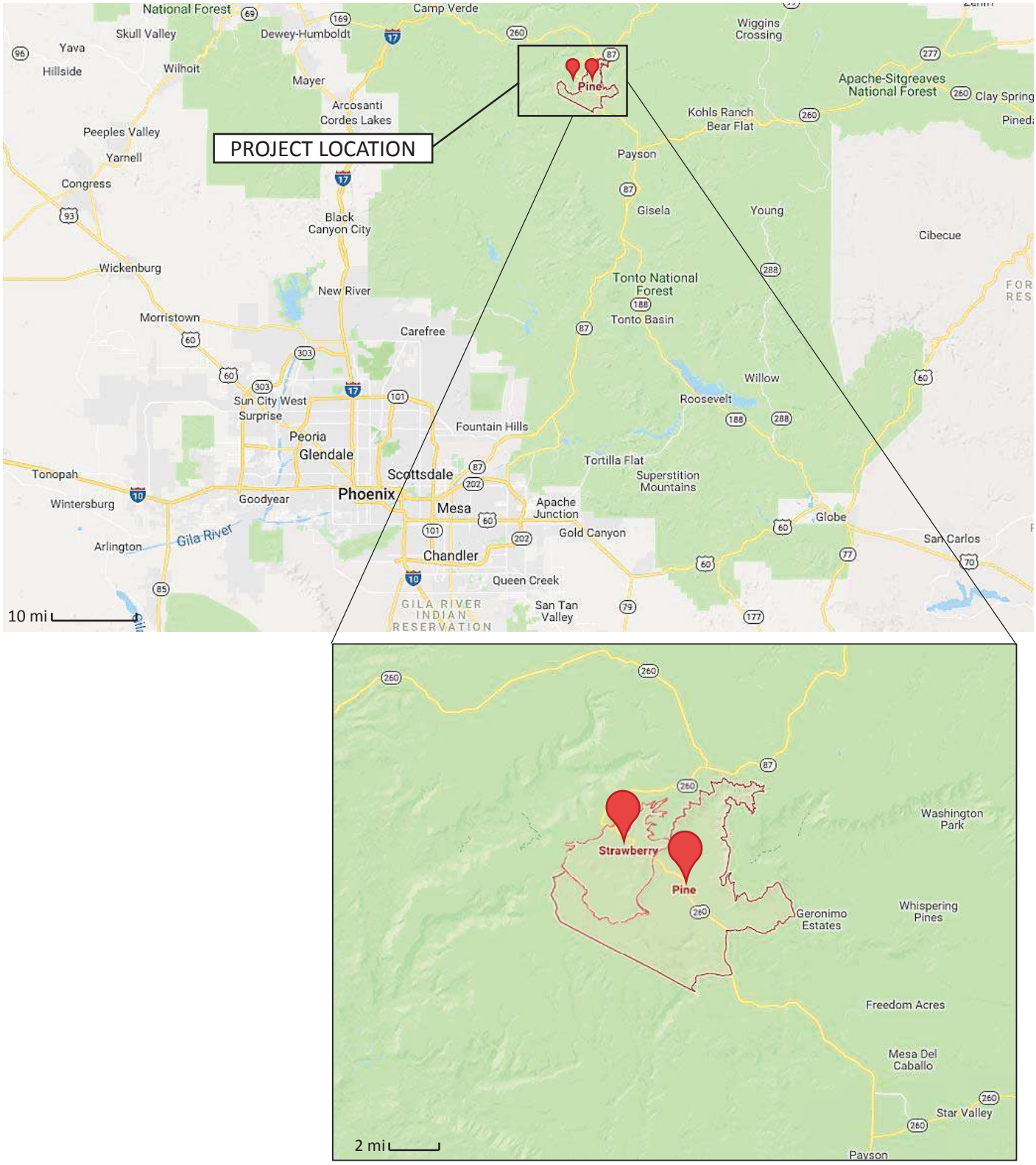
Replace Existing Pipelines: The Proposed Project includes installation of 101,099 feet of new PVC pipelines and valves in sizes of 4-inch through 8-inch to replace existing failing pipes. The specific projects are as listed below:

- → Wagon Wheel Way Road (crossing Fossil Creek Road) - 1,200 feet of new 6" waterline
- → North of Fossil Creek Rd & West of Tomahawk Lane - 19,358 feet total of new 4" and 6" waterline
- → North of Fossil Creek Rd (Tomahawk to Rimwood) - 18,510 feet total of new 4" and 6" waterline
- → North of Fossil Creek Rd (Rimwood to Hwy 87/260) - 27,619 feet total of new 4" and 6" waterline
- → Strawberry View/Ralls - 19,847 feet total of new 4" and 6" waterline
- → Portals 1 and 2 - 14,565 feet total of new 4", 6", and 8" waterline

The proposed projects will not involve any federal lands. All project components will be located on lands in private holdings or City lands. The Pine Strawberry Water System is located in a portion of Sections 20 through 29, 35, and 36, Township 12 North, Range 8 East and a portion of sections 19, 30, and 31, Township 12 North, Range 9 East and a portion of sections 19 and 20, Township 11.5 North, Range 9 East of the Gila and Salt River base and meridian, Maricopa County, Arizona. After the construction of the projects is complete, the disturbed areas will be restored to the existing contour as much as practically possible.

Please review the proposed projects. I would appreciate a response within 20 days. Thank you for your assistance.

Sincerely,
Sunrise Engineering, Inc.
Siddharth Mazumdar
Project Manager
smazumdar@sunrise-eng.com
480.768.8600



GENERAL LOCATION MAP

FIGURE 1.1

PINE STRAWBERRY WATER IMPROVEMENT DISTRICT

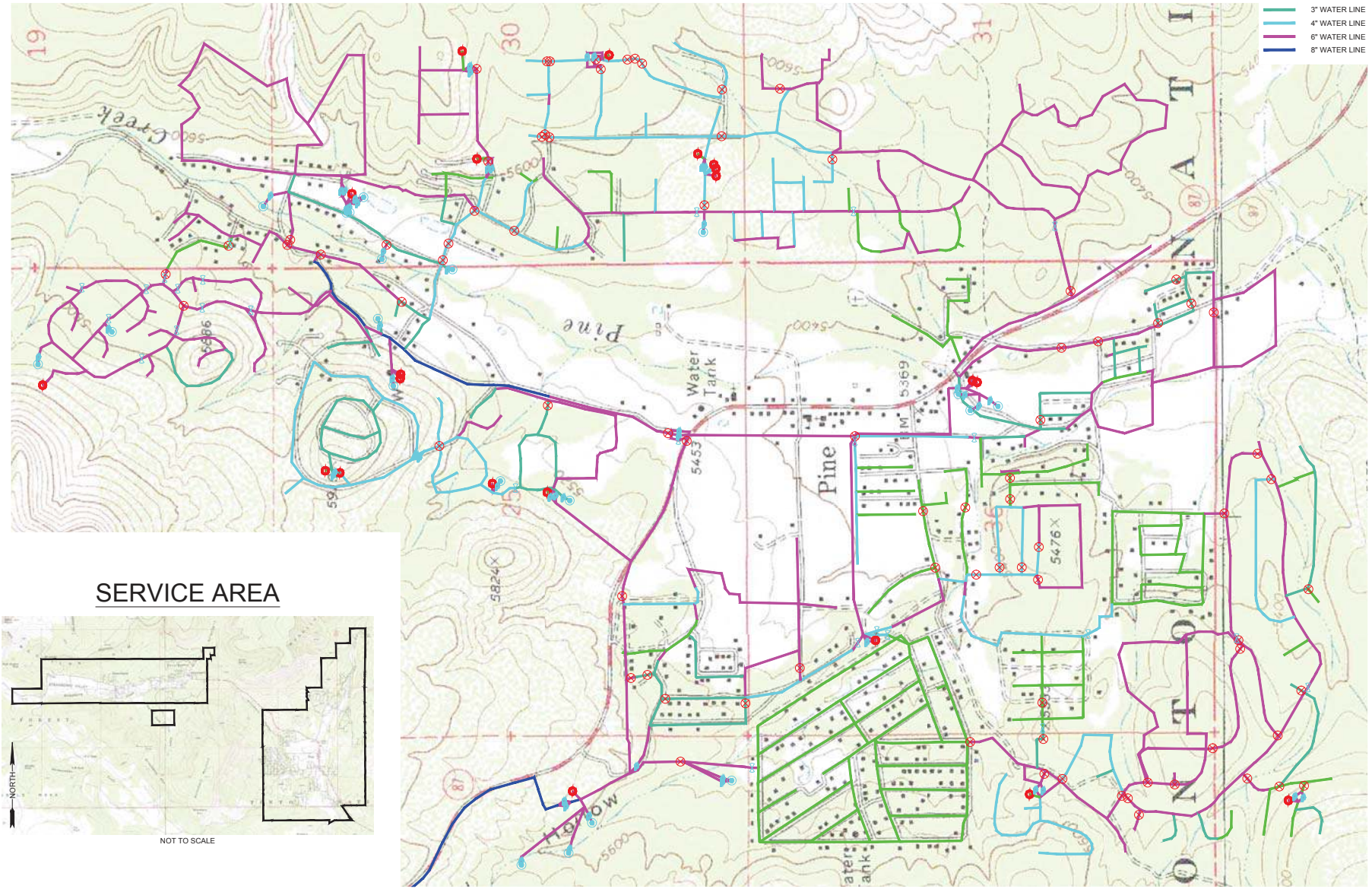
Figure 1.2 - Pine Existing Water System

PINE E□ISTING WATER SYSTEM

A PORTION OF SECTIONS 20 THRU 29, 35, AND 36, TOWNSHIP 12 NORTH, RANGE 8 EAST AND A PORTION OF SECTIONS 19, 30, AND 31, TOWNSHIP 12 NORTH, RANGE 9 EAST AND A PORTION OF SECTIONS 19 AND 20, TOWNSHIP 11.5 NORTH, RANGE 9 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

NORTH
0 500' 1000'
SCALE: 1"=500'

LEGEND
- TANK
- WELL
- PRV
- PUMP
- VALVE
- < 2" WATER LINE
- 3" WATER LINE
- 4" WATER LINE
- 6" WATER LINE
- 8" WATER LINE



SERVICE AREA

NOT TO SCALE

EPS GROUP
125 S. Avondale Blvd., Suite 115
Avondale, AZ 85323
T 623.547.4661 | F 623.547.4662
www.epsgroupinc.com

PINE STRAWBERRY WATER IMPROVEMENT DISTRICT
WATER SYSTEM - PROPOSED PROJECTS
PINE AND STRAWBERRY, ARIZONA

PINE EXISTING WATER SYSTEM

REVISIONS:

DESIGNER: EPS
DRAWN BY: EPS

NOT FOR CONSTRUCTION

JOB NO. 16-058
08-18-2017

SHEET NO. 2 OF 2

16-058 - PINE STRAWBERRY WATER IMPROVEMENT DISTRICT - WATER SYSTEM

Aug 25, 2017 6:05am V:\CAD\Pine Strawberry\16-058 Water System Mgs\Production Drawings\Exhibits\PSWID Existing System Exhibit.dwg pmiranda

FIGURE 2.1

Figure 1.3 - Strawberry Existing Water System

STRAWBERRY E□ISTING WATER SYSTEM

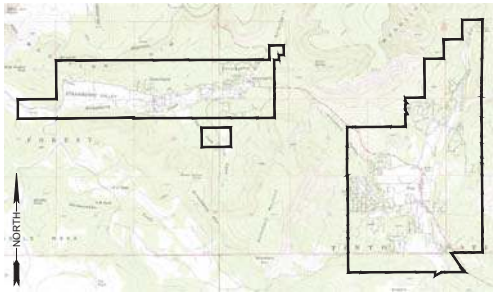
A PORTION OF SECTIONS 20 THRU 29, 35, AND 36, TOWNSHIP 12 NORTH, RANGE 8 EAST
AND A PORTION OF SECTIONS 19, 30, AND 31, TOWNSHIP 12 NORTH, RANGE 9 EAST AND A
PORTION OF SECTIONS 19 AND 20, TOWNSHIP 11.5 NORTH, RANGE 9 EAST OF THE GILA
AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

LEGEND

- TANK
- WELL
- PRV
- PUMP
- VALVE
- < 2" WATER LINE
- 3" WATER LINE
- 4" WATER LINE
- 6" WATER LINE
- 8" WATER LINE

NORTH
0 500' 1000'
SCALE: 1"=500'

SERVICE AREA



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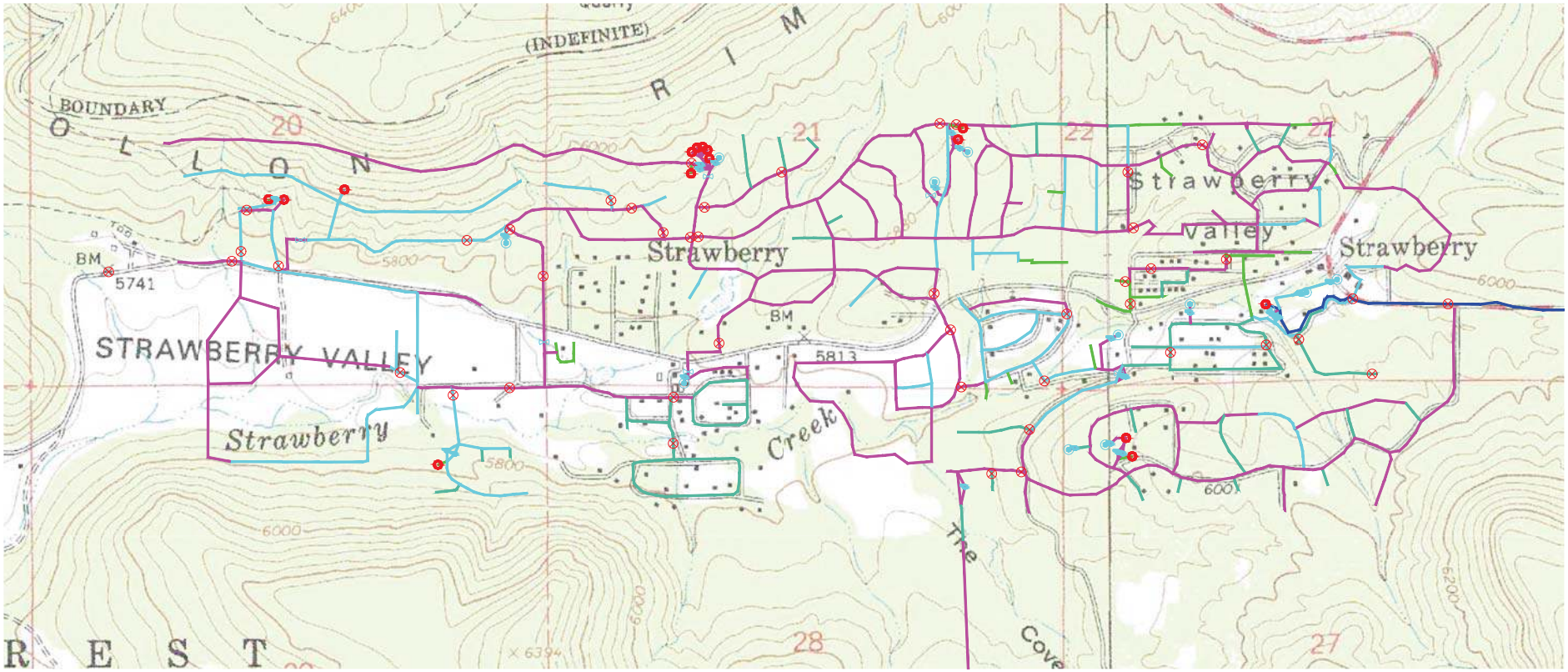

16-058 - PINE STRAWBERRY WATER IMPROVEMENT DISTRICT - WATER SYSTEM

pmirando Aug 25, 2017 6:06am V:\CAD\Pine Strawberry\16-058 Water System Map\Production Drawings\Exhibits\PSWID Existing System Exhibit.dwg

EPS GROUP
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T 623.547.4661 | F 623.547.4662
w w w . e p s g r o u p i n c . c o m

PINE STRAWBERRY WATER IMPROVEMENT DISTRICT
WATER SYSTEM - PROPOSED PROJECTS
PINE AND STRAWBERRY, ARIZONA

STRAWBERRY EXISTING WATER SYSTEM

REVISIONS:

DESIGNER: EPS
DRAWN BY: EPS

NOT FOR CONSTRUCTION

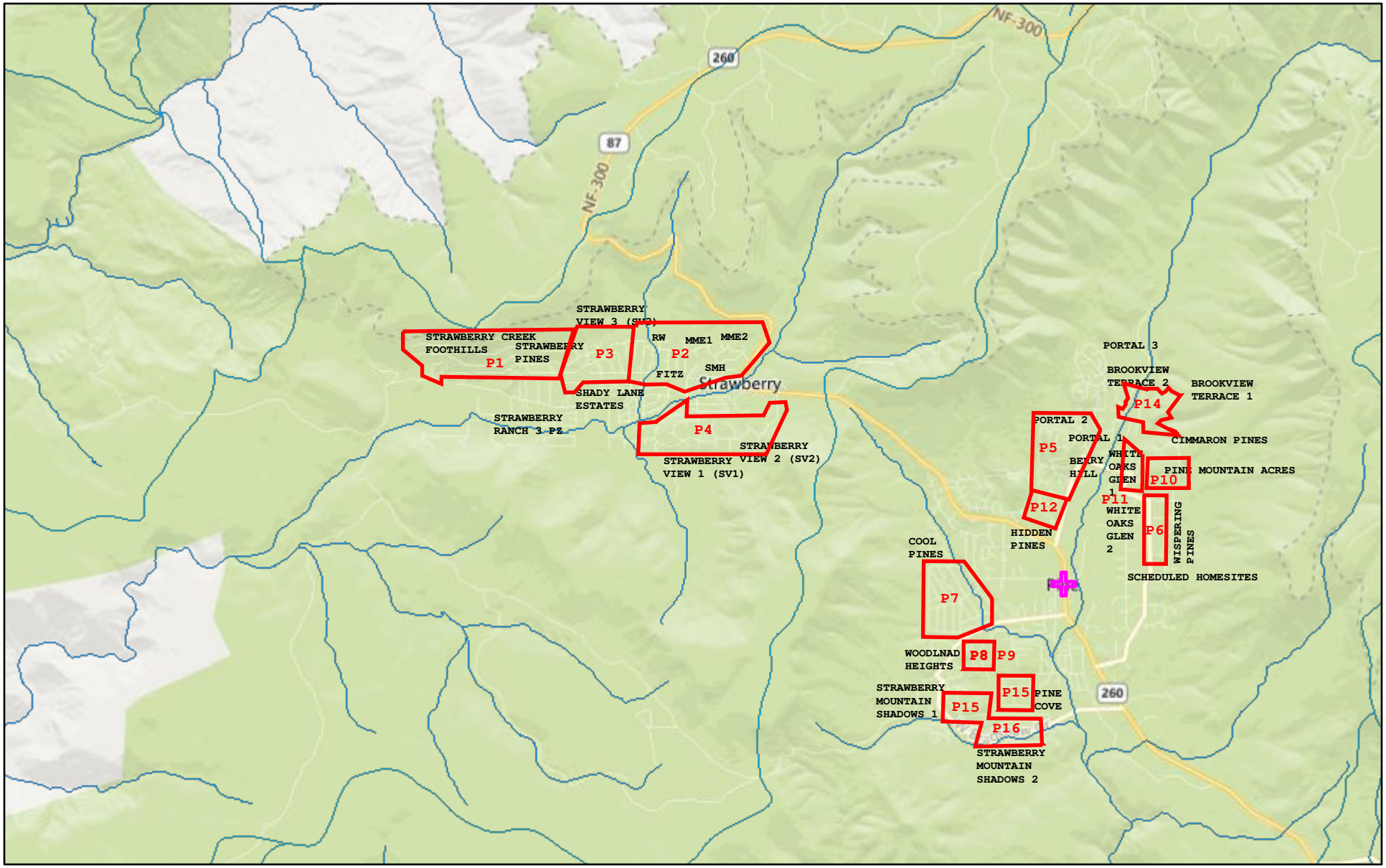
JOB NO. 16-058
08-18-2017
SHEET NO. 1 OF 2

FIGURE 2.2

APPENDIX F

Water Features and Sole Source Aquifer

Water Features



August 13, 2020

1:72,000

0 0.5 1 2 mi

0 0.75 1.5 3 km

Streams

Watersheds (HUC12)

Impaired Streams

Water Bodies

Wild and Scenic Rivers

Impaired Waterbodies

Sole Source Aquifers

EPA United States Environmental Protection Agency

Pacific Southwest, Region 9

Serving: Arizona, California, Hawaii, Nevada, Pacific Islands, Tribal Nations

Ground Water

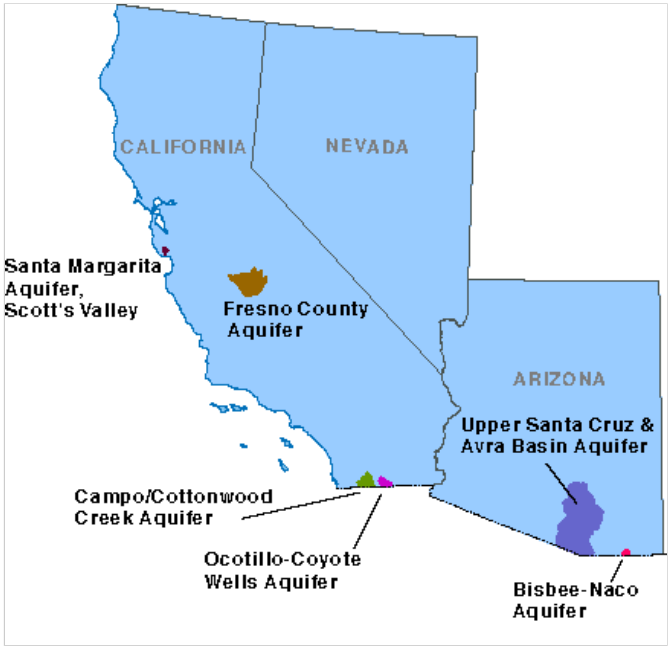
Ground Water Quick Finder

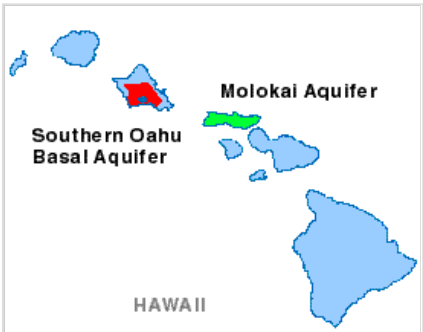
Ground Water Home
Class V Wells
Cesspools in Hawaii
Onsite Sewage Treatment
Permits
Sole Source Aquifer
Source Water Protection
Tribal Water Protection
Underground Injection Wells

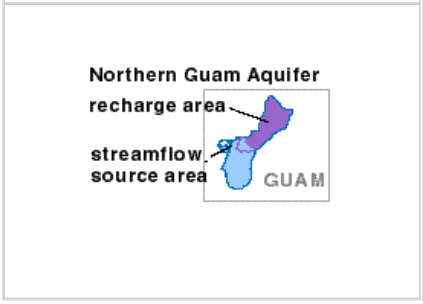
Sole Source Aquifer

The EPA's Sole Source Aquifer (SSA) Program was established under Section 1424(e) of the Safe Drinking Water Act (SDWA.) Since 1977, it has been used by communities to help prevent contamination of groundwater from federally-funded projects. It has increased public awareness of the vulnerability of groundwater resources. The SSA program allows for EPA environmental review (PDF) (1pg, 34K) of any project which is financially assisted by federal grants or federal loan guarantees. These projects are evaluated to determine whether they have the potential to contaminate a sole source aquifer.

In Region 9, nine sole source aquifers have been designated:







State	Sole Source Aquifer Name	Federal Reg. Cit	Publ. Date	Map
AZ	Upper Santa Cruz & Avra Basin Aquifer	49 FR 2948	01/24/84	KMZ PDF (1 pg, 1.3M)
AZ	Bisbee-Naco Aquifer	53 FR 38337	09/30/88	KMZ PDF (1 pg, 175K)
CA	Fresno County Aquifer	44 FR 52751	09/10/79	KMZ PDF (1 pg, 1.3M)
CA	Santa Margarita Aquifer, Scotts Valley	50 FR 2023	01/14/85	KMZ PDF (1 pg, 434K)
CA	Campo/Cottonwood Creek	58 FR 31024	05/28/93	KMZ PDF (1 pg, 321K)
CA	Ocotillo-Coyote Wells Aquifer	61 FR 47752	09/10/96	KMZ PDF (1 pg, 337K)
GU	Northern Guam Aquifer System	43 FR 17867	04/26/78	KMZ PDF (1 pg, 400K)

National Links

EPA Ground Water & Drinking Water Home

You will need Adobe Reader to view some of the files on this page. See EPA's PDF page to learn more about PDF, and for a link to the free Adobe Reader.

Maps

Click here for a national layer including all available coverage for Sole Source Aquifers (SSA) that can be used in Geographic Information Systems (GIS)

State	Sole Source Aquifer Name	Federal Reg. Cit	Publ. Date	Map
HI	Southern Oahu Basal Aquifer	52 FR 45496	11/30/87	KMZ PDF (1 pg, 716K)
HI	Molokai Aquifer	59 FR 23063	04/20/93	KMZ PDF (1 pg, 146K)

A map of all nationally designated SSAs is also available on the Source Water Protection Publications Database.

For more information, please contact the Ground Water Office at
415-972-3971 or visit the national EPA Sole Source Aquifer Program site.

Outreach Documents

Sole Source Aquifer Fact Sheet (PDF) (1pg, 34K)

For Project Planners: What to submit for EPA review of proposed projects (PDF) (1pg, 34K)

Contact Information

See the Sole Source Aquifer section of the Ground Water contacts page.

Last updated on 9/19/2015

APPENDIX G

Biological Resources

LIST OF TEC SPECIES
FROM PSWID PRELIMINARY ENGINEERING REPORT

Tonto National Forest
Federal Threatened, Endangered, and Candidate Species
(January 2014)

Common Name	Scientific Name	Status
C = candidate, D = designated, E = endangered, N/A = not applicable, P = proposed, T =threatened		
Mammals		
Birds		
Cuckoo, yellow-billed	*Coccyzus americanus*	P
Flycatcher, southwestern willow	*Empidonax traillii extimus*	E
Flycatcher, southwestern willow critical habitat	N/A	D
Owl, Mexican spotted	*Strix occidentalis lucida*	T
Owl, Mexican spotted critical habitat	N/A	D
Rail, Yuma clapper	*Rallus longirostris yumanensis*	E
Reptiles		
Gartersnake, northern Mexican	*Thamnophis eques megalops*	P
Gartersnake, northern Mexican critical habitat	N/A	P
Gartersnake, narrow-headed	*Thamnophis rufipunctatus*	P
Gartersnake, narrow-headed critical habitat	N/A	P
Tortoise, Morafka's desert	*Gopherus morafkai*	C
Amphibian		
Frog, Chiricahua leopard	*Lithobates* [*Rana*] *chiricahuensis*	T
Frog, Chiricahua leopard, critical habitat	N/A	D
Fish		
Chub, Gila	*Gila intermedia*	E
Chub, Gila critical habitat	N/A	D
Chub, headwater	*Gila nigra*	C
Chub, roundtail	*Gila robusta*	C
Minnow, loach	*Tiaroga cobitis*	E
Minnow, loach, critical habitat	N/A	D
Pikeminnow, Colorado (non-essential experimental)	*Ptychocheilus lucius*	E
Pupfish, desert	*Cyprinodon macularius*	E
Spikedace	*Meda fulgida*	E
Spikedace, critical habitat	N/A	D
Sucker, razorback	*Xyrauchen texanus*	E
Sucker, razorback, critical habitat	N/A	D
Topminnow, Gila	*Poeciliopsis occidentalis occidentalis*	E
Plants		
Cliffrose, Arizona	*Purshia subintegra*	E
Hedgehog, Arizona	*Echinocereus triglochidiatus var. arizonicus*	E

Tonto National Forest
Forest Sensitive Species
(January 2014)

Common Name	Scientific Name
Mammals (4)	
Bat, Allen's lappet-browned	*Idionycteris phyllotis*
Bat, pale townsend's big-eared	*Corynorhinus townsendii pallescens*
Bat, spotted	*Euderma maculatum*
Bat, western red	*Lasiurus blossevillii*
Birds (5)	
Cuckoo, western yellow-billed (Federally proposed)	*Coccyzus americanus occidentalis*
Falcon, American peregrine	*Falco peregrinus anatum*
Flycatcher, sulphur-bellied	*Myiodynastes luteiventris*
Goshawk, northern	*Accipiter gentilis*
Junco, yellow-eyed	*Junco phaeonotus*
Reptiles (4)	
Gartersnake, northern Mexican (Federal proposed)	*Thamnophis eques megalops*
Gartersnake, narrow-headed (Federally proposed)	*Thamnophis rufipunctatus*
Lizard, Bezy's night	*Xantusia bezyi*
Tortoise, Morafka's desert (Federal candidate)	*Gopherus morafkai*
Amphibians (3)	
Frog, lowland leopard	*Lithobates* [*Rana*] *yavapaiensis*
Frog, western barking	*Eleutherodactylus augusti cactorum*
Frog, northern leopard	*Lithobates* [*Rana*] *pipiens*
Fish (4)	
Chub, headwater (Federal candidate)	*Gila nigra*
Chub, roundtail(Federal candidate)	*Gila robusta*
Sucker, desert	*Catostomus clarki*
Sucker, Sonora	*Catostomus insignis*
Invertebrates (5)	
Beetle, Parker's cylloepus riffle	*Cylloepus parkeri*
Caddisfly, A	*Wormaldia planae*
Mayfly, A	*Fallceon eatoni*
Midge, netwing	*Agathon arizonicus*
Springsnail, fossil	*Pyrgulopsis simplex*
Plants (23)	
Agave, Hohokam	*Agave murpheyi*
Agave, Tonto basin	*Agave delamateri*
Breadroot, Verde	*Pediomelum verdiensis*
Buckwheat, Ripley wild	*Eriogonum ripleyi*
Bugbane, Arizona	*Cimicifuga arizonica*
Dock, blumer's	*Rumex orthoneurus*
Fleabane, fish creek	*Erigeron piscaticus*
Fleabane, Mogollon	*Erigeron anchana*
Groundsel, toumey	*Packera neomexicana var. toumeyi (=Senecio n. var. t.)*

Common Name	Scientific Name
Mallow, Pima Indian	*Abutilon parishii*
Milkwort, Hualapai	*Polygala rusbyi*
Phlox, Arizona	*Phlox amabilis*
Rockdaisy, fish creek	*Perityle saxicola*
Rockdaisy, salt river	*Perityle gilensis var. salensis*
Root, Arizona alum	*Heuchera glomerulata*
Root, eastwood alum	*Heuchera eastwoodiae*
Sage, galiuro	*Salvia amissa*
Sandwort, Mt. Dellenbaugh	*Arenaria aberrans*
Sedge, Chihuahuan	*Carex chihuahuensis*
Sedge, Cochise	*Carex ultra (=C.spissa var. ultra)*
Snapdragon, mapleleaf false	*Mabrya acerifolia (=Maurandya a.)*
Vetch, horseshoe deer	*Lotus mearnsii var. equisolensis*
Woodfern, Aravaipa	*Thelypteris puberula var. sonorensis*

Tonto National Forest
Management Indicator Species

Management Indicator Species	Potential Natural Vegetation Crosswalk w/ Forest Plan Vegetation	Indicator of	Habitat Trend	Population Trend
CPG - colorado plateau grassland, CWRF - cottonwood willow riparian forest, DC - desert communities, IC - interior chaparral, MBDRF - mixed broadleaf deciduous riparian forest, MCA - mixed conifer w/ aspen, MWRF- montane willow riparian forest, PJC - PJ chaparral, PJG - PJ grassland, PPM - ponderosa pine – mild, SDG - semi-desert grassland.				
Elk	PPM, MCA	general forest conditions	Static	Stable
Turkey	PPM, MCA	vertical diversity – forest mix	Static	Stable
Pygmy Nuthatch	PPM	Old growth pine	Static	Decrease
Violet-green swallow	PPM, MCA	Cavity-nesting habitat	Static	Decrease
Western Bluebird	PPM, MCA	Forest openings	Static	Stable
Hairy Woodpecker	PPM, MCA	Snags	Static	Stable
Goshawk	PPM, MCA	Vertical diversity	Static	Decrease
Abert Squirrel	PPM, MCA	Successional stages of pine	Static	Decrease
Ash-throated Flycatcher	PJC, PJG,	Ground cover	Static	Stable
Gray Vireo	PJC, PJG	Tree density	Static	Decrease
Townsend's Solitaire	PJC, PJG	Juniper berry production	Static	Stable
Juniper Titmouse	PJC, PJG	General woodland conditions	Static	Decrease
Northern Flicker	PJC, PJG	Snags	Static	Stable
Spotted Towhee	PJC, PJG	Successional stages of pinyon-juniper	Static	Stable

Management Indicator Species	Potential Natural Vegetation Crosswalk w/ Forest Plan Vegetation	Indicator of	Habitat Trend	Population Trend
Spotted Towhee	IC	Shrub density	Static	Stable
Black-chinned Sparrow	IC	Shrub diversity	Static	Stable
Savannah Sparrow	CPG, PJG	Grass species diversity	Upward/static	Stable
Horned Lark	CPG, PJG	Vegetation aspect	Upward/static	Decrease
Black-throated Sparrow	DC	Shrub diversity	Downward/ static	Stable
Canyon Towhee	DC	Ground cover	Downward/ static	Decrease
Bald Eagle	CWRF	General riparian	No change	Stable
Bell's Vireo	CWRF	Well-developed understory	No change	Decrease
Summer Tanager	CWRF	Tall, mature trees	No change	Decrease
Hooded Oriole	CWRF	Medium-sized Trees	No change	Stable
Hairy Woodpecker	MBDRF	Snags, cavities	No change	Stable
Arizona Gray Squirrel	MBDRF	General riparian	No change	Stable
Warbling Vireo	MBDRF	Tall overstory	No change	Stable
Western Wood Pewee	MBDRF	Medium overstory	No change	Decrease
Common black-hawk	MBDRF	Riparian streamside	No change	Decrease
Marcro-invertebrates	Aquatic	Water quality	N/A	N/A

Tonto National Forest
Migratory bird species of concern

* Species occurs in more than 1 type of habitat		
Ponderosa Pine Forest: primarily pure ponderosa pine forest		
Flammulated Owl*	Northern Goshawk*	Olive-sided Flycatcher*
Grace's Warbler*	Lewis's Woodpecker*	Olive Warbler*
Ponderosa-Gambel's Oak Forest		
Band-tailed Pigeon*	Grace's Warbler*	Northern Goshawk*
Flammulated Owl*	Lewis's Woodpecker*	Olive Warbler*
		Mexican Spotted Owl*
Mixed Conifer Forest: Douglas fir, white fir, ponderosa pine, often some aspen and Gambel's oak.		
Band-tailed Pigeon*	Golden-crowned Kinglet	Olive-sided Flycatcher*
Cordilleran Flycatcher	Mexican Spotted Owl	Red-faced Warbler*
Flammulated Owl*	Northern Goshawk*	Red-naped Sapsucker*
Pinyon Pine – Juniper woodland		
Black-throated Gray Warbler*	Gray Vireo	Peregrine Falcon*
Golden Eagle*	Juniper Titmouse	Pinyon Jay
Gray Flycatcher		
Madrean Evergreen woodland: Madrean evergreen oaks, juniper, pinyon pine		
Black-throated Gray Warbler*	Golden Eagle*	
Interior chaparral: shrub live oak, manzanita, mountain-mahogany, cliffrose		
Black-chinned Sparrow		
Semiarid grassland, often with scattered sotol, agaves burroweed, snakeweed, yucca, mesquite		
Golden Eagle*	Swainson's Hawk	
Sonoran Desertscrub (Arizona Upland Biome): paloverde, ironwood, mesquite, catclaw, acacia, saguro, cholla, barrel cactus, prickly pear, creosote bush, jojoba, crucifixion thorn		
Bendire's Thrasher	Gila Woodpecker	Phainopepla*
Canyon Towhee	Gilded Flicker	Prairie Falcon
Costa's Hummingbird*	Golden Eagle*	Purple Martin
Elf Owl	Peregrine Falcon*	
Montane riparian wetlands: cottonwood, maple, box elder, alder, willow, some Gambel's oak, ponderosa pine, Douglas fir, white fir, and aspen		
Cordilleran Flycatcher*	Red-faced Warbler*	Red-naped Sapsucker*
MacGillivray's Warbler		
Marshlands, cienegas, ponds, and lake edges: bulrush, sedges, pondweeds, cattail, duckweed, saltgrass		
Yuma Clapper Rail		
Interior riparian deciduous forests and woodlands: sycamore, cottonwood, willow, ash, walnut, bigtooth maple, hackberry, cypress, juniper, oak		
Common Black-Hawk*	Northern Beardless-Tyrannulet*	Yellow Warbler*
Sonoran riparian deciduous forest and woodlands: primarily cottonwood, willow, mesquite, tamarisk (salt cedar), some ash, walnut, and hackberry		
Bald Eagle	Northern Beardless-Tyrannulet	Western Yellow-billed Cuckoo
Bell's Vireo*	Southwestern Willow Flycatcher	Yellow Warbler*
Common Black-Hawk*		
Sonoran riparian scrubland (dry wash): mesquite, paloverde, ironwood, burrobush, desert broom, quailbush, desert willow		
Bell's Vireo*	Lucy's Warbler	Phainopepla*
Costa's Hummingbird*		

Correspondence with USFWS, IPaC Report & Species Survey Guideline

From: Beatty, Greg <greg_beatty@fws.gov>
Sent: Tuesday, August 11, 2020 5:59 PM
To: Sepideh Hakim Elahi; Hedwall, Shaula; Rutledge, Katherine M; Key, Julia; Richardson, Mary
Subject: Re: [EXTERNAL] FW: Consultation Letter- Proposed Water Distribution Improvements – Pine Strawberry, AZ

02EAAZ00-2020-TA-1289 Towns of Pine Strawberry Water Improvement

Hi Sepideh,

Thank you for your letter seeking input on the USDA's NEPA document development regarding water improvements for the towns of Pine and Strawberry.

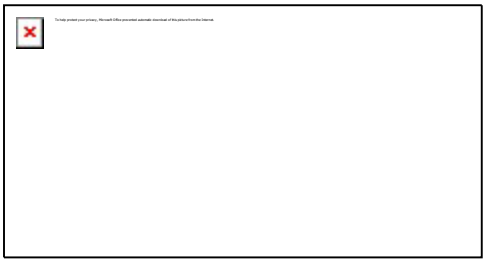
I have created a project number and title described above. Please use that number when referring to this project in future correspondence. Also, please address future communication to Jeff Humphrey, Field Supervisor, and send all electronic communication to our office's incoming mailbox to ensure it is tracked. Our mail box is Incomincorraz@fws.gov.

Based upon the information and maps included in your letter, our recommendation in order to evaluate this project's effects to listed and sensitive native species is to:

1) seek a listed species list from our IPaC system https://ecos.fws.gov/ipac/ and:
2) seek any known listed and sensitive species records from Arizona Game and Fish Department's environmental tool https://ert.azgfd.gov/.
3) we also recommend paying particular attention in your analysis to how the proposed project may affect water in streams, in particular Pine and Fossil Creek, and any effects to listed or sensitive native fish and Chiricahua leopard frogs.
4) we also recommend seeking input from Arizona Game and Fish Department's Habitat Branch and the Tonto National Forest.

Thank you for your letter and let us know if we can be of further assistance,

Greg



IPaC: Home

If you have a project that may affect USFWS trust resources, such as migratory birds, species proposed or listed under the Endangered Species Act, inter-jurisdiction fishes, specific marine mammals, wetlands, and Service National Wildlife Refuge lands, IPaC can help

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
Phone: (602) 242-0210 Fax: (602) 242-2513
http://www.fws.gov/southwest/es/arizona/
http://www.fws.gov/southwest/es/EndangeredSpecies_Main.html

In Reply Refer To: August 03, 2020
Consultation Code: 02EAAZ00-2020-SLI-1265
Event Code: 02EAAZ00-2020-E-02783
Project Name: Environmental Assessment for Pine/Strawberry Water Improvement District (PSWID)

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

To Whom It May Concern:

The Fish and Wildlife Service (Service) is providing this list under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). The list you have generated identifies threatened, endangered, proposed, and candidate species, and designated and proposed critical habitat, that may occur within one or more delineated United States Geological Survey 7.5 minute quadrangles with which your project polygon intersects. Each quadrangle covers, at minimum, 49 square miles. In some cases, a species does not currently occur within a quadrangle but occurs nearby and could be affected by a project. Please refer to the species information links found at:
http://www.fws.gov/southwest/es/arizona/Docs_Species.htm
http://www.fws.gov/southwest/es/arizona/Documents/MiscDocs/AZSpeciesReference.pdf .

The purpose of the Act is to provide a means whereby threatened and endangered species and the habitats upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of Federal trust resources and to consult with us if their projects may affect federally listed species and/or designated critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, we recommend preparing a biological evaluation similar to a Biological Assessment to determine whether the project may

affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If the Federal action agency determines that listed species or critical habitat may be affected by a federally funded, permitted or authorized activity, the agency must consult with us pursuant to 50 CFR 402. Note that a "may affect" determination includes effects that may not be adverse and that may be beneficial, insignificant, or discountable. You should request consultation with us even if only one individual or habitat segment may be affected. The effects analysis should include the entire action area, which often extends well outside the project boundary or "footprint." For example, projects that involve streams and river systems should consider downstream effects. If the Federal action agency determines that the action may jeopardize a proposed species or adversely modify proposed critical habitat, the agency must enter into a section 7 conference. The agency may choose to confer with us on an action that may affect proposed species or critical habitat.
Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend considering them in the planning process in the event they become proposed or listed prior to project completion. More information on the regulations (50 CFR 402) and procedures for section 7 consultation, including the role of permit or license applicants, can be found in our Endangered Species Consultation Handbook at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF.

We also advise you to consider species protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668 et seq.). The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the Service. The Eagle Act prohibits anyone, without a permit, from taking (including disturbing) eagles, and their parts, nests, or eggs. Currently 1026 species of birds are protected by the MBTA, including species such as the western burrowing owl (Athene cunicularia hypugea). Protected western burrowing owls are often found in urban areas and may use their nest/burrows year-round; destruction of the burrow may result in the unpermitted take of the owl or their eggs.

If a bald eagle (or golden eagle) nest occurs in or near the proposed project area, you should evaluate your project to determine whether it is likely to disturb or harm eagles. The National Bald Eagle Management Guidelines provide recommendations to minimize potential project impacts to bald eagles:
https://www.fws.gov/migratorybirds/pdf/management/
nationalbaldeaglenanagementguidelines.pdf
https://www.fws.gov/birds/management/managed-species/eagle-management.php.

The Division of Migratory Birds (505/248-7882) administers and issues permits under the MBTA and Eagle Act, while our office can provide guidance and Technical Assistance. For more information regarding the MBTA, BGEPA, and permitting processes, please visit the following: https://www.fws.gov/birds/policies-and-regulations/incidental-take.php. Guidance for minimizing impacts to migratory birds for communication tower projects (e.g. cellular, digital television, radio, and emergency broadcast) can be found at:

https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds/collisions/communication-towers.php.

Activities that involve streams (including intermittent streams) and/or wetlands are regulated by the U.S. Army Corps of Engineers (Corps). We recommend that you contact the Corps to determine their interest in proposed projects in these areas. For activities within a National Wildlife Refuge, we recommend that you contact refuge staff for specific information about refuge resources.
If your action is on tribal land or has implications for off-reservation tribal interests, we encourage you to contact the tribe(s) and the Bureau of Indian Affairs (BIA) to discuss potential tribal concerns, and to invite any affected tribe and the BIA to participate in the section 7 consultation. In keeping with our tribal trust responsibility, we will notify tribes that may be affected by proposed actions when section 7 consultation is initiated.

We also recommend you seek additional information and coordinate your project with the Arizona Game and Fish Department. Information on known species detections, special status species, and Arizona species of greatest conservation need, such as the western burrowing owl and the Sonoran desert tortoise (Gopherus morafkai) can be found by using their Online Environmental Review Tool, administered through the Heritage Data Management System and Project Evaluation Program https://www.azgfd.com/Wildlife/HeritageFund/.

For additional communications regarding this project, please refer to the consultation Tracking Number in the header of this letter. We appreciate your concern for threatened and endangered species. If we may be of further assistance, please contact our following offices for projects in these areas:

Northern Arizona: Flagstaff Office 928/556-2001
Central Arizona: Phoenix office 602/242-0210
Southern Arizona: Tucson Office 520/670-6144

Sincerely,
/s/ Jeff Humphrey Field Supervisor

Attachment

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
(602) 242-0210

Project Summary

Consultation Code: 02EAAZ00-2020-SLI-1265

Event Code: 02EAAZ00-2020-E-02783

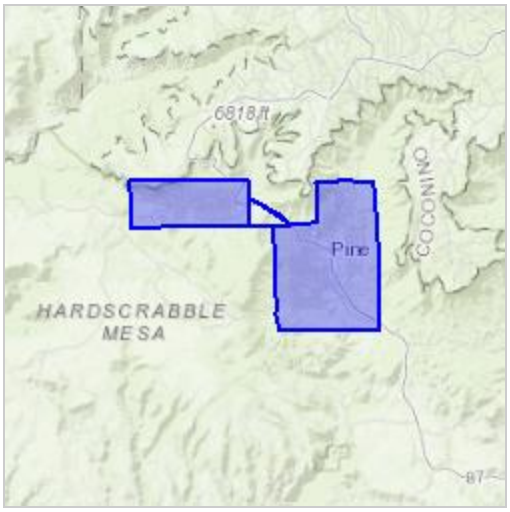
Project Name: Environmental Assessment for Pine/Strawberry Water Improvement District (PSWID)

Project Type: WATER SUPPLY / DELIVERY

Project Description: This Environmental Report (ER) is prepared for Pine Strawberry Water Improvement District (PSWID), to assess the potential environmental impacts of proposed Water System Improvements Project in Gila County, Arizona.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/34.406437667000034N111.51106432335834W



Counties: Coconino, AZ | Gila, AZ

Endangered Species Act Species

There is a total of 8 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Wolf *Canis lupus* Population: Mexican gray wolf, EXPN population No critical habitat has been designated for this species.	Proposed Experimental Population, Non-Essential

Birds

NAME	STATUS
Mexican Spotted Owl *Strix occidentalis lucida* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8196 Species survey guidelines: https://ecos.fws.gov/ipac/guideline/survey/population/129/office/22410.pdf	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **proposed** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Reptiles

NAME	STATUS
Northern Mexican Gartersnake *Thamnophis eques megalops* There is **proposed** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7655	Threatened

Amphibians

NAME	STATUS
Chiricahua Leopard Frog *Rana chiricahuensis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1516	Threatened

Fishes

NAME	STATUS
Colorado Pikeminnow (=squawfish) *Ptychocheilus lucius* Population: Salt and Verde R. drainages, AZ No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3531	Experimental Population, Non-Essential
Loach Minnow *Tiaroga cobitis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6922	Endangered
Spikedace *Meda fulgida* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6493	Endangered

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Mexican Spotted Owl *Strix occidentalis lucida* https://ecos.fws.gov/ecp/species/8196#crithab	Final

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

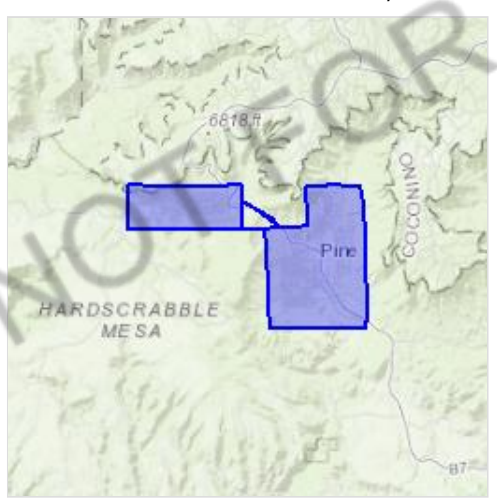
Project information

NAME

Environmental Assessment for Pine/Strawberry Water Improvement District (PSWID)

LOCATION

Coconino and Gila counties, Arizona



DESCRIPTION

This Environmental Report (ER) is prepared for Pine Strawberry Water Improvement District (PSWID), to assess the potential environmental impacts of proposed Water System Improvements Project in Gila County, Arizona.

Local office

Arizona Ecological Services Field Office

Spikedace Meda fulgida There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6493	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Mexican Spotted Owl Strix occidentalis lucida https://ecos.fws.gov/ecp/species/8196#crithab	Final

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your

list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Black-chinned Sparrow Spizella atrogularis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9447	Breeds Apr 15 to Jul 31
Black-throated Gray Warbler Dendroica nigrescens This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 1 to Jul 20
Common Black-hawk Buteogallus anthracinus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 1 to Sep 20
Elf Owl Micrathene whitneyi This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9085	Breeds May 1 to Jul 15
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31

Grace's Warbler Dendroica graciae — Breeds May 20 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Phainopepla phainopepla nitens — Breeds Mar 1 to Aug 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/1372

Pinyon Jay Gymnorhinus cyanocephalus — Breeds Feb 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9420

Red-faced Warbler Cardellina rubrifrons — Breeds May 10 to Jul 15
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Rufous Hummingbird selasphorus rufus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Rufous-winged Sparrow Aimophila carpalis — Breeds Jun 15 to Sep 30
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Virginia's Warbler Vermivora virginiae — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9441

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

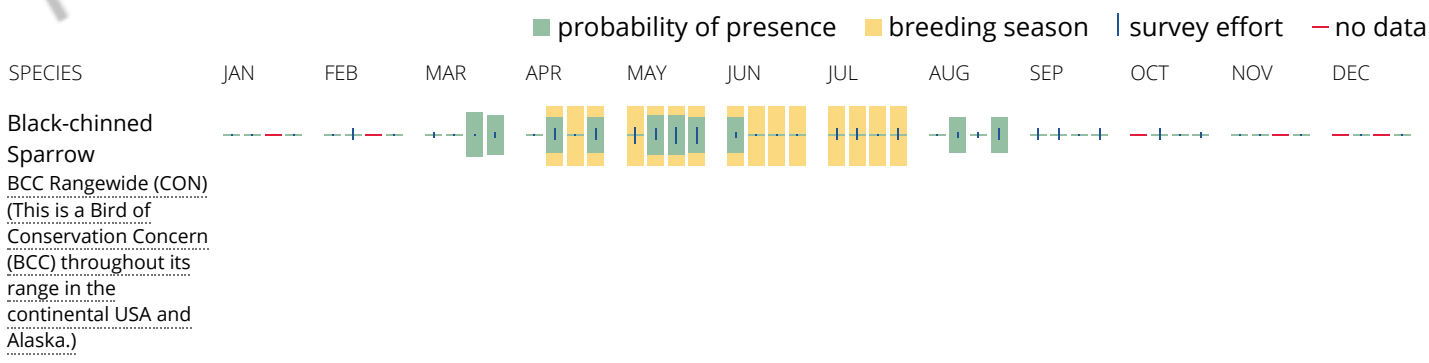
Breeding Season (▬)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

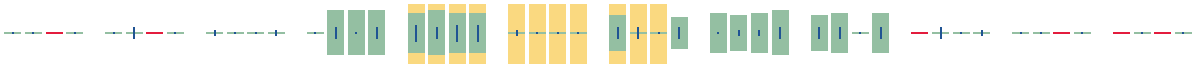
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

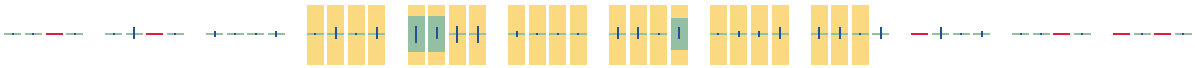
Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



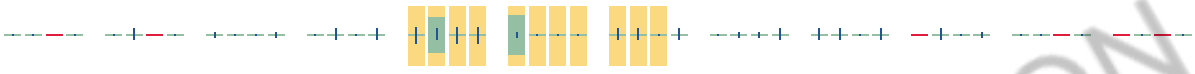
Black-throated Gray Warbler
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



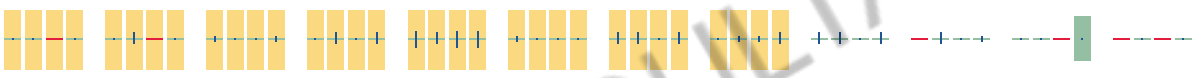
Common Black-hawk
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



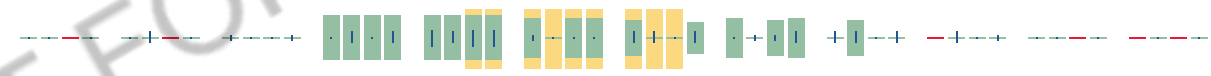
Elf Owl
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



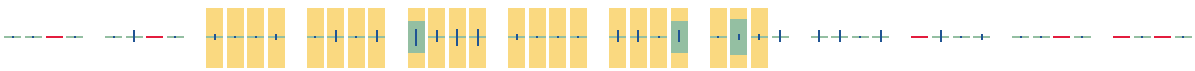
Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



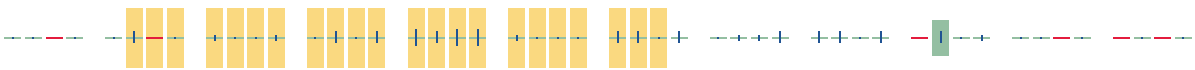
Grace's Warbler
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

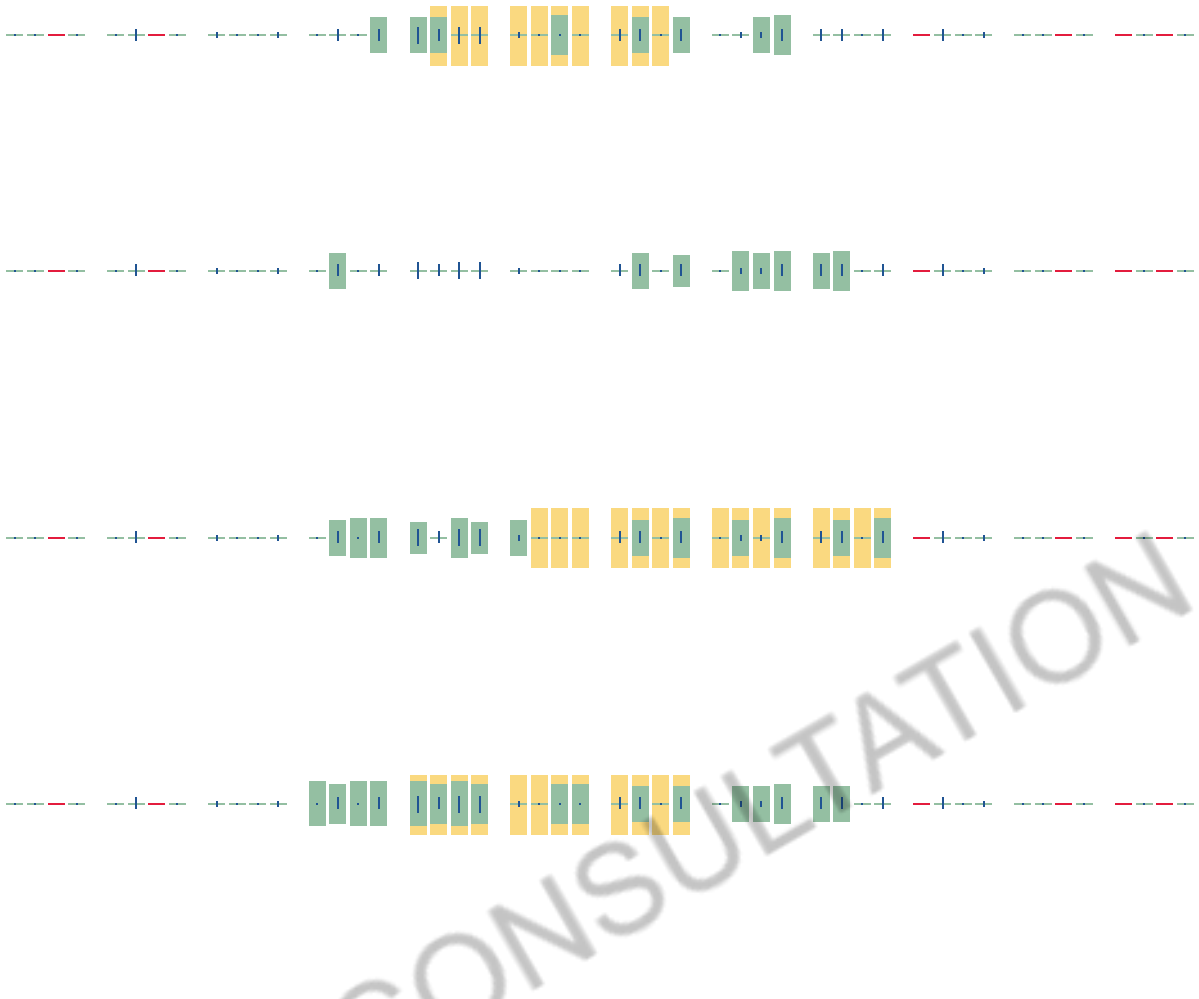


Phainopepla
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Pinyon Jay
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)





Red-faced Warbler
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Rufous Hummingbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Rufous-winged Sparrow
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Virginia's Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1A

FRESHWATER POND

- PUSAh
- PUSCh
- PUSJh
- PUSAx
- PUSCx

RIVERINE

- R4SBC
- R4SBA
- R5UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

U.S. Fish & Wildlife Service

Environmental Assessment for Pine/Strawberry Water Improvement District (PSWID)

Species Survey Guidelines (1 Species)

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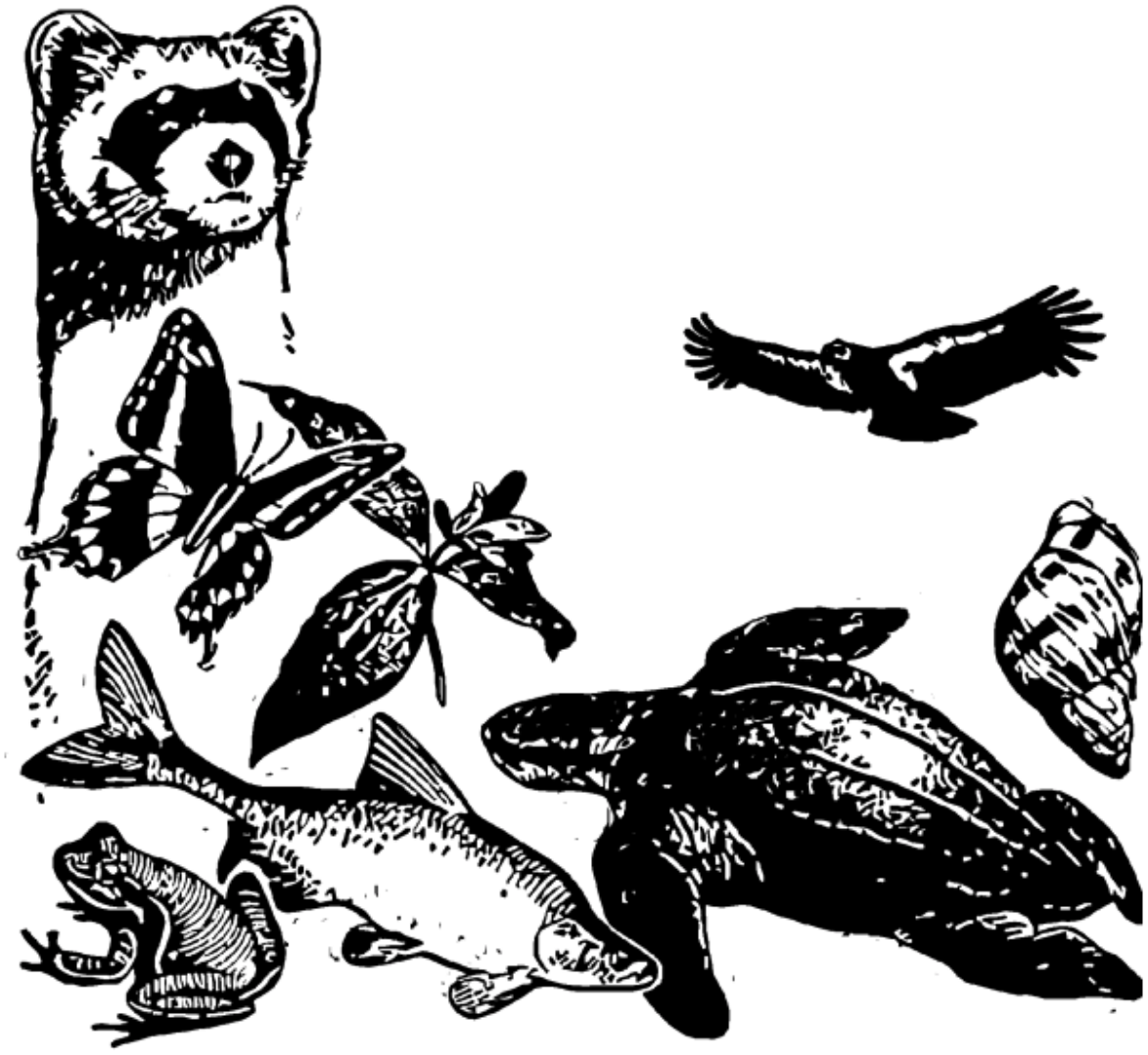


IPaC - Information for Planning and Consultation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish and Wildlife Service environmental review process.

Table of Contents

Species Document Availability

Species with survey guidelines

Mexican Spotted Owl *Strix occidentalis lucida*

Species without survey guidelines available

Chiricahua Leopard Frog *Rana chiricahuensis*

Colorado Pikeminnow (=squawfish) *Ptychocheilus lucius*

Gray Wolf *Canis lupus*

Loach Minnow *Tiaroga cobitis*

Northern Mexican Gartersnake *Thamnophis eques megalops*

Spikedace *Meda fulgida*

Yellow-billed Cuckoo *Coccyzus americanus*

APPENDIX D - MEXICAN SPOTTED OWL SURVEY PROTOCOL

U.S. FISH AND WILDLIFE SERVICE, 2012

INTRODUCTION

The following field survey protocol is designed for detecting Mexican spotted owls (hereafter, "owl"; *Strix occidentalis lucida*) and for surveying areas where human activities might remove or modify owl habitat, or otherwise adversely affect the species. The owl was federally listed as threatened on March 16, 1993 (58 FR 14248). Federal agencies are not required to conduct surveys for listed species prior to preparing a biological assessment under the Endangered Species Act ["Act"; see 50 CFR 402.12(f)]. However, Federal agencies are required to provide the best scientific information available when assessing the effects of their actions to listed species and critical habitat [50 CFR 402.14(d)]. In the absence of necessary information, the U.S. Fish and Wildlife Service (FWS) gives the benefit of the doubt to the listed species [H.R. Conf. Rep. No. 697, 96th Cong., 2nd Sess. 12 (1979)].

This survey protocol expresses the FWS's scientific opinion on adequate owl survey methods and includes guidance and recommendations. It does not constitute law, rules, regulations, or absolute requirements. Our knowledge is continuously developing and changing; therefore, this protocol, which is based upon the best scientific data available, is a work in progress. This protocol will be modified as new information becomes available. The public will be notified of changes to the protocol and surveyor qualifications through postings to the FWS's Arizona Ecological Services Field Office (AESO) (http://www.fws.gov/southwest/es/arizona/MSO). We encourage submissions to us (email submissions to Shaula_Hedwall@fws.gov) at any time of any information that can add to our understanding of what is needed to provide for long-term conservation of this species and its ecosystem. Persons conducting owl surveys must be covered under a research and recovery permit under Section 10(a)(1)(A) of the Act in order to avoid unauthorized harassment of owls, which could violate the prohibitions of Section 9 of the Act. However, no other Federal permitting requirements are implied, though individual states might have their own permitting requirements. Circumstances dictate how owl surveys are implemented. If surveys cannot be accomplished pursuant to this protocol, we recommend contacting the nearest FWS Ecological Services Field Office (ESFO) for guidance on additional survey methods before proceeding.

The FWS endorses the use of this protocol for obtaining information on owl occupancy within and adjacent to proposed project areas. This protocol helps the public and agency personnel determine whether proposed activities will have an impact on owls and/or owl habitat. A properly conducted survey will help agencies determine whether or not further consultation with the FWS is necessary before proceeding with a project. Any information on owl presence within and/or adjacent to the proposed planning or activity areas is important, even if it does not meet the guidelines described below. However, if the only owl location information available for a proposed project was acquired through surveys not conducted in accordance with this protocol, the FWS may conservatively assess the impacts of the proposed management activity on owls, (e.g.) assume the species is present in or near the action area if the best available information

makes such an assumption reasonable. This survey protocol is not designed for monitoring owl population trends or for research applications.

The generally accepted protocol for inventorying Mexican spotted owls was developed by the Southwestern Region of the U.S. Forest Service (FS) in 1988. The protocol was revised in 1989 and in 1990 it was appended to the Forest Service Manual. The protocol, as an element of Interim Directive No. 2, had an official duration of 18 months but has served as the guidance accepted by most agencies and individuals conducting surveys for owls on public lands throughout Arizona, New Mexico, Utah, and Colorado through 2003. The FS reissued the inventory protocol in 1994, again in 1995, and then issued the latest version in February 1996. The FS incorporated recommendations from the draft and subsequent final Recovery Plan for the Mexican Spotted Owl (USDI FWS 1995) regarding the designation of protected activity centers (PACs) around owl locations but did not modify the overall survey design.

Through application of and the use of the data gathered by the existing protocol under informal and formal consultations under Section 7 of the Act, the FWS has found instances where the refinement of the protocol would benefit both the species and those working with it. On January 26, 1998, the FWS met with a group of experts to review the FS protocol and available literature and to improve and update the document. The following draft document is the result of those discussions and subsequent review by FWS biologists and Mexican Spotted Owl Recovery Team members.

This protocol provides a FWS-endorsed method to: 1) make inferences regarding the presence or absence of owls in a defined area; 2) assess occupancy and nesting status, and locate nests, in PACs or in areas where habitat alterations or disturbances to owls are likely to occur; and, 3) provide information to allow designation of PACs.

The primary objective of conducting surveys using this protocol should be to locate and observe the nest of a Mexican spotted owl or young. These observations provide the most reliable and efficient information for documenting presence and delineating potential nest core areas or roost sites (Ward and Salas 2000). Because spotted owls do not nest every year, the alternative, and often default outcome, is to observe adult or subadult spotted owls at daytime roosts. However, it can take up to four years of roost location data to effectively delineate owl core activity areas (Ward and Salas 2000). Locating a resident owl's nest or young may be accomplished most effectively using the mousing technique described in the protocol below (and see Forsman 1983). The mousing technique requires that personnel are trained in proper care and handling of live animals for research, and that, when conducting daytime follow-up surveys, they procure and carry "feeder" mice into the field (American Society of Mammalogists 1998, National Academy of Sciences 1996).

Individuals surveying for owls should meet certain training standards. Experience will be reviewed and approved during a surveyor's application for an FWS issued Section 10(a)(1)(a) recovery permit. These standards strongly encourage surveyors to have knowledge of this protocol and the ability to identify owls visually and vocally, determine sex and age of owls, imitate vocal calls of the owls if not utilizing a tape recording of the calls, and identify other local raptor species. Orienteering skills, including use of map, compass, and/or Global

Positioning System (GPS) units, are essential. Surveyor safety should be of primary importance. Those surveying for owls who do not meet these training standards could "take" owls by harming or harassing them, resulting in criminal or civil penalties.

MEXICAN SPOTTED OWL SURVEY PROTOCOL

The most efficient way to locate owls is to imitate their calls (Forsman 1983). The owl is territorial and responds to imitations of its common vocalizations. Night calling is used to elicit responses from owls and locate the general areas occupied by them. Daytime follow-up visits are used to locate roosting and/or nesting owls and to further pinpoint the activity centers of individual owls. If owls are located, mice are offered to them to locate mates, nests, and young. The information collected from nighttime calling surveys and daytime follow-up surveys assist biologists and land managers to determine whether areas are occupied or unoccupied by owls and to determine the owl's reproductive status.

Throughout this protocol, all bold-faced terms are included in the glossary. Only the first use of the term is bold-faced. An outline summarizing the primary steps for implementing the protocol appear below.

1. Survey Design

The survey design uses designated **calling routes** and **calling stations** to locate owls. The intent of establishing calling routes and calling stations is to obtain **complete coverage** of the survey area so that owls will be able to hear a surveyor calling and a surveyor will be able to hear the owl(s) responding.

A. The survey area should include all areas where owls or their habitat might be affected by management actions. If an area is relatively large, it can be subdivided into manageable subunits to achieve the best survey results. In general, the survey area should include the survey area and an 800-meter (0.5-mile) area from its exterior boundaries. Within the project area, all areas that contain forested **recovery habitat**, riparian forest, and canyon habitat, or might support owls, are surveyed as defined in this revised Recovery Plan. Descriptions of owl habitat for different areas and physiographic provinces should be available from various state and Federal wildlife agencies.

   Where known **protected activity centers (PACs)** exist within the survey area, calling routes can be adjusted to lessen disturbance to established PACs.

B. Owl surveyors should establish calling routes and calling stations to ensure complete coverage of the survey area. The number of calling routes and calling stations will depend upon the size of the area, topography, vegetation, and access. Calling stations should be spaced from approximately 400 meters (0.25 mile) to no more than 800 meters (0.5 mile) apart depending upon topography and background noise levels. Nighttime calling routes and calling stations should be delineated on a map, reviewed in the field, and then relocated, as necessary, to improve the survey effectiveness.

2. Survey Methods

Owls are usually located using nocturnal calling surveys where a surveyor imitates the territorial calls of an owl (Forsman 1983). Upon hearing a suspected intruder within their territories at night, most owls respond by calling to and/or approaching the intruder.

A. CALLING

1. Owls call during all hours of the night. However, optimal survey times include two hours following sunset and two hours prior to sunrise, and surveys should be concentrated around these periods.

2. Surveys should use nighttime surveys for all calling routes in the survey area unless safety concerns dictate that a daytime survey is necessary.

3. Calls can be imitated by the surveyor or by playing recordings of owl vocalizations. If a tape recorder is used, both the tape and tape deck used should be of high quality. Tape decks should have a minimum output of 5 watts (Forsman 1983).

4. The vocal repertoire of owls consists of a variety of hooting, barking, and whistling calls (Ganey 1990). Three call types accounted for 86 percent of calling bouts heard in Arizona: four-note location call, contact call, and bark series. The four-note call appears to be used the most frequently by owls defending a territory. It is suggested that surveyors use all three of these calls during surveys, with the four-note call as the primary call.

5. Surveyors should discontinue calling when a potential owl **predator** is detected, and should move on to another calling station out of earshot of the predator before resuming calling. Surveyors should return at a later time to the station(s) skipped to complete the calling route. If the predator is detected again, the surveyor may try active listening rather than calling at the station. Other solutions completing routes with high-densities of predators, such as great-horned owls, may include active listening at these stations in order to complete the route. Please contact the FWS Mexican spotted owl lead if there are concerns regarding spotted owl predator detections on survey routes.

6. Surveyors should avoid calling for owls during periods of rain or snow, unless there is only a light misting of rain or snow that would not affect the surveyor's ability to detect owls. Surveying during inclement weather could prevent a surveyor from hearing owl responses and reduce the quality of the overall survey effort. Negative results collected under inclement weather conditions are not adequate for evaluating owl presence/**absence**. There is also the added risk of inducing a female owl to leave the **nest** during inclement weather and potentially jeopardizing nesting success.

7. Calling should not be conducted when the wind is stronger than approximately 24 km (15 miles) per hour or when the surveyor feels that the wind is limiting their ability to hear an owl. Consider using the Beaufort Wind Strength Scale. Level 4 describes winds 21 to 29

km (13 to 18 miles) per hour as a moderate breeze capable of moving thin branches, raising dust, and raising paper.

B. SURVEYS

To ensure complete coverage of the survey area, surveyors should select the best survey method for the situation and/or terrain. An owl survey might require a combination of methods, which are defined below, including: 1) calling stations; 2) continuous calling routes to obtain complete coverage of an area; and, 3) leapfrog techniques. Each of these methods is designed for nighttime calling and involves calling for owls and listening for their responses. All surveys where occupancy status is unknown should include nighttime calling.

It is <u>imperative</u> that, whatever method is used, surveyors actively listen during owl surveys. Owls may respond only once; therefore, surveyors must concentrate on listening at all times during surveys. In addition to active listening, surveyors should watch for owls that might be drawn in but do not respond vocally.

1. CALLING STATIONS

a. **Spacing** - Calling stations should typically be spaced approximately 400 meters (0.25 mile) to no more than 800 meters (0.5 mile) apart depending on topography and background noise. In some situations (i.e., complex topography, etc.), establishing calling stations <400 meters apart and more calling stations increases the likelihood of detecting owls. In canyon habitat, if surveying from the canyon bottom, stations should be placed at canyon intersections. If surveying canyons from the rims, calling stations at points and canyon heads should be included.

b. **Timing** - Surveyors should spend at least 15 minutes at each calling station: 10 minutes calling and listening in an alternating fashion, and the last 5 minutes listening. Owl response time varies, most likely because of individual behavior. Some owls will respond immediately, some respond following a delay, and some do not respond. In canyon habitat, it is recommended that surveyors spend a minimum of 20 minutes (30 minutes, if possible) at each station.

c. **Visitation** - Vary the sequence of visitation to calling stations, if possible, during subsequent visits to the area. For example, the order of the calling stations can be reversed. Varying the order of calling stations avoids potential bias related to time of night or other factors.

d. **Intermediate calling stations** should be used when factors decrease the probability of achieving complete coverage using the originally designated stations, or as triangulation points for determining nighttime owl locations. Use of intermediate calling stations can increase the likelihood of detecting owls and, thus, allow for stronger inference regarding the absence of an owl within the area.

2. CONTINUOUS CALLING METHOD

In some cases, using continuous calling is appropriate. Continuous calling involves imitating owl calls at irregular intervals while walking slowly along a route and stopping regularly to listen for owl responses. Because of the sounds produced by walking (e.g., snapping twigs, pinecones, etc.), surveyors utilizing this calling method must concentrate on active listening. In canyon habitat, the continuous calling method is only recommended when combined with calling stations.

a. The surveyor should walk slowly (5 km per hour [3.3 miles per hour]) so as to minimize the possibility that an owl responds after surveyors are out of hearing range (i.e., allow time for owls to respond).

b. The surveyor must stop regularly (400 meters [0.25 mile]) along the route to listen for owl responses.

3. LEAPFROG METHOD

The leapfrog method is very useful when roads allow for coverage of all or a portion of the survey area. This method requires two people and a vehicle.

a. One surveyor is dropped off and begins calling while the other person drives the vehicle ahead at least 800 meters (0.5 mile). The second person then leaves the vehicle for the first person and proceeds ahead while calling.

b. Each surveyor should follow the continuous calling method. The first person continuously calls as he or she walks towards the vehicle, drives the truck at least 800 meters (0.5 mile) past the second person (i.e., "leapfrogs"), leaves the vehicle there and resumes calling along the survey route.

c. Surveyors should repeat this procedure until complete coverage of the survey area is accomplished.

3. Number and Timing of Surveys

Owl detection rates change with season, owl activity, and habitat. Ganey (1990) found that calling activity was highest during the nesting season (March-June). Information from past survey efforts indicate that owl response can also vary with habitat type and/or reproductive chronology (Fig. D.1). Generally, late March through late June is the optimal time period to detect owls. Surveys conducted during March-June will increase the likelihood of detecting owls. Additionally, if owls are <u>not</u> detected when surveys are conducted properly and at these peak times, then inferences about absence of owls in a given area will be stronger. It should be noted that responses in September can be used only to document presence. Surveys in September are not reliable for locating nests, delineating PACS, and/or inferring absence.

Specific criteria on number and timing of surveys are used to determine whether a **complete inventory** has been accomplished. A complete inventory requires that at least four properly scheduled complete surveys be accomplished annually for two years. Additional years of surveys strengthen any inferences made in cases where owls are not detected. If habitat-modifying or potentially disruptive activities are scheduled for a particular year, the second year of surveys should be conducted either the year before or the year of (but prior to) project implementation. In other words, projects should occur as soon as possible after completion of surveys to minimize the likelihood that owls will be present during project implementation. If more than five years have elapsed between the last survey year and the initiation of the proposed action, then one additional year of survey is recommended prior to project implementation.

A. In compliance with the guidelines in B through G below, surveyors should conduct four **complete surveys** during each breeding season. A complete survey can be a combination of a pre-call (daytime reconnaissance of habitat to be night called), a nighttime calling survey, and, if owls are detected, a **daytime follow-up survey**. If owls are not detected during daytime calling, night calling must be completed. However, if owls are located during a pre-call, night calling of the survey area is not required. Surveyors might want to conduct additional surveys if there is evidence that additional owls remain undetected in the area.

B. The four complete surveys must be spread out over the breeding season (1 March - 31 August) by following one of three recommended scheduling scenarios:

   1. Conducting two to four surveys during 1 March - 30 June, with no more than one survey in March. Owl calling activity tends to increase from March through May (Ganey 1990), so this time period is optimal for locating owls.

   2. Completing all surveys by 31 August, with no more than one of the four required surveys conducted in August. Owl response rates tend to decrease by July (Ganey 1990). By September, juveniles have usually dispersed and adults are not necessarily on their territories. If additional surveys are needed (e.g., more than the recommended four surveys), then more than one complete survey could be completed in August.

   3. Allowing at least five full days between surveys. For example, assume a visit ends on 30 April. Using a proper five-day spacing (1-5 May), the next possible survey date would be 6 May (see section 3.D below for an exception to this rule).

C. A complete survey of the area should be conducted within seven consecutive days. If the area is too large to be surveyed in seven consecutive days, it should be divided into smaller subunits based on available owl habitat, topography, and other important factors.

D. In **remote areas,** surveyors can conduct two complete surveys during one trip into the area, so long as surveyors allow a minimum of two days between complete surveys. Conduct all field outings required for a complete survey prior to repeating any route for the second survey. Wait a minimum of 10 days before starting the next two surveys. **Areas defined as remote should be cleared with the FWS prior to proceeding with this deviation from the survey protocol.**

E. The two- to three-hour periods following sunset and preceding sunrise are the peak owl calling periods and the best times to locate owls in or near day **roosts** or nests.

F. Surveys can be discontinued in a given area when data indicate that the entire survey area is designated as PACs.

G. Vocal or visual locations of owls outside the breeding season (1 September - 28 February) as extra information can be of assistance in locating nesting owls in the upcoming breeding season.

4. Methods After Detecting a Mexican Spotted Owl

Once an owl has been detected, the following should be done:

A. Record the time the owl(s) was first detected, the type(s) of call(s) heard (if any), the owl's sex, and whether **juveniles** were detected.

B. Record a compass bearing from the surveyor's location to the location where the owl was heard and/or visually observed. If possible, triangulate the owl's location, taking compass bearings from three or more locations and estimate the distance to the owl. Record both the location where the owl responded from and the surveyor's calling location and triangulation locations on a map or photo attached to the survey form. The surveyor should know her/his location at all times. Triangulating provides an accurate means to map the owl's location. Attempt to confirm the presence of the owl(s) with a daytime follow-up visit (see section 5 below). Daytime owl locations, particularly of nests and young of the year, are very important in determining activity centers.

C. If the owl is heard clearly, and the call type and direction are confirmed, there is no need to continue calling. If, however, there is some doubt as to whether a response was detected, or from which direction, the surveyor should listen carefully for a few minutes, as an owl may call again if given the opportunity. If the owl does not respond after two to five minutes, the surveyor should continue calling to confirm owl presence and better assess the direction of the call. Do not call any more than is necessary. By stimulating the owl(s) to move you may harass a female owl off a nest or increase an owl's risk of predation.

D. Owls may move before or after they begin calling. Every effort should be made to estimate the location of the owl when the first response was heard. After you have determined the owl's location (see section 4.B above), move approximately 800 to 1,200 meters (0.5 to 0.75 mile) away (depending upon topography) before continuing surveys to avoid response by the same owl. If the owl responds from the original detection area, then move farther away before continuing to call.

E. Record the approximate location (bearing and distance), sex, age, and species of all other raptors heard in the survey area.

F. Conduct a daytime follow-up survey as soon as possible (see section 5 below).

5. Conducting Daytime Follow-up Surveys

As with nighttime surveys, follow-up daytime searches ensure quality of results and standardization of effort. Calling to elicit territorial responses is also used during daytime follow-up visits. A daytime follow-up survey helps locate owl roosts, nest sites, and young of the year (during 1 Jun - 1 Aug) by conducting an intensive search within the general vicinity of the original night response location. Owls tend to be more active in the early morning and late evening. During the day, owls are sleepy and do not always readily respond to calling, especially on warm days. Therefore, it is critical that surveyors conduct a thorough daytime search of the response area. Surveyors should spend enough time within the response area to cover all habitats within at least an 800-meter (0.5 mile) radius of the response location. This involves walking throughout the area, calling, listening, and watching for owl sign (e.g., whitewash, pellets, etc.). The FWS recommends that a minimum of one hour be spent searching for owls (regardless of the number of people surveying).

A. Complete a daytime follow-up survey as soon as possible, but within a maximum of 48 hours after owls are detected during nighttime surveys. The optimum daytime follow-up time is the morning following the nighttime detection. In general, the longer the time delay between the nighttime response and daytime follow-up survey, the smaller the probability of locating the bird and finding its roost or nest location. This is especially true if the owl(s) are not nesting. If the daytime follow-up survey is performed longer than 48 hours after the nighttime detection and no owls are found, the survey is considered incomplete and the survey must be re-done.

B. Conduct daytime follow-up surveys in the early morning or late afternoon/early evening. The optimal dawn period is 0.5 hour before sunrise to two hours after sunrise and the optimal dusk period is two hours prior to sunset; each daytime follow-up visit should include one of these time periods. Investing time in searching for the owl during these times will provide a more reliable inference of absence in the case where the owl cannot be located. For areas where spotted owls have been observed during the daytime during previous years, an initial survey in late April through mid-May can often elicit a response. However, non-responses are not that meaningful in documenting absence without nighttime surveys because owls could have moved to another nesting or roosting grove. Initial daytime surveys can be an efficient way to start each survey season where owls have been found in the past. If the initial daytime survey is unsuccessful (i.e., no response is heard), then nighttime surveys should be used to locate owls before attempting additional daytime surveys.

C. The search area for a daytime follow-up survey is a specific, smaller area within the broader survey area in which an owl was detected.

1. Minimum search area is all recovery habitat within at least an 800-meter (0.5-mile) radius of a nighttime owl response.

2. The search area should center on the location of the owl or owls that were heard during the nighttime survey. If there is some uncertainty, focus the search on the best nesting and roosting habitats (e.g. see Ward and Salas 2000).

3. Aerial photos and maps of the area should be studied to identify habitat patches and topographic features, such as canyons or drainages, to prioritize daytime survey locations. In forested areas, spotted owls often roost in first- and second-order tributaries (Ward and Salas 2000).

D. To conduct a thorough search for owls, the surveyor should systematically walk and call all forested recovery, riparian forest, and canyon habitats within the search area. As with nighttime surveys, be aware that owls often fly into the area to investigate; thus, surveyors must also attentively watch for owls. Surveyors should also search for signs of owls such as pellets, white wash, or molted feathers. However, pellets and whitewash alone are not sufficient to document owls. Mobbing jays or other birds can also be a sign that an owl is present.

E. If a daytime follow-up visit is not completed for any reason, or the search effort was not thorough because of the presence of predators or weather, a second follow-up visit should be conducted as soon as possible.

F. If no owl(s) are located during complete daytime follow-up visits, the surveyor should return to conduct nighttime surveys. Four complete surveys to an area are recommended by the survey protocol, but surveyors should assess the confidence of the nighttime and daytime responses and determine if additional nighttime surveys are needed to more accurately determine the location of the responding owl(s). Field personnel conducting surveys need to be given the flexibility to return as many times as necessary to find the owl(s).

G. As with nighttime surveys, daytime follow-up surveys should not be conducted in inclement weather and surveyors should avoid calling when potential owl predators are present.

H. Surveyors should minimize the amount of incidental disturbance to owls. For example, surveyors must not linger in nest sites or over-call in an area.

6. Methods If Mexican Spotted Owls Are Located on a Daytime Follow-up Visit

Mousing is the primary tool to locate an owl's mate, young, and/or nest. Mousing entails feeding live mice to **adult/subadult** owl(s) and observing the owl's subsequent behavior. Surveyors should be prepared to offer four mice (one at a time) to at least one member of the pair or to a single owl located on the daytime follow-up visit. For surveyors to draw conclusions about reproductive status, the owl must take at least two mice before refusing them. A mouse is considered "refused" if, after 30 minutes, it has not been taken by an owl.

If an owl takes a mouse and flies away, the surveyor should follow it as closely as possible to determine where it takes the mouse. If the surveyor is unable to follow the owl, and doesn't know if it took the mouse to a mate, nest, or fledged young, then the fate of that mouse cannot be counted toward the four-mouse minimum described above. Surveyors should be ready to rapidly pursue owls that take mice, as owls sometimes fly several hundred meters with mice to reach their nests or young. It is not necessary to complete the four mice minimum after a mouse has unequivocally been taken to a nest.

Owl pairs are determined to be non-nesting if a single owl eats and/or caches all four mice or eats and/or caches two mice and refuses to take a third. A mouse is cached when the owl puts the mouse in a tree or on the ground and then leaves the mouse or the owl perches with the mouse for at least one hour and gives no sign of further activity. Do not feed any more mice than necessary to determine pair status, nest location, and/or reproductive status (i.e., if all observed juveniles have received a mouse then number of young produced is determined and there is no need to continue mousing). Dropped mice or mice whose fates are unknown do not count toward the total of four mice needed to complete the protocol.

Ancillary notes on an owl's behavior during the mousing attempts are also very important to record. These observations can help clarify situations in which incomplete information was collected. For example, if a male is given a mouse and begins to make single-note contact calls while looking in a specific direction in April-June, that is often a good clue that a mate, nest, and/or young may be present. Sometimes observers are too close to other owls or the nest for the "true" mouse fate to be observed. Such observations should trigger another daytime follow-up to secure the location of a mate, nest, or young of the year. For these types of additional follow-up surveys, nighttime calling is usually not necessary.

7. Determining Status from Nighttime Surveys and Daytime Follow-up Visits

A. "Pair status" is established by any of the following:

1. A male and female owl are heard and/or observed in proximity (500 meters or 0.31 mile apart) to each other on the same visit.
2. A male takes a mouse to a female (see section 6 mousing guidelines).
3. A female is observed or heard on a nest.
4. One or both adults are observed with young.
5. At least one young of the year is observed.

B. "Single status" is inferred from:

1. A daytime observation on a single occasion or nighttime responses of a single owl within the same general area (within 500 meters or 0.31 mile) on two or more occasions, with no response by an owl of the opposite sex after two complete inventories (two years of survey); or

2. Multiple responses over several years from a bird of the same sex (i.e., two responses in the first year of surveys and one response in the second year of surveys, from the same general area).

Determining if the responses occur within the same general area should be based on topography and the location of any other known owls in the surrounding area.

C. "Two birds, pair status unknown" is inferred from:

The presence or response of two owls of the opposite sex where pair status cannot be determined.

D. "Status unknown" is inferred by:

The response of a male and/or female spotted owl that does not meet any of the above criteria. We recommend additional years of survey if this is the site status following a complete inventory of the site.

E. "Absence" is inferred:

If a complete inventory has been conducted according to this protocol, or an alternative protocol approved by the FWS, and no owls are heard. However, absence does not necessarily indicate that owls never occupy the area.

F. Separate territories are inferred by:

When two responses are recorded from owls that are more than 800 meters (0.5 mile) apart. These responses should be considered from individuals in separate territories unless daytime follow-up visits indicate otherwise. Ideally, surveyors on two or more crews should coordinate efforts to begin calling simultaneously near each suspected activity area to rule out the existence of multiple territories. If more than one survey crew elicits responses from owls of the same sex at roughly the same time, then two or more territories probably exist. However, if responses vary from those above, the results are considered inconclusive and additional attempts to determine status should continue. Keep in mind that some spotted owls shift their use of an area after failing to nest in a given season. Hence, responses heard in July that are 800 meters (0.5 mile) from a pair that was nesting in April or early May could be from the same individuals.

8. Determining Nesting Status and Reproductive Success

Determining reproductive success is not required if breeding season restrictions that protect owl reproduction are applied to all management projects in any given year. However, reproduction surveys are always valuable as they can provide information on nest tree locations, which provide the best data for determining 100-acre **core areas** (Ward and Salas 2000) and delineating PAC boundaries as recommended in the revised Recovery Plan. If the exact location of the nest is not determined, but juveniles are seen prior to August, the area where the juveniles are seen

can be referenced as the **nest stand**. There are two stages of reproduction surveys: nesting status and reproductive success.

A. Determining Nesting Status:

1. Nesting-status surveys should be conducted between 1 April and 1 June. The start date is based on nesting initiation dates. Young identified after 1 June would still confirm that nesting occurred but would not allow identification of the exact location of the nest. However, young observed prior to August are usually within 400 meters (0.2 miles) of the nest of that year (Ward and Salas 2000) and this information can be useful in delineating a 100-acre nest buffer.

2. Mousing should be used to determine nesting status. The site is classified as nesting, non-nesting, or unknown nesting status based on the surveyor's observations.

3. Two observations at least one week apart are necessary to determine nesting status if the first observation occurs before 1 May. This is necessary because the owls may show signs of initiating nesting early in the season without actually laying eggs and their behavior could be mistaken for nesting behavior. After 1 May, a single observation of nesting behavior is sufficient.

4. The owls are classified as nesting if, on two visits prior to 1 May, or one visit after 1 May:

   a. The female is seen on the nest;

   b. Either the male or female member of a pair carries a mouse to a nest; or

   c. Young-of-the-year are detected.

5. The owls will be classified as non-nesting if any of the following behaviors are observed. Two observations, minimum three weeks apart, are required during the nest survey period (1 April - 1 June) in order to infer non-nesting status. Because nesting attempts might fail before surveys are conducted, the non-nesting status includes owls that did not attempt to nest as well as those that had a failed nesting attempt. Non-nesting status is inferred during a daytime follow-up visit if:

   a. The female is observed roosting for a full 60 minutes (1-30 April) during the time she should be on a nest. The female should not be in an agitated state and should be given every opportunity to return to the nest. Surveyors should attempt to mouse the female.
   b. The surveyor offers prey to one or both members of the pair and they cache the prey, sit with the prey for an extended period of time (30-60 minutes), or refuse to take additional prey beyond the minimum of two prey items. To be considered a valid nesting survey, one owl must take <u>at least</u> two prey items.

c. All pairs considered to be non-nesting should receive at least one daytime follow-up visit between 15 May and 15 July to confirm that no young were produced.

6. Nesting status is unknown if:

   a. Owls are found after 1 June without young-of-the-year; or

   b. No adult or young owls are found after 1 June at those sites where adult owls were present prior to 1 June.

B. Determining Reproductive Status:

1. Once a pair is classified as nesting, reproductive success surveys should be conducted after the time the young-of-the-year leave the nest (fledge), usually in early to mid-June. For pairs whose nesting status was not determined, reproductive success surveys should be conducted between 15 May and 15 July.

2. At least two visits to the site spaced at least one week apart should be conducted to locate and count fledged young, and the timing of the visits should be scheduled so that the fledged young are observed as soon after leaving the nest as possible.

3. Visual searches and/or mousing should be used to determine reproductive success. The mousing protocol is the same as for determining non-nesting. If young are present, the adults should take at least some of the prey to the young. The sight of an adult with prey can stimulate the young to beg, revealing their number and location.

4. If the owls take at least two prey items and eventually cache, sit with, or refuse further prey without ever taking prey to fledged young during the proper time period and no other indicative behaviors like contact calls or searching are observed, then zero young are recorded. If one individual adult or subadult owl takes and eats four mice on one visit during the proper time period, then zero young are recorded. If, however, other behaviors indicate young may be in the area, another follow-up survey is recommended to verify that zero young were produced, particularly if the pair had been observed nesting earlier that year.

9. Annual Reporting

An annual report of the activities conducted (including field data forms, if appropriate) should be submitted to the FWS Permits Office in Albuquerque, New Mexico, as well as the appropriate state FWS ESFO. If applicable, hard copies of any unpublished or published reports generated by the study and other data that would be useful for the conservation or recovery of the owl should be submitted to the appropriate FWS ESFO(s).

10. Disposition of Dead, Injured, or Sick Mexican Spotted Owls

Upon locating a dead, injured, or sick owl, initial notification should be made to the FWS's Law Enforcement Office in Arizona (telephone: 480-967-7900), Colorado (telephone: 303-274-3560), New Mexico (telephone: 505-346-7828), or Utah (telephone: 801-625-5570) within two working days (48 hours) of its finding. Written notification should be made within five calendar days and should include information on when (date, time) and where (exact location) the owl was found, photographs of the owl and/or area, if possible, and any other pertinent information. The notification should be sent to the Law Enforcement Office with a copy to the appropriate FWS ESFO. Sick and injured owls should be transported by an authorized biologist to a licensed and permitted wildlife rehabilitator or veterinarian, and care must be taken during handling to ensure effective treatment. Should the treated owl(s) survive, the FWS should be contacted regarding the final disposition of the animal. Salvaged specimens or owls that did not survive rehabilitation should be handled with care to preserve the biological material, and the remains of intact owl(s) should be provided to the appropriate FWS ESFO (as noted in the Section 10 permit). If the remains of the owl(s) are not intact or are not collected, the information noted above should be obtained.

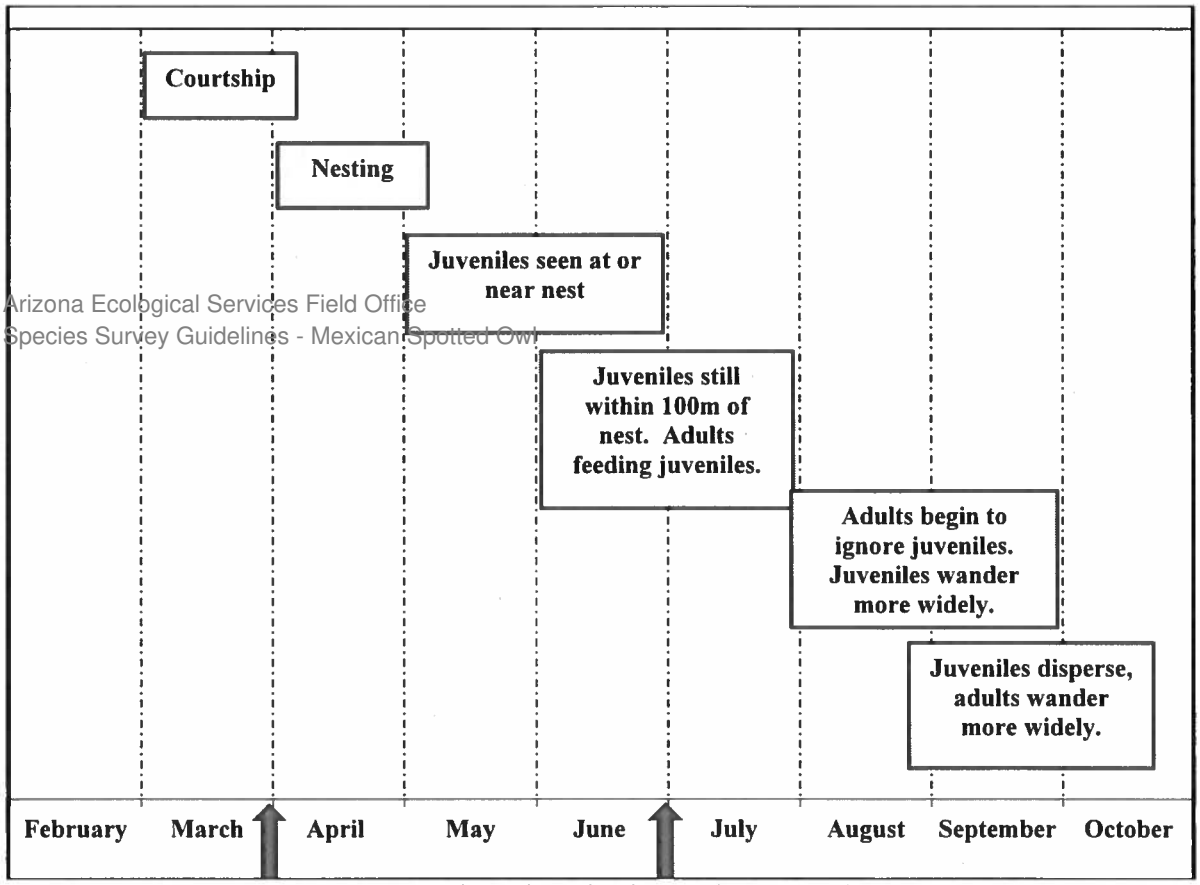


Figure D.1. Generalized reproductive chronology for the Mexican spotted owl. The area between the arrows at the bottom of the table indicates periods of high probability of detecting owls. Chronology may vary slightly with area, elevation, and/or in response to weather.

11. Glossary for Appendix D - Survey Protocol

Absence	Absence of Mexican spotted owls can be inferred when no response is recorded after a complete inventory has been completed in a defined area. Absence does not necessarily indicate that Mexican spotted owls do not or never occupy the area.
Adult	A Mexican spotted owl ≥27 months old. Tips of retrices (tail feathers) will be rounded with white and mottled color. Subadults will have triangular all white tips on tail feathers. For more information on identifying adult and first and second-year subadult Mexican spotted owls, see Moen et al. (1991).
Breeding Season	The time period from 1 March through 31 August that includes courtship, nesting, and nestling- and fledgling-dependency periods. **This is the period of time in which surveys should be conducted.** This time period will vary by geographic locale.
Calling Route	An established route within a survey area where vocal imitations or recorded calls of Mexican spotted owls are used to elicit a response.
Calling Stations	Point locations used to conduct surveys, distributed throughout an area so as to attain complete coverage of the survey area.
Complete Coverage	Complete coverage is obtained when the calling stations have been located within a survey area so that a Mexican spotted owl anywhere in the survey area would be able to hear surveyors and vice-versa.
Complete Inventory	When the following are met: 1) four complete surveys have been conducted in one year; 2) consecutive surveys have been conducted a minimum of five days apart; 3) no more than one survey has been conducted in March; 4) a minimum of two surveys have been conducted by 30 June; 5) all surveys were completed by 31 August, with no more than one survey conducted in the months of July and August; and, 6) two years of survey have been completed.
Complete Survey	A survey is complete when all calling stations or calling routes within a survey area are called within a seven-day period, including daytime follow-up visits for all Mexican spotted owl responses. If every reasonable effort has been made to cover the survey area in one outing but this is not accomplished, then additional outings will be scheduled to cover the remaining area. The entire survey area must be covered within seven consecutive days in order to be considered one complete survey. Although adverse weather conditions may present problems, an effort should be made to complete survey visits on consecutive days. If the survey area is too large to be completely surveyed in seven days, it may be

	divided into smaller areas based on available habitat, topography, drainages, etc.
Core Area	A 40-ha (100-acre) area within designated protected activity centers (PACs) circumscribed around the nest or roost site. The nest or roost area should include habitat that resembles the structural and floristic characteristics of the nest site. These 100-acre areas will be deferred from mechanical treatment. For additional details on delineation, see Ward and Salas (2000).
Daytime Follow-up Visit	A daytime follow-up visit is conducted around Mexican spotted owl responses. The objective of a daytime follow-up visit is to locate Mexican spotted owl(s), their nests and their young by conducting an intensive search within an 800-meter (0.5-mile) radius of the original nighttime or last known response location. The follow-up visit is conducted during daylight hours and should be completed as soon as possible following the initial detection, but no later than 48 hours after detection. If Mexican spotted owls are located during the daytime follow-up visit, the surveyors use the mousing technique to determine nesting and reproductive status.
Intermediate Calling Stations	Calling locations between identified calling stations or routes used to triangulate a Mexican spotted owl's location or used to improve calling coverage of an area when weather or other conditions require. These stations are not required to be established prior to the field outing in which they are used.
Juvenile	A Mexican spotted owl is considered a juvenile in its first five months after hatching. Juveniles one to three months old are very white and have downy plumage over all of the body or evident on breast and head; at four to five months old, juveniles begin losing downy plumage but retain white triangular tips on their tail feathers (Moen et al. 1991).
Mousing	Mousing is a term used to describe the act of offering prey items to owls or other birds of prey. The purpose of mousing Mexican spotted owls is to find mates and determine the reproductive status of the owl(s) (i.e., pair, nesting, non-nesting). In some instances, a male Mexican spotted owl will take a prey item to an unseen female or an adult owl will take prey items to unseen young.
Nest	Mexican spotted owls use broken-topped trees, old raptor nests, witches brooms, caves, cliff ledges, and tree cavities for nests. A Mexican spotted owl must be observed using the structure in order to designate a nest site.
Nest Stand	An area of vegetation that contains a Mexican spotted owl nest.

Nestling	A young owl that is still in the nest; may also be called a hatchling.
Predator	Potential predators of Mexican spotted owl eggs and young include the following: great-horned owl (*Bubo virginianus*), northern goshawk (*Accipiter gentilis*), red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), common ravens (*Corvus corax*) and procyonid mammals (e.g., coati [*Nasua nasua*] and ringtail [*Bassariscus astutus*]).
Protected Activity Center (PAC)	An area of at least 243 ha (600 acres) surrounding the "core area," which is the nest site, a roost grove commonly used during the breeding season in absence of a verified nest site, or the best roosting/nesting habitat if both nesting and roosting information are lacking. The 243 ha (600 acres) (minimum size) is delineated around the activity center using boundaries of known habitat polygons and/or topographic boundaries, such as ridgelines, as appropriate. The boundary should enclose the best possible Mexican spotted owl habitat, configured into as compact a unit as possible, with the nest or activity center located near the center. This should include as much roost/nest habitat as is reasonable, supplemented by foraging habitat where appropriate. For example, in a canyon containing mixed-conifer on north-facing slopes and ponderosa pine on south-facing slopes, it may be more desirable to include some of the south-facing slopes as foraging habitat than to attempt to include 600 acres of north-slope habitat. In many canyon situations, oval PACs may make more sense than, for example, circular PACs; but oval PACs could still include opposing canyon slopes as described above. All PACs should be retained until this subspecies is delisted, even if Mexican spotted owls are not located there in subsequent years.
Remote Area	Generally, any survey area that requires more than four hours of travel time by vehicle and/or foot during good road, trail, and weather conditions (good for the road or trail in question) to reach. All remote areas should be agreed upon by the FWS on a case-by-case basis prior to using the survey protocol to clear a project.
Recovery Habitat	Mixed-conifer and pine-oak forest types, and riparian forests as described in this revised Recovery Plan. Recovery nest/roost habitat either is currently or has the potential to develop into nest/roost habitat. Recovery foraging/non-breeding habitat currently does or could provide habitat for foraging, dispersing, or wintering life history needs. Specific guidelines for management activities and developing recovery nest/roost conditions are specified in this revised Recovery Plan.

Roost	Tree, cliff ledge, rock, or log used by a Mexican spotted owl for extended daytime rest periods. A roost site consists of the roost itself and the immediate vicinity. Roost areas are identified by observations of the Mexican spotted owls and/or the presence of pellets, whitewash, and other evidence.
Subadult	Mexican spotted owls in their second and third summers (5 to 26 months of age). Identified by characteristic tail feathers with white tips tapering to sharp points (i.e., triangular shaped). For more information on identifying subadult Mexican spotted owls, please see Moen et al. (1991).

12. Literature Cited for Appendix D - Survey Protocol

American Society of Mammalogists. 1998. Guidelines for the capture, handling, and care of mammals as approved by the American Society of Mammalogists. Journal of Mammalogy 79:1416–1431.

Forsman, E.D. 1983. Methods and materials for locating and studying spotted owls. USDA Forest Service, General Technical Report PNW-162, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon, USA..

Franklin, A.B. 1992. Population regulation in northern spotted owls: theoretical implications for management Pgs. 815-827 in D.R. McCullough and R.H. Barrett, eds. Wildlife 2001: populations. El Sevier Applied Sciences, London, England.

Ganey, J.L. 1990. Calling behavior of spotted owls in northern Arizona. Condor 92:485-490.

Moen, C.A., A.B. Franklin, and R.J. Gutierrez. 1991. Age determination of subadult northern spotted owls in northwest California. Wildlife Society Bulletin 19:489-493.

National Academy of Sciences. 1996. Guide for the care and use of laboratory animals. Institute for Laboratory Animal Resources. Commission on Life Sciences, National Research Council, Washington, D.C, USA.

U.S. Department of the Interior, Fish and Wildlife Service [USDI FWS]. 1995. Recovery plan for the Mexican spotted owl. Albuquerque, New Mexico.

Ward, J. P., Jr., and D. Salas. 2000. Adequacy of roost locations for defining buffers around Mexican spotted owl nests. Wildlife Society Bulletin 28:688-698.

13. Suggested Reading for Appendix D – Survey Protocol

Ganey, J.L. and J. L. Dick, Jr. 1995. Chapter 4. Habitat relationships of the Mexican spotted owl: current knowledge. Pp. 1-42 *in* USDI Fish and Wildlife Service. Recovery plan for the Mexican spotted owl: volume II. Albuquerque, New Mexico, USA.

Gutiérrez, R. J., A. B. Franklin, and W. S. LaHaye. 1995. Spotted owl. The birds of North America 179:1-28.

Moen, C.A., A.B. Franklin, and R.J. Gutierrez. 1991. Age determination of subadult northern spotted owls in northwest California. Wildlife Society Bulletin 19:489-493.

Rinkevich, S.E., and R.J. Gutierrez. 1996. Mexican spotted owl habitat characteristics in Zion National Park. Journal of Raptor Research 30:74-78.

Seamans, M.E., and R.J. Gutierrez. 1997. Breeding habitat of the Mexican spotted owl in the Tularosa Mountains, New Mexico. Condor 97:944-951.

USDI Fish and Wildlife Service. 1993. Final rule to list the Mexican spotted owl as threatened. Federal Register 14248. Albuquerque, New Mexico, USA.

USDI Fish and Wildlife Service. 1995. Recovery plan for the Mexican spotted owl: volume I. Albuquerque, New Mexico, USA. 172 p.

Ward, J.P., and D. Salas. 2000. Adequacy of roost locations for defining buffers around Mexican spotted owl nests. Wildlife Society Bulletin 28(3):688-698.

White, G. C., A. B. Franklin, and J. P. Ward, Jr. 1995. Chapter 2. Population Biology Pp. 1-25 *in* USDI Fish and Wildlife Service. Recovery plan for the Mexican spotted owl: volume II. Albuquerque, New Mexico, USA.

Zwank, P.J., K.W. Kroel, D.M. Levin, G.M. Southward, and R.C. Romme. 1994. Habitat characteristics of Mexican spotted owls in southwestern New Mexico. Journal of Field Ornithology 65:324-334.

14. Mexican Spotted Owl Survey Protocol Outline

Complete Inventory Four complete surveys each year (minimum five days apart)
No more than one survey in March
Minimum of two surveys prior to June 30th
No more than one survey in each of July and August
All surveys completed by 31 August
Two years of complete surveys

1. Owl(s) Detected, go to 3

2. No Owls Detected, Absence inferred for survey area

3. PRESENCE - Conduct a daytime follow-up visit

   A. No owl(s) found on daytime follow-up visit:

      Status unknown, SINGLE STATUS inferred, return to night calling

   B. Single owl located on daytime follow-up visit:

      Feed maximum 4 mice to owl to determine status; if no other owl located, RESIDENT SINGLE CONFIRMED

   C. Pair of owls located on daytime follow-up visit:

      PAIR CONFIRMED for site, go to 4B

4. NESTING STATUS SURVEYS (1 April - 1 June)

   A. Pair not detected, non-nesting, non-reproduction inferred (for that survey)

   B. Pair located, mouse owls (1 of owl pair fed 4 mice)

      1. If one of the following occurs, nesting confirmed, reproduction unknown, go to 5B:

         a. Female on nest

         b. Owl takes prey to nest

         c. Young in nest with adult present

      2. If one of the following occurs, non-nesting inferred, non reproduction inferred (two visits to infer non-nesting, minimum three weeks apart):

a. One of owl pair fed four mice (know fate of all four mice)

b. Female refuses mouse and/or roosts for minimum one hour (1 April - 30 April)

3. Pair (but no young) located after 1 June:

a. NESTING STATUS UNKNOWN

b. Conduct reproductive visit, go to 5A

5. REPRODUCTIVE SUCCESS VISITS

A. NESTING STATUS UNKNOWN

1. Recommend two visits, one week apart, feed four mice to locate juveniles

B. NESTING STATUS KNOWN

1. One visit to look for juveniles (this may take more than one visit to locate all juveniles produced)

2. If surveyor does not find juveniles, mouse adults to locate juveniles

Correspondence with

Arizona Game & Fish Department (AZGFD)

August 27, 2020

Siddharth Mazumdar
Sunrise Engineering, Inc.
2045 South Vineyard, Suite 101
Mesa, Arizona 85210

RE: Proposed Water Distribution Improvements in Pine and Strawberry Arizona

Dear Siddharth Mazumdar,

The Arizona Game and Fish Department (Department) appreciates the opportunity to review the proposed construction activities for improvements to the wells and pipelines in Pine and Strawberry, Arizona. The activities include the rehabilitation of some existing wells, installation of new wells and replacement of several existing pipelines.

Under Title 17 of the Arizona Revised Statutes, the Department, by and through the Arizona Game and Fish Commission (Commission), has jurisdictional authority and public trust responsibilities for the management of state fish and wildlife resources. In addition, the Department manages threatened and endangered species though Section 6 authorities and the Department's 10(a)1(A) permit. It is the mission of the Department to conserve Arizona's diverse fish and wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations. For your consideration, the Department provides the following comments based on the agency's statutory authorities, public trust responsibilities, and special expertise related to wildlife resources and recreation.

The environmental review (attached) contains the Departments Heritage Data Management System data and the State Wildlife Action Plan data. Based on this information, any trenching associated with the construction activities should be covered and/or backfilled as soon as possible to eliminate any entrapment of wildlife. If these areas cannot be covered, incorporation of escape ramps or fencing along the perimeter using a mesh fence to deter small mammals and herptefauna from entering the area. Disturbance should be reseeded with a native, weed free seed mix and precautions to wash all equipment is necessary to prevent the spread of invasive and noxious weed species. Pre construction surveys would inform the best practices and any additional precautions needed for these species.

Arizona Environmental Online Review Tool Report

Arizona Game and Fish Department Mission
To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

Project Name:
water distribution improvements for pine and strawberry

Project Description:
improvements to wells, new wells and pipelines

Project Type:
Water Use, Transfer, and Channel Activities, Water delivery and supply line or effluent delivery line (operated by municipality or water company), Maintenance to existing lines

Contact Person:
kelly wolff

Organization:
AZGFD

On Behalf Of:
AZGFD

Project ID:
HGIS-11927

Please review the entire report for project type and/or species recommendations for the location information entered. Please retain a copy for future reference.

Disclaimer:

1. This Environmental Review is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
2. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area. This review is also not intended to replace environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the Departments review of site-specific projects.
3. The Departments Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. HDMS data contains information about species occurrences that have actually been reported to the Department. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. HabiMap Arizona data, specifically Species of Greatest Conservation Need (SGCN) under our State Wildlife Action Plan (SWAP) and Species of Economic and Recreational Importance (SERI), represent potential species distribution models for the State of Arizona which are subject to ongoing change, modification and refinement. The status of a wildlife resource can change quickly, and the availability of new data will necessitate a refined assessment.

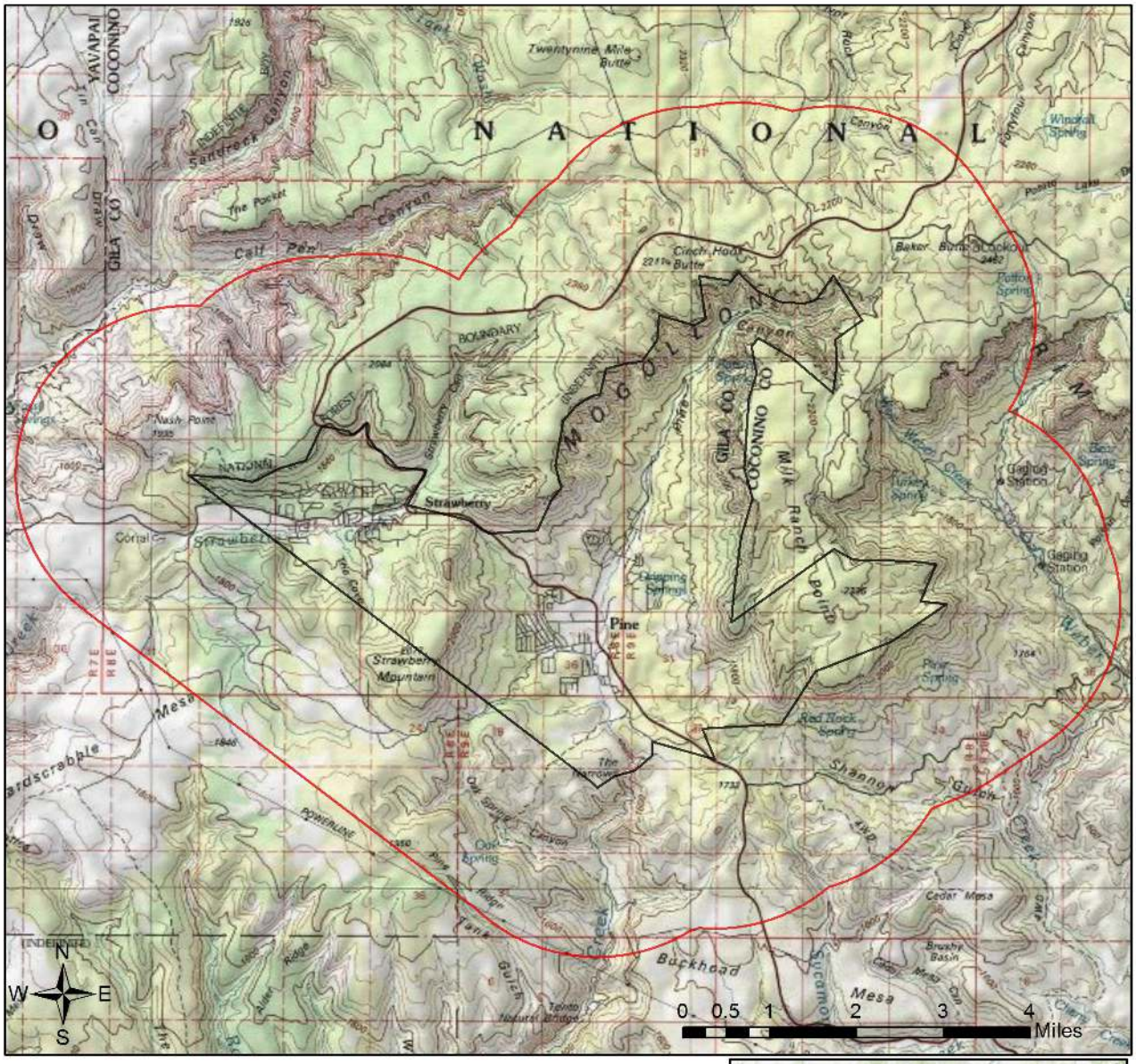
Locations Accuracy Disclaimer:
Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

Recommendations Disclaimer:

1. The Department is interested in the conservation of all fish and wildlife resources, including those species listed in this report and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
2. Recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation).
3. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project. These recommendations are preliminary in scope, designed to provide early considerations on all species of wildlife.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. Further coordination with the Department requires the submittal of this Environmental Review Report with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map). Once AGFD had received the information, please allow 30 days for completion of project reviews. Send requests to:
   Project Evaluation Program, Habitat Branch
   Arizona Game and Fish Department
   5000 West Carefree Highway
   Phoenix, Arizona 85086-5000
   Phone Number: (623) 236-7600
   Fax Number: (623) 236-7366
   Or
   PEP@azgfd.gov
6. Coordination may also be necessary under the National Environmental Policy Act (NEPA) and/or Endangered Species Act (ESA). Site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies

water distribution improvements for pine and strawberry

USA Topo Basemap With Locator Map



Project Boundary

Buffered Project Boundary

Project Size (acres): 13,236.17

Lat/Long (DD): 34.3995 / -111.4521

County(s): Coconino; Gila

AGFD Region(s): Flagstaff; Mesa

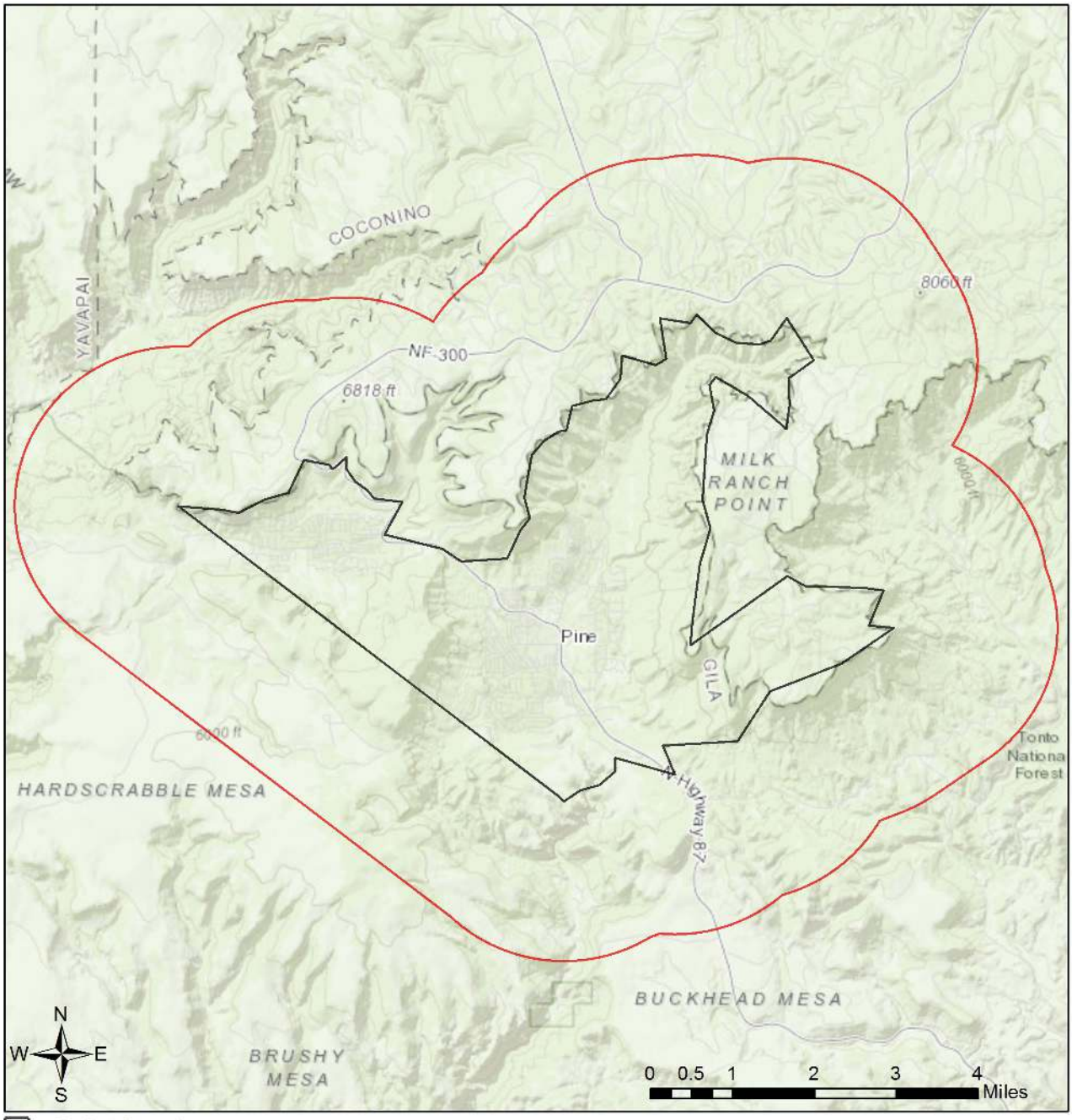
Township/Range(s): T11.5N, R9E; T12N, R8E; T12N, R9E

USGS Quad(s): BUCKHEAD MESA; PINE +

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap

water distribution improvements for pine and strawberry

Web Map As Submitted By User



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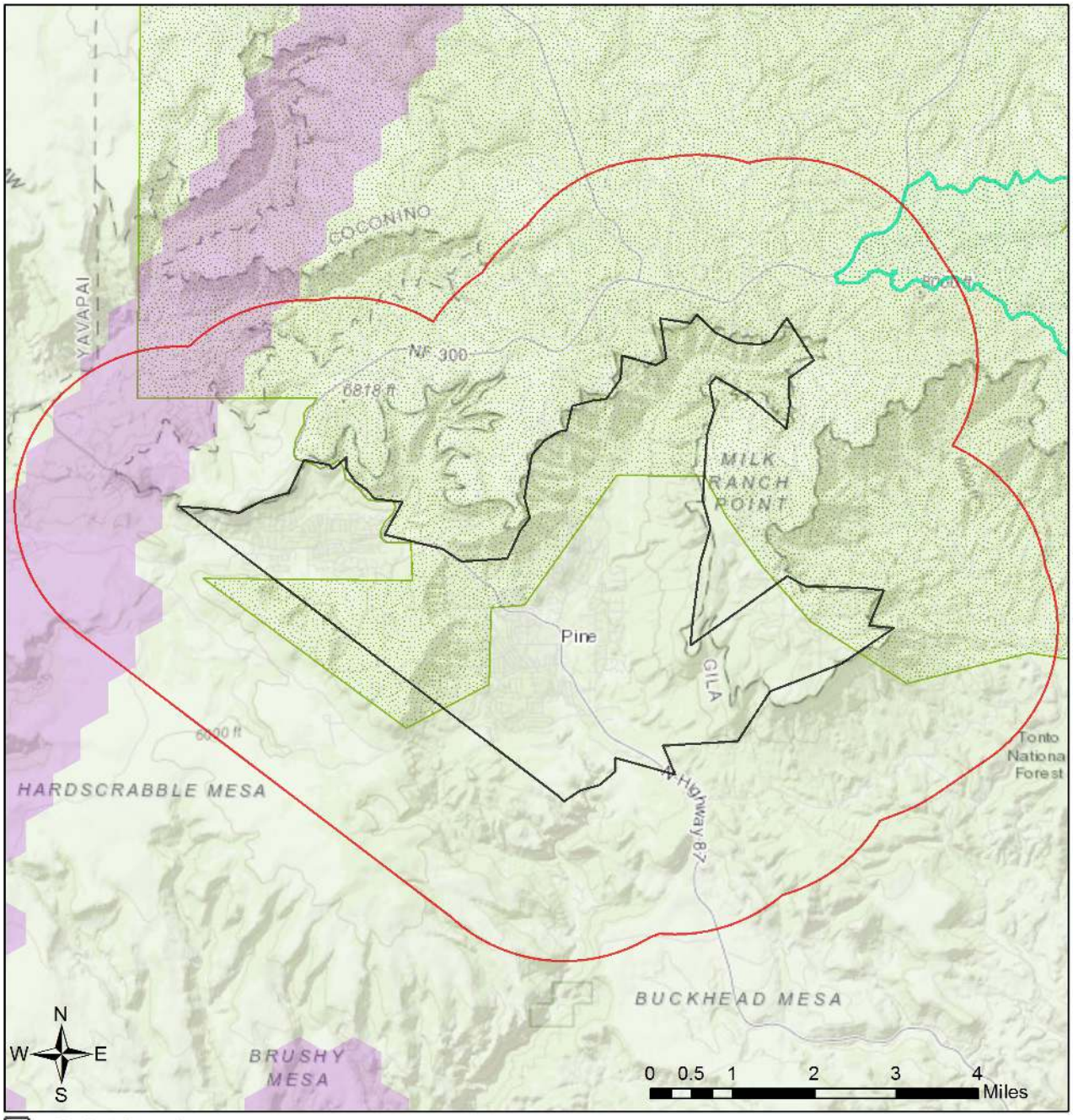
water distribution improvements for pine and strawberry

Important Areas



- Project Boundary
- Buffered Project Boundary
- Wildlife Connectivity
- Important Connectivity Zones
- Pinal County Riparian
- Critical Habitat
- Important Bird Areas

Project Size (acres): 13,236.17

Lat/Long (DD): 34.3995 / -111.4521

County(s): Coconino; Gila

AGFD Region(s): Flagstaff; Mesa

Township/Range(s): T11.5N, R9E; T12N, R8E; T12N, R9E

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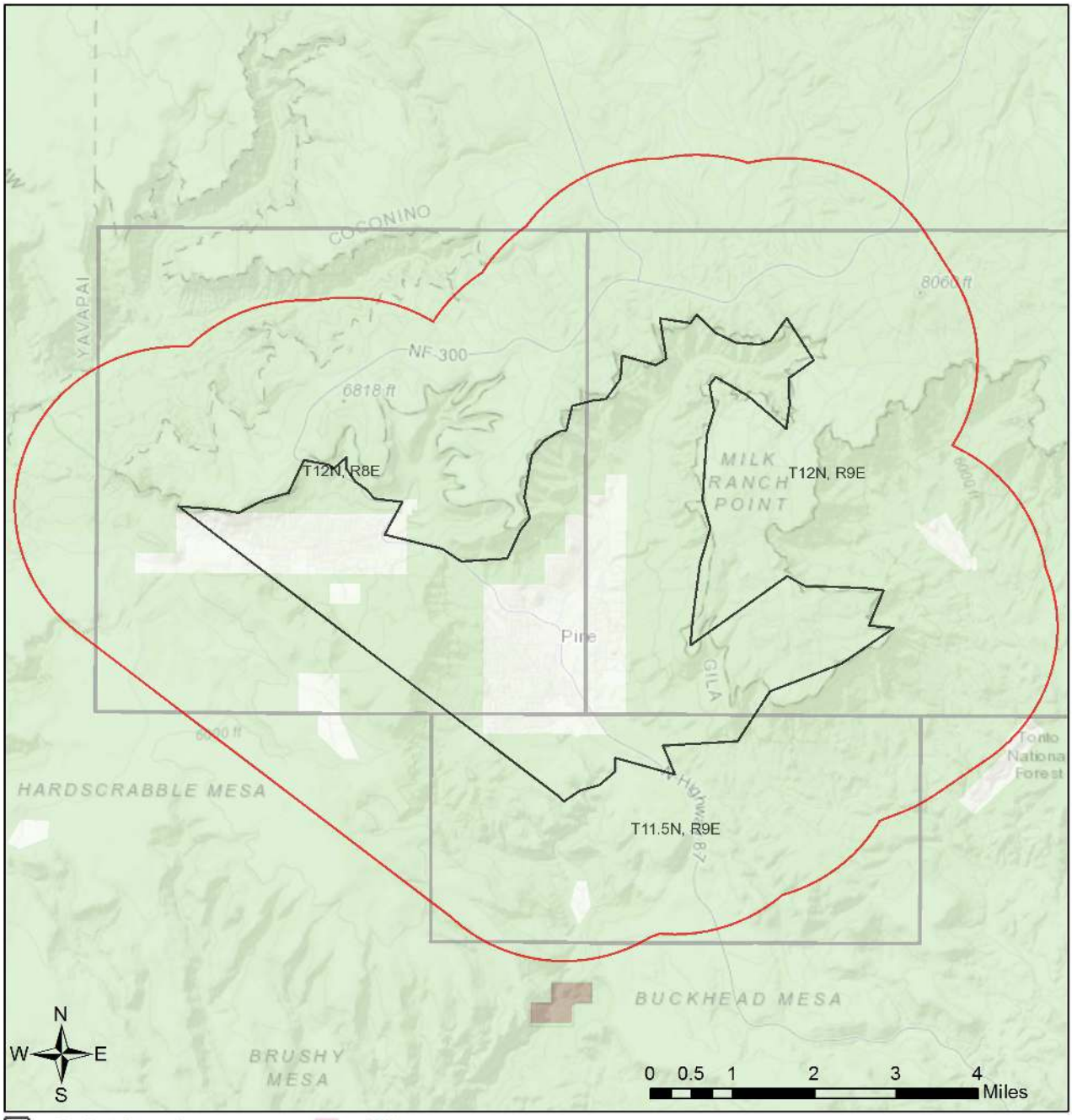
water distribution improvements for pine and strawberry

Township/Ranges and Land Ownership



- Project Boundary
- Buffered Project Boundary
- Township/Ranges

Land Ownership

- AZ Game & Fish Dept.
- BLM
- BOR
- Indian Res.
- Military
- Mixed/Other
- National Park/Mon.
- Private
- State & Regional Parks
- State Trust
- US Forest Service
- Wildlife Area/Refuge

Project Size (acres): 13,236.17

Lat/Long (DD): 34.3995 / -111.4521

County(s): Coconino; Gila

AGFD Region(s): Flagstaff; Mesa

Township/Range(s): T11.5N, R9E; T12N, R8E; T12N, R9E

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Special Status Species Documented within 2 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Accipiter gentilis	Northern Goshawk	SC	S	S		1B
Anaxyrus microscaphus	Arizona Toad	SC		S		1B
Catostomus clarkii	Desert Sucker	SC	S	S		1B
Cicindela oregona maricopa	Maricopa Tiger Beetle	SC				
Echinocereus yavapaiensis	Yavapai Hedgehog Cactus				SR	
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S		1A
Gila robusta	Roundtail Chub	SC	S	S		1A
Hyla wrightorum	Arizona Treefrog					1C
Lithobates chiricahuensis	Chiricahua Leopard Frog	LT				1A
Lithobates pipiens	Northern Leopard Frog		S	S		1A
Penstemon nudiflorus	Flagstaff Beardtongue		S			
Pyrgulopsis sola	Brown Springsnail	SC	S			1A
Rhinichthys osculus	Speckled Dace	SC		S		1B
Rumex orthoneurus	Blumer's Dock	SC	S		HS	
Sonorella ambigua verdensis	Papago Verde Talussnail					1C
Strix occidentalis lucida	Mexican Spotted Owl	LT				1A
Thamnophis rufipunctatus	Narrow-headed Gartersnake	LT	S			1A
Triteleia lemmoniae	Oak Creek Triteleia				SR	

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Special Areas Documented within the Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
CH for Strix occidentalis lucida	Mexican Spotted Owl Designated Critical Habitat					
Canis lupus baileyi	10J area Zone 1 for Mexican Wolf	LE,XN				
Canis lupus baileyi	10J area Zone 2 for Mexican Wolf	LE,XN				

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Species of Greatest Conservation Need Predicted within the Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Accipiter gentilis	Northern Goshawk	SC	S	S		1B
Agosia chrysogaster	Longfin Dace	SC		S		1B
Aix sponsa	Wood Duck					1B
Ambystoma mavortium nebulosum	Arizona Tiger Salamander					1B
Ammospermophilus harrisii	Harris' Antelope Squirrel					1B
Anaxyrus microscaphus	Arizona Toad	SC		S		1B
Aquila chrysaetos	Golden Eagle	BGA		S		1B

Species of Greatest Conservation Need Predicted within the Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Aspidoscelis flagellicauda	Gila Spotted Whiptail					1B
Baeolophus ridgwayi	Juniper Titmouse					1C
Buteo regalis	Ferruginous Hawk	SC		S		1B
Buteogallus anthracinus	Common Black Hawk					1C
Cardellina rubrifrons	Red-faced Warbler					1C
Castor canadensis	American Beaver					1B
Catostomus clarkii	Desert Sucker	SC	S	S		1B
Catostomus insignis	Sonora Sucker	SC	S	S		1B
Chordeiles minor	Common Nighthawk					1B
Cinclus mexicanus	American Dipper					1B
Coccothraustes vespertinus	Evening Grosbeak					1B
Coccyzus americanus	Yellow-billed Cuckoo (Western DPS)	LT	S			1A
Coluber bilineatus	Sonoran Whipsnake					1B
Contopus cooperi	Olive-sided Flycatcher	SC				1C
Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S	S		1B
Crotalus cerberus	Arizona Black Rattlesnake					1B
Cyrtonyx montezumae	Montezuma Quail					1C
Empidonax traillii extimus	Southwestern Willow Flycatcher	LE				1A
Empidonax wrightii	Gray Flycatcher					1C
Euderma maculatum	Spotted Bat	SC	S	S		1B
Eumops perotis californicus	Greater Western Bonneted Bat	SC		S		1B
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S		1A
Geothlypis tolmiei	MacGillivray's Warbler					1B
Gila robusta	Roundtail Chub	SC	S	S		1A
Gymnorhinus cyanocephalus	Pinyon Jay			S		1B
Haliaeetus leucocephalus	Bald Eagle	SC, BGA	S	S		1A
Heloderma suspectum	Gila Monster					1A
Incilius alvarius	Sonoran Desert Toad					1B
Kinosternon sonoriense sonoriense	Desert Mud Turtle			S		1B
Lasiurus blossevillii	Western Red Bat		S			1B
Leopardus pardalis	Ocelot	LE				1A
Lithobates chiricahuensis	Chiricahua Leopard Frog	LT				1A
Lithobates pipiens	Northern Leopard Frog		S	S		1A
Lithobates yavapaiensis	Lowland Leopard Frog	SC	S	S		1A
Lontra canadensis sonora	Southwestern River Otter	SC				1B
Melanerpes uropygialis	Gila Woodpecker					1B
Melospiza lincolnii	Lincoln's Sparrow					1B
Melozone aberti	Abert's Towhee		S			1B
Microtus mexicanus	Mexican Vole					1B

Species of Greatest Conservation Need Predicted within the Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Myiarchus tuberculifer	Dusky-capped Flycatcher					1B
Myiarchus tyrannulus	Brown-crested Flycatcher					1C
Myiodynastes luteiventris	Sulphur-bellied Flycatcher		S			1B
Myotis occultus	Arizona Myotis	SC		S		1B
Myotis velifer	Cave Myotis	SC		S		1B
Myotis yumanensis	Yuma Myotis	SC				1B
Neotamias cinereicollis	Gray-collared Chipmunk					1B
Neotoma stephensi	Stephen's Woodrat					1B
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					1B
Odocoileus virginianus	White-tailed Deer					1B
Oncorhynchus gilae	Gila Trout	LT				1A
Oreoscoptes montanus	Sage Thrasher					1C
Ovis canadensis canadensis	Rocky Mountain Bighorn Sheep					1B
Panthera onca	Jaguar	LE				1A
Patagioenas fasciata	Band-tailed Pigeon					1C
Peucedramus taeniatus	Olive Warbler					1C
Poeciliopsis occidentalis occidentalis	Gila Topminnow	LE				1A
Progne subis hesperia	Desert Purple Martin			S		1B
Psiloscops flammeolus	Flammulated Owl					1C
Ptychocheilus lucius	Colorado Pikeminnow	LE,XN				1A
Pyrgulopsis sola	Brown Springsnail	SC	S			1A
Rhinichthys osculus	Speckled Dace	SC		S		1B
Sciurus arizonensis	Arizona Gray Squirrel					1B
Setophaga petechia	Yellow Warbler					1B
Sphyrapicus nuchalis	Red-naped Sapsucker					1C
Sphyrapicus thyroideus	Williamson's Sapsucker					1C
Spizella atrogularis	Black-chinned Sparrow					1C
Strix occidentalis lucida	Mexican Spotted Owl	LT				1A
Tadarida brasiliensis	Brazilian Free-tailed Bat					1B
Troglodytes pacificus	Pacific Wren					1B
Vireo bellii arizonae	Arizona Bell's Vireo					1B
Vireo vicinior	Gray Vireo		S			1C
Vulpes macrotis	Kit Fox	No Status				1B
Xyrauchen texanus	Razorback Sucker	LE				1A

Species of Economic and Recreation Importance Predicted within the Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Callipepla gambelii	Gambel's Quail					

Species of Economic and Recreation Importance Predicted within the Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Cervus elaphus	Elk					
Meleagris gallopavo	Wild Turkey					
Odocoileus hemionus	Mule Deer					
Odocoileus virginianus	White-tailed Deer					1B
Patagioenas fasciata	Band-tailed Pigeon					1C
Pecari tajacu	Javelina					
Puma concolor	Mountain Lion					
Sciurus aberti	Abert's Squirrel					
Sciurus nayaritensis	Mexican Fox Squirrel					
Tamiasciurus hudsonicus mogollonensis	Red Squirrel					
Ursus americanus	American Black Bear					
Zenaida asiatica	White-winged Dove					
Zenaida macroura	Mourning Dove					

Project Type: Water Use, Transfer, and Channel Activities, Water delivery and supply line or effluent delivery line (operated by municipality or water company), Maintenance to existing lines

Project Type Recommendations:
Minimize potential introduction or spread of exotic invasive species. Invasive species can be plants, animals (exotic snails), and other organisms (e.g., microbes), which may cause alteration to ecological functions or compete with or prey upon native species and can cause social impacts (e.g., livestock forage reduction, increase wildfire risk). The terms noxious weed or invasive plants are often used interchangeably. Precautions should be taken to wash all equipment utilized in the project activities before leaving the site. Arizona has noxious weed regulations (Arizona Revised Statutes, Rules R3-4-244 and R3-4-245). See Arizona Department of Agriculture website for restricted plants, https://agriculture.az.gov/. Additionally, the U.S. Department of Agriculture has information regarding pest and invasive plant control methods including: pesticide, herbicide, biological control agents, and mechanical control, https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/quality/?cid=stelprdb1044769 The Department regulates the importation, purchasing, and transportation of wildlife and fish (Restricted Live Wildlife), please refer to the hunting regulations for further information https://www.azgfd.com/hunting/regulations.

Trenches should be covered or back-filled as soon as possible. Incorporate escape ramps in ditches or fencing along the perimeter to deter small mammals and herptefauna (snakes, lizards, tortoise) from entering ditches.

Vegetation restoration projects (including treatments of invasive or exotic species) should have a completed site-evaluation plan (identifying environmental conditions necessary to re-establish native vegetation), a revegetation plan (species, density, method of establishment), a short and long-term monitoring plan, including adaptive management guidelines to address needs for replacement vegetation.

Project Location and/or Species Recommendations:

HDMS records indicate that one or more native plants listed on the **Arizona Native Plant Law and Antiquities Act** have been documented within the vicinity of your project area. Please contact:
Arizona Department of Agriculture
1688 W Adams St.
Phoenix, AZ 85007
Phone: 602.542.4373
https://agriculture.az.gov/sites/default/files/Native%20Plant%20Rules%20-%20AZ%20Dept%20of%20Ag.pdf starts on page 44

HDMS records indicate that one or more **Listed, Proposed, or Candidate** species or **Critical Habitat** (Designated or Proposed) have been documented in the vicinity of your project. The Endangered Species Act (ESA) gives the US Fish and Wildlife Service (USFWS) regulatory authority over all federally listed species. Please contact USFWS Ecological Services Offices at http://www.fws.gov/southwest/es/arizona/ or:

Phoenix Main Office
9828 North 31st Avenue #C3
Phoenix, AZ 85051-2517
Phone: 602-242-0210
Fax: 602-242-2513

Tucson Sub-Office
201 N. Bonita Suite 141
Tucson, AZ 85745
Phone: 520-670-6144
Fax: 520-670-6155

Flagstaff Sub-Office
SW Forest Science Complex
2500 S. Pine Knoll Dr.
Flagstaff, AZ 86001
Phone: 928-556-2157
Fax: 928-556-2121

HDMS records indicate that **Chiricahua Leopard Frogs** have been documented within the vicinity of your project area. Please review the Chiricahua Leopard Frog Management Guidelines found at: https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/planningFor/wildlifeFriendlyGuidelines/FINALLithchirHabitatGdlns.pdf

HDMS records indicate that **Peregrine Falcons** have been documented within the vicinity of your project area. Please review the Peregrine Falcon Management Guidelines at: https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/planningFor/wildlifeFriendlyGuidelines/peregrineFalconConservGuidelines.pdf.

Thank you for the opportunity to provide input on these water distribution improvements. For further coordination, please contact Kelly Wolff, kwolff@azgfd or 480-324-3550.

Sincerely,

Kristelle Cook ACTING REGIONAL SUPERVISOR

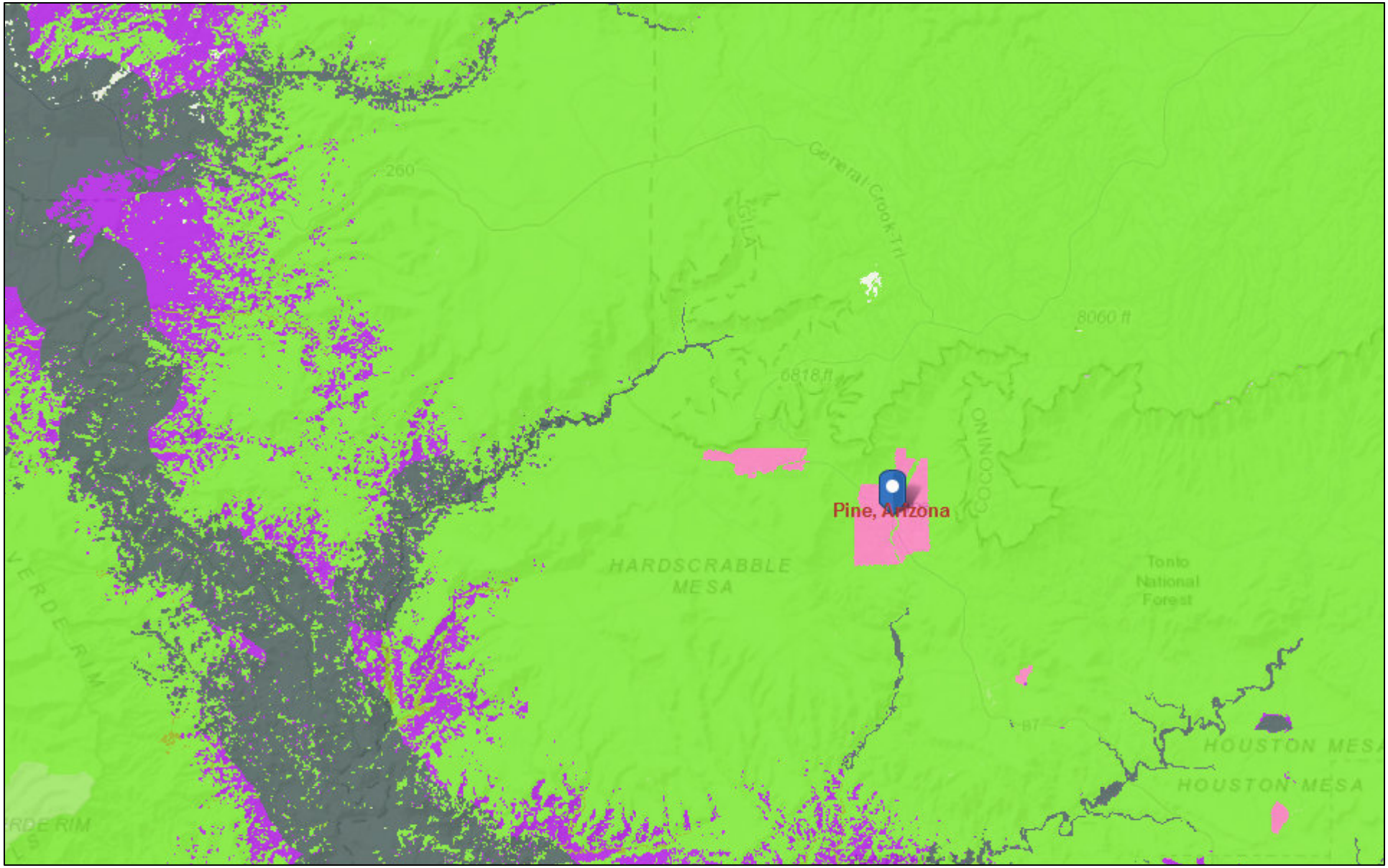
Jay Cook
Regional Supervisor, Mesa

Cc: Ginger Ritter, Project Evaluation Program Supervisor

M20-08142553

Maps of Arizona's Species of Greatest Conservation Need (SGCN), Species of Economic Importance (SERI), Amphibians and Birds species from the Arizona Game and Fish Department (AZGFD)'s Online Environmental Review Tool

Birds



August 17, 2020

- Abert's Towhee
- American Bittern
- American Peregrine Falcon
- Arizona Bell's Vireo
- Golden Eagle
- Lincoln's Sparrow

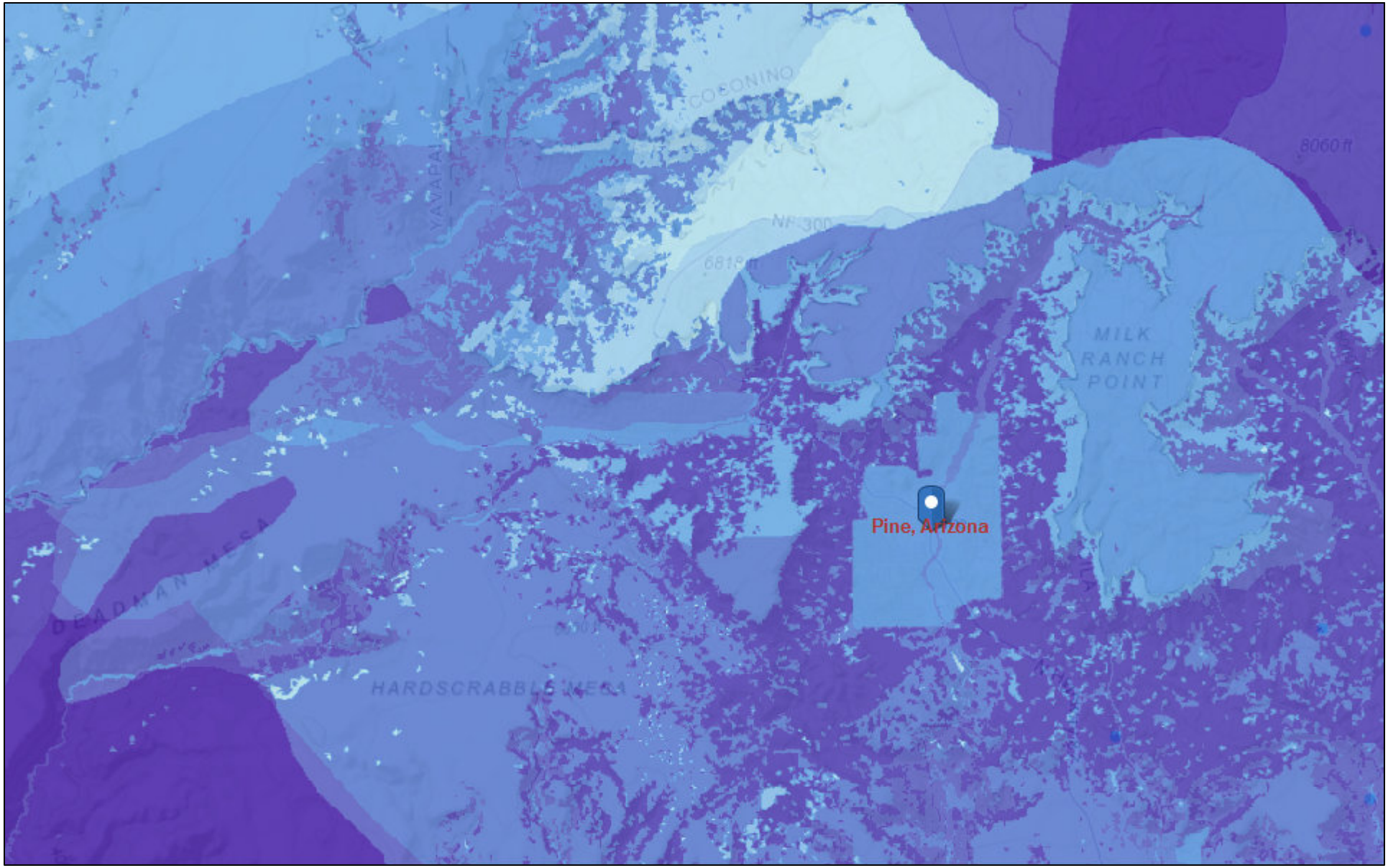
1:251,098

0 2 4 8 mi

0 3.25 6.5 13 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Species of Economic and Recreation Importance Richness



August 17, 2020

High

Low

Wildlife Waters

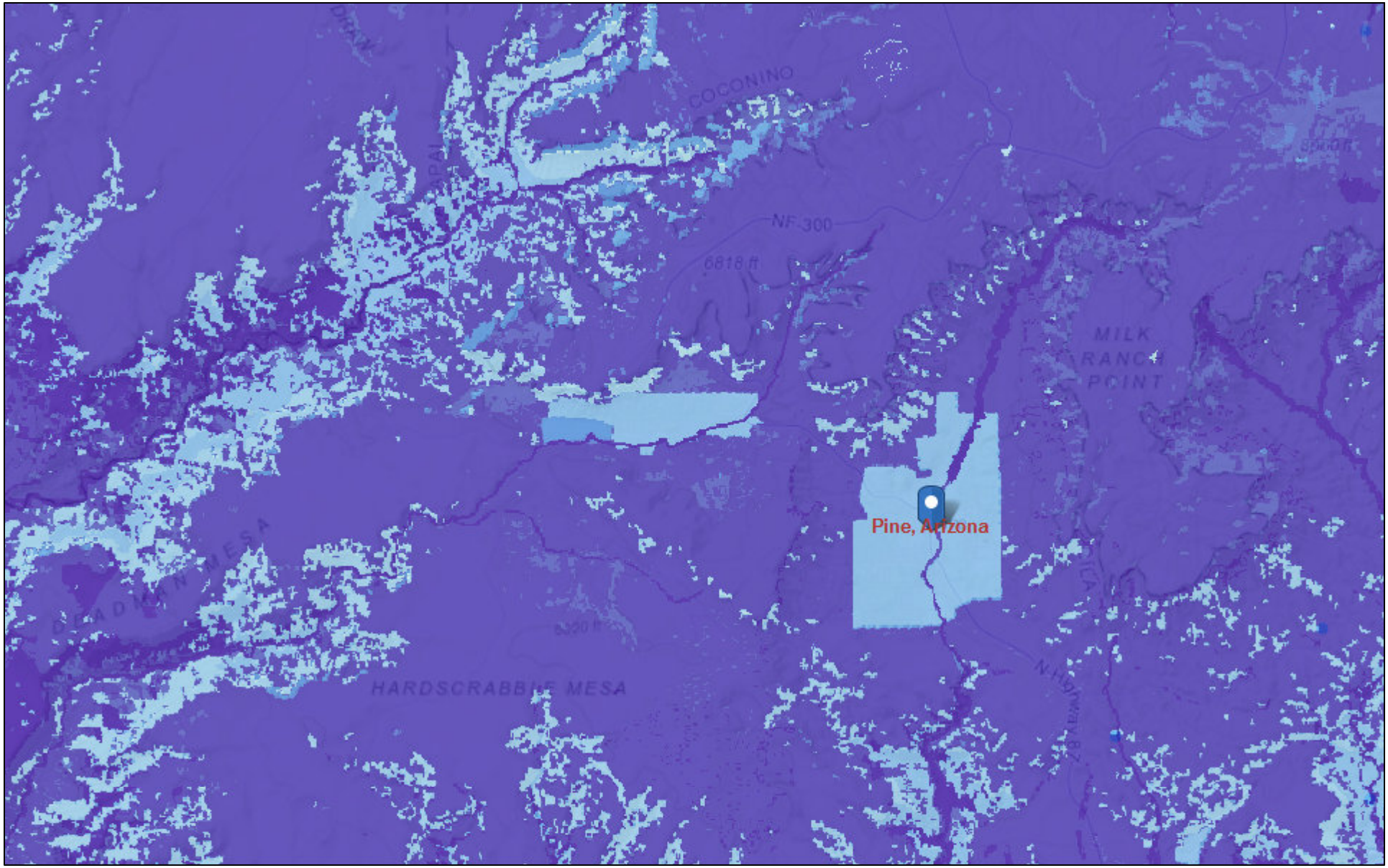
1:125,549

0 1 2 4 mi

0 1.75 3.5 7 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Species of Greatest Conservation Need Richness



August 17, 2020

High

Low

Wildlife Waters

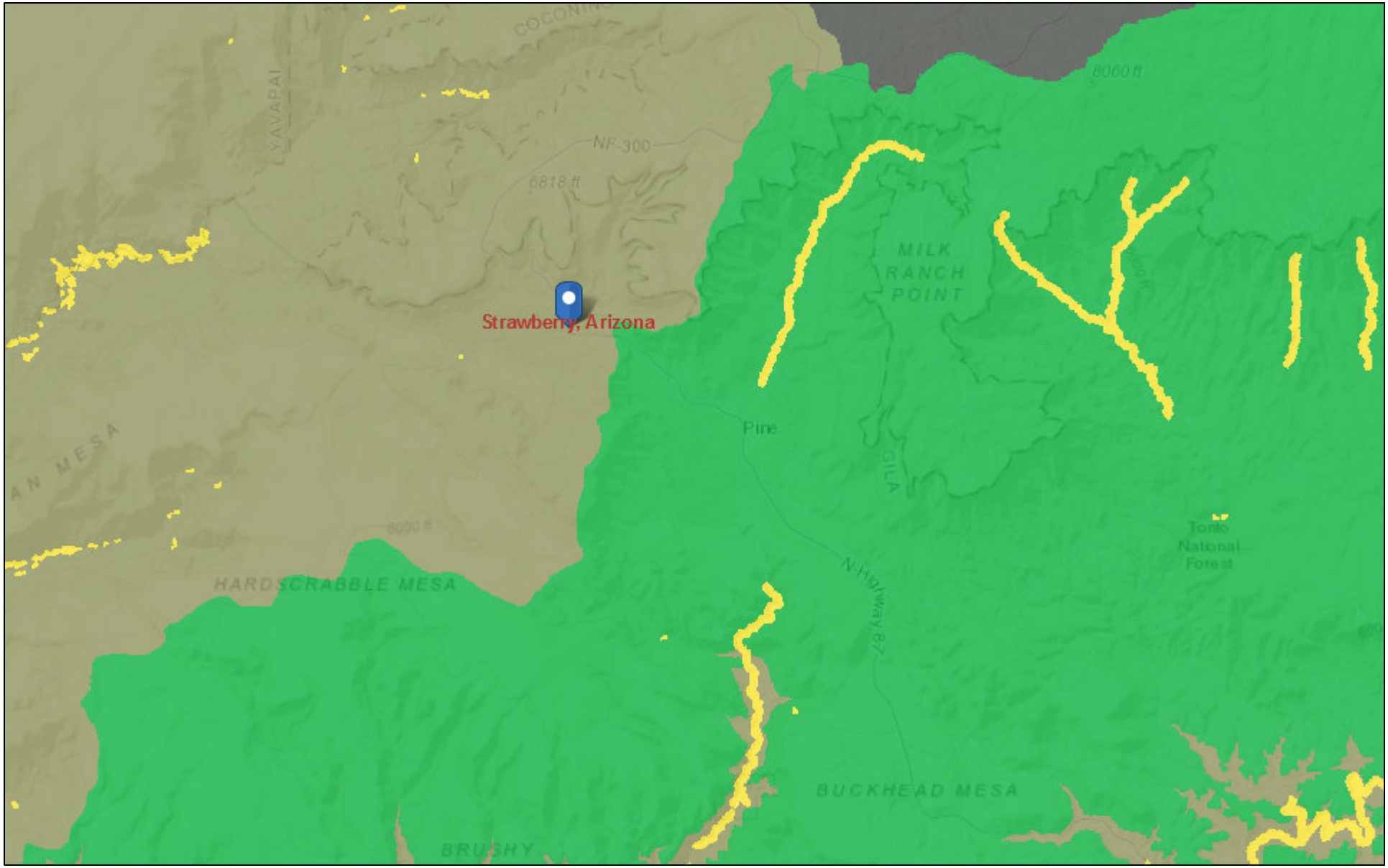
1:125,549

0 1 2 4 mi

0 1.75 3.5 7 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

HabiMap - Amphibians



August 17, 2020

- Arizona Toad
- Chiricahua Leopard Frog
- Desert Pacific Treefrog
- Lowland Burrowing Treefrog
- Lowland Leopard Frog
- Northern Leopard Frog
- Plains Leopard Frog
- Relict Leopard Frog
- Sonoran Tiger Salamander

1:132,787

0 1 2 4 mi

0 1.75 3.5 7 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Correspondence with
Tonto National Forest

From: Ullberg, Drew - FS <drew.ullberg@usda.gov>
Sent: Tuesday, August 18, 2020 11:14 AM
To: Sepideh Hakim Elahi
Subject: RE: Urgent- Consultation Letter- Proposed Water Distribution Improvements – Pine Strawberry, AZ

Good morning,

I read the consultation letter and learned the project does not involve federal lands. Therefore, for all wildlife, natural resources and water quality/compliance information you require, I recommend you contact the appropriate AZ state agencies for each area of concern.

Thank you.

Drew

From: Akins, Christina - FS <christina.akins@usda.gov>
Sent: Wednesday, August 19, 2020 8:49 AM
To: Sepideh Hakim Elahi
Cc: Ullberg, Drew - FS
Subject: RE: Urgent- Consultation Letter- Proposed Water Distribution Improvements – Pine Strawberry, AZ

Follow Up Flag: Follow up
Flag Status: Flagged

Okay – the only extant special status species adjacent to the action area are Mexican spotted owls but their territories are over 1 mile away from the project area so I have no concerns or timing restrictions for you to consider. Thank you for reaching out.

Christina M Akins
Zoned District Wildlife Biologist

Forest Service
Payson and Pleasant Valley Ranger Districts, Tonto National Forest

p: 928-474-7918
c: 928-951-3737
f: 928-474-7999
christina.akins@usda.gov

1009 Highway 260
Payson, AZ 85541
www.fs.fed.us

Caring for the land and serving people

SUNRISE ENGINEERING
Phoenix Metro Office
2045 S. Vineyard, Suite 101, Mesa, Arizona 85210 | 480.768.8600

August 12, 2020

Tonto National Forest
Supervisor's Office
2324 E. McDowell Rd.
Phoenix, Arizona 85006

Subject: Proposed Water Distribution Improvements – Pine Strawberry, AZ

Dear Sir/Madam,

The PSWID is a non-transient community water system in the northwest region of Gila County, Arizona and provides potable water service to the unincorporated communities of Pine and Strawberry. PSWID is in the process of performing an environmental review pursuant to the National Environmental Policy Act (NEPA) for the U.S. Department of Agriculture (USDA) - Rural Development, in order to assess the potential environmental impacts of the City's proposed Water Distribution Improvements in Gila County, Arizona. Enclosed figures 1.1, 4.1, and 4.2 depict the area of the proposed construction activities as described below:

Rehabilitating Existing Wells: The Proposed Project will include the rehabilitation for the following wells: Strawberry Hollow Intertie (New SH-3), Strawberry Ranch 5 – Tract C (SR-5), Strawberry View 1 – Lot 59 (SV1), and Milk Ranch Well #1 (MR1). The overall goal of the well rehabilitation process is to clean and inspect each of the four wells and, if possible, to increase the pumping capacity and/or pumping depth as well as to attempt to solve any operational problems with the well. The overriding criteria for this work will be to not adversely affect the current quantity or quality of the water produced by the well.

Install New Wells: The Proposed Project will include installation of a new well with two K2 booster pumps, near the location of K2 Tank Site, to provide better water and energy efficiency.

Replace Existing Pipelines: The Proposed Project includes installation of 101,099 feet of new PVC pipelines and valves in sizes of 4-inch through 8-inch to replace existing failing pipes. The specific projects are as listed below:

- → Wagon Wheel Way Road (crossing Fossil Creek Road) - 1,200 feet of new 6" waterline
- → North of Fossil Creek Rd & West of Tomahawk Lane - 19,358 feet total of new 4" and 6" waterline
- → North of Fossil Creek Rd (Tomahawk to Rimwood) - 18,510 feet total of new 4" and 6" waterline
- → North of Fossil Creek Rd (Rimwood to Hwy 87/260) - 27,619 feet total of new 4" and 6" waterline
- → Strawberry View/Ralls - 19,847 feet total of new 4" and 6" waterline
- → Portals 1 and 2 - 14,565 feet total of new 4", 6", and 8" waterline

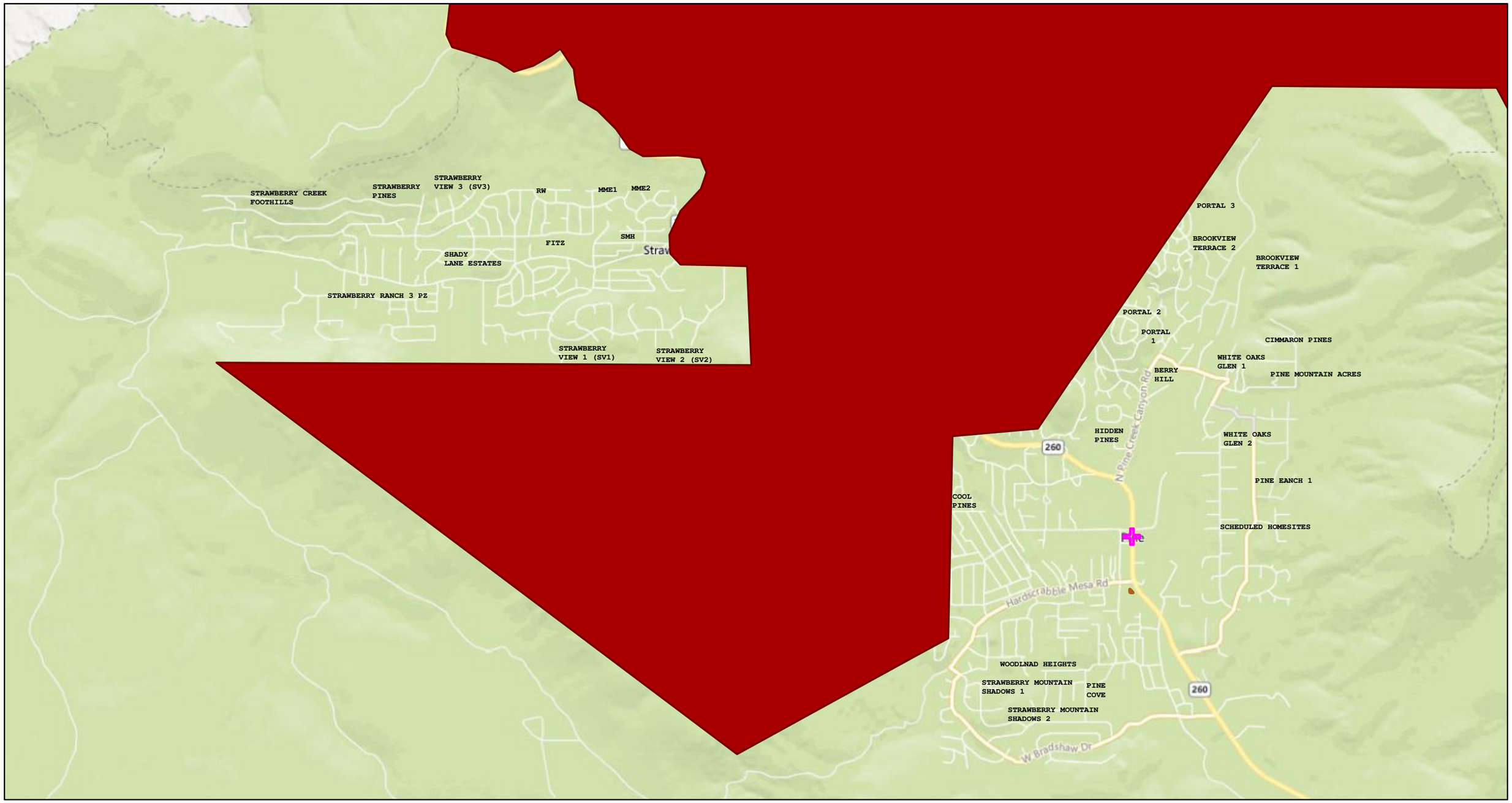
The proposed projects will not involve any federal lands. All project components will be located on lands in

private holdings or City lands. The Pine Strawberry Water System is located in a portion of Sections 20 through 29, 35, and 36, Township 12 North, Range 8 East and a portion of sections 19, 30, and 31, Township 12 North, Range 9 East and a portion of sections 19 and 20, Township 11.5 North, Range 9 East of the Gila and Salt River base and meridian, Maricopa County, Arizona. After the construction of the projects is complete, the disturbed areas will be restored to the existing contour as much as practically possible.

Please review the proposed projects. I would appreciate a response within 14 days. Thank you for your assistance.

Sincerely,
Sunrise Engineering, Inc.
Siddharth Mazumdar
Project Manager
smazumdar@sunrise-eng.com
480.768.8600

PINE/STRAWBERRY - CRITICAL HABITAT



July 22, 2020

Critical Habitat - Polygon Features - Final

1:35,000

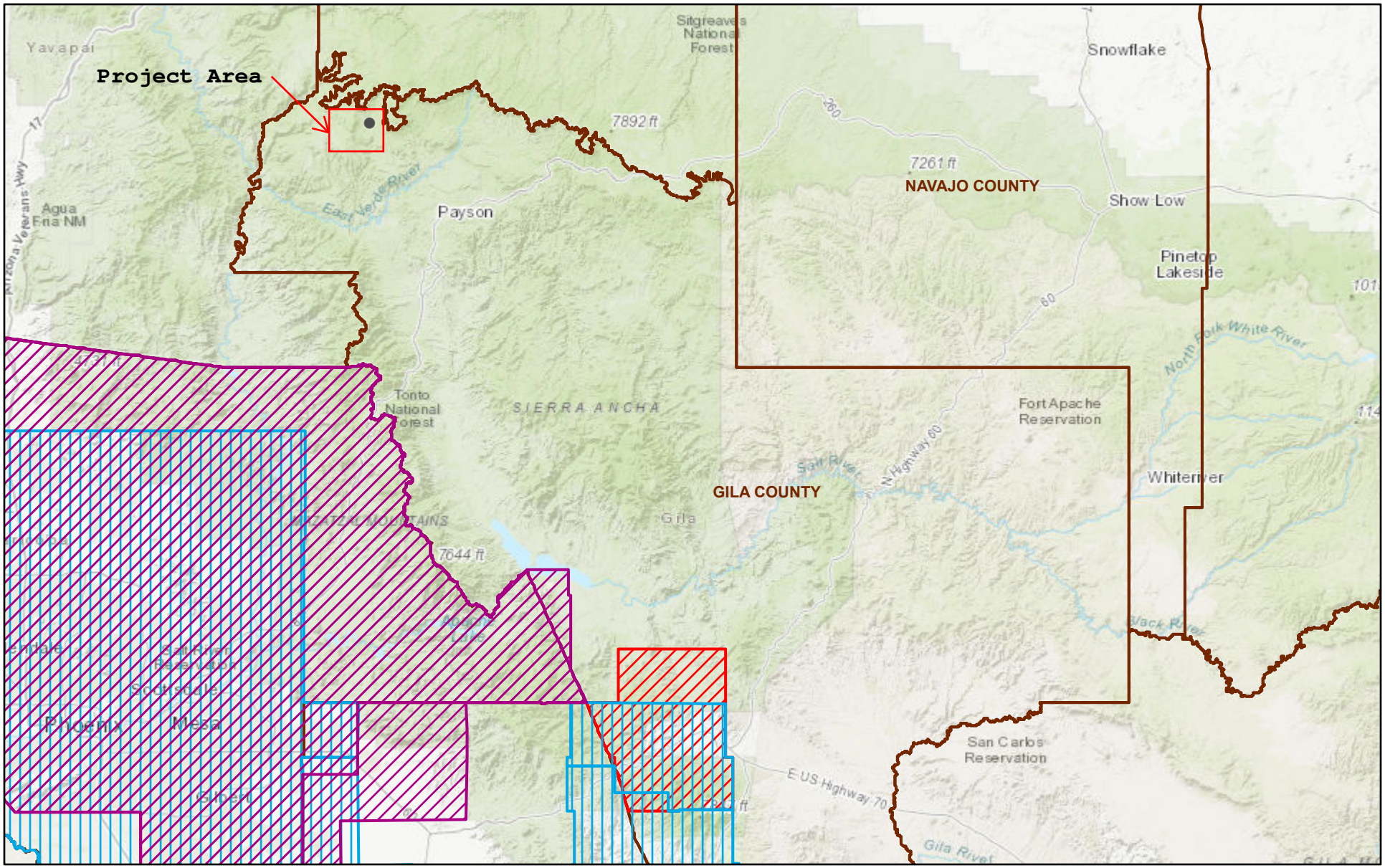
0 0.35 0.7 1.4 mi

0 0.5 1 2 km

APPENDIX H

Air Quality Data

Air Quality - Gila County



7/22/2020, 5:08:06 PM

Ozone (O3) Nonattainment

PM-10 Nonattainment

Sulfur Dioxide (SO2) Nonattainment

Sulfur Dioxide (SO2) Nonattainment

Counties

1:1,155,581

0 5 10 20 mi

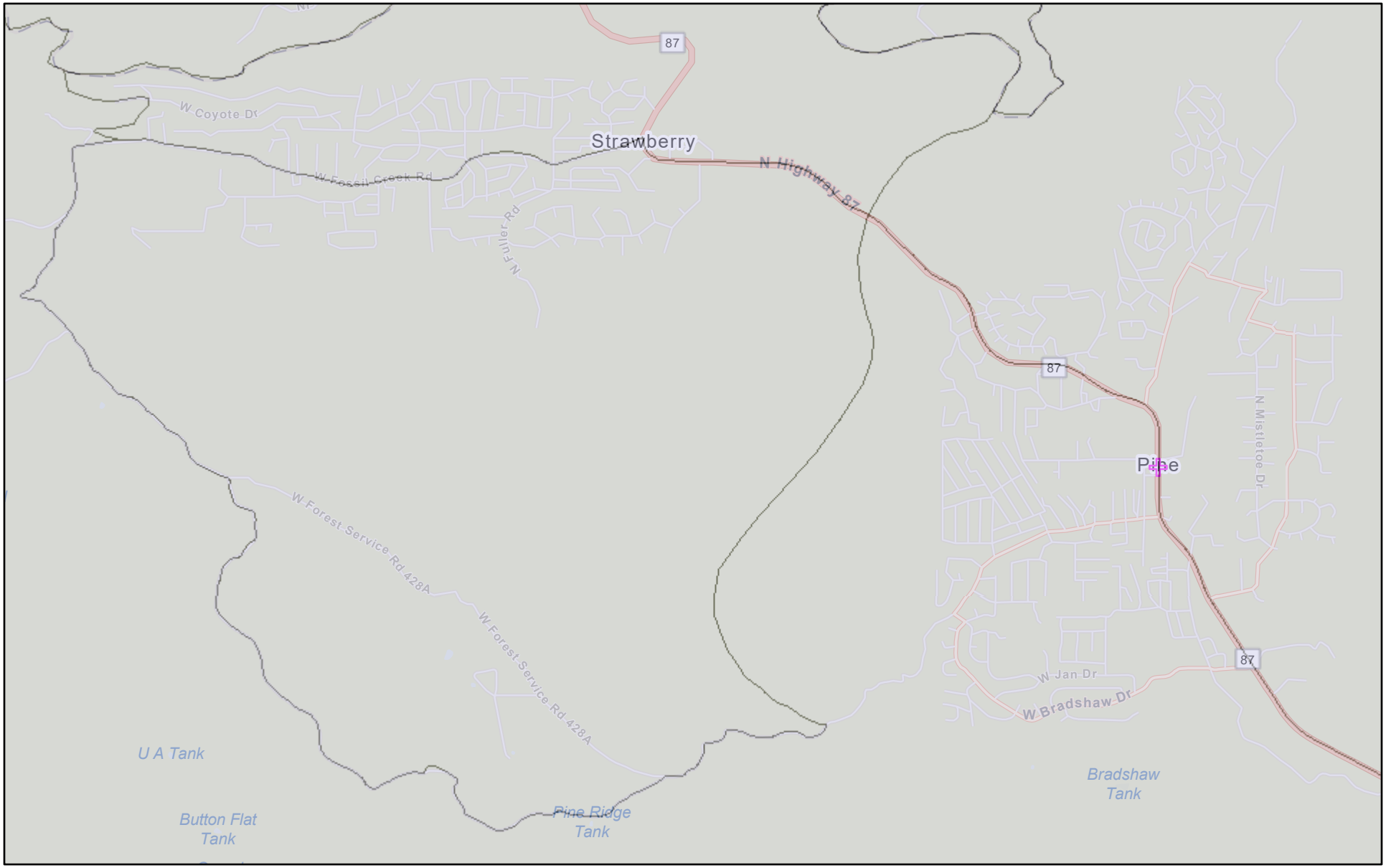
0 12.5 25 50 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS,

APPENDIX I

Demographics

Population Density (per sq. mile)



August 17, 2020

Population Density (per sq. mile)

- 0 – 294
- > 294 – 1,858
- > 1,858 – 4,153
- > 4,153 – 8,085
- > 8,085 – 603,265

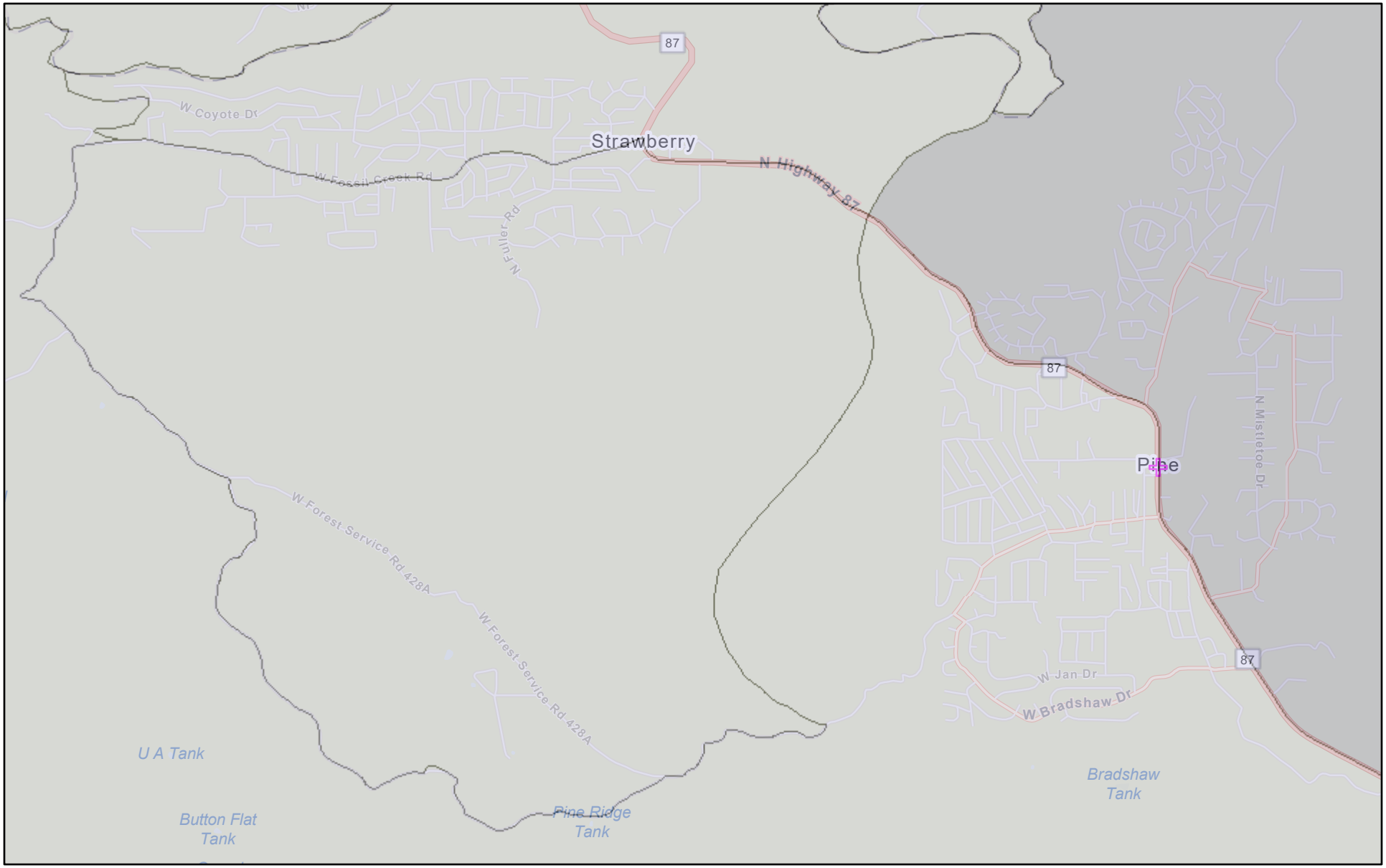
Source: 2013-2017 ACS(bg)

1:45,000

0 0.3 0.6 1.2 mi

0 0.5 1 2 km

Minority Population



August 17, 2020

Minority Population

- 0 – 96
- > 96 – 273
- > 273 – 564
- > 564 – 1,070
- > 1,070 – 17,918

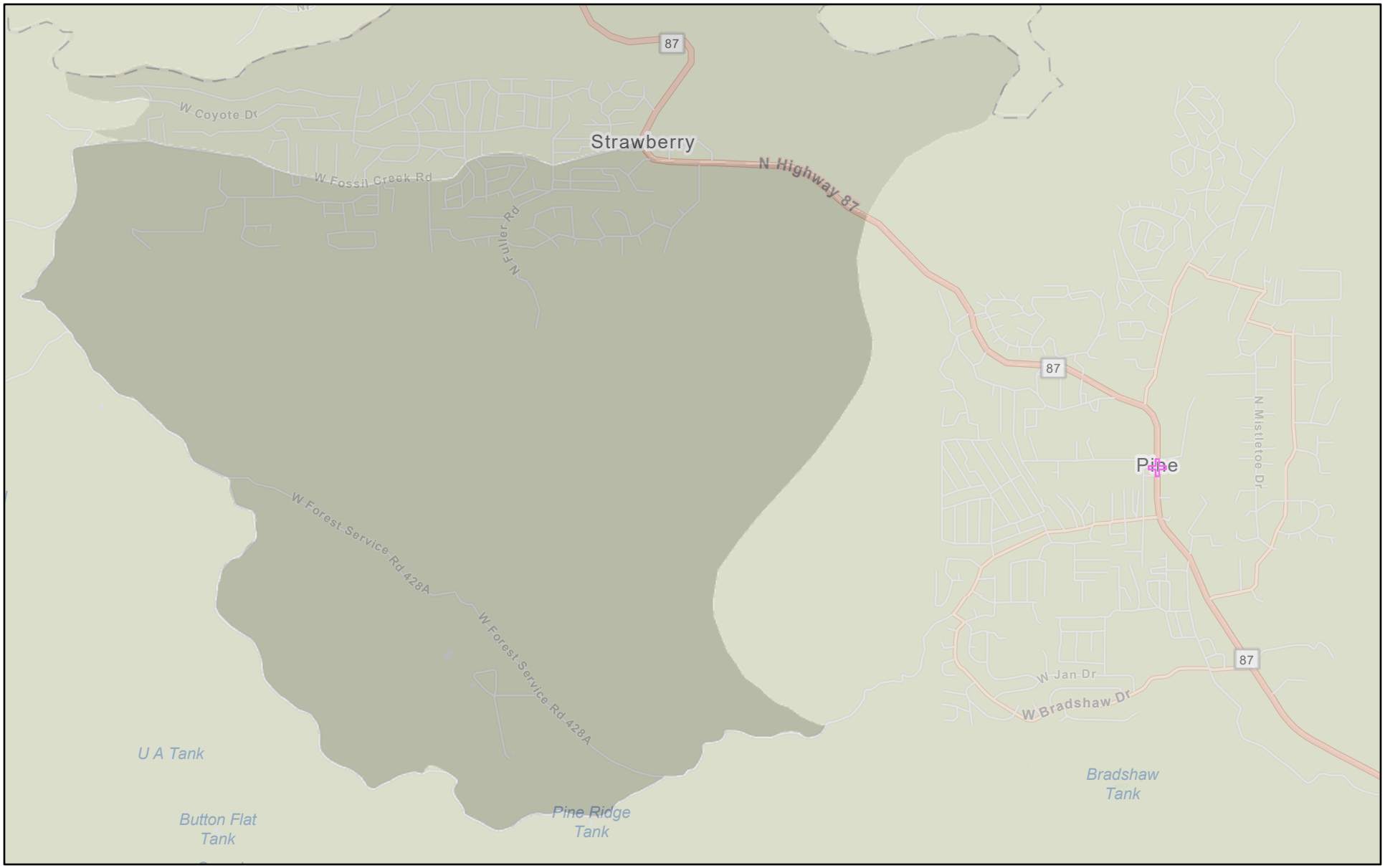
Source: 2013-2017 ACS(bg)

1:45,000

0 0.3 0.6 1.2 mi

0 0.5 1 2 km

Low Income Population



August 17, 2020

Low Income Population (National Percentiles)

- Data not available
- Less than 50 percentile
- 50 -60 percentile
- 60 -70 percentile
- 70 -80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile

1:45,000

0 0.3 0.6 1.2 mi

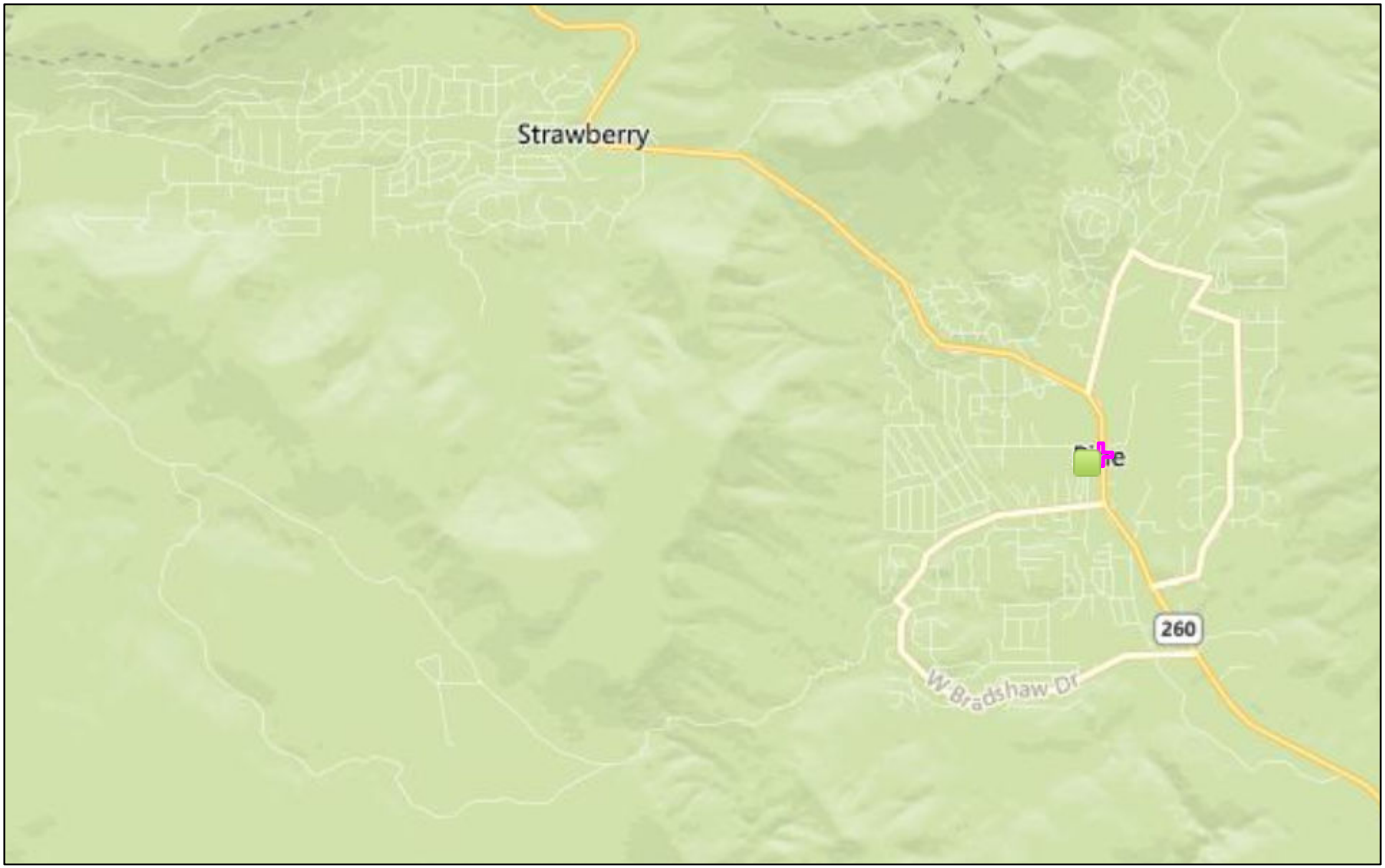
0 0.5 1 2 km

Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

APPENDIX J

Hazardous Waste Site

Pine/Strawberry - EPA - HUMAN HEALTH & SAFETY



July 23, 2020

Hazardous Waste (RCRAInfo)

Search Result (point)

1:45,000

0 0.3 0.6 1.2 mi

0 0.5 1 2 km

ECHO Enforcement and Compliance History Online

Detailed Facility Report

Facility Summary

PINE STRAWBERRY ELEMENTARY SCHOOL
3868 N PINE CREEK DR, PINE, AZ 85544

FRS (Facility Registry Service) ID: 110070206002
EPA Region: 09
Latitude: 34.387139
Longitude: -111.45585
Locational Data Source: FRS
Industry: No description found
Indian Country: N

Enforcement and Compliance Summary

Statute	RCRA
Insp (5 Years)	--
Date of Last Inspection	--
Current Compliance Status	No Violation Identified
Qtrs with NC (of 12)	0
Qtrs with Significant Violation	0
Informal Enforcement Actions (5 years)	--
Formal Enforcement Actions (5 years)	--
Penalties from Formal Enforcement Actions (5 years)	--
EPA Cases (5 years)	--
Penalties from EPA Cases (5 years)	--

Regulatory Information

Clean Air Act (CAA): No Information
Clean Water Act (CWA): No Information
Resource Conservation and Recovery Act (RCRA): Inactive (AZE170629002)
Safe Drinking Water Act (SDWA): No Information

Other Regulatory Reports

Air Emissions Inventory (EIS): No Information
Greenhouse Gas Emissions (eGGRT): No Information
Toxic Releases (TRI): No Information
Compliance and Emissions Data Reporting Interface (CEDRI): No Information

Known Data Problems

Facility/System Characteristics

Facility/System Characteristics

System	Statute	Identifier	Universe	Status	Areas	Permit Expiration Date	Indian Country	Latitude	Longitude
FRS		110070206002					N	34.387139	-111.45585
RCRAInfo	RCRA	AZE170629002	Other	Inactive ( )			N		

Facility Address

System	Statute	Identifier	Facility Name	Facility Address
FRS		110070206002	PINE STRAWBERRY ELEMENTARY SCHOOL	3868 N PINE CREEK DR, PINE, AZ 85544
RCRAInfo	RCRA	AZE170629002	PINE STRAWBERRY ELEMENTARY SCHOOL	3868 N PINE CREEK DR, PINE, AZ 85544-5544

Facility SIC (Standard Industrial Classification) Codes

System	Identifier	SIC Code	SIC Description
No data records returned			

Facility NAICS (North American Industry Classification System) Codes

System	Identifier	NAICS Code	NAICS Description
No data records returned			

Facility Tribe Information

Reservation Name	Tribe Name	EPA Tribal ID	Distance to Tribe (miles)
Tonto Apache Reservation	Tonto Apache Tribe of Arizona	100000305	13.27
Tonto Apache Reservation	Tonto Apache Tribe of Arizona	100000305	13.31

Enforcement and Compliance

Compliance Monitoring History (5 years)

Statute	Source ID	System	Activity Type	Compliance Monitoring Type	Lead Agency	Date	Finding (if applicable)
No data records returned							

Entries in italics are not counted in EPA compliance monitoring strategies or annual results.

Compliance Summary Data

Statute	Source ID	Current SNC (Significant Noncompliance)/HPV (High Priority Violation)	Current As Of	Qtrs with NC (Noncompliance) (of 12)	Data Last Refreshed
RCRA	AZE170629002	No	08/08/2020	0	08/07/2020

Three-Year Compliance History by Quarter

Statute	Program/Pollutant/Violation Type	QTR 1	QTR 2	QTR 3	QTR 4	QTR 5	QTR 6	QTR 7	QTR 8	QTR 9	QTR 10	QTR 11	QTR 12+
RCRA (Source ID: AZE170629002)		10/01-12/31/17	01/01-03/31/18	04/01-06/30/18	07/01-09/30/18	10/01-12/31/18	01/01-03/31/19	04/01-06/30/19	07/01-09/30/19	10/01-12/31/19	01/01-03/31/20	04/01-06/30/20	07/01-09/30/20
	Facility-Level Status	**No Violation Identified**	**No Violation Identified**	**No Violation Identified**	**No Violation Identified**	**No Violation Identified**	**No Violation Identified**	**No Violation Identified**	**No Violation Identified**	**No Violation Identified**	**No Violation Identified**	**No Violation Identified**	**No Violation Identified**

Informal Enforcement Actions (5 Years)

Statute	System	Source ID	Type of Action	Lead Agency	Date
No data records returned					

Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.

Formal Enforcement Actions (5 Years)

Statute	System	Law/Section	Source ID	Action Type	Case No.	Lead Agency	Case Name	Issued/Filed Date	Settlements/Actions	Settlement/Action Date	Federal Penalty	State/Local Penalty	SEP Cost	Comp Action Cost
No data records returned														

Environmental Conditions

Water Quality

Permit ID	Combined Sewer System?	Number of CSO (Combined Sewer Overflow) Outfalls	12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database))	WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database))	State Water Body Name (ICIS (Integrated Compliance Information System))	Impaired Waters	Impaired Class	Causes of Impairment(s) by Group(s)	Watershed with ESA (Endangered Species Act)-listed Aquatic Species?
No data records returned									

Water Body Designated Uses

Reach Code	Water Body Name	Exceptional Use	Recreational Use	Aquatic Life Use	Shellfish Use	Beach Closure Within Last Year	Beach Closure Within Last Two Years
No data records returned							

Air Quality

Nonattainment Area?	Pollutant(s)	Applicable Nonattainment Standard(s)
No	Ozone	
No	Lead	
No	Particulate Matter	
No	Carbon Monoxide	
No	Nitrogen Dioxide	
No	Sulfur Dioxide	

Pollutants

Toxics Release Inventory History of Reported Chemicals Released in Pounds per Year at Site

TRI Facility ID	Year	Total Air Emissions	Surface Water Discharges	Off-Site Transfers to POTWs (Publicly Owned Treatment Works)	Underground Injections	Releases to Land	Total On-site Releases	Total Off-site Transfers
No data records returned								

Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

Chemical Name
No data records returned

Demographic Profile

EJSCREEN EJ Indexes

Eleven primary environmental justice (EJ) indexes of EJSCREEN, EPA's screening tool for EJ concerns. EPA uses these indexes to identify geographic areas that may warrant further consideration or analysis for potential EJ concerns. The index values below are for the Census block group in which the facility is located. Note that use of these indexes does not designate an area as an "EJ community" or "EJ facility." EJSCREEN provides screening level indicators, not a determination of the existence or absence of EJ concerns. For more information, see the EJSCREEN home page.

Census Block Group EJ Indexes (percentile)	
Particulate Matter (PM 2.5)	42.9
Ozone NATA Diesel PM	27.6
NATA Air Toxics Cancer Risk	41.3
NATA Respiratory Hazard Index (HI)	42.7
Traffic Proximity	59.2
Lead Paint Indicator	62.6
Superfund Proximity	48.3
Risk Management Plan (RMP) Proximity	48
Hazardous Waste Proximity	56
Wastewater Discharge Proximity	74.8

Number of EJ Indexes Above 80th Percentile
0

View EJSCREEN Report

Demographic Profile of Surrounding Area (3 Miles)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2010 U.S. Census and 2006-2010 American Community Survey 5-Year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. EPA's spatial processing methodology considers the overlap between the selected radii and the census blocks (for U.S. Census demographics) and census block groups (for ACS demographics) in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary.

General Statistics	
Total Persons	2,132
Population Density	78/sq.mi.
Percent Minority	5%
Households in Area	1,089
Housing Units in Area	2,843
Households on Public Assistance	19
Persons Below Poverty Level	957

Geography	
Radius of Selected Area	3 mi.
Center Latitude	34.387139
Center Longitude	-111.45585
Land Area	100%
Water Area	0%

Income Breakdown - Households (%)	
Less than $15,000	156 (17.83%)
$15,000 - $25,000	143 (16.34%)
$25,000 - $50,000	318 (36.34%)
$50,000 - $75,000	86 (9.83%)

Age Breakdown - Persons (%)	
Children 5 years and younger	43 (2%)
Minors 17 years and younger	208 (10%)
Adults 18 years and older	1,924 (90%)
Seniors 65 years and older	718 (34%)

Race Breakdown - Persons (%)	
White	2,077 (97%)
African-American	4 (0%)
Hispanic-Origin	57 (3%)
Asian/Pacific Islander	14 (1%)
American Indian	9 (0%)
Other/Multiracial	28 (1%)

Education Level (Persons 25 & older) - Persons (%)	
Less than 9th Grade	26 (1.49%)
9th through 12th Grade	102 (5.83%)
High School Diploma	750 (42.88%)
Some College/2-year	505 (28.87%)
B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More	366 (20.93%)

Income Breakdown - Households (%)	
Greater than $75,000	172 (19.66%)

/

APPENDIX K

USDA Soil Resource Report

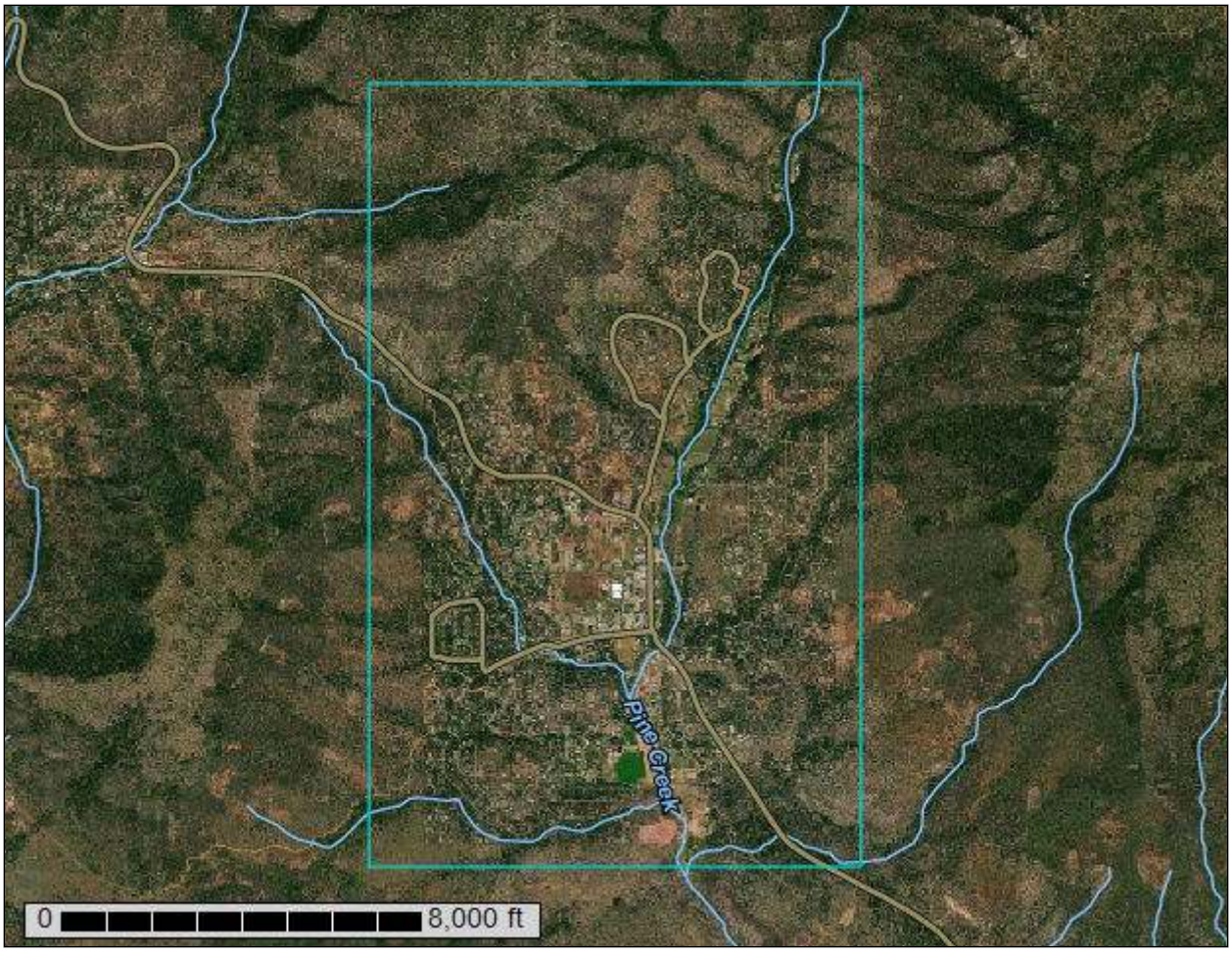
United States Department of Agriculture

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 Long Valley Area, Arizona; and Tonto National Forest, Arizona, Parts of Gila, Maricopa, Pinal and Yavapai Counties



July 22, 2020

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 (https://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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Contents

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.

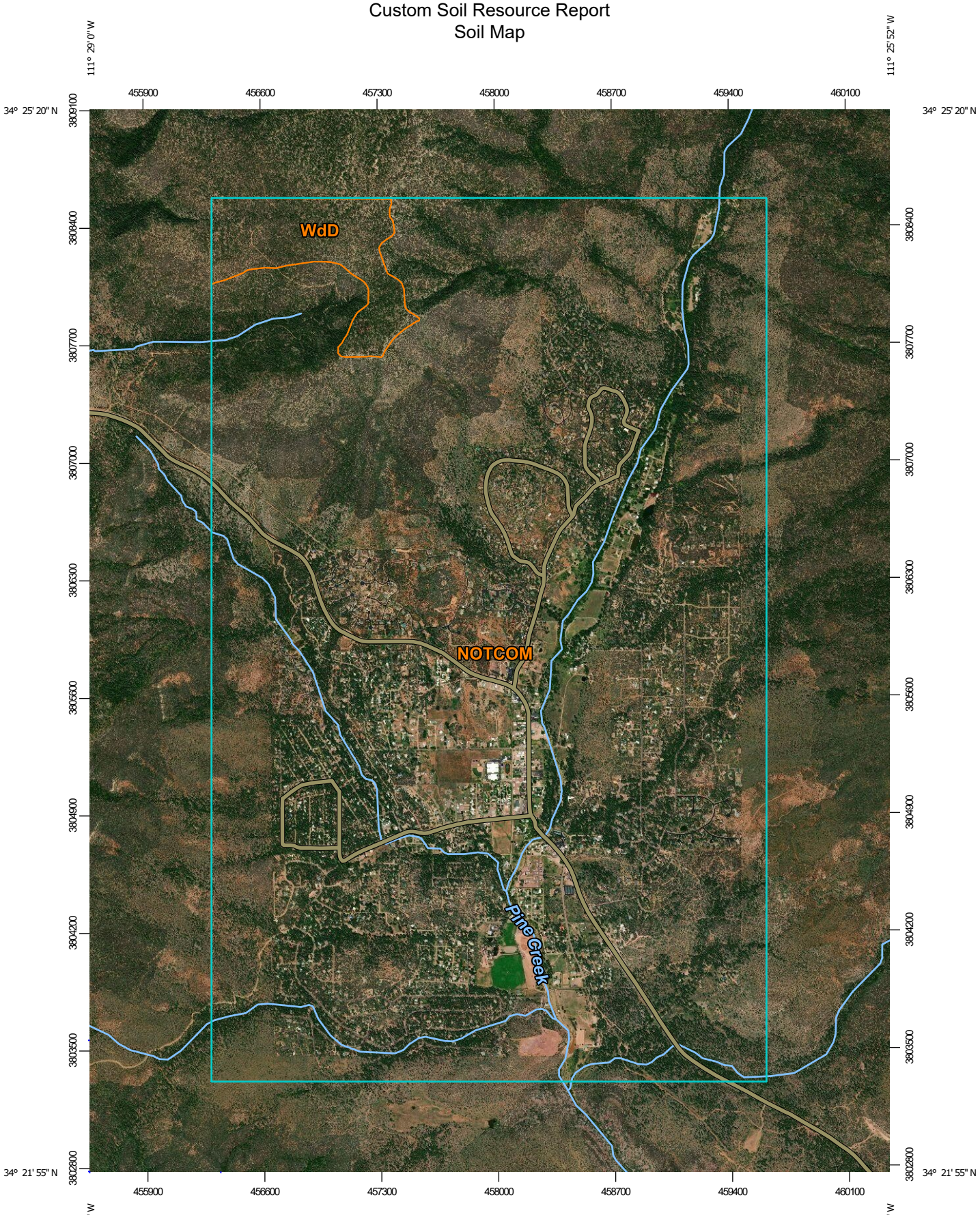
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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 scales ranging from 1:24,000 to 1:31,700.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Long Valley Area, Arizona
Survey Area Data: Version 10, Jun 3, 2020

Soil Survey Area: Tonto National Forest, Arizona, Parts of Gila, Maricopa, Pinal and Yavapai Counties
Survey Area Data: Version 9, Jun 3, 2020

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Dec 31, 2009—Oct 12, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
WdD	Wildcat very rocky loam, 0 to 20 percent slopes	145.7	3.4%
Subtotals for Soil Survey Area		**145.7**	**3.4%**
Totals for Area of Interest		**4,336.4**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
NOTCOM	No Digital Data Available	4,190.7	96.6%
Subtotals for Soil Survey Area		**4,190.7**	**96.6%**
Totals for Area of Interest		**4,336.4**	**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.

Long Valley Area, Arizona

WdD—Wildcat very rocky loam, 0 to 20 percent slopes

Map Unit Setting

National map unit symbol: 1n8j0
Elevation: 6,800 to 7,400 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 44 to 47 degrees F
Frost-free period: 100 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Wildcat and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wildcat

Setting

Landform: Plateaus
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

A1 - 0 to 2 inches: very cobbly loam
A2 - 2 to 7 inches: loam
Bt1 - 7 to 17 inches: clay
Bt2 - 17 to 32 inches: clay
R - 32 to 42 inches: bedrock

Properties and qualities

Slope: 0 to 20 percent
Percent of area covered with surface fragments: 30.0 percent
Depth to restrictive feature: 20 to 50 inches to lithic bedrock
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: Sandy Loam 17-22" p.z. Steep (PIPO, POTR5) (F039XA124AZ)

Minor Components

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

Tonto National Forest, Arizona, Parts of Gila, Maricopa, Pinal and Yavapai Counties

NOTCOM—No Digital Data Available

Map Unit Composition

Notcom: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Notcom

Properties and qualities

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United States Department of Agriculture

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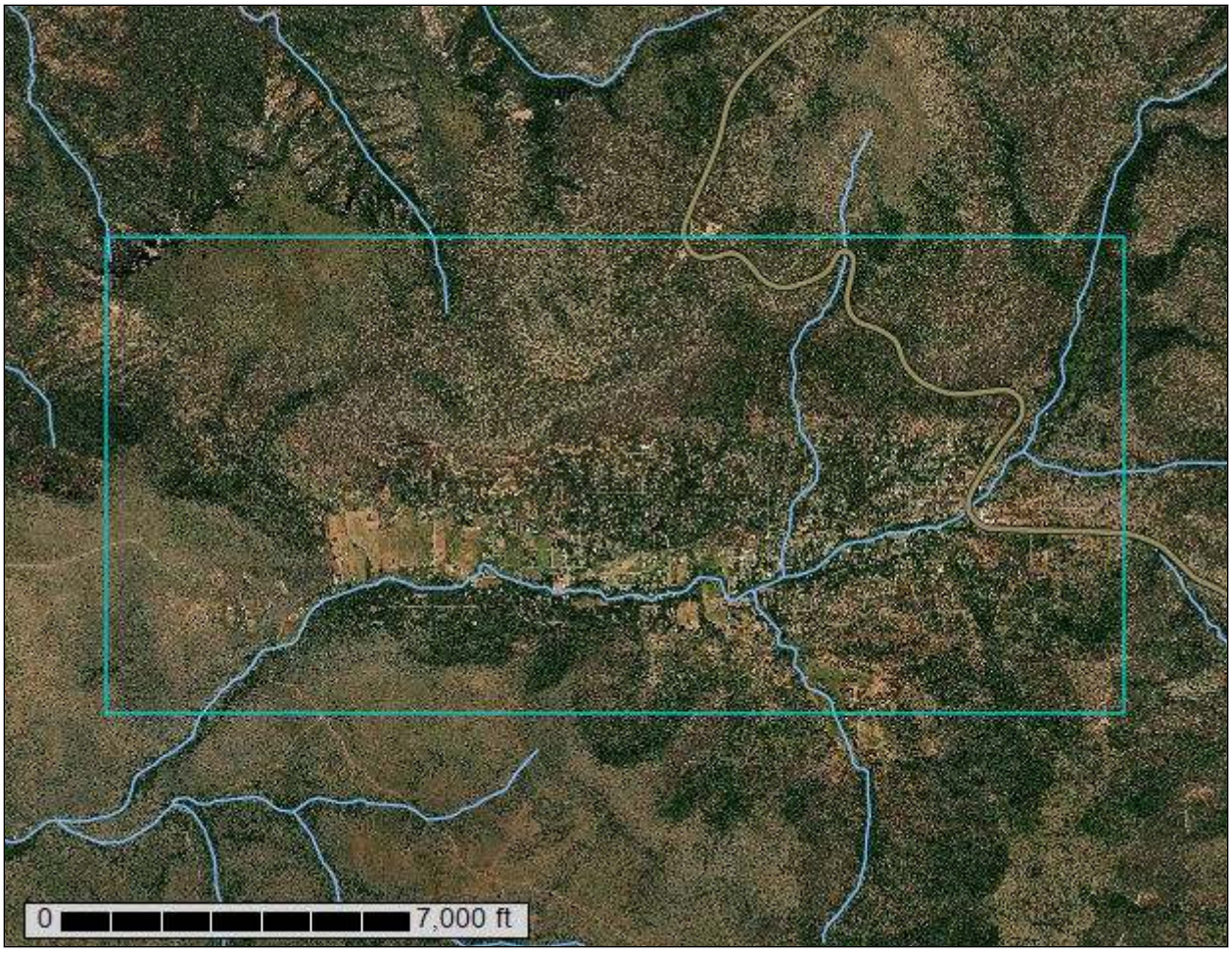

July 22, 2020

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 (https://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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Contents

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.

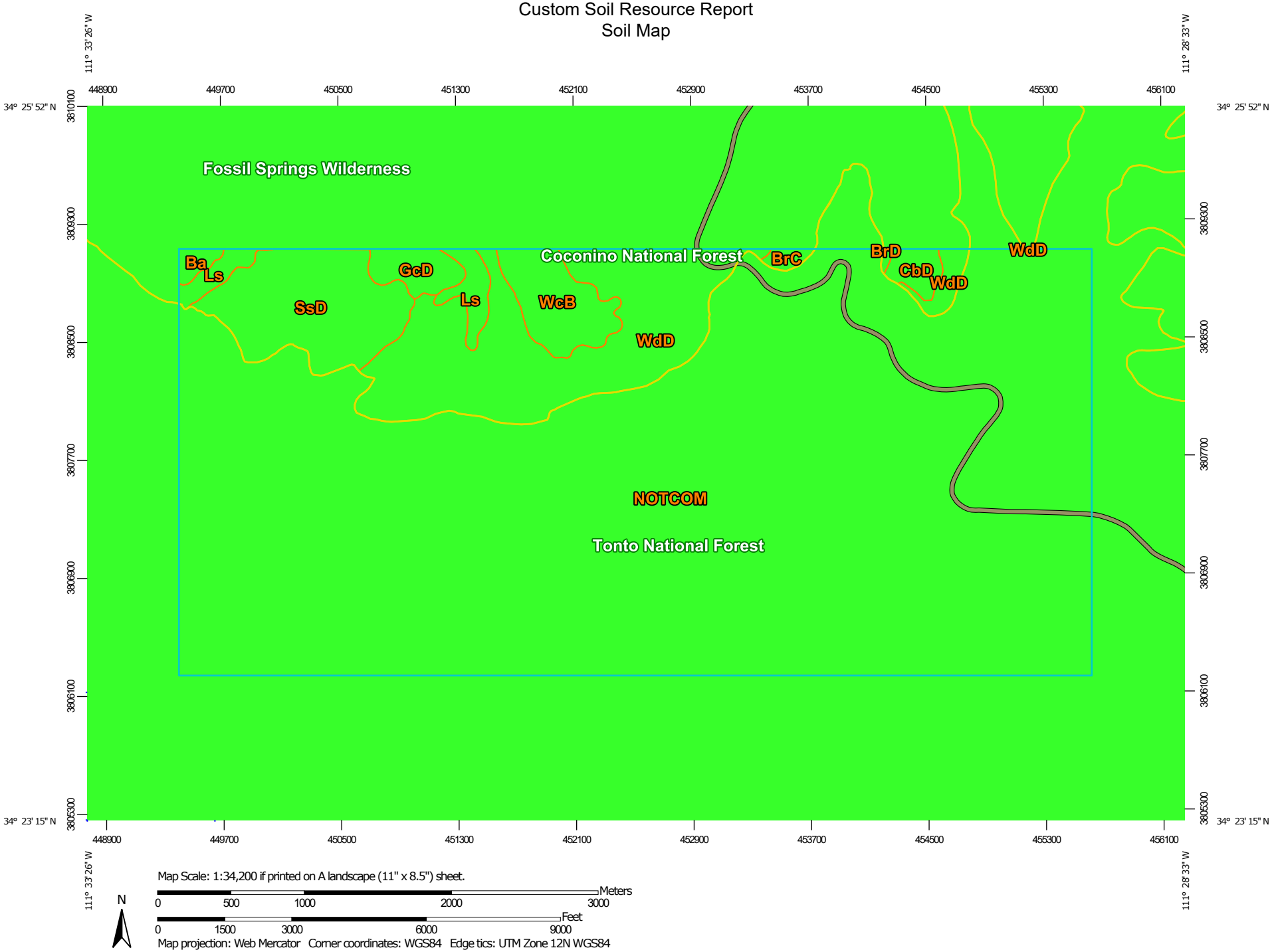
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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 Survey Areas
- 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

Federal Land
- BIA
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Fish and Wildlife Service
- Forest Service
- National Park Service
- Tennessee Valley Authority

Water Features
- Streams and Canals

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

Background
- Topographic Map
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:24,000 to 1:31,700.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Long Valley Area, Arizona
Survey Area Data: Version 10, Jun 3, 2020

Soil Survey Area: Tonto National Forest, Arizona, Parts of Gila, Maricopa, Pinal and Yavapai Counties
Survey Area Data: Version 9, Jun 3, 2020

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Dec 31, 2009—Oct 12, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ba	Basalt rock land	11.9	0.3%
BrC	Brolliar very stony clay loam, 0 to 10 percent slopes	9.2	0.2%
BrD	Brolliar very stony clay loam, 10 to 30 percent slopes	2.1	0.0%
CbD	Cabezon very stony clay loam, 0 to 20 percent slopes	24.2	0.5%
GcD	Gem cobbly clay loam, 0 to 20 percent slopes	40.0	0.9%
Ls	Limestone and sandstone rock land	49.7	1.1%
SsD	Springerville-Gem complex, 0 to 20 percent sloeps	211.1	4.7%
WcB	Wildcat gravelly fine sandy loam, 0 to 5 percent slopes	92.7	2.1%
WdD	Wildcat very rocky loam, 0 to 20 percent slopes	445.3	10.0%
Subtotals for Soil Survey Area		**886.2**	**19.9%**
Totals for Area of Interest		**4,460.7**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
NOTCOM	No Digital Data Available	3,574.4	80.1%
Subtotals for Soil Survey Area		**3,574.4**	**80.1%**
Totals for Area of Interest		**4,460.7**	**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.

Long Valley Area, Arizona

Ba—Basalt rock land

Map Unit Setting

National map unit symbol: 1n8dx
Elevation: 5,000 to 7,100 feet
Mean annual precipitation: 11 to 24 inches
Mean annual air temperature: 44 to 61 degrees F
Farmland classification: Not prime farmland

Map Unit Composition

Rock land, basalt: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Land, Basalt

Setting

Parent material: Basalt

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

BrC—Brolliar very stony clay loam, 0 to 10 percent slopes

Map Unit Setting

National map unit symbol: 1n8f1
Elevation: 6,700 to 7,100 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 44 to 46 degrees F
Frost-free period: 90 to 100 days
Farmland classification: Not prime farmland

Map Unit Composition

Brolliar and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brolliar

Setting

Landform: Plateaus
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

A - 0 to 3 inches: very stony clay loam

B - 3 to 6 inches: clay
Bt1 - 6 to 11 inches: cobbly clay
Bt2 - 11 to 24 inches: very cobbly clay
R - 24 to 34 inches: bedrock

Properties and qualities

Slope: 0 to 10 percent
Percent of area covered with surface fragments: 17.5 percent
Depth to restrictive feature: 24 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Low
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
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: Clay Loam Upland 17-22" p.z. (PIPO) (F039XA102AZ)

Minor Components

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

BrD—Brolliar very stony clay loam, 10 to 30 percent slopes

Map Unit Setting

National map unit symbol: 1n8f2
Elevation: 6,700 to 7,400 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 44 to 46 degrees F
Frost-free period: 90 to 100 days
Farmland classification: Not prime farmland

Map Unit Composition

Brolliar and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brolliar

Setting

Landform: Plateaus

Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

A - 0 to 3 inches: very stony clay loam
B - 3 to 6 inches: clay
Bt1 - 6 to 11 inches: cobbly clay
Bt2 - 11 to 24 inches: very cobbly clay
R - 24 to 34 inches: bedrock

Properties and qualities

Slope: 10 to 30 percent
Percent of area covered with surface fragments: 25.0 percent
Depth to restrictive feature: 24 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Low
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
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: Basalt Hills 17-22" p.z. (PIPO, QUGA) (F039XA135AZ)

Minor Components

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

CbD—Cabezon very stony clay loam, 0 to 20 percent slopes

Map Unit Setting

National map unit symbol: 1n8f4
Elevation: 5,600 to 7,000 feet
Mean annual precipitation: 12 to 20 inches
Mean annual air temperature: 48 to 58 degrees F
Frost-free period: 150 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Cabezon and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cabezon

Setting

Landform: Plateaus
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

A - 0 to 3 inches: very stony clay loam
Bt1 - 3 to 9 inches: clay
Bt2 - 9 to 17 inches: clay
R - 17 to 60 inches: bedrock

Properties and qualities

Slope: 0 to 20 percent
Percent of area covered with surface fragments: 20.0 percent
Depth to restrictive feature: 8 to 20 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: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Volcanic Upland 16-20" p.z. (R038XB213AZ)

Minor Components

Unnamed soils

Percent of map unit: 20 percent
Hydric soil rating: No

GcD—Gem cobbly clay loam, 0 to 20 percent slopes

Map Unit Setting

National map unit symbol: 1n8fd
Elevation: 5,000 to 7,000 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 49 to 53 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Gem and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gem

Setting

Landform: Plateaus
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Cinders and/or residuum weathered from basalt

Typical profile

A - 0 to 3 inches: cobbly clay loam
B - 3 to 9 inches: clay loam
Bt - 9 to 21 inches: very cobbly clay
Btk - 21 to 25 inches: very stony clay
R - 25 to 60 inches: bedrock

Properties and qualities

Slope: 0 to 20 percent
Depth to restrictive feature: 22 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
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: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: D
Ecological site: Stony Upland 17-22" p.z. (R039XA106AZ)

Minor Components

Unnamed soils
Percent of map unit: 10 percent
Hydric soil rating: No

Ls—Limestone and sandstone rock land

Map Unit Setting
National map unit symbol: 1n8h4
Elevation: 6,200 to 7,800 feet
Mean annual precipitation: 15 to 24 inches
Farmland classification: Not prime farmland

Map Unit Composition
Rock land, coconino and kiabab formations: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Land, Coconino And Kiabab Formations

Setting
Parent material: Coconino and kaibab formation

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Minor Components

Unnamed soils
Percent of map unit: 25 percent
Hydric soil rating: No

SsD—Springerville-Gem complex, 0 to 20 percent sloeps

Map Unit Setting
National map unit symbol: 1n8hv
Elevation: 6,000 to 6,950 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 56 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Springerville and similar soils: 60 percent
Gem and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Springerville

Setting

Landform: Plateaus
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Cinders and/or residuum weathered from basalt

Typical profile

A - 0 to 3 inches: cobbly clay
C1 - 3 to 45 inches: clay
C2 - 45 to 61 inches: gravelly clay
R - 61 to 63 inches: bedrock

Properties and qualities

Slope: 0 to 20 percent
Depth to restrictive feature: 36 to 70 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
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: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: Stony Upland 17-22" p.z. (R039XA106AZ)

Description of Gem

Setting

Landform: Plateaus
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Cinders and/or residuum weathered from basalt

Typical profile

A - 0 to 3 inches: cobbly clay loam
B - 3 to 9 inches: clay loam

Bt - 9 to 21 inches: very cobbly clay
Btk - 21 to 25 inches: very stony clay
R - 25 to 60 inches: bedrock

Properties and qualities

Slope: 0 to 20 percent
Depth to restrictive feature: 22 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
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: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: Stony Upland 17-22" p.z. (R039XA106AZ)

Minor Components

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

WcB—Wildcat gravelly fine sandy loam, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1n8hz
Elevation: 6,800 to 7,400 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 44 to 47 degrees F
Frost-free period: 100 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Wildcat and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wildcat

Setting

Landform: Plateaus

Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

A1 - 0 to 2 inches: gravelly fine sandy loam
A2 - 2 to 7 inches: loam
Bt1 - 7 to 17 inches: clay
Bt2 - 17 to 32 inches: clay
R - 32 to 42 inches: bedrock

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: 20 to 50 inches to lithic bedrock
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: D
Ecological site: Loamy Upland 17-22" p.z. (PIPO) (F039XA111AZ)

Minor Components

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

WdD—Wildcat very rocky loam, 0 to 20 percent slopes

Map Unit Setting

National map unit symbol: 1n8j0
Elevation: 6,800 to 7,400 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 44 to 47 degrees F
Frost-free period: 100 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Wildcat and similar soils: 90 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wildcat

Setting

Landform: Plateaus
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

A1 - 0 to 2 inches: very cobbly loam
A2 - 2 to 7 inches: loam
Bt1 - 7 to 17 inches: clay
Bt2 - 17 to 32 inches: clay
R - 32 to 42 inches: bedrock

Properties and qualities

Slope: 0 to 20 percent
Percent of area covered with surface fragments: 30.0 percent
Depth to restrictive feature: 20 to 50 inches to lithic bedrock
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: Sandy Loam 17-22" p.z. Steep (PIPO, POTR5) (F039XA124AZ)

Minor Components

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

Tonto National Forest, Arizona, Parts of Gila, Maricopa, Pinal and Yavapai Counties

NOTCOM—No Digital Data Available

Map Unit Composition

Notcom: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Notcom

Properties and qualities

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