PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT

PRELIMINARY ENGINEERING REPORT FOR WATER DISTRIBUTION SYSTEM IMPROVEMENTS

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PROJECT PLANNING

1.1 INTRODUCTION

This chapter presents a general geographic and historical description of the project area under consideration. The description includes scale maps and photographs of the area and the existing service areas, including legal and natural boundaries and a topographical map of the Pine-Strawberry Water Improvement District ("PSWID" or "District") service area. This chapter also presents maps and narrative descriptions of the environmental and water resources present in the planning area that affect the design of the project. Finally, this chapter outlines PSWID's proposed approach to engage the community in the project planning process.

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. Today's system was developed gradually beginning in the 1960s as development of the area accelerated. The various stand-alone water systems were operated for many years as private water companies and cooperatives before the PSWID was created.

The system encompasses approximately 10.1 square miles of service area. The system operates under the authority of the Arizona Department of Environmental Quality (ADEQ) as system number AZ0404034 and is classified as a Grade 3 Water Distribution System. The system also operates under the Arizona Department of Water Resources (ADWR) as Community Water System number 91-000135.0000. The District was formed by Gila County on June 2, 1996 by County resolution number 96-6-12 and recorded as document number 96-011964. The District is a public water system governed by an elected seven-member Board of Directors and began operating the water system on October 1, 2009.

The District provides water that is supplied exclusively by groundwater pumped from the District's wells drawn from the Lower Verde watershed. In 2017, PSWID produced 319.92 acre-feet (104.2 million gallons) of water to serve its 3,148 service connections. The water is produced, stored, and delivered through a complex network of 23 wells and 9 water sharing agreements, 1.311 million gallons of water in 22 storage tanks, 24 booster stations, and more than 58 miles of water mains.

The majority of residential units in Pine and Strawberry are seasonal and not occupied throughout the year. Consequently, the demand for water in the Pine and Strawberry communities is very seasonal, with the months of June through September representing the highest demand months of the year. It is interesting to note that the average demand for the month of August is less than that of September, indicating that some of the population leaves the area in August and returns in September.

The District, by virtue of being a water provider in northern Gila County, has rights to the surface water that is developed by the C.C. Cragin Dam and Reservoir, formerly known as Blue Ridge Reservoir. The Town of Payson is in the final stages of building a system to move the C.C. Cragin Reservoir water to its location and utilize it in the Town's water system. As a part of the planning for the Payson project, some feasibility analysis of the use of the remaining 500 acre-feet per year of this surface water source by the District and other water providers was completed in 2006 and is discussed in detail in section 1.6.1 of this report.

1.2 LOCATION AND GENERAL DESCRIPTION

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. A map showing the general location of the PSWID is included as Figure 1.1.

1.2.1 Legal Boundaries and Service Areas Map

The projects under consideration by this Preliminary Engineering Report are located throughout the service area of the PSWID. Figure 1.2 shows the current service areas of PSWID, which are congregated into two main geographic areas that correspond closely with the communities of Pine and Strawberry, neither of which are incorporated municipalities. The District serves customers on private lands that are surrounded by the Tonto National Forest.

1.2.2 Service Area Topographical Map

The PSWID service area is located in the mountainous terrain below the Mogollon Rim in north-central Arizona. Thus, the topography varies greatly, ranging from 5,300 feet to 6,400 feet elevation above sea level. In addition, the system developed gradually over time with each residential subdivision building a separate, stand-alone water system with little or no redundancy, all of which were ultimately included in the current PSWID system. This gradual development combined with the wide range of elevations within the service results in a total of 27 separate pressure zones, 20 in the Strawberry system and 7 in the Pine system. Many of these pressure zones operate at similar pressures, but their physical separation due to distance and topography prevent them from being combined into larger and fewer zones. Figure 1.3 shows the topography of the service area. Figure 1.4 shows the pressure zones.

1.3 ENVIRONMENTAL RESOURCES PRESENT

It is an important goal of any infrastructure project to protect the environment within which it is developed, operated and maintained. The PSWID and its consultants and contractors must utilize good design, construction and management tools to ensure that the environment is protected for the benefit of the current and future residents of the area and those who travel to the PSWID area for recreation. While the PSWID is providing one of the most basic of human needs, good quality drinking water, it must do so in a manner that balances the needs of its customers with protection of the environment. Thus, the District must strive to achieve sustainability in its operations. See complete analysis of Environmental Report [By others, to be provided].

1.3.1 Environmental Resources That Affect Project Design

Native American Tribal Reservations: There are no Native American tribal reservations located within or adjacent to the boundaries of the PSWID. The closest reservations are the Tonto Apache near the Town of Payson (17 miles east of PSWID) and the Yavapai-Apache Indian Community near the Town of Camp Verde (50 miles west of PSWID).

Endangered Species: The list of Federal Threatened, Endangered, and Candidate Species that are native to the PSWID service area and the surrounding Tonto National Forest is found in Appendix A – PSWID Area Endangered Species List.

Government Land: The private land served by the PSWID is surrounded by the Tonto National Forest. Water system improvements or ancillary facilities cannot be sited on national forest lands. Any facilities designed and constructed adjacent (contiguous) to either national forest land cannot encroach, require easements, or cause any detrimental environmental effect on the land.

Recreational Areas: The Tonto National Forest completely surrounds the District's service area and contains 4,489 square miles. Due to seasonal variations and varying climate conditions, Tonto National Forest offers a multitude of recreational opportunities. Activities include hiking, camping, canyoneering, horseback riding, fishing, kayaking, motorized watercraft, jeep trails, road biking, and mountain biking. Lakes located within the Tonto National Forest include Bartlett Lake, Saguaro Lake, Canyon Lake, Apache Lake and Roosevelt Lake. Many of these lakes offer marina facilities and camping. Smaller lakes known for cool weather fishing are located above the Mogollon Rim and include Woods Canyon, Willow Springs, Bear Canyon, Knoll, Chevelon Canyon, Black Canyon, Blue Ridge, Long, and Hawley. An Arizona State Park, called Tonto Natural Bridge, is located less than eight miles east of the District on Highway 87.

Lakes and Rivers: The region surrounding the PSWID service area includes many ephemeral rivers and creeks that flow during summer rain storms and spring snowmelt. However, only two rivers in the region flow year around; the Verde River and the Salt River. Fossil Creek and the East Verde River drain much of the land within and around the District boundaries. Both of those rivers are tributary to the Verde River, which flows by the District area approximately 13 miles to the southwest. The Verde River is tributary to the Salt River and the two join at a location approximately 70 miles south of the District Boundary.

See complete analysis of Environmental Report [By others, to be provided].

1.4 POPULATION TRENDS

1.4.1 U.S. Census and Population Data

PSWID serves the unincorporated communities of Pine and Strawberry, Arizona. These two communities are recognized as Census-Designated Places ("CDPs") by the United States Census Bureau for statistical purposes only. CDPs have been used in each decennial census since 1980 as the counterparts of incorporated places, such as self-governing cities, towns, and villages, for the purposes of gathering and correlating statistical data. CDPs are populated areas that generally include one officially designated but currently unincorporated small community, for which the CDP is named, plus surrounding inhabited countryside of varying dimensions and, occasionally, other, smaller unincorporated communities as well.

1.4.2 Population Projections for Project Planning Area &

The Arizona Office of Economic Opportunity (AOEO) has the mission "To provide reliable unbiased projections of future population growth and a single state repository for current population references enabling sound planning and decision making by government and private entities." The AOEO has provided state and county population projections for the period 2015 to 2050. These projections are provided at the following website: https://population.az.gov/population-projections

These projections include 2016 to 2050 sub-county projections for CDPs, including Pine and Strawberry. For the community of Pine, the 2000 census population was 1,931 and the 2010 census population was 1,963. That population is estimated to grow to 1,997 in 2015. After 2015, the AOEO projections show that the population of Pine will slightly decline to 1,971 by 2025 and to 1,861 by 2050.

For the Strawberry CDP, the 2000 census population was 1,028 and the 2010 census population was 961. That population is estimated to grow to 978 in 2015. After 2015, the AOEO projections show that the population of Strawberry will slightly decline to 965 by 2025 and to 911 by 2050.

These population forecasts would indicate that these communities are fully built and that no future growth would occur, unless existing constraints were relaxed. These constraints could include current zoning laws, lack of private land for development, lack of community wastewater collection and treatment systems, and a bias against densification within the current community. Vacant developable parcels of land exist within both communities and it is unclear why they have not yet developed.

The current annual water usage data from PSWID (based on June 2020 water usage) found that a total of 3,240 service connections provided 76,715,857 gallons of water to consumers in the service area. There are 3,174 single family dwelling unit connections that consumed 62,774,679 gallons of water, resulting in approximately 19,778 gallons per year per dwelling unit. The total number of equivalent dwelling units (EDUs) for 2020 is then calculated to be 3,878.9 EDUs. See the following table for June 2020 EDU calculations.

Equivalent Dwelling Unit Calculation

Item	Amount (2)	Units
Total Gallons Sold	76,715,857	Gallons/Month
Single Family Dwelling Units (Gallons Sold)	62,774,679	Gallons/Month
Total Number of Connections	3,240	Units
Number of Single-Family Dwelling Unit Connections	3,174	Units
Consumption per Single Family Dwelling Unit	19,778	Gallons/Unit/Month
Consumption of Non-Single-Family Dwelling Unit	13,941,178	Gallons/Month
Non-single-Family Equivalent Dwelling Units	705	EDUs-Gallons/Month
Total Number of EDUs (1)	**3,879**	Units

(1) Includes Single-Family Dwelling Units. (2) Table Source: PSWID Water Usage, June 2020

It is important to note that the population figures reported by the AOEO are the **permanent residents of the community**, in keeping with US Census methodologies. The Gila County Comprehensive Plan reports that **approximately 55 percent of the housing units in both Pine and Strawberry are seasonal units**. When seasonal units are occupied, there is a trend toward a higher number of persons per unit than would be present during the off-season, i.e. winter. These two factors help to explain why the combined population of about 3,000 persons for the two communities reported by the State balloons to an estimated 8,000 persons served by PSWID during their highest demand days.

In December 2014, CH2MHill, under contract with the District, completed a Water System Master Plan ("Master Plan"). The Master Plan projected future growth in the system, but this projection was based on observed vacant land and expected land use, not population projections. Gila County's parcel GIS file, along with aerial photographs, was utilized by the Master Plan author to determine existing vacant land. The land use category from the parcel file, as well as aerial photographs, were utilized to determine overall land use and the density of each use expressed as the number of dwelling units per acre (du/acre) for residential land use for each vacant parcel. The vacant parcel and land use information were used in conjunction with a water duty factor (gallons per day per acre (gpd/acre)) to develop future demand. This analysis determined that the build-out conditions for the system will add an average demand of 72,000 gallons per day (gpd) or 50 gallons per minute (gpm). The Master Plan reported the average day demand during the years 2010 to 2013 to be 131 gpm. (The District's records indicate that the average day water production during that period was 196 gpm. In calendar year 2017, the District's average water production rate was 130 gpm. Through August of 2018, the District's average water production rate was 141 gpm.)[1] The growth projected by the Master Plan represents a 38 percent increase in water demand due to build-out of the service area. The Master Plan did not predict when build-out would occur.

1.5 COMMUNITY ENGAGEMENT

District Management is concerned about engaging the community in this process for planning and financing improvements to the system, and has developed a plan to inform its customers and the public in general about the need for system improvements, desired service levels, and financing and revenue strategies for those projects.

Outreach: The District held a public information meetings in January and February of 2018, in an open house format, to provide an opportunity for customers and other members of the public to learn more about the specific system improvement projects.

Notification: The District's website and the Payson Roundup newspaper were used to provide notifications to the public of the January and February public meetings, and to house an overview presentation to provide information on the proposed system improvements and financing plan. Other outreach efforts include planned and unplanned water outages, and daily interaction with customers during meter reads.

1.6 WATER RESOURCES

1.6.1 Existing Water Resources Portfolio

Groundwater: All of the water supplied to the District's customers comes from groundwater wells. PSWID owns 23 water production wells (15 in Pine; 8 in Strawberry) with various production capacities. The operational status of these wells is described in Chapter 2. In addition, nine water production wells owned by other private entities (five in Pine; four in Strawberry) pump directly into the PSWID water distribution system or storage facilities. The water from these other wells is provided under what are commonly referred to as Water Sharing Agreements (WSA). Considering only District-owned assets, Pine has 334.5 gpm of existing production capability, and Strawberry has 65 gpm. Production capacities of WSAs include 106.5 gpm in Pine and 67.7 gpm in Strawberry. Under Arizona groundwater statutes, the District has the legal right to pump as much groundwater as is needed to serve its customers, subject to conservation and other legal requirements.

Surface Water: The District may have the right to utilize some of the surface water in the C.C. Cragin (formerly Blue Ridge) reservoir pursuant to the 2004 Arizona Water Settlements Act (Public Law 108-451 - December 10, 2004). A financial feasibility study of providing

[1] The Master Plan's demand figure is based on an analysis of billing data, while the District's production data is based on well production figures. The difference between the two figures is system loss.

water from the reservoir to nearby communities was conducted for Gila County by Tetra Tech, Inc. in December 2007, and is the source of much of the following information.

The C.C. Cragin Reservoir is located near Clint's Well, on the Mogollon Rim in Coconino County, about 25 miles north of Payson (32 highway miles from Pine). The reservoir has a storage capacity of 15,000 acre-feet, and is physically located within the Coconino National Forest. As a part of the Arizona Water Settlement Act, the Salt River Project (SRP) acquired the C.C. Cragin Reservoir and water transfer system from Phelps Dodge Corporation in February 2005. Ownership of the reservoir was transferred as of 2007 to the Bureau of Reclamation, with the SRP operating the reservoir under the provisions of the Salt River Federal Project. As a part of the acquisition agreement, a portion of the water is to be delivered to the Gila River Indian Community in accordance with the Comprehensive Gila River Settlement.[2]

In addition, the agreement also set aside 3,500 acre-feet of water per year to be used to improve water supplies in northern Gila County. Of this amount, 3,000 acre-feet has been designated for use by the Town of Payson; the remaining 500 acre-feet are planned to serve other communities in northern Gila County. (The PSWID currently pumps about 300 acre-feet per year of groundwater.) Surface water from the reservoir is currently conveyed from the pump station located near the reservoir through an existing pipeline to the headwaters of the East Verde River near Washington Park where the existing electrical generator is located. A new 18-inch diameter pipeline is proposed to transfer water from Washington Park to the Payson area.[3]

Tetra Tech's feasibility study utilized cost-estimating methodology and unit costs from a study titled *Town of Payson, Blue Ridge Reservoir Water Supply Pipeline and Treatment Plant,* (Pipeline Study) prepared by Black & Veatch in 2006. The Pipeline Study report discusses proposed pipelines from the Blue Ridge Reservoir to the Town of Payson and the community of Pine, as well as proposed surface water treatment for both areas (Black & Veatch, 2006). Tetra Tech's study identified more than 15 rural communities, not including Pine or Strawberry, that are located near the proposed pipeline or near the Town of Payson that may be able to utilize the water. With its existing operational structure and financing capability, the PSWID is in the best position to take advantage of the available water supply from the C.C. Cragin Reservoir.

The Pipeline Study includes a discussion of a proposed 14.7-mile raw water pipeline extension from the Washington Park generator to Payson, as well as a micro-filtration-type treatment plant for this water source. A second proposed pipeline trunk off the main Payson line to serve the community of Pine is evaluated in the report, along with plans for a corresponding micro-filtration (membrane) type water treatment plant. The initial length of the raw water main will be sized to deliver a combined design flow of 4.5 million gallons per

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[2] Tetra Tech, Inc., *Blue Ridge (C.C. Cragin) Reservoir Drinking Water Source Financial Feasibility Study*, (Gila County, Arizona, 2007), 1.
[3] Ibid., 1.

day (mgd) (considering 0.6 mgd for the Pine Extension and 3.9 mgd for the remaining length for Payson). The optimum pipe diameter for the Payson raw water main was originally determined to be 16-inches; ductile iron pipe (DIP) was determined to be the best choice for pipe material. However, according to the Town of Payson, 18-inch diameter DIP has been purchased for the pipeline. The proposed Pine Extension consists of an eight-inch DIP pipeline that is 15.2 miles long, with three intermediate booster pump stations (Black & Veatch, 2006).[4]

The proposed Payson raw water pipeline runs in a south-southwesterly direction, beginning at the Washington Park generator and mainly following the Houston Mesa Road to the proposed water treatment plant near Mesa Del Caballo, a community about three miles north of Payson. The proposed Pine extension (previously determined to not be feasible due to excessive cost) begins at Station 183+00 of the Payson raw water pipeline alignment at the intersection of Forest Road (FR) 32 and FR 64 (Control Road). The proposed pipeline runs west along Forest Route (FR) 64 to the intersection of State Route 87, then northwesterly along State Route 87 to the proposed Pine treatment plant (Black & Veatch, 2006).[5]

The Town of Payson website includes information about the proposed C.C. Cragin reservoir pipeline and water treatment project. Numerous elements of the project have been completed beginning in 2011 with purchase of the pipe. The schedule included on the Town's website appears to indicate that all elements of the project will be completed in 2018.

The proposed water treatment plants for the Town of Payson and community of Pine involve microfiltration treatment followed by disinfection. At both areas, an on-site finished water reservoir and pump station are proposed to be constructed for treated water storage and distribution (Black & Veatch, 2006). Using Year 2006 unit costs, the Pipeline Study includes estimates of probable capital and operation/maintenance costs for the Pine pipeline and water treatment plant, as shown in the following table.[6]

Proposed Pine Raw Water Main and Treatment Plant

Item	Cost
Raw water main	$15,185,000
Water treatment plant	$1,670,000
Total capital cost	**$16,855,000**
Amortized Cost per Year (20 year period)	$1,590,993
Operation & maintenance ($/year)	$162,262
Total annual cost	**$1,753,255**

[4] Ibid., 3.
[5] Ibid., 4.
[6] Ibid., 4.

Cost per 1,000 gallons ($/kgal)	$10.76
Table Source: Black & Veatch, 2006	

It is not known if the District participated in the Pipeline Study with the Town of Payson or has taken any actions to acquire the rights to any of the C.C. Cragin Reservoir water. Because the District should be planning for long-term water supplies (i.e. 100 years), it is recommended that the District revisit the 2006 Black & Veatch Pipeline Study, update the information and feasibility analysis of that study, and consider making use of some of the C.C. Cragin Reservoir water.

1.6.2 Emergency Sources of Water

The District has the ability to transfer water between Pine and Strawberry through an eight-inch interconnect, which is capable of moving approximately 144,000 gallons in either direction per day. The pipeline is known as the Magnolia Pipeline. PSWID also has an interconnection in the Strawberry Hollow development, which is capable of supplementing water into the Pine service area at about 50 gpm or 72,000 gpd. In addition, the Mag-Ralls intertie pipeline was installed in March 2018 to provide district operators more flexibility in moving water from Pine to Strawberry and vice versa. To enhance reliability of the system, variable frequency pump drives have been installed at the MR 2 well, the SH 3 Well and booster pumps, and the K2 booster pumps.

1.6.3 Seasonal Operations

During winter months, water consumption drops off significantly due to seasonal residents leaving the area. Due to the decrease in demand, some facilities can be turned off to reduce power consumption during the off season, as well as allow water tables to recover over a longer period of time. This also provides time for maintenance activities. Detailed information pertaining to seasonal operations is contained in the PSWID operation manual document maintained by the District.

1.6.4 Water Resources Summary

The Master Plan analyzed the system demands and supplies and provided a comparison by service area under existing and build-out scenarios. These comparisons are shown in Figures 1.5 and 1.6. Demands are represented by the colored vertical bars, and the total supply is shown as a horizontal line on the graphs. Pine has adequate water supply today and at build-out to meet both the Average Day Demand (“ADD”) and the Maximum Day Demand (“MDD”). Strawberry has adequate supplies to meet ADD under existing and build-out demand scenarios and existing MDD if WSA wells are included. However, Strawberry does not have enough supply, even when considering use of WSA wells to meet MDD at build-out. Water systems should have enough supply to meet maximum day conditions to allow for storage tanks to refill during high demand months. PSWID has the flexibility to transfer water from Pine to Strawberry to make up for this shortfall using District-owned wells under existing conditions, but there is not enough supply available in Pine to continue this practice into the future without the use of WSA wells, or developing other sources of water such as the C.C. Cragin Reservoir water or new wells.

Figure 1.5

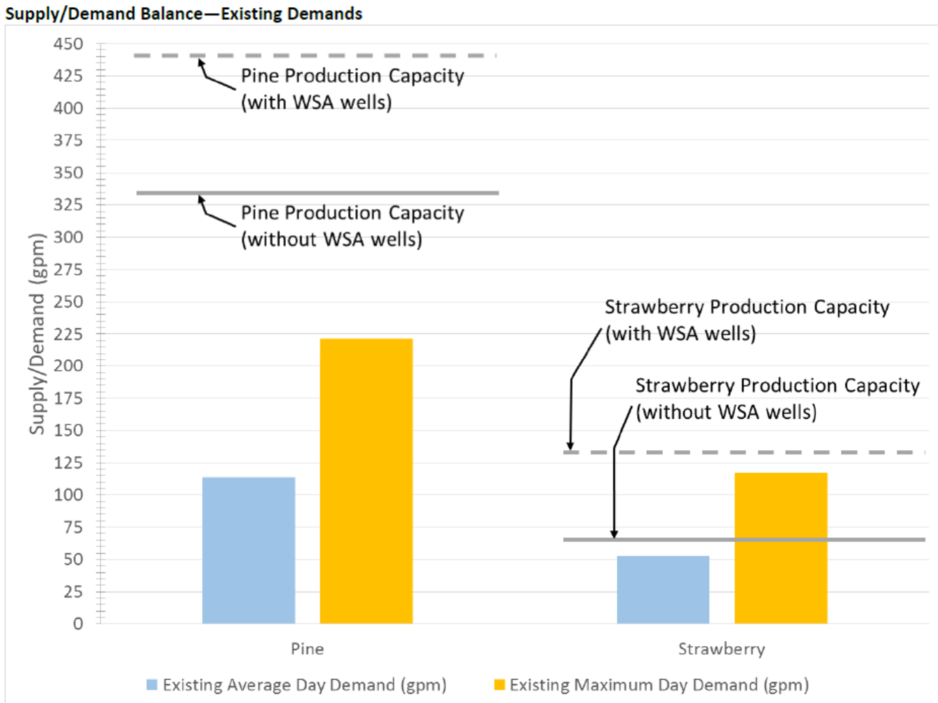
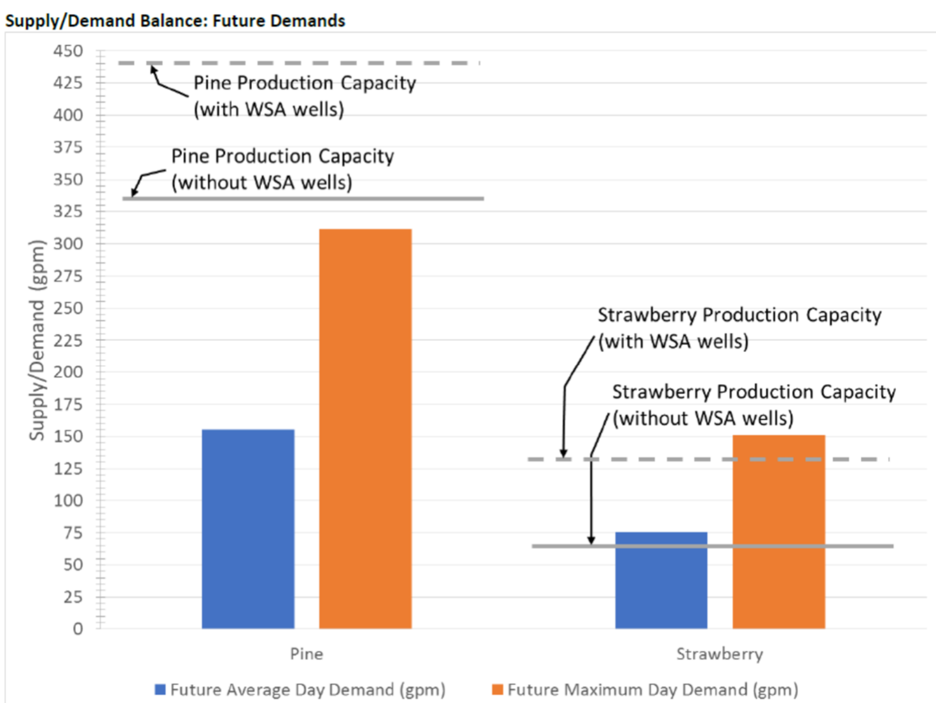


Figure 1.6



1.7 WATER DEMANDS

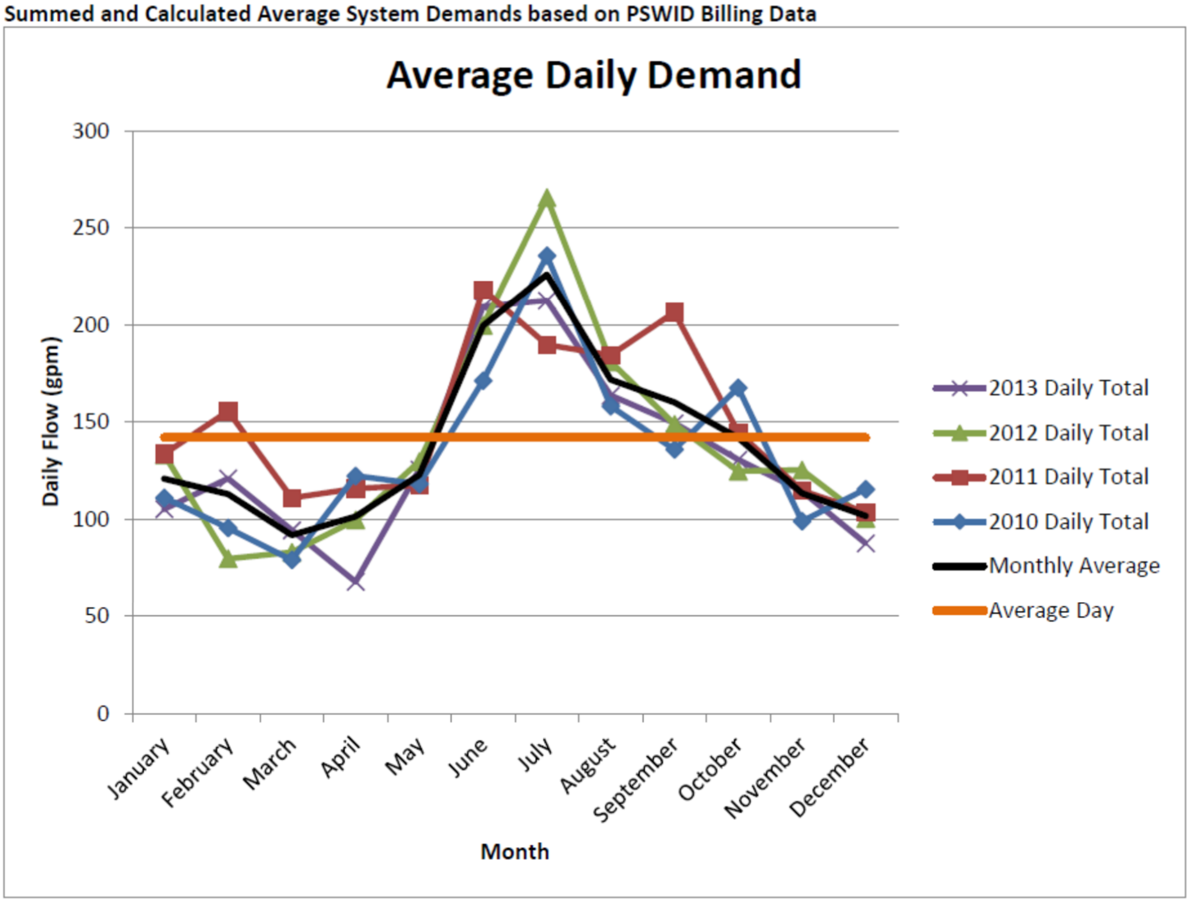
1.7.1 Existing Demands

The 2014 Master Plan analyzed the then-current demands within the PSWID systems. Historical performance of the District's distribution system, along with information gathered from nearby water systems, were used to develop existing system demands, water duty factors, and peaking factors. Future system demands were developed based on the build-out land use analysis and water duty factors.

Water billing data from PSWID customers was collected and analyzed for the years 2010 to 2013 to determine water consumption trends in Pine and Strawberry. The average daily flow for each year was calculated. Using average flows over the four years, a monthly average demand and Average Day Demand (ADD) were calculated. Figure 1.7 shows the total daily demand for each of the four years for PSWID customers, as well as the monthly average demand, and the ADD.

Figure 1.7

Summed and Calculated Average System Demands based on PSWID Billing Data



The monthly average demand matches closely with the daily total demand from 2013. Therefore, 2013 was chosen as the basis for demand calculation. Billing data from the month of October 2013 was used for the ADD and was calculated to be approximately 131 gallons per minute (gpm).

1.7.2 Unaccounted for Water

The demand summed from the billing data does not contain unaccounted for water, which is significant in both the Pine and Strawberry service areas, as shown in Table 1.1. This information was developed as a part of the Master Plan. The District reported that the overall system lost and unaccounted for water amounted to 13.3 percent of the water produced during the month of April 2018. Compared to the data in Table 1.1, it appears that the District has made great strides in reducing lost and unaccounted for water. However, the public water system industry's rule of thumb is less than 10 percent lost and unaccounted for water. Thus, the District should continue to strive to reduce losses.

Table 1.1 – Percent Loss Per Month in 2013

Service Area	January	February	March	April	May	June	July	August	September	October	November	December	2013 Total
Pine	58%	33%	57%	59%	46%	34%	20%	26%	42%	47%	34%	41%	37%
Strawberry	36%	30%	8%	50%	30%	17%	3%	51%	0%	10%	31%	25%	12%
Total System	52%	32%	45%	56%	41%	28%	12%	9%	31%	34%	33%	36%	29%

Note: Information pertaining to water loss was provided and calculated by PSWID
Source: 2014 Master Plan by CH2MHill

One of the contributing factors of the high water loss is likely the use of acrylonitrile butadiene styrene (ABS) pipe. ABS pipe is typically used for drain, waste, and vent piping applications, not for pressurized distribution system piping. Other contributing factors are the age and condition of the system. Over time, as existing pipelines are replaced with polyvinyl chloride (PVC) or other appropriate pipe materials, and as proactive maintenance of the distribution system is enhanced, it is expected that system losses will decrease.

1.7.3 Peaking Factors

To determine the Maximum Day Demand, the Master Plan utilized billing data from the month of July 2013, because no real-time data were available to develop a MDD condition. The average of use during the peak month of July was calculated to be approximately 213 gpm, which is the average daily use of the maximum month. Based on this information, the MDD peaking factor, compared to ADD, was calculated to be approximately 1.6. The Master Plan recommended using a MDD peaking factor of 2 is based on discussions with District Staff, data from surrounding communities, and industry standards. For determination of the Peak Hour Demand ("PHD") peaking factor, the same lack of real-time data prevented a calculation based on actual hourly flow data. Therefore, a PHD factor of 3 (PHD to ADD) was recommended, based on the peaking factors of surrounding communities and industry standards.

These factors were then applied to the Average Day Demand to calculate reasonable and conservative demands for the entire combined system as shown in Table 1.2.

Table 1.2 – Average Day Demand, Maximum Day Demand, and Peak Hour Demand - Daily Totals and Recommended Peaking Factors

Existing Demand Scenario	Base Month	Daily Total (gpm)	Recommended Peaking Factor
Average Day Demand (ADD)	October 2013	167	-
Maximum Day Demand (MDD)	July 2013	334	2
Peak Hour Demand (PHD)	N/A	501	3

Source: 2014 Master Plan by CH2MHill

EXISTING FACILITIES

2.1 INTRODUCTION

An overview of the District's existing water distribution system includes the following categories:

- Source water (wells)
- Treatment (disinfection)
- Booster Pumping
- Storage
- Transmission and distribution piping, and appurtenances.

The objective of this chapter of the Preliminary Engineering Report (PER) is to describe the primary PSWID system facilities, provide locations of the main facilities, give a brief history, and describe existing conditions. Most of the District's water facilities are aged, obsolete, failing, and are at or beyond their useful life. The information presented in this chapter is derived from site evaluations and inspections, the CH2MHill 2014 Master Plan, record drawings, and reports provided by the District staff.

2.2 EXISTING FACILITIES OVERVIEW

The PSWID inherited numerous private water systems when it was formed in 1996. These systems were installed by owners and developers of private land within the Pine and Strawberry communities over a period of many years. Since the area was settled by pioneers in 1879, Pine and Strawberry have become fast-growing communities of year-round and seasonal residents and businesses.

PSWID owns 23 water production wells (15 in Pine; 8 in Strawberry) with various production capacities. In addition, nine water production wells owned by other private parties (five in Pine; four in Strawberry) pump directly into the PSWID water distribution system or storage facilities through Water Sharing Agreements (WSA).

The groundwater is not treated, except to add chlorine to maintain a residual disinfection level in the distribution system. The chlorine is added at certain water wells through liquid chlorine solution chlorinators. The systems include a total of 22 storage tanks with a total of 1.311 million gallons of storage, 24 booster stations, and more than 58 miles of water mains.

2.3 EXISTING FACILITIES MAP

Figures 2.1 and 2.2 show the existing District facilities.

2.4 SCHEMATIC PROCESS LAYOUT OF EXISTING FACILITIES

Figure 2.7 provides a schematic diagram of the existing Pine water system. Figure 2.8 provides a schematic diagram of the existing Strawberry water system.

2.5 EXISTING FACILITIES HISTORY

The existing PSWID facilities were generally constructed over the last several decades as the private lands in the Pine and Strawberry communities were developed. Individual, stand-alone water systems based on small groundwater wells were installed by owners and developers as each area developed. There was little or no effort made toward consolidating the systems into larger, more efficient operations until the District was formed. Even now, it is very difficult to consolidate the systems due to the terrain and the differing pressures under which each of the original systems operate. This is the reason why the District still has 27 different pressure zones within the service area.

The PSWID owns 17 Active water production wells (14 in Pine; 3 in Strawberry) at various production capacities. The PSWID also employs 8 water production wells owned by other private entities (4 in Pine; 4 in Strawberry) that pump directly into the PSWID water distribution system or storage facilities.

The PSWID has 22 storage tanks with a total of 1.331 MG of storage. The Pine service area has a total of 11 storage tanks with a storage volume of 1,037,000 gallons (78 percent of total). The Strawberry service area has a total of 11 tanks with a storage volume of 294,000 gallons (22 percent).

The PSWID has approximately 357,600 linear feet of water mains (67.7 miles). The water mains range in size from 2-inch to 8-inch and 78 percent of the water mains are sized 4-inch or smaller.

In 2008, the consulting firm of CVL prepared an assessment of the District's existing infrastructure. The result of that assessment for each major category of the District's facilities is reflected in the following paragraphs.

2.5.1 Source Water History

Tables 2.1 and 2.2 list the existing wells for the Pine and Strawberry systems, respectively. This information is from the 2014 Master Plan.

Table 2.1 – Well Production - Pine

Location Name	Well Production (gpm)	Notes
Pine Crest Lot 25	N/A	Offline – dry hole
Portal 1 TR A	16.5	
Portal 2 Lot 73	14.5	
Portal 3 TR A next to Lot 61	23.0	
Milk Ranch Well #1	85.0	
Milk Ranch Well #2	75.0	
Milk Ranch Well #3	75.0	
Canyon Shadows	N/A	Offline – dry hole
STWID #1	24.0	WSA
Brookview Terrace 4	15.5	WSA
Bloom	30.0	WSA
Gordon	40.0	WSA
STWID #2	7.0	WSA

Source: 2014 Master Plan by CH2MHill

Table 2.2 – Well Production - Strawberry

Location Name	Well Production (gpm)	Notes
Strawberry View 1 Lot 59	28.0	
Strawberry Ranch 5 TR C	11.0	
Strawberry View 3 Lot 226	26.0	
K2	N/A	Not in Service
Rimwood	N/A	Offline – dry shallow hole
Strawberry View 3	N/A	Offline – dry shallow hole
Strawberry Creek Foothills	N/A	Offline – dry shallow hole
Strawberry Ranch 2	N/A	Offline – dry shallow hole
Gordon Strawberry	9.2	WSA
McKnight	23.5	WSA

Johnson 1	22.0	WSA
Johnson 2	13.0	WSA

Source: 2014 Master Plan by CH2MHill

2.5.2 Source Water Component Failures

The inability of a well to produce its nominal capacity of water could be due to many reasons, including pump failures, casing failures, lowering groundwater table, and problems with pump controls. In the case of PSWID, six of the wells listed above have suffered from lowering groundwater levels and have been taken out of production. Some of the wells produce excessive amounts of sand, which can damage pump impellers and casings, as well as create deposits in the waterlines. Pump and control failures are temporary problems and can be resolved with replacement and maintenance. Problems with the well casings have not been reported, although some of the wells are approaching 40 to 50 years of age. The Master Plan did not identify other problems or failures of District wells such as poor water quality.

The 2008 CVL assessment indicated that the District's wells had, on the average, reached about 93 percent of their expected life. In 2017, District staff performed an updated condition assessment and determined that the wells had reached 123 to 140 percent of their expected life. That assessment also found that 42 percent of the wells will need upgrades and repairs within one year. Based on the 2008 CVL assessment, replacing 42 percent of the District's wells would cost nearly $400,000. Well replacements would have be completed strategically to minimize the effect of the lost production on the ability of the system to serve customer demands. Thus, well replacements will require a number of years to accomplish.

2.5.3 Source Water Violations

The 2014 Master Plan provides additional information with respect to violations:

> *"CH2M HILL requested that the District provide any information related to water quality compliance reporting for the previous 3 years of system operation. A review of the information, including PSWID's Consumer Confidence Reports (CCRs) and sanitary surveys from 2010 to 2013, indicates that PSWID has been in compliance with all federal and state drinking water standards during this period."*

The current District Manager is not aware of any previous or current source water violations.

2.5.4 Source Water Condition

The wells owned by the District are capable of meeting the demands of the system throughout the year and the District is fortunate that the water quality produced by the wells meets or exceeds the Primary Drinking Water Standards and no treatment is needed. The District chooses to chlorinate the water prior to distribution as a precaution.

The 2014 Master Plan identified the need for additional well capacity for the Strawberry system as it approaches build-out.

2.5.4.1 Suitability of Source Water for Continued Use

While the District's wells currently meet the demands of the system, the average age of the wells is about 40 years. The advanced age of the wells increases the likelihood that the wells may begin to experience major failures of the casings. Routine maintenance and replacement of components from time to time will be required to keep the wells in good operating condition. However, a major casing failure will require the well to be replaced, which is a costly and time consuming project.

2.5.4.2 Adequacy of Well Site Facilities

The PSWID well sites are small and not well secured. Most of the well sites have several deficiencies that require remediation and replacement for them to remain viable water production sources for the District in the future.

2.5.4.3 Capacity of Well Field

Of the 23 wells owned by the District, only 17 are active (14 in Pine and 3 in Strawberry). The District also employs 8 wells through Water Sharing Agreements (4 in Pine and 4 in Strawberry). These 25 wells have adequate capacity to supply the demands of the systems for the foreseeable future. According to the Master Plan, additional well capacity will need to be added to the Strawberry system to meet future growth needs. The District should also monitor the static water levels in the wells from year to year to determine if any long-term trends in groundwater levels can be discerned. In addition, as part of a drought contingency plan the District will explore the opportunity in install wells into a deeper, more stable aquifer.

2.5.4.4 Compliance of Well Sites with Federal, State, and Local Laws

The water produced by the District's wells meets or exceeds all Primary Drinking Water Standards and there are no unresolved Notices of Violation from the Arizona Department Environmental Quality. However, the District is working to resolve numerous deficiencies and compliance issues that do not rise to the level of an ADEQ violation, but are needed to provide efficient and secure water services as well as safe working conditions for the District's employees.

2.5.4.5 Well Site Energy Analysis

The District obtained a State grant with which to conduct an energy evaluation for all of well facilities. Improvements have been made to include VFD motors on these wells.

The operation of this system is controlled at the local well and tank sites. No central communication system is in place for the system. A system that can be remotely controlled and operate will operate more efficiently and economically. Energy can also be conserved by reducing the trips operators must make to check the operation of these facilities.

2.6 TREATMENT HISTORY

The only treatment of the water supply that the District is required to perform is disinfection before the water is introduced into the distribution system. The District provides disinfection by adding chlorine to the water at the well sites using liquid chlorine solution chlorinators. These machines are reliable and the District has spare units that can be easily installed to replace a failed chlorinator within a short period of time. This approach to disinfection has worked well for the District and should continue to provide reliable chlorination for the foreseeable future. There are no known violations related to disinfection or other treatment requirements.

2.7 BOOSTER PUMPING HISTORY

Tables 2.3 and 2.4 list the existing booster stations for the Pine and Strawberry systems, respectively. This information is from the 2014 Master Plan.

Table 2.3 – Pine Booster Stations

Pine Service Area Zone/Group of Zones	Asset Name	Booster Pump Horsepower	VFD?	Hydro Tank (gallons)
Brookview Terrace/Canyon Tank	Brookview Terrace Booster Station (2 pumps)	5 and 7.5	No	None
	Pine Ranch Booster (2 pumps)	5		
	Church Vault Booster	5		
Portal 2 Upper	Portal 2 Tank Booster (Top)	5	No	2,000
Portal 1 & 2 Middle	Midway Booster	3	No	119
300K	Milk Ranch Booster (2 pumps)	15	Yes	86
	Magnolia Line Booster (2 pumps)	15	Yes	
Pine Ranch 1	Pine Ranch 1 Booster	5	Yes	119
Pine Ranch 2	Pine Ranch 2 Booster (1 pump)	5	No	1,000
Hidden Pines	Hidden Pines Booster	3	No	None
Pine Mountain Acres	Pine Mountain Acres Booster (2 pumps)	5	Yes	119
White Oaks Glen	White Oaks Glen Booster (2 pumps)	5	Yes	119
Fara	Strawberry Mountain Shadows 2 Booster (2 pumps)	5	Yes	None

Strawberry Mountain Shadows	Strawberry Mountain Shadows Booster (2 pumps)	5	No	2,000

Table 2.4 – Strawberry Booster Stations

Strawberry Service Area Zone/Group of Zones	Asset Name	Booster Pump Horsepower	VFD?	Hydro Tank (gallons)
K2	K2 Booster (2 pumps)	7.5	Yes	3,000
	Magnolia Line Booster (2 pumps)	15	Yes	
Strawberry View 1	SV1-K2-SR5 Inter-tie Booster (2 pumps)	7.5	Yes	
	Strawberry View 1 Booster (1 pump)	5	Yes	
Tank Farm	Tank Farm Booster	5	Yes	2,000
Rimwood	Rimwood Booster (2 pumps)	5	Yes	10,000
Homestead	Homestead Booster (1 pump)	5	Yes	
Strawberry Ridge Estates	Strawberry Ridge Estates Booster	Not in Service – reserved for future development	Yes	
Hardscrabble Mesa	Hardscrabble Mesa Booster (1 pump)	3	No	
Walnut Glen	Walnut Glen Booster	5	Yes	

Most of these booster stations are in-line, meaning that they pump from one pressure zone to a higher pressure zone. System pressures vary widely primarily due to the mountainous terrain. According to the 2014 Master Plan, there are numerous locations within both systems where the system pressure is either below 40 psi or above 100 psi. In the latter cases, pressure regulating valves are required to be installed on the water service to each home located within the high-pressure area in order to maintain the pressure in the house at or below 80 psi. The Master Plan recommended that these low- and high-pressure areas be further evaluated.

The 2008 CVL facilities assessment indicated that the district's booster stations, on the average, reached between 63 and 138 percent of their expected life. In 2017, District staff's updated condition assessment determined that the booster stations had reached 175 to 250 percent of their expected life. District staff reported that assets which are 75 percent or more through their standard useful life should be considered for major overhaul or replacement, especially if they have not received regular preventative maintenance. Staff further concluded that 54 percent of the District's booster stations will need upgrades and repairs within the next year, including redundant pumps, SCADA, and variable frequency drive controls (VFD).

2.7.1 Pumping Component Failures

With 23 active booster stations serving 27 different pressure zones, the pumps and related facilities are critical to the daily operation of the District's systems. The PSWID operations staff is able to maintain these booster stations in operating condition despite old and obsolete equipment and harsh climate conditions. Fourteen of the booster stations are in need of equipment upgrades and new pumps, and six of those are deemed to be in critical need of new equipment and control upgrades within the next year.

2.7.2 Pumping Violations

The District currently has no violations related to the booster stations.

2.7.3 Pumping Condition

The District's booster stations are capable of meeting the demands of the system throughout the year, but much of the equipment is old and obsolete and lacks redundancy. The following booster stations have been determined to need VFDs, replacement of the existing pumps, and addition of a redundant pump with associated piping and controls. Projects under WIFA funding have been identified and are being implemented to upgrade these booster stations:

- Brookview Terrace - Tract A (2 Pumps)
- Hwy 87 & Pine Creek (Church Vault - partially built, add BPS.)
- Pine Ranch 2 - Lot 25 (1 Pump)
- Strawberry View 1 - Lot 59 (1 Pump)
- Portal 2 - Lot 178 (1 Pump)
- Strawberry Knolls 2 - Lot 138 (2 Pump)
- Hardscrabble Mesa (1 Pump)
- Portal 2 Common Area - Next to Lot 166 (1 Pump)
- Pine Mountain Acres - Lot 7 (2 Pump)
- Pine Valley Homesites - Lot 109 (2 Pump)
- Strawberry Hollow #3 (2 Pump)
- Strawberry Mountain Shadows 1 - Lot 25 (2 Pump)
- Strawberry Ranch 2 - TR D (Pumps Failed - Replace 2 Pumps)
- Strawberry Ranch 5 - TR C (1 Pump)

2.7.4 Suitability of Pumping for Continued Use

All of the District's current active booster stations are suitable for continued use, subject to rehabilitation and upgrades to improve efficiency, reduce maintenance costs and improve reliability. These upgrades include SCADA, VFDs, and hydropneumatic tanks. Also, routine maintenance and replacement of components from time to time will be required to keep the booster stations in good operating condition.

2.7.5 Adequacy of Booster Pumping Facilities

The PSWID booster stations are adequate in the sense that they provide the flows into the system that are required to meet the daily demands. However, many of the stations are equipped with old and obsolete equipment, which increases the amount of time spent on maintenance and reduces their reliability.

2.7.6 Capacity of Booster Pumping Facilities

The capacities of the booster station facilities are shown in Tables 2.3 and 2.4.

2.7.7 Compliance of Booster Pumping Facilities with Federal, State, and Local Laws

The existing District booster stations are not subject to any ADEQ Notices of Violation. It is recommended that the District conduct building and electrical code inspections of the booster stations to ensure safety and current code compliance.

2.7.8 Energy Analysis

The District obtained a State grant with which to conduct an energy evaluation for all of well facilities. Improvements have been made to include VFD motors on these wells.

The operation of this system is controlled at the local well and booster sites. No central communication system is in place for the system. A system that can be remotely controlled and operate will operate more efficiently and economically. Energy can also be conserved by reducing the trips operators must make to check the operation of these facilities.

2.8 STORAGE HISTORY

The Pine area has a total of 11 storage tanks with a storage volume of 1.037 million gallons (79 percent of total). The Strawberry service area has a total of 11 tanks with a storage volume of 274,000 gallons (21 percent of total). The District has inspected all of the tanks during the period of 2012 to 2015. Copies of the inspection reports are included in Appendix B. Tables 2.5 and 2.6 list the storage tanks and their locations, along with their year of installation (if known) and the date of inspection.

Table 2.5 – Pine Storage Tanks

Pine Service Area Zone/Group of Zones	Asset Name	Storage Capacity (gallons)	Year Installed	Inspection Date
Brookview Terrace/Canyon Tank	Brookview Terrace Tank	100,000	1980	1/18/15
	Pine Ranch Tanks (2 @ 10,000)	20,000	1972	1/11/15
	Canyon Tanks (2 @ 220,000)	440,000	2020	No inspection yet

Portal 3 Upper	Portal 3 Tank – Rehab	150,000	2020	No inspection yet
Portal 1&2 Middle	Portal 2 Tank – Rehab	100,000	2020	No inspection yet
300K	300K Tank	300,000	?	11/1/12
	Water Tank Road Tank	100,000	?	2/8/15
	Milk Ranch Tanks (2)	67,000	2012 2013	No inspection yet

Table 2.6 – Strawberry Storage Tanks

Strawberry Service Area Zone/Group of Zones	Asset Name	Storage Capacity (gallons)	Year Installed	Inspection Date
K2	K2 Tank	100,000	1992	2/15/15
Strawberry View 1	Strawberry View 1 Tank #1 Strawberry View 1 Tank #2	10,000 10,000	2018 2018	No inspection yet
Tank Farm	Tank Farm Tank #1	15,000	?	4/2/13
	Tank Farm Tank #2	10,000	?	4/2/13
	Tank Farm Tank #3	10,000	?	4/2/13
	Tank Farm Tank #4	10,000	?	4/2/13
Rimwood	Strawberry Creek Foothills Tank	20,000	1980	?
	Rimwood Tank	67,500	?	4/7/13
Homestead	Homestead Tank	1,500	?	?
Strawberry Ridge Estates	Strawberry Ridge Estates Tank	20,000*	?	Not in service
Hardscrabble Mesa	Hardscrabble Tank	20,000	1987	9/22/12

* Not in service – reserved for future development

The 2008 CVL system assessment estimated that the storage tanks had reached between 40 percent and 64 percent of their useful lives. District Staff now estimates that the tanks are between 60 percent and 80 percent of their useful lives.

2.8.1 Storage Component Failures

The 21 active tanks provide the storage that is necessary to not only meet the peak hour demands on the system, but to also allow the wells to refill the tanks during the night when demands are lower. The PSWID operations staff is able to maintain these storage tanks in operating condition despite their age and harsh climate conditions that take degrade the coatings and steel. Seven of the tanks are in need of rehabilitation or replacement. Three of those are need attention within the next year, including two tanks that need to be replaced soon.

It is important for the District to plan for tank maintenance and replacement based on inspections. In order to routinely inspect the tanks for needed maintenance, a second tank should be provided at each location. One tank can remain in operation while the other tank is taken out of service for cleaning and inspection. This redundancy requires the ability to isolate the tanks. SCADA at all tank sites will also enhance the District's ability to operate and maintain their facilities.

2.8.2 Storage Violations

The District currently has no violations related to the storage tanks.

2.8.3 Storage Condition

The Arizona Administrative Code (AAC) Title 18, Chapter 5 (R18-5-503) recommends that the minimum storage capacity required for a community water system shall be equal to the Average Day Demand (ADD) during the peak month of the year. For PSWID, this equates to the ADD during the peak month of July.

The 2014 Master Plan analyzed the existing PSWID storage tanks against the State guidelines. The analysis assumed that all production wells (District-owned and WSAs) are considered for equalization calculations in Strawberry. Following is an excerpt from the Master Plan that summarizes the results of the storage analysis.

> *"When examined by pressure zones, Strawberry…. meet[s] state recommendations under existing and build-out conditions….[A]ll zones in Strawberry have adequate storage with the exceptions of a minor shortfall in the Homestead zone under existing and build-out demand conditions and about a 30,000 gallon shortfall in the K2/Rimwood/Strawberry Ranch 3 area under build-out demand conditions. The system also likely does not warrant the need to increase storage in the zones due to water quality concerns because of lack of tank turnover; therefore, existing storage volumes are adequate.*
>
> *Pine has adequate storage to meet state….recommendations….under existing conditions and at build-out when evaluated by pressure zones with the exception of the Pine Ranch area. The system likely does not warrant the need to increase storage in this zone due to water quality concerns because of lack of tank turnover; therefore, PSWID may choose to monitor the area in coming years if demands increase to review the need for additional storage in the Pine Ranch area."*

It should be noted that the above excerpt from the Master Plan reports that there will be storage shortfalls in the Strawberry system at build-out. However, Table 3-6 of the Master

Plan report shows that there will surplus amounts of storage in the Strawberry system at build-out under the State requirements.

2.8.4 Suitability of Storage for Continued Use

Because growth within the systems has been nominal since 2014, it is assumed that the above statements regarding adequacy of the storage tanks to meet daily demands are still true. However, beginning in 2012, District Staff has completed inspections of the oldest and most deteriorated tanks and determined that several of the tanks are in need of rehabilitation or replacement. Most of the tanks are of welded steel construction with coatings to reduce corrosion. In some cases, the coatings are failing to the point that, if they are not rehabilitated within a reasonable period of time, the underlying steel will rust through. The inspections also revealed other deficiencies that should be addressed, such as missing handrails, missing vent screen, etc. In addition, the tanks do not meet OSHA standards for fall protection and there are site issues such security fencing, drainage and access for maintenance purposes.

Tanks that are in need of rehabilitation are:

- Brookview Terrace
- Water Tank Road Tank

Without rehabilitation, the useful life of the tanks that are in better condition will be reduced. The tanks that are 40 to 60 years old have clearly served their expected lives, are prone to catastrophic failure, and are in need of immediate replacement as indicated above. WIFA-funded projects to rehabilitate the above-listed tanks have been identified and are being implemented.

2.8.5 Adequacy of Potable Water Storage Facilities

The storage tank capacity analysis conducted for the 2014 Master Plan indicated that, ignoring fire protection storage, the existing tanks were adequate to serve the needs of the systems with the following exceptions:

1. A minor shortfall in the Homestead zone under existing and build-out demand conditions and
2. About a 30,000 gallon shortfall in the K2/Rimwood/Strawberry Ranch 3 area under build-out demand conditions.

2.8.6 Capacity of Storage

The nominal capacities of the District's storage tanks are provided in Tables 2.5 and 2.6.

2.8.7 Compliance of Storage with Federal, State, and Local Laws

The existing District storage tanks are not subject to any ADEQ Notices of Violation.

2.8.8 Energy Analysis

Not applicable.

2.9 SUPPLY AND DISTRIBUTION PIPING AND APPURTENANCES HISTORY

The majority of the installation of the District's water transmission pipelines and distribution facilities dates back to more than 30 years ago with some going back to the 1960s. The existing water distribution system contains more than 60 miles of water main of widely varying age, material type, and size, ranging in diameter from 1-inch to 8-inches. Table 2.7 summarizes the system pipes by size and material.

Table 2.7 – Pipe Summary

Diameter (inches)	Plastic Pipe Length (feet)	Ductile Iron Pipe Length (feet)	Percent of Total Length	Cumulative Percent of Total Length
1	220	0	0.06%	0.06%
2	63,855	0	18%	18%
3	51,584	0	14%	32%
4	82,048	0	23%	55%
6	145,103	1,098	41%	96%
8	13,683	0	4%	100%
Totals	**356,492**	**1,098**		

Source: PSWID GIS prepared by CH2MHill

The vast majority of the pipe in the system is plastic pipe which includes polyvinyl chloride (PVC) and acrylonitrile butadiene styrene (ABS). The District is in the process of updating the mapping of the system to include an inventory based on the type of pipe material. Current estimates are that approximately 60 percent of the plastic pipe is PVC and 40 percent is ABS. The ABS pipe and some of the PVC pipe are considered to be substandard for use in the public water systems. Thus, these material types comprise most of the pipe failures that plague the system. District Staff have also discovered small amounts of asbestos/cement pipe and galvanized pipe.

Fifty-five percent of the pipe in the system is smaller than 6 inches in diameter. Smaller diameter pipe, especially in rural systems with long runs between customers, can result in substantially lower pressures during peak usage periods.

The 2008 CVL system assessment estimated that the distribution pipes had reached 80 percent their useful lives. District Staff now estimates that the pipes are at 98 percent of their useful lives.

2.9.1 Supply and Distribution Piping and Appurtenances Component Failures

Many of the distribution system pipes were installed by private owners and developers, probably without much oversight by regulatory agencies with jurisdiction. Also, at the time, there was no "water company" to enforce standards for materials, minimum pipe sizes, trench conditions and other quality-related items. This lack of oversight and good quality construction is evident with the poor pipe materials that are discovered by District Staff and the large amount of money and effort that must be expended by the District to repair leaks in the various systems. The age of the infrastructure also contributes to the frequency of pipe breaks. Following are recently compiled data regarding pipe breaks:

- In 2017, PSWID field staff repaired 125 breaks and leaks in mains and service connections across the system.
- An average of 383 hours per month has been spent on repairing leaks and breaks along with another 101 hours per month performing "corrective" maintenance.
- Repairs of items that have failed or broken cost the District almost $240,000 last year alone.
- PSWID staff compiled data on where the main breaks occurred over the past two years. These areas are:
    - North side of Rimwood
    - Strawberry Ranch 3
    - Canyon Tank/Portal 3 Lower
    - Cool Pines Estates
    - Woodland Heights/No Name
    - Old Country

  Many of these areas were also identified as problem areas in the 2014 master plan.

The system also suffers from a high rate of unaccounted for and lost water, most of which is due to leaking and broken pipes. There is significant water loss in both the Pine and Strawberry service areas, with a 13.3 percent overall system loss reported in April 2018. The 2014 Master Plan reported that, during 2013 based on PSWID supplied data, the Pine system had a total loss of 37 percent, the Strawberry system lost 12 percent, and the system as a whole lost 29 percent of the water pumped from the ground. One of the contributing factors of the high water loss is the use of ABS pipe. ABS pipe is typically used for drain, waste, and vent piping applications, not for pressurized distribution system piping. Other contributing factors are the age and condition of the system. Over time, as existing pipelines are replaced with PVC or other appropriate pipe materials, and as proactive maintenance of the distribution system is enhanced, it is expected that the system losses will decrease.

2.9.2 Appurtenance Component Failures

The mountainous terrain sometimes requires that pressure regulating valves (PRV) be used to control pressures in the system. In some areas, all of the water to numerous homes is supplied through a PRV. Some of these PRVs are old and failing and need to be replaced in order to enhance their dependability. The District is currently planning to replace and relocate three PRVs in accordance with the recommendations of the Master Plan.

2.9.3 Supply and Distribution Piping and Appurtenances Violations

The District currently is not meeting guidelines and regulation related to the distribution system and appurtenances. ADEQ Engineering Bulletin 10 is the guiding document from the State of Arizona for Water System Design. This document establishes a minimum of 6-inch water line with no restrictions or waivers required, see section 7.C.3 (sheet 7-3). Pages from this document can be found in Appendix K.

2.9.4 Supply and Distribution Piping and Appurtenances Condition

Given the age, substandard material, and routine failure of supply and distribution piping and appurtenances, the overall condition of the supply and distribution piping and appurtenances is considered to be in very poor or failed condition. District Management has identified numerous replacement projects that would replace at least 142,000 lineal feet of pipes in sizes ranging from 2 inch to 8 inch. Some of those replacement projects, which comprise 49,289 lineal feet of pipe, are moving ahead under WIFA and District capital funding. A list of those projects is included in Appendix G. A second series of projects, which would replace another 93,035 lineal feet of pipe is proposed by this report. The total amount of proposed piping for new projects is approximately 185,746 linear feet.

2.9.5 Suitability of Supply and Distribution Piping and Appurtenances for Continued Use

The District's distribution system suffers from aging pipes and valves, substandard materials in a large portion of the system, and routine failure of distribution piping and appurtenances. Because of these factors, the water supply and distribution system piping and appurtenances in many parts of the system are considered to be not suitable for continued use, and requires significant replacement as soon as possible.

2.9.6 Adequacy of Supply and Distribution Piping and Appurtenances

Given the current age, substandard pipe materials, and failure rate, the supply and distribution piping and appurtenances are not adequate to serve the District's needs in many portions of the system. In addition, many of the original pipes are relatively small in size. Table 2.7 shows that almost one-third of the total length of pipes in both systems are 3 inches or smaller, while more than half of the pipes are 4 inches or smaller. During peak demand periods, small pipes can decrease the level of service to system customers by creating high friction losses. Undersized pipes can also require higher system pressures to offset the friction losses and decrease the energy efficiency of the system.

2.9.7 Capacity of Supply and Distribution Piping and Appurtenances

The capacity of the supply and distribution piping and appurtenances in many portions of the system is inadequate because of the age of the pipes, type of material, and the occurrence rate of failures.

2.9.8 Compliance of Supply and Distribution Piping and Appurtenances with Federal, State, and Local Laws

The existing District supply and distribution piping and appurtenances are not subject to any ADEQ Notices of Violation.

2.9.9 Energy Analysis

Internal or external pipeline condition assessments were not performed as part of the scope of services for this PER. However, as piping ages the coefficient of friction typically increases due to tuberculation and deposition of minerals on the pipe walls. Based on age of the piping, it is estimated that 20 to 30 percent of the required energy to operate the system can be contributed to increased friction and can be considered a “loss”.

Additionally, all customer meters are read manually. This is a large labor-intensive operation to read these meters. It uses a significant amount of energy to accomplish this task. By installing remote read meters. The energy required to read the meters would be greatly reduced. It will free personnel to work on other pressing matter which will also the system to operate more efficiently. The more efficient operation of the system will save additional energy.

2.10 FINANCIAL STATUS OF EXISTING FACILITIES

The District’s Financial Statements for fiscal year 2019, as excerpted from the annual audit, are provided in Appendix C.

2.10.1 Monthly Usage Categories for Most Recent Fiscal Year

The District does not have separate usage rates for different categories of customers. All customers pay the same usage rate regardless of whether the customer is residential, commercial or other. However, the District charges a higher monthly base fee for commercial customers compared to residential, and that monthly base fee increases as the meter size increases, up to 2-inch size. The current rate structure does not reflect pricing based on the customer’s distance from the source or the customer’s ground elevation compared to the source.

The District utilizes water usage rate tiers, which are structured to charge more per gallon as the usage increases from one tier to the next higher. This rate structure encourages water conservation because the customer pays more for each gallon of water as they use more. The top tier is for 10,001 gallons and above. Additional information on these rate structures can be found in Appendix D.

2.10.2 Current Water Rate Schedule

The District’s current rate schedule is included in Appendix D.

2.10.3 Annual O&M Costs

A summary report of the District's current Budgeted Operation and Maintenance expenses and the anticipated expenses after the construction of the proposed projects are included in Appendix E.

2.10.4 Current Water Distribution System Capital Improvement Program

The District's three-year Capital Improvement Program budget is included in Appendix F.

2.10.5 Water Infrastructure Finance Authority of Arizona

In early summer of 2017, several District Board members and staff met with representatives from the Water Infrastructure Finance Authority (WIFA) of Arizona to explore the possibility of securing a financial aid package for the District. The District Board committed the total annual capital improvements budget amount of $500,000 towards debt service for the loan, and WIFA staff determined that the District qualified for an $8,000,000 loan with some forgivable principal funding. The District completed the applications and documents for the financial aid package and, after processing by the WIFA staff, the District was awarded the $8,000,000 package with $500,000 forgivable principal and a 20-year term. The loan closed on February 9, 2018.

Principal payments have been deferred for the first two years of the loan. All payments will be made from the capital improvements budget of $500,000 each year with no increases to the current rates that were established July 1, 2016. The District has an extensive list of projects to be completed in three phases over the next three years including waterline replacements, tank refurbishments and/or removals/replacements in addition to well refurbishments including new pumps, motors and VFD installations. The projects being financed by the WIFA loan are shown in Appendix G. The following table provides more information for the WIFA loan.

Loan Number	**920283-18**
Closing Date	**02/09/18**
First Payment Period	**07/01/18**
Financial Assistance Terms and Conditions	
Original Loan Amount as of the Closing Date	$8,000,000.00
Forgivable Principal Amount	$500,000.00
Intended Repayment Amount	$7,500,000.00
Loan Term (years)	20
Combined Interest & Fee Rate	2.104%
Total Number of Payment Periods within Loan Term	40
Principal Repayments	
Period Principal Repayment Begin	6
First Principal Repayment Date	07/01/20
Final Principal Repayment Date	07/01/37
Combined Interest and Fee Payment Dates	

First Combined Interest and Fee Payment Date*	07/01/18
Final Combined Interest and Fee Payment Date	07/01/37
Debt Service Reserve Fund Requirements	
Total Reserve Amount	$504,851.79
Annual Amount	$100,970.36
Reserve Funded by:	01/01/23
Replacement Reserve Fund Requirement	
Begin Funding on:	07/01/23
Annual Amount	$100,970.36
Semi-Annual Deposit	$50,485.18
Annual Payment	
Year 1	$62,243.33
Year 2	$157,800.00
Years 3 through 20	$504,851.79

* Actual initial Combined Interest and Fee payment calculated only on dollar amount drawn against loan as of initial payment date.

2.10.6 Existing Debts and Required Reserve Accounts

In addition to the WIFA loan, the District had a pre-existing loan with Compass Bank that was refinanced on July 24, 2015 for $6,444,398. This 10-year loan requires a balloon payment at the end. The current principal balance is approximately $4,115,400 and the payment is approximately $400,000 per year. The required reserve is $250,000 which is maintained in a separate account. The District will be required to pay the balance in a balloon payment at the end of the loan period on July 24, 2025. In the meantime, the District has been making extra principal payments on a quarterly basis, including a payment in April 2020 of $100,000.

2.11 WATER AND ENERGY AUDITS

The District has not performed any recent energy audits. The 2014 Master Plan reported on a water audit that was compiled by PSWID Staff and found that, during 2013, the Pine system had a total water loss of 37 percent, the Strawberry system lost 12 percent, and the system as a whole lost 29 percent of the water pumped from the ground.

NEED FOR PROJECT

3.1 INTRODUCTION

Many portions of the PSWID system are old and deteriorated; a situation that creates problems for the District and its water customers. The District desires to continue to produce and deliver its potable water to the end-users (customers) from its numerous wells, tanks, booster stations and waterlines. Under this scenario, the District needs to continue to rehabilitate and replace the components of the system, and continue to operate and aggressively maintain its production, distribution, and water storage assets.

This chapter presents a discussion on the general need for water system improvement projects in the PSWID, focusing on three main areas:

1. Health, Sanitation, and Security
2. Aging Infrastructure
3. Reasonable Growth

3.2 STATE REGULATORY INPUT AND CONCERNS

The Safe Drinking Water Act (SDWA) is the main federal law that requires the U.S. Environmental Protection Agency (EPA) to set drinking water standards that public water systems in the U.S. are required to meet, and to ensure the health of water consumers is carefully protected. In Arizona, the EPA has granted the Arizona Department of Environmental Quality (ADEQ) the authority and responsibility to oversee drinking water rules and programs. ADEQ conducts annual compliance inspections for all community water systems. If ADEQ finds the system to be in non-compliance with any of the applicable rules or regulations, a Notice of Violation will be issued to the water system owner and a certain amount of time will be allowed for the problem to be corrected. The PSWID currently has no outstanding Notices of Violation. ADEQ did have some issues with the Strawberry View 1 tank and booster station facilities. The District has recently completed a project to replace the tank, electrical meter panel, sub-panels, controller, and booster pumps, all of which has satisfied the ADEQ concerns.

3.3 HEALTH, SANITATION, AND SECURITY

Poor quality drinking water and poor sanitation are among the world's leading causes of preventable morbidity and mortality. The level of public and professional concern about water safety has been increasing, fuelled by concerns raised by outbreaks of potentially lethal diseases and the recognition of new agents of diseases and the challenges they present to health protection.

The PSWID is under public charge with the responsibility for producing, storing, and delivering safe and secure drinking water to the residential and commercial users within the communities they serve. There are a number of threats to drinking water that may pose a health risk: human threats; wastes injected underground; naturally occurring substances that contaminate drinking water; and drinking water that is not properly treated or disinfected, or which travels through an improperly maintained distribution system. Some of the naturally occurring pollutants that contaminate the drinking water source include microorganisms (bacteria, viruses, parasites, and other microorganisms), nitrates and nitrites, heavy metals, and fluoride. Potential contamination may also occur as a result of human activity. For example, activities such as mining can release large amounts of heavy metals into nearby ground water sources. Another example of human activities that can pollute ground water is improperly managed septic leaching fields.

The District has an excellent history of providing safe, high-quality water to its customers as evidenced by the good annual water quality reports and the lack of violations issued by ADEQ under its water quality rules and regulations. This excellent record is in spite of dealing with operational issues associated with aging and substandard infrastructure.

3.3.1 Health and Sanitation Needs

The minimum basic drinking water system needs to maintain health and sanitation include:

- Water sampling and testing
- High quality source water
- Backflow prevention
- Metered and monitored disinfection
- Adequate system storage
- Minimization of disinfection byproducts

3.3.1.1 Sampling and Testing

The District should continue its permanent sampling and testing location program. Sampling and testing locations are required to be distributed in different areas throughout the system (including the extremities) to obtain an accurate and timely overview of the water quality in the distribution system. Sampling and testing locations need to be strategically selected based on land use, system configuration, and ease of access. A process of continuous improvement should be based on the hydraulic water model to designate and engineer locations for required water quality sampling and testing. These locations may change over time as the system is upgraded and expanded.

3.3.1.2 High Quality Source Water

The District is blessed with high quality groundwater to pump and serve to its customers with minimal treatment. The District should continue to be diligent about testing the groundwater as it is pumped to the surface to monitor for both organic and inorganic contaminants including microbiological monitoring. The overall objective of microbiological monitoring (i.e., monitoring for total coliforms and *E. coli*) in water distribution systems is related to the protection of public health, especially to the prevention of the spread of waterborne diseases. The presence of total coliforms in groundwater indicates that contamination of the well may have occurred due to the lack of or degradation of the well's sanitary seal. Monitoring of the location and proper maintenance of septic waste systems that may be located near wells is essential to help eliminate well contamination. The District has made a commitment to disinfect the well water and monitor the residual chlorine levels in the system. Travel time, water age, and lack of disinfectant residual in the water system may increase the potential for biological growth in the outlying areas and/or reservoir sites.

Triggered source water monitoring is conducted if a total coliform-positive sample is collected. If the triggered source water sample indicates the presence of fecal coliform, corrective action is taken. From 2010 to 2013, triggered source water sampling was only required once at the end of 2012. The triggered monitoring results were absent for fecal coliform and no further action was required of PSWID by the State.

3.3.1.3 Backflow Prevention

Section R18-4-215 of the Arizona Administrative Code requires all public water systems to protect against contamination caused by backflow through unprotected cross-connections by requiring the installation and periodic testing of backflow-prevention assemblies. Article III, Section 5 of the District's Rules and Regulations, as adopted on January 19, 2017, require the customer to provide an approved backflow prevention device on the customer's side of the meter, if required by the District. Article V, Section 2.5 of the District's Rules requires the customer to maintain the backflow device, if installed. The District should ensure that all of the major water users within the PSWID service area (i.e. commercial businesses, apartment complexes, and restaurants) have backflow prevention devices installed on the main water supply line to their facilities. The lack of a backflow preventer on the water service can, under certain conditions, result in contaminated water being drawn into the District's mains, thus compromising the quality and safety of the entire water system and putting the safety of the end-users (customers) at risk. All major water users and other customers that represent a potential source of contamination within the District's service area should have a properly tested and installed backflow preventer assembly on the service connections. The District should continue its regular backflow preventer testing program.

3.3.1.4 Metered and Monitored Disinfection

There are numerous disinfection technologies used in the water industry to remove or inactivate disease-causing organisms, or to prevent the formation of harmful chemicals. Proper disinfection of the finished water in a supply system is the single most important aspect of potable water delivery and is a response to most of the regulatory requirements for municipal water system operation. The District has been using one of the simplest methods for well water disinfection, which is the introduction of chlorine (sodium hypochlorite or bleach) in liquid form into the system. The District is in the process of converting its disinfection systems from the pellet type to the liquid injection type. Typically, these chlorine injection systems are flow-paced to properly measure and dose the correct amount of disinfectant. Downstream of the injection point and throughout the system sampling locations are identified where samples can be obtained to measure the disinfectant residual to ensure that it is being maintained within regulated and effective parameters.

3.3.1.5 Adequate System Storage

For the maintenance of good health and sanitation within the PSWID system, adequate water storage to meet the peak demands must be provided. Lack of adequate storage may result in tanks being depleted during peak periods, which could cause booster stations to shut down or perform poorly. This situation could cause unusually low or zero pressures in the system, which means that customers cannot obtain water from the system for their sanitation needs.

The storage tank capacity analysis conducted for the 2014 Master Plan indicated that, ignoring fire protection storage, the existing tanks were adequate to serve the needs of the systems with the following exceptions:

1. A minor shortfall in the Homestead zone under existing and build-out demand conditions, and
2. About a 30,000 gallon shortfall in the K2/Rimwood/Strawberry Ranch 3 area under build-out demand conditions.

It should be noted that the above conclusions from the Master Plan indicate that there will be storage shortfalls in the Strawberry system at build-out. However, Table 3-6 of the Master Plan report shows that there will surplus amounts of storage in the Strawberry system at build-out under the State requirements. The water storage situation throughout the District should be assessed to ensure that the stored water can be delivered to the system areas that need peak supplies and to avoid stranding water in remote storage tanks. This analysis of the volumes of storage and where they are located with respect to the demands will also help to ensure that, during the winter when demands are low, water is not being stored unused and stagnating in certain areas.

3.3.1.6 Minimization of Disinfection Byproducts

The Environmental Protection Agency promulgated the Stage 2 Disinfectants and Disinfection Byproduct Rule (DBPR) to reduce potential cancer risks and address concerns with potential reproductive and developmental risks from disinfection byproducts (DBPs). Disinfectants are an essential element of drinking water treatment because of the barrier they provide against harmful waterborne microbial pathogens. However, disinfectants react with naturally occurring organic and inorganic matter in source water and distribution systems to form DBPs that may pose health risks. The Stage 2 DBPR is designed to reduce the level of exposure from DBPs without undermining the control of microbial pathogens. The groundwater pumped by the District's wells contain low levels of organics that can form DBPs.

The federal regulations establish maximum contaminant levels (MCLs) for disinfectants and DBPs. PSWID maintains an average Chlorine residual concentration of approximately 0.7 milligram per liter (mg/L) within the distribution system, which adequately meets state requirements. Prior to 2014, PSWID monitored total trihalomethanes (TTHMs) and five regulated haloacetic acids (HAA5s) at 10 different locations under Stage 1 DBPR. Annual monitoring from 2010 to 2013 shows that the TTHMs and HAA5 levels in PSWID's system are well below the MCLs of 80 micrograms per liter (µg/L) and 60 µg/L, respectively. Due to the low levels, the State reduced the number of monitoring locations for DBPs from 10 to 2 under Stage 2 DBPR (effective 2014). The following table provides the levels of TTHMs, HAA5, and Chlorine in the PSWID system for the years 2009 through 2016.

Test Results for Disinfection and Disinfection Byproducts

Year	TTHMs (ppb)			HAA5 (ppb)			Chlorine (ppm)		
	MCL	Low	High	MCL	Low	High	MRDL	Low	High
2009	80	ND	0	60	ND	0	4	0	1.83
2010	80	ND	ND	60	ND	ND	4	0.47	0.70
2011	80	ND	13.2	60	ND	ND	4	0.47	0.70
2012	80	ND	0.0136	60	ND	0.0063	4	0.23	1.26
2013	80	ND	13.1	60	ND	15	4	0.07	3.96
2014	80	5.7	11.2	60	ND	3.9	4	0.49	1.32
2015	80	4.8	16.5	60	ND	7.7	4	0.48	1.32
2016	80	2.2	22.6	60	ND	10	4	0.40	3.7

ppb = parts per billion
ppm = parts per million
ND = Not Detected

3.3.2 Security Needs

Drinking water is critical to the life of an individual and of society. In addition to health and sanitation needs, drinking water is essential to many businesses and other services such as health care. Contamination or loss of the local drinking water supply could have far-reaching implications for the public health and economic welfare of the community. As part of their obligation to supply potable water to its customers, the PSWID should strive to implement a secure and resilient drinking water infrastructure that provides clean and safe water as an integral part of daily life, ensuring public confidence in the District's drinking water service through a layered defense of effective preparedness and security practices.

The Federal and State governments have long been active in addressing security risks and threats through regulations, technical assistance, research, and outreach programs. As a result, an extensive system of regulations governing maximum contaminant levels of 90 contaminants, construction and operating standards (principally implemented by State regulatory agencies), monitoring, emergency response planning, training, research, and education have been developed to better protect the Nation's drinking water supply and receiving waters.

The Arizona Department of Environmental Quality (ADEQ) has adopted regulations that provide for basic protection of and security for public water systems. Section R18-4-204 of the Arizona Administrative Code (AAC) requires all public water systems to have an emergency operation plan that includes the steps to be taken to assure continuation of service in the following emergency situations:

1. Loss of a source;
2. Loss of water supply due to major component failure;
3. Damage to power supply equipment or loss of power;
4. Contamination of water in the distribution system from backflow;
5. Collapse of a reservoir, reservoir roof, or pumphouse structure;
6. A break in a transmission or distribution line; and
7. Chemical or microbiological contamination of the water supply.

Protection of the water supply is also enhanced by sanitary surveys that are conducted by ADEQ personnel or third parties approved by ADEQ. Section R18-4-208 of the AAC requires a sanitary survey be conducted every five years for a public water system, or more frequently as determined by ADEQ. The frequency of the sanitary survey is based on the quality and quantity of the source water, and whether the system is properly designed, maintained and operated.

Engineering Bulletin 10 - Guidelines for the Construction of Water Systems (May 1978), as adopted by ADEQ under Section R18-5-502 of the AAC, provides sizing and design criteria as well as other requirements and guidelines for public water systems. Bulletin 10 requires well sites to be enclosed in building or surrounded with a 6-foot high fence. Bulletin 10 states that it is desirable for booster stations to be enclosed in a structure or building and to be secured by locked doors or 6-foot high security fencing with locked gates. Storage tanks shall include a 6-foot fence, locks on access manholes, or other necessary precautions to prevent trespassing, vandalism, and sabotage.

The EPA and Department of Homeland Security (DHS) in their 2010 Water Sector-Specific Plan (https://www.dhs.gov/sites/default/files/publications/nipp-ssp-water-2010-508.pdf) addressed risk-based critical infrastructure protection strategies for, among others, drinking water utilities. The Plan describes processes and activities to enable the protection, and increased resilience, of the water sector's infrastructure. These strategies, goals and recommendations are in addition to the vulnerability assessments and emergency response plans that were mandated by the Bioterrorism Act of 2002. At present, the District has basic security provisions at all of its sites and is working to achieve "post 9-11 security" as commonly referred to in the water industry. However, these measures are not consistent and need to be upgraded.

3.3.2.1 Security Needs Program

The District is evaluating each well, tank and booster station site as a part of its ongoing program to upgrade and improve all of its facilities. An assessment of the security needs of each site is a part of that ongoing evaluation and upgrade program.

3.4 AGING INFRASTRUCTURE

The infrastructure upgrades required of the District's drinking water system are very extensive and can be grouped into four major categories that are addressed in this report: (1) source water, (2) pumping, (3) distribution, and (4) storage, each of which plays an important role in delivering safe and convenient drinking water to the public. Metering is another critical piece of the overall system infrastructure, because of the need for accuracy in delivering water to customers and charging them for that service. The District strives to maintain accurate metering by replacing worn out meters as needed.

3.4.1 Infrastructure Needs

This section provides an overview of the District's water infrastructure needs.

3.4.1.1 Source Water Upgrades

As previously discussed, the District has sufficient well capacity in the Pine system to meet the peak demands of its customers now and into the future. The Strawberry system has adequate well capacity today, but will experience a shortfall as build-out of the area approaches. However, some of the wells are very old and in need of rehabilitation or replacement. The average age of the wells in the Pine portion of the system is 38 years. The average age of the wells in the Strawberry portion of the system is 43 years. A few of the wells are 50 years old.

These older wells are subject to catastrophic failure and should be replaced in the near future. Some wells may experience drawdown issues as the regional groundwater table becomes lower, both seasonally and in response to drought conditions. The District is monitoring well drawdown measurements and has found that the wells are experiencing about a 50-foot drawdown from winter to summer. If the drawdown worsens over time due to pumping and drought, some of the wells will need to be deepened or replaced with deeper wells. The District also needs to upgrade the well pump controls to variable frequency drives (VFD) for the well pumps to replace obsolete equipment and provide energy savings.

The District has recently received a one time State Grant for energy conservation from the in association with Arizona Public Service Electric Company (APS) to undertake numerous projects including installation of Variable Frequency Drives on the motors of wells. The District has made the following improvements at the following locations:

Current State Grant-Funded Well Projects

Facility Name	Type of Project
Magnolia/Ralls- WM & VFD Installation	VFD
Milk Ranch Well #2	VFD
Pine Crest - Lot 25	VFD
Portal 3 - Lot 97 (WSA)	VFD
Strawberry Hollow	VFD
Strawberry Hollow (Old PSWID SH3)	VFD
Strawberry Hollow Intertie (New SH3)	VFD
Strawberry Ranch 5 - TR C	VFD
Strawberry View 1 - Lot 59	VFD

As discussed in Section 1.6, the District has the opportunity to utilize up to 500 acre-feet per year of surface water from the C.C Cragin Reservoir. However, the costs to do so may be prohibitive and the District should examine the feasibility of utilizing that source before committing its resources. Also, the reliability of the C.C Cragin Reservoir as a source of water for the District should be considered. It is reported that the current water level in the reservoir is 20 feet below the intake for the Town of Payson system that is currently under construction.

3.4.1.2 Pumping

As previously discussed, 14 of the District's 25 booster stations are in need of upgrades and rehabilitation due to their age and obsolete equipment. Six of these booster stations should be addressed within the next year including pump replacements and new VFD control systems to enhance energy efficiency. Improvements for all 14 of the booster stations that need attention are being funded by the WIFA loan. The 14 booster stations are:

- Brookview Terrace - TR A (2 Pumps)
- Pine Ranch 2 - Lot 25 (1 Pump)
- Strawberry View 1 - Lot 59 (1 Pump)
- Portal 2 - Lot 178 (1 Pump)
- Strawberry Knolls 2 - Lot 138 (2 Pumps)
- Hardscrabble Mesa (1 Pump)
- Portal 2 Common Area - Next to Lot 166 (1 Pump)
- Pine Mountain Acres - Lot 7 (2 Pumps)
- Pine Valley Homesites - Lot 109 (2 Pumps)
- Strawberry Hollow #3 (2 Pumps)
- Strawberry Mountain Shadows 1 - Lot 25 (2 Pumps)
- Strawberry Ranch 2 - TR D (Pumps Failed - Replace 2 Pumps)
- Strawberry Ranch 5 - TR C (1 Pump)

3.4.1.3 Transmission and Distribution Upgrades

While the extent of the use of substandard pipe materials and installation methods is still being discovered by PSWID Staff, the District has identified a list of 19 pipeline replacement projects that will replace failing and undersized pipe, and replace a failing PRV. That list of projects represents almost 40 percent of the system and over 142,000 lineal feet of pipe. Implementing those projects will go a long way towards eliminating the leaks and broken pipes that plague the system and cause a substantial amount of lost water and a large cost to the District's annual budget. Twelve of those projects are included in the WIFA-funded program that is currently being implemented and are listed below.

Current WIFA-Funded Pipe Replacement Projects

Project Name	Type	Project Cost
Circle Drive Waterline Replacement-Completed	Pipe Replacement	$196,536.90
Whispering Pines (Size 6")	Pipe Replacement	$256,289.00
Pine Creek 4" Waterline Replacement-Completed	Pipe Replacement	$146,185.08
Pinewood Haven/Rim Vista Waterline Replacement	Pipe Replacement	$805,000.00
Cool Pines Est Pipe Upgrade Phase A/Water Tank Rd 100K	Pipe Replacement	$502,940.00
Strawberry Ranch 2 & Strawberry Knolls 2 -Completed	Pipe Replacement	$1,050,000.00
Woodland Heights Pipeline Upgrade Phase A	Pipe Replacement	$458,370.00
Woodland Heights Pipeline Upgrade Phases B & C	Pipe Replacement	$1,270,410.00
Spruce Drive Waterline Replacement	Pipe Replacement	$115,500
Total		**$4,810,230.98**

3.4.1.4 Storage Needs

As stated earlier, the District needs, within the next year, to replace the Canyon Tank #1, replace the Strawberry View Tank #1 (currently under construction – WIFA-funded), and rehabilitate the Brookview Terrace Tank. Within the next three to five years, the District needs to rehabilitate the Canyon Tank #2, Portal 2 Tank, Water Tank Road Tank, and the Strawberry Creek Foothills Tank. This work is a part of the current WIFA-funded program.

3.4.2 Principal Infrastructure Concerns and Impact

The PSWID water system faces a number of challenges including aging and failed/failing infrastructure, increasing regulatory requirements, staffing limitations, and inadequate resources. These challenges are magnified by a condition where little change in population and water-based revenue is expected. Much of the water infrastructure in the PSWID service area is nearing or past the end of its useful life and needs to be replaced. Much of the PSWID infrastructure was installed more than 40 years ago, which is the time period pipelines of those construction materials can be expected to last.

3.4.3 Water Loss

A reasonable water loss rate for a public water system of any size is 10 percent. In 2013, the PSWID overall water system loss rate was 29 percent. In April 2018, the overall loss rate was 13.3 percent. Replacement of the substandard and failing waterlines will greatly help to continue reducing the water loss rate, with the goal of achieving 10 percent or less.

3.4.4 Management Adequacy

The District has recently hired a full-time Manager with an extensive background in water system operations, maintenance and management of public water systems. In addition, the District has retained consulting engineering firms to advise and assist with the implementation of capital improvements.

3.4.5 Existing Design Concerns

The PSWID system suffers primarily from under-design in the areas of pipe size, storage tank size and redundancy, pump redundancy, and system-wide SCADA. The major waterline replacements that are needed will alleviate most of the severely undersized waterlines. Through the WIFA-funded program, nearly 50,000 feet of existing undersized and failing pipes will be replaced with larger pipes consisting of appropriate materials. Regarding storage, there is a projected shortfall of 30,000 gallons in the Strawberry system. But, the larger need regarding storage is to replace and rehabilitate certain tanks as discussed previously. Several of the existing booster stations have only one pump. If that pump fails, there is no back-up pump and that area is out of water. The District desires to provide a redundant pump at all booster stations and redundant storage tanks or interconnections.

3.4.6 System Obsolescence

The PSWID water infrastructure needs costly upgrades. As with many utilities, when their water infrastructure was built decades ago, an adequate plan to fund its upkeep, maintenance, and replacement was not put in place. This is not the fault of the District, because it inherited the water systems that had been operated without adequate maintenance for decades. PSWID, like others, is now entering a period where many of the water pipes, tanks and booster facilities built over the last 50 years are failing and need to be replaced more or less at the same time. This aging or obsolete infrastructure and its replacement will put a tremendous financial strain on the District. PSWID is not unique in that they are limited on how much they can raise water rates, due to resistance from the customers. The District recognizes this conundrum and has embarked on an ambitious and proactive program to begin replacement and rehabilitation of its infrastructure using loans and grants.

3.4.7 Distribution System Infrastructure Safety Concerns

Safety associated with the District's water system is primarily related to protecting the quality of the water that is pumped into the pipes. Potential threats to that safety can come from contamination of the groundwater, inadequate disinfection, animal tank intrusion, lack of adequate site security, backflow events, and main breaks that allow contaminated water to enter the system. District Staff is aware of these potential threats and has implemented programs to reduce these threats. Again, the age and obsolescence of the infrastructure contributes to the occurrence, frequency and severity of these threats. The District must also address OSHA compliance for its facilities and systems, as well as OSHA-compliant personnel practices. The District must find funding for projects that will minimize the potential safety hazards represented by these threats.

3.5 REASONABLE GROWTH

The 2014 Master Plan author conducted an analysis to forecast the estimated water demand at build-out of the existing water service areas. This analysis was performed by using aerial photos and ground review to determine vacant parcels. These parcels were compared to the County's General Plan to determine future land uses. Water duties (a calculation of how much water is used on a per-acre basis by different existing land uses) were applied to the acreage for each future land use. Table 3.1 shows the future average day demand by land use for parcels that have yet to be developed, as of 2013. All water infrastructure, including wells, tanks, boosters, pipes and related facilities should be installed by the land developers who are causing the growth.

It appears that no growth has occurred within the PSWID system since the Master Plan was prepared using 2013 data. The Master Plan reported that the District served approximately 3,200 customers in 2013. In November 2017, the District served 3,142 customers.

Table 3.1 - Future Development Breakdown[1]

Land Use	Acres	Duty Factor (gpd/acre)	Average Day Demand (gpd)	Average Day Demand (gpm)
Commercial	1	295	288	0.2
Mixed Use (Mixed)	28	103	2,880	2.0
Multifunctional Corridor (Multi-Use)	43	471	20,160	14.0
Residential 0.4 du/acre	18	160	2,880	2.0
Residential 1 du/acre	342	80	27,360	19.0
Residential 2-3.5 du/acre	228	79	18,000	12.5
Residential 3.5-5 du/acre	1.3	22	28.8	0.02
Residential 5-10 du/acre	2	22	43.2	0.03
Residential 10+ du/acre	16	22	360	0.25
Totals	**679.3**		**72,000**	**50**

[1] Source: *Pine-Strawberry Water Improvement District Water System Master Plan*, CH2MHill, 2014, 2-6.

As the table shows, it was estimated by the Master Plan authors that the build-out conditions for the system will add an average demand of 72,000 gallons per day (gpd) or 50 gallons per minute (gpm). The Master Plan calculated the existing average day demand during 2010 to 2013 to be 131 gpm. The projected growth represents a 38 percent increase in water demand due to build-out of the service area. The Master Plan did not project when build-out would occur. The District should update the Master Plan and the system model to provide a plan for the water supplies and infrastructure that will be needed to serve the future development within the system.

3.5.1 Capacity Necessary to Meet Needs During Planning Period

Source Water: The Master Plan analyzed the system demands and supplies and provided a comparison by service area under existing and build-out scenarios. These comparisons are shown in Figures 1.5 and 1.6. The Pine system has adequate water supply today and at build-out to meet both the Average Day Demand (ADD) and the Maximum Day Demand (MDD). Strawberry has adequate supplies to meet ADD under existing and build-out demand scenarios and existing MDD, if WSA wells are included. However, Strawberry does not have enough supply, even with the use of WSA wells to meet MDD at build-out. PSWID has the flexibility to transfer water from Pine to Strawberry to make up for this shortfall using District-owned wells under existing conditions, but there is not enough supply available in Pine to continue this practice into the future without the use of WSA wells. The Master Plan recommended that the District either purchase or install new water supply wells, but did not provide additional details of location or size. Based on growth projections in the Master Plan, new well supplies of at least 100 gpm capacity would be needed to meet the build-out maximum day demands (Growth MDD = Growth ADD of 50 gpm x Peak Factor of 2 = 100 gpm). The computer model of the system should be updated and expanded to ensure that the new supplies are located near the future demands.

Storage: As the Master Plan stated, "…all zones in Strawberry have adequate storage with the exceptions of a minor shortfall in the Homestead zone under existing and build-out demand conditions and about a 30,000 gallon shortfall in the K2/Rimwood/Strawberry Ranch 3 area under build-out demand conditions…therefore, existing storage volumes are adequate." The system model should be updated and expanded to ensure that these storage facilities can efficiently serve the new development locations.

The Master Plan also states, "Pine has adequate storage…under existing conditions and at build-out when evaluated by pressure zones with the exception of the Pine Ranch area. The system likely does not warrant the need to increase storage in this zone [i.e. Pine Ranch (explanation added)] due to water quality concerns because of lack of tank turnover; therefore, PSWID may choose to monitor the area in coming years if demands increase to review the need for additional storage in the Pine Ranch area." Providing mixing and/or controlling the fill and draw of these tanks during low demand conditions could resolve this issue.

It should be noted that the above excerpt from the Master Plan reports that there will be storage shortfalls in the Strawberry system at build-out. However, Table 3-6 of the Master Plan report shows that there will surplus amounts of storage in the Strawberry system at build-out under the State requirements.

Booster Pumping: The 2014 Master Plan did not identify any pumping capacity shortfalls in the current conditions or at build-out. The Master Plan recommended three booster station upgrade projects, but these were intended to address existing pressure issues, not to provide for future growth.

Distribution Waterlines: With respect to the distribution system, the Master Plan focused more on issues with old and small waterlines, rather than growth. As stated previously, the system is plagued with old, substandard plastic piping that is failing, and the District has the desire to replace roughly 40 percent of the existing pipelines with high-quality, larger diameter pipes. The Master Plan identified several areas where growth of the system is expected and provided cost estimates of new pipelines that would be needed to serve those areas, which are Bradshaw, Old Country, Woodland Heights, 300K, Canyon Tank Brook View Terrace, Hidden Pines, Pine Ranch 1, and Rimwood. The Master Plan identified these future pipelines as 6-inch PVC and estimated the total cost at $1,464,350. These future pipelines will likely be installed by land developers, and the District should review and approve their plans prior to construction.

3.5.2 Facilities Proposed to be Constructed to Meet Future Growth Needs

Source Water: It is estimated that an additional 100 gpm of well capacity will be needed within the overall system by the time the service area reaches build-out. Most of the existing PSWID wells produce in the range of 30 to 60 gpm. Therefore, two to three additional wells will be needed at the time of build-out. As the system expands and develops toward build-out, the need for additional wells beyond the 100-gpm estimate, in order to provide redundancy and meet peak demands, should be monitored by the District and implemented as needed.

Storage: The Master Plan identified storage shortfalls at build-out conditions only in the Strawberry system; in the Homestead zone and the K2/Rimwood/Strawberry Ranch 3 area. But, the Master Plan did not propose projects to remedy these shortfalls. Also, it should be noted that these conclusions from the Master Plan, that there will be storage shortfalls in the Strawberry system at build-out, are contradicted by Table 3-6 of the Master Plan report which shows that there will surplus amounts of storage in the Strawberry system at build-out under the State requirements.

Booster Pumping: Based on the Master Plan and current operations, it appears that additional booster pumping capacity will not be needed to serve the build-out system conditions. The greater need at this time is to rehabilitate the existing booster stations to install new, more efficient pumps, motors and controls, and to provide redundancy. However, the District should monitor the hour meters for the pump stations where growth is occurring in order to ensure that the pumps are adequately sized to meet the demands without running an inordinate amount of time. Implementing a system-wide SCADA system will help District Staff to monitor booster operations and plan for pump replacements or upgrades.

Distribution Waterlines: Additional pipelines will be needed to serve the growth areas, but their installation can wait until the development of the areas is proposed through the Gila County approval process. The District should monitor this process to be sure they are aware of pending developments that will require their services. The District should also require that these pipes and related facilities be installed at the expense of the developers. The District should also require modeling of the system and these proposed expansions to ensure that the pipes are located and sized properly, valves are located appropriately, and low pressure and dead end area are avoided.

3.5.3 Timeline for Phased Growth Expansion

Projections described in Section 1.4 indicate that the populations of the Pine and Strawberry communities will be declining from their current levels during the years beyond 2025. However, the 2014 Water Master Plan identified nearly 680 acres of land that could develop in the future and add 72,000 gallons per day to the District's average day demand. These two pieces of information are incongruous and raise the question of how much future development, and therefore, demand for water, will be seen by the PSWID.

If growth within the PSWID service area occurs, it is impossible to predict the timeline for that growth, because multiple factors that affect development of vacant land in this portion of Arizona are involved in the process. The District should not be spending its scarce resources installing facilities in anticipation of growth. By the same token, the District should be monitoring development approvals through the County to be aware of pending development and to then work with the developers to install the necessary infrastructure.

In the meantime, the District is moving ahead with numerous system improvement projects using funding through the WIFA loan. All of those projects, however, are aimed at improving the existing facilities and operations, and are not providing capacity for future growth within the service area.

3.5.4 Estimated Number of New Customers Committed

The Master Plan's projection of vacant land development within the system resulted in a 38 percent increase in average day demand at build-out. The District currently serves about 3,148 customers. A 38 percent increase would mean an additional 1,196 customers at the time of build-out. Based on District meter readings over the last 12 months, customers consume an average of 77 gallons per day. Applying that factor to the 72,000 gallon per day increased average day demand projected by the Master Plan results in an additional 935 customers at build-out.

3.6 SUMMARY AND CONCLUSIONS

The importance of a reliable and efficient water distribution and treatment system is self-evident. The health of the communities, the protection of its water source, and future economic growth and development, are linked to the District's ability to maintain, and as necessary, upgrade these facilities. As described in this report, however, PSWID's water system components are failing, and the District does not have the funds to adequately repair and replace the necessary infrastructure. Clearly, there is a compelling need for a comprehensive and sustainable water infrastructure funding program, and significant additional investment from the federal government is needed for this purpose.

The overall major challenges for the District include:

- Substandard, failed and obsolete infrastructure past its useful life
- Deteriorated infrastructure rapidly approaching the end of its useful life
- Limited ability to fund improvements

Delaying the infrastructure improvement investment can result in health and safety risks, degrading water service, more water service disruptions, and more expenditures for emergency repairs. In addition, the failure of substandard pipe materials creates lost water and additional cost to the District not only for the repairs, but also for the water that is pumped and then wasted. Just as important is the implementation of a program to ensure that the District's drinking water remains safe and that multiple barriers against contamination are in place. These barriers include source water protection, treatment, distribution system integrity, and a public information program.

Many of the District's critical water system components have reached or exceeded their design life and must be repaired or replaced. Maintaining and repairing an aging and obsolete water system such as the PSWID presents many unique challenges. For example, maintaining and rehabilitating water storage tanks requires that they be taken out of service for cleaning and recoating. This is difficult to do without interrupting water service to customers. Also, the lack of redundant pumps and reliable controls at booster stations can result in the water service being out of commission during nights and weekends, when emergency repairs must be made. And, the very large amount of effort that must be expended in fixing numerous pipe leaks each month takes Staff away from focusing on other critical maintenance needs of the aging facilities and creates a large expense to the District.

This report serves as a foundation for the District's efforts to attack these issues and as the next step in the critical process of establishing a sustainable water infrastructure funding program.

ALTERNATIVES CONSIDERED

4.1 ALTERNATIVES CONSIDERED

This evaluation has demonstrated that major infrastructure improvements are needed in the PSWID systems in the following categories:

- Source Water (Wells)[7]
- Water Storage
- Booster Stations
- Distribution System

The existing PSWID water supply system has been developed gradually over the last several decades based solely on decentralized groundwater wells, tanks, and booster stations that are located close to the homes and businesses that they serve. Consideration of alternative improvement strategies for a water system such as the PSWID system cannot feasibly involve changing the fundamental nature of the system from decentralized well supplies to a centralized supply from a point source of surface water such as a lake or river.

Therefore, the approach utilized in this evaluation is consideration of alternative projects for each of the four system categories that are based on the criticality of the need within each category and among the categories. The District has commenced a WIFA-funded program that will rehabilitate eight wells, upgrade controls for 11 wells, replace or rehabilitate seven storage tanks, upgrade all 23 booster stations, and replace more than 49,000 lineal feet of waterlines. This report identifies additional projects for well and distribution pipeline replacements.

Following is a summary of the alternatives considered for each category. Detailed descriptions of the alternatives are presented later.

4.1.1 Source Water

The PSWID does not have a viable alternative to the use of groundwater to serve its customers, with the possible exception of surface water from the C.C Cragin Reservoir, the feasibility of which is questionable (see Section 1.6.1). Other than the C.C. Cragin Reservoir, there are no surface water supplies that are large enough, sufficiently dependable, or legally available to the District that are within a reasonable distance to the PSWID service areas. The available volume of unclaimed water from the C.C. Cragin Reservoir is 500 acre-feet per year, which is compared to the District's current average groundwater production of about 300 acre-feet per year. Thus, if feasible, the C.C. Cragin reservoir could represent a long-term alternative or supplemental source of water for the PSWID.

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[7] The District may want to consider utilizing C.C Cragin surface water to supplement its well supplies.

However, utilizing water from the C.C. Cragin Reservoir would be substantially different from the District's current operational scheme. The District's system is currently designed to operate from decentralized well sites and booster stations. Utilizing the water from the C.C. Cragin Reservoir would require the water to enter the system at one location. A previously conceived plan for a pipeline from the C.C. Cragin Reservoir to the PSWID had the pipeline connecting at the easternmost end of the system on Highway 87. Because the system is not designed for all of the water to enter the system at that location, transmission mains, and possibly booster stations, would be needed to ensure efficient movement of the water from the source to the 27 different service zones.

It is beyond the scope of this study to determine how to convert the PSWID system to the use of surface water or to determine its feasibility. It is recommended that the District analyze that feasibility and take advantage of the C.C. Cragin water, if feasible. In the meantime, this evaluation will focus on groundwater continuing to provide the source water for the District.

The following three alternatives were considered under Source Water:

1. Rehabilitate existing wells
2. Drill new wells.
3. No action.

4.1.2 Distribution System

A significant portion of the District's distribution system is more than 30 years old and was constructed using substandard pipe materials such as ABS and PVC that are not intended for use in high-pressure public water systems. These pipes are failing on a regular basis. The District recorded a monthly average of more than 10 pipe breaks or leaks in the system during fiscal year 2017. District Staff have identified the locations where most of these pipe breaks occur. Many of these locations were also identified as problem areas in the 2014 Master Plan.

Alternative projects, in the traditional sense, for the distribution system, which is based on conveying water in an underground pipe system, do not exist. Therefore, alternatives for the distribution system projects are limited to the sizes and materials of the pipes. With respect to inadequate pipe size, the 2014 Master Plan identified only the Cool Pines Estates waterline replacement project, which would replace the entire system of 2-inch pipes in that area, as the only project to replace undersized pipes. The Master Plan also identified three looping projects that would tie together dead-end mains to help improve pressures during peak demands. These projects are included in the WIFA-funded program and are currently being implemented.

Making pipes unnecessarily large can lead to stagnant and stale water issues, especially considering the second-home nature of the community. Many homes in Pine and Strawberry remain empty for several months at a time, thus adding to potential stagnant and stale water issues. For these reasons, the District has decided that, unless a recognized hydraulic deficiency exists, pipes that are four inches in diameter and larger will be replaced with new pipes of the same size. Any pipes smaller than four inches will be upgraded to at least four-inch diameter.

With respect to pipe materials, it is recommended that two pipe materials be investigated for use in the pipeline replacement projects:

1. PVC pipe, which meets the requirements of AWWA Standard C900 with a pressure class of 250, and
2. Ductile Iron pipe with a pressure class of 350.

4.1.3 Water Storage Tanks

The District utilizes ground water. The water is pulled from the aquiver and stored in tanks. These storage tanks allow the water to be pumped from the aquifer at a lower rate and then storage for use in high demand periods. The system lacks redundant storage at most locations. The tank has to be taken completely off line to preform maintenance on the tanks. The District utilizes three wells at the Milk Ranch location and has limited storage at this location. There is a desire to provide redundant storage so that the productive well area will have a redundant storage. Welded steel tanks provide the most economical, long term storage solution.

4.2 DESCRIPTION OF ALTERNATIVES CONSIDERED

The alternatives considered under the two principal categories are further developed in the following paragraphs. Descriptions include design criteria, schematic layout map, environmental impacts, land requirements, potential construction problems, sustainability considerations, and cost estimates.

4.2.1 Source Water

Drill New Wells: The District will need to add well capacity to the Strawberry system between now and build-out of the area. This additional capacity could be provided by new wells drilled by the District or by developers of the lands. The timing of these new wells is determined by the timing of the new development. Thus, new wells needed for capacity to meet build-out demands are beyond the scope of this evaluation.

The District may also need to drill new wells to solve existing or emerging water quality problems and to replace wells that are failing.

It is anticipated that a new deep well will be installed in the Strawberry Ranch Pressure Zone Area as soon on Figure 4.2 Located in Appendix L.

Groundwater is available in deeper aquifers in the area. At the time of this report, no local data is available that show any groundwater depletion or increase in the area. drilling of new wells can be a viable solution to the water supply problem. See Table 4.1 for new deep well to be drilled.

Table 4.1 – New Deep Well to be Drilled

Name	System Location	Phase Drilled
Strawberry Ranch PZ	Strawberry	2

4.2.2 Water Storage

The WIFA-funded project includes seven projects associated with the District's storage tanks, including the replacement of two tanks and rehabilitation of five others. There are one 100,000-gallon weld steel water storage tank project to be included in this report. This tank will be located at the Milk Ranch well area.

4.2.3 Booster Stations

The WIFA-funded project includes 14 projects associated with the District's booster stations, including additional pumps, replacement of existing pumps, and the addition of VFD drives. There are no other booster station-related projects to be included in this report.

4.2.4 Distribution System

Replace Existing Pipelines: Pipelines in need of replacement in this report are currently funded by WIFA. See Appendix F for WIFA-Funded Program Projects Cost Summary.

4.2.5 No Action

As previously stated, the existing system was originally installed by private owners & developers throughout many decades as a piecemeal and inefficient system. The current condition of the system, mentioned in this report, identifies leaks and lifecycle limits that are expected to worsen as time passes. Taking no action will cause a continued loss of water through leakage, intermittent delivery of water supply, risk of contamination and eventual system failure.

4.3 DESIGN CRITERIA

The design criteria for the major water system components are summarized in Table 4.3. The information in this table should be further detailed and expanded upon to develop facility specific design criteria as part of a pre-design phase.

Table 4.3 - Design Criteria for Major Water System Components

Wells	• Water quality – meets primary Maximum Contaminant Level and close to secondary MCL standards • Total water quantity – increase if possible • Security – per EPA/ADEQ Guidelines and Standards • Site drainage • SCADA and Instrumentation & Control (I&C)
Pipelines	• Replacement pipelines shall be the same diameter, unless a hydraulic deficiency has been identified in the area, or per ADEQ minimum size criteria, but not less than 4-inch diameter • Pipe material for high-pressure applications (greater than 150 psi) shall be ductile iron or steel. Ductile iron, class 350 or PVC class 250 for normal system pressures • Cathodic protection or polywrap for ductile iron pipe • Within public right-of-way or existing PUEs • Properly restrained • Air release and blow-off valves
Monitoring, SCADA, I&C	• New software • New PLCs • Cyber security • Operational flexibility • Multiple operating points • Remote operation capability • System model • Remote read meters capability

Water Model, SCADA	• New software • New PLCs • Cyber security • Operational flexibility • Multiple operating points • Remote operation capability • System model

Water Storage Tank	• Provide Redundant Storage Capacity • Provide Long-Term, Reliable Storage • Provide storage that meets ADEQ requirements

4.4 LAYOUT MAPS

Figures 4.1 and 4.2 in Appendix L are maps of the District service area on which the improvement projects listed above are shown.

4.5 ENVIRONMENTAL IMPACTS

All waterline projects presented in this report will replace existing waterlines within existing roadway rights-of-way or easements. New pipelines will be installed more or less parallel to the existing pipelines in new trenches. The existing pipes will be abandoned in place. New trenching will create asphalt waste in paved streets. Asphalt waste will likely be crushed and recycled or disposed of in a local approved landfill. Some waste dirt from the new trenches will be generated and will likely be recycled locally either on the road or on the roadway shoulders. It is anticipated that little, if any, new trenching will be done outside of previously disturbed areas.

If rehabilitation of existing wells is to be done, it will produce residual material that is cleaned from the inside of the well casing and muddy/sandy water that is produced when the well is re-developed following cleaning. The construction documents for the well rehabilitation projects will include requirements for the Contractor to capture residuals in an on-site settling basin before allowing excess water to leave the site into natural drainageways.

For new drilled wells, new sites for the wells may need to be acquired by the District. Replacement wells should not be drilled immediately adjacent to existing wells due to the possibility that decades of pumping may have eroded underground caverns adjacent to the well casing. Depending on the location of the new well sites, trees and undergrowth will need to be cleared from most of the site to accommodate the well, the well drilling equipment, settling basin, access drive and equipment pads. Under a permit issued by the Arizona Department of Water Resources, the well drilling operation will produce water, sand, soil, and mud that will be directed to a settling basin to allow only clear water to leave the site. Depending on the drilling method, much of the water may be recycled as drilling mud, but any that is discharged from the site will have residuals settled out beforehand.

The Arizona State Museum (ASM) has reviewed archaeological projects and site records within the project and have provided recommendations and responsibilities for any future improvements within the area. A letter from ASM is included in Appendix J.

4.6 POTENTIAL LAND REQUIREMENTS

Because all the proposed waterline replacement projects will be confined to existing rights-of-way and easements, acquisition of additional land for these projects is not anticipated. Drilling new wells may require acquisition of new well sites. A well site that is not associated with a storage tank will vary in size depending on location and terrain, but will typically be less than one acre. However, the District should confirm property limits and easement locations to ensure that no additional land rights are needed. This may require a field survey of each property and easement owned by the District.

4.7 CONSTRUCTIBILITY ISSUES

4.7.1 Existing Conditions That Could Affect Construction

This section presents the existing conditions that could affect the construction of the proposed improvements. The main existing conditions in the PSWID water distribution system that could affect construction include, but are not limited to, the following:

- Presence of bedrock or cobbles during excavation
- Extensive permitting required
- Potential archeological issues (minimized if construction limited to existing right-of-way or easements)
- Potential environmental issues (minimized if construction limited to existing right-of-way or easements)
- Off-season (winter) construction to avoid service disruption due to construction during peak season (summer) water consumption
- Potential for excavations in snow and frozen ground during winter
- Potential for excavation/site flooding during monsoon rains
- Traffic control and protection on streets and highways
- Construction disruption to residents and local businesses including business access
- Maintaining service during construction and new component switchovers
- Remote geographical location for materials and supplies
- Limited skilled/local labor availability
- Lack of information about the existing District infrastructure
- Adequate District staff to oversee the design, construction, and start-up and commissioning efforts
- Lack of staff training (safety, design review, construction oversight, facility operation, and management etc.)

4.7.2 Conditions That Could Affect Operation of the Facilities

This section presents the existing conditions within the system that could detrimentally affect the operation of the proposed improvements. The main existing conditions in the PSWID water distribution system that could affect system operation include, but are not limited to, the following:

- Extensive operational permitting
- Extensive regulatory compliance and monitoring
- Potential environmental issues
- Expediting project schedule to remain ahead of continued system deterioration
- Remote geographical location for replacement parts and supplies
- Limited skilled/local labor availability
- Lack of information about the existing District infrastructure
- Adequate District staff to oversee the operation, maintenance, upkeep, security, and record keeping for the Proposed Project
- Adequate budget

4.8 SUSTAINABILITY CONSIDERATIONS

Table 4.4 is a summary of the potential sustainability considerations for the projects recommended by this report.

Table 4.4 - Sustainability Considerations for Water Distribution System Improvements

Projects	Water and Energy Efficiency	Green Infrastructure	Other Aspects of Sustainability
Rehabilitate Existing Wells	• More efficient pumps • Reduced electrical use • Increased production	• Rehabilitate existing facilities	• To be determined and planned for during Preliminary Design Activities
Install New Wells	• More efficient Pumps • Reduced electrical use • Increased production • Eliminate water quality issues (sanding)	• Reduce water stream of water by reducing pump to waste requirement due to reduced sanding of well	• To be determined and planned for during Preliminary Design Activities
Replace Failing Water Lines	• Eliminate leakage with new piping • Energy savings • Reduction in lost water	• Reduce water loss • Reduce operation costs • Reduce energy use	• To be determined and planned for during Preliminary Design Activities
Prepare System Maps and Water Model with Operating Procedures Manual	• Less time and energy wasted trying to locate water lines • More efficient operation of system	• Reduce water loss • Reduce operation costs • Reduce energy use	• To be determined and planned for during Preliminary Design Activities
Install SCADA System	• Less time and energy wasted with manual operation • More efficient Operation	• Reduce water loss • Reduce operation costs • Reduce energy use	• To be determined and planned for during Preliminary Design Activities
Install Electronic Read Water Meters	• Less time and energy wasted with manual operation • More efficient Operation	• Reduce water loss • Reduce operation costs • Reduce energy use	• To be determined and planned for during Preliminary Design Activities

4.9 COST ESTIMATES

Estimates of the implementation costs for the recommended projects identified in the previous sections are presented in the following tables. The project cost estimates include construction costs, engineering, construction management, permitting, and a construction contingency amount.

4.9.1 Storage tanks

The cost estimate for the construction of Milk Ranch storage tank is shown in Table 4.5.

Table 4.5

Milk Ranch Tank

17	Construction Cost			
	Mobilization, Demobilization	1	$40,000	$40,000
	100,000 Gal Tank	100,000	$1	$100,000
	Foundation	1	$25,000	$25,000
	Misc Site Piping	1	$25,000	$25,000
	Fence, site improvements	1	$15,000	$15,000
	Level Controls	1	$15,000	$15,000
	Construction Contingency		15%	$30,750
	Subtotal			$250,750
	Non-Construction Cost			
	Engineering		12%	$30,090
	Construction Management		10%	$25,075
Total Estimated Project Cost				**$305,915**

4.9.2 Drill New Deep Well

The estimated cost to drill a new well within the District's service area is shown in Table 4.6. Any new drilling will occur in phase 2 as more environmental data is available. The estimated depth of 2,000 feet for the new well is based on an average of the existing District wells in the area. The proposed depth of a new well would be determined by a hydrogeologist based on a study of a particular site.

Table 4.6

Strawberry Ranch PZ Deep Well

1	Construction Cost			
	Site acquisition (0.5 acre)	1	$75,000	$75,000
	Mobilization, Demobilization	1	$42,000	$42,000
	Clear site	1	$4,000	$4,000
	Drill and case 8-inch hole (feet)	2000	$500	$1,000,000
	Install surface casing & well seal	1	$25,000	$25,000
	Construct well head & appurtenances	1	$50,000	$50,000
	Install submersible well pump	1	$50,000	$50,000
	Piping and valves	1	$50,000	$50,000
	Electrical and controls	1	$75,000	$75,000
	Fence, site improvements	1	$20,000	$20,000
	Construction Contingency		15%	$208,650
	Subtotal			$1,599,650
	Non-Construction Cost			
	Engineering/Hydrogeologist		10%	$159,965
	Hydrogeologic Study		3%	$39,991
	Construction Management		10%	$159,965
Total Estimated Project Cost				**$1,959,571**

4.9.3 Waterline Replacement Projects

The recommended waterline replacement projects are described in the following tables 4.7-4.22 with estimated costs for each.

Table 4.7

Strawberry Creek Foothills/Strawberry Pines Waterline Replacement

1	Construction Cost			
	New 6" Waterline (Complete)	19,358	$140.00	$2,710,120
	Construction Contingency		15%	$406,518
	Subtotal	**19,358**		**$3,116,638**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$280,497
	Construction Management		7.5%	$233,748
	Total Estimated Project Cost			**$3,630,883**

Table 4.8

RW/MME1/MME2/SMH/Fitz-Strawberry Waterline Replacement

2	Construction Cost			
	New 6" Waterline (Complete)	27,619	$140.00	$3,866,660
	Construction Contingency		15%	$579,999
	Subtotal	**27,619**		**$4,446,659**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$400,199
	Construction Management		7.5%	$333,499
	Total Estimated Project Cost			**$5,180,358**

Table 4.9

Strawberry View 3/Shady Lane Waterline Replacement

3	Construction Cost			
	New 6" Waterline (Complete)	18,851	$140.00	$2,639,140
	Construction Contingency		15%	$395,871
	Subtotal	**18,851**		**$3,035,011**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$273,151
	Construction Management		7.5%	$227,626
	Total Estimated Project Cost			**$3,535,788**

Table 4.10

Strawberry View 1 and 2 Waterline Replacement

4	Construction Cost			
	New 6" Waterline (Complete)	19,847	$140.00	$2,778,580
	Construction Contingency		15%	$416,787
	Subtotal	**19,847**		**$3,195,367**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$287,583
	Construction Management		7.5%	$239,653
	Total Estimated Project Cost			**$3,722,603**

Table 4.11

Portals 1, 2, and 3 Waterline Replacement

5	Construction Cost			
	New 6" Waterline (Complete)	28,565	$140.00	$3,999,100
	Construction Contingency		15%	$599,865
	Subtotal	**28,565**		**$4,598,965**
	Non-Construction Cost			
	Plans, Specs, and Estimates		10%	$459,897
	Construction Management		10%	$459,897
	Total Estimated Project Cost			**$5,518,758**

Table 4.12

Whispering Pines Waterline Replacement

6	Construction Cost			
	New 6" Waterline (Complete)	2,245	$140.00	$314,300
	Construction Contingency		15%	$47,145
	Subtotal	**2,245**		**$361,445**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$32,530
	Construction Management		7.5%	$27,108
	Total Estimated Project Cost			**$421,083**

Table 4.13

Cool Pines Phase A Waterline Replacement

7	Construction Cost			
	New 6" Waterline (Complete)	4,167	$140.00	$583,380
	Construction Contingency		15%	$87,507
	Subtotal	**4,167**		**$670,887**
	Non-Construction Cost			
	Plans, Specs, and Estimates		10%	$67,089
	Construction Management		10%	$67,089
	Total Estimated Project Cost			**$805,064**

Table 4.14

Woodland Heights Phase A Waterline Replacement

8	Construction Cost			
	New 6" Waterline (Complete)	3,739	$140.00	$523,460
	Construction Contingency		15%	$78,519
	Subtotal	**3,739**		**$601,979**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$54,178
	Construction Management		7.5%	$45,148
	Total Estimated Project Cost			**$701,306**

Table 4.15

Woodland Heights Phase B and C Waterline Replacement

9	Construction Cost			
	New 6" Waterline (Complete)	11,631	$140.00	$1,628,340
	Construction Contingency		15%	$244,251
	Subtotal	**11,631**		**$1,872,591**
	Non-Construction Cost			
	Plans, Specs, and Estimates		10%	$187,259
	Construction Management		10%	$187,259
	Total Estimated Project Cost			**$2,247,109**

Table 4.16

Pine Mountain Acres/Pinion Waterline Replacement

10	Construction Cost			
	New 6" Waterline (Complete)	1,250	$140.00	$175,000
	Construction Contingency		15%	$26,250
	Subtotal	**1,250**		**$201,250**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$18,113
	Construction Management		7.5%	$15,094
	Total Estimated Project Cost			**$234,456**

Table 4.17

White Oak/Cedar Meadows Waterline Replacement

11	Construction Cost			
	New 6" Waterline (Complete)	2,400	$140.00	$336,000
	Construction Contingency		15%	$50,400
	Subtotal	**2,400**		**$386,400**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$34,776
	Construction Management		7.5%	$28,980
	Total Estimated Project Cost			**$450,156**

Table 4.18

Hidden Pines Waterline Replacement

12	Construction Cost			
	New 6" Waterline (Complete)	2,400	$140.00	$336,000
	Construction Contingency		15%	$50,400
	Subtotal	**2,400**		**$386,400**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$34,776
	Construction Management		7.5%	$28,980
	Total Estimated Project Cost			**$450,156**

Table 4.19

Cimmaron Pines Waterline Replacement

13	Construction Cost			
	New 6" Waterline (Complete)	6,500	$140.00	$910,000
	Construction Contingency		15%	$136,500
	Subtotal	**6,500**		**$1,046,500**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$94,185
	Construction Management		7.5%	$78,488
	Total Estimated Project Cost			**$1,219,173**

Table 4.20

Brookview Terrace 1 and 2 Waterline Replacement

14	Construction Cost			
	New 6" Waterline (Complete)	7,300	$140.00	$1,022,000
	Construction Contingency		15%	$153,300
	Subtotal	**7,300**		**$1,175,300**
	Non-Construction Cost			
	Plans, Specs, and Estimates		10%	$117,530
	Construction Management		10%	$117,530
	Total Estimated Project Cost			**$1,410,360**

Table 4.21

Strawberry Mountain Shadows 1 & 2/Pine Cove Waterline Replacement

15	Construction Cost			
	New 6" Waterline (Complete)	25,000	$140.00	$3,500,000
	Construction Contingency		15%	$525,000
	Subtotal	**25,000**		**$4,025,000**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$362,250
	Construction Management		7.5%	$301,875
	Total Estimated Project Cost			**$4,689,125**

Table 4.22

Strawberry Mountain Shadows 2 Service Corp Stop Replacement

16	Construction Cost			
	New Corp Stop and Line to Meter	116	$3,000.00	$348,000
	Construction Contingency		15%	$52,200
	Subtotal	**116**		**$400,200**
	Non-Construction Cost			
	Plans, Specs, and Estimates		9.0%	$36,018
	Construction Management		7.5%	$30,015
	Total Estimated Project Cost			**$466,233**

The total cost for construction and non-construction estimated for all sixteen waterline replacement projects is $29,520,592 and $5,162,019, respectively. The grand total cost for all sixteen projects is $34,682,611.

4.9.4 Administrative Projects

The Administrative projects are included in Table 4.23.

Table 4.23

System Wide SCADA				
18	Construction Cost			
	Mobilization, Demobilization	1	$10,000	$10,000
	Install SCADA Equipment at all well, tank, and booster sites	1	$250,000	$250,000
	Construction Contingency		15%	$39,000
	Subtotal			$299,000
	Non-Construction Cost			
	Engineering			$100,000
	Programming			$150,000
Total Estimated Project Cost				**$549,000**
System Wide Water Model				
19	Non-Construction Cost			
	Engineering			$300,000
Total Estimated Project Cost				**$300,000**

4.9.5 Summary of Estimated Costs

Table 4.24 provides a summary of the project costs for the recommended projects described above. Operation and Maintenance (O&M) cost for each project will decrease as shown on the Projected Budget Report for Pre-construction and Post-Construction in Appendix E.

Table 4.24-Water System Category Cost Estimate Summary by Alternative

Summary of Costs

	Project Name	Construction Cost	Non-Construction Cost	Total Costs
Phase 1 Projects				
1	Strawberry Creek Foothills/Strawberry Pines Waterline Replacement	$3,116,638	$514,245	$3,630,883
2	RW/MME1/MME2/SMH/Fitz-Strawberry Waterline Replacement	$4,446,659	$733,699	$5,180,358
3	Strawberry View 3/Shady Lane Waterline Replacement	$3,035,011	$500,777	$3,535,788
4	Strawberry View 1 and 2 Waterline Replacement	$3,195,367	$527,236	$3,722,603
5	Portals 1, 2, and 3 Waterline Replacement	$4,598,965	$919,793	$5,518,758
6	Whispering Pines Waterline Replacement	$361,445	$59,638	$421,083
7	Cool Pines Phase A Waterline Replacement	$670,887	$134,177	$805,064
8	Woodland Heights Phase A Waterline Replacement	$601,979	$99,327	$701,306
9	Woodland Heights Phase B and C Waterline Replacement	$1,872,591	$374,518	$2,247,109
10	Pine Mountain Acres/Pinion Waterline Replacement	$201,250	$33,206	$234,456

11	White Oak/Cedar Meadows Waterline Replacement	$386,400	$63,756	$450,156
12	Hidden Pines Waterline Replacement	$386,400	$63,756	$450,156
13	Cimmaron Pines Waterline Replacement	$1,046,500	$172,673	$1,219,173
14	Brookview Terrace 1 and 2 Waterline Replacement	$1,175,300	$235,060	$1,410,360
15	Strawberry Mountain Shawdows 1 & 2/Pine Cove Waterline Replacement	$4,025,000	$664,125	$4,689,125
16	Strawberry Mountain Shawdows 2 Service Corp Stop Replacement	$400,200	$66,033	$466,233
17	Milk Ranch Tank	$250,750	$55,165	$305,915
18	System Wide SCADA	$299,000	$250,000	$549,000
19	System Wide Water Model		$300,000	$300,000
Subtotal		**$30,070,342**	**$5,767,184**	**$35,837,526**
Other Phase 1 Costs				
	Compass Bank Loan Payoff		$4,000,000	$4,000,000
	Interim Financing Fees		$1,200,000	$1,200,000
	Single Audit Fees		$15,000	$15,000
	Program Management Fees		$1,433,501	$1,433,501
Subtotal			**$6,648,501**	**$6,648,501**
Total Phase 1		**$30,070,342**	**$12,415,685**	**$42,486,027**

Phase 2 Projects				
1	Strawberry Ranch PZ Deep Well	$1,599,650	$359,921	$1,959,571
Total Phase 2		**$1,599,650**	**$359,921**	**$1,959,571**
Grand Total		**$31,669,992**	**$12,775,606**	**$44,445,598**

SELECTION OF AN ALTERNATIVE

5.1 INTRODUCTION

In an evaluation such as this at a preliminary engineering level, selection of alternatives would be based on a life-cycle cost analysis and drilling of wells alternatives using the calculated net present value. In the case of the PSWID system, few alternatives exist for improving such a system without changing the fundamental way in which the system operates.

5.1.1 Source Water

In Section 4.1.1, two alternatives were presented for the source water component of the PSWID system but only one, drilling new wells, will be implemented. As has been previously discussed, there are no viable alternatives to groundwater wells for providing source water to the system, with the possible exception of surface water from the C.C. Cragin Reservoir, the feasibility of which is questionable. Absent that option, the District will continue to rely on its existing groundwater wells, probably in perpetuity.

Because groundwater wells are expensive to permit and install and are not always successful in producing the quality and quantity of water desired, the District must use their existing wells as long as possible, i.e. to extend their service lives to the maximum. Loss of a groundwater well is usually caused by a failure of the steel casing and/or its perforations. Regular cleaning and video inspections of each well will allow District Staff to know when a well is approaching the end of its useful life and begin planning for its replacement. Depending on the geologic conditions, the replacement well may need to be drilled some distance away from the old well, which may require acquiring a new site, which will add time and complexity to the replacement process.

There are no alternatives for drilling wells. No other option of source water is available. No other sources of water are available. Rehab of an existing Milk Ranch Well has been explored by the district and a solution has not been found other than replacement to be able to get full capacity of the well.

5.1.1.1 Life Cycle Cost Analysis – Source Water

Rehabilitation of existing wells is not a viable solution as wells are not deep enough for deep aquifer. The only source of water contemplated and cost of life cycle analysis calculated is for drilling new wells into deep aquifers. Cost for new deep well drilling is shown in Table 4.6

5.1.1.2 Non-Monetary Factors – Source Water

Non-monetary factors, including social and environmental aspects of these projects, should also be considered. Several factors are shown in Table 5.1 along with a score of positive, neutral, or negative.

Table 5.1 – Non-Monetary Factors for Well Projects

Non-Monetary Factors	Drill Replacement Wells	Comment
Social	Negative	Disruption due to construction of new well. Abandoning operational wells.
Environmental	Negative	Disposal of residuals. Land use.
Sustainability	Negative	Use existing wells as long as possible.
Operator Training	Neutral	
Permitting	Negative	New well permitting more rigorous.
Community Objections	Negative	Abandoning operational wells.
Health and Safety	Positive	New well could have more sanitary protections.
Land Acquisition	Negative	
Constructability Issues	Negative	New well could be unsuccessful.
Adaptability/Expandability	Positive	Take advantage of new well in deeper aquifer.
Regulatory Compliance	Negative	New well water quality could be out of compliance.
Overall Score	**Negative**	

The recommendation is to drill a new well in deep aquifer.

5.1.2 Distribution System

In Section 4.1.2, it was noted that alternatives to distributing water to the District's customers through an underground pipe system do not exist and that PVC and Ductile Iron be investigated as alternative materials for replacement waterlines.

5.1.2.1 Life Cycle Cost Analysis – Distribution System

Research indicates that PVC and Ductile Iron are very competitive as materials for underground municipal water supply pipes. PVC pipe suppliers claim that it has an indefinite life, while Ductile Iron suppliers claim a useful life of at least 100 years. PVC pipe claims to be as much as 37 percent less expensive to install than Ductile Iron pipe including both the cost of the pipe and installation costs. If all other factors are deemed to be equal for both types of pipe, then a life cycle cost analysis would show that PVC pipe has an advantage due to its lower capital cost. This is one of the reasons that PVC pipe has become so popular with utility systems over the last 30 years.

5.1.2.2 Non-Monetary Factors – Distribution System

Non-monetary factors, including social and environmental aspects of the alternative pipe materials, should also be considered. Several factors are shown in Table 5.2 along with a score of positive, neutral, or negative.

Table 5.2 – Non-Monetary Factors for Waterline Replacement Projects (Materials)

Non-Monetary Factors	PVC Pipe	Ductile Iron Pipe	Comment
Social	Positive	Negative	Higher cost of DIP perceived as wasteful.
Environmental	Neutral	Neutral	
Sustainability	Neutral	Neutral	Efficient manufacturing. Recyclable.
Operator Training	Neutral	Neutral	
Permitting	Neutral	Neutral	
Community Objections	Positive	Negative	Higher cost of DIP perceived as wasteful.
Health and Safety	Negative	Positive	PVC more easily damaged.
Land Acquisition	Neutral	Neutral	
Constructability Issues	Neutral	Neutral	PVC lower cost offset by higher care during installation.
Adaptability/Expandability	N/A	N/A	
Regulatory Compliance	Neutral	Neutral	Both meet ADEQ requirements.
Overall Score	**Positive**	**Negative**	

Considering the installation cost advantage of PVC pipe and a slightly better score in non-monetary factors, it is recommended that the District utilize PVC pipe that meets the requirements of AWWA C900, Class 250 specifications for its waterline replacement projects. However, it is recommended that the District bid PVC and Ductile Iron pipe materials side-by-side in one of its upcoming larger replacement projects in order to determine which material is more cost effective in that region.

5.1.3 Administrative Projects

In Section 4, it was noted that there is a big benefit making the system more efficient and saving energy by installing these administrative projects.

5.1.3.1 Life Cycle Cost Analysis – Administrative Projects

There projects are now standard operating proceed. There is no alternative to not completing these projects. By not having these projects the water system is not operating at peak efficiency, operating at less than peak efficiency is not an option.

5.1.3.2 Non-Monetary Factors – Distribution System

Non-monetary factors, including social and environmental aspects of the alternative pipe materials, should also be considered. Several factors are shown in Table 5.2 along with a score of positive, neutral, or negative.

Non-Monetary Factors	Admin. Projects	Comment
Social	Positive	Less efficient operations is perceived as wasteful.
Environmental	Positive	Helps eliminate wasted water
Sustainability	Positive	Helps eliminate wasted water.
Operator Training	Positive	Helps the operator understand the system
Permitting	Positive	Helps the designer/operator understand the system making permitting easier
Community Objections	Positive	Makes meter reading more accurate and dependable
Health and Safety	Positive	Reducing trips to site by the operators
Land Acquisition	Positive	Helps planning where the most efficient land acquisition for the system
Constructability Issues	Positive	Helps the operator locate existing lines
Adaptability/Expandability	Positive	Helps the designer/operator understand the system making it possible to adapt the system to changes
Regulatory Compliance	Positive	Helps the operator understand the system making compliance easier to maintain
Overall Score	**Positve**	

These Administrative Projects allow the system to operate more efficiently. The allow the operators to understand the system and how it works so that can more easily adapt to system changes. They free up operators to time to allow them to more efficiently operate the water system.

5.1.4 Water Storage Projects

In Section 4, it was noted that there is a redundant storage is desired.

5.1.4.1 Life Cycle Cost Analysis – Water Storage Projects

Providing Redundant Water Storage will allow the water system to be maintained with minimal disruptions to serve. This cannot happen at this time. Redundant Storage also reducing the requirement for pump wells during higher demand periods. Energy can be conserved by allowing wells to pump at low demand periods to fill the tanks.

5.1.4.2 Non-Monetary Factors – Water Storage

Non-monetary factors, including social and environmental aspects of the alternative pipe materials, should also be considered. Several factors are shown in Table 5.2 along with a score of positive, neutral, or negative.

Non-Monetary Factors	Admin. Projects	Comment
Social	Positive	Less efficient operations is perceived as wasteful.
Environmental	Positive	Allows the aquifer to replenish by storing more water and pumps well less.
Sustainability	Positive	Helps meet peak water demands
Community Objections	Positive	Makes water system more dependable
Land Acquisition	Positive	Tank is planned for District owned property
Adaptability/Expandability	Positive	Allows more flexibility will operations
Age of Water	Negative	Run risk of water quality issues due to age of the water.
Overall Score	**Positve**	

This Water Storage Project allow the system to operate more efficiently. Its allow the operators to replenish the aquifer by pumping wells at a lower rate. It allows the other tanks to be maintained properly, thereby increasing the design live of the tanks.

PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

6.1 PROPOSED PROJECT

6.1.1 Recommended Alternatives for Implementation

Following are the recommended alternatives for each category of system improvements:

New Deep Well:	Install new deep well at an estimated cost of $1,959,751.
Distribution System:	Complete sixteen projects to replace 180,872 feet of existing pipelines at an estimated cost of $34,682,611.
Administrative Projects:	Complete three administrative projects at an estimated cost of $849,000.
Water Storage Projects:	Complete Milk Ranch water storage project at a cost of $305.15.

6.1.2 Description of Proposed Project

It is recommended that the proposed project consist of the following principal water system improvement elements:

Install New Deep Well: The Proposed Project will generally include the work items outlined in Section 4.2.1 for the following well: Strawberry Ranch PZ, Table 4.1.

Replace Existing Pipelines: The Proposed Project includes installation of 180,872 feet of new PVC pipelines and valves in sizes of 4-inch through 6-inch to replace existing failing pipes. The specific projects are as listed in Table 4.7-4.22.

Complete Administrative Projects: The Proposed Project includes administrative projects per section 4.9.4. The specific projects are as listed in Table 4.23.

Construction of new Tank: The Proposed Project will generally include the work items outlined in Section 4.2.2 for the following Tank: Milk Ranch Tank.

6.1.3 Proposed Project Layout

The locations of the specific projects described above are shown on Figures 4.1 through 4.4. Administrative project not shown on the Figures.

6.2 PRELIMINARY PROJECT DESIGN

6.2.1 Storage Tank Project

The tank construction will generally follow the scope of work described in Section 4.9.1. The overall goal of the project is to provide a redundant water storage solution at the Milk Ranch Wells Site location.

6.2.2 New Deep Well Construction

The new deep well construction process will generally follow the scope of work described in Section 4.2.1. The overall goal of the project is to produce new water sources for the district.

6.2.3 Pipeline Replacements

The general criteria for design and construction of the six waterline replacement projects is as follows:

1. During final design of each project, verify pipe sizes of replacement waterlines to ensure that the District's standards for peak velocity are not exceeded.
2. Locations of replacement and new valves will be reviewed to improve operational control of the system and optimize the number of services that may be shut down due to a main break.
3. Develop in concert with the contractor a phased construction plan to allow switchover of services to the new pipes without excessive downtime.

6.2.4 Administrative Projects

The general criteria for administrative projects are as follows:

1. Obtain bids from qualified contractors to complete this work. Review with Contractor the needs of the system to meet the goals of the district.
2. Obtain costs of software and equipment needed.
3. Prepare an implementation plan to accomplish the projects.

6.3 PROPOSED PROJECT SCHEDULE

Taking wells out of service for reconstruction may affect the District's ability to meet peak demands. Therefore, the well rehabilitation work should be conducted during the months of October through May when overall system demand is lower, as shown in Figure 6.1. Likewise, the pipeline replacement work will include short duration shutdowns while services are switched over to the new pipelines. These projects should also be done during the winter and early spring months. Due to their elevation, the communities of Pine and Strawberry can experience significant snowfall and freezing temperatures. Pipeline installation during the winter may be affected by winter conditions and longer contract times should be considered.

It is envisioned that these projects will be phased over a three-year period in order to improve the manageability of the program and help limit the overall disruption to the community due to construction within the roads and temporary shutdowns of the water supply. The pipeline replacement projects would be designed during the spring and summer with permitting and bidding in the late summer or early fall. Thus, a Notice to Proceed can be issued to the contractor in October with construction occurring during the next six months. The well rehabilitation and new well construction projects will be of a much shorter duration and could be accomplished during one winter. The Administrative Projects can be completed at any time. The Figure 6.1 illustrates a possible scenario for scheduling of the 10 projects.

Figure 6 - Possible Project Schedule

Projects	Yr 1	Yr 2	Yr 3	Yr 4
System Wide SCADA				
System Wide Water Model				
Strawberry Creek Foothills/Strawberry Pines Waterline Replacement				
RW/MME1/MME2/SMH/Fitz-Strawberry Waterline Replacement				
Milk Ranch Tank				
Strawberry View 3/Shady Lane Waterline Replacement				
Strawberry View 1 and 2 Waterline Replacement				
Portals 1, 2, and 3 Waterline Replacement				
Cool Pines Phase A Waterline Replacement				
Woodland Heights Phase A Waterline Replacement				
Woodland Heights Phase B and C Waterline Replacement				
Pine Mountain Acres/Pinion Waterline Replacement				
White Oak/Cedar Meadows Waterline Replacement				
Hidden Pines Waterline Replacement				
Cimmaron Pines Waterline Replacement				
Brookview Terrace 1 and 2 Waterline Replacement				
Strawberry Mountain Shawdows 1 & 2/Pine Cove Waterline Replacement				
Strawberry Mountain Shawdows 2 Service Corp Stop Replacement				
Whispering Pines Waterline Replacement				
Strawberry Ranch PZ Deep Well				

6.4 PERMIT REQUIREMENTS

The permitting requirements for the waterline replacement projects will be relatively straightforward. Any significant work on a public water system must be approved and permitted through the Arizona Department of Environmental Quality (ADEQ). District Staff and the District's engineering consultants are already familiar with this process. Working within public streets and roads will require a permit to be issued by the Gila County

Engineering Department. These permits are routine and should not represent undue delays for the projects. Working within easements on private property will require at least a check of the easement language to determine if prior notice or approval of the property owner is required before construction can be started.

Construction of New Wells will require permitting through ADEQ and the Arizona Department of Water Resources. These permits are routine and should not represent undue delays for the projects.

6.5 TOTAL PROPOSED PROJECT COST ESTIMATE (ENGINEER'S OPINION OF PROBABLE COST)

The total project cost estimate prepared as part of this study includes two components: construction costs and non-construction costs. The sum of the construction and non-construction costs represents the capital cost for constructing the facility and associated infrastructure. Engineering, construction management, legal, and administration fees have been incorporated into the total project cost estimate (although the District may chose to fund these services through alternative means). The total project cost estimate is provided in Table 6.1.

Table 6.1-Water System Category Cost Estimate Summary by Alternative

	Project Name	Construction Cost	Non-Construction Cost	Total Costs
Summary of Costs				
Phase 1 Projects				
1	Strawberry Creek Foothills/Strawberry Pines Waterline Replacement	$3,116,638	$514,245	$3,630,883
2	RW/MME1/MME2/SMH/Fitz-Strawberry Waterline Replacement	$4,446,659	$733,699	$5,180,358
3	Strawberry View 3/Shady Lane Waterline Replacement	$3,035,011	$500,777	$3,535,788
4	Strawberry View 1 and 2 Waterline Replacement	$3,195,367	$527,236	$3,722,603
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7	Cool Pines Phase A Waterline Replacement	$670,887	$134,177	$805,064
8	Woodland Heights Phase A Waterline Replacement	$601,979	$99,327	$701,306
9	Woodland Heights Phase B and C Waterline Replacement	$1,872,591	$374,518	$2,247,109
10	Pine Mountain Acres/Pinion Waterline Replacement	$201,250	$33,206	$234,456
11	White Oak/Cedar Meadows Waterline Replacement	$386,400	$63,756	$450,156
12	Hidden Pines Waterline Replacement	$386,400	$63,756	$450,156
13	Cimmaron Pines Waterline Replacement	$1,046,500	$172,673	$1,219,173
14	Brookview Terrace 1 and 2 Waterline Replacement	$1,175,300	$235,060	$1,410,360
15	Strawberry Mountain Shawdows 1 & 2/Pine Cove Waterline Replacement	$4,025,000	$664,125	$4,689,125
16	Strawberry Mountain Shawdows 2 Service Corp Stop Replacement	$400,200	$66,033	$466,233
17	Milk Ranch Tank	$250,750	$55,165	$305,915
18	System Wide SCADA	$299,000	$250,000	$549,000
19	System Wide Water Model		$300,000	$300,000
Subtotal		**$30,070,342**	**$5,767,184**	**$35,837,526**
Other Phase 1 Costs				
	Compass Bank Loan Payoff		$4,000,000	$4,000,000
	Interim Financing Fees		$1,200,000	$1,200,000

	Single Audit Fees		$15,000	$15,000
	Program Management Fees		$1,433,501	$1,433,501
Subtotal			**$6,648,501**	**$6,648,501**
Total Phase 1		**$30,070,342**	**$12,415,685**	**$42,486,027**
Phase 2 Projects				
1	Strawberry Ranch PZ Deep Well	$1,599,650	$359,921	$1,959,571
Total Phase 2		**$1,599,650**	**$359,921**	**$1,959,571**
Grand Total		**$31,669,992**	**$12,775,606**	**$44,445,598**

6.6 ANNUAL OPERATING BUDGET

A summary of the District's annual operating budget for the previous fiscal year is presented in Appendix E. Most, if not all, of the projects proposed by this report will have a positive effect on the District's operation and maintenance costs. Rehabilitation of existing wells will increase the efficiency of the wells and reduce the operating costs. Replacement of failing and leaking waterlines will reduce manpower costs for fixing leaks and will reduce water loss which decreases the amount of water to be pumped. Reducing the amount of water that is pumped will reduce power costs.

The waterline replacement projects alone will substantially reduce the District's expenses. It has been reported that the system operators spent an average of 383 person-hours per month during 2017 on repairing waterline breaks and leaks. Much of this time was overtime paid for nights, weekends and holidays. At an average rate of $40 per hour, that amount of time costs the District over $180,000 per year. District Staff estimated that repairing items that have failed or broken during 2017 cost the District almost $240,000.

It is difficult to quantify at this time the amount of savings that the District will enjoy by implementing these rehabilitation and replacement projects. The District recently ended its long relationship with its contract operating company and is now operating the system with its own employees. This transition represents a major change in how the District accounts for the cost of operating and maintaining its water systems. The District will need to complete several months of operations under this new approach before its costs can be reliably quantified.

Additionally, short lived assets require replacement within 5 to 15 years of installation. The approximate life cycle of these items can be found in the table below.

6.7 INCOME

A financial statement done by independent auditors was done for PSWID for fiscal years 2018 and 2019. The report includes analysis on all capital projects commissioned at the time and a statement of cash flows for FY19. Net cash flows from operating activities were $1,469,242. Overall PSWID's net position increased by $869,959 (approximately a 75%

increase from the previous year). A projected budget report for fiscal year 2021 provided by PSWID show a total operating income of $1,007,863. See Appendix C for the complete breakdown of PSWID Financial Statements for 2019 and Appendix I for projected budget for 2021.

Table 6.2 - Short Lived Assets

Description	Estimated Life Cycle		
	1-5 years	6-10 years	11-15 years
Existing System			
Wells			$ 600,000.00
Chlorination Equipment	$ 30,000.00		
SCADA, Electrical Equipment, Generators,Pumps, Meters, Valves		$ 500,000.00	
Pipe, Tank, Equipment Paint exposed to sun			$ 450,000.00
New Improvements			
Wells Phase 2			$ 50,000.00
SCADA & Electrical Equipment		$ 300,000.00	
Pipe, Tank, Equipment Paint exposed to sun			$ 100,000.00
Subtotal	$ 30,000.00	$ 800,000.00	$ 1,200,000.00
Total of Short-Lived Assers (1-15 years)	$ 2,030,000.00		
Total Annual Reserve Desposit, Short-Lived Assets (1-15 years. per year)	$ 166,000.00		
Total Monlthy Reserve Desposit, Short-Lived Assets (1-15 years. per month)	$13,833.33		

CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations developed as a part of this evaluation are based on the District Manager's overall assessment of the condition of the water system components and the Engineer's expertise. District staff and the District's consultants were directly involved in the identification of the system failings and needs, and their involvement is reflected in the recommendations outlined in this report.

7.1 CONCLUSIONS

1. Many of the District's wells, pipelines and other facilities are in excess of 40 years old and have reached or are nearing the end of their useful lives.
2. A substantial amount of the pipelines that were installed over the years have been of substandard materials and/or installation leading to an inordinate amount of expense for repairs.
3. Some of the pipelines are undersized and need to be upgraded in order to improve water service to the homes and businesses.

7.2 RECOMMENDATIONS

1. The District should submit an application to the USDA Rural Development agency for funding of the projects outlined in this report.
2. If successful, the District should embark on a multi-year program to implement the well and waterline projects outlined in this report.

APPENDICES

APPENDIX A

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* Grace's Warbler*	Northern Goshawk* Lewis's Woodpecker*	Olive-sided Flycatcher* Olive Warbler*
Ponderosa-Gambel's Oak Forest		
Band-tailed Pigeon* Flammulated Owl*	Grace's Warbler* Lewis's Woodpecker*	Northern Goshawk* Olive Warbler* Mexican Spotted Owl*
Mixed Conifer Forest: Douglas fir, white fir, ponderosa pine, often some aspen and Gambel's oak.		
Band-tailed Pigeon* Cordilleran Flycatcher Flammulated Owl*	Golden-crowned Kinglet Mexican Spotted Owl Northern Goshawk*	Olive-sided Flycatcher* Red-faced Warbler* Red-naped Sapsucker*
Pinyon Pine – Juniper woodland		
Black-throated Gray Warbler* Golden Eagle* Gray Flycatcher	Gray Vireo Juniper Titmouse	Peregrine Falcon* Pinyon Jay
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 Canyon Towhee Costa's Hummingbird* Elf Owl	Gila Woodpecker Gilded Flicker Golden Eagle* Peregrine Falcon*	Phainopepla* Prairie Falcon Purple Martin
Montane riparian wetlands: cottonwood, maple, box elder, alder, willow, some Gambel's oak, ponderosa pine, Douglas fir, white fir, and aspen		
Cordilleran Flycatcher* MacGillivray's Warbler	Red-faced Warbler*	Red-naped Sapsucker*
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 Bell's Vireo* Common Black-Hawk*	Northern Beardless-Tyrannulet Southwestern Willow Flycatcher	Western Yellow-billed Cuckoo Yellow Warbler*
Sonoran riparian scrubland (dry wash): mesquite, paloverde, ironwood, burrobush, desert broom, quailbush, desert willow		
Bell's Vireo* Costa's Hummingbird*	Lucy's Warbler	Phainopepla*

APPENDIX B

Active Tanks	Code	Year Installed	Inspection Date	Video or pics	Rpt HC/E	Status / Comments
Pine						
Brookview Terrace	BT-1	1980	1/18/15	video	N/Y	
Canyon Tank #1 (Pine Creek East?)	CT	1960	1/11/15	pics	Y/Y	
Canyon Tank #2 (Pine Creek West?)	CT	1980	2/22/15	pics	Y/Y	
Milk Ranch Well #1	MRW-1	2012				
Milk Ranch Well #1	MRW-2	2013				
Pine Ranch 1 #1 (Whispering Pines East?)	PR-1	1972	1/11/15	video & pics	Y/Y	Suspect pics on this disk are for West tank
Pine Ranch 1 #2 (Whispering Pines West?)	PR-1	1972	1/11/15	none	Y/Y	Report says there is video
Portal 2	PS-2	1980	9/23/12	none	N/N	See DM 6/26/14 comments
Portal 3	PS-3	1980	10/14/12	none	N/N	See DM 6/26/14 comments
Water Tank Road	WTR	Unknown	2/8/15	pics	Y/Y	Same report pictures as Pine Creek Canyon West
300K	SH-2	Unknown	11/1/12			DM 6/26/14 - Due for follow up in 1 yr
Strawberry						
Hardscrabble Mesa (Strawberry Mtn)	HSM	1987	9/22/12			See DM 6/26/14 comments
Homestead Lot 5	HS					???????????????
Rimwood Lot 93	RW	unknown	4/7/13	None	N/N	See DM 6/26/14 comments
Strawberry Creek Foothills	SCFH	1980				DM 6/26/14 insp due in 2014
Strawberry Knolls 2	K-2	1992	2/15/15	pics	Y/Y	DM 6/26/14 – Insp 4/6/13, see comments
Strawberry Ridge Estates	SRE	unknown		None	N/N	DM 6/26/14 – Out of Svc, may not be PSWID asset
Strawberry View 1	SV-1	unknown	9/22/12	None	N/N	DM 6/26/14 – ADEQ order to fix or replace
Tank Farm #1	TF	unknown	4/2/13	None	N/N	DM 6/26/14 – ADEQ order to fix or replace
Tank Farm #2	TF	unknown	4/2/13	None	N/N	See DM 6/26/14 comments
Tank Farm #3	TF	unknown	4/2/13	None	N/N	See DM 6/26/14 comments
Tank Farm #4	TF	unknown	4/2/13	None	N/N	See DM 6/26/14 comments

4

Inspection Report Checklist

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Project Location: Strawberry Creek Foothills Coyote SCFT 002

TANK DETAILS

Tank Capacity:	20 000	**Tank Style:**	Welded Steel 3/16 1/4 Bottom
Inspection Date:	12-2-11	**Inspector:**	Ec Gc
Construction Style:	Above Ground	**Construction Date:**	1980
Builder:	Brown Tank	**Height/ Diameter:**	
Ladder Gate:	No	**Safety Climb Equip:**	Cage only
Exterior Lead:	TBD	**Interior Lead:**	TBD

	Yes	No
Can we take out of service?		X
Is electricity available?	X	
Is water supply available?	X	

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating: Peeling & Rust Through		X	
Interior Coating: Coal tar Peeling All over			9

Inspection Notes:

Structural, Sanitation, Safety and Security Conditions

	Good	Fair	Needs Work	
Sidewalls & Roof INT	X			
Balcony/ Catwalk/Handrails				None

Inspection Notes:

	Good	Fair	Needs Work	
Manways/ Hatches 30" manway 24" top	X			
Welds/ Bolts/ Rivets	X			
Ladders: Exterior: Interior:	X			
Overflow Assembly	X			
Target & Float Assembly	X			
Vents	X			None
Antennas				None
Cathodic Protection/ Telemetry				None
Interior Structure	X			
Foundations Rusting Around outside All Around			X	

SANITATION

	Good	Fair	Needs Work
Roof Hatch NEEDS NEW LOCK	X		
Roof Vent Screen	X		
Overflow Assembly Screen & Flapper NO FLAPPER	X		

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System CAGE				None
Primary Hatch	X			
Ladder Gate Climb Prevention Shield				None
Access Manway	X			
Balcony/ Catwalk/ Handrails				None
Aviation/ Warning Lights/ Beacon				None

Inspection Notes:

Tank site summary & Notes:

Records indicate inspection date None

SRE001

5

Currently OFFLINE

Inspection Report Checklist

Project Location: Lot 71 Tomahawk TR.
Tomahawk Past Tank Farm SRE 001

TANK DETAILS

Tank Capacity:	20 000	**Tank Style:**	welded steel
Inspection Date:	12-2-11	**Inspector:**	Ed Ge
Construction Style:	Above Ground	**Construction Date:**	1980
Builder:	UNK	**Height/ Diameter:**	24 H / 12 D
Ladder Gate:	NO	**Safety Climb Equip:**	NO
Exterior Lead:	TBD	**Interior Lead:**	TBD

	Yes	No
Can we take out of service?		X
Is electricity available?	X	
Is water supply available?	X	

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating:	X		
Interior Coating: SMALL AMOUNT OF RUST	X		

Inspection Notes:
1" SEDIMENT

Structural, Sanitation, Safety and Security Conditions

	Good	Fair	Needs Work
Sidewalls & Roof	X		
Balcony/ Catwalk/Handrails				NONE

Inspection Notes:

	Good	Fair	Needs Work
Manways/ Hatches 30" bottom 24 top	X		
Welds/ Bolts/ Rivets	X		
Ladders: Exterior:	X		
Interior:				NONE
Overflow Assembly	X		
Target & Float Assembly	X		
Vents	X		
Antennas				NONE
Cathodic Protection/ Telemetry				NONE
Interior Structure	X		
Foundations SOME DIRT	X		

SANITATION

	Good	Fair	Needs Work
Roof Hatch	X		
Roof Vent Screen	X		
Overflow Assembly Screen & Flapper No Flapper	X		

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System				NONE
Primary Hatch	X			
Ladder Gate Climb Prevention Shield				NONE
Access Manway	X			
Balcony/ Catwalk/ Handrails				NONE
Aviation/ Warning Lights/ Beacon				NONE

Inspection Notes:

Tank site summary & Notes:

Records indicate inspection date was 3-23-2012   SRV1001

6

Inspection Report Checklist

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Project Location: STRAWBERRY VIEW 1 SRV1001

TANK DETAILS

Tank Capacity:	20,000	**Tank Style:**	welded steel
Inspection Date:	12-2-11	**Inspector:**	Ed GC
Construction Style:	ABOVE GROUND	**Construction Date:**	UNK
Builder:	UNK	**Height/ Diameter:**	10 H. 19 D
Ladder Gate:	No NO LADDER	**Safety Climb Equip:**	NO
Exterior Lead:	to BE TESTED	**Interior Lead:**	to BE tested

	Yes	**No**
Can we take out of service?		X
Is electricity available?	X	
Is water supply available?	X	

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating: SOME PEELING 9 SCREWS 2 LEAKE		X	
Interior Coating: SOME RUST 4 RUST THROUGH		5	

Inspection Notes: SEDIMENT ON BOTTOM

Structural, Sanitation, Safety and Security Conditions

INT.	Good	Fair	Needs Work	
Sidewalls & Roof SOME RUST		X		
Balcony/ Catwalk/Handrails NONE				NO

Inspection Notes:

	Good	Fair	Needs Work	
Manways/ Hatches NO MANWAY 18" HATCH			X	
Welds/ Bolts/ Rivets		X		
Ladders: Exterior:				NONE
Interior:				NONE
Overflow Assembly NO FLAPPER		X		
Target & Float Assembly	X			
Vents SCREENS	X			
Antennas				NONE
Cathodic Protection/ Telemetry				NONE
Interior Structure		X		
Foundations	X			

SANITATION

	Good	Fair	Needs Work
Roof Hatch 18" NO LOCK	X		
Roof Vent Screen	X		
Overflow Assembly Screen & Flapper	X		

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System				NONE
Primary Hatch		X		
Ladder Gate Climb Prevention Shield				NONE
Access Manway				NONE
Balcony/ Catwalk/ Handrails				NONE
Aviation/ Warning Lights/ Beacon				NONE

Inspection Notes:

Tank site summary & Notes:

Records indicate inspection date was 3-23-2012

POR2001 #1

6

Inspection Report Checklist

Project Location: Portal 2 - Summit POR 2001 #1
Summit Drive

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TANK DETAILS

Tank Capacity:	100,000	**Tank Style:**	welded steel
Inspection Date:	11-30-11	**Inspector:**	EC
Construction Style:	Above Ground	**Construction Date:**	1980
Builder:	UNK	**Height/ Diameter:**	12 H 37 D
Ladder Gate:	No - Fenced	**Safety Climb Equip:**	None
Exterior Lead:	NO	**Interior Lead:**	NO

	Yes	No
Can we take out of service?	X	
Is electricity available?	X	
Is water supply available?		X

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating:			7
Interior Coating:			10

Lots Bare metal

Inspection Notes: PARTIALLY COAL TAR & PART PAINT & PART GALV.
EXT. DIRT OVER FOUNDATION RING CAUSING EXT RUST

Structural, Sanitation, Safety and Security Conditions

	Good	Fair	Needs Work
Sidewalls & Roof	X		
Balcony/ Catwalk/Handrails NOT OSHA APPROVED		X	

Inspection Notes:
FLOAT SWITCH HAS EXPOSED WIRE & SHOCKED ME
SEDIMENT & DEBRIS ON BOTTOM 2-3"

	Good	Fair	Needs Work
Manways/ Hatches	X		
Welds/ Bolts/ Rivets	X		
Ladders: Exterior:	X		
Interior:	X		
Overflow Assembly FLAPPER DOES NOT CLOSE			
Target & Float Assembly	X		
Vents	X		
Antennas ABANDONED	X		
Cathodic Protection/ Telemetry			
Interior Structure	X		
Foundations	X		

NONE

NEEDS ELECTRIC WORK TO MEET CODE
EXPOSED ELECTRIC

SANITATION

	Good	Fair	Needs Work
Roof Hatch	X		
Roof Vent Screen	X		
Overflow Assembly Screen & Flapper No Flapper	X		

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System				NONE
Primary Hatch 30" top 30" Bottom	X			
Ladder Gate Climb Prevention Shield				NONE
Access Manway GOOD	X			
Balcony/ Catwalk/ Handrails Some By Hatchway	X			
Aviation/ Warning Lights/ Beacon				NONE

Inspection Notes:

Tank site summary & Notes:

Records indicate inspection date was 10-14-2012

Bo POR3001

7

Inspection Report Checklist

Project Location: Portal 3 Pol 3001

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TANK DETAILS

Tank Capacity:	150 000	**Tank Style:**	WELDED STEEL
Inspection Date:	11-30-11	**Inspector:**	[illegible]
Construction Style:	ABOVE GROUND	**Construction Date:**	1980
Builder:	Brown Tank + Steel	**Height/ Diameter:**	24 ft
Ladder Gate:	No	**Safety Climb Equip:**	LADDER ALL THE WAY TO GROUND
Exterior Lead:	TBD	**Interior Lead:**	TBP

NO ROAD

	Yes	No
Can we take out of service?	X	
Is electricity available?	X	
Is water supply available?	X	

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating: PRIMER EXPOSED			8
Interior Coating: COAL TAR			7

Inspection Notes:
NEEDS WASH OUT - SEDIMENT & SCALE ON SIDES

Structural, Sanitation, Safety and Security Conditions

	Good	Fair	Needs Work
Sidewalls & Roof RUSTY			8 PAINT
Balcony/ Catwalk/Handrails BROKEN WELD ON HANDRAIL			X

Inspection Notes: LADDER IS IN FRONT OF TOP HATCH

	Good	Fair	Needs Work	
Manways/ Hatches 30" SIDE 30" TOP	X			
Welds/ Bolts/ Rivets	X			
Ladders: Exterior:	X			
Interior:				
Overflow Assembly SCREEN NO FLAPPER			X	
Target & Float Assembly			X	BROKEN
Vents	X			
Antennas				NONE
Cathodic Protection/ Telemetry				NONE
Interior Structure			X	
Foundations SAND INSIDE FOUNDATION RING			X	

SANITATION

	Good	Fair	Needs Work
Roof Hatch	X		
Roof Vent Screen	X		
Overflow Assembly Screen & Flapper		X	

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System				NONE
Primary Hatch 30"	X			
Ladder Gate Climb Prevention Shield				NONE
Access Manway 30"	X			
Balcony/ Catwalk/ Handrails - BROKEN HAND RAIL WELD			X	
Aviation/ Warning Lights/ Beacon				NONE

Inspection Notes:

LADDER IN FRONT HATCHWAY

Tank site summary & Notes:

Records indicate inspection date 11-01-2012

STRHODZ

Arizona Tank Divers, LLC
Water Quality Specialists
Earl Chitwood 928.238.0005 ▪ Gary Chitwood 928.978.1833
aztankdivers@gmail.com

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Pine, Arizona

STRH002

300K TANK

INSPECTION

DATE

11/01/2012

Project Location: Pine,Az. 300k Elevation: ____________ Dive Time: ________ 4 Hrs: ____________

TANK DETAILS INSPECTION REPORT

Inspector: Earl Chitwood, Gary Chitwood, Jeb Beyers, Randy Lance

Inspection Date: Nov. 1 2012

Tank Capacity: 300K Tank Style: ____________

Construction Date: Unknown

Height/Diameter: 24x50 Ladder Gate: None

Ext. Lead: Unknown Int. Lead: Unknown

YES	NO		
O	X	Can we take out of service?	
O	X	Is electricity available?	
O	X	Is water supply available?	

PROTECTIVE COATING CONDITIONS

Good	Fair	Needs Work		Comments
O	O	X	Exterior Coating	Lots of exterior rust spots covering entire exterior
O	O	X	Interior Coating	Interior coating is coal tar. Parts of it are failing due to rust nodules

STRUCTURAL, SANITATION, SAFETY AND SECTURITY CONDITIONS

Good	Fair	Needs Work		Comments
O	O	X	Sidewalls & Roof	Sunken roof, Broken rafters, Dollar plate rusted
O	O	X	Balcony/Catwalk/Handrails	No balcony, catwalk, or handrails.
O	O	X	Manways/Hatches	Needs seal on roof hatch
O	X	O	Welds/Bolts/Rivets	
O	X	X	Ladders: EXT:	Does not go to ground. No Hatch cover.
O	X	O	INT:	
O	O	X	Overflow Assembly:	Hole in screen 2" in diameter.
O	O	X	Target & Float Assembly:	Float works. No water level indicators.
O	X	O	Vents:	
O	X	O	Antennas:	Level indicators
O	O	O	Cathodic Protection/Telemetry:	NONE
O	O	X	Interior Stucture:	
O	X	O	Foundation:	Some fire hazard, grass, and brush

SANITATION

Good	Fair	Needs Work		Comments
O	O	X	Roof Hatch:	Needs seal
O	X	O	Roof Vent Screen:	
O	O	X	Overflow Assembly Screen & Flapper	No flapper, small animals can get in

SAFETY & SECURITY

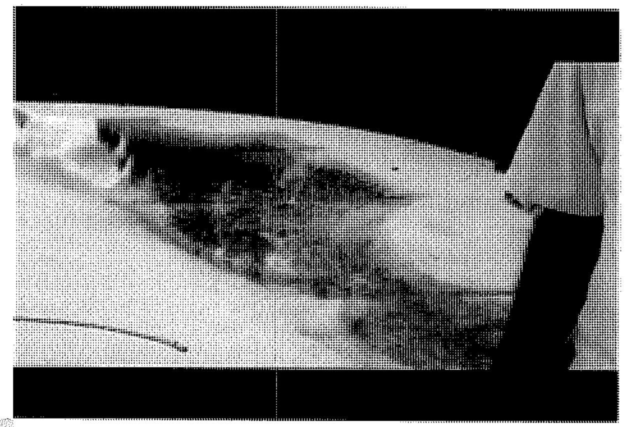
Good	Fair	Needs Work		Comments
O	O	X	Safety Climb System	None
O	X	O	Primary Hatch	
O	O	X	Ladder Gate	None
O	X	O	Access Manway	Only security is lock on roof hatch.
O	O	O	Aviation/Warning Lights/Beacons	None
O	O	X	Fence	No Fence around tank. No ladder lockout.

These are some of the item we found in the tank.

1. Lots of small rocks. 1" to 2" in diameter
2. Brass rod approximately 3' long.
3. 2 beer bottles.
4. about a dozen hand sized pieces of rusty steel. Approximately 1" thick.
5. Approximately 40lbs of rust particles 1/4" and larger.
6. Debris on bottom of tank including sand, clay, rust, interior coatings buried from 4" to 8" thick
7. Some white in color biofilm on bottom of tank under 8" sediment.

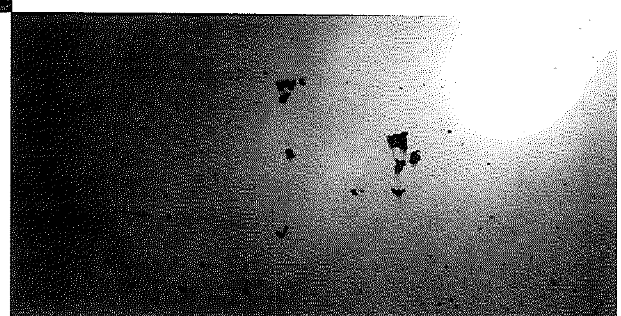
1. Sunken roof due to collapsing 8
rafters. Rafters not attached to dollar plate.
2.Dollar plate is seriously failing
due to extreme rust.
3. Serious structural issues.

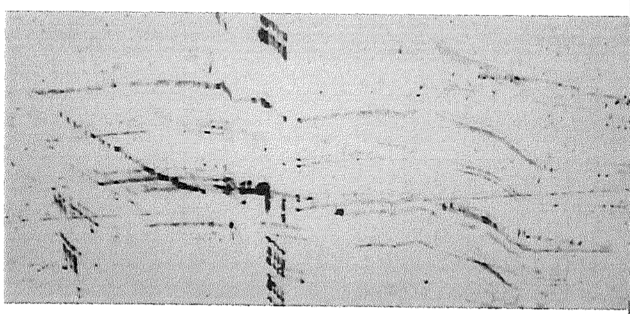
Note: No safety rails on tank



1. Note rust streak and water leaking from below man way.
2. Roof hatch needs a new seal.
3. welds, bolts, and rivet are fair.

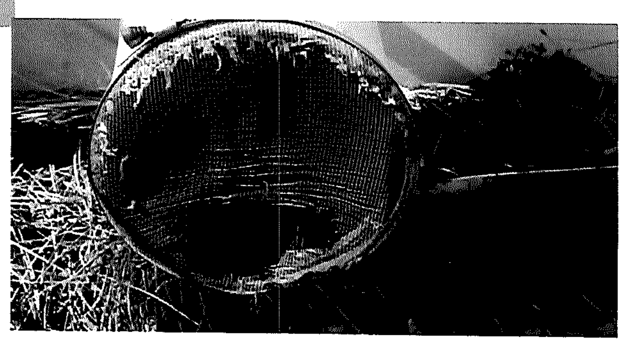
1. Exterior of tank needs recoating. Paint is almost completely gone.
2. Paint thickness was about 1 to 2 mm with lots of rusty spot areas.





1. rusty areas around entire tank and on roof area.

1. hole in rodent barrier screen approximately 2" in diameter. This can allow rodents, insects and frogs access to the tank.
2. We did see lots of tadpoles in the video.



Recommendations for tank to meet current standards

1. Exterior coating needs recoating.
2. Interior coating needs recoating.
3. Sunken roof due to collapsing rafters, from failed dollar plate.
4. No OSHA hand rails on top of tank.
5. No seal on hatch.
6. Exterior ladder is not OSHA approved.
7. No security lockout plate on ladder.
8. 2" hole in rodent screen on overflow assembly.
9. Target and float work but no water level indicators.
10. Some fire hazard with grass and brush near exterior electric connections.
11. No fence around entire area.

In general, the entire area and tank need major renovation.
As far as exterior paint and coatings they are long over due.

8

Inspection Report Checklist

Project Location: Strawberry Hollow #2

11-01-12 STRHOO2

TANK DETAILS

Tank Capacity:	300 000	**Tank Style:**	Welded Steel
Inspection Date:	11-30-11	**Inspector:**	Ece
Construction Style:	Above Ground	**Construction Date:**	?
Builder:	Unknown	**Height/ Diameter:**	24 H 48 D
Ladder Gate:	No	**Safety Climb Equip:**	No
Exterior Lead:	to Be tested	**Interior Lead:**	to Be tested

Easy to get to Drive up

	Yes	**No**
Can we take out of service?	X	
Is electricity available?	X	
Is water supply available?	X	

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating:		5	
Interior Coating: NONE			10

Inspection Notes:

Structural, Sanitation, Safety and Security Conditions

INTERIOR	Good	Fair	Needs Work	
Sidewalls & Roof FAILING ROOF COLLAPSING ON SW TOP			10	NOW
Balcony/ Catwalk/Handrails NO HAND RAILS			10	

Inspection Notes:
ROOF COLLAPSING NEED SUPPORT 3" crack on ROOF - VERY SLIPPERY NO HANDRAILS

	Good	Fair	Needs Work	
Manways/ Hatches 30" top 30" BOTTOM			X	NO LOCK
Welds/ Bolts/ Rivets	X			
Ladders: Exterior:	X			
Interior: Rusting		X		
Overflow Assembly NO FLAPPER		X		
Target & Float Assembly	X			
Vents	X			
Antennas				NONE
Cathodic Protection/ Telemetry				NONE
Interior Structure FAILING - ROOF COLLAPSING				
Foundations	X			

SANITATION

	Good	Fair	Needs Work	
Roof Hatch No Hasp No Lock	X			No Hasp
Roof Vent Screen	X			
Overflow Assembly Screen & Flapper No Flappers	X			

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System				None
Primary Hatch	X			
Ladder Gate Climb Prevention Shield				None
Access Manway	X			
Balcony/ Catwalk/ Handrails None				None
Aviation/ Warning Lights/ Beacon				None

Inspection Notes:

Tank site summary & Notes:

Records indicate inspection date was 4-2-2013 SRV3001 #1

7

Inspection Report Checklist

Project Location: EBT #1 TANK FARM SRV 3001 #1

TANK DETAILS

Tank Capacity:	10 CWD	**Tank Style:**	welded steel
Inspection Date:	12-2-11	**Inspector:**	Ec
Construction Style:	ABOVE GROUND	**Construction Date:**	UNK
Builder:	UNK	**Height/ Diameter:**	16 H 12 D
Ladder Gate:	NO	**Safety Climb Equip:**	NO
Exterior Lead:	TBD	**Interior Lead:**	TBD

	Yes	No
Can we take out of service?	X	
Is electricity available?	X	
Is water supply available?	X	

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating: 2 LEAKS	7		
Interior Coating: GALV, NO COATING – RUST EVERYWHERE			10

Inspection Notes: SEDIMENT + RUST DEBRI

Structural, Sanitation, Safety and Security Conditions

INTERIOR	Good	Fair	Needs Work
Sidewalls & Roof			7
Balcony/ Catwalk/Handrails				NONE

Inspection Notes:

	Good	Fair	Needs Work
Manways/ Hatches NO MANWAY 18" HATCH			
Welds/ Bolts/ Rivets	X		
Ladders: Exterior:	X		
Interior:			
Overflow Assembly	X		
Target & Float Assembly	X		
Vents	X		
Antennas NONE			
Cathodic Protection/ Telemetry NONE			
Interior Structure	X		
Foundations	X		

SANITATION

	Good	Fair	Needs Work
Roof Hatch	X		
Roof Vent Screen	X		
Overflow Assembly Screen & Flapper No Flapper	X		

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System				None
Primary Hatch	X			
Ladder Gate Climb Prevention Shield				None
Access Manway				None
Balcony/ Catwalk/ Handrails				None
Aviation/ Warning Lights/ Beacon				None

Inspection Notes:

Tank site summary & Notes:

Records indicate inspection date was 4-2-2013 SRV 3001 # 2

8

Inspection Report Checklist

Project Location: EAST #2 SRV3001 #2

NO LADDER AT ALL, NEED 20'

TANK DETAILS

Tank Capacity:	10 K	**Tank Style:**	welded Steel
Inspection Date:	12-2-11	**Inspector:**	[illegible]
Construction Style:	GRADE	**Construction Date:**	UNK
Builder:	UNK	**Height/ Diameter:**	16 x 12
Ladder Gate:	NO	**Safety Climb Equip:**	NO
Exterior Lead:	TBD	**Interior Lead:**	TBD

	Yes	No
Can we take out of service?	X	
Is electricity available?	X	
Is water supply available?	X	

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating:	X		
Interior Coating:	X		

Inspection Notes:

Structural, Sanitation, Safety and Security Conditions

	Good	Fair	Needs Work	
Sidewalls & Roof	X			
Balcony/ Catwalk/Handrails	X			NONE

Inspection Notes:

	Good	Fair	Needs Work	
Manways/ Hatches No manway 18" Hatch		X		
Welds/ Bolts/ Rivets	X			
Ladders: Exterior:	NONE			NONE
Interior:	NONE			NONE
Overflow Assembly	X			
Target & Float Assembly			X	NONE
Vents	X			
Antennas				NONE
Cathodic Protection/ Telemetry				NONE
Interior Structure	X			
Foundations	X			

SANITATION

	Good	Fair	Needs Work
Roof Hatch	X		
Roof Vent Screen	X		
Overflow Assembly Screen & Flapper No Flapper	X		

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System				NONE
Primary Hatch	X			
Ladder Gate Climb Prevention Shield				NONE
Access Manway				NONE
Balcony/ Catwalk/ Handrails				NONE
Aviation/ Warning Lights/ Beacon				NONE

Inspection Notes:

Tank site summary & Notes:

Records indicate inspection date was 4-2-2013 SRV3001 #3

9

Inspection Report Checklist

Project Location: East #3 SRV3001 #3

TANK DETAILS

Tank Capacity:	10-K	**Tank Style:**	welded steel
Inspection Date:	12-2-11	**Inspector:**	[illegible]
Construction Style:	Ground	**Construction Date:**	Unk
Builder:	UNK	**Height/ Diameter:**	16 X 12
Ladder Gate:	No	**Safety Climb Equip:**	No
Exterior Lead:	TBD	**Interior Lead:**	TBD

	Yes	No
Can we take out of service?	X	
Is electricity available?	✓	
Is water supply available?	X	

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating:	X		
Interior Coating:	X		

Inspection Notes:

Structural, Sanitation, Safety and Security Conditions

1X/+	Good	Fair	Needs Work	
Sidewalls & Roof	X			
Balcony/ Catwalk/Handrails				NONE

Inspection Notes:

	Good	Fair	Needs Work	
Manways/ Hatches NO manway 18" HATCH	X			
Welds/ Bolts/ Rivets	X			
Ladders: Exterior: Interior:				NONE NONE
Overflow Assembly	X			
Target & Float Assembly				NONE
Vents	X			
Antennas				NONE
Cathodic Protection/ Telemetry				NONE
Interior Structure	X			
Foundations	X			

SANITATION

	Good	Fair	Needs Work
Roof Hatch 18"	X		
Roof Vent Screen	X		
Overflow Assembly Screen & Flapper No flapper	X		

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System				None
Primary Hatch	X			
Ladder Gate Climb Prevention Shield				None
Access Manway				None
Balcony/ Catwalk/ Handrails				None
Aviation/ Warning Lights/ Beacon				None

Inspection Notes:

Tank site summary & Notes:

Records indicate inspection date was 4-2-2013 SRV 3001 # 4

10

Inspection Report Checklist

RECEIVED
DEC 29 2015
By

Project Location: EAST #4 SRV3001 #4

TANK DETAILS

Tank Capacity:	10-K	**Tank Style:**	welded steel
Inspection Date:	12-2-11	**Inspector:**	[illegible]
Construction Style:	GRADE	**Construction Date:**	UNK
Builder:	UNK	**Height/ Diameter:**	16 X 12
Ladder Gate:	NO	**Safety Climb Equip:**	NO
Exterior Lead:	TBD	**Interior Lead:**	TBD

	Yes	No
Can we take out of service?	X	
Is electricity available?	X	
Is water supply available?	X	

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating:	X		
Interior Coating:	X		

Inspection Notes:

Structural, Sanitation, Safety and Security Conditions

	Good	Fair	Needs Work	
Sidewalls & Roof	X			
Balcony/ Catwalk/Handrails				NONE

Inspection Notes:

	Good	Fair	Needs Work	
Manways/ Hatches NO manway 18" Hatch	X			
Welds/ Bolts/ Rivets	X			
Ladders: Exterior:				NONE
Interior:				NONE
Overflow Assembly	X			
Target & Float Assembly				NONE
Vents	X			
Antennas				NONE
Cathodic Protection/ Telemetry				NONE
Interior Structure	X			
Foundations	X			

SANITATION

	Good	Fair	Needs Work
Roof Hatch 18"	X		
Roof Vent Screen	X		
Overflow Assembly Screen & Flapper No Flapper	X		

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System				None
Primary Hatch	X			
Ladder Gate Climb Prevention Shield				None
Access Manway				None
Balcony/ Catwalk/ Handrails				None
Aviation/ Warning Lights/ Beacon				None

Inspection Notes:

Tank site summary & Notes:

Records indicate inspection date was 04/06/2013

SKT2002

2

RECEIVED
DEC 29 2015
By

Inspection Report Checklist

Project Location: Strawberry Knolls 2 SKT2002
Parkinson Dr

TANK DETAILS

Tank Capacity:	100 000	**Tank Style:**	welded steel
Inspection Date:	12-2-11	**Inspector:**	Ec
Construction Style:	Above Ground	**Construction Date:**	1992
Builder:	CNK	**Height/ Diameter:**	27 Ø 24 H
Ladder Gate:	NO	**Safety Climb Equip:**	NO
Exterior Lead:	to be tested	**Interior Lead:**	to be tested

	Yes	**No**
Can we take out of service?		X
Is electricity available?	X	
Is water supply available?	X	

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating: SMALL AMOUNT OF RUST	X		
Interior Coating:	5		

Inspection Notes: SEDIMENT ON FLOOR

Structural, Sanitation, Safety and Security Conditions

INT.	Good	Fair	Needs Work
Sidewalls & Roof	X		
Balcony/ Catwalk/Handrails	X		

Inspection Notes:

	Good	Fair	Needs Work	
Manways/ Hatches 30 Bottom	X			
Welds/ Bolts/ Rivets	X			
Ladders: Exterior: LADDER IN FRONT OF HATCH	X			
Interior: SOME RUST	X			
Overflow Assembly	X			
Target & Float Assembly	X			
Vents	X			
Antennas	X			NONE
Cathodic Protection/ Telemetry	X N/A			NONE
Interior Structure	X			
Foundations	X			

SANITATION

	Good	Fair	Needs Work
Roof Hatch SOME RUST	X		
Roof Vent Screen SOME STANDING WATER ON ROOF	X		
Overflow Assembly Screen & Flapper NO FLAPPER	X		

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System				NONE
Primary Hatch	X			
Ladder Gate Climb Prevention Shield				NONE
Access Manway 30"	X			
Balcony/ Catwalk/ Handrails LADDER IN FRONT OF HATCH	X			
Aviation/ Warning Lights/ Beacon				NONE

Inspection Notes:

Tank site summary & Notes:

Records indicate inspection date 4-7-2013

Rimwood1

3

Inspection Report Checklist

RECEIVED
DEC 29 2015
By

Project Location: Rim Wood Lot 93
5347 N. Rimwood Road
Rimwood1

TANK DETAILS

Tank Capacity:	67500	**Tank Style:**	welded steel
Inspection Date:	12-2-11	**Inspector:**	[illegible]
Construction Style:	Above Ground	**Construction Date:**	UNK
Builder:	UNK	**Height/ Diameter:**	28 H x 20 D.
Ladder Gate:	NO	**Safety Climb Equip:**	None
Exterior Lead:	to be tested	**Interior Lead:**	to be tested

	Yes	No
Can we take out of service?		X
Is electricity available?	X	
Is water supply available?	X	

Protective Coating Conditions

Coating Conditions	Good	Fair	Needs Work
Exterior Coating: Peeling in several places	X		
Interior Coating: Coat thru Rusted through			7

Inspection Notes:

Structural, Sanitation, Safety and Security Conditions

INTO	Good	Fair	Needs Work
Sidewalls & Roof			X
Balcony/ Catwalk/Handrails Ladder in Front of Hatch	X		

Inspection Notes:

	Good	Fair	Needs Work	
Manways/ Hatches 30" Bottom 24" top	X			
Welds/ Bolts/ Rivets	X			
Ladders: Exterior:	X			
Interior:	X			
Overflow Assembly	X			
Target & Float Assembly	X			
Vents Both Covered No Flapper	X			
Antennas				None
Cathodic Protection/ Telemetry				None
Interior Structure	X			
Foundations	X			

SANITATION

	Good	Fair	Needs Work
Roof Hatch	X		
Roof Vent Screen	X		
Overflow Assembly Screen & Flapper No Flapper		X	

Inspection Notes:

SAFETY & SECURITY

	Good	Fair	Needs Work	
Safety Climb System CAGE				NONE
Primary Hatch NO Lock	X			
Ladder Gate Climb Prevention Shield				NONE
Access Manway	X			
Balcony/ Catwalk/ Handrails			X	
Aviation/ Warning Lights/ Beacon				NONE

Inspection Notes:

Tank site summary & Notes:

Records indicate inspection date none

SCFT2002

INSPECTION REPORT FOR: CH2MHILL, PSWID

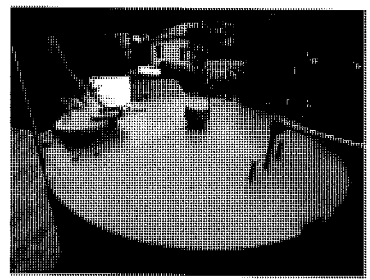
Whispering Pines Road West Tank

1-11-15

ACCESS LADDER

TYPE: NONE ☐ STEEL ☒ ALUMINUM ☐
COATING CONDITION: E ☒ G ☐ F ☐ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
LADDER SUPPORT CONDITTION: E ☒ G ☐ F ☐ P ☐
SAFETY CLIMB CONDITIONS: E ☒ G ☐ F ☐ P ☐
SAFETY CLIMB TYPE: OPEN ☒ CAGE ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
IS TOP OF TANK EASILY ACCESSIBLE YES ☒ NO ☐

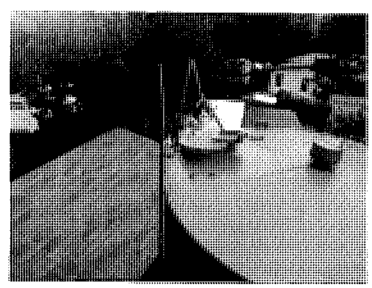
SUMMARY: Ladder is in excellent condition



ROOF CONDITION

COATING CONDITION: E ☒ G ☐ F ☐ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
LOW SPOTS PRESENT: YES ☐ NO ☒
HOLES IN ROOF: YES ☐ NO ☒

SUMMARY : Oxidation present

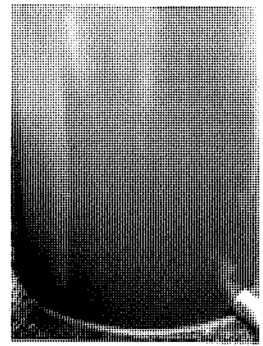


ACCESS HATCH

COATING CONDITION: E ☒ G ☐ F ☐ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
HINGE CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION PRESENT: YES ☐ NO ☒
OXIDATION PRESENT: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒
HATCH SIZE: 18 ☐ 24 ☐ 30 ☒ 36 ☐
LATCH LOCKED: YES ☒ NO ☐
GASKET: YES ☒ NO ☐
INTACT: YES ☒ NO ☐
INSECTS, DIRT UNDER HATCH: YES ☐ NO ☒

SUMMARY: Access hatch in excellent condition

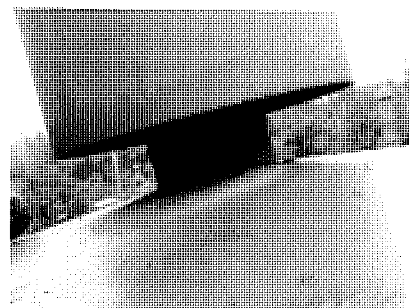
EXTERIOR TANK WALL CONDITION



COATING CONDITION: E ☒ G ☐ F ☐ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒
DENTS: YES ☐ NO ☒
HOLES: YES ☐ NO ☒

SUMMARY: Exterior wall condition is excellent

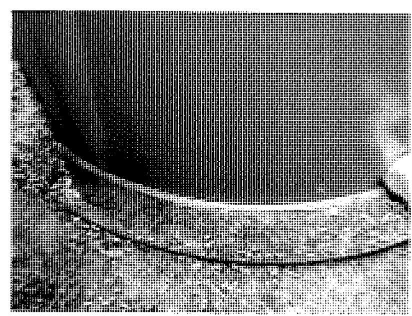
ROOF VENT



COATING CONDITION: E ☒ G ☐ F ☐ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
SCREEN CONDITION: E ☐ G ☒ F ☐ P ☐
CAP CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY : Excellent

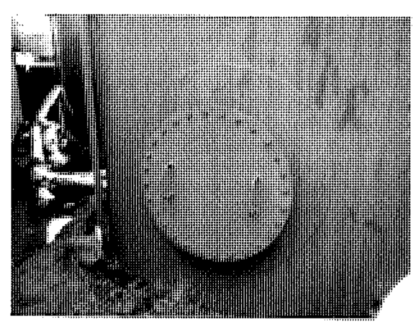
FOUNDATION



EXPOSED: YES ☒ NO ☐
BOLTS PRESENT: YES ☐ NO ☒
CORROSION: YES ☐ NO ☒
CRACKS: YES ☐ NO ☒

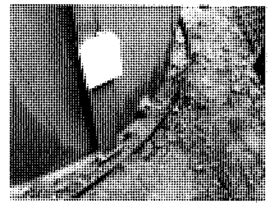
SUMMARY: Excellent

MANWAY



COATING CONDITION: E ☐ G ☐ F ☐ P ☐
WELDS CONDITION: E ☐ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☐
OXIDATION: YES ☐ NO ☐
DELAMINATION: YES ☐ NO ☐

TARGET AND FLOAT



SUMMARY: In Excellent working order

<u>INTERIOR CONDITION</u>

INLET CONDITION

COATING CONDITION:	E ☒ G ☐ F ☐ P ☐
WELDS CONDITION:	E ☒ G ☐ F ☒ P ☐
CORROSION:	YES ☐ NO ☒
DELAMINATION:	YES ☐ NO ☒

SUMMARY : Excellent, see video

MANWAY CONDITION

COATING CONDITION:	E ☒ G ☐ F ☐ P ☐
WELDS CONDITION:	E ☒ G ☐ F ☐ P ☐
CORROSION:	YES ☐ NO ☒
DELAMINATION:	YES ☐ NO ☒

SUMMARY: Excellent , see video

OVERFLOW CONDITION

COATING CONDITION:	E ☒ G ☐ F ☐ P ☐
WELDS CONDITION:	E ☒ G ☐ F ☐ P ☐
CORROSION:	YES ☐ NO ☒
DELAMINATION:	YES ☐ NO ☒
SCREEN OR FLAPPER:	E ☒ G ☐ F ☐ P ☐

SUMMARY: Excellent

INTERIOR WALLS

COATING CONDITION:	E ☐ G ☐ F ☐ P ☒
WELDS CONDITION:	E ☒ G ☐ F ☐ P ☐
CORROSION:	YES ☒ NO ☐
DELAMINATION:	YES ☐ NO ☒

SUMMARY: Interior part of tank needs new coating

OUTLET CONDITION

COATING CONDITION: E ☒ G ☐ F ☐ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY: Excellent

ROOF CONDITON

COATING CONDITION: E ☐ G ☐ F ☒ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SUMMARY: Corrosion is just starting

SUPPORT COLUMNS

COATING CONDITION: E ☐ G ☐ F ☐ P ☐
WELDS CONDITION: E ☐ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☐
DELAMINATION: YES ☐ NO ☐

SUMMARY: NONE

FLOOR CONDITION

COATING CONDITION: E ☒ G ☐ F ☐ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒
NODULES: YES ☐ NO ☒ # Click here to enter text.
DIAMETER Click here to enter text.
HOLES: YES ☐ NO ☒ # Click here to enter text.
DIAMETER Click here to enter text.

SUMMARY: Floor in excellent condition, see video

INTERIOR LADDER CONDITION

INTERIOR LADDER:	YES ☒ NO ☐
COATING CONDITION:	E ☐ G ☒ F ☐ P ☐
WELDS CONDITION:	E ☒ G ☐ F ☐ P ☐
LADDER SUPPORTS:	E ☒ G ☐ F ☐ P ☐
CORROSION:	E ☐ G ☒ F ☐ P ☐
DELAMINATION:	E ☒ G ☐ F ☐ P ☐

SUMMARY: NONE

SEDIMENT

TYPE OF MATERIAL: SAND ☒ CALCIUM ☒ OTHER ☒
Chlorine residue

DEPTH OF MATERIAL : 1 "

SAFETY
CLIMB SYSTEM

CAGE:	YES ☐ NO ☒
OPEN:	YES ☒ NO ☐
FALL CABLE:	YES ☐ NO ☒
HANDRAILS:	YES ☐ NO ☒
COATING CONDITION:	E ☒ G ☐ F ☐ P ☐
WELDS CONDITION:	E ☒ G ☐ F ☐ P ☐
CORROSION PRESENT:	E ☐ G ☒ F ☐ P ☐
OXIDATION PRESENT:	YES ☒ NO ☐
DELAMINATION:	YES ☐ NO ☒

SUMMARY: Needs exterior coating

SECURITY

GATE:	E ☒	F ☐	G ☐	P ☐
LOCKED:	YES ☒	NO ☐		
FENCE:	YES ☒	NO ☐		
HEIGHT:	5 ☐	6 ☒	7 ☐	8 ☐
BARBWIRE:	YES ☐	NO ☒		
VANDALISM:	YES ☐	NO ☒		
CAMERAS:	YES ☒	NO ☐		
ALARMS:	YES ☐	NO ☒		
SILENT:	YES ☐	NO ☒		
AUDIBLE:	YES ☐	NO ☒		
VISABLE:	YES ☒	NO ☐		
LADDER GATE:	YES ☐	NO ☒		

SUMMARY: Tank area is secure

OVERALL TANK CONDITION

ACCESS LADDER:	E ☒	G ☐	F ☐	P ☐
EXT. ROOF CONDITION:	E ☒	G ☐	F ☐	P ☐
ACCESS HATCH:	E ☒	G ☐	F ☐	P ☐
EXT. TANK WALLS:	E ☒	G ☐	F ☐	P ☐
ROOF VENT:	E ☒	G ☐	F ☐	P ☐
FOUNDATION:	E ☒	G ☐	F ☐	P ☐
EXT. MANWAY:	E ☒	G ☐	F ☐	P ☐
TARGET AND FLOAT:	E ☒	G ☐	F ☐	P ☐
INTERIOR INLET:	E ☒	G ☐	F ☐	P ☐
INT. MANWAY:	E ☒	G ☐	F ☐	P ☐
OVERFLOW:	E ☒	G ☐	F ☐	P ☐
INT. WALLS:	E ☒	G ☐	F ☐	P ☐
INT. OUTLET:	E ☒	G ☐	F ☐	P ☐
INT. ROOF:	E ☒	G ☐	F ☐	P ☐
SUPPORT COLUMN:	E ☐	G ☐	F ☐	P ☐
FLOOR CONDITION:	E ☒	G ☐	F ☐	P ☐
INT. LADDER:	E ☒	G ☐	F ☐	P ☐
SEDIMENT:	E ☒	G ☐	F ☐	P ☐
SAFETY:	E ☒	G ☐	F ☐	P ☐
SECURITY:	E ☒	G ☐	F ☐	P ☐

SUMMARY: Tank is in excellent condition

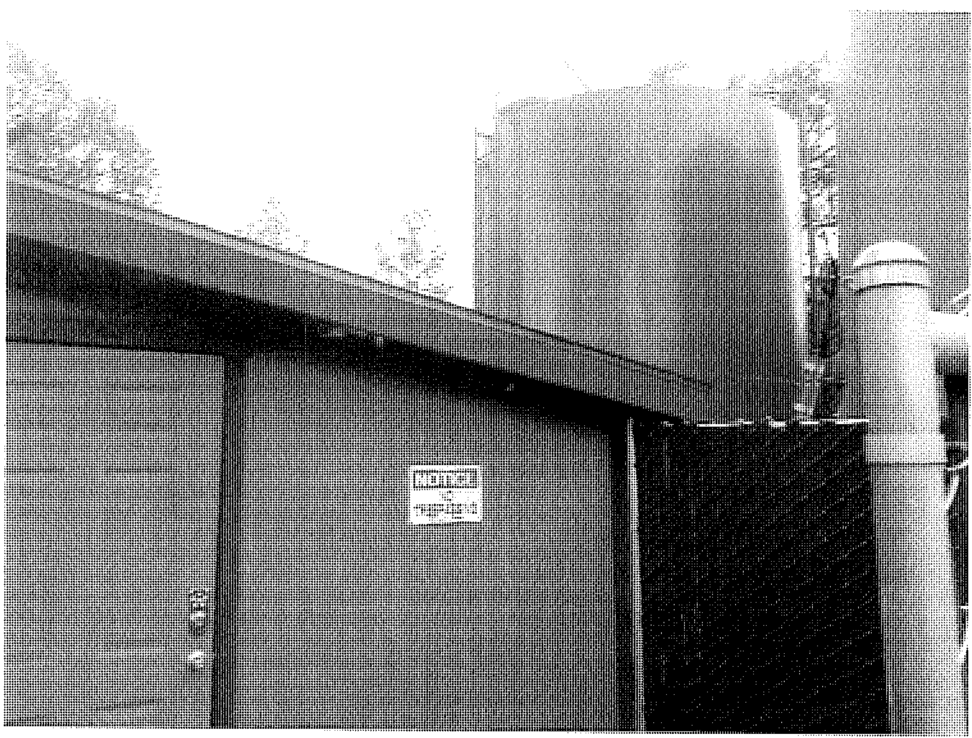
RECOMMENDATIONS

There is a leak in the general area. We did leak detection test and could not find the tank leaking.

INSPECTION REPORT FOR: CH2MHILL, PSWID

Whispering Pines Road East Tank

1-11-15

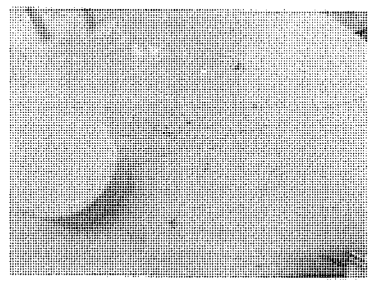


ACCESS LADDER

TYPE: NONE ☐ STEEL ☒ ALUMINUM ☐

COATING CONDITION:	E ☒	F ☐	G ☐	P ☐
WELDS CONDITION:	E ☒	F ☐	G ☐	P ☐
LADDER SUPPORT CONDITTION:	E ☒	F ☐	G ☐	P ☐
SAFETY CLIMB CONDITIONS:	E ☒	F ☐	G ☐	P ☐
SAFETY CLIMB TYPE:	OPEN ☒	CAGE ☐		
CORROSION:	YES ☐	NO ☒		
OXIDATION:	YES ☒	NO ☐		
DELAMINATION:	YES ☐	NO ☒		
IS TOP OF TANK EASILY ACCESSIBLE	YES ☒	NO ☐		

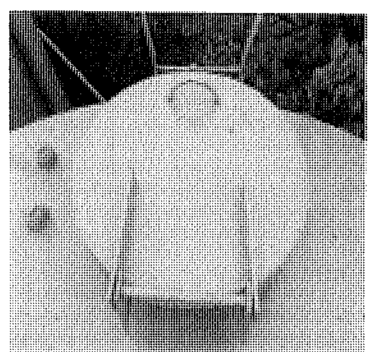
SUMMARY: Ladder is in excellent condition



ROOF CONDITION

COATING CONDITION:	E ☒	F ☐	G ☐	P ☐
WELDS CONDITION:	E ☒	F ☐	G ☐	P ☐
CORROSION:	YES ☐	NO ☒		
OXIDATION:	YES ☒	NO ☐		
DELAMINATION:	YES ☐	NO ☒		
LOW SPOTS PRESENT:	YES ☐	NO ☒		
HOLES IN ROOF:	YES ☐	NO ☒		

SUMMARY : Oxidation present

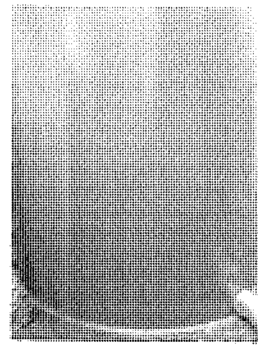


ACCESS HATCH

COATING CONDITION:	E ☒	F ☐	G ☐	P ☐
WELDS CONDITION:	E ☒	F ☐	G ☐	P ☐
HINGE CONDITION:	E ☒	F ☐	G ☐	P ☐
CORROSION PRESENT:	YES ☐	NO ☒		
OXIDATION PRESENT:	YES ☐	NO ☒		
DELAMINATION:	YES ☐	NO ☒		
HATCH SIZE:	18 ☐	24 ☐	30 ☒	36 ☐
LATCH LOCKED:	YES ☒	NO ☐		
GASKET:	YES ☒	NO ☐		
INTACT:	YES ☒	NO ☐		
INSECTS, DIRT UNDER HATCH:	YES ☐	NO ☒		

SUMMARY: Access hatch in excellent condition

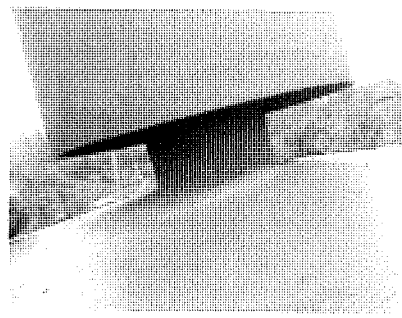
EXTERIOR TANK WALL CONDITION



COATING CONDITION: E ☒ F ☐ G ☐ P ☐
WELDS CONDITION: E ☒ F ☐ G ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒
DENTS: YES ☐ NO ☒
HOLES: YES ☐ NO ☒

SUMMARY: Exterior wall condition is excellent

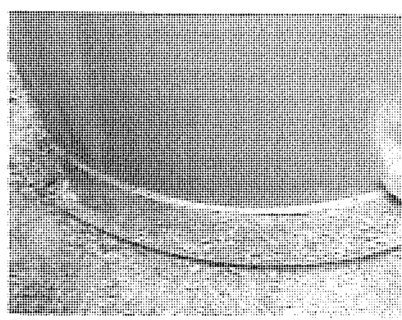
ROOF VENT



COATING CONDITION: E ☒ G ☐ F ☐ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
SCREEN CONDITION: E ☐ G ☒ F ☐ P ☐
CAP CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY : Excellent

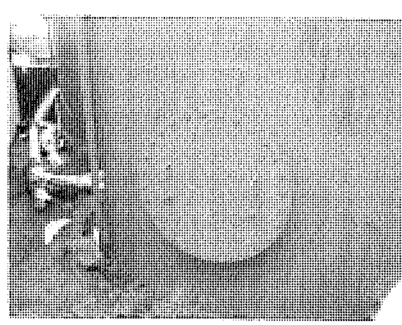
FOUNDATION



EXPOSED: YES ☒ NO ☐
BOLTS PRESENT: YES ☐ NO ☒
CORROSION: YES ☐ NO ☒
CRACKS: YES ☐ NO ☒

SUMMARY: Excellent

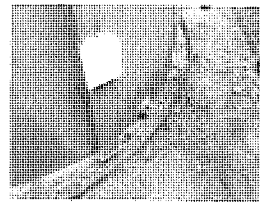
MANWAY



COATING CONDITION: E ☐ F ☐ G ☐ P ☐
WELDS CONDITION: E ☐ F ☐ G ☐ P ☐
CORROSION: YES ☐ NO ☐
OXIDATION: YES ☐ NO ☐
DELAMINATION: YES ☐ NO ☐

SUMMARY : No Manway

TARGET AND FLOAT



SUMMARY: In Excellent working order

INTERIOR CONDITION

INLET CONDITION

COATING CONDITION: E ☒ F ☐ G ☐ P ☐
WELDS CONDITION: E ☒ F ☐ G ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

NO PIC

SUMMARY : Excellent, see video

MANWAY CONDITION

COATING CONDITION: E ☒ F ☐ G ☐ P ☐
WELDS CONDITION: E ☒ F ☐ G ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

N/A

SUMMARY: Excellent , see video

OVERFLOW CONDITION

COATING CONDITION: E ☒ F ☐ G ☐ P ☐
WELDS CONDITION: E ☒ F ☐ G ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒
SCREEN OR FLAPPER: E ☒ F ☐ G ☐ P ☐

NO PIC

SUMMARY: Excellent

INTERIOR WALLS

COATING CONDITION: E ☐ F ☐ G ☐ P ☒
WELDS CONDITION: E ☒ F ☐ G ☐ P ☐
CORROSION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SEE VIDEO

SUMMARY: Interior part of tank needs new coating

OUTLET CONDITION

COATING CONDITION: E ☒ F ☐ G ☐ P ☐
WELDS CONDITION: E ☒ F ☐ G ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SEE VIDEO

SUMMARY: Excellent

ROOF CONDITON

COATING CONDITION: E ☐ G ☐ F ☒ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SEE VIDEO

SUMMARY: Corrosion is just starting

SUPPORT COLUMNS

COATING CONDITION: E ☐ F ☐ G ☐ P ☐
WELDS CONDITION: E ☐ F ☐ G ☐ P ☐
CORROSION: YES ☐ NO ☐
DELAMINATION: YES ☐ NO ☐

SEE VIDEO

SUMMARY: NONE

FLOOR CONDITION

COATING CONDITION: E ☒ F ☐ G ☐ P ☐
WELDS CONDITION: E ☒ F ☐ G ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒
NODULES: YES ☐ NO ☒ # Click here to enter text.
DIAMETER Click here to enter text.
HOLES: YES ☐ NO ☒ # Click here to enter text.
DIAMETER Click here to enter text.

SEE VIDEO

SUMMARY: Floor in excellent condition, see video

INTERIOR LADDER CONDITION

INTERIOR LADDER: YES ☐ NO ☐
COATING CONDITION: E ☐ F ☐ G ☐ P ☐
WELDS CONDITION: E ☐ F ☐ G ☐ P ☐
LADDER SUPPORTS: E ☐ F ☐ G ☐ P ☐
CORROSION: E ☐ F ☐ G ☐ P ☐
DELAMINATION: E ☐ F ☐ G ☐ P ☐

SEE VIDEO

SUMMARY: NONE

SEDIMENT

TYPE OF MATERIAL: SAND ☒ CALCIUM ☒ OTHER ☒
Chlorine residue

DEPTH OF MATERIAL : 1 "

SEE VIDEO

<u>SAFETY</u>
CLIMB SYSTEM

CAGE: YES ☐ NO ☒
OPEN: YES ☒ NO ☐
FALL CABLE: YES ☐ NO ☒
HANDRAILS: YES ☐ NO ☒
COATING CONDITION: E ☒ G ☐ F ☐ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION PRESENT: E ☐ G ☒ F ☐ P ☐
OXIDATION PRESENT: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SEE VIDEO

SUMMARY: Needs exterior coating

SECURITY

GATE:	E ☒ F ☐ G ☐ P ☐
LOCKED:	YES ☒ NO ☐
FENCE:	YES ☒ NO ☐
HEIGHT:	5 ☐ 6 ☒ 7 ☐ 8 ☐
BARBWIRE:	YES ☐ NO ☒
VANDALISM:	YES ☐ NO ☒
CAMERAS:	YES ☐ NO ☒ # Click here to enter text.
ALARMS:	YES ☐ NO ☒
SILENT:	YES ☐ NO ☒
AUDIBLE:	YES ☐ NO ☒
VISABLE:	YES ☒ NO ☐
LADDER GATE:	YES ☐ NO ☒

SEE VIDEO

SUMMARY: Click here to enter text.

OVERALL TANK CONDITION

	E	G	F	P
ACCESS LADDER:	☒	☐	☐	☐
EXT. ROOF CONDITION:	☒	☐	☐	☐
ACCESS HATCH:	☒	☐	☐	☐
EXT. TANK WALLS:	☒	☐	☐	☐
ROOF VENT:	☒	☐	☐	☐
FOUNDATION:	☒	☐	☐	☐
EXT. MANWAY:	☐	☐	☐	☐
TARGET AND FLOAT:	☒	☐	☐	☐
INTERIOR INLET:	☒	☐	☐	☐
INT. MANWAY:	☒	☐	☐	☐
OVERFLOW:	☒	☐	☐	☐
INT. WALLS:	☒	☐	☐	☐
INT. OUTLET:	☒	☐	☐	☐
INT. ROOF:	☒	☐	☐	☐
SUPPORT COLUMN:	☐	☐	☐	☐
FLOOR CONDITION:	☒	☐	☐	☐
INT. LADDER:	☐	☐	☐	☐
SEDIMENT:	☒	☐	☐	☐
SAFETY:	☒	☐	☐	☐
SECURITY:	☒	☐	☐	☐

SUMMARY: Tank is in excellent condition

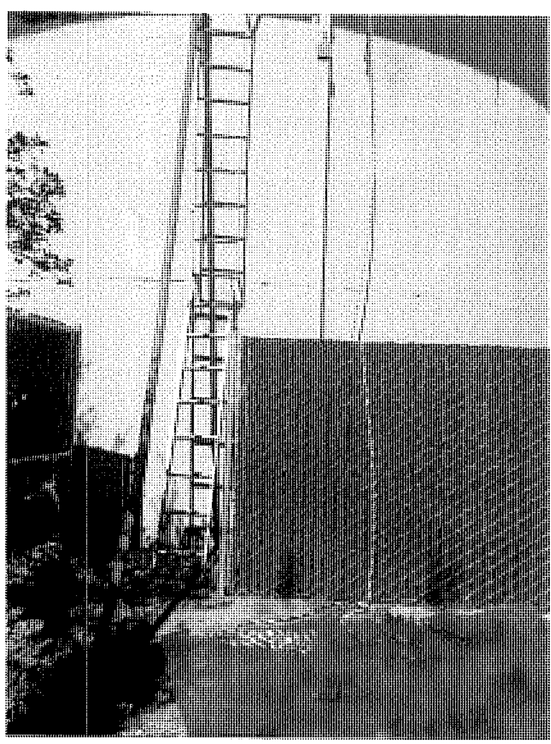
ECOMMENDATIONS

There is a leak in the general area. We did leak detection test and could not find the tank leaking.

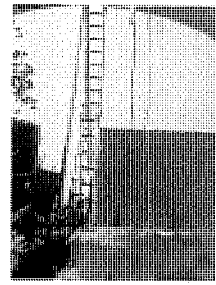
INSPECTION REPORT FOR: PSWID

WATER TANK ROAD

2-8-15



ACCESS LADDER



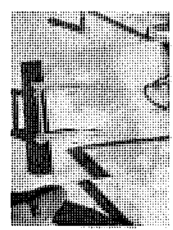
TYPE: NONE ☐ STEEL ☒ ALUMINUM ☐
COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
LADDER SUPPORT CONDITION: E ☒ G ☐ F ☐ P ☐
SAFETY CLIMB CONDITIONS: E ☒ G ☐ F ☐ P ☐
SAFETY CLIMB TYPE: OPEN ☒ CAGE ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
IS TOP OF TANK EASILY ACCESSIBLE YES ☒ NO ☐

SUMMARY: Needs paint

ROOF CONDITION

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
LOW SPOTS PRESENT: YES ☐ NO ☒
HOLES IN ROOF: YES ☐ NO ☒

SUMMARY : Needs paint

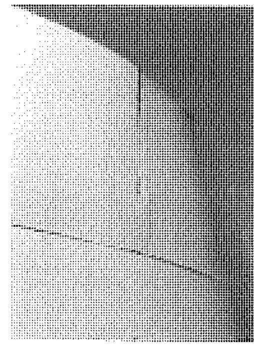


ACCESS HATCH

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
HINGE CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION PRESENT: YES ☐ NO ☒
OXIDATION PRESENT: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
HATCH SIZE: 18 ☐ 24 ☒ 30 ☐ 36 ☐
LATCH LOCKED: YES ☒ NO ☐
GASKET: YES ☒ NO ☐
INTACT: YES ☒ NO ☐
INSECTS, DIRT UNDER HATCH: YES ☐ NO ☒

SUMMARY: Needs paint

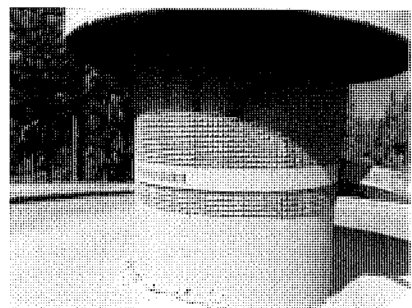
EXTERIOR TANK WALL CONDITION



COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
DENTS: YES ☐ NO ☒
HOLES: YES ☐ NO ☒

SUMMARY: Needs exterior paint

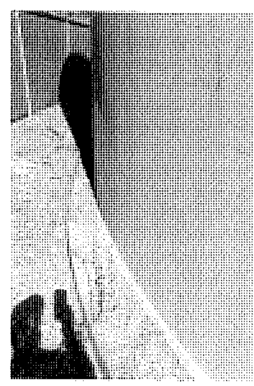
ROOF VENT



COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
SCREEN CONDITION: E ☒ G ☐ F ☐ P ☐
CAP CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SUMMARY : Beginning to corrode

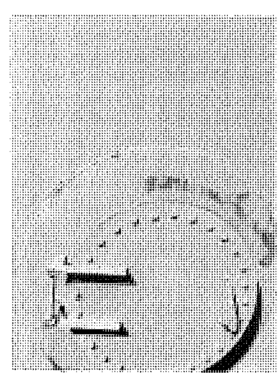
FOUNDATION



EXPOSED: YES ☒ NO ☐
BOLTS PRESENT: YES ☐ NO ☒
CORROSION: YES ☐ NO ☒
CRACKS: YES ☐ NO ☒

SUMMARY: In good shape

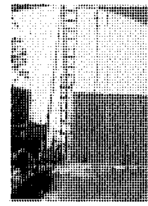
MANWAY



COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☒ NO ☐
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SUMMARY:

TARGET AND FLOAT



SUMMARY: Good working order

INTERIOR CONDITION

INLET CONDITION

COATING CONDITION:	E ☒ G ☐ F ☐ P ☐
WELDS CONDITION:	E ☒ G ☐ F ☐ P ☐
CORROSION:	YES ☐ NO ☒
DELAMINATION:	YES ☐ NO ☒

SUMMARY : In excellent shape. See Video

MANWAY CONDITION

COATING CONDITION:	E ☒ G ☐ F ☐ P ☐
WELDS CONDITION:	E ☒ G ☐ F ☐ P ☐
CORROSION:	YES ☐ NO ☒
DELAMINATION:	YES ☐ NO ☒

SUMMARY: In excellent shape

OVERFLOW CONDITION

COATING CONDITION:	E ☒ G ☐ F ☐ P ☐
WELDS CONDITION:	E ☒ G ☐ F ☐ P ☐
CORROSION:	YES ☐ NO ☒
DELAMINATION:	YES ☐ NO ☒
SCREEN OR FLAPPER:	E ☒ G ☐ F ☐ P ☐

SUMMARY: In excellent condition

INTERIOR WALLS

COATING CONDITION:	E ☐ G ☒ F ☐ P ☐
WELDS CONDITION:	E ☐ G ☒ F ☐ P ☐
CORROSION:	YES ☐ NO ☒
DELAMINATION:	YES ☐ NO ☒

SUMMARY: In good condition

OUTLET CONDITION

COATING CONDITION: E ☒ G ☐ F ☐ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY: In excellent condition

CEILING CONDITON

COATING CONDITION: E ☐ G ☒ F ☐ P ☐
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY: In good condition

SUPPORT COLUMNS

COATING CONDITION: E ☒ G ☐ F ☐ P ☐
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY: In excellent condition

FLOOR CONDITION

COATING CONDITION: E ☐ G ☒ F ☐ P ☐
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
NODULES: YES ☐ NO ☒ #
DIAMETER
HOLES: YES ☐ NO ☒ #
DIAMETER

SUMMARY: Floor is in corrosion stage

INTERIOR LADDER CONDITION

INTERIOR LADDER: YES ☒ NO ☐
COATING CONDITION: E ☐ G ☒ F ☐ P ☐
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
LADDER SUPPORTS: E ☐ G ☒ F ☐ P ☐
CORROSION: E ☒ G ☐ F ☐ P ☐
DELAMINATION: E ☒ G ☐ F ☐ P ☐

SUMMARY: In good shape

SEDIMENT

TYPE OF MATERIAL: SAND ☒ CALCIUM ☒ OTHER ☒
Fine Sediment
DEPTH OF MATERIAL : 1"

SAFETY
CLIMB SYSTEM

CAGE: YES ☐ NO ☒
OPEN: YES ☒ NO ☐
FALL CABLE: YES ☐ NO ☒
HANDRAILS: YES ☒ NO ☐
COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION PRESENT: YES ☐ NO ☒
OXIDATION PRESENT: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SUMMARY: Needs paint

Water Tank Road

SECURITY

GATE:	E ☒	G ☐	F ☐	P ☐
LOCKED:	YES ☒	NO ☐		
FENCE:	YES ☒	NO ☐		
HEIGHT:	5 ☐	6 ☒	7 ☐	8 ☐
BARBWIRE:	YES ☐	NO ☒		
VANDALISM:	YES ☐	NO ☒		
CAMERAS:	YES ☐	NO ☒		
ALARMS:	YES ☐	NO ☒		
SILENT:	YES ☐	NO ☒		
AUDIBLE:	YES ☐	NO ☒		
VISABLE:	YES ☐	NO ☒		
LADDER GATE:	YES ☐	NO ☒		

SUMMARY: Gate was locked

OVERALL TANK CONDITION

ACCESS LADDER:	E ☒	G ☐	F ☐	P ☐
EXT. ROOF CONDITION:	E ☒	G ☐	F ☐	P ☐
ACCESS HATCH:	E ☒	G ☐	F ☐	P ☐
EXT. TANK WALLS:	E ☒	G ☐	F ☐	P ☐
ROOF VENT:	E ☒	G ☐	F ☐	P ☐
FOUNDATION:	E ☐	G ☒	F ☐	P ☐
EXT. MANWAY:	E ☐	G ☒	F ☐	P ☐
TARGET AND FLOAT:	E ☒	G ☐	F ☐	P ☐
INTERIOR INLET:	E ☒	G ☐	F ☐	P ☐
INT. MANWAY:	E ☒	G ☐	F ☐	P ☐
OVERFLOW:	E ☒	G ☐	F ☐	P ☐
INT. WALLS:	E ☒	G ☐	F ☐	P ☐
INT. OUTLET:	E ☒	G ☐	F ☐	P ☐
INT. ROOF:	E ☐	G ☒	F ☐	P ☐
SUPPORT COLUMN:	E ☒	G ☐	F ☐	P ☐
FLOOR CONDITION:	E ☐	G ☐	F ☐	P ☒
INT. LADDER:	E ☐	G ☒	F ☐	P ☐
SEDIMENT:	E ☐	G ☐	F ☐	P ☒
SAFETY:	E ☒	G ☐	F ☐	P ☐
SECURITY:	E ☒	G ☐	F ☐	P ☐

SUMMARY: Click here to enter text.

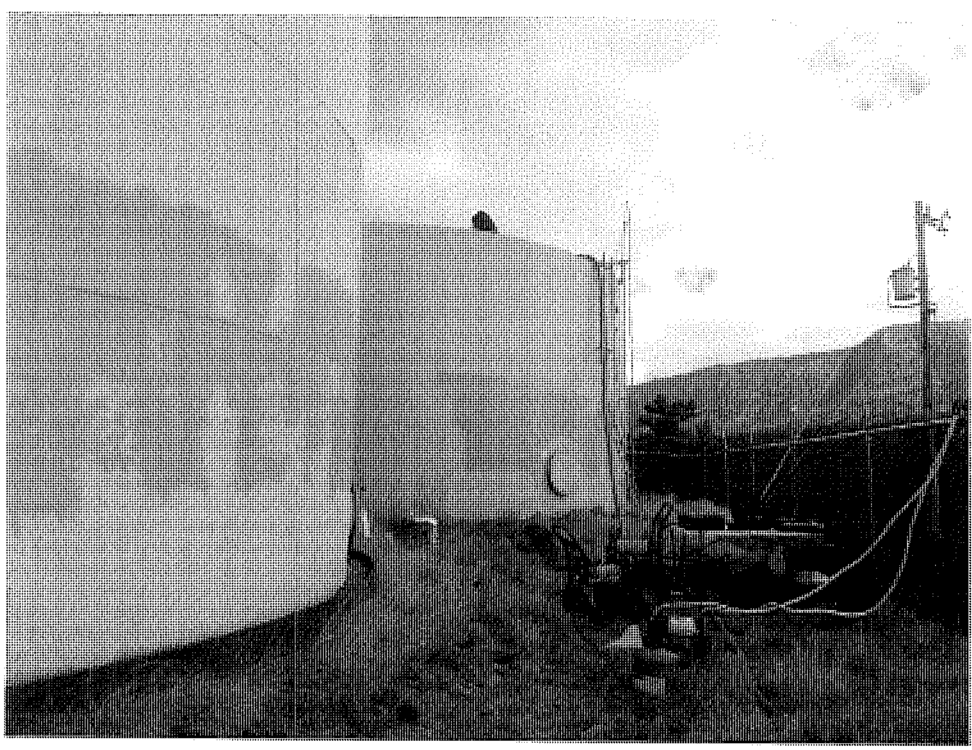
RECOMMENDATIONS

Tank is in good shape. Showing signs of floor corrosion. Needs exterior paint.

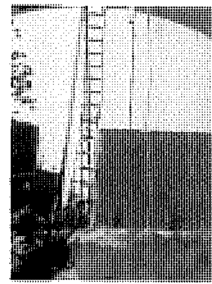
INSPECTION REPORT FOR: CH2MHILL, PSWID

PINE CREEK CANYON West

2-22-15



ACCESS LADDER



TYPE: NONE ☐ STEEL ☒ ALUMINUM ☐
COATING CONDITION: E ☐ G ☐ F ☒ P ☐
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
LADDER SUPPORT CONDITION: E ☐ G ☒ F ☐ P ☐
SAFETY CLIMB CONDITIONS: E ☐ G ☐ F ☐ P ☒
SAFETY CLIMB TYPE: OPEN ☒ CAGE ☐
CORROSION: YES ☒ NO ☐
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
IS TOP OF TANK EASILY ACCESSIBLE YES ☒ NO ☐

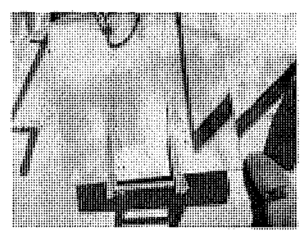
SUMMARY: Ladder is ½ ladder

ROOF CONDITION

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☒ NO ☐
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
LOW SPOTS PRESENT: YES ☐ NO ☒
HOLES IN ROOF: YES ☐ NO ☒

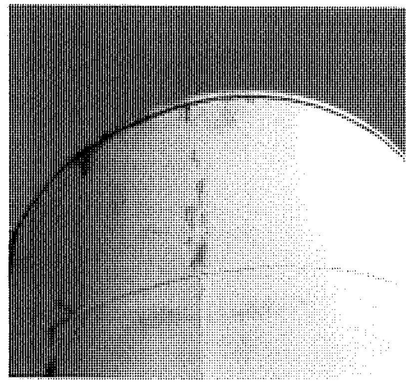
SUMMARY : Total paint failure

ACCESS HATCH



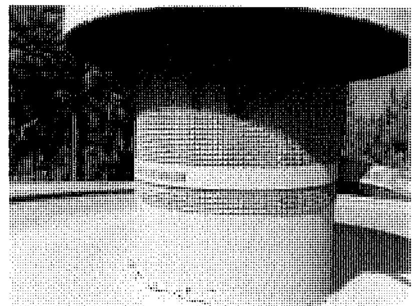
COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
HINGE CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION PRESENT: YES ☒ NO ☐
OXIDATION PRESENT: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
HATCH SIZE: 18 ☐ 24 ☐ 30 ☒ 36 ☐
LATCH LOCKED: YES ☐ NO ☒
GASKET: YES ☐ NO ☒
INTACT: YES ☐ NO ☒
INSECTS, DIRT UNDER HATCH: YES ☐ NO ☒

SUMMARY: Not lockable needs paint



E ERIOR TANK WALL CONDITION

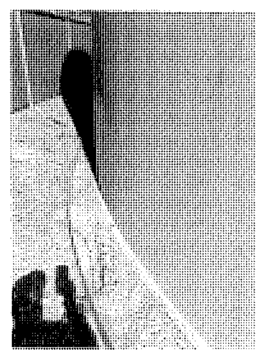
COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☐ F ☒ P ☐
CORROSION: YES ☒ NO ☐
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
DENTS: YES ☐ NO ☒
HOLES: YES ☐ NO ☒
SUMMARY: Seeping at foundation in 4 spots



ROOF VENT

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
SCREEN CONDITION: E ☐ G ☐ F ☒ P ☐
CAP CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☒ NO ☐
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

S MARY : Needs screen checked



FOUNDATION

EXPOSED: YES ☒ NO ☐
BOLTS PRESENT: YES ☐ NO ☒
CORROSION: YES ☒ NO ☐
CRACKS: YES ☐ NO ☒

SUMMARY: Leaking in 8 spots and muddy

MANWAY

COATING CONDITION: E ☐ G ☐ F ☒ P ☐
WELDS CONDITION: E ☐ G ☐ F ☒ P ☐
CORROSION: YES ☒ NO ☐
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☒ NO ☐
SUMMARY: Needs paint

TARGET AND FLOAT

SUMMARY: Does not work broken cable

INTERIOR CONDITION

INLET CONDITION

COATING CONDITION:	E ☐	G ☐	F ☐	P ☒
WELDS CONDITION:	E ☐	G ☐	F ☒	P ☐
CORROSION:	YES ☒	NO ☐		
DELAMINATION:	YES ☒	NO ☐		

SUMMARY : Total coating failure, delaminating

MANWAY CONDITION

COATING CONDITION:	E ☐	G ☐	F ☐	P ☒
WELDS CONDITION:	E ☐	G ☐	F ☒	P ☐
CORROSION:	YES ☒	NO ☐		
DELAMINATION:	YES ☒	NO ☐		

SUMMARY: Total coating failure, delaminating

OVERFLOW CONDITION

COATING CONDITION:	E ☐	G ☐	F ☐	P ☒
WELDS CONDITION:	E ☐	G ☐	F ☒	P ☐
CORROSION:	YES ☒	NO ☐		
DELAMINATION:	YES ☒	NO ☐		
SCREEN OR FLAPPER:	E ☐	G ☐	F ☒	P ☐

SUMMARY: Total coating failure, delaminating

INTERIOR WALLS

COATING CONDITION:	E ☐	G ☐	F ☐	P ☒
WELDS CONDITION:	E ☐	G ☐	F ☒	P ☐
CORROSION:	YES ☒	NO ☐		
DELAMINATION:	YES ☒	NO ☐		

SUMMARY: Total coating failure, delamination, rust

OUTLET CONDITION

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☐ F ☐ P ☒
CORROSION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SUMMARY: Total coating failure

ROOF CONDITON

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☐ F ☒ P ☐
CORROSION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SUMMARY: Roof is close to delamination

SUPPORT COLUMNS

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☐ F ☒ P ☐
CORROSION: YES ☒ NO ☐
DELAMINATION: YES ☒ NO ☐

SUMMARY: 9 columns starting to delaminate

FLOOR CONDITION

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☐ F ☐ P ☒
CORROSION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☐
NODULES: YES ☒ NO ☐ # Click here to enter text.
DIAMETER 8” to 2”
HOLES: YES ☐ NO ☐ # Click here to enter text.
DIAMETER Click here to enter text.

SUMMARY: Floor delaminating, exterior seepage

INTERIOR LADDER CONDITION

INTERIOR LADDER: YES ☒ NO ☐
COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☐ F ☒ P ☐
LADDER SUPPORTS: E ☐ G ☐ F ☒ P ☐
CORROSION: YES ☒ NO ☐
DELAMINATION: YES ☒ NO ☐

SUMMARY: Ladder delamination in several areas

SEDIMENT

TYPE OF MATERIAL: SAND ☒ CALCIUM ☒ OTHER ☒
Rocks, stalagmites of rust, electric dikes, pieces of metal, piece of pipe.
DEPTH OF MATERIAL :

SAFETY
CLIMB SYSTEM

CAGE: YES ☐ NO ☒
OPEN: YES ☒ NO ☐
FALL CABLE: YES ☐ NO ☒
HANDRAILS: YES ☐ NO ☒
COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☐ F ☒ P ☐
CORROSION PRESENT: YES ☒ NO ☐
OXIDATION PRESENT: YES ☒ NO ☐
DELAMINATION: YES ☒ NO ☐

SUMMARY: Interior ladder is the only climb system

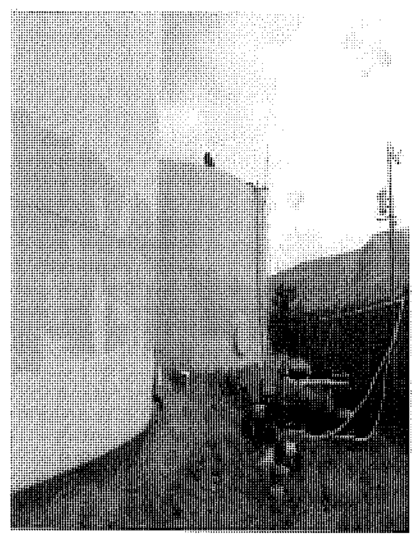
:URITY

GATE:	E ☐	G ☐	F ☐	P ☒
LOCKED:	YES ☒	NO ☐		
FENCE:	YES ☒	NO ☐		
HEIGHT:	5 ☐	6 ☒	7 ☐	8 ☐
BARBWIRE:	YES ☒	NO ☐		
VANDALISM:	YES ☒	NO ☐		
CAMERAS:	YES ☒	NO ☐		
ALARMS:	YES ☐	NO ☒		
SILENT:	YES ☐	NO ☒		
AUDIBLE:	YES ☐	NO ☒		
VISABLE:	YES ☐	NO ☒		
LADDER GATE:	YES ☐	NO ☒		

SUMMARY: Vandal could crawl under gate, tank hatch not lockable, vandals have thrown materials into tank

OVERALL TANK CONDITION

..CESS LADDER:	E ☐	G ☐	F ☒	P ☐
EXT. ROOF CONDITION:	E ☐	G ☐	F ☐	P ☒
ACCESS HATCH:	E ☐	G ☐	F ☐	P ☒
EXT. TANK WALLS:	E ☐	G ☐	F ☐	P ☒
ROOF VENT:	E ☐	G ☐	F ☐	P ☒
FOUNDATION:	E ☐	G ☐	F ☐	P ☒
EXT. MANWAY:	E ☐	G ☐	F ☒	P ☐
TARGET AND FLOAT:	E ☐	G ☐	F ☐	P ☒
INTERIOR INLET:	E ☐	G ☐	F ☐	P ☒
INT. MANWAY:	E ☐	G ☐	F ☐	P ☒
OVERFLOW:	E ☐	G ☐	F ☐	P ☒
INT. WALLS:	E ☐	G ☐	F ☐	P ☒
INT. OUTLET:	E ☐	G ☐	F ☐	P ☒
INT. ROOF:	E ☐	G ☐	F ☐	P ☒
SUPPORT COLUMN:	E ☐	G ☐	F ☐	P ☒
FLOOR CONDITION:	E ☐	G ☐	F ☐	P ☒
INT. LADDER:	E ☐	G ☐	F ☒	P ☐
SEDIMENT:	E ☐	G ☐	F ☐	P ☒
SAFETY:	E ☐	G ☐	F ☐	P ☒
SECURITY:	E ☐	G ☐	F ☐	P ☒



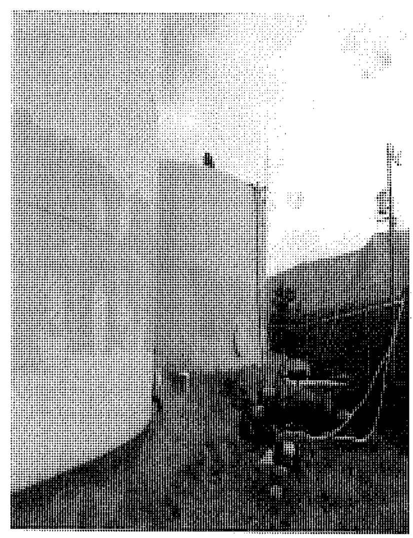
..MARY: Misc. items rusted to floor

SECURITY

GATE:	E ☐	G ☐	F ☐	P ☒
LOCKED:	YES ☒	NO ☐		
FENCE:	YES ☒	NO ☐		
HEIGHT:	5 ☐	6 ☒	7 ☐	8 ☐
BARBWIRE:	YES ☒	NO ☐		
VANDALISM:	YES ☒	NO ☐		
CAMERAS:	YES ☒	NO ☐		
ALARMS:	YES ☐	NO ☒		
SILENT:	YES ☐	NO ☒		
AUDIBLE:	YES ☐	NO ☒		
VISABLE:	YES ☐	NO ☒		
LADDER GATE:	YES ☐	NO ☒		

SUMMARY: Vandal could crawl under gate, tank hatch not lockable, vandals have thrown materials into tank

OVERALL TANK CONDITION



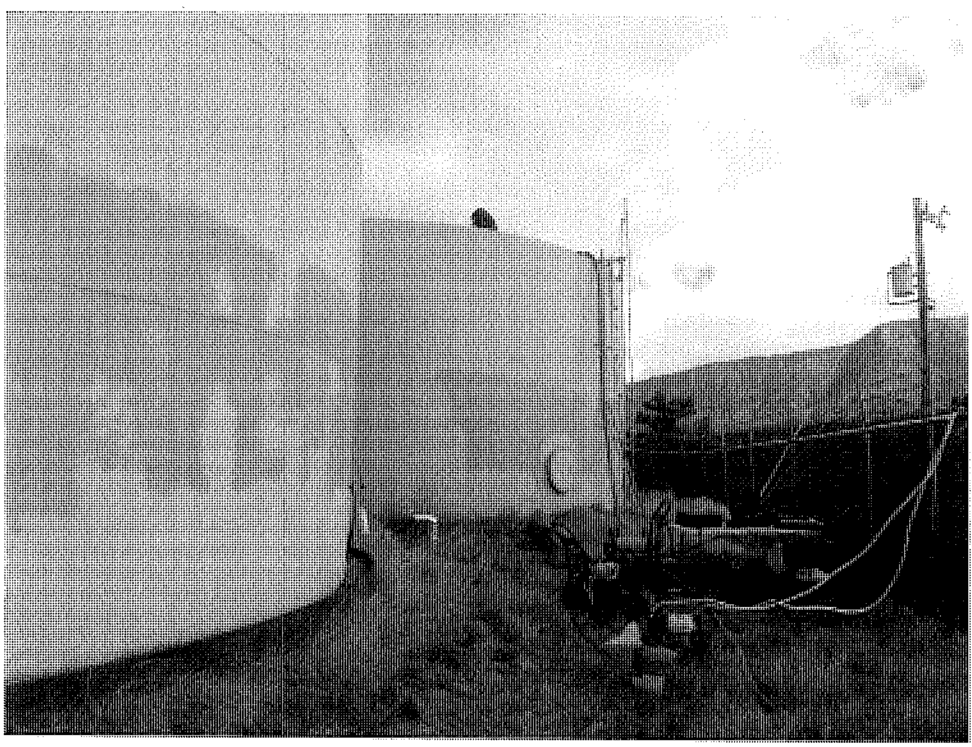
ACCESS LADDER:	E ☐	G ☐	F ☒	P ☐
EXT. ROOF CONDITION:	E ☐	G ☐	F ☐	P ☒
ACCESS HATCH:	E ☐	G ☐	F ☐	P ☒
EXT. TANK WALLS:	E ☐	G ☐	F ☐	P ☒
ROOF VENT:	E ☐	G ☐	F ☐	P ☒
FOUNDATION:	E ☐	G ☐	F ☐	P ☒
EXT. MANWAY:	E ☐	G ☐	F ☒	P ☐
TARGET AND FLOAT:	E ☐	G ☐	F ☐	P ☒
INTERIOR INLET:	E ☐	G ☐	F ☐	P ☒
INT. MANWAY:	E ☐	G ☐	F ☐	P ☒
OVERFLOW:	E ☐	G ☐	F ☐	P ☒
INT. WALLS:	E ☐	G ☐	F ☐	P ☒
INT. OUTLET:	E ☐	G ☐	F ☐	P ☒
INT. ROOF:	E ☐	G ☐	F ☐	P ☒
SUPPORT COLUMN:	E ☐	G ☐	F ☐	P ☒
FLOOR CONDITION:	E ☐	G ☐	F ☐	P ☒
INT. LADDER:	E ☐	G ☐	F ☒	P ☐
SEDIMENT:	E ☐	G ☐	F ☐	P ☒
SAFETY:	E ☐	G ☐	F ☐	P ☒
SECURITY:	E ☐	G ☐	F ☐	P ☒

SUMMARY: Misc. items rusted to floor

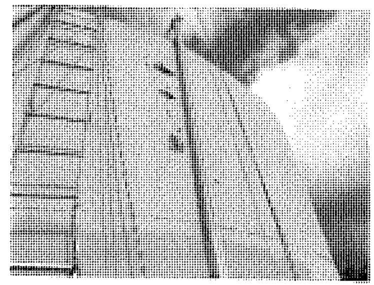
INSPECTION REPORT FOR: CH2MHILL, PSWID

PINE CREEK CANYON EAST

1-11-15



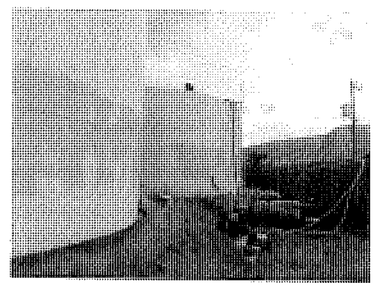
ACCESS LADDER



TYPE: NONE ☐ STEEL ☒ ALUMINUM ☐
COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
LADDER SUPPORT CONDITION: E ☒ G ☐ F ☐ P ☐
SAFETY CLIMB CONDITIONS: E ☐ G ☐ F ☒ P ☐
SAFETY CLIMB TYPE: OPEN ☒ CAGE ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
IS TOP OF TANK EASILY ACCESSIBLE YES ☒ NO ☐

SUMMARY: Excellent

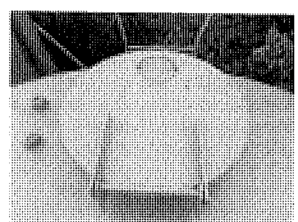
ROOF CONDITION



COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
LOW SPOTS PRESENT: YES ☐ NO ☒
HOLES IN ROOF: YES ☐ NO ☒

SUMMARY : Needs Paint

ACCESS HATCH

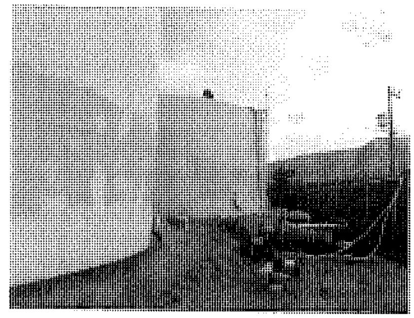


COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
HINGE CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION PRESENT: YES ☐ NO ☒
OXIDATION PRESENT: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
HATCH SIZE: 18 ☐ 24 ☒ 30 ☐ 36 ☐
LATCH LOCKED: YES ☒ NO ☐
GASKET: YES ☒ NO ☐
INTACT: YES ☒ NO ☐
INSECTS, DIRT UNDER HATCH: YES ☐ NO ☒

SUMMARY: Needs Paint

EXTERIOR TANK WALL CONDITION

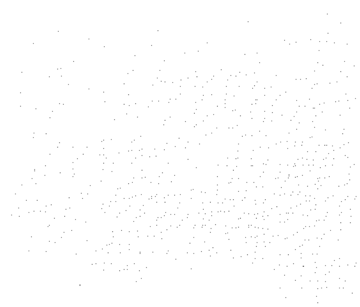
COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
DENTS: YES ☐ NO ☒
HOLES: YES ☐ NO ☒



SUMMARY: Exterior needs paint

ROOF VENT

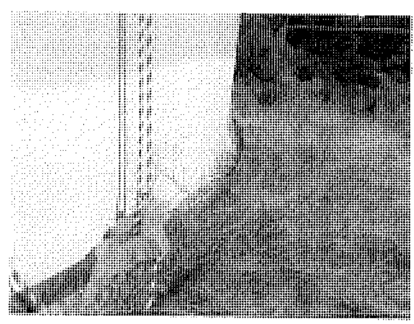
COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
SCREEN CONDITION: E ☐ G ☐ F ☐ P ☒
CAP CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒



SUMMARY : Screen needs replacing

FOUNDATION

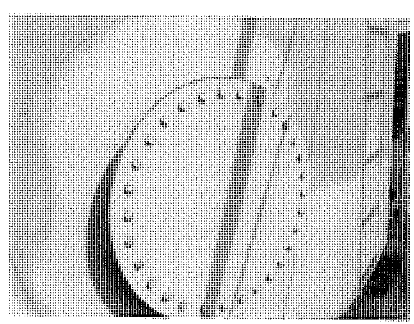
EXPOSED: YES ☒ NO ☐
BOLTS PRESENT: YES ☐ NO ☒
CORROSION: YES ☐ NO ☒
CRACKS: YES ☐ NO ☒



SUMMARY: Some fire fuel in the area

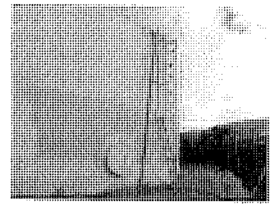
MANWAY

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒



SUMMARY: Needs paint

RGET AND FLOAT



SUMMARY: Excellent

INTERIOR CONDITION
INLET CONDITION

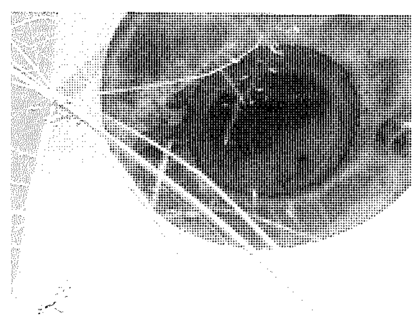
COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY : See Video, needs recoating

MANWAY CONDITION

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
RROSION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SUMMARY: Needs recoating



OVERFLOW CONDITION

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
SCREEN OR FLAPPER: E ☐ G ☐ F ☒ P ☐

SUMMARY: Screen needs replacing

INTERIOR WALLS

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
AMINATION: YES ☐ NO ☒

SUMMARY: Calcium scale

O TLET CONDITION

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY: Needs recoating

CEILING CONDITON

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY: Needs recoating

PPORT COLUMNS

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SUMMARY: Needs coating

FLOOR CONDITION

COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☒ G ☐ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒
NODULES: YES ☐ NO ☒ # Click here to enter text.
DIAMETER Click here to enter text.
HOLES: YES ☐ NO ☒ # Click here to enter text.
DIAMETER Click here to enter text.

IMARY: Needs coating

INTERIOR LADDER CONDITION

INTERIOR LADDER:	YES ☐ NO ☒
COATING CONDITION:	E ☐ G ☐ F ☐ P ☐
WELDS CONDITION:	E ☐ G ☐ F ☐ P ☐
LADDER SUPPORTS:	E ☐ G ☐ F ☐ P ☐
CORROSION:	E ☐ G ☐ F ☐ P ☐
DELAMINATION:	E ☐ G ☐ F ☐ P ☐

SUMMARY: No interior ladder

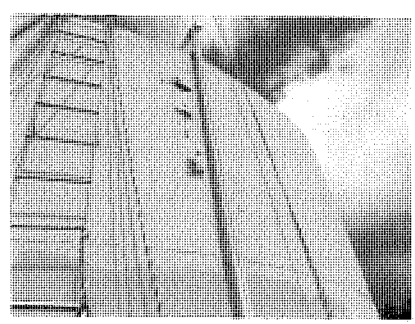
SEDIMENT

TYPE OF MATERIAL: SAND ☒ CALCIUM ☒ OTHER ☒

DEPTH OF MATERIAL : 1"

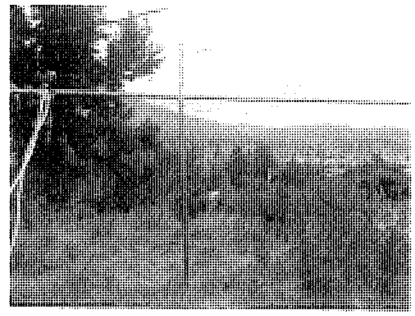
SAFETY
CLIMB SYSTEM

CAGE:	YES ☐ NO ☒
OPEN:	YES ☒ NO ☐
FALL CABLE:	YES ☐ NO ☒
HANDRAILS:	YES ☐ NO ☒
COATING CONDITION:	E ☐ G ☐ F ☐ P ☒
WELDS CONDITION:	E ☒ G ☐ F ☐ P ☐
CORROSION PRESENT:	YES ☐ NO ☒
OXIDATION PRESENT:	YES ☒ NO ☐
DELAMINATION:	YES ☐ NO ☒



SUMMARY: Click here to enter text.

SECURITY



GATE:	E ☒	G ☐	F ☐	P ☐
LOCKED:	YES ☒	NO ☐		
FENCE:	YES ☒	NO ☐		
HEIGHT:	5 ☐	6 ☒	7 ☐	8 ☐
BARBWIRE:	YES ☐	NO ☒		
VANDALISM:	YES ☐	NO ☒		
CAMERAS:	YES ☐	NO ☒		
ALARMS:	YES ☐	NO ☒		
SILENT:	YES ☐	NO ☒		
AUDIBLE:	YES ☐	NO ☒		
VISABLE:	YES ☐	NO ☒		
LADDER GATE:	YES ☐	NO ☒		

SUMMARY: Large hole under gate

OVERALL TANK CONDITION

ACCESS LADDER:	E ☒	G ☐	F ☐	P ☐
ROOF CONDITION:	E ☐	G ☐	F ☐	P ☒
ACCESS HATCH:	E ☒	G ☐	F ☐	P ☐
EXT. TANK WALLS:	E ☐	G ☐	F ☐	P ☒
ROOF VENT:	E ☐	G ☐	F ☒	P ☐
FOUNDATION:	E ☒	G ☐	F ☐	P ☐
EXT. MANWAY:	E ☒	G ☐	F ☐	P ☐
TARGET AND FLOAT:	E ☒	G ☐	F ☐	P ☐
INTERIOR INLET:	E ☐	G ☒	F ☐	P ☐
INT. MANWAY:	E ☐	G ☒	F ☐	P ☐
OVERFLOW:	E ☐	G ☒	F ☐	P ☐
INT. WALLS:	E ☐	G ☐	F ☐	P ☒
INT. OUTLET:	E ☐	G ☐	F ☐	P ☒
INT. ROOF:	E ☐	G ☐	F ☐	P ☒
SUPPORT COLUMN:	E ☐	G ☒	F ☐	P ☐
FLOOR CONDITION:	E ☐	G ☐	F ☐	P ☒
INT. LADDER:	E ☐	G ☒	F ☐	P ☐
SEDIMENT:	E ☐	G ☒	F ☐	P ☐
SAFETY:	E ☐	G ☐	F ☒	P ☐
SECURITY:	E ☐	G ☐	F ☒	P ☐

SUMMARY: Tank is in good condition

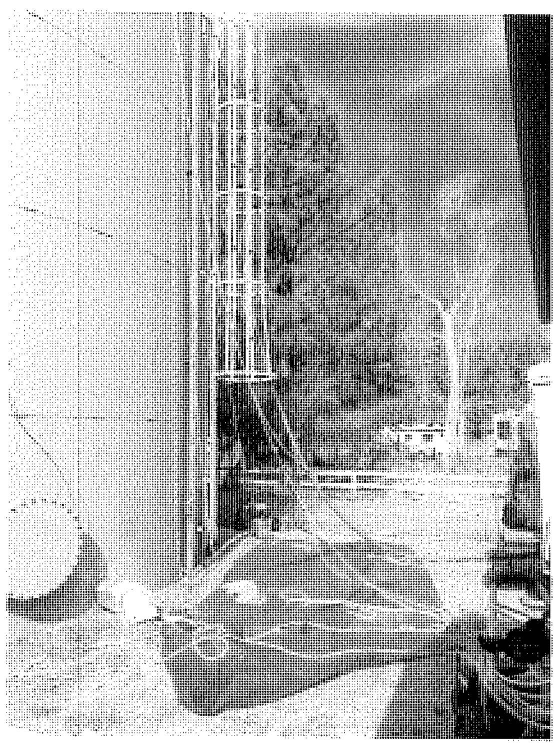
RECOMMENDATIONS

This tank needs interior coating
Tank also needs exterior coating
Tank is good shape but needs attention soon

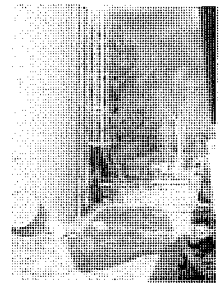
INSPECTION REPORT FOR: PSWID

K-2

2-15-15



ACCESS LADDER



TYPE: NONE ☐ STEEL ☒ ALUMINUM ☐

COATING CONDITION: E ☐ G ☐ F ☒ P ☐

WELDS CONDITION: E ☐ G ☒ F ☐ P ☐

LADDER SUPPORT CONDITION: E ☐ G ☒ F ☐ P ☐

SAFETY CLIMB CONDITIONS: E ☐ G ☒ F ☐ P ☐

SAFETY CLIMB TYPE: OPEN ☐ CAGE ☒

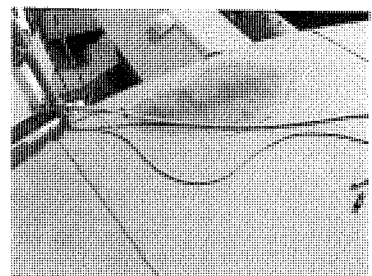
CORROSION: YES ☐ NO ☒

OXIDATION: YES ☒ NO ☐

DELAMINATION: YES ☐ NO ☒

IS TOP OF TANK EASILY ACCESSIBLE YES ☒ NO ☐

SUMMARY: Ladder is open, no way to lock out



ROOF CONDITION

COATING CONDITION: E ☐ G ☐ F ☒ P ☐

WELDS CONDITION: E ☒ G ☐ F ☐ P ☐

CORROSION: YES ☒ NO ☐

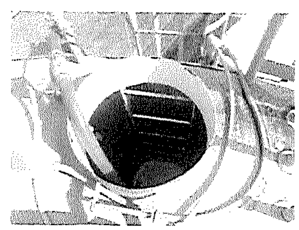
OXIDATION: YES ☒ NO ☐

DELAMINATION: YES ☐ NO ☒

LOW SPOTS PRESENT: YES ☒ NO ☐

HOLES IN ROOF: YES ☐ NO ☒

SUMMARY : 7 low spots around perimeter of roof



ACCESS HATCH

COATING CONDITION: E ☐ G ☐ F ☒ P ☐

WELDS CONDITION: E ☐ G ☒ F ☐ P ☐

HINGE CONDITION: E ☐ G ☒ F ☐ P ☐

CORROSION PRESENT: YES ☐ NO ☒

OXIDATION PRESENT: YES ☒ NO ☐

DELAMINATION: YES ☐ NO ☒

HATCH SIZE: 18 ☐ 24 ☐ 30 ☒ 36 ☐

LATCH LOCKED: YES ☒ NO ☐

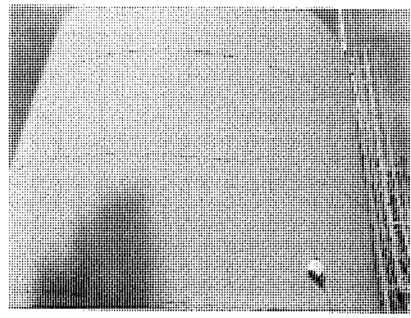
GASKET: YES ☒ NO ☐

INTACT: YES ☐ NO ☒

INSECTS, DIRT UNDER HATCH: YES ☒ NO ☐

SUMMARY: Hatch seal needs replacing

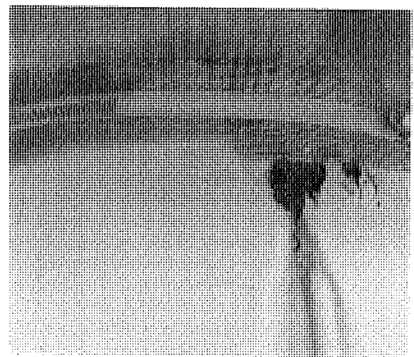
EXTERIOR TANK WALL CONDITION



COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒
DENTS: YES ☐ NO ☒
HOLES: YES ☐ NO ☒

SUMMARY: Needs paint

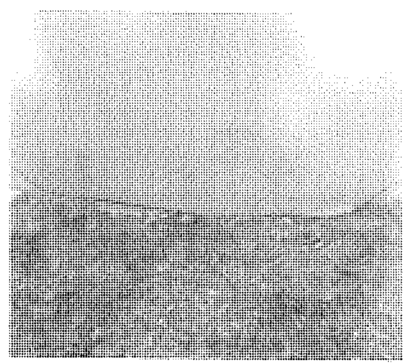
ROOF VENT



COATING CONDITION: E ☐ G ☒ F ☐ P ☐
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
SCREEN CONDITION: E ☐ G ☒ F ☐ P ☐
CAP CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SUMMARY : Needs paint and screen

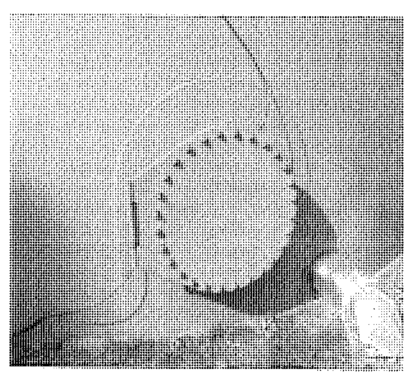
FOUNDATION



EXPOSED: YES ☒ NO ☐
BOLTS PRESENT: YES ☐ NO ☒
CORROSION: YES ☐ NO ☒
CRACKS: YES ☐ NO ☒

SUMMARY: Good

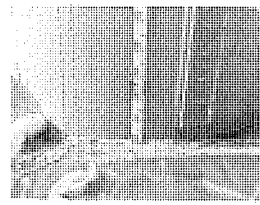
MANWAY



COATING CONDITION: E ☐ G ☐ F ☐ P ☒
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☐ NO ☒
OXIDATION: YES ☒ NO ☐
DELAMINATION: YES ☐ NO ☒

SUMMARY: Needs exterior paint

TARGET AND FLOAT



SUMMARY: Well marked in good order

INTERIOR CONDITION

INLET CONDITION

COATING CONDITION:	E ☐ G ☐ F ☒ P ☐
WELDS CONDITION:	E ☐ G ☒ F ☐ P ☐
CORROSION:	YES ☐ NO ☒
DELAMINATION:	YES ☐ NO ☒

SUMMARY : Interior coating in good shape, see video

MANWAY CONDITION

COATING CONDITION:	E ☐ G ☐ F ☒ P ☐
WELDS CONDITION:	E ☐ G ☒ F ☐ P ☐
CORROSION:	YES ☐ NO ☒
DELAMINATION:	YES ☐ NO ☒

SUMMARY: Interior coating in good shape

OVERFLOW CONDITION

COATING CONDITION:	E ☐ G ☐ F ☒ P ☐
WELDS CONDITION:	E ☐ G ☒ F ☐ P ☐
CORROSION:	YES ☐ NO ☒
DELAMINATION:	YES ☐ NO ☒
SCREEN OR FLAPPER:	E ☐ G ☐ F ☐ P ☒

SUMMARY: Holes in overflow screen

INTERIOR WALLS

COATING CONDITION:	E ☐ G ☐ F ☒ P ☐
WELDS CONDITION:	E ☐ G ☒ F ☐ P ☐
CORROSION:	YES ☐ NO ☒
DELAMINATION:	YES ☐ NO ☒

SUMMARY: Interior coating in good shape.

OUTLET CONDITION

COATING CONDITION: E ☐ G ☐ F ☒ P ☐
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY: In good shape

CEILING CONDITON

COATING CONDITION: E ☐ G ☐ F ☒ P ☐
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY: In good shape

SUPPORT COLUMNS

COATING CONDITION: E ☐ G ☐ F ☒ P ☐
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒

SUMMARY: In good shape

FLOOR CONDITION

COATING CONDITION: E ☐ G ☐ F ☒ P ☐
WELDS CONDITION: E ☐ G ☒ F ☐ P ☐
CORROSION: YES ☐ NO ☒
DELAMINATION: YES ☐ NO ☒
NODULES: YES ☐ NO ☒ # DIAMETER
HOLES: YES ☐ NO ☒ # DIAMETER

SUMMARY: In good shape

INTERIOR LADDER CONDITION

INTERIOR LADDER:	YES ☒ NO ☐
COATING CONDITION:	E ☐ G ☐ F ☒ P ☐
WELDS CONDITION:	E ☐ G ☒ F ☐ P ☐
LADDER SUPPORTS:	E ☐ G ☒ F ☐ P ☐
CORROSION:	E ☐ G ☐ F ☐ P ☐
DELAMINATION:	E ☐ G ☐ F ☐ P ☐

SUMMARY: Click here to enter text.

SEDIMENT

TYPE OF MATERIAL: SAND ☒ CALCIUM ☒ OTHER ☐

DEPTH OF MATERIAL : 1”

SAFETY

CLIMB SYSTEM

CAGE:	YES ☒ NO ☐
OPEN:	YES ☐ NO ☒
FALL CABLE:	YES ☐ NO ☒
HANDRAILS:	YES ☒ NO ☐
COATING CONDITION:	E ☐ G ☒ F ☐ P ☐
WELDS CONDITION:	E ☐ G ☒ F ☐ P ☐
CORROSION PRESENT:	YES ☐ NO ☒
OXIDATION PRESENT:	YES ☒ NO ☐
DELAMINATION:	YES ☐ NO ☒

SUMMARY: Good

SECURITY

GATE:	E ☐	G ☐	F ☐	P ☒
LOCKED:	YES ☐	NO ☒		
FENCE:	YES ☐	NO ☒		
HEIGHT:	5 ☐	6 ☐	7 ☐	8 ☐
BARBWIRE:	YES ☐	NO ☒		
VANDALISM:	YES ☐	NO ☒		
CAMERAS:	YES ☐	NO ☒		
ALARMS:	YES ☐	NO ☒		
SILENT:	YES ☐	NO ☒		
AUDIBLE:	YES ☐	NO ☒		
VISABLE:	YES ☐	NO ☒		
LADDER GATE:	YES ☐	NO ☒		

SUMMARY: Click here to enter text.

OVERALL TANK CONDITION

ACCESS LADDER:	E ☐	G ☐	F ☒	P ☐
F ROOF CONDITION:	E ☐	G ☒	F ☐	P ☐
ACCESS HATCH:	E ☐	G ☒	F ☐	P ☐
EXT. TANK WALLS:	E ☐	G ☐	F ☒	P ☐
ROOF VENT:	E ☐	G ☐	F ☒	P ☐
FOUNDATION:	E ☐	G ☒	F ☐	P ☐
EXT. MANWAY:	E ☐	G ☒	F ☐	P ☐
TARGET AND FLOAT:	E ☒	G ☐	F ☐	P ☐
INTERIOR INLET:	E ☐	G ☒	F ☐	P ☐
INT. MANWAY:	E ☐	G ☒	F ☐	P ☐
OVERFLOW:	E ☐	G ☐	F ☐	P ☒
INT. WALLS:	E ☐	G ☒	F ☐	P ☐
INT. OUTLET:	E ☐	G ☒	F ☐	P ☐
INT. ROOF:	E ☐	G ☒	F ☐	P ☐
SUPPORT COLUMN:	E ☐	G ☒	F ☐	P ☐
FLOOR CONDITION:	E ☐	G ☒	F ☐	P ☐
INT. LADDER:	E ☐	G ☒	F ☐	P ☐
SEDIMENT:	E ☐	G ☒	F ☐	P ☐
SAFETY:	E ☐	G ☒	F ☐	P ☐
SECURITY:	E ☐	G ☐	F ☐	P ☒

SUMMARY: Click here to enter text.

RECOMMENDATIONS

1. This tank needs a ladder gate and fence around area.
2. Exterior needs paint but can wait a couple of years.
3. Roof vent needs screen.
4. Interior is in good shape.
5. Holes in overflow screen.
6. Overall this tank is in good shape, could use a little more security.

APPENDIX C

Pine-Strawberry Water Improvement District
Financial Statements
for the Fiscal Year Ended June 30, 2019
with Report of Certified Public Accountants

TABLE OF CONTENTS

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HINTON BURDICK
CPAs & ADVISORS

INDEPENDENT AUDITORS' REPORT

Board of Directors
Pine-Strawberry Water improvement District
Pine, Arizona

Report on the Financial Statements

We have audited the accompanying financial statements of the business-type activities of Pine-Strawberry Water Improvement District, as of and for the year ended June 30, 2019, and the related notes to the financial statements, which collectively comprise the District's basic financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express opinions on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards,* issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Opinions

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of the business-type activities of Pine-Strawberry Water Improvement District as of June 30, 2019, and the respective changes in financial position and cash flows thereof for the year then ended in accordance with accounting principles generally accepted in the United States of America.

HintonBurdick.com › 888-566-1277

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of the financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do no provide us with sufficient evidence to express an opinion or provide any assurance.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards,* we have also issued our report dated September 10, 2019 on our consideration of the District's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts and grant agreements and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the District's internal control over financial reporting and compliance.

HintonBurdick, PLLC

HintonBurdick, PLLC
Gilbert, Arizona
September 10, 2019

MANAGEMENT'S DISCUSSION AND ANALYSIS (MD&A)
(Required Supplementary Information)

As management of the Pine-Strawberry Water Improvement District (District), we offer readers of the District's financial statements this narrative overview and analysis of the financial activities of the District for the fiscal year ended June 30, 2019.

FINANCIAL HIGHLIGHTS

- The District's total net position increased $869,959. This represents a 75.73 percent increase from the prior fiscal year end net position due to an increase in property tax revenue resulting from the increase in property valuations and reductions in interest and operating expenses.

- Operating revenues water fees accounted for $2.1 million in revenue, an increase of 0.7 percent from the prior year.

- The District had approximately $1.88 million in operating expenses, an increase of 1.2 percent from the prior fiscal year.

- The District had $215,458 in non-operating expenses, a decrease of $4,375 due to decreased interest and finance payments on the note payable refinanced in July 2015.

OVERVIEW OF FINANCIAL STATEMENTS

This discussion and analysis are intended to serve as an introduction to the District's basic financial statements. The District's basic financial statements comprise two components: 1) proprietary financial statements, and 2) notes to the financial statements.

The statement of net position presents information on all the District's assets, liabilities, and deferred inflows/outflows of resources with the difference reported as net position. Over time, increases or decreases in net position may serve as a useful indicator of whether the financial position of the District is improving or deteriorating.

The statement of revenues, expenses, and changes in net position presents information showing how the District's net position changed during the most recent fiscal year. All changes in net position are reported as soon as the underlying event giving rise to the change occurs, regardless of the timing of related cash flows. Thus, revenues and expenses are reported in this statement for some items that will only result in cash flows in future fiscal periods.

The statement of cash flows outlines the cash inflows and outflows related to the operation of the District for the year ended June 30, 2019.

OVERVIEW OF FINANCIAL STATEMENTS

As discussed more thoroughly in Note 1 to the financial statements, the operations of the District are accounted for in a single proprietary fund. As a result, only the financial statements required for a proprietary fund are presented.

Notes to the financial statements. The notes provide additional information that is essential to a full understanding of the data provided in the financial statements. The notes to the financial statements can be found immediately following the basic financial statements.

FINANCIAL ANALYSIS

Net position may serve over time as a useful indicator of a government's financial position. In the case of the District, assets and deferred outflows of resources exceeded liabilities by $2,018,753 at the current fiscal year end. At the fiscal year end the District reported an increase in total net position. In addition, portions of the District's net position are restricted for debt service repayment and capital projects.

The following table presents a summary of the District's net position for the fiscal years ended June 30, 2018 and June 30, 2019.

	Balance as of June 30, 2018	Balance as of June 30, 2019
Assets:		
Current assets	$ 1,906,112	$ 2,282,528
Capital assets, net	4,167,213	6,463,751
Total assets	6,073,325	8,746,279
Deferred outflows of resources	974,601	943,162
Total assets and deferred outflows of resources	7,047,926	9,689,441
Liabilities:		
Current liabilities	719,860	845,236
Long-term liabilities	5,179,272	6,825,452
Total liabilities	5,899,132	7,670,688
Net position:		
Net investment in capital assets	(1,242,164)	(613,951)
Restricted	342,057	473,513
Unrestricted	2,048,901	2,159,191
Total net position	$ 1,148,794	$ 2,018,753

PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT
MANAGEMENT'S DISCUSSION AND ANALYSIS (MD&A)
YEAR ENDED JUNE 30, 2019

FINANCIAL ANALYSIS

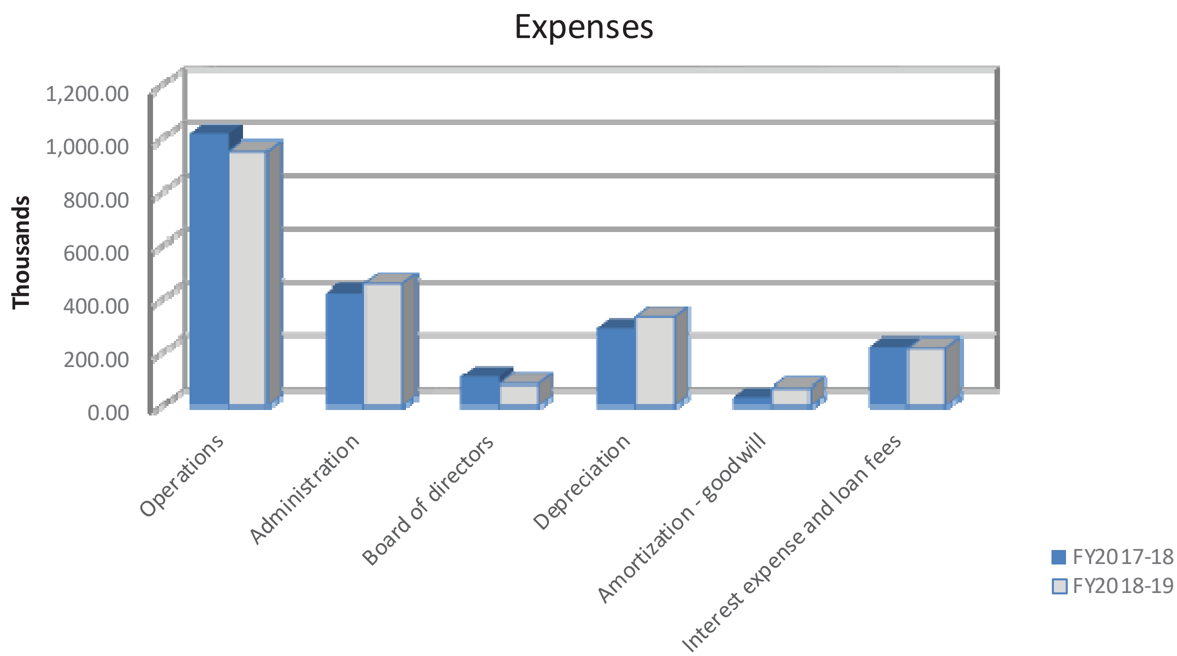
The District's financial position is the product of several financial transactions including the net result of activities, the acquisition of debt, the acquisition and disposal of capital assets, and the depreciation of capital assets. The following is a significant current year transaction that had an impact on the Statement of Net Position.

- The increase of $1,668,325 in long-term liabilities due to an additional WIFA Loan.

Changes in net position. The District's total revenues for the current fiscal year were $3.0 million. The total expenses were $2.1 million. The following table presents a summary of the changes in net position for the fiscal years ended June 30, 2018 and June 30, 2019.

	Fiscal Year Ended June 30, 2018	Fiscal Year Ended June 30, 2019
Revenues:		
Operating revenues:		
Other local	$ 16,968	$ 16,771
Grant revenue	531,682	78,297
Property taxes	727,105	769,944
Water Fee	2,086,260	2,100,117
Nonoperating revenues:		
Investment Income	1,188	3,424
Total revenues	3,363,203	2,968,553
Expenses:		
Operating expenses:		
Operations	1,015,180	952,639
Administration	421,976	453,717
Board of directors	106,801	79,994
Depreciation	286,162	331,170
Amortization - goodwill	31,439	65,616
Nonoperating expenses:		
Interest expense and loan fees	219,833	215,458
Total expenses	2,081,391	2,098,594
Change in net position	1,281,812	869,959
Net position, beginning	(133,018)	1,148,794
Net position, ending	$ 1,148,794	$ 2,018,753

FINANCIAL ANALYSIS



The following are significant current year transactions that had an impact on the change in net position.

- The decrease of $62,541 in operations expense due to normal fluctuations in the costs of operations.
- The increase of $31,741 in administration expense due primarily due to changes in the staffing arrangement of the District.
- The decrease of $4,375 in interest expense and loan fees due to non-reoccurring financing costs in the prior fiscal year.

CAPITAL ASSETS AND DEBT ADMINISTRATION

Capital Assets. At year end, the District had invested $6.5 million in capital assets, net of accumulated depreciation, including wells, distribution piping, fire hydrants, vehicles, computers, and other equipment. This amount represents a net increase of $2,296,538, prior to depreciation, from the prior fiscal year, primarily due to completion of distribution piping and VFD installations. Total depreciation expense for the current fiscal year was $365,348.

CAPITAL ASSETS AND DEBT ADMINISTRATION

The following schedule presents a summary of capital asset balances for the fiscal years ended June 30, 2018 and June 30, 2019.

	Balance as of June 30, 2018	Balance as of June 30, 2019
Capital assets - non-depreciable	$ 622,440	$ 1,493,372
Capital assets - depreciable, net	3,544,773	4,970,379
Total	$ 4,167,213	$ 6,463,751

Additional information on the District's capital assets can be found in Note 5.

Debt Administration. At year end, the District had $7.1 million in long-term debt outstanding. This represents a net increase of $1,668,325. This is due primarily to a new WIFA loan of $2.3 million and annual debt service of $676,089, which consists of an early payment of $450,000.

Additional information on the District's long-term debt can be found in Note 7.

ECONOMIC FACTORS AND NEXT YEAR'S BUDGET AND RATES

Many factors were considered by the District's administration during the process of developing the fiscal year 2019-20 budget. Among them:

- Fiscal year 2018-19 budget balance carry forward (estimated $550,000).
- WIFA Funding capital projects (estimated $5,155,586).

Also considered in the development of the budget is the local economy and inflation of the surrounding area.

CONTACTING THE DISTRICT'S FINANCIAL MANAGEMENT

This financial report is designed to provide our citizens, taxpayers, investors and creditors with a general overview of the District's finances and to demonstrate the District's accountability for the resources it receives. If you have questions about this report or need additional information, contact the Business and Finance Department, Pine-Strawberry Water Improvement District, P.O. Box 134, Pine, AZ 85544-0134.

Basic Financial Statements

PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT
Statement of Net Position
June 30, 2019

Assets		
Current assets:		
Cash and investments	$	1,203,777
Restricted cash and investments		473,513
Property taxes receivable		15,328
Accounts receivable, net of allowance		235,569
Customer deposits		225,602
Prepaid items		32,944
Inventory		95,795
Total current assets		2,282,528
Noncurrent assets:		
Capital assets, non-depreciable		1,493,372
Capital assets, depreciable (net)		4,970,379
Total noncurrent assets		6,463,751
Total assets		8,746,279
Deferred outflows of resources		
Goodwill - net of amortization		943,162
Total deferred outflows		943,162
Total assets and deferred outflows	$	9,689,441

The accompanying notes are an integral part of the financial statements.

PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT
Statement of Net Position - Continued
June 30, 2019

Liabilities	
Current liabilities:	
Accounts payable	$ 286,166
Payroll liabilities	11,284
Deposits held for others	225,602
Interest payable	46,171
Current portion of compensated absences	5,941
Current portion of notes payable	270,072
Total current liabilities	845,236
Noncurrent liabilities:	
Non-current portion of compensated absences	17,822
Non-current portion of long-term obligations	6,807,630
Total noncurrent liabilities	6,825,452
Total liabilities	7,670,688
Net Position	
Net investment in capital assets	(613,951)
Restricted for:	
Debt service	401,456
Capital outlay	72,057
Unrestricted	2,159,191
Total net position	2,018,753
Total liabilities, deferred inflows, and net position	$ 9,689,441

The accompanying notes are an integral part of the financial statements.

PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT
Statement of Revenues, Expenses and Changes in Net Position
For the Year Ended June 30, 2019

Operating revenues	
Other local	$ 16,771
Property taxes	769,944
Water fees	2,100,117
Total operating revenues	2,886,832
Operating expenses	
Operations	952,639
Administration	453,717
Board of Directors	79,994
Depreciation & amortization	396,786
Total operating expenses	1,883,136
Operating income / (loss)	1,003,696
Non-operating income (expenses)	
Investment income	3,424
Grant revenue	78,297
Interest expense and loan fees	(215,458)
Total non-operating revenue (expenses)	(133,737)
Changes in net position	869,959
Total net position - beginning of year	1,148,794
Total net position - end of year	$ 2,018,753

The accompanying notes are an integral part of the financial statements.

PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT
Statement of Cash Flows
For the Year Ended June 30, 2019

Cash flows from operating activities:	
Cash received from customers	$ 2,120,977
Cash received from property taxes	768,516
Cash paid to suppliers for goods and services	(755,762)
Cash paid to employees	(664,489)
Cash flows from operating activities	1,469,242
Cash flows from capital and related financing activities:	
Proceeds from long-term debt	2,344,414
Principal paid on long-term debt	(676,089)
Interest paid	(221,971)
Purchase of capital assets	(2,661,886)
Capital grants	153,276
Cash flows from capital and related financing activities	(1,062,256)
Cash flows from investing activities:	
Interest on investments	3,424
Cash flows from investing activities	3,424
Net change in cash and cash equivalents, including restricted cash	410,410
Cash and cash equivalents, beginning of year including restricted cash and customer deposits	1,492,482
Cash and cash equivalents, end of year including restricted cash and customer deposits	$ 1,902,892

The accompanying notes are an integral part of the financial statements.

PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT
Statement of Cash Flows - Continued
For the Year Ended June 30, 2019

Reconciliation of operating income (loss) to net cash flows from operating activities:		
Operating income / (loss)	$	1,003,696
Adjustments to reconcile operating income / (loss) to cash flows from operating activities:		
Depreciation		365,347
Amortization		31,439
Changes in operating assets and liabilities:		
(Increase)/decrease in receivables		(17,287)
(Increase)/decrease in property taxes receivable		(1,428)
(Increase)/decrease in inventories		(18,442)
(Increase)/decrease in prepaid expenses		(3,828)
Increase/(decrease) in accounts payable		79,885
Increase/(decrease) in accrued liabilities		1,455
Increase/(decrease) in compensated absences		7,029
Increase/(decrease) in deposits held for others		21,376
Net cash flows from operating activities	$	1,469,242

The accompanying notes are an integral part of the financial statements.

Note 1. Summary of Significant Accounting Policies

The financial statements of the Pine-Strawberry Water District (District) have been prepared in conformity with accounting principles generally accepted in the United States of America as applied to government units. The operations of the District are presented in the accompanying financial statements as a single proprietary fund. The Governmental Accounting Standards Board (GASB) is the accepted standard-setting body for establishing governmental accounting and financial reporting principles.

The more significant of the District's accounting policies are described below.

Reporting Entity

Management of the District is independent of other state or local governments. The County Treasurer collects taxes for the District, but exercises no control over its expenditures/ expenses.

The Board of Directors consists of seven members elected by the public. Under existing statutes, the Board of Directors' duties and powers include, but are not limited to, the acquisition, maintenance and disposition of District property, charges for water and related services.

The Board also has broad financial responsibilities, including the approval of the annual budget, and the establishment of a system of accounting and budgetary controls.

The financial reporting entity consists of a primary government. A component unit is a legally separate entity that must be included in the reporting entity in conformity with generally accepted accounting principles. The District is a primary government because it is a special-purpose government that has a separately elected governing body, is legally separate, and is fiscally independent of other state or local governments. Furthermore, there are no component units combined with the District for financial statement presentation purposes, and the District is not included in any other governmental reporting entity. Consequently, the District's financial statements include only the funds of those organizational entities for which its elected Board of Directors is financially accountable. The District's major operations include construction and maintenance of District facilities, and charges for water and related services.

Basis of presentation – fund financial statements

The fund financial statements provide information about the government's funds. The District has only one fund which is the water fund. The water fund is a proprietary fund and all of the financial activities of the District are reported within this fund.

Note 1. Summary of Significant Accounting Policies, Continued

Measurement Focus, Basis of Accounting and Financial Statement Presentation

The District's financial statements are reported using the economic resources measurement focus and the accrual basis of accounting. Revenues are recorded when earned and expenses are recorded when a liability is incurred, regardless of the timing of related cash flows. Property taxes are recognized as revenues in the year for which they are levied.

Operating revenues and expenses are distinguished from nonoperating items. Operating revenues and expenses generally result from providing services and producing and delivering goods in connection with a proprietary fund's principal ongoing operations. The principal operating revenues of the District are water fees and property taxes. Operating expenses include the cost of goods and services and administrative expenses. All revenues and expenses not meeting this definition are reported as nonoperating revenues and expenses.

Use of Estimates

The preparation of the financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. Actual results may differ from those estimates.

Cash and Investments

For purposes of the Statement of Cash Flows, the District considers all highly liquid investments with a maturity of three months or less when purchased to be cash equivalents. Cash and cash equivalents at year end were cash in bank, and cash and investments held by the County Treasurer.

Arizona statute requires a pooled collateral program for public deposits and a Statewide Collateral Pool Administrator (Administrator) in the State Treasurer's Office. The purpose of the pooled collateral program is to ensure that governmental entities' public deposits placed in participating depositories are secured with collateral of 102 percent of the public deposits, less any applicable deposit insurance. An eligible depository may not retain or accept any public deposit unless it has deposited the required collateral with a qualified escrow agent or the Administrator. The Administrator manages the pooled collateral program, including reporting on each depository's compliance with the program.

Accounts Receivable

All receivables, including property taxes receivable, are shown net of an allowance for uncollectibles.

Investment Income

Investment income is composed of interest, dividends, and net changes in the fair value of applicable investments. Investment income is included in nonoperating revenues in the proprietary financial statements.

Note 1. Summary of Significant Accounting Policies, Continued

Property Tax Calculator

The County Treasurer is responsible for collecting property taxes for all governmental entities within the county. The county levies real and personal property taxes on or before the third Monday in August that become due and payable in two equal installments. The first installment is due on the first day of October and becomes delinquent after the first business day of November. The second installment is due on the first day of March of the next year and becomes delinquent after the first business day of May.

Pursuant to A.R.S., a lien against assessed real and personal property attaches on the first day of January preceding assessment and levy; however according to case law, an enforceable legal claim to the asset does not arise.

Inventories

All inventories are valued at cost using the first-in/first-out (FIFO) method. Inventories consist of expendable supplies held for consumption. Inventories are recorded as expenses when consumed.

Prepaid Items

Certain payments to vendors reflect costs applicable to future accounting periods and are recorded as prepaid items in the proprietary financial statements.

Capital Assets

Capital assets, which include infrastructure; land and improvements; buildings and improvements; vehicles, furniture, and equipment; and construction in progress, are reported in the proprietary financial statements.

On September 30, 2009 the District acquired a water utility company. The District valued the assets using the Reconstructed Cost New Less Depreciation (RCNLD) method.

Capital assets are defined by the District as assets with an initial, individual cost in excess of $5,000 and an estimated useful life of more than two years. Such assets are recorded at historical cost, or estimated historical cost if actual historical cost is not available. Donated capital assets are recorded at the estimated acquisition value at the date of donation.

The costs of normal maintenance and repairs that do not add to the value of the asset or materially extend the life of the asset are not capitalized.

Note 1. Summary of Significant Accounting Policies, Continued

Depreciation

Capital assets are depreciated using the straight-line method over the following estimated useful lives:

Infrastructure	5 – 50 years
Leasehold improvements	3 – 5 years
Buildings and improvements	3 – 15 years
Vehicles, furniture and equipment	5 – 10 years

Deferred Outflows/Inflows of Resources

In addition to assets, the statement of financial position may report a separate section for deferred outflows of resources. This separate financial statement element, deferred outflows of resources, represents a consumption of net position that applies to a future period and so will not be recognized as an outflow of resources (expense/expenditure) until then. The District has one item that qualifies for reporting in this section, goodwill resulting from the 2009 water utility company purchase.

In addition to liabilities, the statement of financial position may report a separate section for deferred inflows of resources. This separate financial statement element, deferred inflows of resources, represents an acquisition of net position that applies to a future period(s) and so will not be recognized as an inflow of resources (revenue) until that time. The District has no items that qualify for reporting in the category.

Compensated Absences

The District's policy permits employees to accumulate earned but unused vacation and sick leave benefits, which are eligible for payment upon separation from government service. The liability for such leave is reported as incurred in the financial statements.

Long-Term Obligations

Long-term debt and other long-term obligations are reported as liabilities on the statement of net position. Note premiums and discounts, are amortized over the life of the notes using the straight-line method. Deferred amounts on refunding result from the difference between the carrying value of refunded debt and its reacquisition price. This amount is deferred and amortized over the shorter of the life of the refunded or refunding debt.

Net Position

Net position comprise the various net earnings from operating income, nonoperating revenues and expenses, and capital contributions. Net position are classified in the following three components.

Note 1. Summary of Significant Accounting Policies, Continued

Net investment in capital assets: This component of the net position consists of capital assets, net of accumulated depreciation and reduced by the outstanding balances of any bonds, mortgages, notes or other borrowings that are attributable to the acquisition, construction or improvement of those assets. If there are significant unspent related debt proceeds at year end, the portion of the debt attributable to the unspent proceeds is not included in the calculation of invested net position, net of related debt. Rather, that portion of the debt is included in the same net asset component of the unspent proceeds.

Restricted: This component of net position consists of constraints imposed by creditors (such as through debt covenants), grantors, contributors, laws or regulations of other governments or constraints imposed by law through constitutional provisions or enabling legislation.

Unrestricted net position: This component of net position consists of net position that does not meet the definition of "restricted" or "net investment in capital assets."

Net Position Flow Assumption

The District applies restricted resources first when outlays are incurred for purposes for which either restricted or unrestricted amounts are available.

Note 2. Stewardship, Compliance, and Accountability

Net Position – At year end, the District reported a net position of $2,018,753, an increase in net position of $869,959 from the prior year ending net position of $1,148,794. The net position rose primarily due to continued attempts to reduce costs and increase revenues.

Note 3. Cash and Investments

Deposits

Custodial Credit Risk – Deposits

Custodial credit risk is the risk that in the event of bank failure the District's deposits may not be returned to the District. The District does not have a deposit policy for custodial credit risk. At year end, the carrying amount of the District's deposits was $1,892,040 and the bank balance was $2,167,628. At year end, all of the District's deposits were covered by insurance or collateral held by the pledging financial institution's trust department or agent but not in the District's name. Additionally, the District had $400 cash on hand at year-end.

Note 3. Cash and Investments, Continued

Fair Value Measurements

The District categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles. The hierarchy is based on the valuation inputs used to measure the fair value of the asset.

Level 1 inputs are quoted prices in active markets for identical assets
Level 2 inputs are significant other observable inputs
Level 3 inputs are significant unobservable inputs

The County Treasurer's pool is an external investment pool with no regulatory oversight. The pool is not required to register (and is not registered) with the Securities and Exchange Commission. The fair value of each participant's position in the County Treasurer investment pool approximates the value of the participant's shares in the pool and the participants' shares are not identified with specific investments. Participants in the pool are not required to categorize the value of shares in accordance with the fair value hierarchy.

At year end, the District's investments consisted of the following:

	Average Maturities	Fair Value
County Treasurer's investment pool	0.09 years	$ 10,452
Total		$ 10,452

Interest Rate Risk

The District does not have a formal investment policy that limits investment maturities as a means of managing its exposure to fair value losses arising from increasing interest rates.

Credit Risk

The District has no investment policy that would further limit its investment choices. As of year end, the District's investment in the County Treasurer's investment pool did not receive a credit quality rating from a national rating agency.

Custodial Credit Risk - Investments

The District's investment in the County Treasurer's investment pool represents a proportionate interest in the pool's portfolio; however, the District's portion is not identified with specific investments and is not subject to custodial credit risk.

Note 4. Receivables

Accounts receivables are net of an allowance for doubtful accounts of $5,220 leaving a net accounts receivable balance of $235,569 at June 30, 2019. The District's receivables primarily consist of amounts due from individuals and businesses in the communities of Pine, Arizona and Strawberry, Arizona. Amounts are not subject to liens unless accounts are delinquent.

Note 5. Capital Assets

A summary of capital asset activity for the current fiscal year follows:

	June 30, 2018	Additions	Disposals	Reclassification	June 30, 2019
Capital assets not being depreciated:					
Land	$ 201,967	$ -	$ -	$ -	$ 201,967
Construction in progress	420,473	2,458,297	(1,587,365)	-	1,291,405
Total capital assets not being depreciated	622,440	2,458,297	(1,587,365)	-	1,493,372
Captital assets being depreciated:					
Infrastructure	5,710,487	1,606,654	-	29,056	7,346,197
Buildings and improvements	70,385	-	-	-	70,385
Leasehold Improvements	19,555	-	-	-	19,555
Vehicles, furniture and equipment	268,453	184,300	-	(29,056)	423,697
Total capital assets being depreciated	6,068,880	1,790,954	-	-	7,859,834
Less: accumulated depreciation for:					
Infrastructure	(2,341,019)	(326,886)	-	60,692	(2,607,213)
Buildings and improvements	(60,209)	(1,627)	-	-	(61,836)
Leasehold Improvements	(19,555)	-	-	-	(19,555)
Vehicles, furniture and equipment	(103,324)	(36,835)	-	(60,692)	(200,851)
Total accumulated depreciation	(2,524,107)	(365,348)	-	-	(2,889,455)
Total capital assets being depreciated, net	3,544,773	1,425,606	-	-	4,970,379
Total capital assets, net of accumulated depreciation	$ 4,167,213	$ 3,883,903	$ (1,587,365)	$ -	$ 6,463,751

Note 5. Capital Assets, Continued

Depreciation expense was charged to expense functions as follows:

Administration	$ 3,328
Operations	362,019
Total depreciation expense	$ 365,347

As of June 30, 2019, the District had the following significant capital projects in process:

Project:	*Funding Budget*	*Costs to Date*	*Remaining Budget*	*In Process June-19*
Pinewood Haven/Rim Vista Waterline	$ 805,000	$ 603,533	$ 201,467	$ 603,533
Whispering Pines 6" Waterline Replacement	256,289	6,612	249,677	6,612
WIFA Program Management Fees & Expenses	375,750	24,656	351,094	24,656
Portals 2 & 3 Tank Rehabilitiations	680,958	499,377	181,581	499,377
Canyon Tanks 1 & 2 Replacement	710,000	123,042	586,958	123,042
Pine Ranch 2 Booster Stations	81,144	660	80,484	660
Tall Pines Waterline Replacement	1,737,780	780	1,737,000	780
Cool Pines Waterline Replacement	502,940	32,745	470,195	32,745
	$ 5,149,861	$ 1,291,405	$ 3,858,456	$ 1,291,405

These projects are all funded by a WIFA Grant and Loan.

Note 6. Operating Leases

The District has a non-cancelable operating lease for the use of office facilities. The lease generally contains a renewal option and requires the District to pay for certain executory costs such as taxes, maintenance, and insurance. Rental expense for the lease consisted of $14,400 for the year ended June 30, 2019. Future minimum lease payments on the operating lease for the next five years are:

Year Ending June 30,	Minimum Lease Payments
2020	$ 14,400
2021	14,400
2022	14,400

Note 7. Long Term Liabilities

Long-term liability activity for the current fiscal year was as follows:

	Beginning Balance	Additions	Reductions	Ending Balance	Due Within One Year
Notes payable from direct borrowings	$ 5,409,377	$ 2,344,414	$ 676,089	$ 7,077,702	$ 270,072
Compensated absences	16,734	7,029	-	23,763	5,941
Total long-term liabilities	$ 5,426,111	$ 2,351,443	$ 676,089	$ 7,101,465	$ 276,013

Annual debt service requirements to maturity on notes payable from direct borrowings at year end are summarized as follows:

Year Ending June 30:	Principal	Interest	Total
2020	$ 270,072	$ 227,596	$ 497,668
2021	760,857	212,005	972,862
2022	776,860	190,906	967,766
2023	793,345	169,273	962,618
2024	810,327	147,087	957,414
2025-2026	3,666,241	159,199	3,825,440
Total	$ 7,077,702	$ 1,106,066	$ 8,183,768

Note 7. Long Term Liabilities, Continued

The District entered into a secured loan agreement in the aggregate sum of $6,444,398 to refinance the existing note payable. This is a 10-year refinance with an average interest rate of 3.85 percent due in quarterly payments of $112,110 through July 2025, when the remaining outstanding principal balance is due. The Board has approved to make an additional $400,000 in principal payments each year. The loan is collateralized by the borrower's net revenues, all accounts, deposit accounts (except security deposits of customers), chattel paper, instruments, documents, accounts receivable and general intangibles. In the event of default, the interest rate will increase by 5 percent. In addition unpaid principal and interest may become immediately due and payable at the discretion of the bank. Actions may be taken as necessary, including legal action, to collect amounts due or obtain possession of collateral. The District is responsible for reimbursement of all attorney fees associated with collection. At June 30, 2019, the outstanding principal balance is $4,733,288.

The District entered into a loan agreement with the Water Infrastructure Finance Authority of Arizona for $7,500,000. Interest is due semiannually at a rate of 2.104%. Principal payments are due beginning July 1, 2020 through July 1, 2037. The loan is collateralized by the water distribution system and properties. In the event of default, actions may be taken as necessary, including legal action, to collect amounts due. The District is also responsible for reimbursement of all attorney fees associated with collection. As of June 30, 2019, the District had drawn down $2,344,414 of the available loan balance.

Note 8. Risk Management

The District is exposed to various risks of loss related to torts; theft of, damage to, and destruction of assets; errors and omissions; injuries to employees; and natural disasters. The District carries commercial insurance for all risks of loss, including property and liability, workers' compensation and employee health and accident insurance. Settled claims resulting from these risks have not exceeded commercial insurance coverage in any of the past three fiscal years.

Other Communications from Independent Auditors

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Independent Auditor's Report on Internal Control over Financial Reporting and on Compliance and Other Matters Based on an Audit of Financial Statements Performed in Accordance with *Government Auditing Standards*

Board of Directors
Pine-Strawberry Water Improvement District
Pine, Arizona

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of the business-type activities of Pine-Strawberry Water Improvement District as of and for the year ended June 30, 2019 and the related notes to the financial statements, which collectively comprise the District's basic financial statements, and have issued our report thereon dated September 10, 2019.

Internal Control over Financial Reporting

In planning and performing our audit of the financial statements, we considered the District's internal control over financial reporting (internal control) to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the District's internal control. Accordingly, we do not express an opinion on the effectiveness of the District's internal control.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses may exist that have not been identified.

Compliance and Other Matters

As part of obtaining reasonable assurance about whether the District's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance that are required to be reported under *Government Auditing Standard.*

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the entity's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the entity's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

HintonBurdick, PLLC

HintonBurdick, PLLC
Gilbert, Arizona
September 10, 2019

APPENDIX D

PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT

P.O. Box 134 Pine, AZ 85544 - (928) 476-4222

Approved Water Rate Schedule for
7/1/2020 through 6/30/2021

Residential Base Fees

Meter Size	5/8”	3/4”	1”	1 ½”	2”	3”	4”
Monthly Base Fee	$46.00	$46.00	$61.66	$113.50	$138.50	-	-

Commercial Base Fees

Meter Size	5/8”	3/4”	1”	1 ½”	2”	3”	4”
Monthly Base Fee	$63.50	$63.50	$113.50	$153.50	$213.50	$243.50	$463.50

Water Usage Rate Tiers

Usage Tier	Tier 1	Tier 2	Tier 3	Tier 4
Water Usage per billing period	1 to 3,000 gallons	3,001 to 5,000 gallons	5,001 to 10,000 gallons	10,001 to unlimited gallons
Rate per 1,000 gallons	$1.75	$7.00	$10.00	$15.00

Applicable sales taxes will be added to the total amount of the monthly bill.

Meter Installation and Impact Fees

Meter Size	5/8”	3/4”	1”	1 ½”	2”	3”	4”
New Meter Install Fee	$1,200.00	$1,250.00	$1,350.00	$1,700.00	$1,800.00	Note 1	Note 1
Impact Fee (Note 2)	$2,000.00	$2,000.00	$2,300.00	$2,900.00	$3,500.00	$3,500.00	$3,500.00

Note 1 – At Market Value
Note 2 - Impact fee applies to a location where service has never been established

Miscellaneous Fees

Type of Fee	Fee Amount	Description
NSF	$30.00	All returned payments
Establishment Fee	$50.00	All new and transferred customers
Re-Establishment Fee	$100.00 + (Base fee rate x # of months service was terminated up to 12 months)	When customer or PSWID stops service and then restarts service at the same address
Re-connection Fee	$50.00	Due to shut off for non-payment
Turn Water on/off	$50.00	At customer request for a non-emergency
Meter Re-read Fee	$50.00	If requested by customer & initial read was correct
Meter Field Test Fee	$50.00	If requested by customer & meter is accurate
Meter Re-install Fee	$150.00	If pre-plumbed
Security Deposit	$150.00	Required for all customers
After Hours Service Fee	$125.00 per/hour	At customer’s request – Minimum fee 1 hour
Late Fee	$5.00 + 2% monthly	Charged monthly on balance due until current
Adjust Meter Box	$200.00	At customer request or due to damage from customer negligence
Meter Relocation (or) Meter Elevation Change	$250.00	At customer request
Water Loss Protection	$1.80 Res/$5.00 Comm Per month	Automatically enrolled-option to opt out

APPENDIX E

PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT

PROJECTED BUDGET REPORT FOR PRE-CONSTRUCTION AND POST-CONSTRUCTION

FOR USDA-RURAL DEVELOPMENT FUNDED PROJECTS

Revenue (Cash In)	Pre-Construction Budget Approved Budget FY 2020/2021	Post-Construction Budget Projected FY 2028/2029
Property Tax Levies	$844,362	$1,124,362
Customer Sales	$2,094,400	$2,359,326
Miscellaneous Revenues	$95,000	$107,017
Sales Tax on Revenues	$140,000	$157,709
TOTAL REVENUE	**$3,173,762**	**$3,748,414**
Expenses (Cash Out)		
Operations	$425,000	$459,609
Field Labor & Burden	$410,000	$443,387
Admin	$485,000	$546,349
Board	$60,000	$66,591
Capital Projects & Infrastructure Repairs	$545,899	$578,054
Equipment Replacement	$100,000	$200,000
Sales Tax on Revenues	$140,000	$157,709
TOTAL EXPENSES	**$2,165,899**	**$2,451,699**
Depreciation Estimate	**$415,000**	**$425,000**
Total Operating Expenses	**$2,580,899**	**$2,876,699**
Net Operating Income	**$592,863**	**$871,715**
Add Back Depreciation Expense	**$415,000**	**$425,000**
Total Operating Income	**$1,007,863**	**$1,296,715**

1. *Revenue assumptions are calculated using 1.5% inflation rate.*
2. *Expense assumptions are calculated using 1.5% inflation rate.*

WIFA-FUNDED PROGRAM PROJECTS COST SUMMARY

APPENDIX F

WIFA PSWID Funding Program FY18 thru FY22

Approved Modified Funding Project Schedule - August 27, 2020

	PSWID CIP PROGRAM FY18 THRU FY22	TYPE	PHASE	FINAL FUNDING
	PROJECT NAME			PROJECT SCHEDULE
920283-18-02	Circle Drive Waterline Replacement - Completed	Pipe	1	$196,536.90
920283-18-04	Pine Creek 4" Waterline Replacement- Completed	Pipe	2.1	$146,185.08
920283-18-05	Pinewood Haven/Rim Vista Waterline Replacement -Completed	Pipe	2.1	$889,430.44
920283-18-06	Cool Pines Est Pipe Waterline Replacement Upgrade Phases B & C	Pipe	2.2	$532,413.13
920283-18-07	Strawberry Ranch 2 & Strawberry Knolls 2 - Completed	Pipe	2.2	$1,049,411.32
920283-18-17	State Route 87 Bradshaw to MR Well Site Waterline-In Process	Pipe	1	$903,860.00
920283-18-18	Juniper-Tanner Ralls/Fossil Creek-Wagon Wheel-In Process	Pipe	1	$515,000.00
920283-18-19	Strawberry Knolls 1-In Process	Pipe	1	$641,110.00
920283-18-21	Install 3,240 Radio Read Meters-In Process	Meters	1	$946,000.00
	Waterline Projects Total			$5,819,946.87
920283-18-01	Strawberry View 1 Tank Replacement 20K - Completed	Tank	1	$315,802.50
920283-18-13	Canyon Tanks 1 & 2 Replacement 220K - Completed	Tank	2	$994,078.69
920283-18-16	Portal 2/Portal 3 Tank Rehabilitations - 100K - Completed	Tank	2	$893,675.94
	Tank Projects Total			$2,203,557.13
	Aerial Surveys - Completed			$40,000.00
				$40,000.00
	Total Revised Funded Projects			$8,063,504.00
	WIFA TOTAL FUNDING DIFFERENCE			-$63,504.00
	TOTAL FUNDED PROJECTS			$8,000,000.00

Public Meeting Minutes

APPENDIX G

PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT

Regular Meeting
Thursday July 23, 2020 at 6:00 p.m.
PSWID Administrative Office
6306 W Hardscrabble Rd.
Pine, AZ 85544

1. **CALL TO ORDER**
   Bob Arbuthnot called the meeting to order at 6:00 p.m.

2. **PLEDGE OF ALLEGIANCE**
   Led by Bob Arbuthnot

3. **PRAYER**
   Offered by Forrest McCoy

4. **ROLL CALL OF BOARD MEMBERS**
   Conducted by Bob Arbuthnot: Board members present: Bob Arbuthnot, Sharon Hillman, Forrest McCoy, Alan Kleinman, David Wilson and Larry Bagshaw. A quorum was present. Cato Esquivel was also present. Riley Snow, the district's attorney was present via phone.

5. **CALL FOR MOTION TO APPROVE MINUTES OF THE FOLLOWING MEETINGS:**

   June 25, 2020 – Forrest McCoy moved that the minutes be approved. Alan Kleinman seconded the motion. It was approved unanimously.

6. **REPORTS TO THE BOARD**
   a. District Attorney's Report –No report.
   b. WIFA/EUSI Program Manager's Report – As posted to the website.
   c. Chairman's report- As posted to the website.
   d. Treasurer's report – As posted to the website.
   e. Secretary's report – None
   f. District Manager's Report –As posted to the website.

7. **CALL TO THE PUBLIC**
   None

8. **OLD BUSINESS**
   I. **DISCUSS AND TAKE POSSIBLE ACTION FOR A SLIGHT CHANGE TO THE FISCAL YEAR 2020/2021 BUDGET.** Sharon Hillman. Sharon discovered that she had transposed some digits in the amount of property taxes and was short by $270, so she increased the amount of property taxes by $270 and deducted $270 from customer sales. The budget totals remained the same as published

   II. **DISCUSS AND TAKE POSSIBLE ACTION REGARDING A GRANT/LOAN**

APPLICATION WITH THE USDA. Sharon Hilllman. Sunrise Engineering is in the process of doing the environmental assessment with the projected completion date by the end of October. We did received a UDSA grant for $30,000 for it with the district paying $8000 and USDA grant funds paying the remainder. When it is done, the application can be submitted.

III. **DISCUSS AND TAKE POSSIBLE ACTION REGARDING THE USBR WEEG PROJECT APPLICATION.** Sharon Hillman. In order to submit the application, we need to determine both a dollar amount and a project. After looking at the budget with Bob Arbuthnot and Cato Esquivel, it was determined that we could use $300,000 of the CIP funds for the project. The project will be determined by next month's board meeting. Alan Kleinman moved that the board approve $300,000 in CIP funds to match the USBR 50% funding with the project to be defined by the end of August to continue with the application. Larry Bagshaw seconded the motion. The motion passed unanimously.

9. NEW BUSINESS

I. **DISCUSS AND TAKE POSSIBLE ACTION REGARDING EXTENDING THE ON CALL CONTRACT FOR ENGINEERING PROFESSIONAL SERVICES.** Cato Esquivel. This was pulled from the agenda, as Bob Arbuthnot and Sharon Hillman had taken care of this in June.

II. **DISCUSS AND TAKE POSSIBLE ACTION REGARDING THE CONTRACT WITH RAY PUGEL FOR MILK RANCH I FOR WATER HOOK-UPS.** Bob Arbuthnot/Riley Snow. Ray and Julie Pugel and Robert and Sally Randall were in attendance. Sharon Hillman had questioned whether the district should charge impact fees for the 17 meters for the Rimside Village development. Riley Snow stated that the board should have an executive session to discuss the contract. The board will hold an executive session on July 30 at 5 p.m. Mr. Pugel did give the board a history of the Milk Ranch I well.

III. **DISCUSS AND TAKE POSSIBLE ACTION REGARDING AUTHORIZING SHARON HILLMAN TO ELECTRONICALLY SIGN DOCUMENTS FOR US GOVERNMENT APPLICATIONS.** Sharon Hillman. Sharon is requesting authorization to sign the applications electronically. She is finding that even though Bob Arbuthnot signs the various forms and she uploads them with his signature, that she still needs to electronically sign them. Alan Kleinman moved that the Treasurer be approved to electronically sign necessary grant/loan forms to submit applications for funding. David Wilson seconded the motion. The motion carried unanimously.

IV. **DISCUSS AND TAKE POSSIBLE ACTION REGARDING WATER SHARING**

AGREEMENTS AND WELL STATUS. Larry Bagshaw/Cato Esquivel. Larry had requested information regarding the agreements and the wells. Cato provided the board with a list of the water sharing agreements. He had sent renewal letters with no rate increases and had received signed ones back from all but Solitude Trails. Larry brought up that Solitude Trails should be charged a wheeling fee and also should be required to sign the agreement.

V. **DISCUSS AND TAKE POSSIBLE ACTION REGARDING SCHEDULING THE NOV/DEC MEETINGS SINCE THEY FALL ON HOLIDAYS.** Bob Arbuthnot. Since the fourth Thursday of both months is a legal holiday, the board needs to choose alternate meeting dates for both months. It was determined that those months, the meeting will be on the 3rd Thursday. The meetings will be held on November 19 and December 17.

10. **IDENTIFY POTENTIAL AGENDA ITEMS FOR THE NEXT SCHEDULED BOARD OF DIRECTORS MEETING ON August 27, 2020.**

- **a.** USDA application update
- **b.** WIFA update
- **c.** WIFA project list revision
- **d.** Resolution regarding Milk Ranch I contract.
- **e.** Ponderosa Water update.
- **f.** Project for the USBR Drought Resiliency Application

11. **MOTION TO ADJOURN.** Forrest McCoy moved the meeting be adjourned. David Wilson seconded the motion. The motion carried unanimously.

Water System Master Plan Report by CH2MHill

APPENDIX H

Final Report

Water System Master Plan

Prepared for

Pine-Strawberry Water Improvement District

December 2014

CH2MHILL®

1501 W. Fountainhead Pkwy
Suite 401
Tempe, AZ 85282

In association with Verde Engineering Group

Executive Summary

The purpose of the Pine-Strawberry Water Improvement District (PSWID) Water Master Plan (WMP) is to evaluate the water system and make recommendations for improvements. The WMP will be used as a guiding document for future capital investments constituting the following:

- Compiling background information regarding the system, its operation, and condition to develop the basis for the planning framework
- Developing water demand projections through build-out
- Documenting PSWID's water resource portfolio, including quality, and developing a supply/ demand balance
- Developing a hydraulic model of the system to evaluate the existing and build-out systems and document improvements required for hydraulic or condition-based replacement needs
- Development of a capital improvement plan and associated costs

The PSWID is a water system that provides potable water service to the communities of Pine and Strawberry. The District provides water that is supplied by groundwater pumped from wells drawn from the Lower Verde watershed. PSWID serves about 8,000 customers through 3,200 service connections. The water is produced, stored, and delivered through a complex network of 23 wells and 9 water sharing agreements; 1.311 million gallons of water in 22 storage tanks; 24 booster stations; and more than 58 miles of water mains.

Water billing data from PSWID customers was collected and analyzed for the years 2010 to 2013 to determine water consumption trends in Pine and Strawberry. The data were used to establish consumption trends by customer class for average day and maximum day conditions. By scaling the billing data to match production rates, which accounts for lost and unaccounted for water, CH2M HILL established existing demands.

Future demands were projected by using the unit demand by customer class from the previously discussed analysis and vacant land remaining to develop in the system. There is greater potential for new customer growth in the Pine service area. A summary of the demands by service area and zones is shown in Table ES-1 for average day and maximum day under existing and build-out conditions.

TABLE ES-1
Existing and Future Demands by Zone—Average Day Demands and Maximum Day Demands

Zone/Group of Zones	Existing ADD (gpm)	Existing MDD (gpm)	Future ADD (gpm)	Future MDD (gpm)
Pine	**113.9**	**221.3**	**155.6**	**311.4**
300K	66.4	125.7	81.3	162.6
Canyon Tanks/Brookview Terrace	16.1	32.0	24.3	48.6
Pine Ranch	15.0	31.3	33.3	66.7
Portal 2	6.8	13.3	6.8	13.6
Portal 3	9.6	18.9	9.9	19.9
Strawberry	**53.2**	**117.6**	**75.5**	**151.0**
Hardscrabble Mesa	0.0	0.1	0.0	0.1

TABLE ES-1
Existing and Future Demands by Zone—Average Day Demands and Maximum Day Demands

Zone/Group of Zones	Existing ADD (gpm)	Existing MDD (gpm)	Future ADD (gpm)	Future MDD (gpm)
Homestead	0.3	0.9	0.3	0.6
K2/Rimwood/Strawberry Ranch 3	46.8	104.9	68.1	136.3
Strawberry View 1	5.6	10.9	6.6	13.2
Tank Farm	0.4	0.7	0.4	0.8
Grand Total	**167.1**	**338.8**	**231.1**	**462.4**

ADD=average day demand
MDD=maximum day demand
gpm=gallons per minute

CH2M HILL evaluated the District's ability to meet demands now and at build-out by examining existing well production capabilities as shown in Figures ES-1 and ES-2. For this analysis, CH2M HILL evaluated production for District-owned wells and also the addition of Water Sharing Agreement (WSA) wells. Considering District-owned assets, Pine has 334.5 gpm of existing production capability, and Strawberry has 65 gpm. Production capacities of WSAs include 106.5 gpm in Pine and 67.7 gpm in Strawberry.

FIGURE ES-1
Supply/Demand Balance: Existing Demands

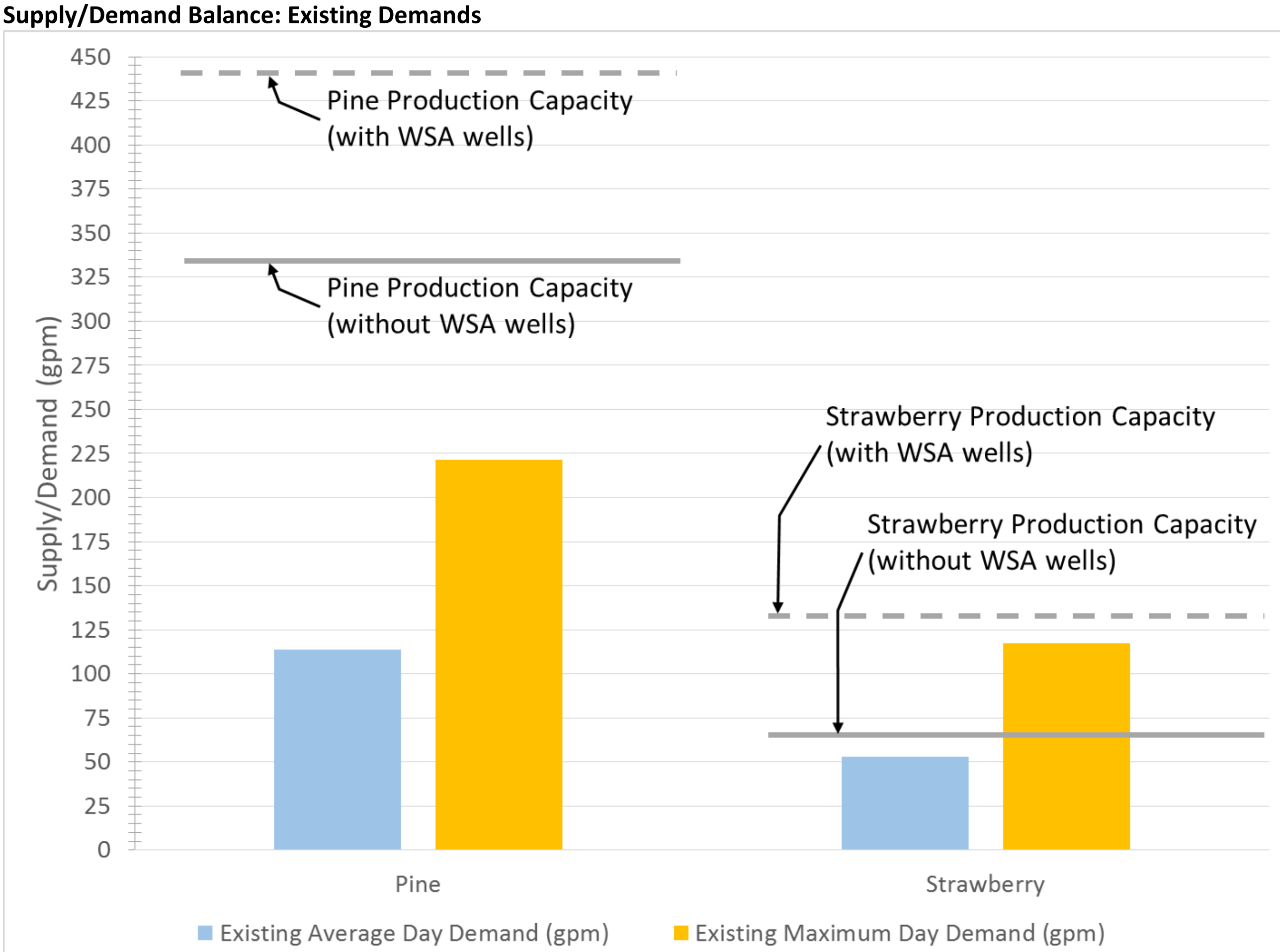
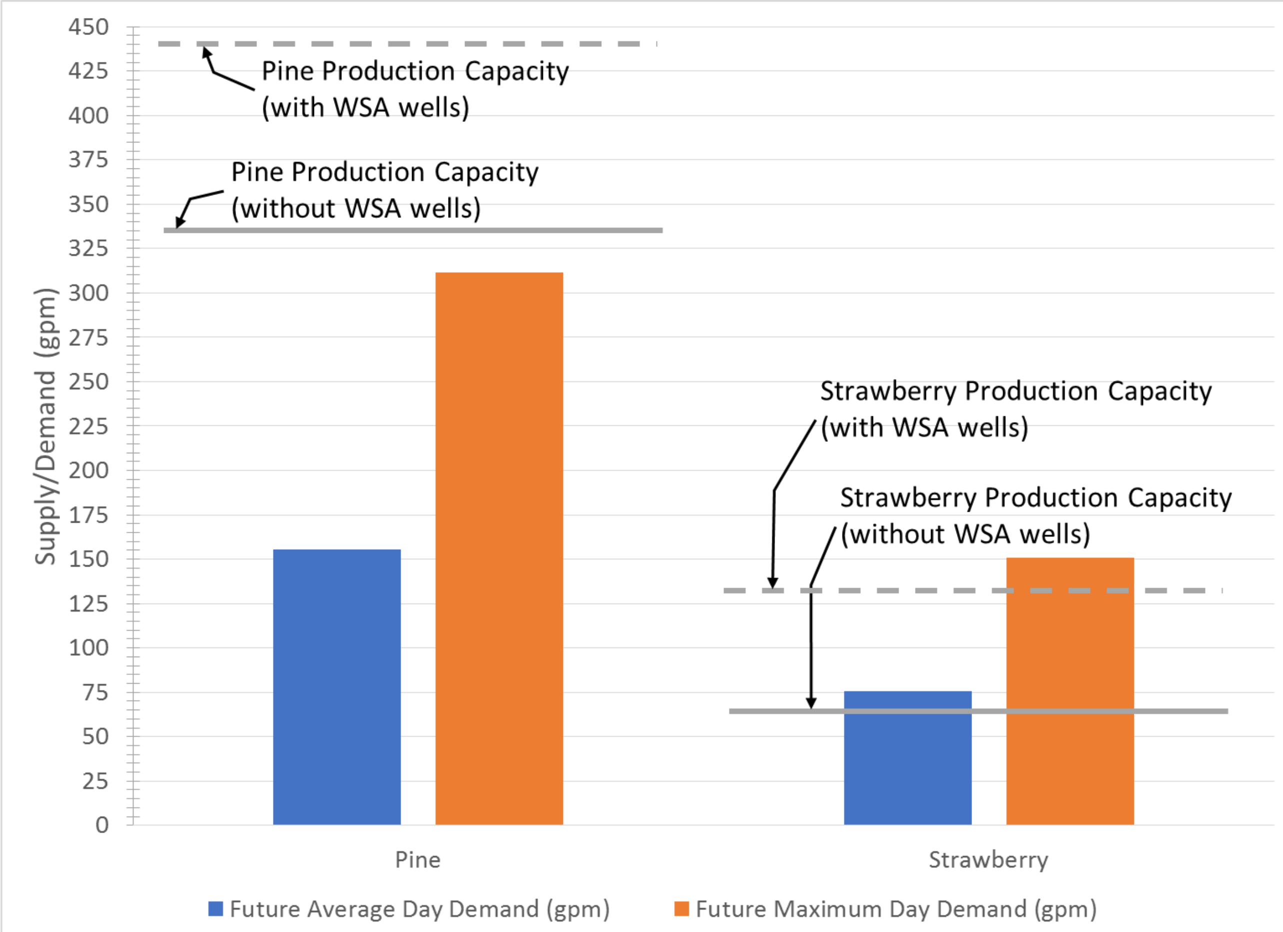


FIGURE ES-2
Supply/Demand Balance: Future Demands



Pine has adequate water supply today and at build-out to meet both ADD and MDD. Strawberry has adequate supplies to meet average day demands under existing and build-out demand scenarios and existing maximum day demands if WSA wells are included; however, Strawberry does not have enough supply, even when considering use of WSA wells to meet MDD at build-out. Water systems should have enough supply to meet maximum day conditions to allow for storage tanks to refill during high demand months. PSWID has the flexibility to transfer water from Pine to Strawberry to make up for this shortfall using District-owned wells under existing conditions, but there is not enough supply available in Pine to continue this practice into the future without the use of WSA wells.

CH2M HILL also evaluated storage capacities within the system using industry standards. When examined by pressure zones, Strawberry falls short of meeting industry standard recommendations, but does meet state recommendations under existing and build-out conditions. The shortfall is the fire storage volume. The Board provided CH2M HILL direction not to incorporate the capital improvements required to meet fire suppression needs in the system due the significant investments required in additional storage, pipeline upgrades, hydrant installation, and pump station improvements.[1] If the fire storage volume is excluded from the industry standard recommendations, all zones in Strawberry have adequate storage with the exceptions of a minor shortfall in the Homestead zone under existing and build-out demand conditions and about a 30,000 gallon shortfall in the K2/Rimwood/Strawberry Ranch 3 area under build-out demand conditions. The

[1] Letter from Tom Weeks, PSWID Chairman, to Brad Cole, District Manager, dated October 21, 2014.

system also likely does not warrant the need to increase storage in the zones due to water quality concerns due to lack of tank turnover; therefore, existing storage volumes are adequate.

Pine has adequate storage to meet state and American Water Works Association (AWWA) recommendations without fire storage volumes under existing conditions and at build-out when evaluated by pressure zones, with the exception of the Pine Ranch area. As noted above, the system also likely does not warrant the need to increase storage in the zone due to water quality concerns due to lack of tank turnover; therefore, PSWID may choose to monitor the area in coming years if demands increase to review the need for additional storage in the Pine Ranch area.

With respect to water quality, a review of the PSWID's regulatory documentation and data shows that PSWID is in compliance with the state and National Primary Drinking Water Standards. As regulations are updated, it is recommended that PSWID implement additional sampling and/or requirements to remain in compliance. Regulations candidate for updates expected within the next 5 years that will affect PSWID include the Lead and Copper Rule, as well as the Arsenic Rule.

In addition, the U.S. Environmental Protection Agency (USEPA) has a published list of Secondary Drinking Water Standards that are non-enforceable guidelines for several compounds that may cause cosmetic or aesthetic effects in drinking water supply. PSWID may consider monitoring the parameters on an infrequent basis if customer complaints relating to color, taste, odor, or skin irritation are received. Lastly, is recommended that PSWID continue to be responsive to any system deficiencies identified during sanitary surveys conducted by the Arizona Department of Environmental Quality (ADEQ).

Next, CH2M HILL developed a hydraulic model of the system from system paper maps, global positioning system (GPS) points, and multiple system operation manuals and spreadsheets, all provided by PSWID. Elevation information was downloaded from the U.S. Geological Survey (USGS) website. CH2M HILL also relied upon GIS layers provided by Gila County as background maps for the model development. The layers included features such as parcels and street centerlines. The model attributes were drawn by hand and data was populated into the model attribute tables from the resources provided.

Two development scenarios were analyzed: the existing development scenario and the future development scenario representing build-out. Based on the analyses, CH2M HILL recommends several projects to improve system performance and account for new growth. The projects are summarized in Tables ES-2 and ES-3. Cost estimates presented in 2014 dollars. The costs presented are installed costs and do not include markups for engineering/permitting (typically 10 percent of the total material/installed cost) nor contingency (typically 15 percent of the total material/installed cost). Contractor bid costs, such as mobilization/demobilization and their profit, are excluded as well.

TABLE ES-2

Cost Summaries for Projects that Address Growth and Hydraulics

	Quantities			
Project Description	**Pipeline**	**Valves**	**Pump**	**Estimated Project Cost**
Pine				
Portal 3 Middle pressure reducing valves (PRVs) adjustment		2 - 6-inch PRVs		**$24,000**
Pine Ranch 1 and Pine Ranch 2 Zone realignment	120 ft—6 in	1 - closed valve		**$4,600**
Portal 3 Pressure Zone realignment (create new zone)	1228 ft—6 in	3 - 6-inch PRVs 2 - closed valves		**$74,840**
Cool Pines Estates pipe upgrade	8470 ft—6 in			**$254,100**

TABLE ES-2

Cost Summaries for Projects that Address Growth and Hydraulics

	Quantities			
Project Description	**Pipeline**	**Valves**	**Pump**	**Estimated Project Cost**
Strawberry Mountain Shadows Bradshaw Zone realignment	635 ft—8	1—3-inch PRV 2—closed valves	2—50-gpm pump @ 145 ft	**$143,225**
300K Boosted Zone	333 ft—6 in	3—closed valves	1—20-gpm pump @ 85 ft	**$62,990**
Old County Zone realignment	580 ft—6 in	1—6-inch PRV 2—closed valves		**$31,400**
Canyon Tank Brook View terrace looping	1,760 ft—6 in			**$43,200**
Pine Ranch 1 future development	9,050 ft—6 in			**$271,500**
Hidden Pines future development	2,170 ft—6 in			**$65,100**
Canyon Tank Brook View Terrace future development	7,380 ft—6 in			**$221,400**
Bradshaw future development	4,750 ft—6 in			**$142,500**
Old County future development	6,380 ft—6 in			**$191,400**
Tall Pines future development	2,610 ft—6 in			**$78,300**
300K future development	4,480 ft—6 in			**$156,800**
Fara Booster upgrade			2—10 gpm pumps @ 205 ft of head	**$100,000**
Strawberry				
Rimwood Looping	3,880 ft—6"			**$116,400**
Strawberry Ranch 3 PRVs	1600' - 6"	2 - 6-inch PRVs		**$72,000**
Strawberry View 1 Looping	1710 ft—6 in			**$51,300**
Strawberry Ranch 3 future development	5,220 ft—6 in			**$156,450**
Tank Farm future development	4,002 ft—8 in			**$0**
Rimwood future development	6,025 ft—6 in			**$180,750**

PRV=pressure reducing valve

TABLE ES-3
Cost Summaries for Projects that address Rehabilitation

Project Description	Quantities: Pipeline	Valves	Pump	Estimated Project Cost
Pine				
Milk Ranch to 300 K transmission pipeline	1,870 ft—6 in			**$56,100**
Old County distribution pipeline	514 ft—2 in 3,425 ft—3 in 774 ft—6 in			**$102,200**
Tall Pines distribution pipeline	9,535 ft—2 in 5,207 ft—4 in 1,056 ft—6 in			**$352,555**
Canyon Tank/Portal 3 lower distribution pipeline	824 ft—2 in 1,470 ft—3 in 4,697 ft—6 in			**$186,790**
Cool Pines Estates distribution pipeline	15,820 ft—2 in			**$316,400**
Strawberry				
Strawberry Ranch 3 distribution pipeline	3,100 ft—3 in			**$62,000**
Rimwood distribution pipeline	1,346 ft—2 in 1,614 ft—3 in 2,645 ft—4 in 13,205 ft—6 in			**$494,555**

The projects were prioritized using equally weighted criteria and performance measure scales for each of the criterion. Scoring each of the projects against the performance measures yields a "benefit" score for each project. The maximum benefit a project may achieve is 100 points. Cost was also factored into the analysis using the costs from Tables ES-2 and ES-3, and a benefit-cost curve was developed.

Based on the benefit-cost analysis, CH2M HILL grouped the projects into high, medium, and low priority categories, as shown in Table ES-4. PSWID should consider implementing the higher priority projects first because they provide the highest benefit per project dollar. As can be seen in the analysis, nearly all of the projects that serve growth have low benefit scores and subsequent benefit-cost scores since they do not address existing assets. Also, PSWID may consider to have the growth projects funded or partially funded by the developers that plan to develop the areas.

TABLE ES-4
Project Priority Groups

Project Name	Total Benefit	Benefit-Cost Score	Project Priority
Pine Ranch 1 and Pine Ranch 2 Zone realignment	12.50	2717.39	High
Milk Ranch to 300 K transmission pipeline	100.00	1782.53	High
Strawberry Ranch 3 distribution pipeline	80.00	1290.32	High
300 K Boosted Zone	47.50	754.09	High
Strawberry View 1 looping	32.50	633.53	High

TABLE ES-4
Project Priority Groups

Project Name	Total Benefit	Benefit-Cost Score	Project Priority
Strawberry Ranch 3 PRVs	45.00	625.00	High
Canyon Tank Brook View Terrace looping	25.00	578.70	High
Old County Zone realignment	17.50	557.32	High
Portal 3 Middle PRV adjustment	12.50	520.83	High
Old County distribution pipeline	52.50	513.70	High
Fara Booster upgrade	40.00	400.00	Medium
Canyon Tank/Portal 3 lower distribution pipeline	65.00	347.98	Medium
Rimwood looping	32.50	279.21	Medium
Hidden Pines future development	17.50	268.82	Medium
Portal 3 Pressure Zone realignment (create new zone)	20.00	267.24	Medium
Tall Pines future development	17.50	223.50	Medium
Cool Pines Estates pipe upgrade	45.00	177.10	Medium
Tall Pines distribution pipeline	57.50	163.10	Medium
Cool Pines Estates distribution pipeline	50.00	158.03	Medium
Bradshaw future development	17.50	122.81	Low
Strawberry Mountain Shadows Bradshaw Zone realignment	17.50	122.19	Low
Strawberry Ranch 3 future development	17.50	111.86	Low
300 K future development	17.50	111.61	Low
Rimwood distribution pipeline	55.00	111.21	Low
Rimwood future development	17.50	96.82	Low
Old County future development	17.50	91.43	Low
Canyon Tank Brook View Terrace future development	17.50	79.04	Low
Pine Ranch 1 future development	64.46	17.50	Low

Contents

Tables

Figures

Acronyms and Abbreviations

AAC	Arizona Administrative Code
ABS	acrylonitrile butadiene styrene
ADD	average day demand
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
APN	assessor's parcel number
ASR	Aquifer Storage and Recovery
AWWA	American Water Works Association
CCR	Consumer Confidence Reports
cfs	cubic feet per second
DBP	disinfection byproduct
D/DBPR	Disinfectants and Disinfection Byproduct Rule
du/acre	dwelling units per acre
EPS	Extend Period Simulation
fps	feet per second
gpd	gallons per day
gpd/acre	gallons per day per acre
GPS	global positioning system
GIS	geographic information system
GPCPD	gallons per capita per day
gpm	gallons per minute
GWS	groundwater systems
HAA5	five regulated haloacetic acids
HGL	Hydraulic Grade Line
IOC	inorganic contaminants
µg/L	micrograms per liter
MCL	maximum contaminant level
MDD	maximum day demand
mg/L	milligrams per liter
NGCSD	Northern Gila County Sanitary District
PF	peaking factor
PHD	peak hour demand
PRV	pressure reducing valves

psi	pounds per square inch
PSWID	Pine-Strawberry Water Improvement District
PVC	polyvinyl chloride
PWC	Pine Water Company, Inc.
SOC	synthetic organic compounds
SWC	Strawberry Water Company, Inc.
TOP	Town of Payson
TTHMS	total trihalomethanes
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VOC	volatile organic compounds
WMP	Water Master Plan
WSA	Water Sharing Agreement

SECTION 1

Water Master Plan Update Overview

1.1 Pine-Strawberry Water Improvement District Goals and Objectives

The purpose of the Pine-Strawberry Water Improvement District (PSWID) Water Master Plan (WMP) is to evaluate the water system and make recommendations for improvements. The WMP will be used as a guiding document for future capital investments constituting the following:

- Compiling background information regarding the system, its operation, and condition to develop the basis for the planning framework
- Developing water demand projections through build-out
- Documenting PSWID's water resource portfolio, including quality, and developing a supply/demand balance
- Developing a hydraulic model, including fire flow, of the system to evaluate the existing and build-out systems and document improvements required for hydraulic or condition-based replacement needs
- Development of a capital improvement plan and associated costs
- Completion of a WMP report

1.2 Pine-Strawberry Water Improvement District Background

The PSWID is a non-transient community water system in the northwest region of Gila County, Arizona and provides potable water service to the communities of Pine and Strawberry. The system encompasses approximately 10.1 square miles of service area.

The system operates under the authority of the Arizona Department of Environmental Quality (ADEQ) as system number AZ0404034 and is classified as a Grade 3—Water Distribution System and a Grade 1—Water Treatment System. The system also operates under the Arizona Department of Water Resources (ADWR) as Community Water System number 91-000135.0000.

The District was formed by Gila County on June 2, 1996 by County resolution number 96-6-12 and recorded as document number 96-011964. The District is a public water system governed by an elected seven-member Board of Directors and began operating the water system on October 1, 2009.

The District provides water that is supplied exclusively by groundwater pumped from the District's wells drawn from the Lower Verde watershed. In 2012, PSWID produced nearly 112 million gallons of water to serve its population of almost 8,000 customers through 3,200 service connections. The water is produced, stored, and delivered through a complex network of 23 wells and 9 water sharing agreements, 1.311 million gallons of water in 22 storage tanks, 24 booster stations, and more than 58 miles of water mains.

1.3 Planning Framework Development

To establish the planning framework for the PSWID WMP, the consultant team of CH2M HILL and Verde Engineering Group reviewed and summarized relevant documentation. The documentation included the following:

- Town of Payson General Plan
- Master Water Plan for Waterworks System serving the Town of Payson

- Gila County Comprehensive Plan
- Mollogon Rim Water Resources Management Study Report of Findings

Electronic versions of the references are provided with the electronic copy of the WMP, and summaries of the references are available in Appendix A.

SECTION 2

System Demand Analysis

2.1 Development of System Demands

Historical performance of the District's distribution system, along with information gathered from nearby water systems, were used to develop existing system demands, water duty factors, and peaking factors. Demands were allocated to the model based on billing system address and parcel data. Future system demands were developed based on the build-out land use analysis and water duty factors.

2.1.1 Existing Demand Development

Water billing data from PSWID customers was collected and analyzed for the years 2010 to 2013 to determine water consumption trends in Pine and Strawberry. The average daily flow for each year was calculated. Using average flows over the 4 years, a monthly average demand and average day demand (ADD) were calculated. Figure 2-1 shows the total daily demand for each of the 4 years for PSWID customers, as well as the monthly average demand, and the ADD.

The monthly average demand matches closely with the daily total demand from 2013; therefore, 2013 was chosen as the basis for demand calculation. Billing data from the month of October 2013 was used for the ADD and was calculated to be approximately 131 gallons per minute (gpm). The demand summed from the billing data does not contain unaccounted for water. Billing data from the month of July 2013 was used to estimate the maximum day demand (MDD) as no real-time data are available to develop a MDD condition. The average of use during the peak month of July was calculated to be approximately 213 gpm, which is the average daily use of the maximum month. The two values were divided (average day of the maximum month/ADD) to calculate a peaking factor (PF); the PF for the PSWID system was calculated to be approximately 1.6.

As noted, since no real-time data are available, a MDD PF of 2 is recommended based on discussions with District Staff, data from surrounding communities, and industry standards. Due to the same real-time data constraint, hourly flow data was not available for analysis to develop the peak hour demand (PHD) PF. Therefore, a PHD factor of 3 (PHD to ADD) is recommended, based on the peaking factors of surrounding communities (Payson's MDD:ADD was 2.5 as noted in Appendix A) and industry standards. A summary of several industry references regarding ranges of peaking factors for MDD and PHD are noted in Table 2-1 below:

TABLE 2-1
Peaking Factor Summary from Reference Material

Reference	MDD: ADD Ratio	PHD:ADD Ratio
Water Distribution Modeling[2]	1.2—3.0	3.0—6.0
Water Distribution Systems Handbook[3]	1.5—3.5	2.0—7.0
Davis' Handbook of Applied Hydraulics[4]	1.5—3.0	2.0—4.0

[2] Walski, Thomas M. et al., *Water Distribution Modeling*, First Edition, June 2001. ISBN: 0-09657580-4-4.

[3] Mays, Larry W., *Water Distribution Systems Handbook*, 2000, page 3.9.

[4] Velon, J.P., and T.J. Johnson, "Water Distribution and Treatment." *Davis' Handbook of Applied Hydraulics*, 4th Edition, McGraw-Hill, New York, 1993.

2.1.1.1 System Loss and Unaccounted for Water

There is significant water loss in both the Pine and Strawberry service areas, as shown in Table 2-2. One of the contributing factors of the high water loss is likely the use of acrylonitrile butadiene styrene (ABS) pipe. ABS pipe is typically used for drain, waste, and vent piping applications, not for pressurized distribution system piping. Other contributing factors are the age and condition of the system. Over time, as existing pipelines are replaced with polyvinyl chloride (PVC) or other appropriate pipe materials, and as proactive maintenance of the distribution system is enhanced, it is expected that system losses will decrease.

TABLE 2-2
Percent of Loss Per Month in 2013

Service Area	January	February	March	April	May	June	July	August	September	October	November	December	2013 Total
Pine	-58%	-33%	-57%	-59%	-46%	-34%	-20%	-26%	-42%	-47%	-34%	41%	-37%
Strawberry	-36%	-30%	-8%	-50%	-30%	-17%	3%	51%	0%	10%	-31%	25%	-12%
Total System	-52%	-32%	-45%	-56%	-41%	-28%	-12%	-9%	-31%	-34%	-33%	36%	-29%

Note: Information pertaining to water loss was provided and calculated by PSWID.

PSWID identified problem maintenance areas within the Pine and Strawberry systems. These are identified in Figures 2-2 and 2-3. In Pine, the problem repair areas are ranked 1-5 and noted on the figure (one represents the most frequent repair area) and described below:

1. 6-inch main behind Uncle Tom's
   - Shallow and limited valves
2. Rim Vista, Pine Creek, and Pinewood Haven area
   - Thin-walled pipe
   - Limited valves
3. Pine Valley Homesites and Woodland Heights (near PSWID office)
   - Thin-walled pipe
   - Limited valves
   - Easement lines
4. Berry Hill area (where Pine Creek Canyon turns into a dirt road)
   - Thin-walled pipe
5. Cool Pines Estates
   - Thin-walled black ABS pipe

Within Strawberry, staff identified the following problem areas:

1. Circle Drive (freeze/thaw issues with thin-walled pipe)
2. North side of Rimwood zone

Unaccounted for water was added the total demand summed from the water billing data. The accounts assigned to the Pine System were allocated 37 percent more demand, and the accounts assigned to the Strawberry System were allocated 12 percent more demand. Table 2-3 presents the ADD, MDD, and PHD totals assigned in the model.

TABLE 2-3
Average Day Demand, Maximum Day Demand, and Peak Hour Demand Daily Totals and Recommended Peaking Factors

Existing Demand Scenario	Base Month	Daily Total (gpm)	Recommended PF
Average Day Demand (ADD)	October 2013	167	
Maximum Day Demand (MDD)	July 2013	334	2
Peak Hour Demand (PHD)	n/a	501	3

2.1.1.2 Fire Flow Demands

The required fire flow demands are based on the 2003 International Fire Code. For residential properties, the requirement is 1,000 gpm at a minimum residual pressure of 20 pounds per square inch (psi) for 2 hours.

2.1.2 Model Demand Allocation

Demands were allocated in the model at the parcel level. Within the parcel geographic information system (GIS) file provided by Gila County, each parcel has an individual assessor's parcel number (APN). A portion of the District's billing records were tied to a specific APN, and the remaining billing records contained a service address. The parcel file also contains the parcel address. A geocoding process was completed to match each billing record to its respective parcel. The geocoding process searches and matches the billing address from the billing system to the parcel address in the county's GIS layer. The end result is a parcel GIS file, which contains the billing account number corresponding to the parcel, or a billing database file, which contains the parcel APN for each billing account. The geocoding process does not result in a direct match for all records; there are usually accounts or parcels that do not contain all the necessary information to make a direct match. The geocoding process run on the District's data; however, was quite successful, resulting in a 91 percent match.

The results from the geocoding process were used to load existing demand into the model. The ADD and MDD factors for each billing account were transferred to the matching parcel to simulate both ADD and MDD demands. Each parcel was then joined to the nearest model node, and the demands were assigned to the model node nearest the parcel they represent. Details of the analysis are presented in Appendix B.

2.1.3 Future Demand Development

Future demands were developed based on build-out land use analysis and calculated water duty factors.

2.1.3.1 Build-out Land Use Analysis

Build-out was calculated based on observed vacant land and expected land use. The parcel GIS file, along with aerial photographs, were utilized to determine existing vacant land. The County's land use category from the parcel file, as well as aerial photographs, were utilized to determine overall land use and the density of each use expressed as the number of dwelling units per acre (du/acre) for residential land use for each vacant parcel. The vacant parcel and land use information were used in conjunction with a water duty factor (gallons per day per acre [gpd/acre]) to develop future demand. Maps of the vacant parcels, along with corresponding area and land use, are shown in Figures 2-4 and 2-5.

2.1.3.2 Duty Factors

Water duty factors were calculated from the existing ADD assigned to each parcel during the geocoding and demand allocation process. Parcel land use categories were given for each parcel in the County's parcel database. The residential parcels were further subdivided into categories based on density. This categorization provided a means to determine a duty factor for residential land use with differing numbers of du/acre. Once each parcel category was defined, the total demand (gallons per day [gpd]) and number of acres were summed and divided to calculate the water duty factor (gpd/acre). Table 2-4 presents the calculated duty factors for each land use type. It is interesting to note the variations among the unit demands within the residential land use categories. CH2M HILL speculates that the duty factors of larger parcels (one unit per acre) is comprised of more full-time residents, resulting in more water use per acre. The more dense developments (5-10 units per acre) are likely comprised of more part-time residents, reducing the consumption per acre on an average basis.

TABLE 2-4
Calculated Water Duty Factors

Land Use	ADD (gpd)	Acres	Duty Factor (gpd/acre)	Duty Factor (gpm/acre)
Commercial	2,357	8	295	0.205
Mixed Use (Mixed)	6,174	60	103	0.071
Multifunctional Corridor (Multi-Use)	941	2	471	0.327
Residential .4 du/acre	62,388	391	160	0.111
Residential 1 du/acre	57,411	722	80	0.055
Residential 2-3.5 du/acre	6,136	78	79	0.055
Residential 3.5-5 du/acre	964	65	22[a]	0.015
Residential 5-10 du/acre	1,221	55	22	0.015
Residential 10 + du/acre	n/a	n/a	22	0.015

[a] Residential 3.5—5 calculated to 15 gpd/acre, this is low compared to other calculated values. Recommend 22 gpd/acre consistent with other low density parcels.

2.1.3.3 Future Demands

The calculated duty factor from existing parcels and the vacant parcel information were utilized to assign a future demand to each vacant parcel. The allocation of future demands using the calculated duty factors assumes that a similar ratio of part-time residents will exist in the future. The parcel was then joined to the nearest model node, for insertion in the model. The amount (gpd/gpm) of future demand assigned per land use category is shown in Table 2-5. Figure 2-6 presents the demand summary for ADD, MDD, and PHD for existing and build-out demands. No timeframe has been identified for build-out as part of this report; however, references in Appendix A note it may occur by 2040.

TABLE 2-5
Future Development Breakdown

Land Use	ADD (gpd)	ADD (gpm)
Commercial	288	0.2
Mixed Use (Mixed)	2,880	2.0
Multifunctional Corridor (Multi-Use)	20,160	14.0
Residential .4 du/acre	2880	2.0
Residential 1 du/acre	27,360	19.0
Residential 2-3.5 du/acre	18,000	12.5
Residential 3.5-5 du/acre	28.8	0.02
Residential 5-10 du/acre	43.2	0.03
Residential 10 + du/acre	360	0.25
Total	72,000	50

FIGURE 2-1
Summed and Calculated Average System Demands based on PSWID Billing Data

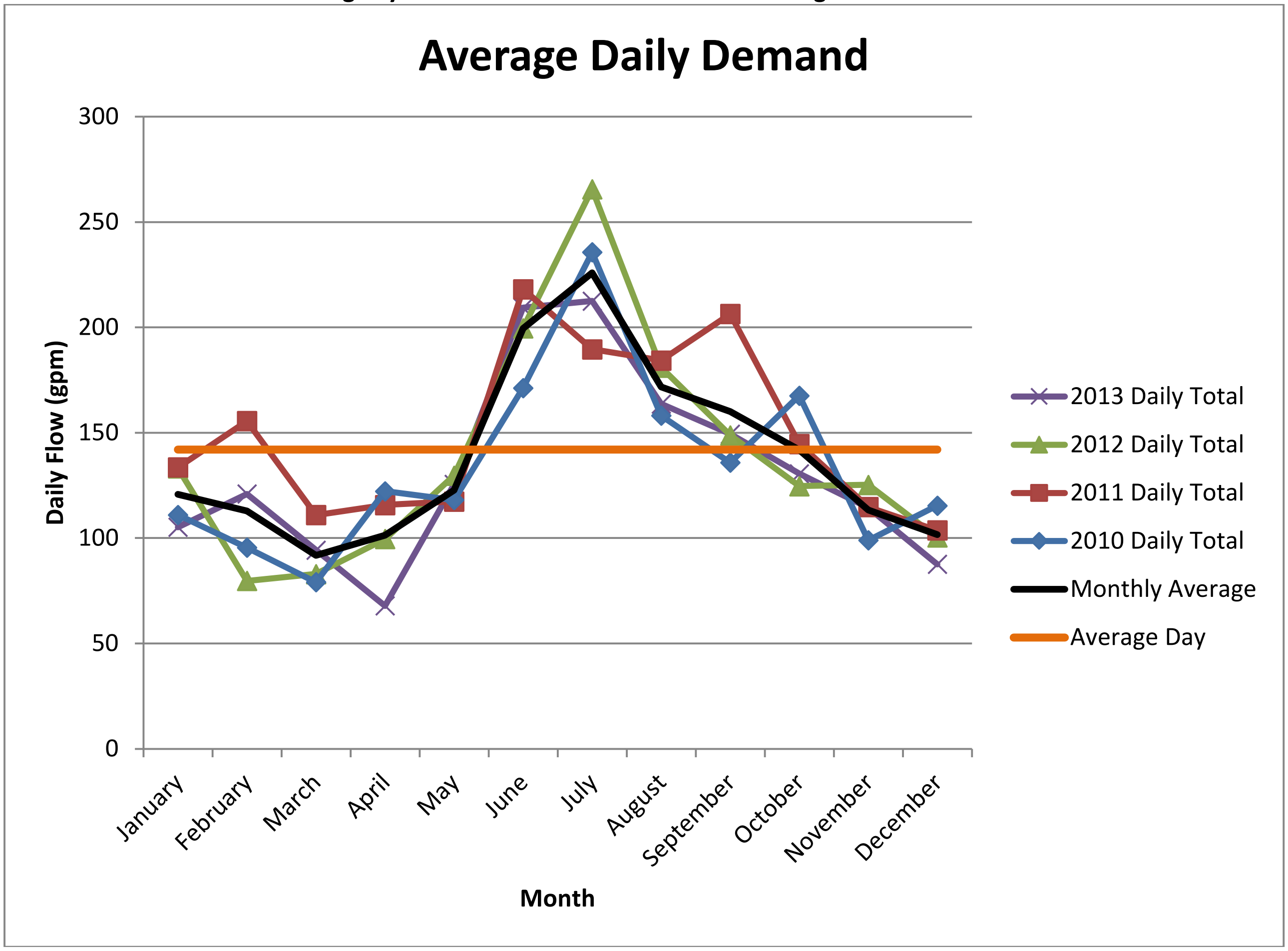


FIGURE 2-2
Problem Repair Areas—Pine

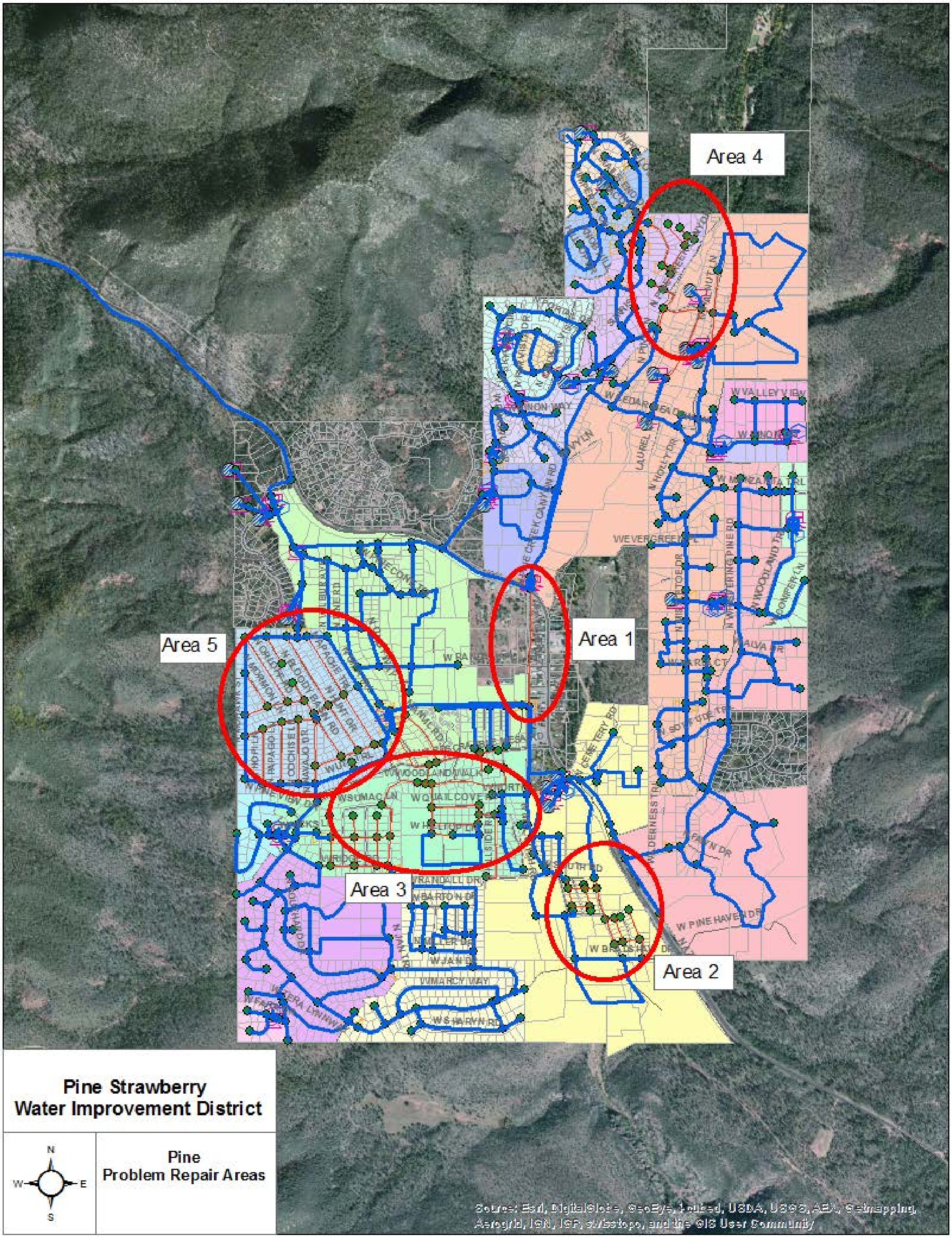
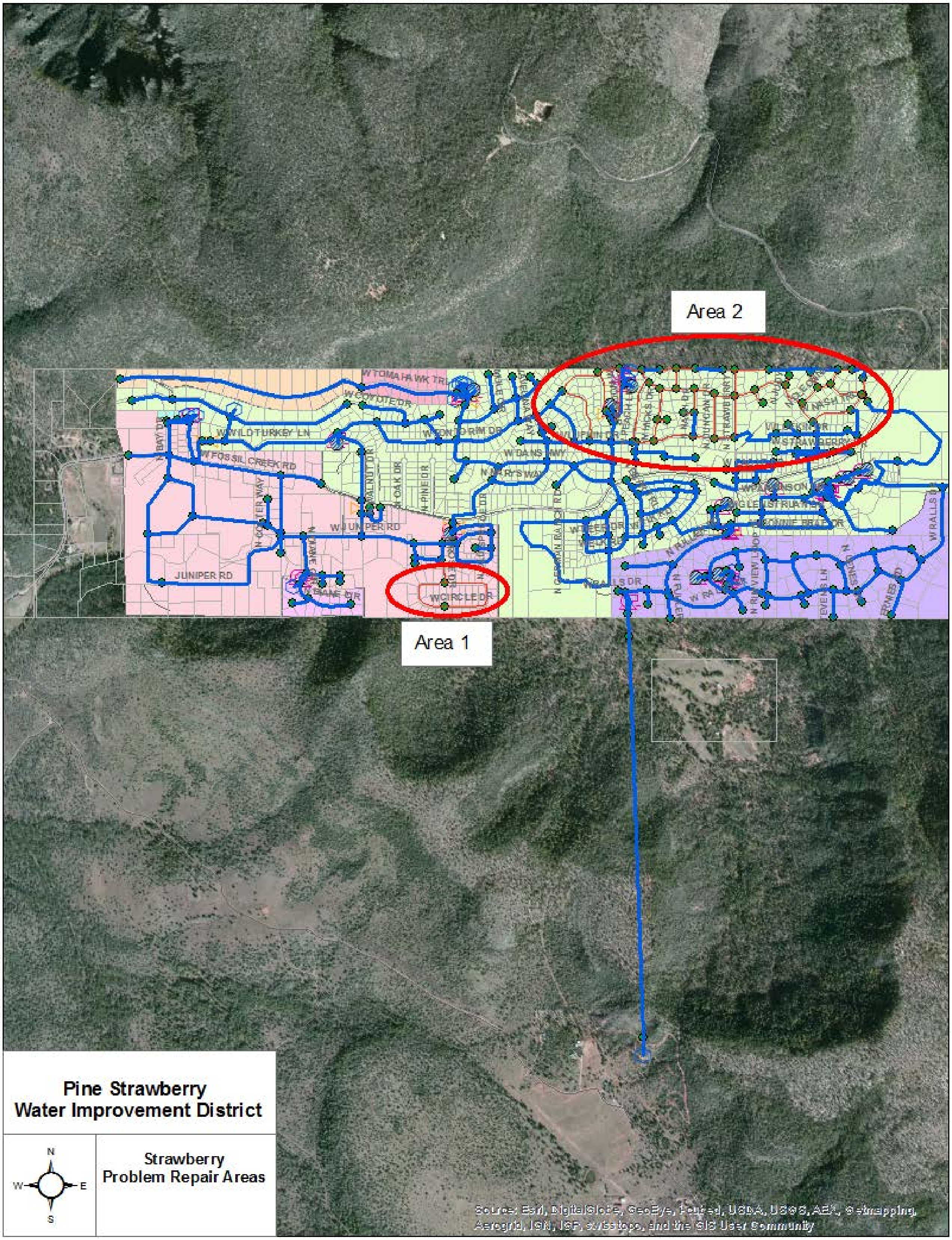
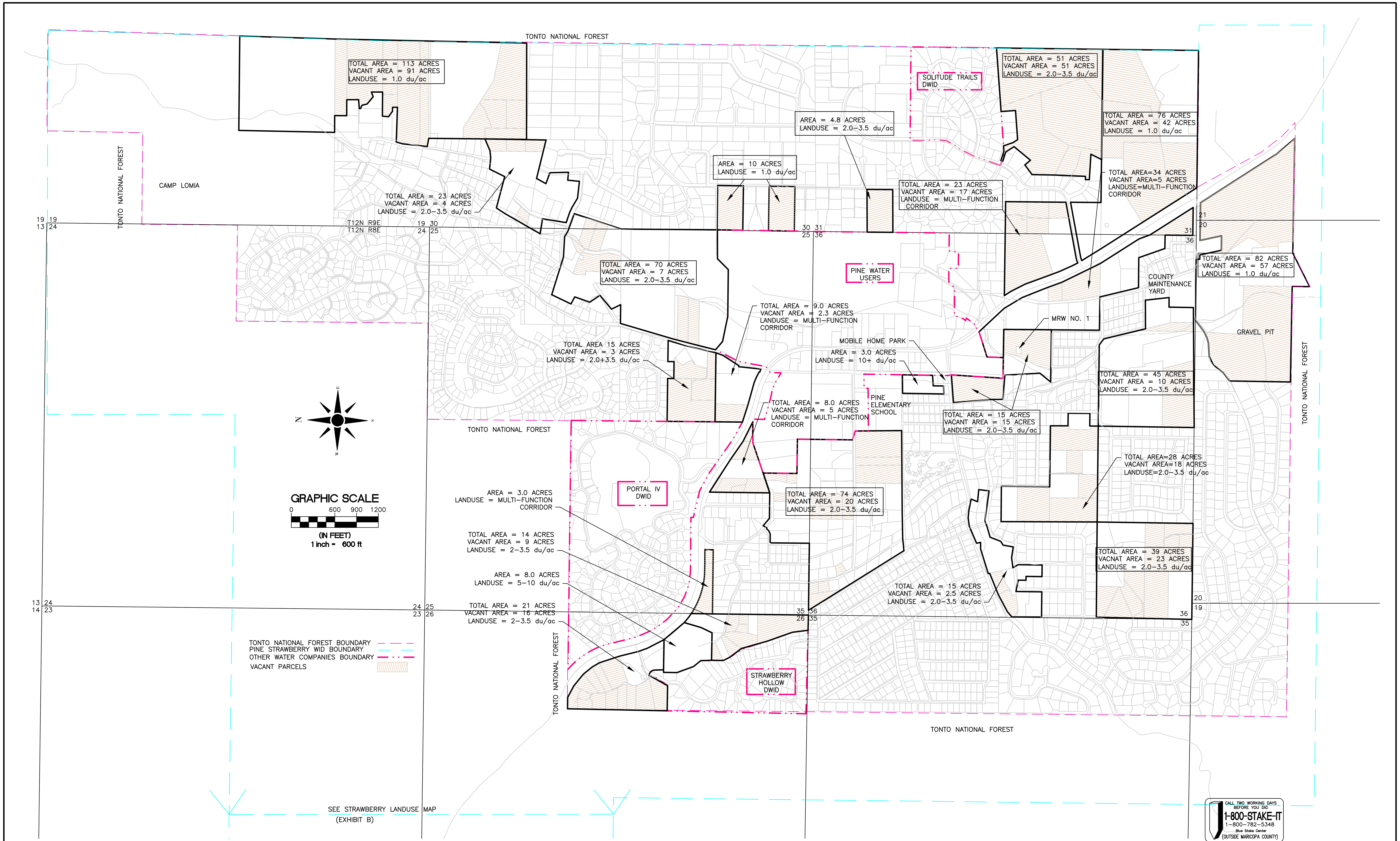


FIGURE 2-3
Problem Repair Areas—Strawberry





NO.	REVISIONS	DATE	BY	CHK.

Pine Landuse Map

Verde Engineering Group PLLC
1109 North McLane Road
Payson, Arizona 85541
Ralph Bossert P.E. R.L.S.
(928) 978–4345
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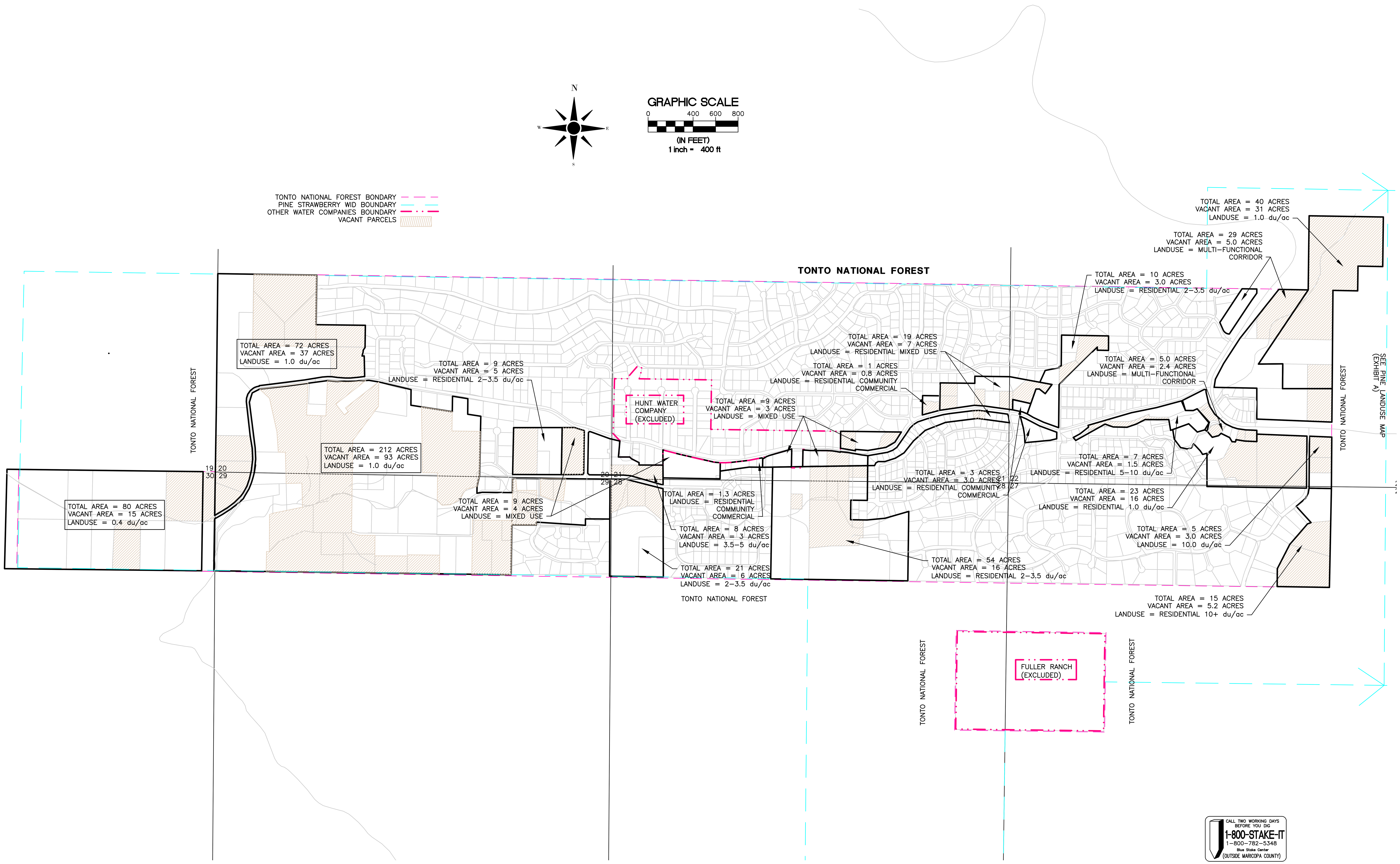
PSWID WATER MASTER PLAN
GILA COUNTY, ARIZONA

JOB NO.	13–39
DESIGNED BY:	VE
DRAWN BY:	VE
CHECKED BY:	DCF
APPROVED BY:	DCF
DATE:	09/19/14

EXHIBIT A
PINE LANDUSE MAP

SCALE: HORIZ: 1"= 600'
CONT. INTERVAL = NA
DRAWING NO. EXA
SHEET NO. 1 OF: 2



NO.	REVISIONS	DATE	BY	CHK.

Strawberry Landuse Map 24-36

Verde Engineering Group PLLC
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PSWID WATER MASTER PLAN

GILACOUNTY, ARIZONA

JOB NO.	13-39
DESIGNED BY:	VE
DRAWN BY:	VE
CHECKED BY:	DCF
APPROVED BY:	DCF
DATE:	09/19/14

EXHIBIT B STRAWBERRY LANDUSE MAP

SCALE: HORIZ: 1"= 400'
CONT. INTERVAL = NA
DRAWING NO. EXB
SHEET NO. 2 OF: 2

FIGURE 2-6
Demand Summary

SECTION 3

Water Resources Portfolio Planning and Review

3.1 Existing Water Resources Portfolio

PSWID owns 23 water production wells (15 in Pine; 8 in Strawberry) at various production capacities. There are also nine water production wells owned by other private entities (five in Pine; four in Strawberry) that pump directly into the PSWID water distribution system or storage facilities. The other wells are commonly referred to as Water Sharing Agreements (WSA). The water is not treated, except to add chlorine to maintain a residual disinfection level in the distribution system. The chlorine is added at certain water wells through pellet chlorinators. There are a total of 22 storage tanks with a total of 1.311 million gallons of storage. The Pine area has a total of 11 storage tanks with a storage volume of 1.037 million gallons (79 percent of total). The Strawberry service area has a total of 11 tanks (one tank is reserved for future development and is not included in the volume) with a storage volume of 274,000 gallons (21 percent of total).

The PSWID system is divided into two service areas, Pine and Strawberry. The Pine service area contains 20 pressure zones and the Strawberry service area contains 7 pressure zones (one is reserved for future development in Strawberry Ridge Estates). Figure 3-1 shows the pressure zone configuration for Pine and Strawberry. Demands in the zones are served by groundwater wells, both those owned by PSWID and WSA wells. Water is pumped, stored, and flows through pressure reducing valves (PRVs) or via pump stations to provide service. Table 3-1 presents the PSWID asset inventory by pressure zone.

TABLE 3-1
Asset Inventory[1]

Zone/Group of Zones	Asset Name	Well Capacity (gpm)	Storage Capacity (gallons)	Pump (hp)	PRV Setting (psi)	Notes
Strawberry Service Area						
K2	Johnson 1	22.0				WSA
	Johnson 2	13.0				WSA
	K2 Tank		100,000			
	K2 Booster (2 pumps)			7.5		
	Magnolia Line Booster (2 pumps)			15		
Strawberry View 1	SV1-K2-SR5 Inter-tie PRV				40	
	SV1-K2-SR5 Inter-tie Booster (2 pumps)			7.5		
	McKnight Well	23.5				WSA
	Strawberry View 1 Well	28.0				
	Strawberry View 1 Tank		20,000			
	Strawberry View 1 Booster			5		
Tank Farm	Tank Farm Booster			5		
	Tank Farm Tank		15,000			
	Tank Farm Tank #2		10,000			
	Tank Farm Tank #3		10,000			
	Tank Farm Tank #4		10,000			
	Tank Farm Well (Strawberry View 3)	26.0				
Rimwood	Strawberry Creek Foothills Tank		20,000			
	Strawberry View 3 PRV				30	
	Tank Farm PRV to Rimwood				54	

TABLE 3-1
Asset Inventory[1]

Zone/Group of Zones	Asset Name	Well Capacity (gpm)	Storage Capacity (gallons)	Pump (hp)	PRV Setting (psi)	Notes
	Rimwood Tank		67,500			
	Rimwood Booster (2 pumps)			5		
	Gordon Strawberry	9.2				WSA
	Strawberry Ranch Well 5	11.0				
	K2 Well	N/A				Not in Service
	Rimwood Well	N/A				Offline—dry shallow well
	Strawberry View 3 Well	N/A				Offline—dry shallow well
	Strawberry Creek Foothills Well	N/A				Offline—dry shallow well
Strawberry Ranch 3	Strawberry Ranch 3 PRV				50	
	Strawberry Ranch 2 Well	N/A				Offline—dry shallow well
Homestead	Homestead Tank		1,500			
	Homestead Booster (1 pump)			5		
Strawberry Ridge Estates	Strawberry Ridge Estates Tank		20,000			Not in service; reserved for future development
	Strawberry Ridge Estates Booster			N/A		Not in service; reserved for future development
Hardscrabble Mesa	Hardscrabble Tank		20,000			
	Hardscrabble Booster			3		
Walnut Glen	Walnut Glen Booster			5		
			Pine Service Area			
	Brookview Terrace Tank		100,000			
	STWID #1	24				WSA
	Brookview Terrace Well #1	13				Offline

TABLE 3-1
Asset Inventory[1]

Zone/Group of Zones	Asset Name	Well Capacity (gpm)	Storage Capacity (gallons)	Pump (hp)	PRV Setting (psi)	Notes
Brookview Terrace/Canyon Tank	Brookview Terrace Well #2	14				
	Brookview Terrace Booster Station (2 pumps)			5 and 7.5		
	Brookview Terrace Well #4	15.5				WSA
	Bloom Well	20.0				WSA
	Gordon Well	40.0				WSA
	Portal Well #1	16.5				
	Canyon Tanks Well	5.5				
	Canyon Tanks (2 Tanks- 100,000 each)		200,000			
	Pine Ranch Tanks (2 Tanks – 10,000 each)		20,000			
	Pine Ranch Booster (2 pumps)			5		
	Church Vault Booster			5		
Portal 3 Upper	STWID #2 Well	7				WSA
	Portal 3 Tank		150,000			
	Portal 3 Well	23.0				
Portal 3 Middle	Juniper Loop West PRV				65	
	Trails End PRV				65	
	Juniper Loop East PRV				65	
Portal 3 Lower	Trails End South				55	
	Canyon Shadows	N/A				Offline—dry shallow well
	Willow Lane				65	

TABLE 3-1
Asset Inventory[1]

Zone/Group of Zones	Asset Name	Well Capacity (gpm)	Storage Capacity (gallons)	Pump (hp)	PRV Setting (psi)	Notes
Portal 2 Upper	Portal 2 Tank Booster (Top)			5		
Portal 1&2 Middle	Portal 2 Tank		100,000			
	Midway Booster			3		
Portal 2	Portal 2 Well	14.5				
	300K Tank		300,000			
	Water Tank Road Tank		100,000			
	Milk Ranch Tanks (2)		67,000			
	Milk Ranch Well #1	85.0				
	Milk Ranch Well #2	75.0				
	Milk Ranch Well #3	75.0				
300K	Milk Ranch Booster (2 pumps)			15		
	Church Vault PRV				92	
	Magnolia Line Booster (2 Pumps)			15		
	Water Tank Road PRV from 300k				58.0	
	Pine Crest	10.0				Offline—often sands up
	SH1[2]	10.0				Offline
	SH2	6.0				
	SH3	20.0				
	SH4[2]	13.0				Offline
Pine Ranch 1	Pine Ranch 1 Booster			5		
Pine Ranch 2	Pine Ranch 2 Booster			5		
Old County	Highway 87 PRV				42	

TABLE 3-1
Asset Inventory[1]

Zone/Group of Zones	Asset Name	Well Capacity (gpm)	Storage Capacity (gallons)	Pump (hp)	PRV Setting (psi)	Notes
Hidden Pines	Hidden Pines Booster			5		
	Hidden Pines PRV				60	
Pine Mtn Acres	Pine Mountain Acres Booster (2 pumps)			5		
White Oaks Glen	White Oaks Glen Booster (2 pumps)			5		
Fara	Strawberry Mountain Shadows 2 Booster (2 pumps)			5		
Strawberry Mountain Shadows	Strawberry Mountain Shadows Booster (2 pumps)			5		
Bradshaw/Tall Pines/Cool Pines Estates	Cool Pines Estates PRV from 300k				unknown	
	Water Tank Road PRV to Cool Pines				76	
	Water Tank Road PRV to Tall Pines				40	
Cool Pines Estates	PRV					
No Name	Three potential PRVs				unknown	

1. The assets, capacities, and settings listed in this table are current as of the writing of this report (December 2014). Values may change over time, especially well capacities due to groundwater table variations.

2. SH1 And SH4 wells are out of service, but capable of repair.

A schematic showing the configuration of the assets is shown in Figures 3-2 and 3-3, and a system map showing location of the assets is provided as Figure 3-4.

The System has approximately 307,498 linear feet of water mains (58 miles). The water mains range in size from 2- to 8-inch and 78 percent of the water mains are sized 4-inch or smaller. Figure 3-5 shows the system water mains by diameter.

3.1.1 Emergency Sources of Water

The District has the ability to transfer water between Pine and Strawberry through an 8-inch interconnect, which is capable of moving approximately 144,000 gallons in either direction per day. The pipeline is known as the Magnolia Pipeline.

The PSWID also has an interconnect in the Strawberry Hollow development, which is capable of supplementing water into the Pine service area at about 50 gpm or 72,000 gpd.

3.1.2 Seasonal Operations

During winter months, water consumption drops off significantly due to seasonal residents leaving the area. Due to the decrease in demand, some facilities can be turned off to reduce power consumption during the off season, as well as allow water tables to recover over a longer period of time. Detailed information pertaining to seasonal operations is contained in the PSWID operation manual document maintained by the District.

3.2 Water Balance Assessment

3.2.1 Production

CH2M HILL evaluated the District’s ability to meet demands now and at build-out by examining existing well production capabilities. The current well production rates for Pine and Strawberry are shown in Tables 3-2 and 3-3. For this analysis, CH2M HILL evaluated production for District-owned wells and also shows the addition of WSA wells. Considering District-owned assets, Pine has 334.5 gpm of existing production capability, and Strawberry has 65 gpm. Production capacities of WSAs include 106.5 gpm in Pine and 67.7 gpm in Strawberry.

TABLE 3-2
Well Production—Pine

Location Name	Well Production (gpm)	Notes
Brookview Terrace 1 TR A	N/A	Offline; motor/pump need replaced
Brookview Terrace 2 TR A	14.0	
Berry Hill TR B (Canyon Tank)	5.5	
Milk Ranch Well 1	85.0	
Milk Ranch Well 2	75.0	
Milk Ranch Well 3	75.0	
Strawberry Hollow 1	N/A	Offline; electrical issue
Strawberry Hollow 2	6.0	
Strawberry Hollow Intertie (New SH3)	20.0	
Strawberry Hollow 4 (Old PSWID SH3)	N/A	Offline; dry hole

TABLE 3-2
Well Production—Pine

Location Name	Well Production (gpm)	Notes
Pine Crest Lot 25	N/A	Offline; dry hole
Portal 1 TR A	16.5	
Portal 2 Lot 73	14.5	
Portal 3 TR A-next to Lot 61	23.0	
Canyon Shadows	N/A	Offline; dry hole
STWID #1	24.0	WSA
Brookview Terrace 4	15.5	WSA
Bloom	20.0	WSA
Gordon	40.0	WSA
STWID #2	7.0	WSA

TABLE 3-3
Well Production—Strawberry

Location Name	Well Production (gpm)	Notes
Strawberry View 1 Lot 59	28.0	
Strawberry Ranch 5 TR. C	11.0	
Strawberry View 3 Lot 226	26.0	
K2	N/A	Not in Service
Rimwood	N/A	Offline – dry shallow well
Strawberry View 3	N/A	Offline – dry shallow well
Strawberry Creek Foothills	N/A	Offline – dry shallow well
Strawberry Ranch 2	N/A	Offline – dry shallow well
Gordon Strawberry	9.2	WSA
McKnight	23.5	WSA
Johnson 1	22.0	WSA
Johnson 2	13.0	WSA

A summary of the demands by service area and zones is shown in Table 3-4 for average day and maximum day under existing and build-out conditions. As noted in Section 2, there is greater potential for new customer growth in the Pine service area.

TABLE 3-4
Existing and Future Demands by Zone—Average Day Demands and Maximum Day Demands

Zone/Group of Zones	Existing ADD (gpm)	Existing MDD (gpm)	Future ADD (gpm)	Future MDD (gpm)
Pine	**113.9**	**221.3**	**155.6**	**311.4**
300K	66.4	125.7	81.3	162.6
Canyon Tanks/Brookview Terrace	16.1	32.0	24.3	48.6
Pine Ranch	15.0	31.3	33.3	66.7
Portal 2	6.8	13.3	6.8	13.6
Portal 3	9.6	18.9	9.9	19.9
Strawberry	**53.2**	**117.6**	**75.5**	**151.0**
Hardscrabble Mesa	0.0	0.1	0.0	0.1
Homestead	0.3	0.9	0.3	0.6
K2/Rimwood/Strawberry Ranch 3	46.8	104.9	68.1	136.3
Strawberry View 1	5.6	10.9	6.6	13.2
Tank Farm	0.4	0.7	0.4	0.8
Grand Total	**167.1**	**338.8**	**231.1**	**462.4**

A comparison of the supplies and demands by service area are shown in Figures 3-6 and 3-7 under existing and build-out scenarios. Demands are represented by the colored vertical bars, and the total supply is shown as a horizontal line on the graphs. Pine has adequate water supply today and at build-out to meet both ADD and MDD. Strawberry has adequate supplies to meet ADD under existing and build-out demand scenarios and existing MDD if WSA wells are included; however, Strawberry does not have enough supply, even when considering use of WSA wells to meet MDD at build-out. Water systems should have enough supply to meet maximum day conditions to allow for storage tanks to refill during high demand months. PSWID has the flexibility to transfer water from Pine to Strawberry to make up for this shortfall using District-owned wells under existing conditions, but there is not enough supply available in Pine to continue this practice into the future without the use of WSA wells.

3.2.2 Storage

The American Water Works Association (AWWA) recommends that water systems should have adequate storage to meet demands for operational and fire-flow conditions. *AWWA Manual M32: Computer Modeling of Water Distribution Systems*, Second Edition (AWWA M32) notes that the required storage volume should be categorized into three primary components: equalization storage, fire storage, and emergency storage. The sum of all of these components equates to the required storage volume, which includes the following:

- Equalization storage is storage volume to ensure that customer demands can be met in a maximum day condition beyond what can be supplied by well production. In other words, it can be calculated as the difference between MDD and production. In the case of the Pine service area, there is adequate production from wells to supply a MDD condition, but the PSWID may still consider adding 10-15 percent of ADD for equalization storage in this area.
- Fire storage is storage volume needed for fire suppression. Per Section 2.1.1.2, the fire-flow volume at PSWID is recommended to be 1,000 gpm for 2 hours, which is equivalent to 120,000 gallons.

- Emergency storage provides adequate supply during unplanned items such as pipeline failures, equipment failures, or water production interruptions. The required volume is subjective depending on the level of risk and consequences of an event occurring, but as a general guideline it may be calculated as the volume required to serve customers during an average day (ADD).

As an alternative, the Arizona Administrative Code (AAC) Title 18, Chapter 5 (R18-5-503) recommends that the minimum storage capacity required for a community water system shall be equal to the ADD during the peak month of the year. For PSWID, this equates to the ADD during the peak month of July. The storage requirements recommended by both AWWA and the AAC along with the existing storage volumes are shown in Tables 3-5 and 3-6. The analysis below assumes that all production wells (District-owned and WSAs) are considered for equalization calculations in Strawberry.

TABLE 3-5
Storage Analysis—Service Area Summary

Analysis Area	Equalization: MDD less Production (gallons)	Fire Storage: 1,000 gpm for 2 hours (gallons)	Emergency Storage: ADD (gallons)	Storage Requirement: AWWA (gallons)	Storage Requirement: AAC Ch 18 (gallons)	Existing Storage (gallons)
Strawberry (Existing)	NA	120,000	76,576	**196,576**	**122,521**	274,000
Strawberry (Future)	26,317	120,000	108,654	**254,972**	**173,847**	274,000
Pine (Existing)	NA	120,000	164,078	**284,078**	**262,524**	1,037,000
Pine (Future)	NA	120,000	224,110	**344,110**	**358,576**	1,037,000

When evaluating the storage requirements by service area, Strawberry and Pine have adequate existing storage to meet both AWWA and state recommendations under current and build-out demand conditions. It is important to note that when evaluating the systems at a service area level, this assumes that the distribution system is adequate to move the stored water to where it is needed within the various pressure zones. The distribution systems that serve Pine and Strawberry have little elevated storage that can serve customers via gravity without being pumped, which reduces flexibility to easily deliver water to customers in times of emergencies.

TABLE 3-6
Storage Analysis—Zone Summary

Analysis Area	Equalization: MDD less Production (gallons)	Fire Storage: 1,000 gpm for 2 hours (gallons)	Emergency Storage: ADD (gallons)	Storage Requirement: AWWA (gallons)	Storage Requirement: AAC Ch 18 (gallons)	Existing Storage (gallons)
Strawberry (Existing)						
Hardscrabble Mesa	177	120,000	48	**120,226**	**77**	20,000
Homestead	1,355	120,000	452	**121,806**	**723**	1,500
K2/Rimwood/ Strawberry Ranch 3	71,631	120,000	67,399	**259,030**	**107,838**	187,500
Strawberry View 1	NA	120,000	8,129	**128,129**	**13,006**	20,000
Tank Farm	NA	120,000	548	**120,548**	**877**	45,000
Strawberry (Future)						
Hardscrabble Mesa	81	120,000	48	**120,226**	**77**	20,000

TABLE 3-6
Storage Analysis—Zone Summary

Analysis Area	Equalization: MDD less Production (gallons)	Fire Storage: 1,000 gpm for 2 hours (gallons)	Emergency Storage: ADD (gallons)	Storage Requirement: AWWA (gallons)	Storage Requirement: AAC Ch 18 (gallons)	Existing Storage (gallons)
Homestead	919	120,000	452	**121,806**	**723**	1,500
K2/Rimwood/ Strawberry Ranch 3	116,741	120,000	98,074	**334,816**	**156,919**	187,500
Strawberry View 1	NA	120,000	9,532	**129,532**	**15,251**	20,000
Tank Farm	NA	120,000	548	**120,548**	**877**	45,000
Pine (Existing)						
300K	NA	120,000	95,661	**215,661**	**153,058**	467,000
Canyon Tanks/ Brookview Terrace	NA	120,000	23,220	**143,220**	**37,152**	300,000
Pine Ranch	45,118	120,000	21,582	**186,700**	**34,532**	20,000
Portal 2	NA	120,000	9,765	**129,765**	**15,625**	100,000
Portal 3	NA	120,000	13,849	**133,849**	**22,158**	150,000
Pine (Future)						
300K	NA	120,000	117,026	**237,026**	**187,242**	467,000
Canyon Tanks/Brookview Terrace	18,175	120,000	35,037	**173,212**	**56,059**	300,000
Pine Ranch	96,095	120,000	47,998	**264,093**	**76,797**	20,000
Portal 2	NA	120,000	9,765	**129,765**	**15,625**	100,000
Portal 3	NA	120,000	14,283	**134,283**	**22,853**	150,000

When examined by pressure zones, Strawberry falls short of meeting AWWA recommendations, but does meet state recommendations under existing and build-out conditions. The shortfall is the fire storage volume. The Board provided CH2M HILL direction not to incorporate the capital improvements required to meet fire suppression needs in the system due the significant investments required in additional storage, pipeline upgrades, hydrant installation, and pump station improvements.[5] If the fire storage volume is excluded from the AWWA recommendations, all zones in Strawberry have adequate storage with the exceptions of a minor shortfall in the Homestead zone under existing and build-out demand conditions and about a 30,000 gallon shortfall in the K2/Rimwood/Strawberry Ranch 3 area under build-out demand conditions. The system also likely does not warrant the need to increase storage in the zones due to water quality concerns because of lack of tank turnover; therefore, existing storage volumes are adequate.

Pine has adequate storage to meet state and AWWA recommendations without fire storage volumes under existing conditions and at build-out when evaluated by pressure zones with the exception of the Pine Ranch area. The system likely does not warrant the need to increase storage in this zone due to water quality

[5] Letter from Tom Weeks, PSWID Chairman, to Brad Cole, District Manager, dated October 21, 2014.

concerns because of lack of tank turnover; therefore, PSWID may choose to monitor the area in coming years if demands increase to review the need for additional storage in the Pine Ranch area.

Details of the water balance assessment for storage and production are available in Appendix C.

3.3 Water Quality Regulatory Assessment

A review of PSWID's recent water quality data was performed and is summarized in the following subsections.

3.3.1 Compliance with Existing Drinking Water Regulations

Drinking water regulations in Arizona are defined in Title 18, Chapter 4, of the AAC (18 A.A.C.4), which were last amended August 22, 2008. The list below presents a summary of the current state and federal regulations that PSWID must comply with. CH2M HILL requested that the District provide any information related to water quality compliance reporting for the previous 3 years of system operation. A review of the information, including PSWID's Consumer Confidence Reports (CCRs) and sanitary surveys from 2010 to 2013, indicates that PSWID has been in compliance with all federal and state drinking water standards during this period. The subsequent sections briefly describe some of the key regulations applicable to PSWID and the results from PSWID's regular water quality monitoring program. The following current federal and state drinking water regulations were reviewed:

- National Primary Drinking Water Standards
- Groundwater Rule
- Total Coliform Rule
- Disinfectants and Disinfection Byproduct Rule (D/DBPR)
- Lead and Copper Rule
- Inorganic Chemicals
- Volatile Organic and Synthetic Organic Rules
- Radionuclide Rule

3.3.1.1 Groundwater Rule and Total Coliform Rule

The Groundwater Rule, promulgated in 2006, establishes a risk-targeted approach to identify groundwater systems (GWSs) susceptible to fecal contamination and required corrective actions take place to correct deficiencies. PSWID complies with the Groundwater Rule by collecting nine total coliform samples per month, as required under the Total Coliform Rule for GWSs serving a population of 7,601 to 8,500 persons. Triggered source water monitoring is conducted if a total coliform-positive sample is collected. If the triggered source water sample indicates the presence of fecal coliform, corrective action is taken. From 2010 to 2013, triggered source water sampling was only required once at the end of 2012. The triggered monitoring results were absent for fecal coliform and no further action was required of PSWID by the state.

3.3.1.2 Disinfection and Disinfection Byproducts

Disinfectants and disinfection byproducts (DBPs) are regulated under the Stage 1 (published 1998) and Stage 2 D/DBPR (published 2006). The federal regulations establish maximum contaminant levels (MCLs) for disinfectants and DBPs. PSWID maintains an average chlorine residual concentration of approximately 0.7 milligram per liter (mg/L) within the distribution system, which adequately meets state requirements. Prior to 2014, PSWID monitored total trihalomethanes (TTHMs) and five regulated haloacetic acids (HAA5s) at 10 different locations under Stage 1 DBPR. Annual monitoring from 2010 to 2013 shows that the TTHMs and HAA5 levels in PSWID's system are well below the MCLs of 80 micrograms per liter (µg/L) and 60 µg/L, respectively. Due to the low levels, the state reduced the number of monitoring locations for DBPs from 10 to2 under Stage 2 DBPR (effective 2014). The two locations (PR1 L1 and WOGL L16) were selected based on having the highest historical levels of TTHMs and HAA5s. Table 3-7 presents a summary of the monitoring stations under Stage 1 and 2 DBPR.

TABLE 3-7
Total Trihalomethanes and Five Regulated Halgacetic Acids Monitoring Sites Under Stage 1 and 2 Disinfectants and Disinfection Byproduct Rule

Site No.	Location Code	Location	System	Stage 1 DBPR (prior to 2014)	Stage 2 DBPR (effective 2014)
1	SKIL 14	8152 W. Eagle Dr.	Strawberry	x	
2	SRS TR.C	4980 N. Fuller Rd.	Strawberry	x	
3	SCF TR.B	W. Coyote Dr. (No address)	Strawberry	x	
4	HS L5	Bay Dr. (No address)	Strawberry	x	
5	CPE L331A	Mohawk St. (No address)	Strawberry	x	
6	PR1 L1	4120 N. Whispering Pines Rd.	Pine	x	x
7	WOGL L16	5623 W. Pinon Dr.	Pine	x	x
8	P2 L178	4630 N. Portal Dr.	Pine	x	
9	P1 TR.A	4499 N. Pine Creek Canyon Rd.	Pine	x	
10	P3 L107	Juniper Loop (No address)	Pine	x	

3.3.1.3 Lead and Copper Rule

The Lead and Copper Rule was first established in 1991 to protect public health by minimizing lead and copper levels in drinking water, primarily by reducing water corrosively. Lead and copper enter drinking water mainly from corrosion of lead and copper containing plumbing materials. Under the current rule, if lead and copper levels exceed the action levels of 0.015 mg/L and 1.3 mg/L respectively, in more than 10 percent of the first draw tap water samples, counter measures, as well as public notification and education, are required. Regular sampling by PSWID indicates that the distribution system is in compliance.

U.S. Environmental Protection Agency (USEPA) is scheduled to propose revisions to the Lead and Copper Rule that will likely address the following:

- Partial lead service line replacement
- Guidance on optimized corrosion control treatment
- Changes in sample site selection criteria and sampling protocol
- Public education for copper to address issues with new plumbing fixtures

Due to all the issues under consideration, the USEPA is expected to form a workgroup under the National Drinking Water Advisory Council to begin dialogue in 2014 on potential revisions. Based on the list of issues USEPA may address during its review, it does not appear that the revised regulation would have a significant impact on PSWID's operations or future capital improvement project requirements.

3.3.1.4 Inorganic Contaminants, Volatile Organic Compounds, and Synthetic Organic Compounds

In addition to monitoring lead and copper, PSWID regularly collects samples to monitor other inorganic contaminants (IOCs), as well as volatile organic compounds (VOCs), and synthetic organic compounds (SOCs) to meet the National Primary Drinking Water Regulations. IOCs monitored include arsenic, barium, fluoride, nitrate, and nitrite. VOCS and SOCs include toluene and carbon tetrachloride. To date, all IOCs, VOCs, and SOCs in PSWID's system have been detected at levels below the existing MCLs.

3.3.1.5 Radionuclides

Under the Radionuclide Rule, PSWID is required to monitor for radioactive contaminants once every 6 years. However, based on the initial monitoring conducted in the early 2000s, PSWID was granted reduced monitoring to once every 9 years for the majority of the required monitoring locations. Radionuclides monitored include beta/photon emitters, gross alpha particles, combined radium 226/228, and uranium.

Recent sampling by PSWID indicates that all radionuclide levels are in compliance with the MCLs.

3.3.1.6 Sanitary Surveys

ADEQ performs periodic sanitary surveys of PSWID’s system to confirm compliance with the state’s statutes, codes, and regulations for public water systems. Although some system deficiencies were identified within the past 5 years, PSWID has consistently responded to all recommendations made by ADEQ and remains in compliance. The most recent sanitary survey performed in February 2013, identified a few system deficiencies, including insufficient security to a booster station, unkempt conditions at several tanks, inappropriate sample taps, and aging tank infrastructure. PSWID has addressed and completed all but one item, the aging tank infrastructure. The item is currently in the process of being addressed by PSWID. It is anticipated that follow-up inspection by ADEQ will confirm compliance.

3.3.2 Regulatory Conclusions and Recommendations

A review of the PSWID’s regulatory documentation and water quality data shows that PSWID is in compliance with the state and National Primary Drinking Water Standards. As regulations are updated, it is recommended that PSWID implement additional sampling and/or requirements to remain in compliance. Regulations candidate for updates expected within the in the next 5 years that will affect PSWID include the Lead and Copper Rule, as well as the Arsenic Rule.

In addition, USEPA has a published a list of Secondary Drinking Water Standards that are non-enforceable guidelines for several compounds that may cause cosmetic or aesthetic effects in drinking water supply. PSWID may consider monitoring the parameters on an infrequent basis if customer complaints relating to color, taste, odor, or skin irritation are received.

Lastly, is recommended that PSWID continue to be responsive to any system deficiencies identified during sanitary surveys conducted by ADEQ.

FIGURE 3-1
Pressure Zone Map

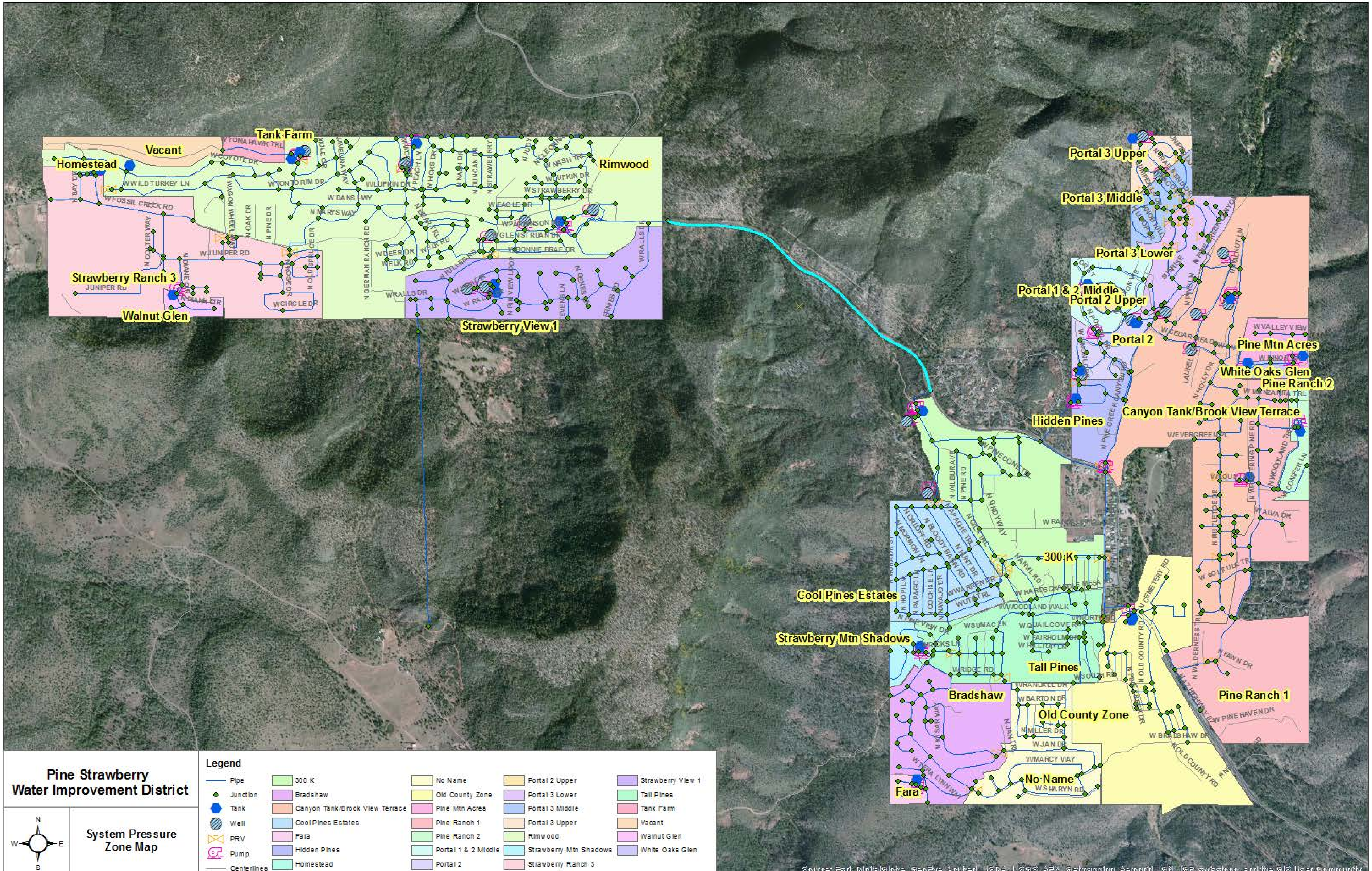


FIGURE 3-2
System Schematic—Pine

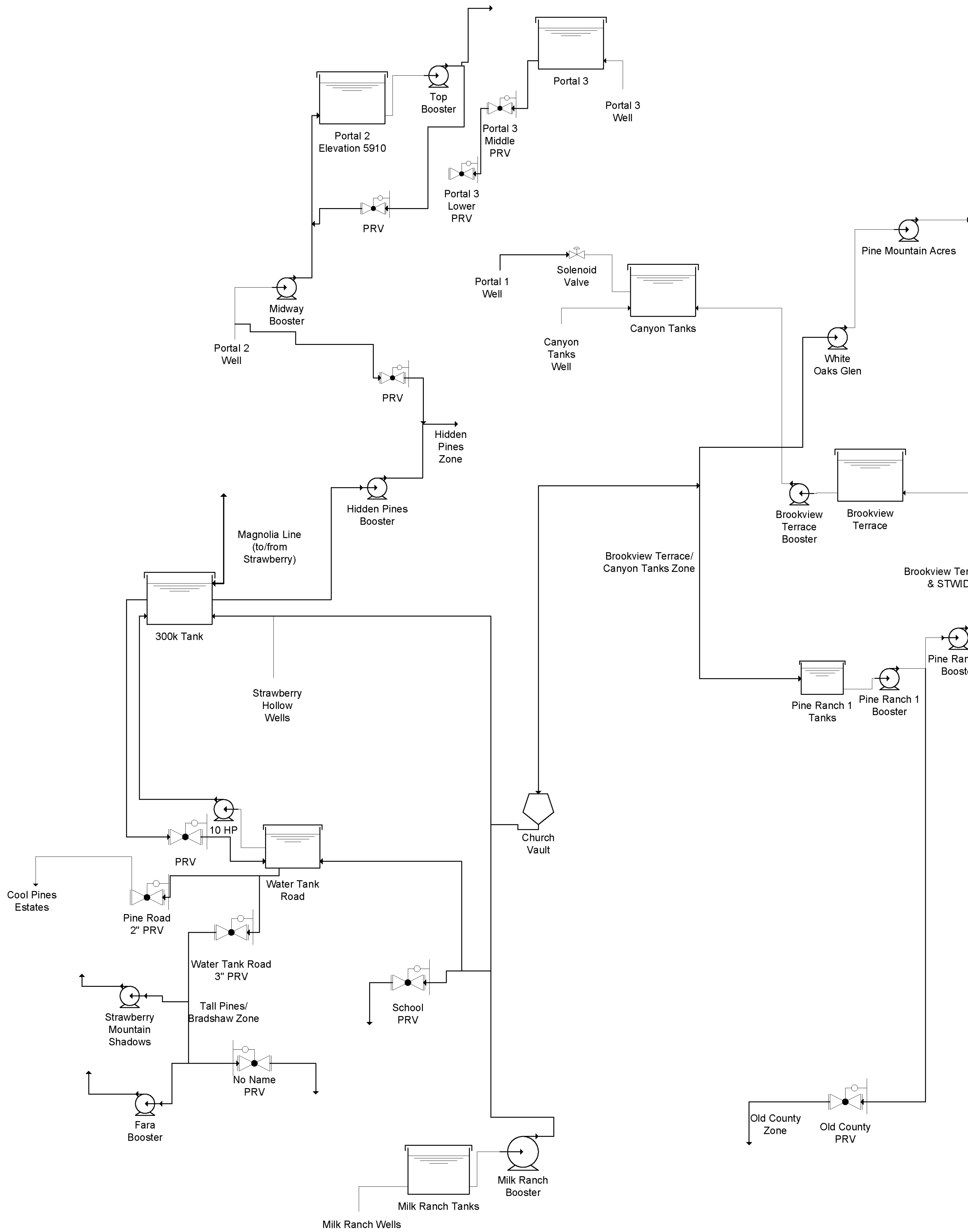


FIGURE 3-3
System Schematic—Strawberry

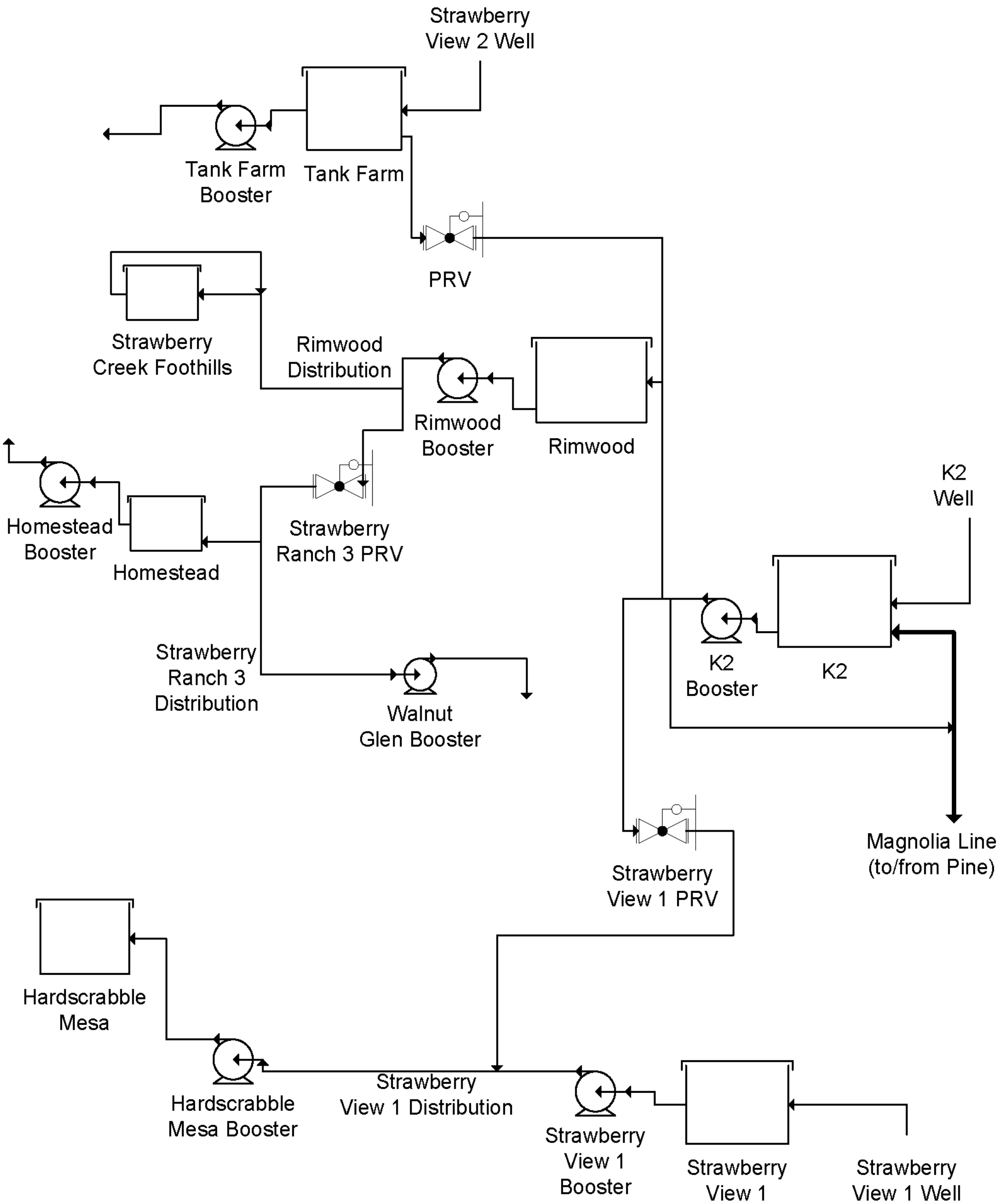


FIGURE 3-4
System Overview Map

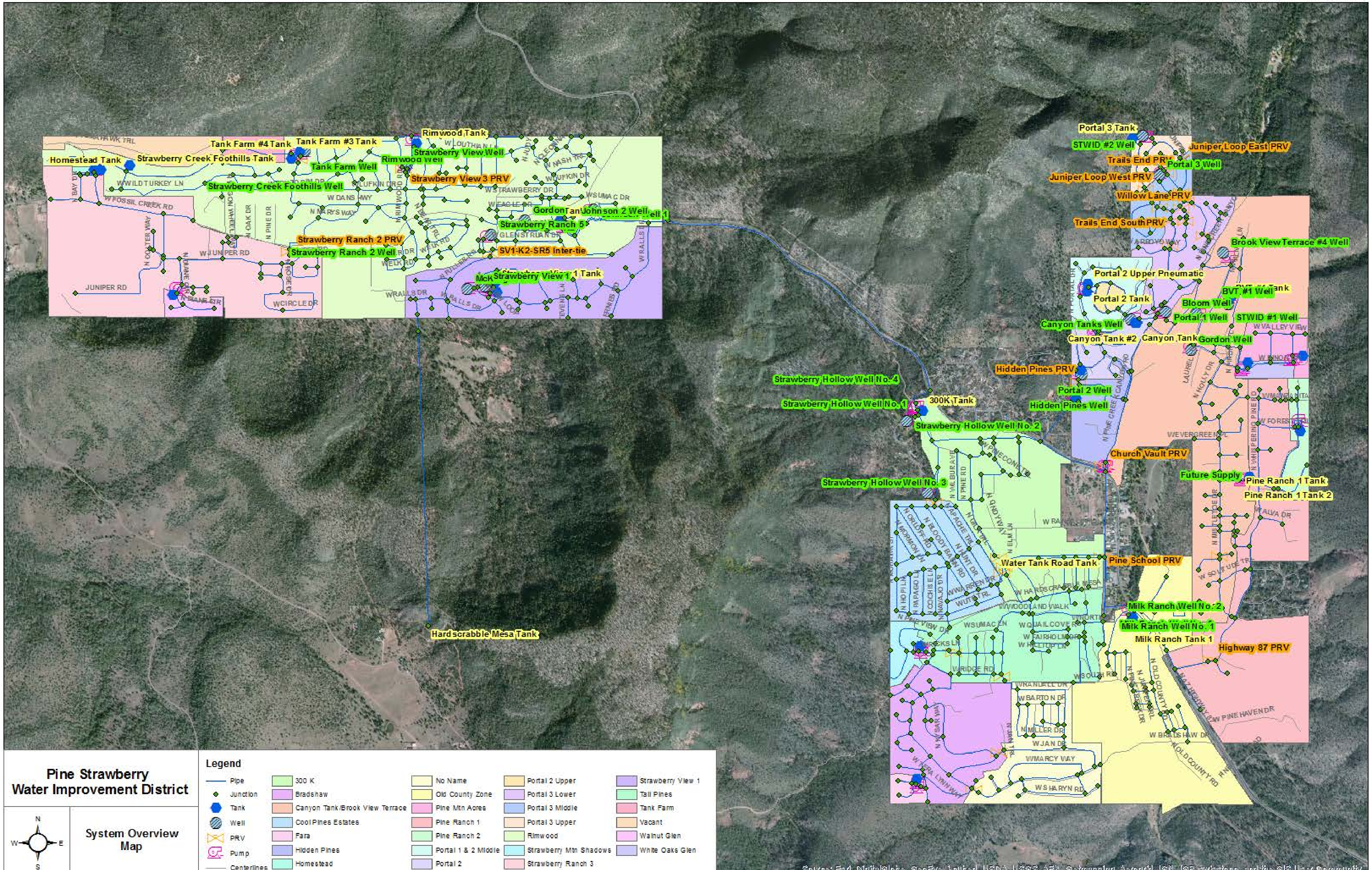


FIGURE 3-5
System Water Mains by Diameter

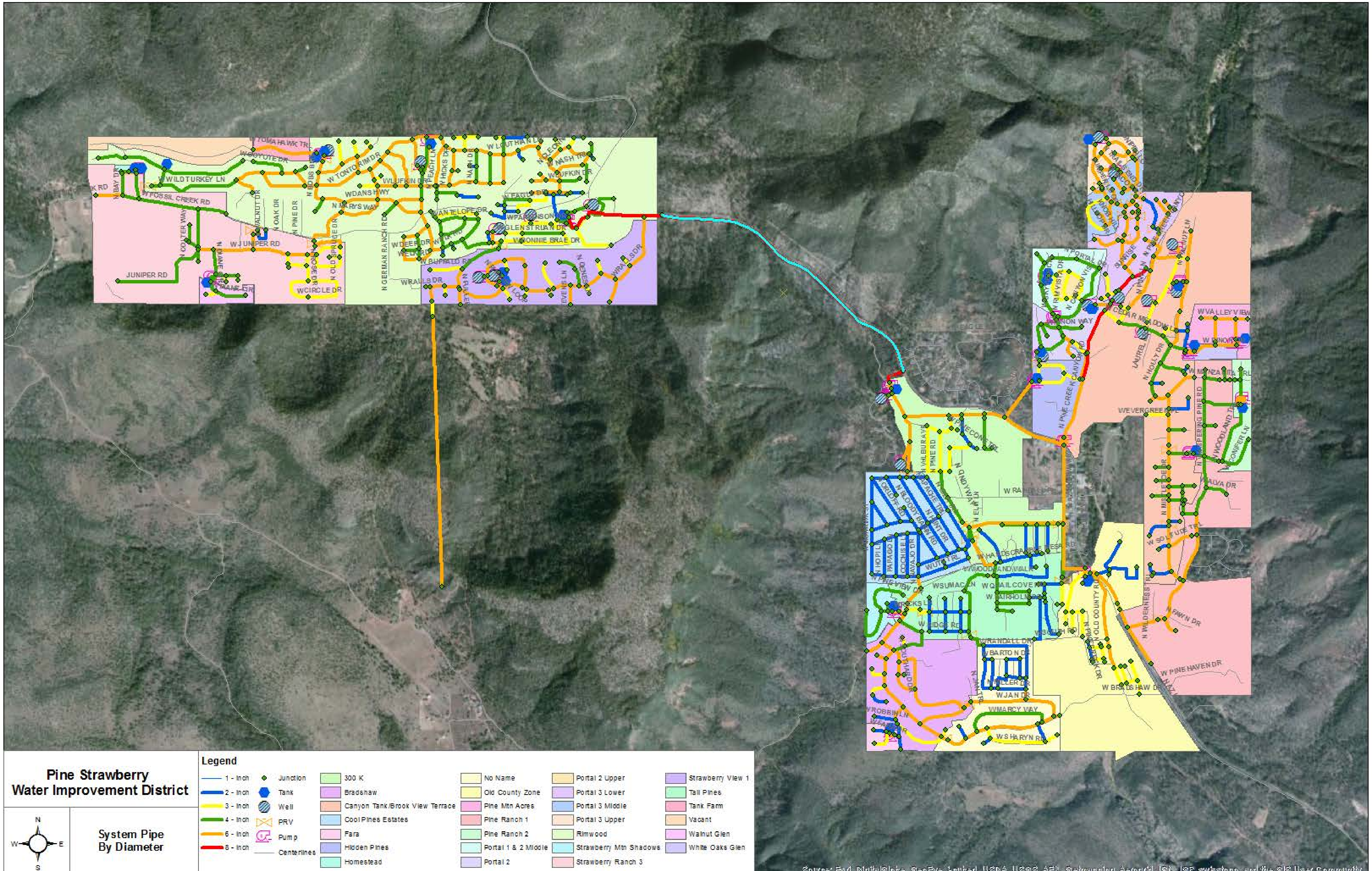


FIGURE 3-6
Supply/Demand Balance—Existing Demands

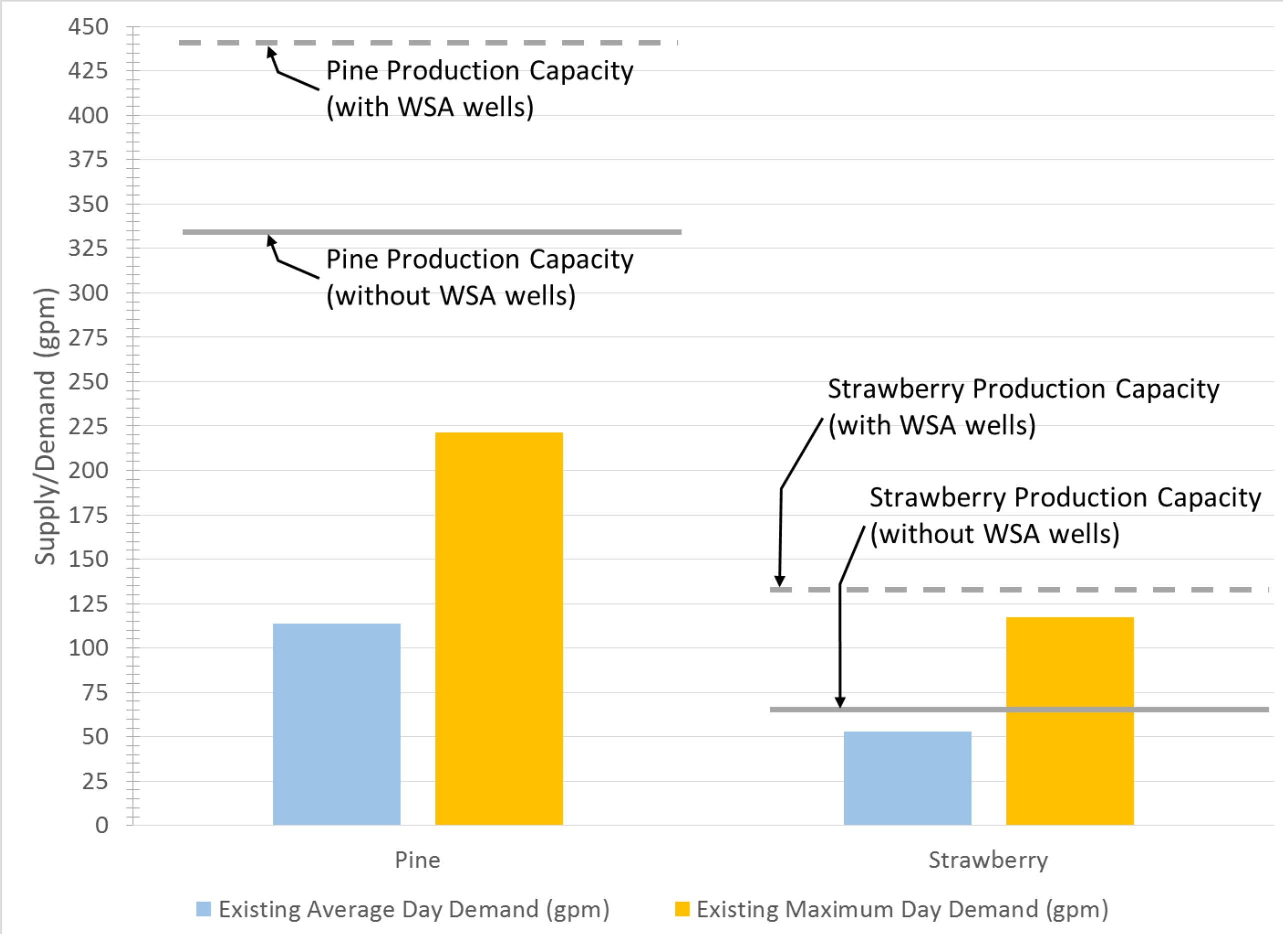
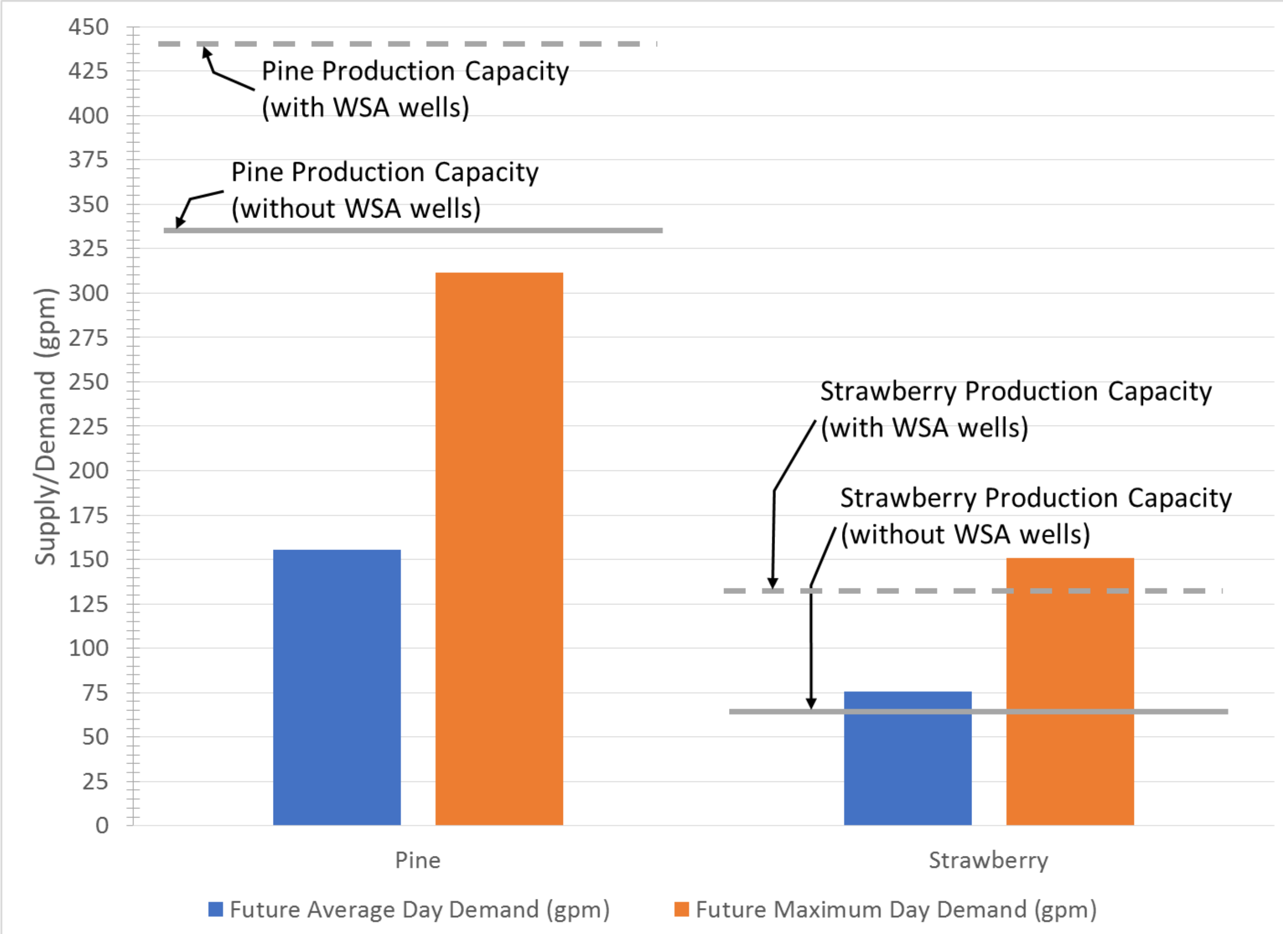


FIGURE 3-7
Supply/Demand Balance: Future Demands



SECTION 4

Evaluation of Water System Operation

4.1 Hydraulic Model Development

The hydraulic model was developed from system paper maps, global positioning system (GPS) points, and multiple system operation manuals and spreadsheets, all provided by PSWID. Elevation information was downloaded from the U.S. Geological Survey (USGS) website. CH2M HILL also relied upon GIS layers provided by Gila County as background maps for the model development. The layers included features such as parcels and street centerlines. The model attributes were drawn by hand and data was populated into the model attribute tables from the resources provided. Multiple conversations with the District Manager and District staff took place to gather, discuss, and validate the data from the sources, which included the following:

- Pine Water Co., Inc. Map (1983/2005)
- Strawberry Water Co., Inc. Map (1983/2009)
- GPS Data Points of System Assets (District Manager)
- Pump Nameplate Photographs (District Manager)
- GIS Shapefiles (streets, centerlines, parcels) from Gila County
- PSWID Operations/Control Strategy Document
- PSWID List of Facilities (Excel Database)
- National Elevation Dataset Raster Products by the U.S. Geological Survey

4.1.1 Software Selection

The hydraulic model was developed using the WaterGEMS software product by Bentley. WaterGEMS is a comprehensive water distribution modeling and management software package that is easy to use. It can run as a stand-alone application or can be integrated with other software packages such as ArcGIS, AutoCAD, or MicroStation. The basic hydraulic model can be exported to EPANET software, which is a free public-domain software package developed by the USEPA.

4.2 Hydraulic Model Analysis

Two development scenarios were analyzed: the existing development scenario and the future development scenario representing build-out. The hydraulic model and ancillary files are provided in Appendix D. Within each of the scenarios, the ADD, MDD, and PHD conditions were reviewed. There were two simulations run on each of the demand scenarios (ADD, MDD, PHD), one for steady-state or static conditions, which represent one point in time in the system, and one for an extended period of time called an extended period simulation (EPS). The EPS simulates the system operating over a specified period of time, such as several hours or days.

For EPS, a daily diurnal pattern is applied to the model demands to simulate the fluctuation of water use by customers over the course of the day, and controls are set on model attributes, such as pumps to indicate the desired operation of the attribute. For example a pump may be set to turn on or off according to the water level in a specific tank.

The modeling software package allows for the development and analysis of several different scenarios, and the data specific to each scenario are saved in a database that can be applied when needed. Figure 4-1 shows the model scenario hierarchy set up in the PSWID hydraulic model. To run the EPS simulations, it was necessary to apply a diurnal pattern, and since PSWID does not monitor hourly flow information, the Town of Payson diurnal pattern (24-hour) was utilized. The diurnal pattern is illustrated in Figure 4-2. The pattern illustrates that more customer water use is expected in the morning hours between 7 AM and 11 AM, with very little consumption expected overnight.

4.2.1 Model Operation

The system criteria utilized for system evaluation was selected based on industry accepted standards from AWWA. The criteria shown below are the recommended values. However, all areas of the system may not have the potential to conform to recommended values. Areas were evaluated on an individual basis and the PSWID desired level of service for each area will be taken into consideration when evaluating and recommending improvement projects.

4.2.2 System Criteria

4.2.2.1 Pressure

Industry standards, shown in Table 4-1, for minimum and maximum pressure requirements were used to guide recommended improvements.

TABLE 4-1
Pressure Criteria

Condition	Minimum Pressure	Maximum Pressure
Maximum Day Demand	40 psi	80 psi
Fire Flow	20 psi	N/A

4.2.2.2 Velocity

Industry standards, as shown in Table 4-2, for maximum allowable velocity in feet per second (fps) were used.

TABLE 4-2
Velocity Criteria

Condition	Maximum Allowable Velocity
Maximum Day Demand	<5 fps
Peak Hour Demand	<10 fps
Fire Flow	<15 fps

4.2.2.3 Fire Flow

A fire flow of 1,000 gpm was applied as the systems' fire flow criteria.

4.2.3 Existing 2014 System

System pressures vary widely. Areas with low pressures (below 40 psi) and areas with high pressures (above 80 psi) should be further evaluated. The average system velocities remain under 5 fps in most areas of the system. Some higher velocities can be seen in areas near pumping facilities, which is a typical occurrence as the suction of the pump pulls water from the system.

4.2.3.1 Extended Period Conditions

Figures 4-3 through 4-6 show the results for Pine and Strawberry existing system pressures under average MDD conditions, along with system pressures and pipeline velocities under the peak hour condition on maximum day.

4.2.3.2 Fire Flow Analysis

The available fire flow in most of the system is very low (less than 500 gpm); this is due to pipe diameter limitations and lack of looping in the pipeline network to allow flow in multiple directions. Details of the fire flow simulations are shown on Figures 4-7, 4-8, 4-11, 4-14, 4-17, 4-20. The fire flow simulation results indicate what flow the system is capable of delivering at that location, if one fire event were to occur at that location. It does not imply that the system is capable of meeting demands of multiple fires, only one at a time.

4.2.4 Future Conditions

The future condition model does not contain improvements that are necessary to fix existing problems; therefore, any problem seen during the existing conditions will often get worse under future conditions (additional demand). Solutions to exiting system problems are included in section 4.3. Similar to the existing system, the future system pressures vary widely. Areas with low pressures (below 40 psi) and areas with high pressures (above 80 psi) should be further evaluated. The average system velocities remain under 5 fps in most areas of the system. Some higher velocities can be seen in areas near pumping facilities, which is to be expected.

4.2.4.1 Extended Period Conditions

Figures 4-9 through 4-20 show the results for Pine and Strawberry existing system pressures under average MDD conditions, along with system pressures and pipeline velocities under the peak hour condition on maximum day.

4.3 Improvement Recommendations

4.3.1 Recommended Improvements addressing Hydraulics and Growth

In addition to pipeline extensions to serve new development, preliminary improvements and recommendations are described in the following lists.

4.3.1.1 Pine

Pine projects are listed below. Detailed figures for each project showing location of pipe installation, closed pipes, PRV insertions, and other details are included as Figures 4-21 to 4-35.

- **Portal 3 Middle PRV Adjustment (Hydraulic Improvement)—**This project is recommended to alleviate existing high pressures on the boundary of the Portal 3 Middle Zone and Portal 3 Lower Zone. A portion of Portal 3 Middle will be joined with Portal 3 Lower. The project consists of inserting two new PRVs in the existing Portal 3 Middle Zone and opening the three existing PRVs on the boarder of the Portal 3 Lower Zone. The recommended PRV setting is 65 psi, which is the same as the existing PRV setting between Portal 3 Middle and Portal 3 Lower.

- **Pine Ranch 1 and Pine Ranch 2 Zone Realignment (Hydraulic Improvement)—**Pipeline on the north side of Pine Ranch 1 experiences low pressures. Adding a portion of the Pine Ranch 1 zone to the Pine Ranch 2 zone will help alleviate low pressure.

- **Portal 3 Pressure Zone Realignment (Hydraulic Improvement)—**Pressures within the existing Portal 3 Lower zone are both high on the south side of the zone and low on the north side of the zone. Moving the boundary of the existing Portal 3 Lower zone and creating a New Portal 3 Lower zone are recommended to mitigate the high and low pressures.

  Pipeline on the north side of the zone experiences low pressure due to the high elevation. The installation of three new PRVs has been recommended, this creates a smaller Portal 3 Lower zone. The setting on the three new PRVs should be approximately 48 psi (5,750 feet). There is one segment of pipeline that will need to be installed to keep zone connectivity in place.

  After the installation of the three PRVs, the area to the south will need to be transformed into a new zone. The recommended New Portal 3 Lower zone will alleviate the high pressures experienced on the south side of the existing zone. The Hydraulic Grade Line (HGL) of this zone is recommended to be set at 5,750, the three PRVs installed in the first part of this project provide water to this zone. There are two pipeline connections to the Canyon Tank zone that will need to be closed, and there are new pipelines recommended for installation to connect the area to the zone.

- **Cool Pines Estates Pipe Upgrade (Hydraulic Improvement)—**The pipeline in Cool Pines Estates is very small (2-inch-diameter). This causes high headloss, and thus low pressure, as system demands are met. Increasing the pipeline diameter decreases headloss and improves system pressures. A 6-inch-diameter loop is recommended to be installed around the Cool Pines Estates development.
- **Strawberry Mountain Shadows/Bradshaw Zone Realignment (Hydraulic Improvement)—**The existing Bradshaw zone experiences low pressures. Combining the Bradshaw zone with the existing Strawberry Mountain Shadows zone is recommended. The existing hydraulic grade of Strawberry Mountain Shadows (5,670) works well with the elevations in the Bradshaw zone. New Strawberry Mountain Shadows pumps, as well as the installation of connectivity pipeline, closed valves, and a PRV, are recommended to complete the zone reconfiguration. The PRV creates a new Tall Pines PRV zone, and the setting on the PRV is recommended to be approximately 20 psi (5,567 feet). As part of this project it is also recommended that the PRV settings in the existing No Name zone be reduced to help alleviate high pressures throughout the zone. Existing settings on the 3 PRVs are approximately 60 psi (5575 feet). It is recommended to reduce the PRV settings to approximately 40 psi (5528 feet).
- **300 K Boosted Zone (Hydraulic Improvement)—**The 300 K zone experiences low pressures. The creation of a new 300 K boosted zone is recommended to alleviate the low pressures. A new pump station, three closed valves, and the installation of connectivity pipe is recommended to create this new zone.
- **Old County Zone Realignment (Hydraulic Improvement)—**Portions of the east side of the Tall Pines zone experience high pressures due to low elevations. It is recommended to expand the Old County zone to include these pipelines and alleviate high pressure. The installation of new pipeline, as well as the closing of two existing pipelines, are recommended to complete this zone realignment.
- **Canyon Tank/Brook View Terrace Looping (Hydraulic Improvement)—**Looping pipeline in the Canyon Tank/Brook View Terrace zone is recommended. Dead ends in distribution system pipeline are undesirable and connecting the dead ends where reasonable will result in hydraulic efficiency and better water quality.
- **Fara Booster Upgrade (Hydraulic Improvement)—**Pressures in the Fara zone are low, increasing the head output on the pump would improve pressures and is recommended. Not shown on a figure.
- **Bradshaw Future Development (Growth)—**Development is expected in this area of Bradshaw. An estimate of potential new pipeline was made to aid in capital improvement program planning.
- **Old County Future Development (Growth)—**Development is expected in this area of Old County. An estimate of potential new pipeline was made to aid in capital improvement program planning.
- **Tall Pines Future Development (Growth)—**Development is expected in this area of Tall Pines. An estimate of potential new pipeline was made to aid in capital improvement program planning.
- **300 K Future Development (Growth)—**Development is expected in this area of 300 K. An estimate of potential new pipeline was made to aid in capital improvement program planning.
- **Canyon Tank Brook View Terrace Future Development (Growth)—**Development is expected in this area of Canyon Tank Brook View Terrace. An estimate of potential new pipeline was made to aid in capital improvement program planning.
- **Hidden Pines Future Development (Growth)—**Development is expected in this area of Canyon Tank Brook View Terrace. An estimate of potential new pipeline was made to aid in capital improvement program planning.

- **Pine Ranch 1 Future Development (Growth)—**Development is expected in this area of Canyon Tank Brook View Terrace. An estimate of potential new pipeline was made to aid in capital improvement program planning.

Improvement scenarios reviewed, but not included as recommended improvements, are as follows:

- **Fire Suppression Level of Service—**No projects were recommended to increase the level of fire suppression service. In order to increase the level of fire suppression service, high capacity pumps and larger-diameter pipeline would be needed system-wide. The cost of upgrading the system to provide fire suppression is expensive, and the PSWID Board provided direction not to include these upgrades in the system as noted in Section 3. However, as natural re-development takes place throughout the system, it would be prudent to consider the level of fire suppression desired. There may be opportunities to increase pipeline diameter and pumping capacity over time, to achieve a differing level of service.
- **Realignment of Canyon Tank/Brook View Terrace HGL—**The Canyon Tank/Brook View Terrace Zone would benefit from an adjustment of hydraulic grade line in the zone. Zone low and high pressures would be made more stable through the addition of a higher overall HGL and a small PRV area on the south side of the zone. Changing the hydraulic grade line of a zone would require upgrading all zone pumps and tanks to work with the new hydraulic grade line. Due to the extensive number of wells pumping to this zone and the number of tanks within the zone, a new HGL project was not recommended. If redevelopment of this zone ever takes place, it would be prudent to consider changing zone boundaries and HGLs.

4.3.1.2 Strawberry

Strawberry projects are listed below. Detailed figures for each project showing location of pipe installation, closed pipes, PRV insertions, and other details are included as figures 4-36 to 4-41.

- **Rimwood Looping (Hydraulic Improvement)—**Looping pipeline in the Rimwood zone is recommended. Dead ends in distribution system pipeline are undesirable and connecting the dead ends where reasonable will result in hydraulic efficiency and better water quality.
- **Strawberry Ranch 3 PRVs (Hydraulic Improvement)—**Strawberry Ranch 3 is currently served by a single PRV. The installation of two additional PRVs along with required system pipeline is recommended.
- **Strawberry View 1 Looping (Hydraulic Improvement)—**Looping pipeline in the Strawberry View 1 zone is recommended. Dead ends in distribution system pipeline are undesirable and connecting the dead ends where reasonable will result in hydraulic efficiency and better water quality.
- **Strawberry Ranch 3 Future Development (Growth)—**Development is expected in this area of Strawberry Ranch 3. An estimate of potential new pipeline was made to aid in capital improvement program planning.
- **Tank Farm Future Development (Growth)**—Pipeline has been installed to serve future Tank Farm development. However, at the time of this report development, the pipeline has not been placed into service, as no new customers have materialized.
- **Rimwood Future Development (Growth)—**Development is expected in this area of Rimwood. An estimate of potential new pipeline was made to aid in capital improvement program planning.
- **Repurpose Strawberry Creek Foothills Tank—**To provide a useable supply in the area. The existing Strawberry Creek Foothills grade line is too low to be of service to the Rimwood zone. It is recommended to repurpose this tank to provide a useable supply to an area in need. Not shown on a figure.
- **Purchase Existing or Install New Water Supply Well(s)—**To provide enough supply to meet maximum day demands at build-out. Not shown on a figure.

Improvement scenarios reviewed, but not included as recommended improvements, include the following:

- **Fire Suppression Level of Service—**No projects were recommended to increase the level of fire suppression service. In order to increase the level of fire suppression service, high capacity pumps and larger-diameter pipeline would be needed system-wide. The cost of upgrading the system to provide fire suppression is expensive, and the PSWID Board provided direction not to include these upgrades in the system, as noted in Section 3. However, as natural re-development takes place throughout the system, it would be prudent to consider the level of fire suppression desired. There may be opportunities to increase pipeline diameter and pumping capacity over time, to achieve a differing level of service.

4.3.2 Recommended Improvements addressing System Rehabilitation

There are also several projects recommended to replace pipeline assets in very poor condition, as noted in Section 2, that require frequent repairs and maintenance. When these assets fail, customers often experience unplanned outages until the repairs are completed. These projects are listed below and shown on Figures 4-42 through 4-48:

- Milk Ranch to 300 K Transmission Pipeline
- Old County Distribution Pipeline
- Tall Pines Distribution Pipeline
- Canyon Tank / Portal 3 Lower Distribution Pipeline
- Cool Pines Estates Distribution Pipeline
- Strawberry Ranch 3 Distribution Pipeline
- Rimwood Distribution Pipeline

4.3.3 Implementation Schedule and Cost Summaries

The projects identified in Sections 4.3.1 and 4.3.2 were prioritized using a cost-benefit analysis. The costs presented are installed costs and do not include markups for engineering/permitting (typically 10 percent of the total material/installed cost) nor contingency (typically 15 percent of the total material/installed cost). Contractor bid costs such as mobilization/demobilization and their profit are excluded as well.

Summaries of the costs are shown in Tables 4-3 and 4-4. Cost estimates presented in 2014 dollars are presented in Appendix E.

TABLE 4-3

Cost Summaries for Projects that address Growth and Hydraulics

	Quantities			
Project Description	**Pipeline**	**Valves**	**Pump**	**Estimated Project Cost**
Pine				
Portal 3 Middle PRV adjustment		2—6-inch PRVs		**$24,000**
Pine Ranch 1 and Pine Ranch 2 zone realignment	120 ft—6 in	1—closed valve		**$4,600**
Portal 3 Pressure zone realignment (create new zone)	1228 ft—6 in	3—6-inch PRVs 2—closed valves		**$74,840**
Cool Pines Estates pipe upgrade	8470 ft—6 in			**$254,100**
Strawberry Mountain Shadows Bradshaw zone realignment	635 ft—8 in	1—3-inch PRV 2—closed valves	2—50-gpm pump @ 145 ft	**$143,225**
300 K Boosted zone	333 ft—6 in	3—closed valves	1—20-gpm pump @85 ft	**$62,990**

TABLE 4-3

Cost Summaries for Projects that address Growth and Hydraulics

Project Description	Quantities: Pipeline	Valves	Pump	Estimated Project Cost
Old County zone realignment	580 ft—6 in	1—6-inch PRV 2—closed valves		**$31,400**
Canyon Tank Brook View Terrace looping	1760 ft—6 in			**$43,200**
Pine Ranch 1 future development	9050 ft—6 in			**$271,500**
Hidden Pines future development	2170 ft—6 in			**$65,100**
Canyon Tank Brook View Terrace future development	7380 ft—6 in			**$221,400**
Bradshaw future development	4750 ft—6 in			**$142,500**
Old County future development	6380 ft—6 in			**$191,400**
Tall Pines future development	2610 ft—6 in			**$78,300**
300 K future development	4480 ft—6 in			**$156,800**
Fara Booster upgrade			2—10 gpm pumps @ 205 ft of head	**$100,000**
Strawberry				
Rimwood looping	3880 ft—6 in			**$116,400**
Strawberry Ranch 3 PRVs	1600 ft—6 in	2—6-inch PRVs		**$72,000**
Strawberry View 1 looping	1710 ft—6 in			**$51,300**
Strawberry Ranch 3 future development	5220 ft—6 in			**$156,450**
Tank Farm future development	4002 ft—8 in			**$0**
Rimwood future development	6025 ft—6 in			**$180,750**

TABLE 4-4

Cost Summaries for Projects that Address Rehabilitation

Project Description	Quantities: Pipeline	Valves	Pump	Estimated Project Cost
Pine				
Milk Ranch to 300 K transmission pipeline	1870 ft—6 in			**$56,100**
Old County distribution pipeline	514 ft—2 in 3425 ft—3 in 774 ft—6 in			**$102,200**
Tall Pines distribution pipeline	9535 ft—2 in 5207 ft—4 in 1056 ft—6 in			**$352,555**

TABLE 4-4

Cost Summaries for Projects that Address Rehabilitation

	Quantities			
Project Description	**Pipeline**	**Valves**	**Pump**	**Estimated Project Cost**
Canyon Tank/Portal 3 Lower distribution pipeline	824 ft—2 in 1470 ft—3 in 4697 ft—6 in			**$186,790**
Cool Pines Estates distribution pipeline	15820 ft—2 in			**$316,400**
Strawberry				
Strawberry Ranch 3 distribution pipeline	3100 ft—3 in			**$62,000**
Rimwood distribution pipeline	1346 ft—2 in 1614 ft—3 in 2645 ft—4 in 13205 ft—6 in			**$494,555**

The projects were prioritized using equally weighted criteria and performance measure scales for each of the criterion. The criteria and scales used to score each of the projects are shown in Table 4-5.

TABLE 4-5

Scoring Matrix for Improvement Projects

Criterion	Weight	0	1	3	5	7	10
Condition (Physical/ Performance)	**25%**	Project is for new asset without replacement of existing	Project addresses asset in good physical condition or replaces asset that experiences limited failures	Project addresses asset in fair physical condition or replaces asset that experiences occasional failures		Project addresses asset in poor physical condition or replaces asset that experiences failures more than expected but not routinely failing	Project addresses asset in very poor physical condition or replaces asset that experiences routine failures
Reliability	**25%**	Project has no impact on reliability (pressure/capacity/ redundancy)		Project has low impact on reliability (pressure/capacity/ redundancy)	Project has moderate impact on reliability (pressure/capacity/ redundancy)	Project has significant impact on reliability (pressure/capacity/ redundancy)	Project has a major impact on reliability (pressure/capacity/ redundancy)
O&M Efficiency	**25%**	Project causes increase in operations and maintenance costs (new PS)	Project has a neutral effect on operations and maintenance costs		Project makes minor contribution to operations and maintenance cost reduction or creates opportunities to improve operational flexibility	Project makes minor contribution to operations and maintenance cost reduction and creates opportunities to improve operational flexibility	Project makes moderate contribution to operations and maintenance cost reduction and creates opportunities to maximize operational flexibility
Community/ Customer	**25%**	Project does not address customer issues or has negative community impacts		Project addresses some customer issues or has smaller-scale positive community impacts		Project addresses significant customer issues or has large-scale positive community impacts	Project increases customer satisfaction levels and has large-scale positive community impacts

Scoring each of the projects against the matrix above yields a benefit score for each project. The maximum benefit a project may achieve is 100 points. Details of the project scoring are shown in Appendix F. The project benefits are shown in Figure 4-49. A higher bar indicates higher benefit. Cost was also factored into the analysis using the costs from the tables, and a benefit-cost curve was developed as shown in Figure 4-50. Projects on the left side have more benefit per dollar and the benefit/cost ratio decreases towards the right. As can be seen in the analysis, nearly all of the projects that serve growth have low benefit scores and subsequent benefit-cost scores, since they do not address existing assets. Also, PSWID may consider to have these growth projects funded or partially funded by the developers that plan to develop these areas.

Based on the benefit-cost analysis, CH2M HILL grouped the projects into high, medium, and low priority categories, as shown in Table 4-6. PSWID should consider implementing the higher priority projects first as they provide the highest benefit per project dollar.

TABLE 4-6
Project Priority Groups

Project Name	Total Benefit	Benefit-Cost Score	Project Priority
Pine Ranch 1 and Pine Ranch 2 zone realignment	12.50	2717.39	High
Milk Ranch to 300 K transmission pipeline	100.00	1782.53	High
Strawberry Ranch 3 distribution pipeline	80.00	1290.32	High
300 K Boosted zone	47.50	754.09	High
Strawberry View 1 looping	32.50	633.53	High
Strawberry Ranch 3 PRVs	45.00	625.00	High
Canyon Tank Brook View Terrace looping	25.00	578.70	High
Old County zone realignment	17.50	557.32	High
Portal 3 Middle PRV adjustment	12.50	520.83	High
Old County distribution pipeline	52.50	513.70	High
Fara Booster upgrade	40.00	400.00	Medium
Canyon Tank/Portal 3 Lower distribution pipeline	65.00	347.98	Medium
Rimwood looping	32.50	279.21	Medium
Hidden Pines future development	17.50	268.82	Medium
Portal 3 Pressure zone realignment (create new zone)	20.00	267.24	Medium
Tall Pines future development	17.50	223.50	Medium
Cool Pines Estates pipe upgrade	45.00	177.10	Medium
Tall Pines distribution pipeline	57.50	163.10	Medium
Cool Pines Estates distribution pipeline	50.00	158.03	Medium
Bradshaw future development	17.50	122.81	Low
Strawberry Mountain Shadows Bradshaw zone realignment	17.50	122.19	Low
Strawberry Ranch 3 future development	17.50	111.86	Low
300 K future development	17.50	111.61	Low
Rimwood distribution pipeline	55.00	111.21	Low

TABLE 4-6
Project Priority Groups

Project Name	Total Benefit	Benefit-Cost Score	Project Priority
Rimwood future development	17.50	96.82	Low
Old County future development	17.50	91.43	Low
Canyon Tank Brook View Terrace future development	17.50	79.04	Low
Pine Ranch 1 future development	64.46	17.50	Low

FIGURE 4-1
WaterGEMS Scenario Hierarchy

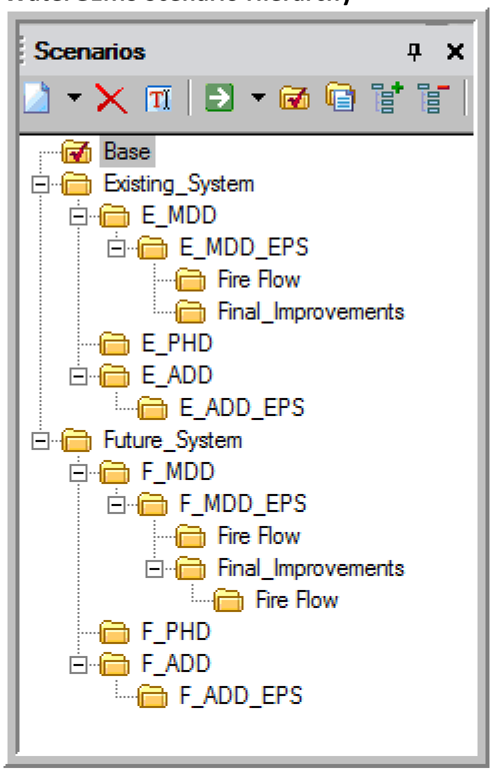


FIGURE 4-2
Diurnal Pattern, 24-hour Period

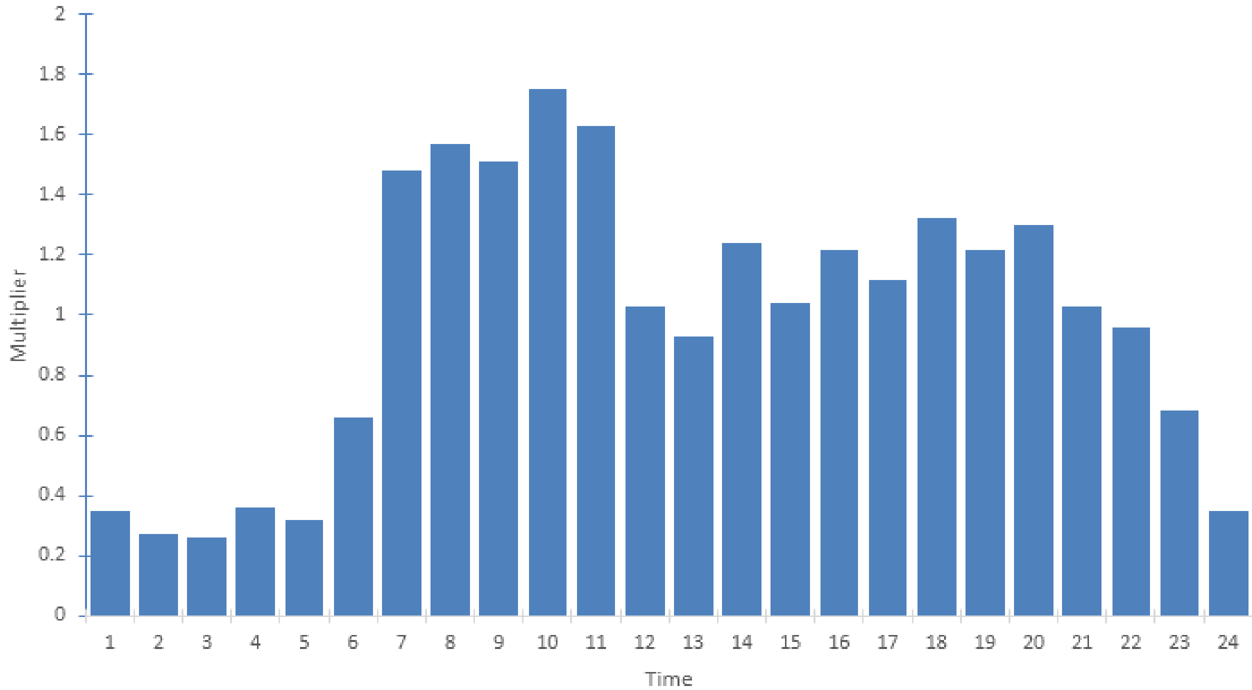


FIGURE 4-3
Pine Existing System Pressure

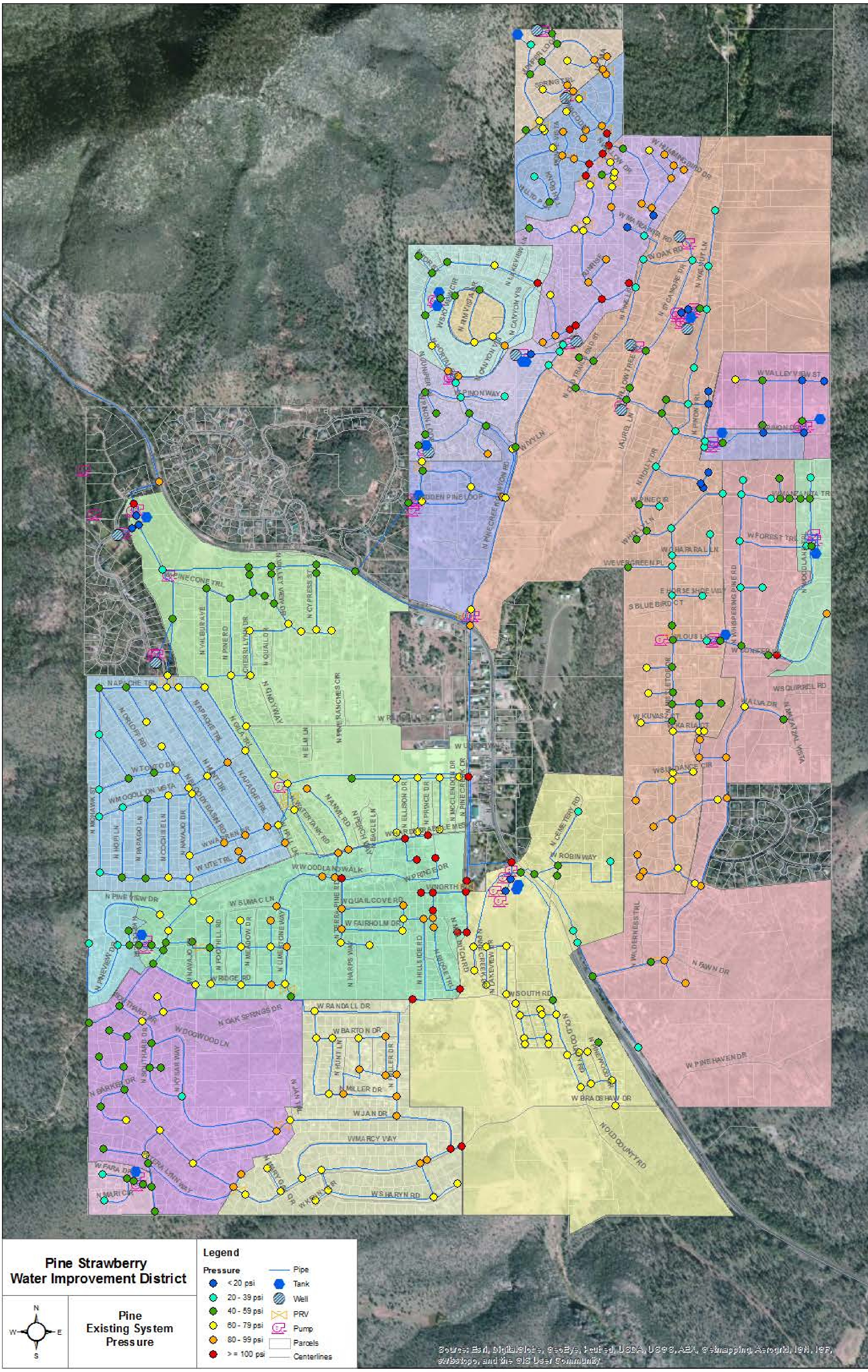


FIGURE 4-4
Pine Existing System Maximum Velocity

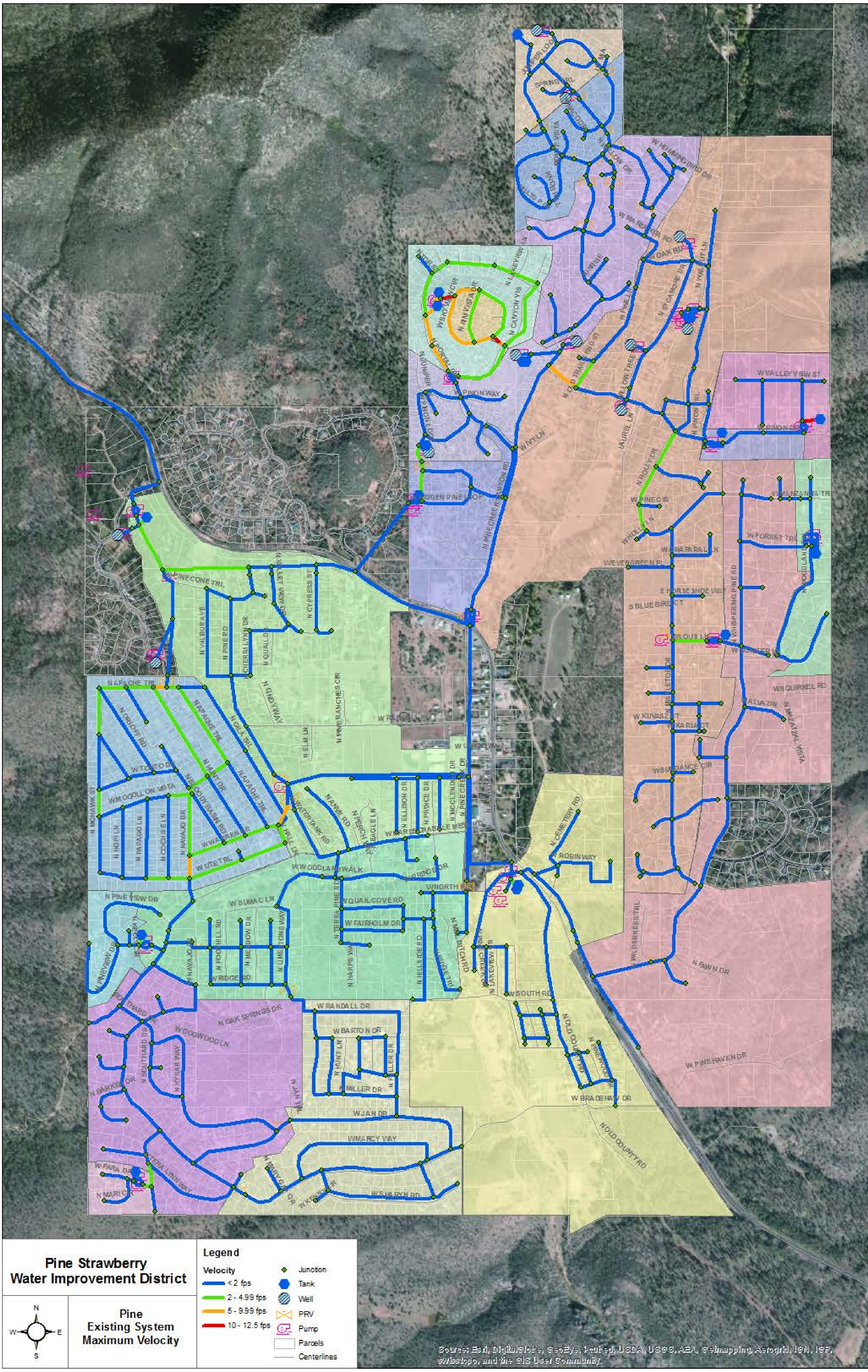


FIGURE 4-5
Strawberry Existing System Pressure

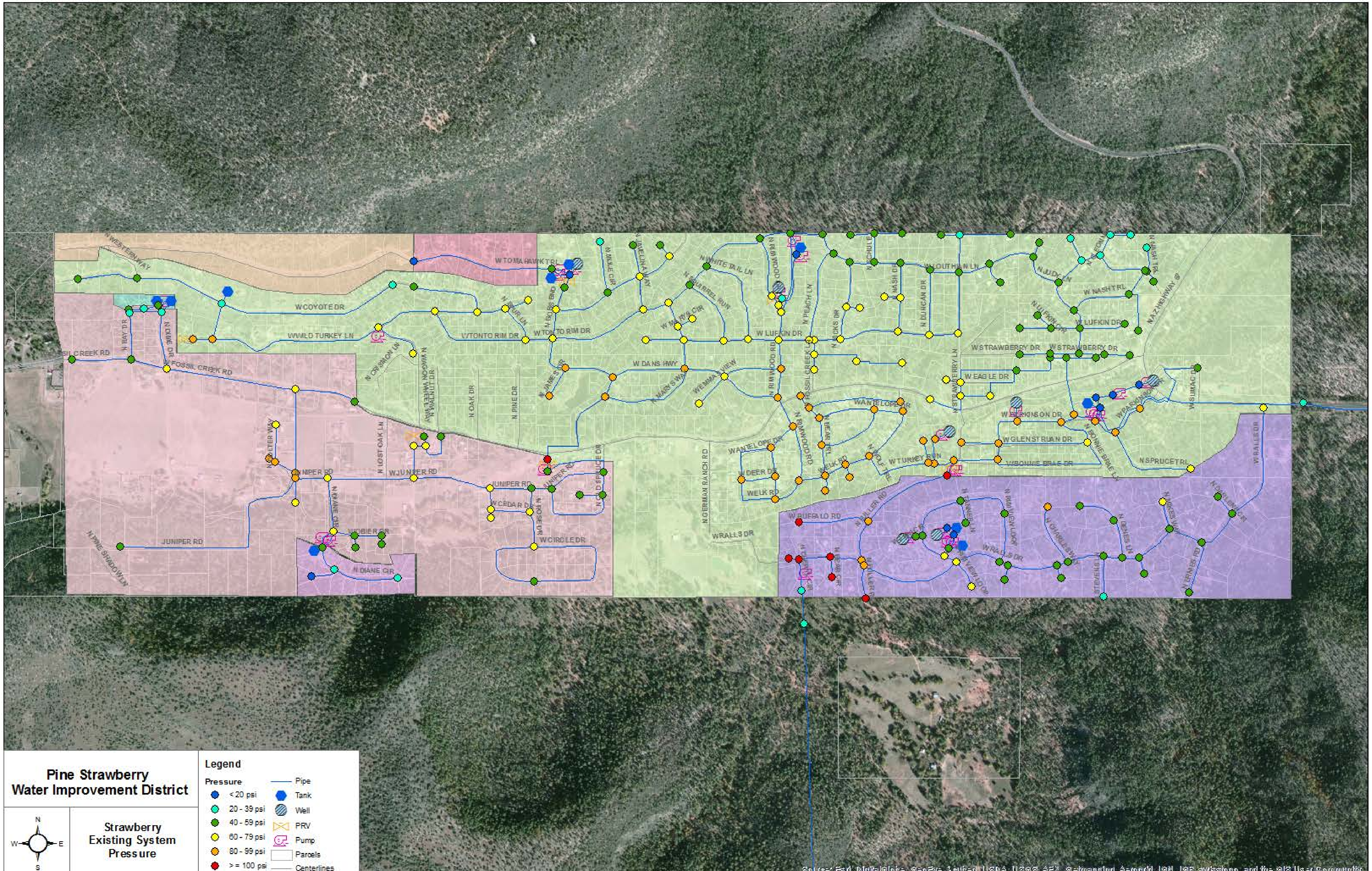


FIGURE 4-6
Strawberry Existing System Maximum Velocity

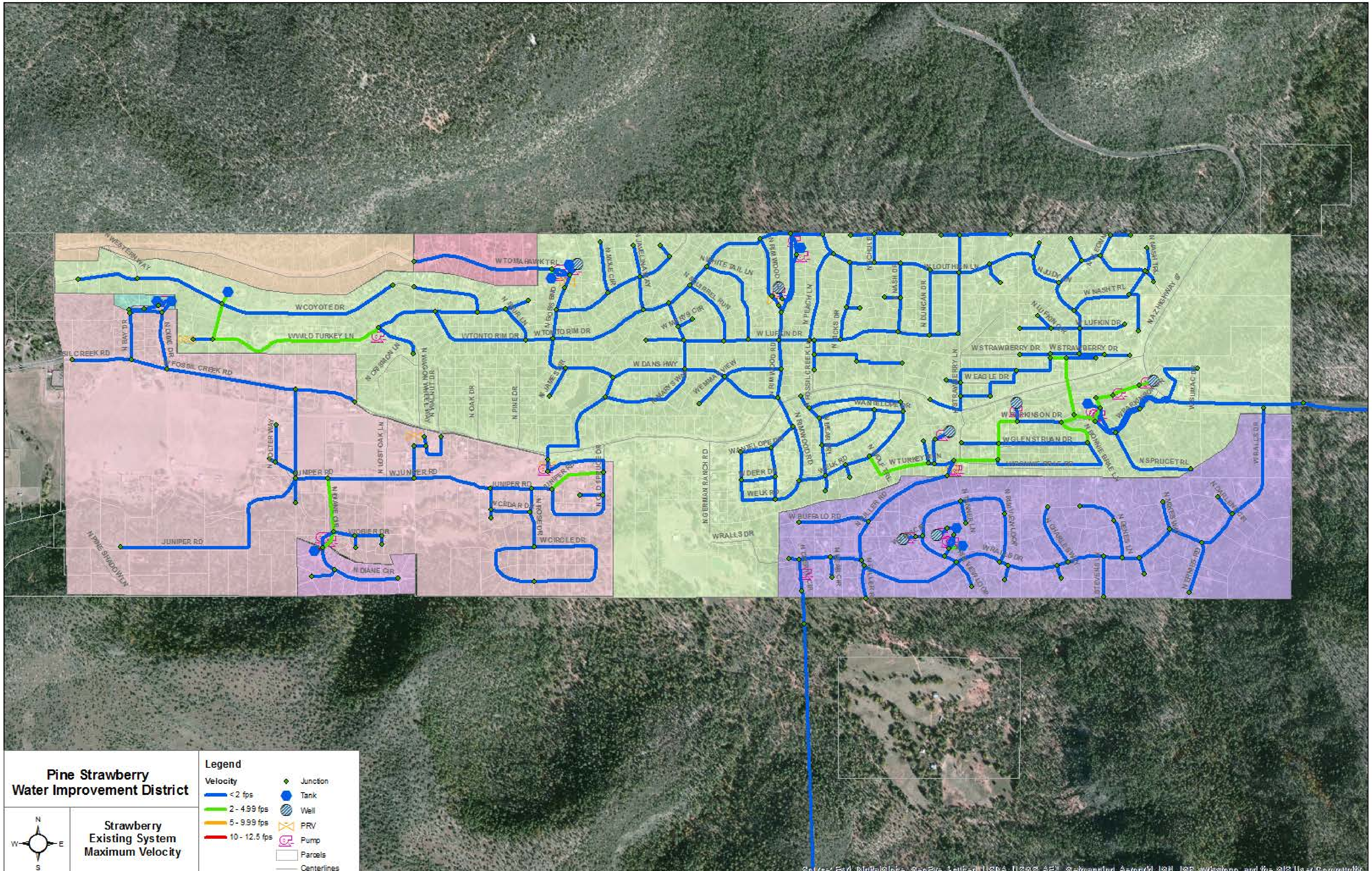


FIGURE 4-7
Pine Existing System Fire Flows

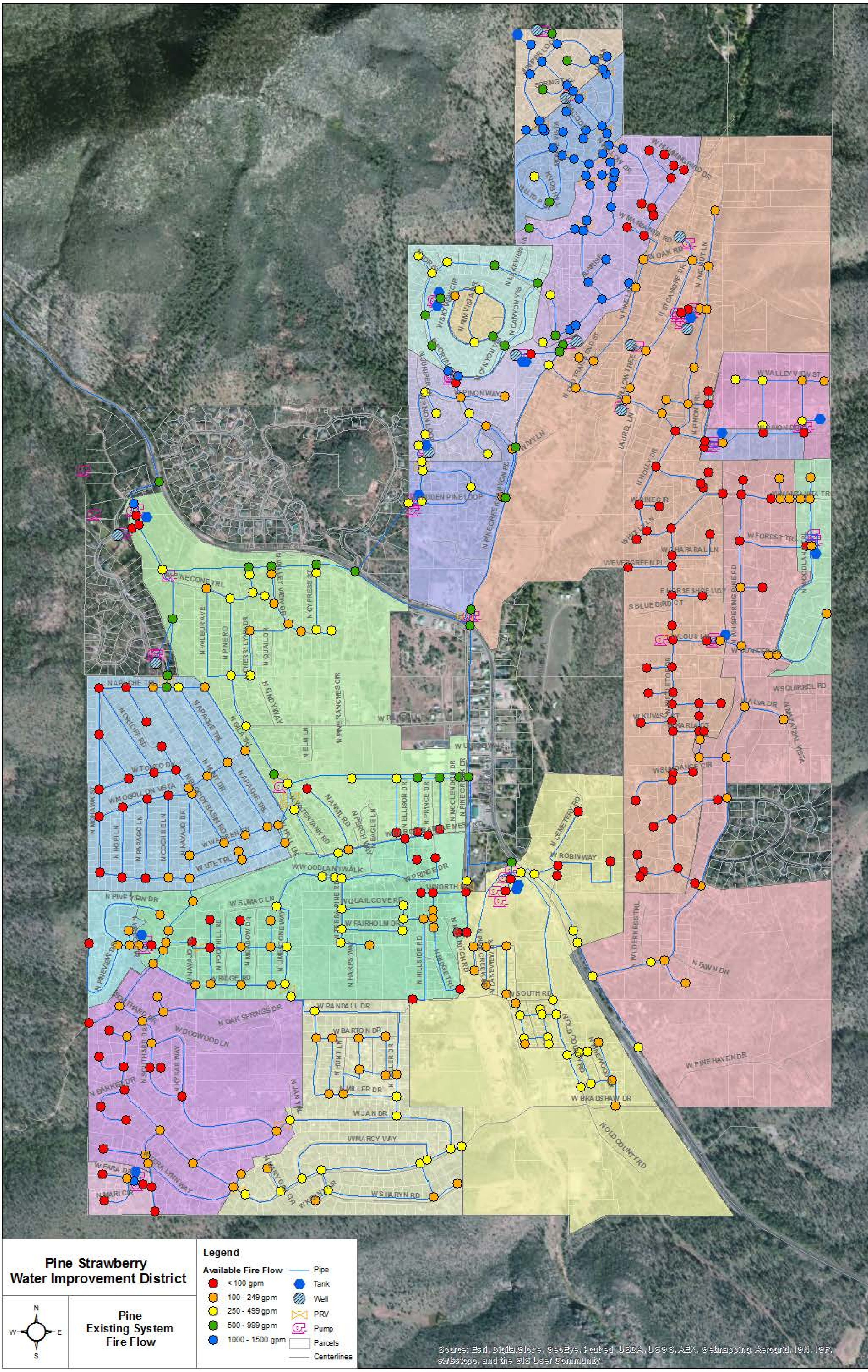


FIGURE 4-8
Strawberry Existing System Fire Flow

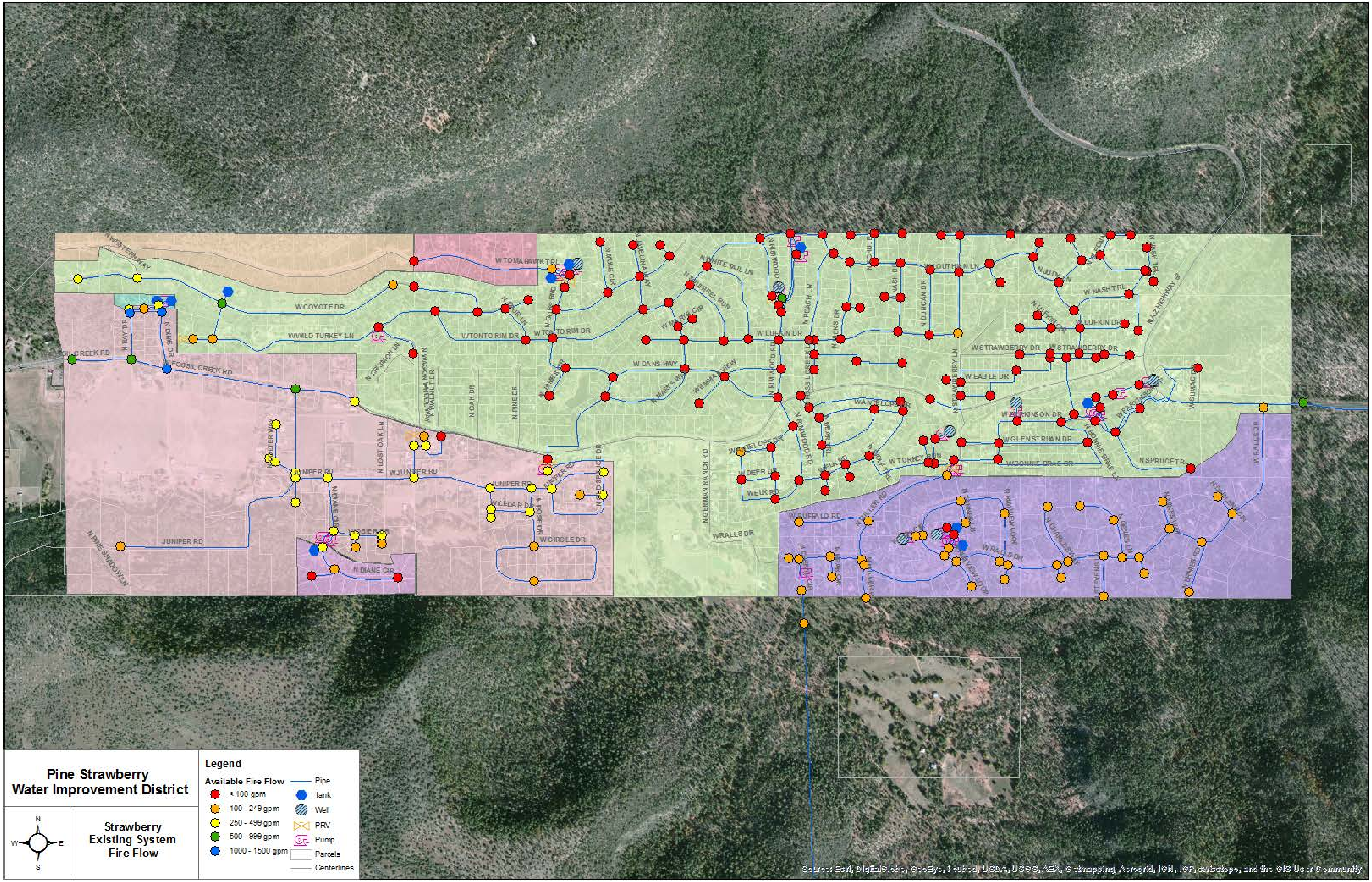


FIGURE 4-9
Pine Future System Pressure

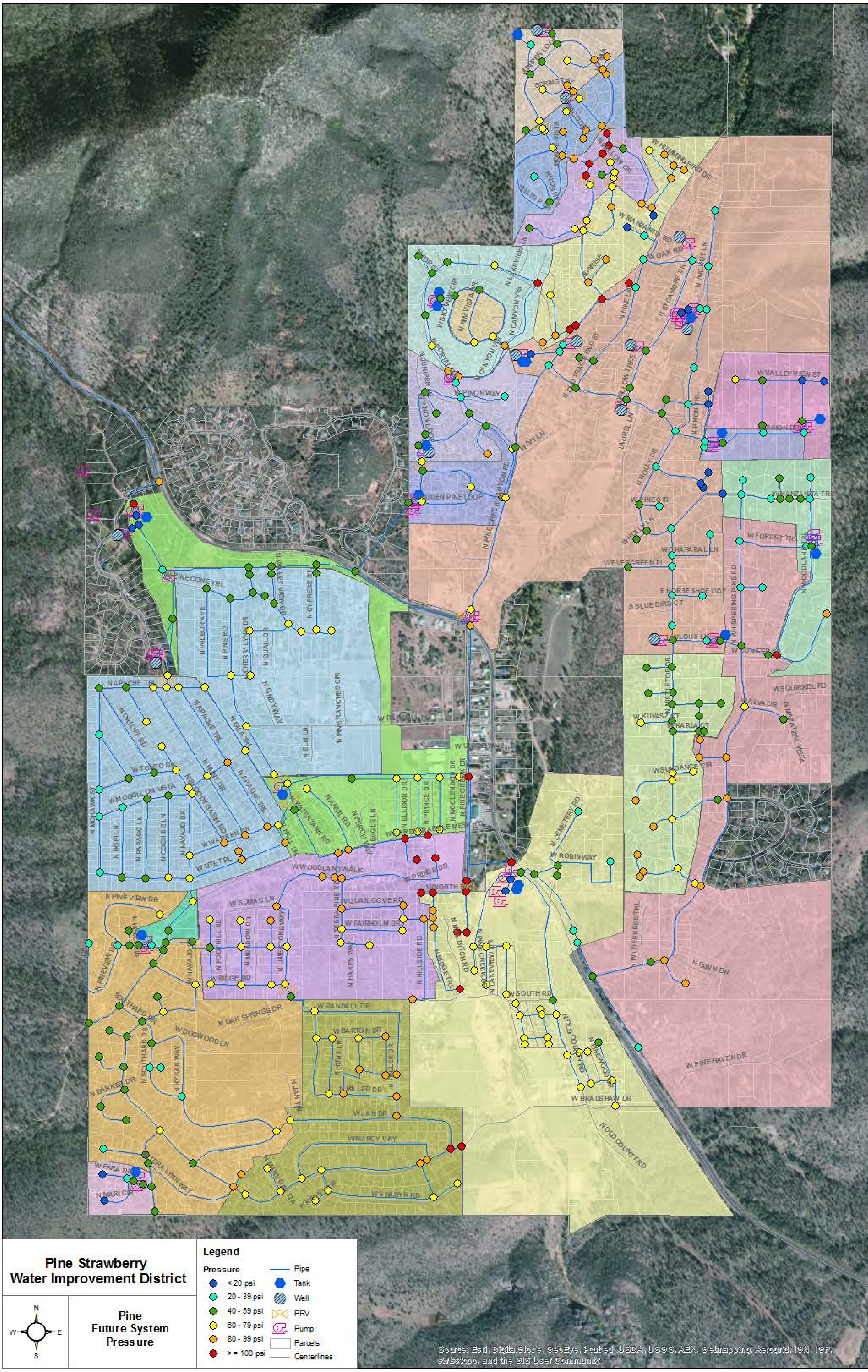


FIGURE 4-10
Pine Future System Maximum Velocity

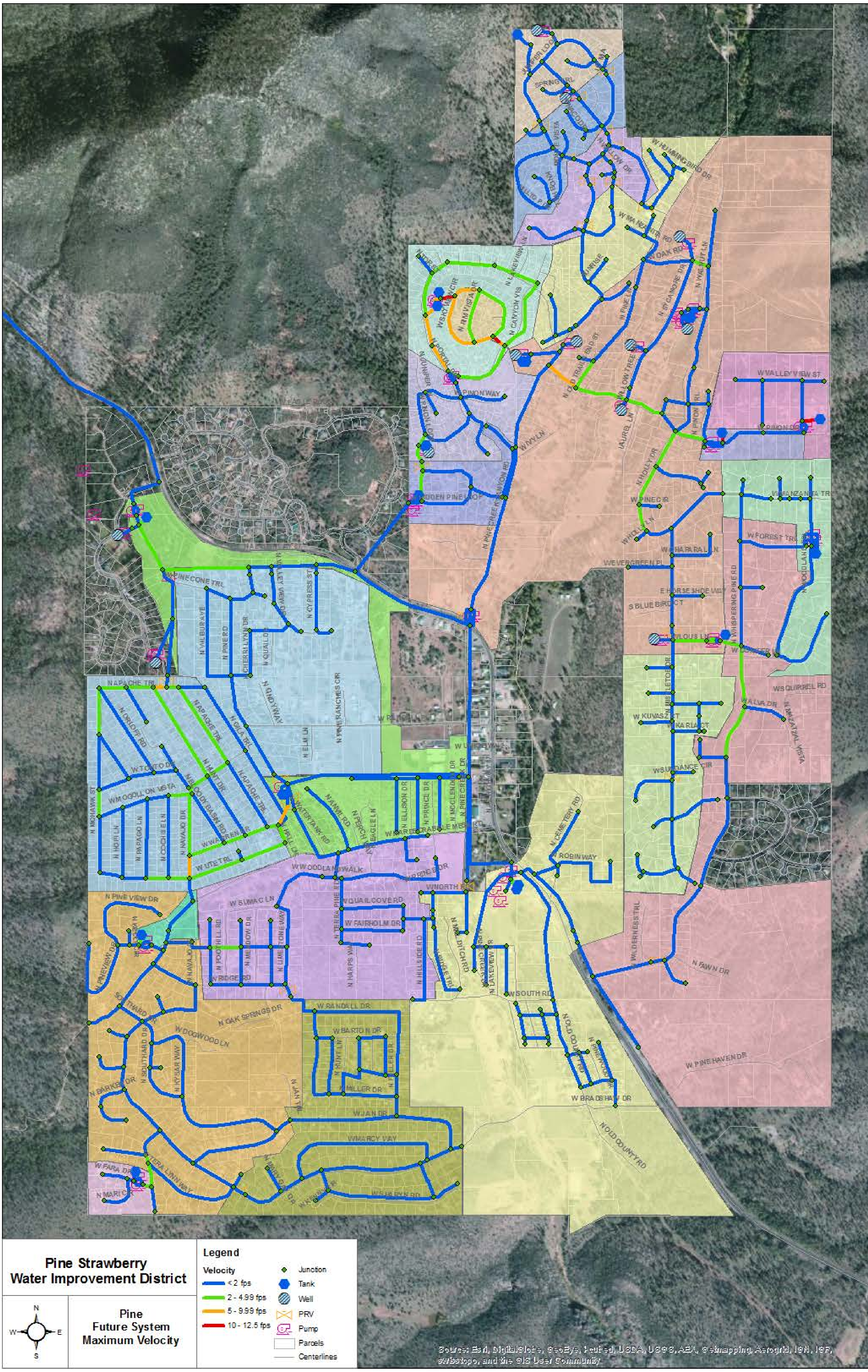


FIGURE 4-11
Pine Future System Fire Flow

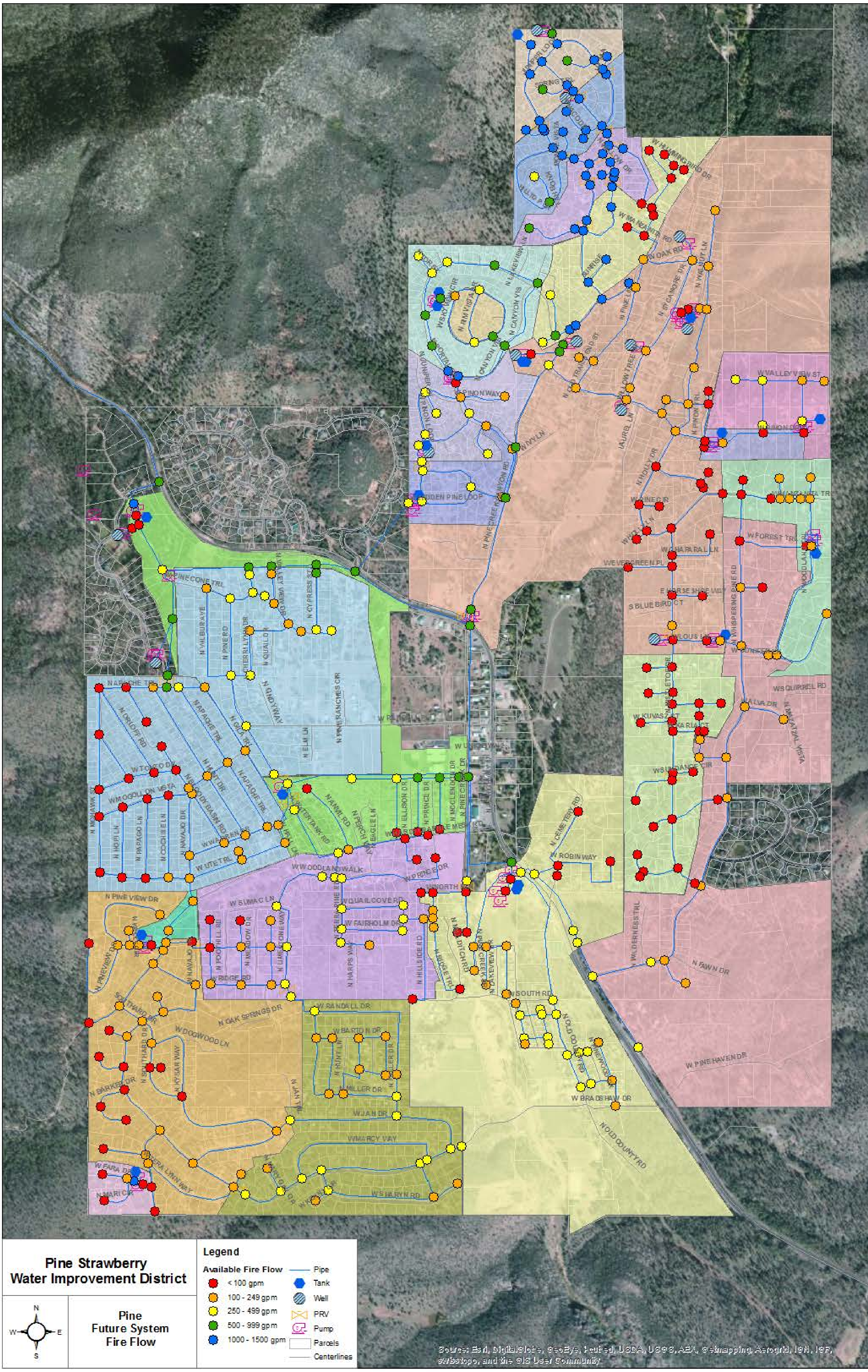


FIGURE 4-12
Strawberry Future System Pressure

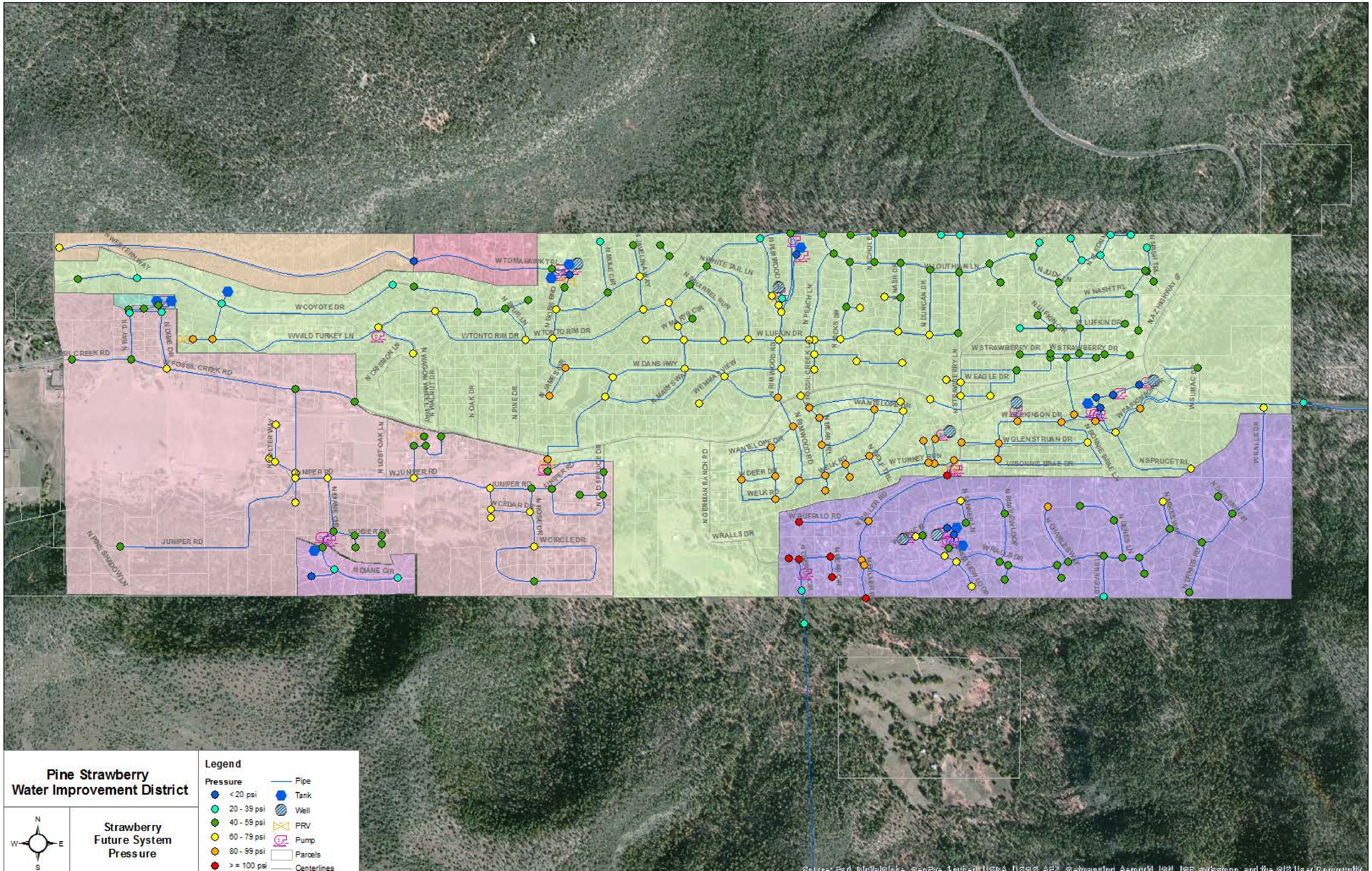


FIGURE 4-13
Strawberry Future System Maximum Velocity

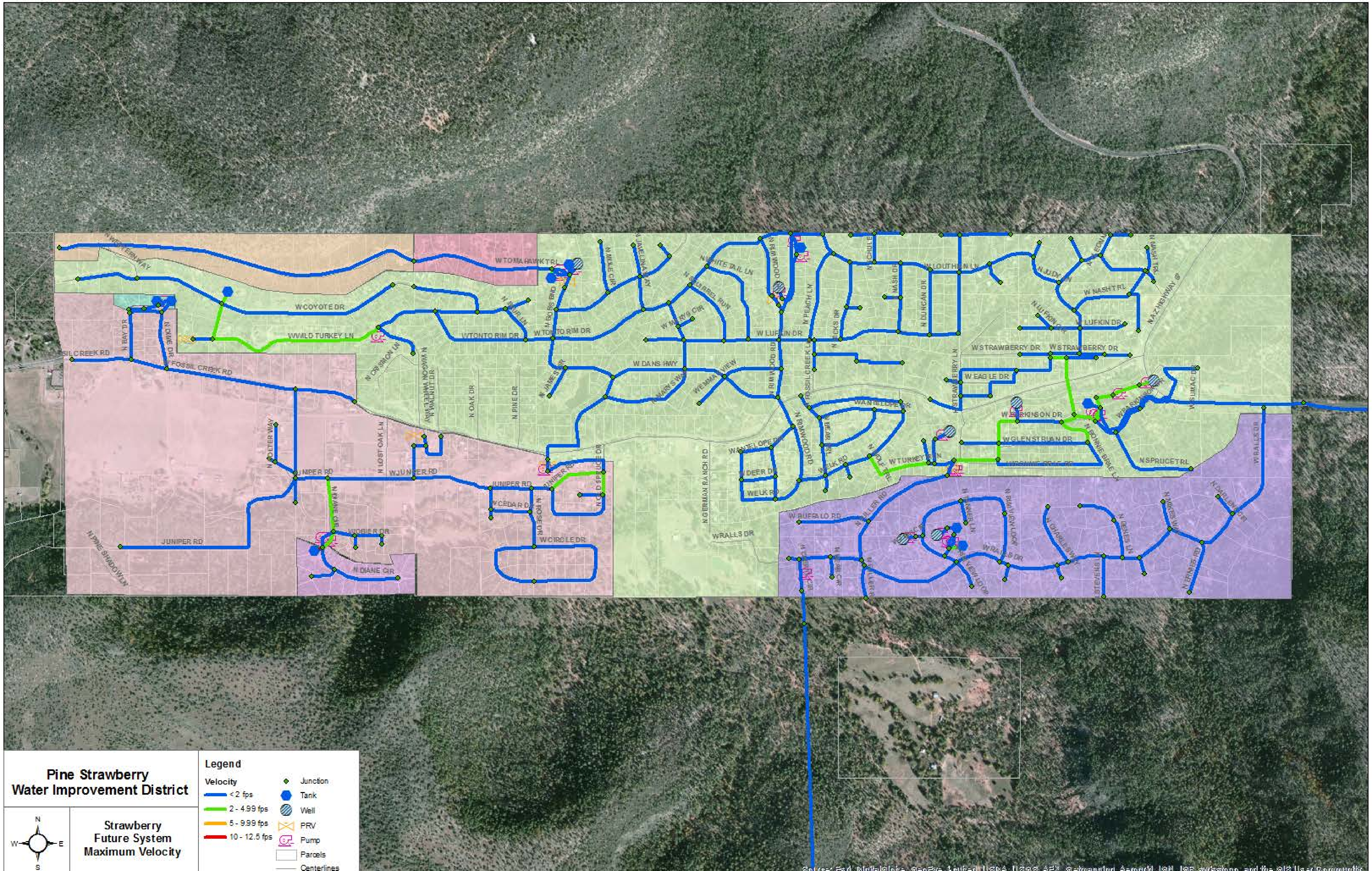


FIGURE 4-14
Strawberry Future System Fire Flow

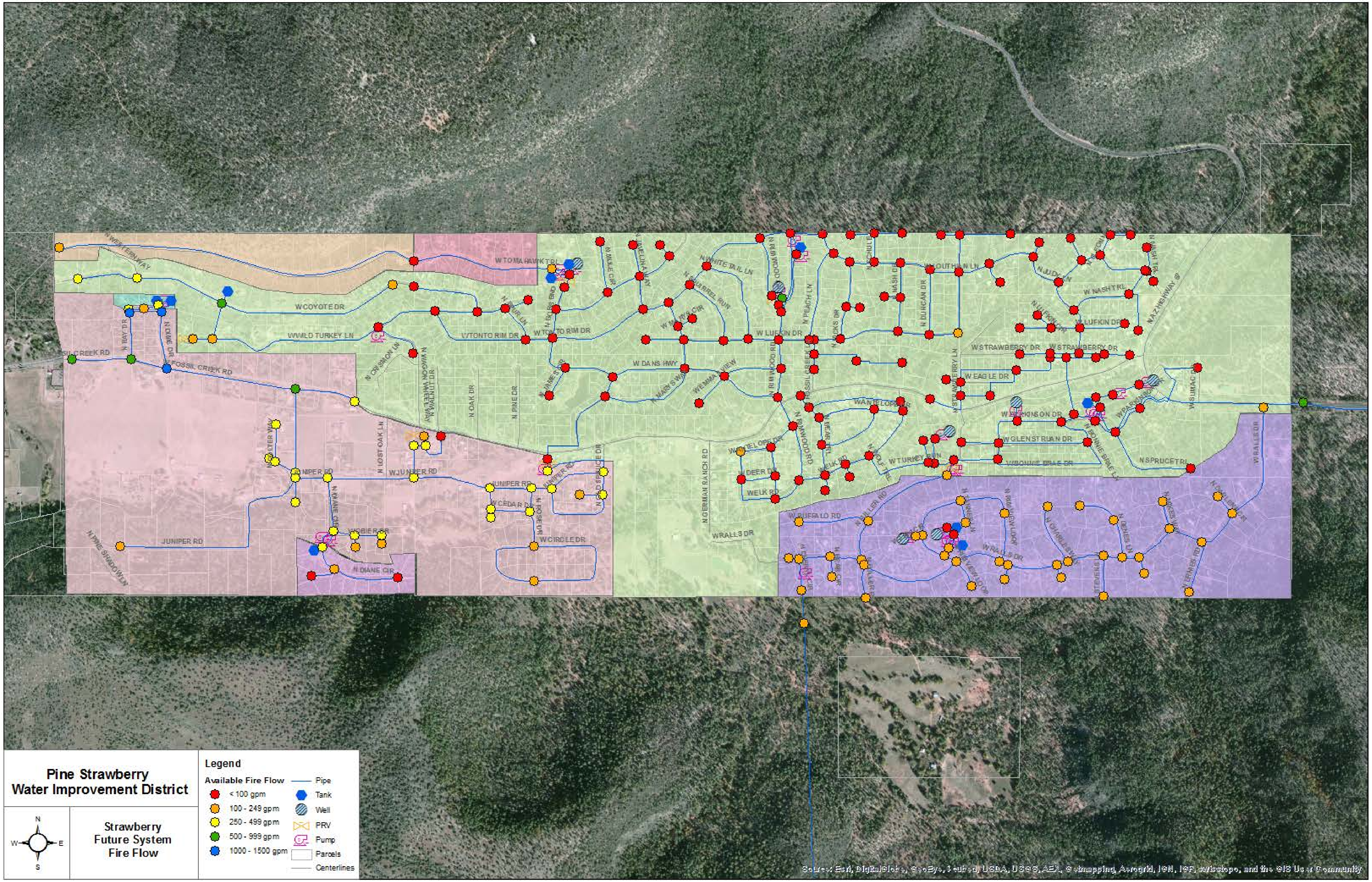


FIGURE 4-15
Pine Future System with Improvements Pressure

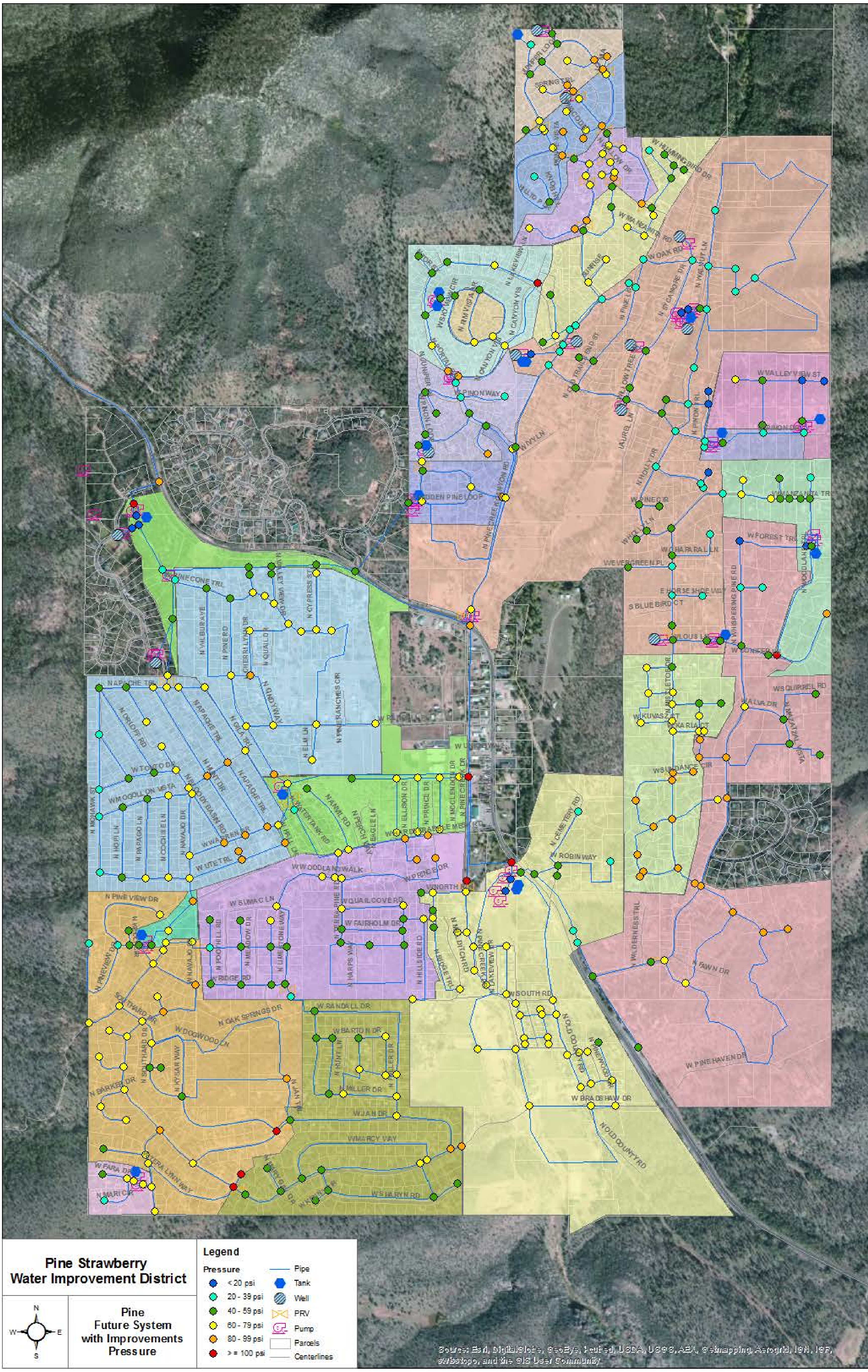


FIGURE 4-16
Pine Future System with Improvements Maximum Velocity

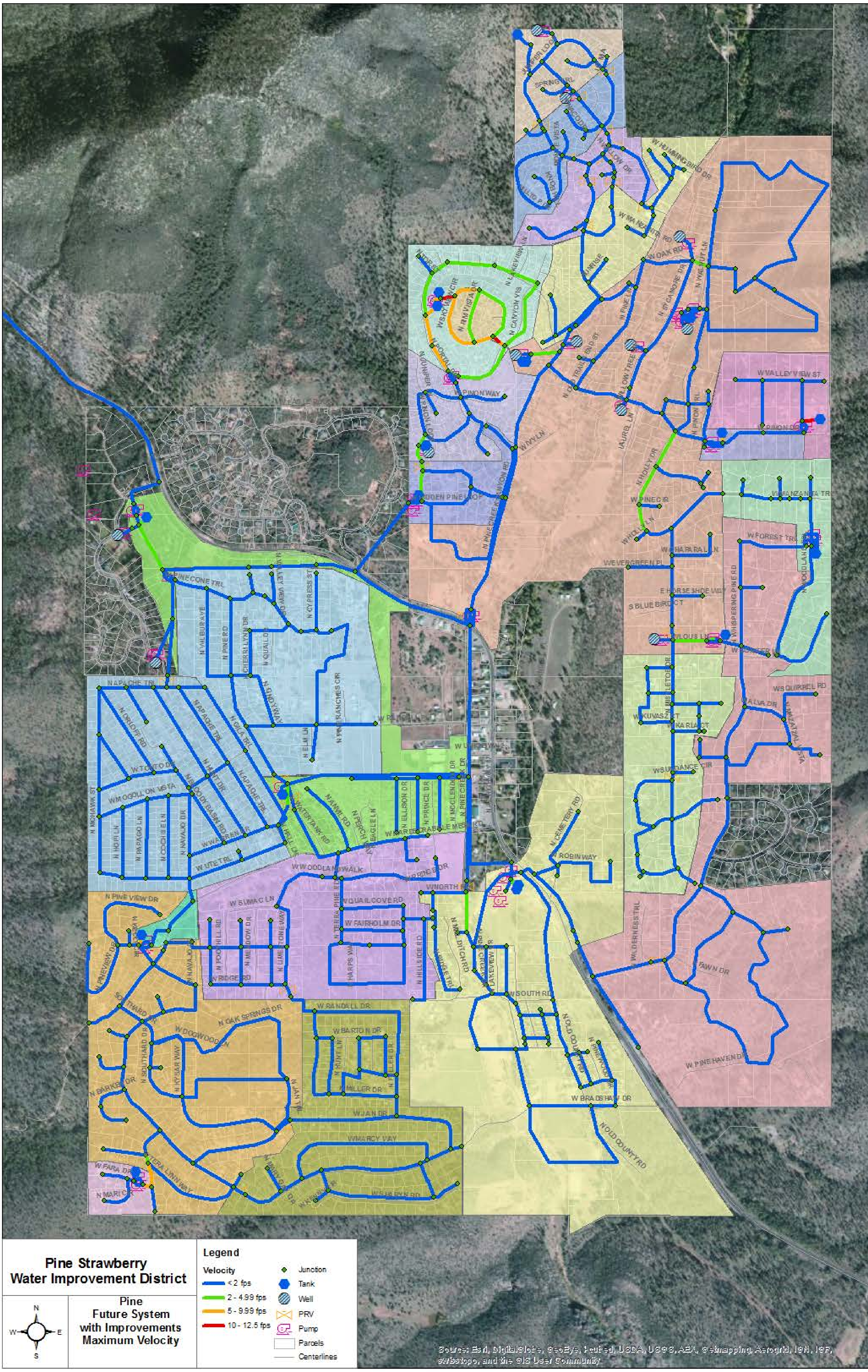


FIGURE 4-17

Pine Future System with Improvements Fire Flow

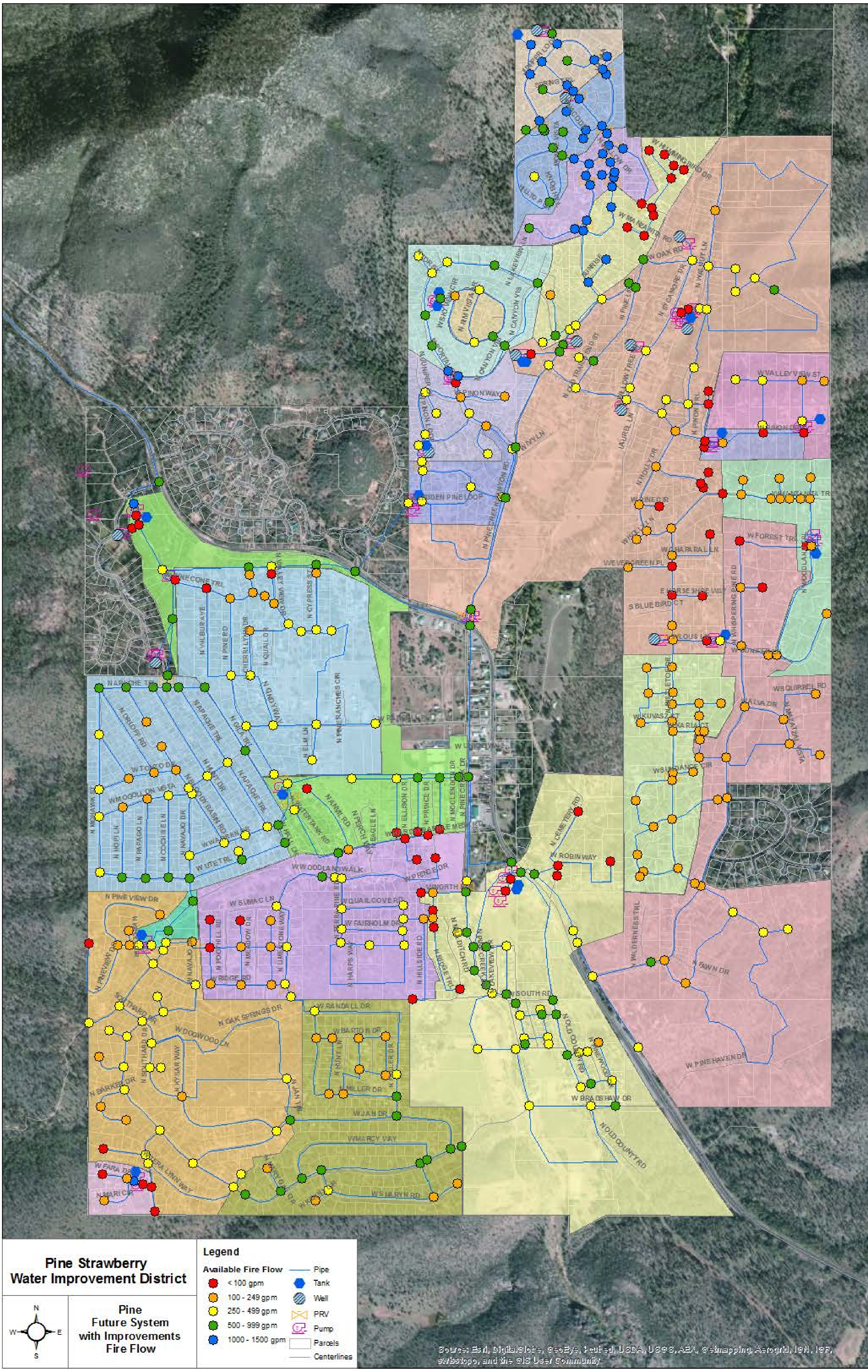


FIGURE 4-18
Strawberry Future System with Improvements Pressure

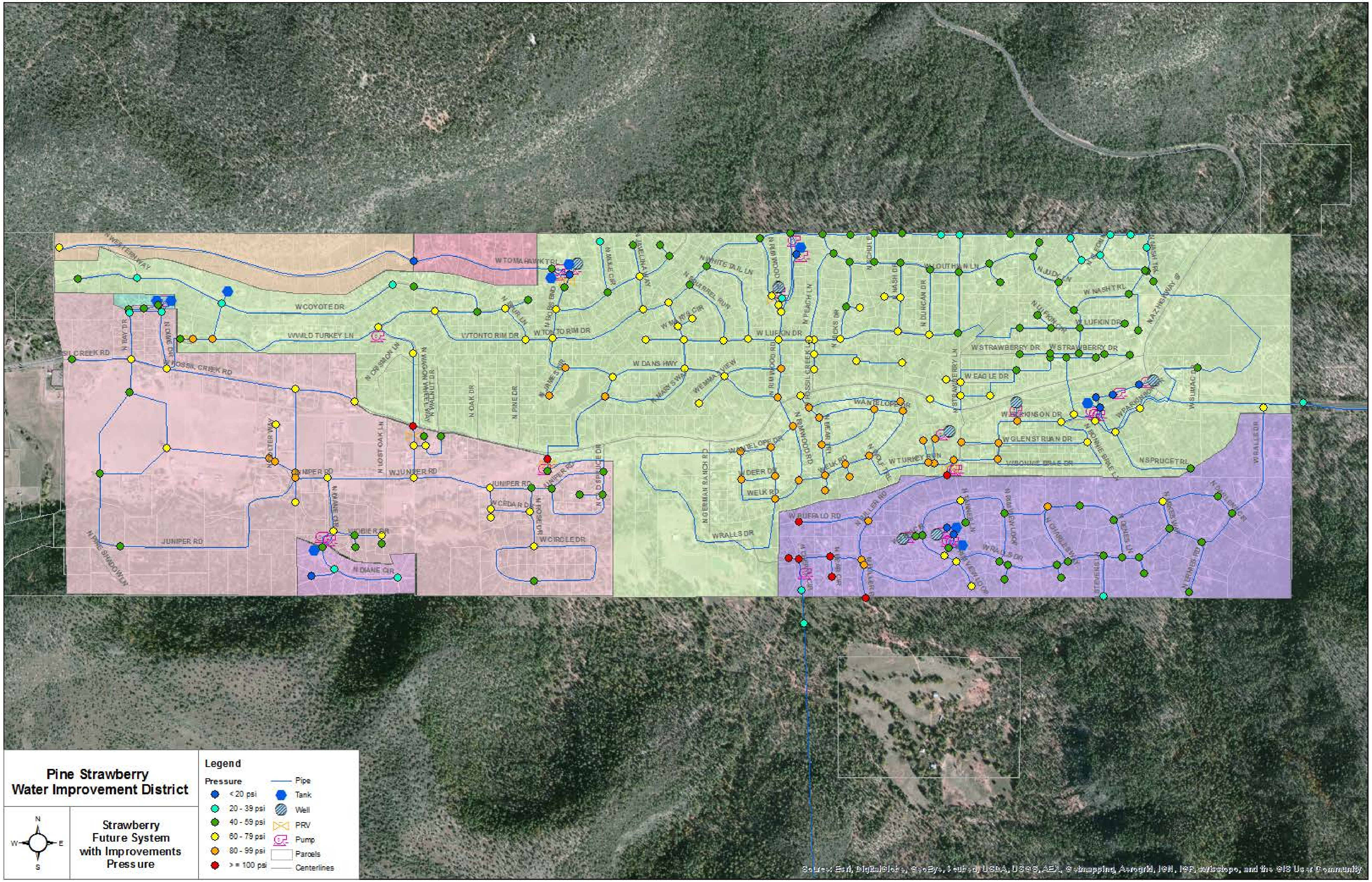


FIGURE 4-19

Strawberry Future System with Improvements Maximum Velocity

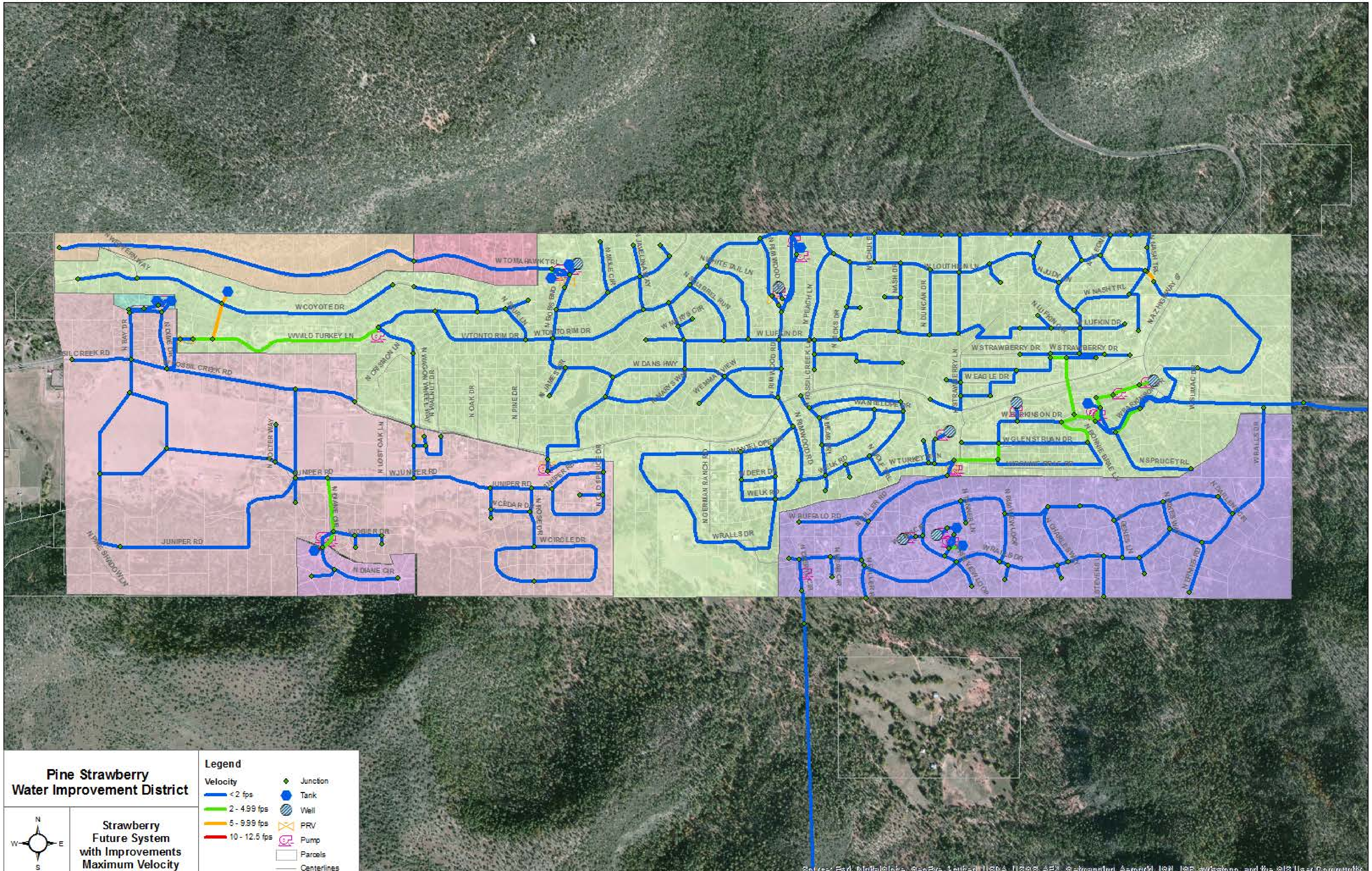


FIGURE 4-20
Strawberry Future System with Improvements Fire Flow

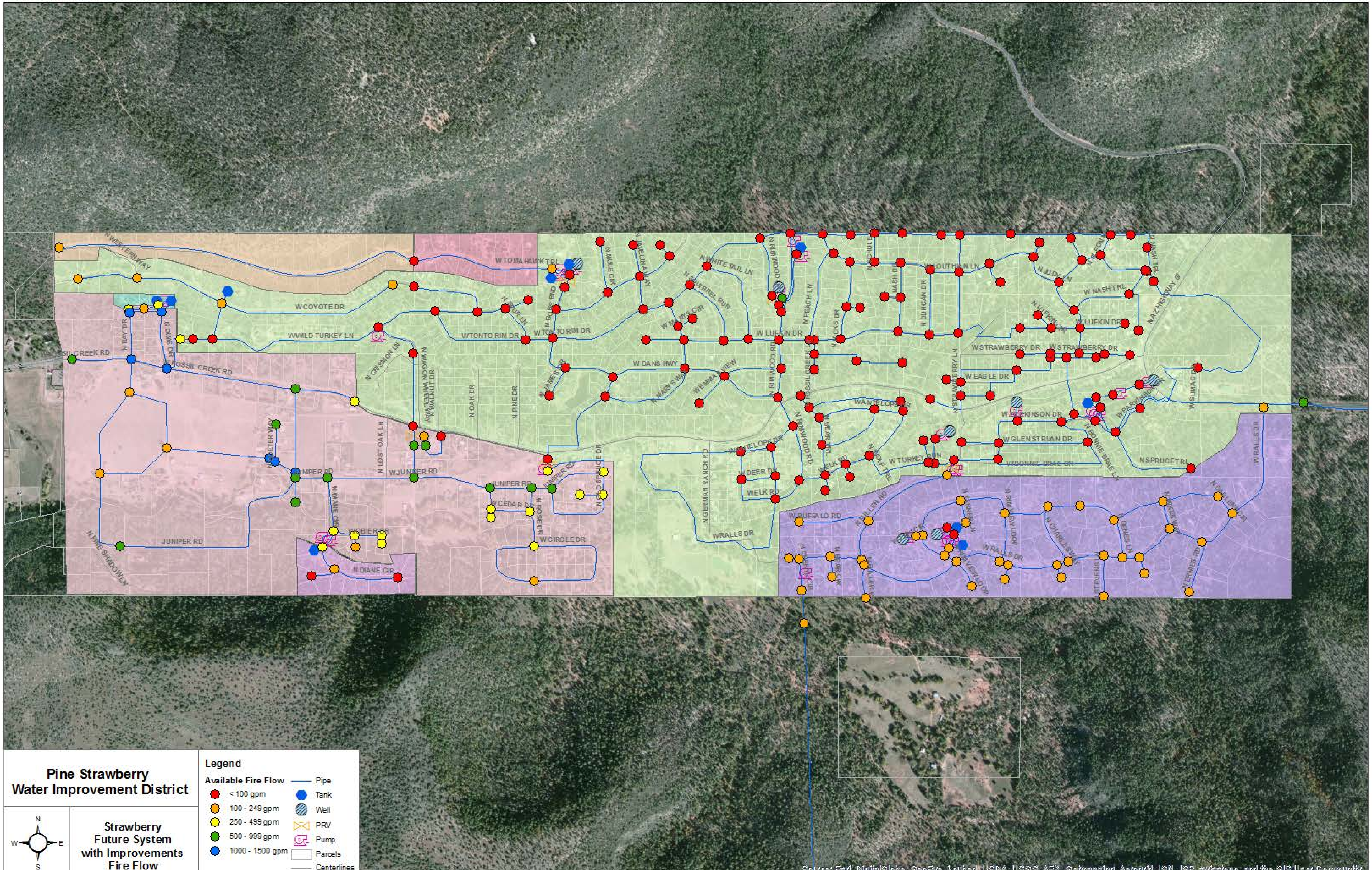


FIGURE 4-21
Portal 3 Middle PRV Adjustment

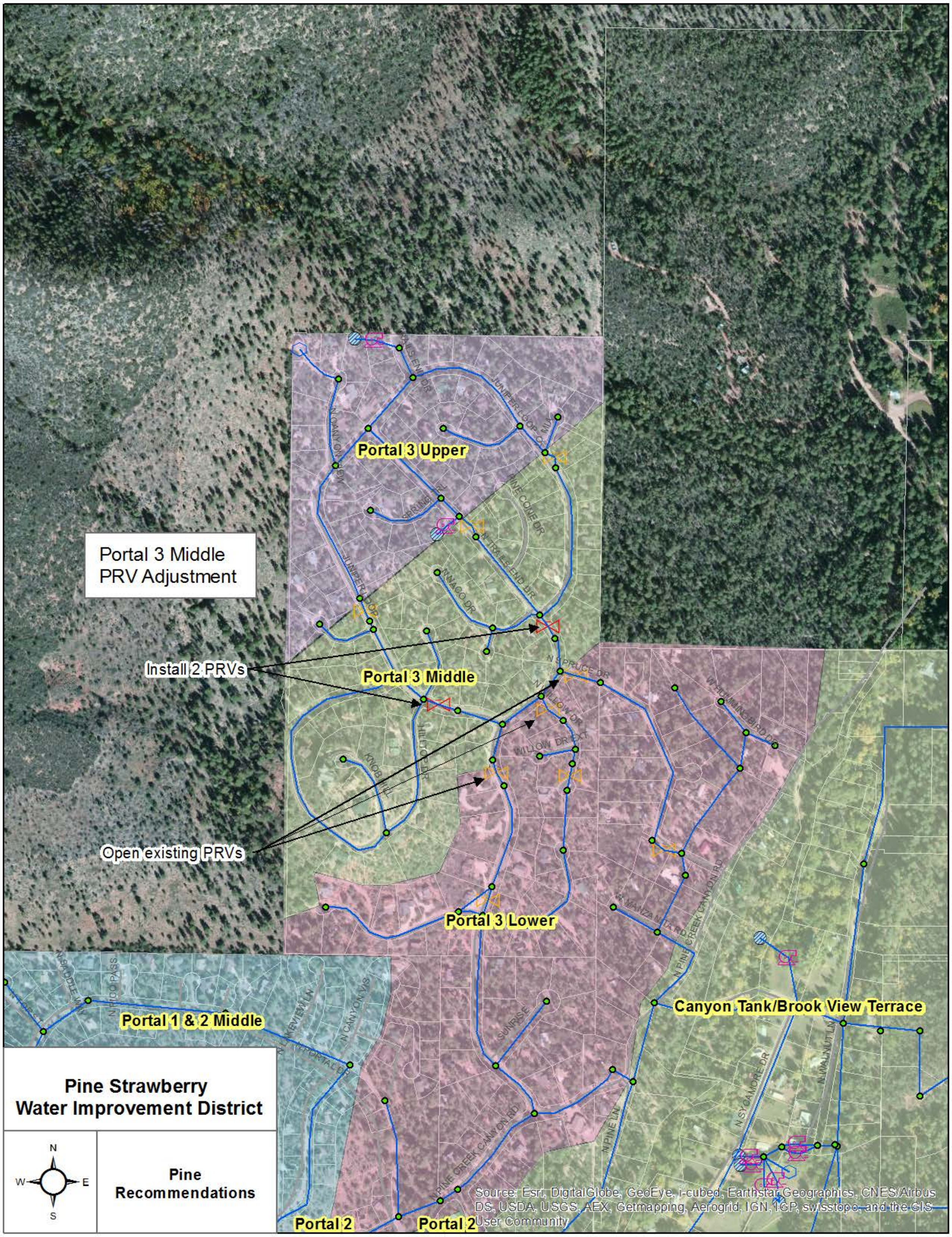


FIGURE 4-22
Pine Ranch 1 and Pine Ranch 2 Zone

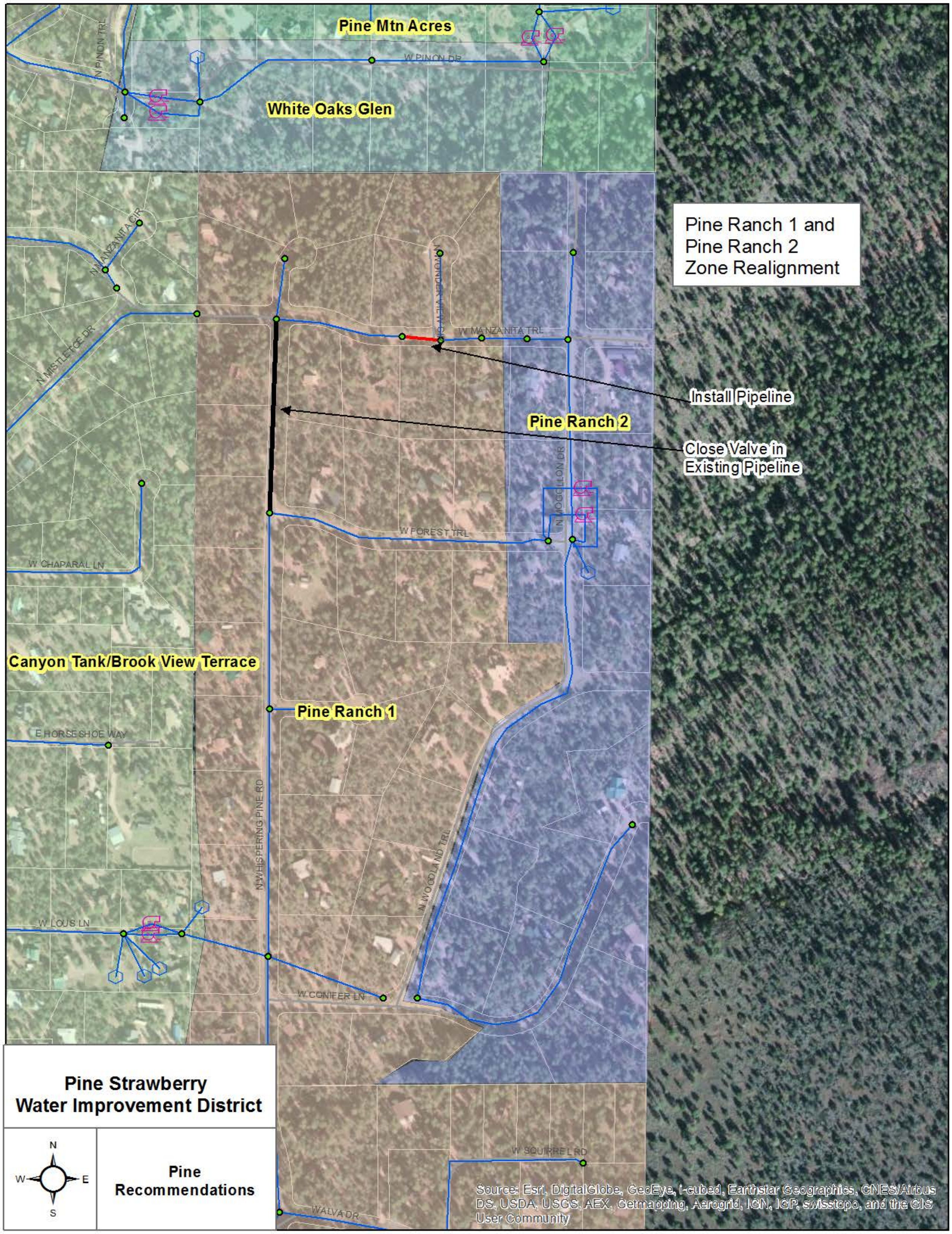


FIGURE 4-23
Portal Pressure Zone Realignment

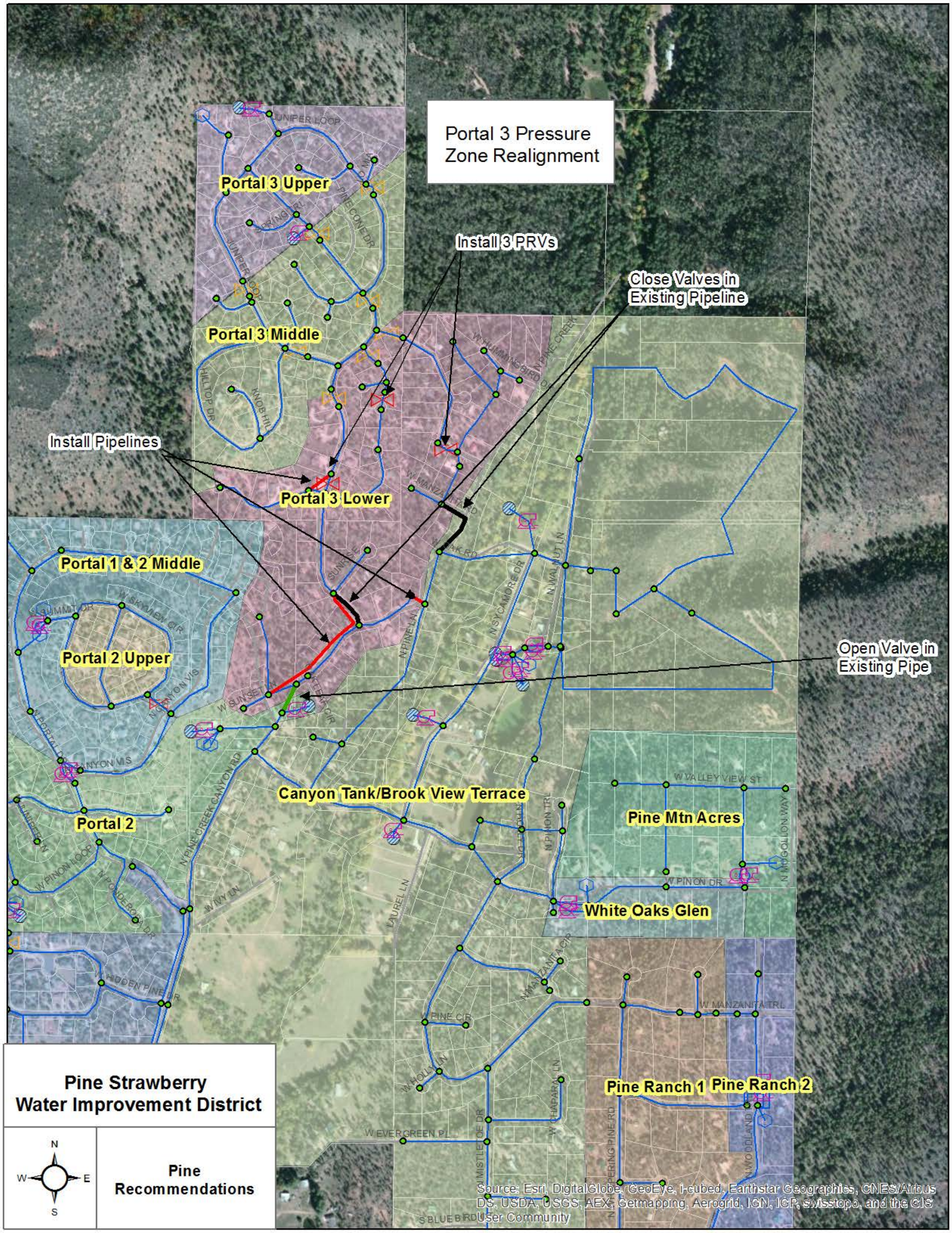


FIGURE 4-24
Cool Pines Estates Pine Upgrade

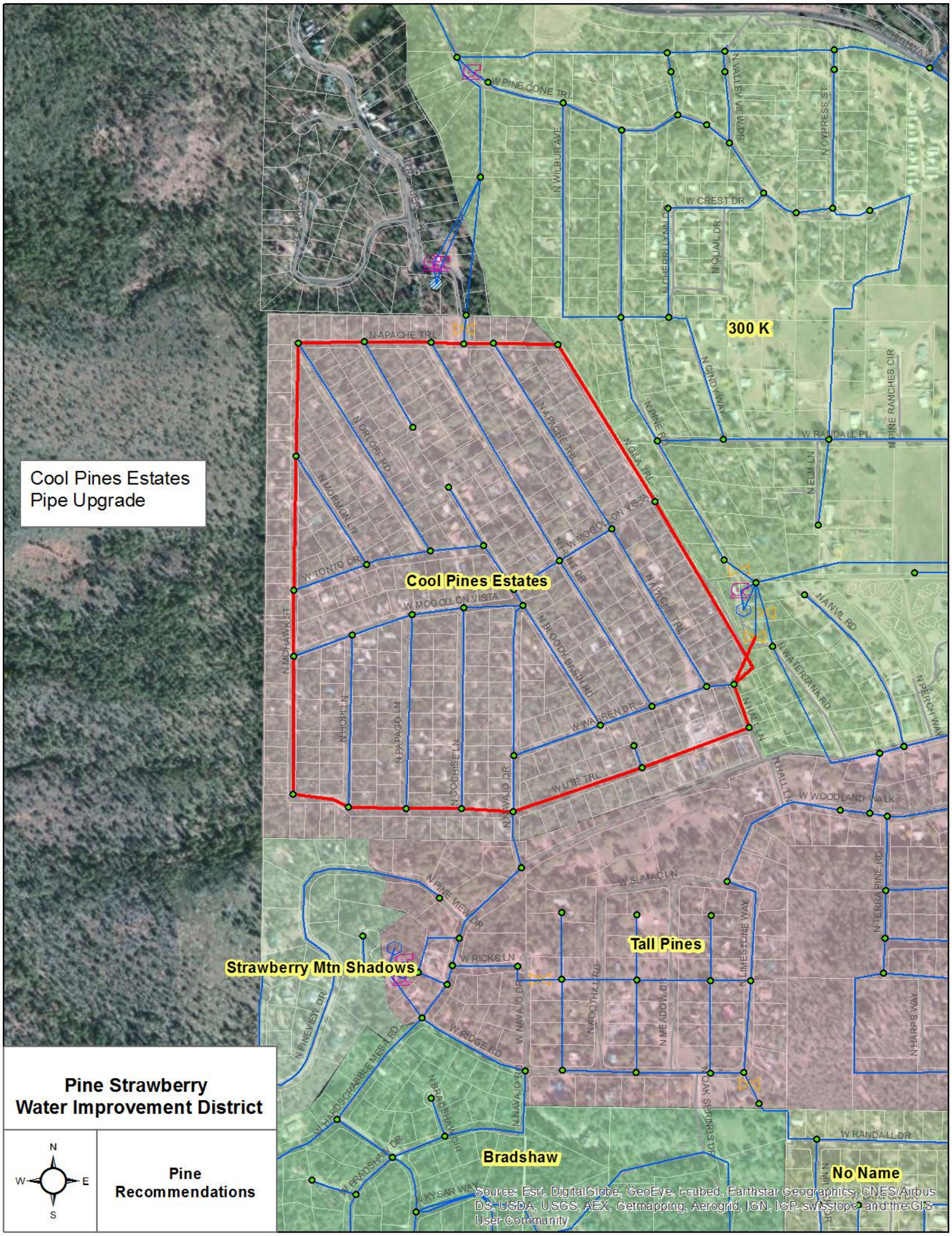


FIGURE 4-25
Strawberry Mountain Shadows Bradshaw Zone Realignment

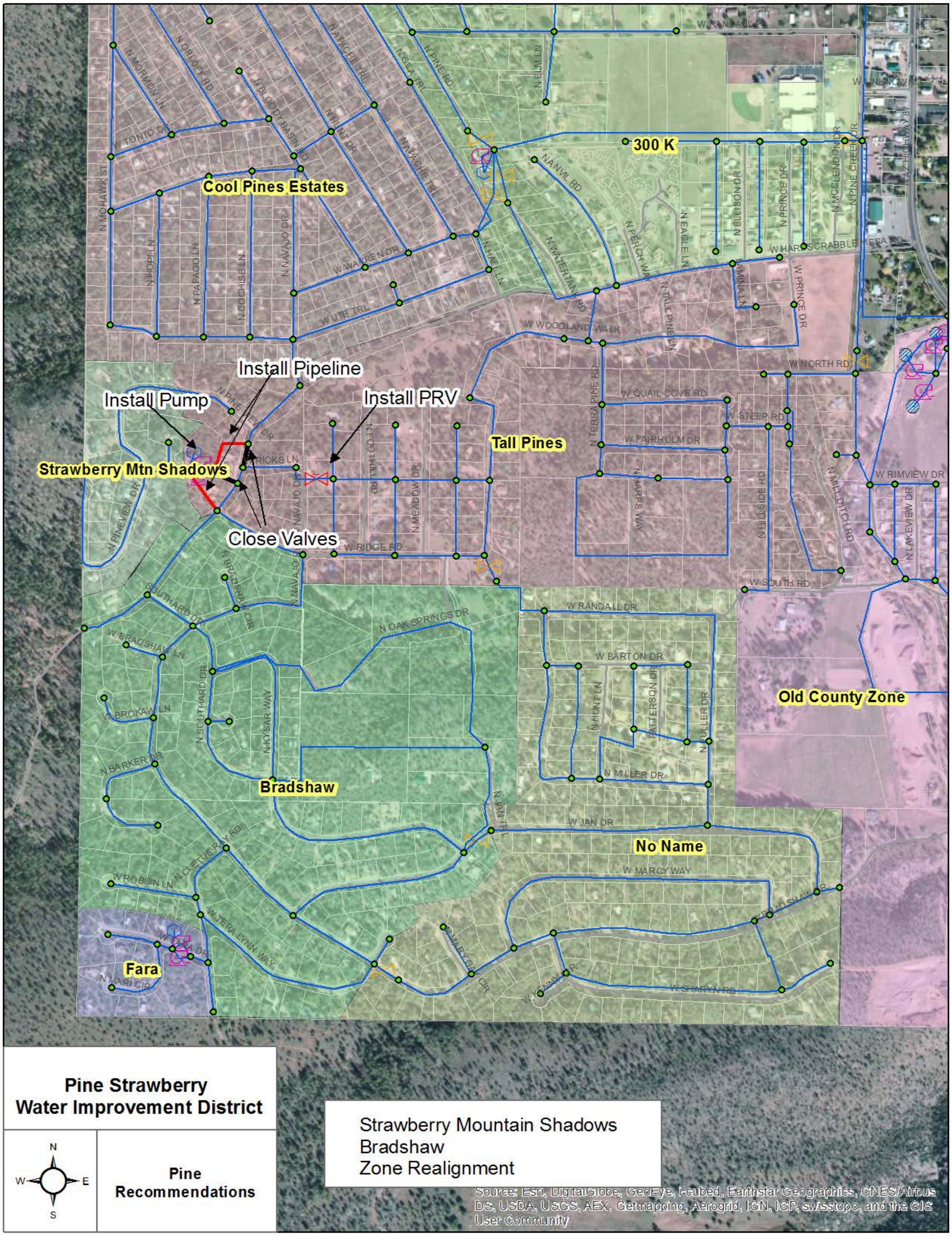


FIGURE 4-26
300 K Boosted Zone

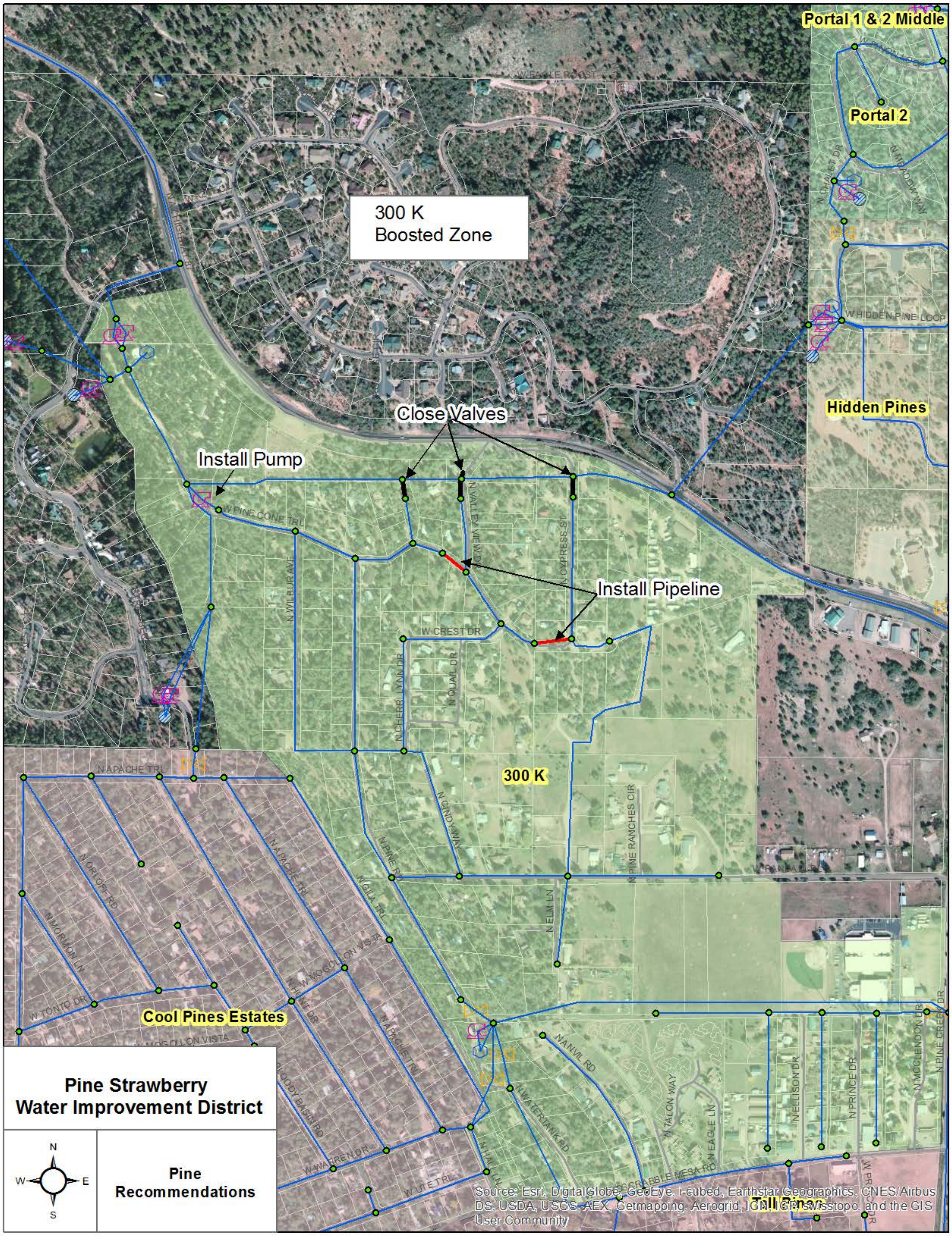


FIGURE 4-27
Old County Zone Realignment

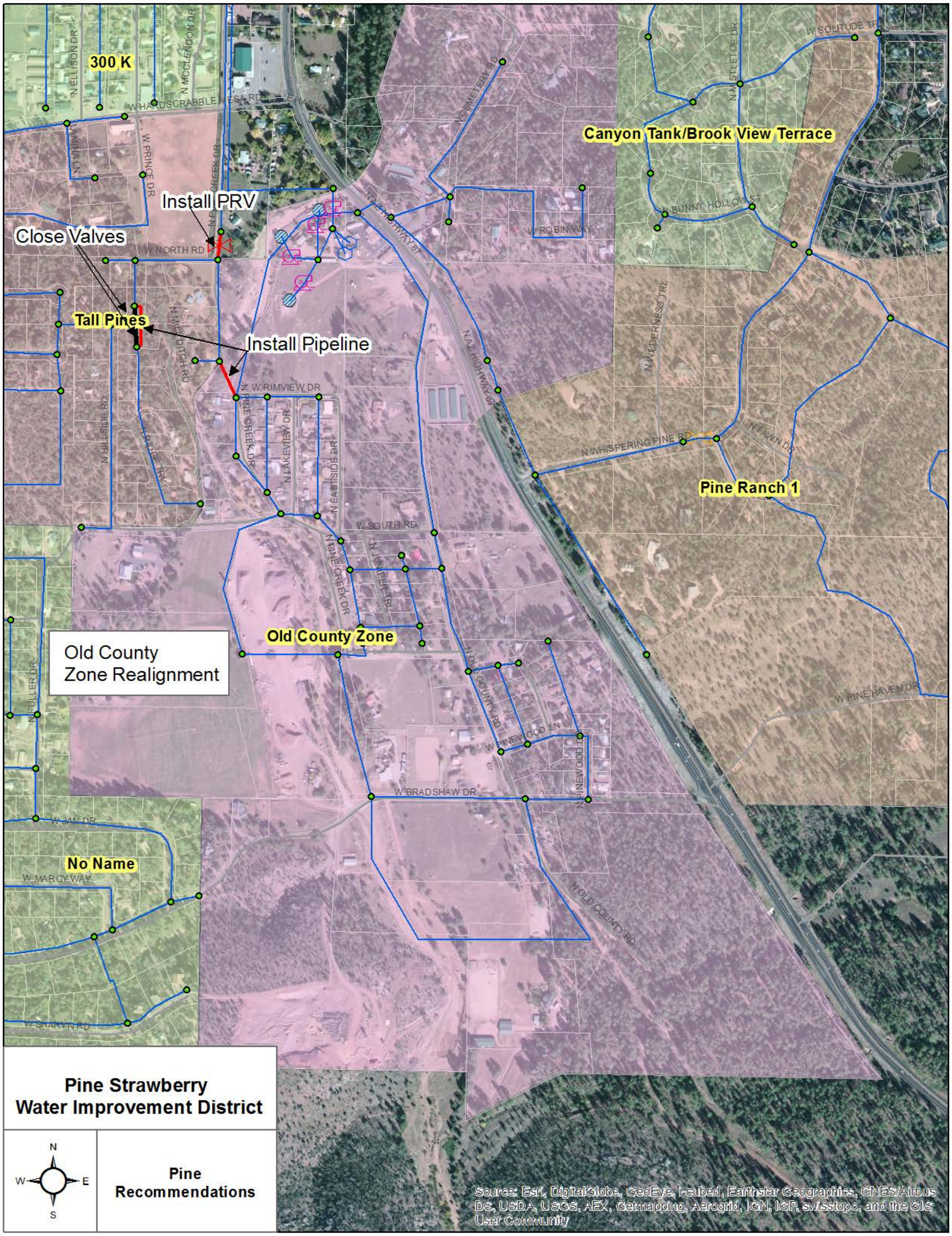


FIGURE 4-28
Canyon Tank Brook View Terrace Looping

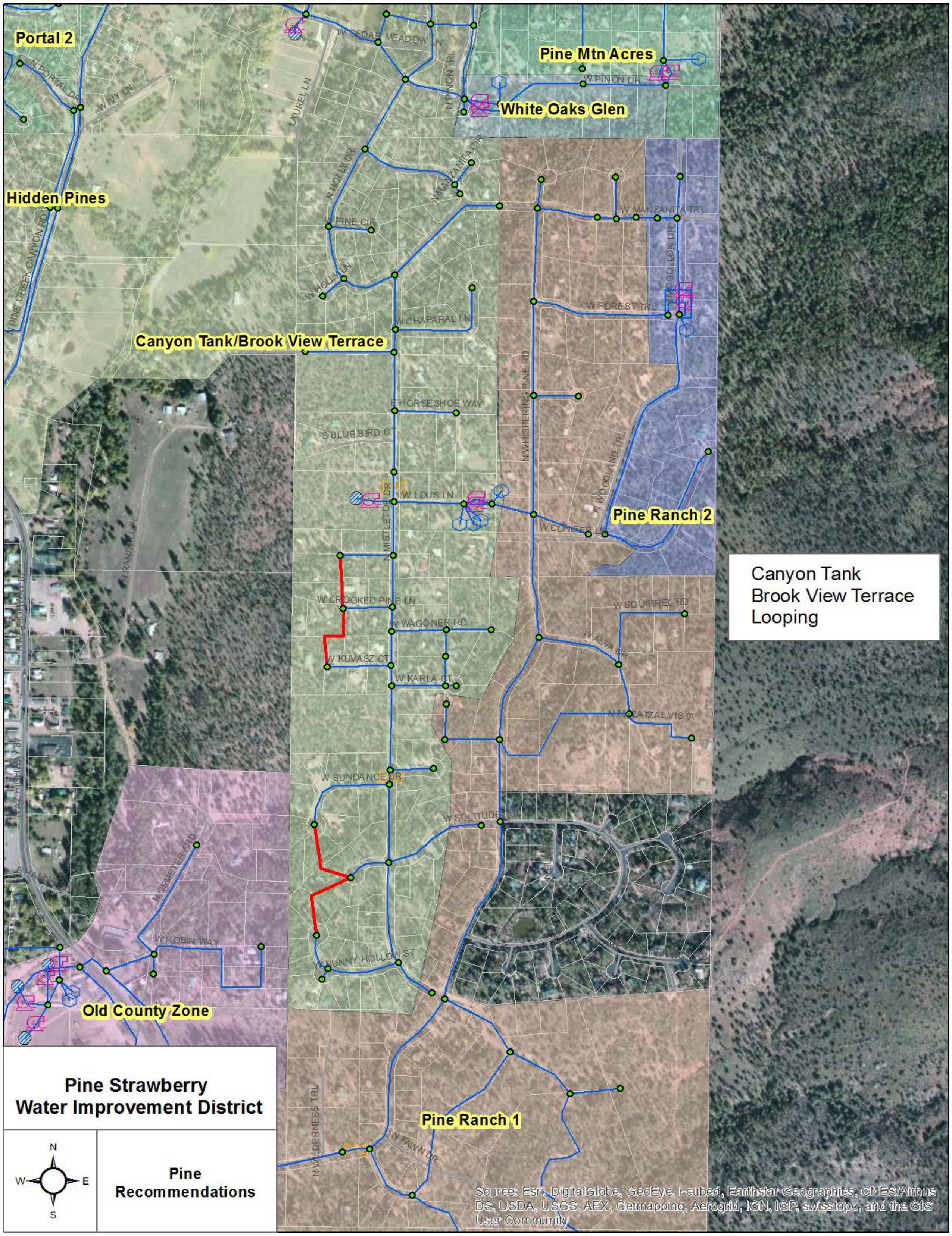


FIGURE 4-29
Bradshaw Future Development

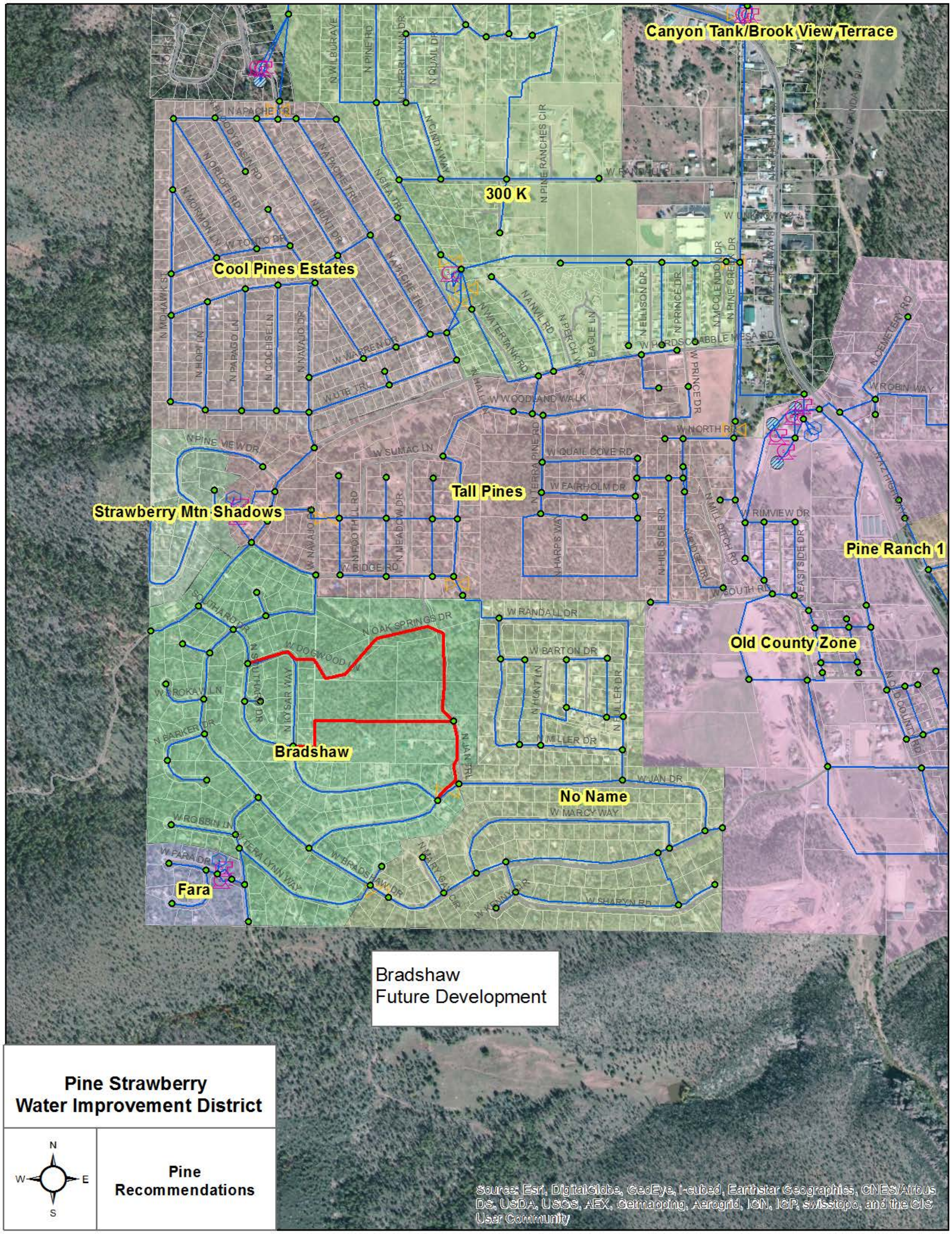


FIGURE 4-30
Old County Future Development

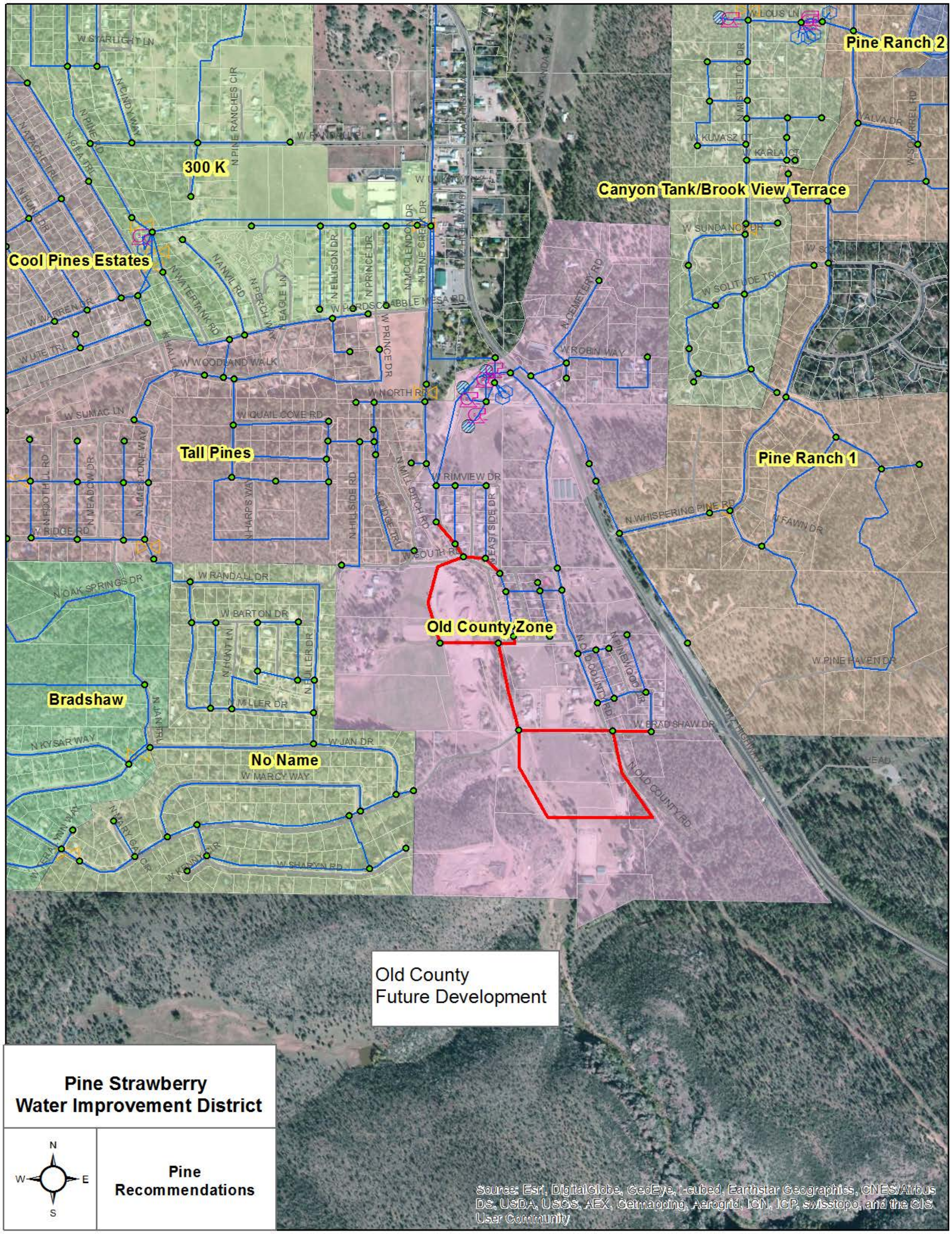


FIGURE 4-31
Tall Pines Future Development

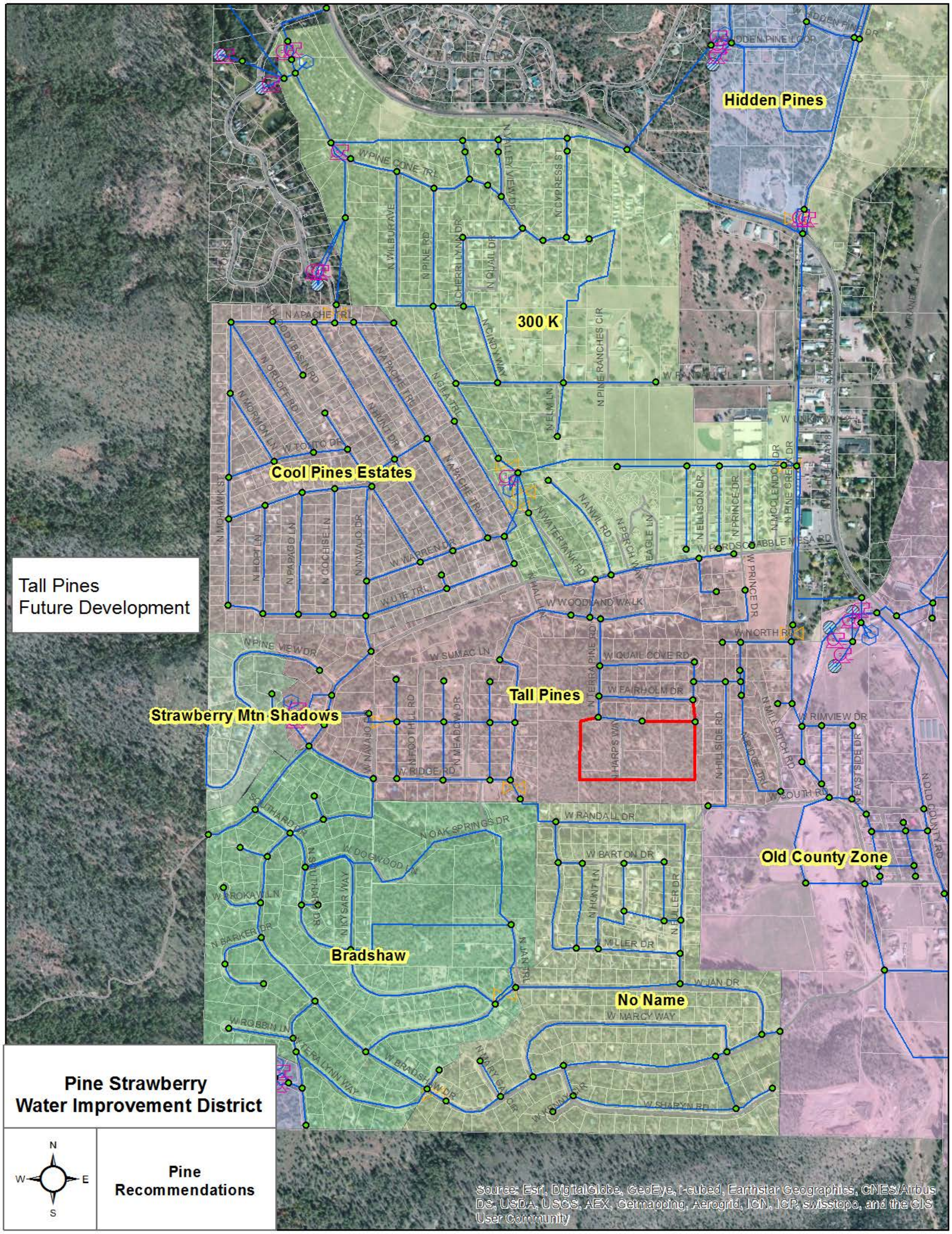


FIGURE 4-32
300 K Future Development

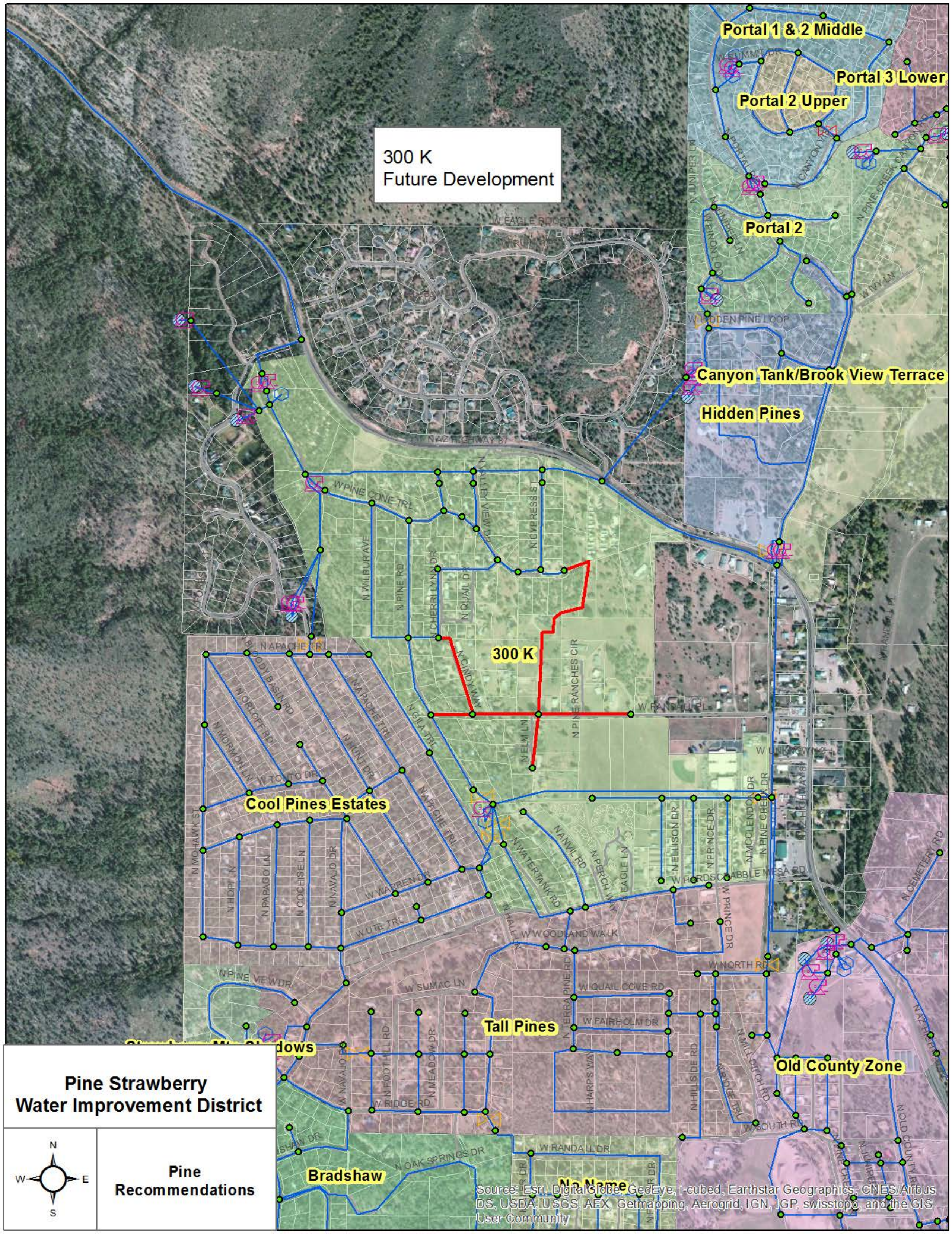


FIGURE 4-33
Canyon Tank Brook View Terrace Future Development

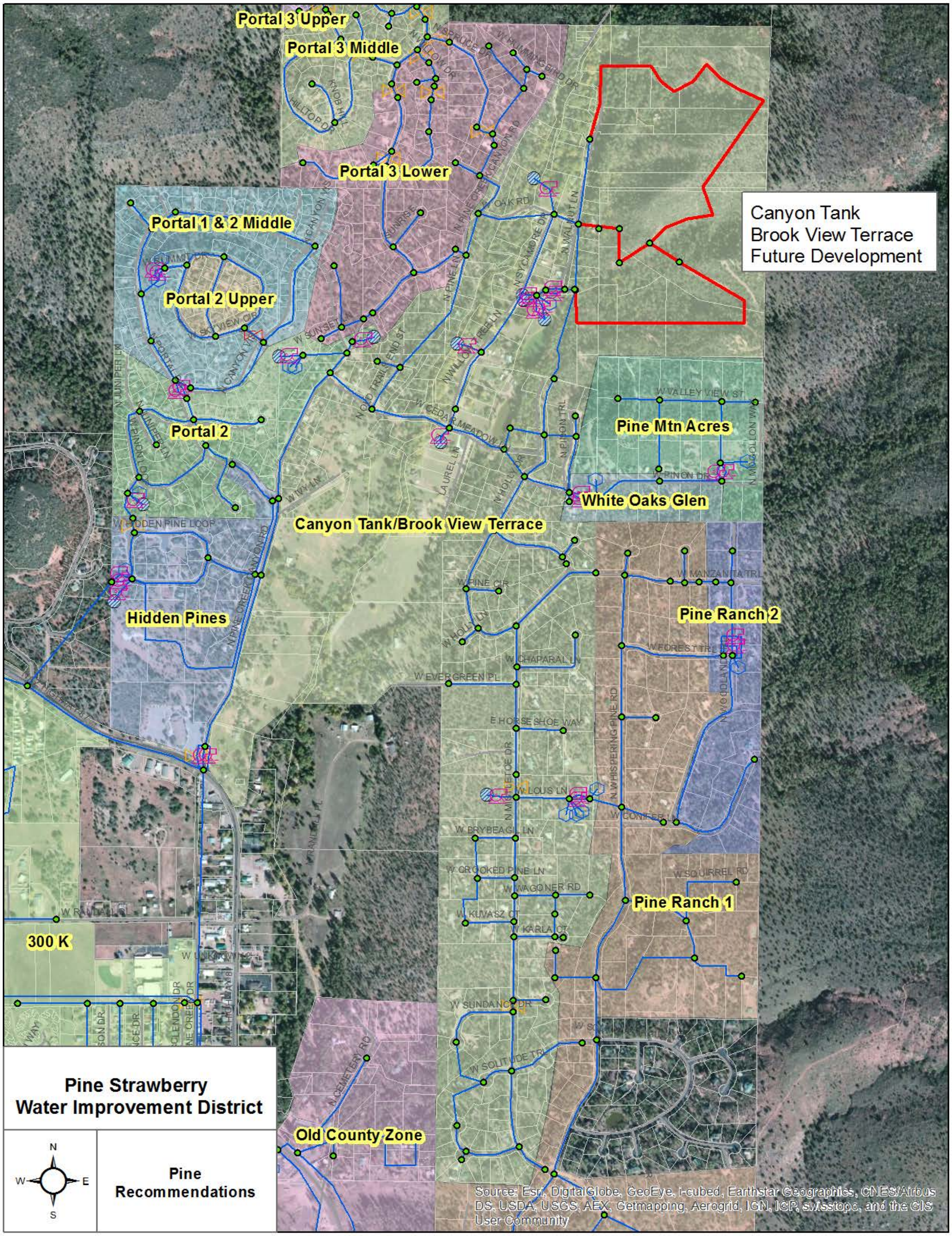


FIGURE 4-34
Hidden Pines Future Development

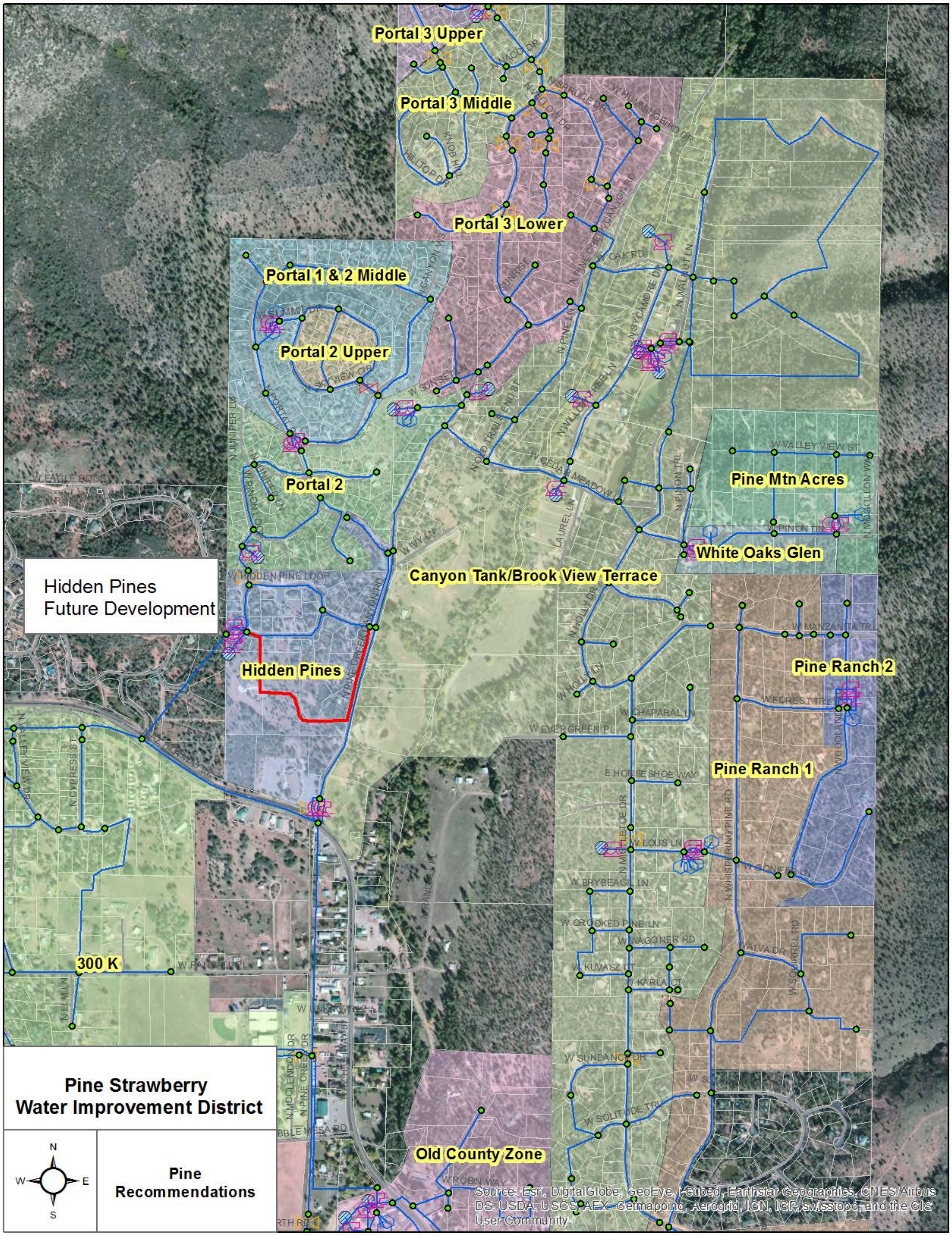


FIGURE 4-35
Pine Ranch 1 Future Development

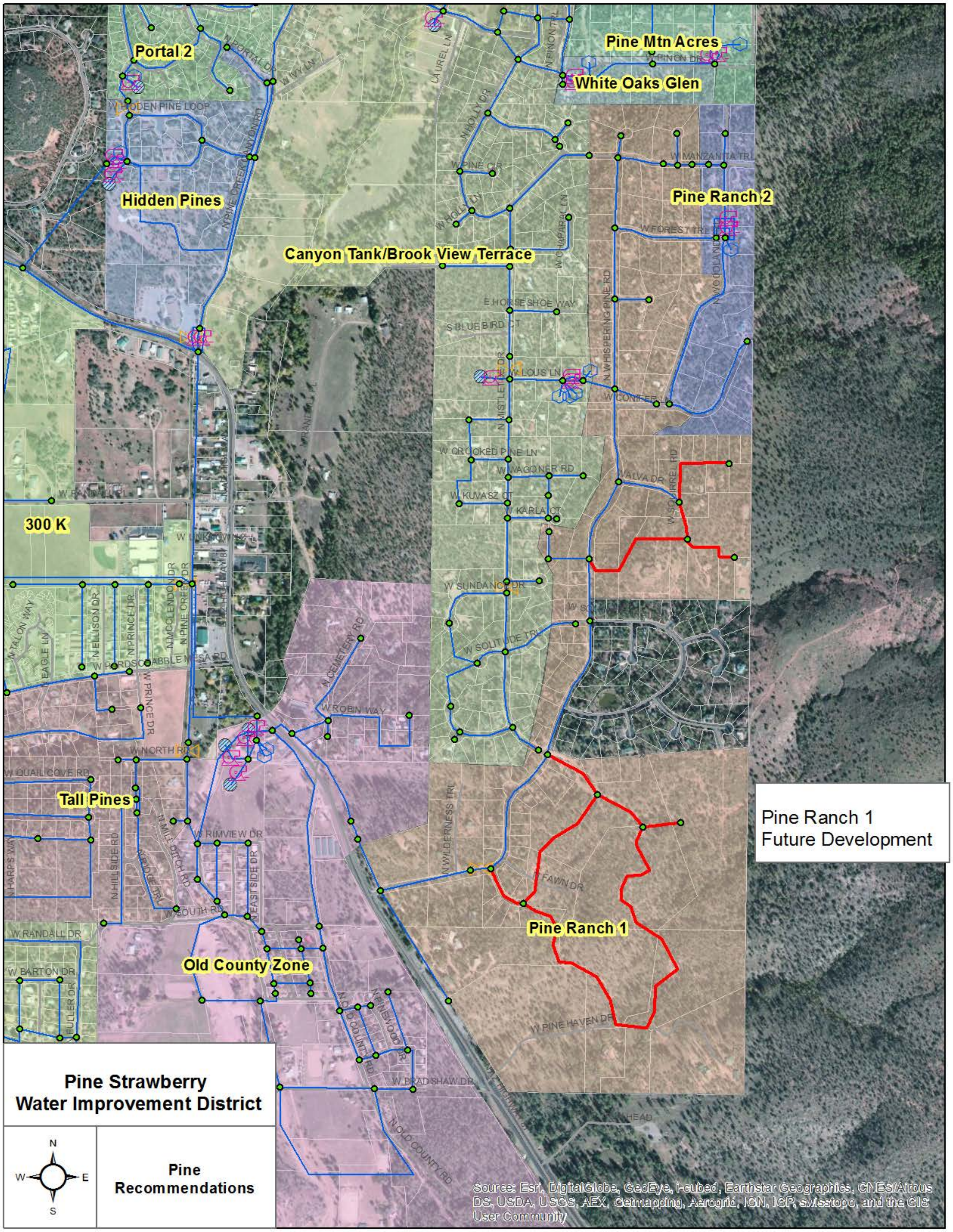


FIGURE 4-36
Rimwood Looping

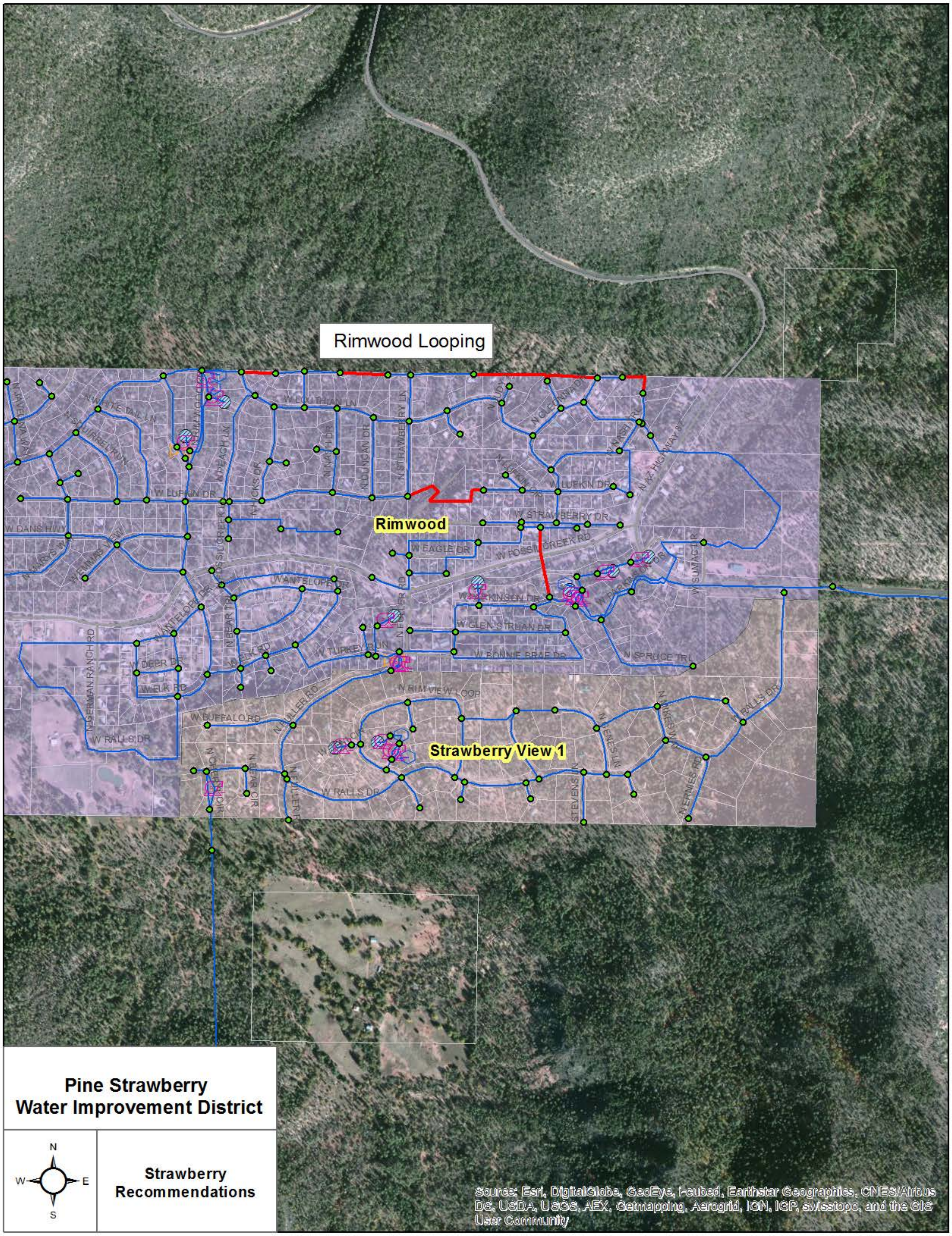


FIGURE 4-37
Strawberry Ranch 3 PRVs

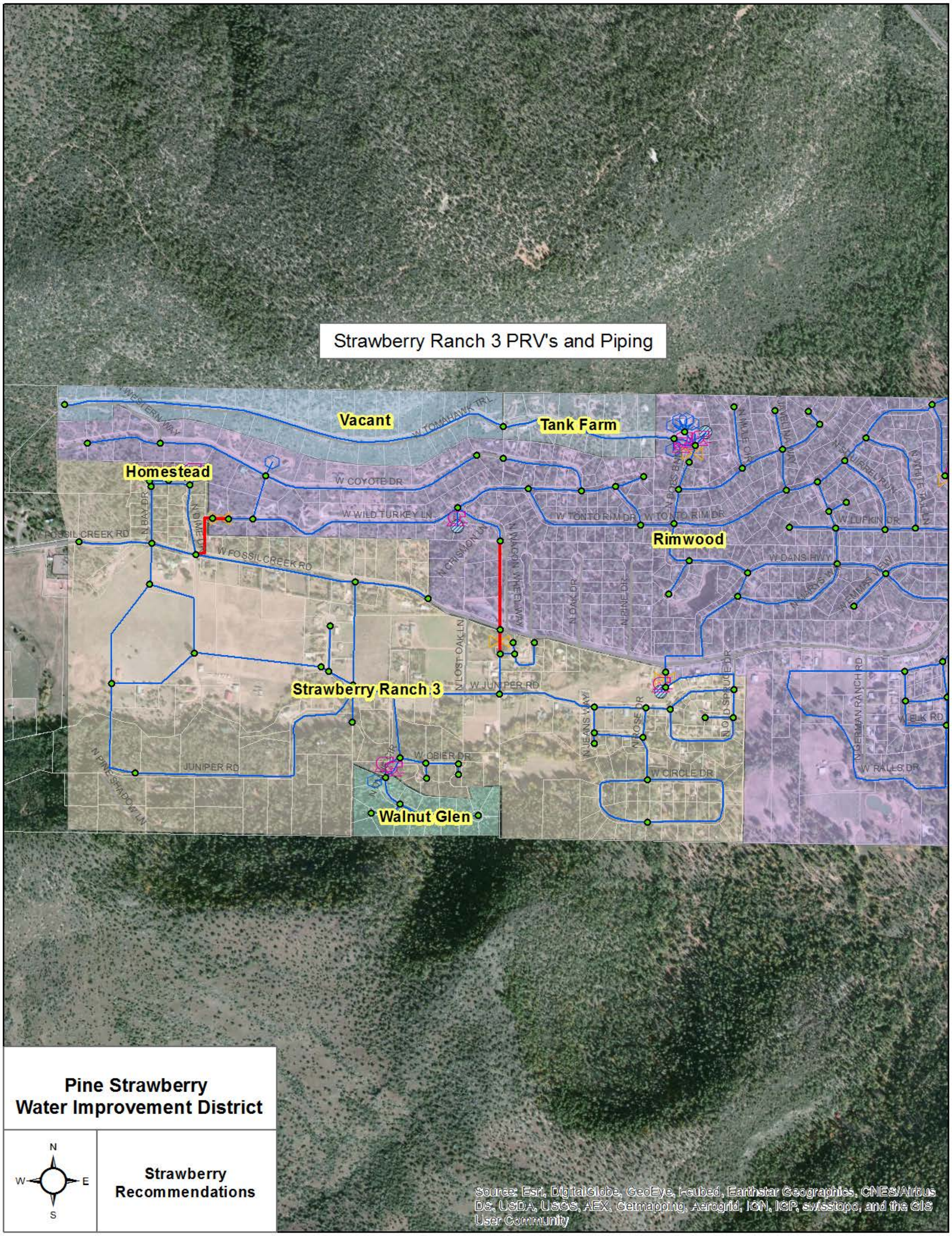


FIGURE 4-38
Stawberrry View 1 Looping

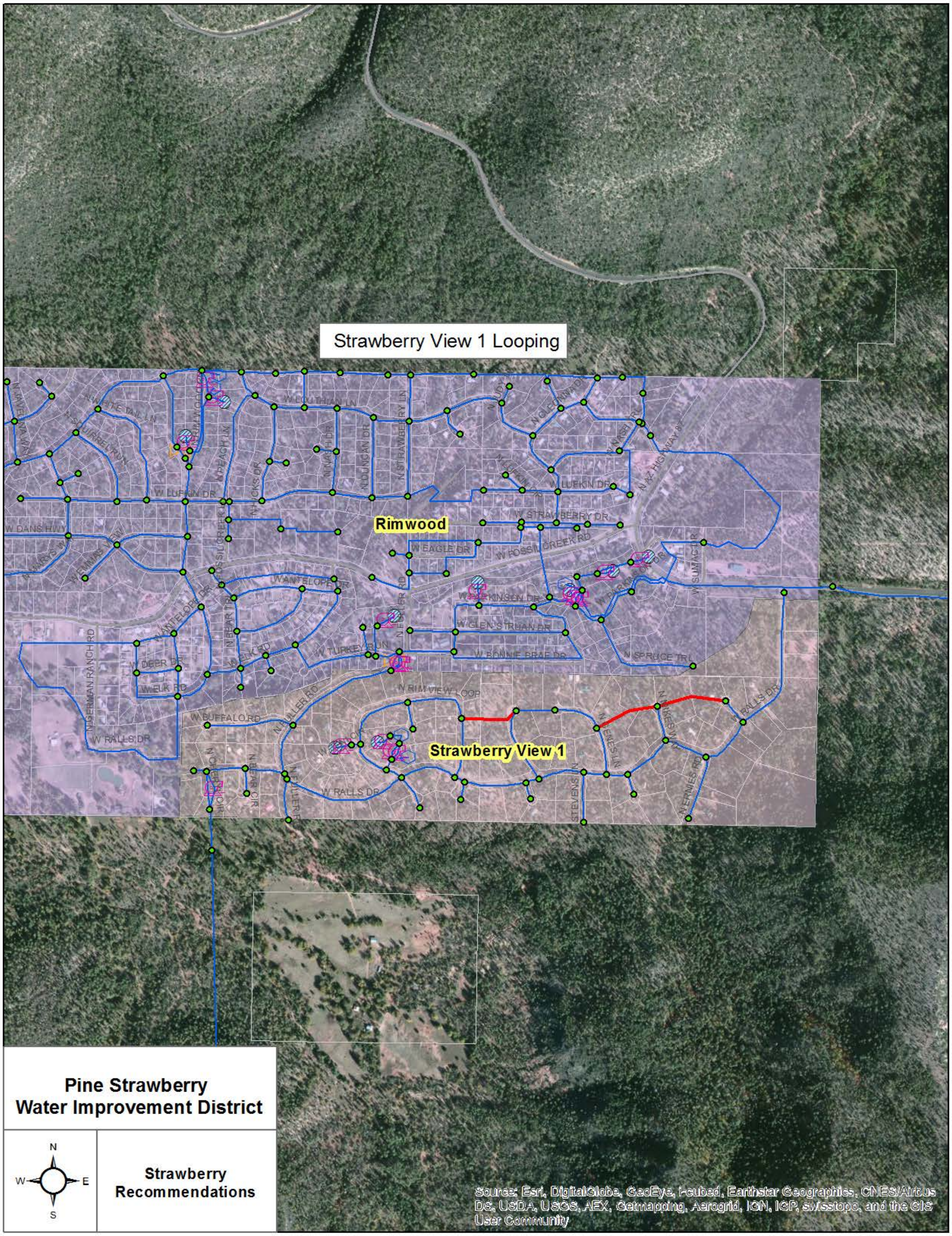


FIGURE 4-39
Strawberry Ranch 3 Future Development

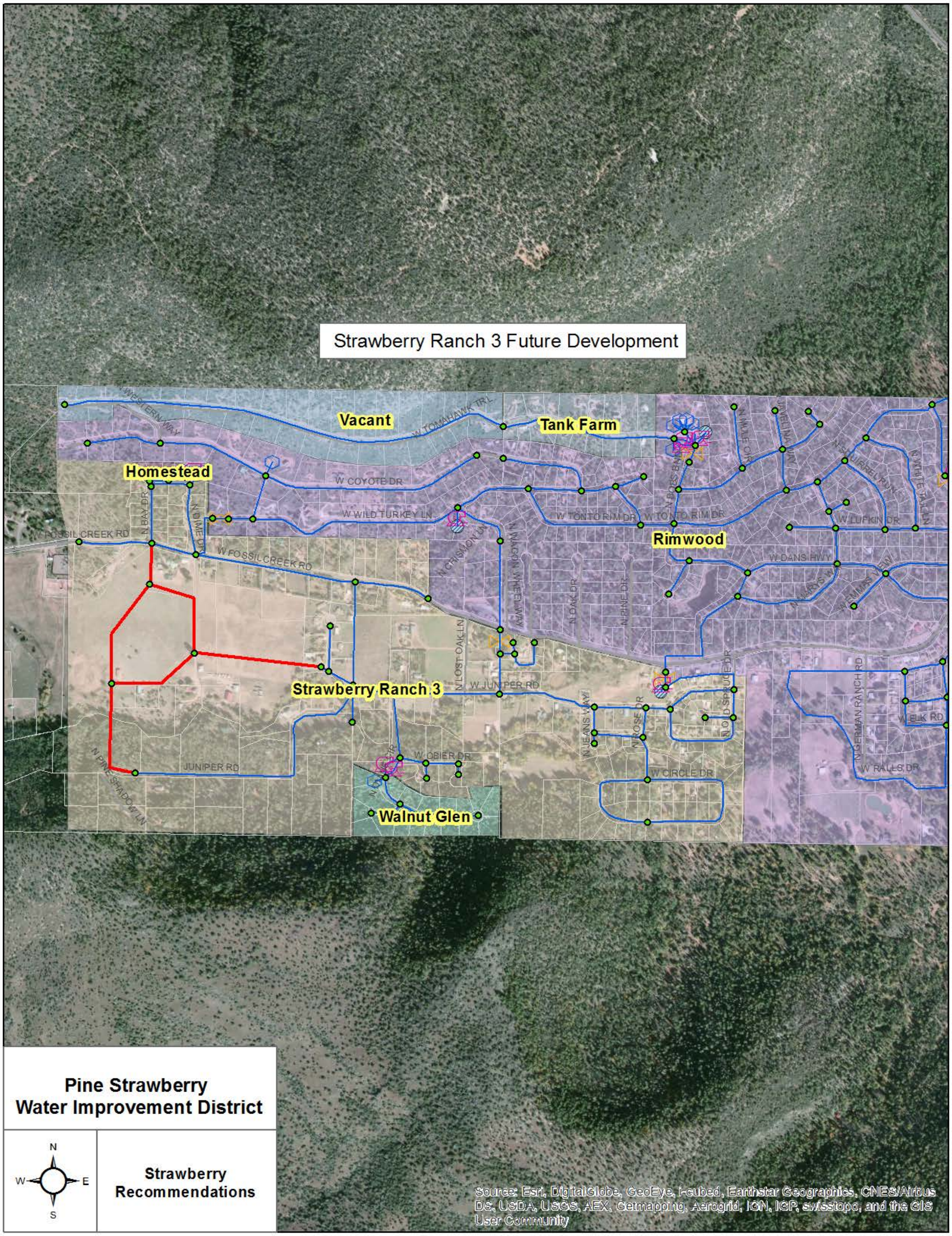


FIGURE 4-40
Tank Farm Future Development

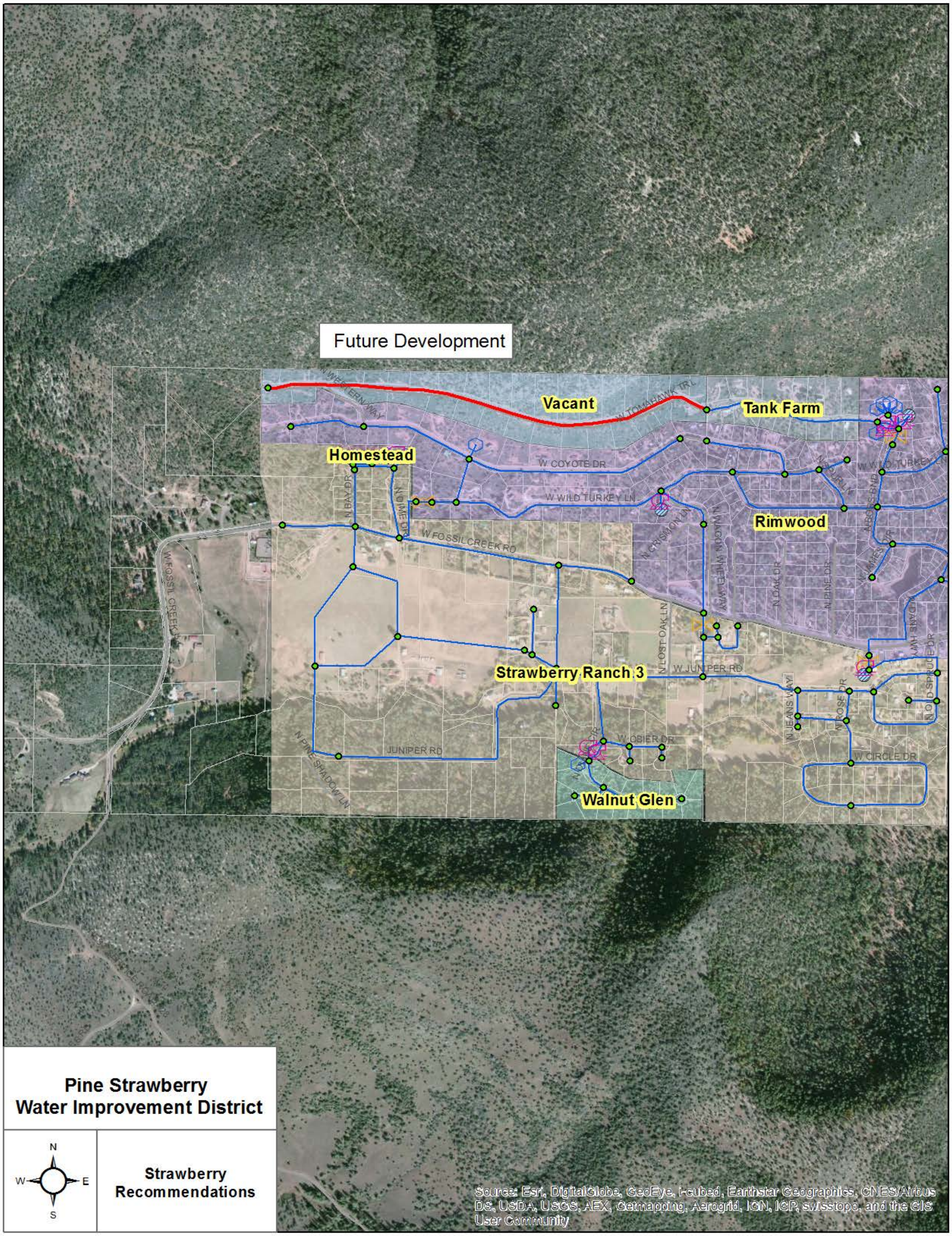


FIGURE 4-41
Rimwood Future Development

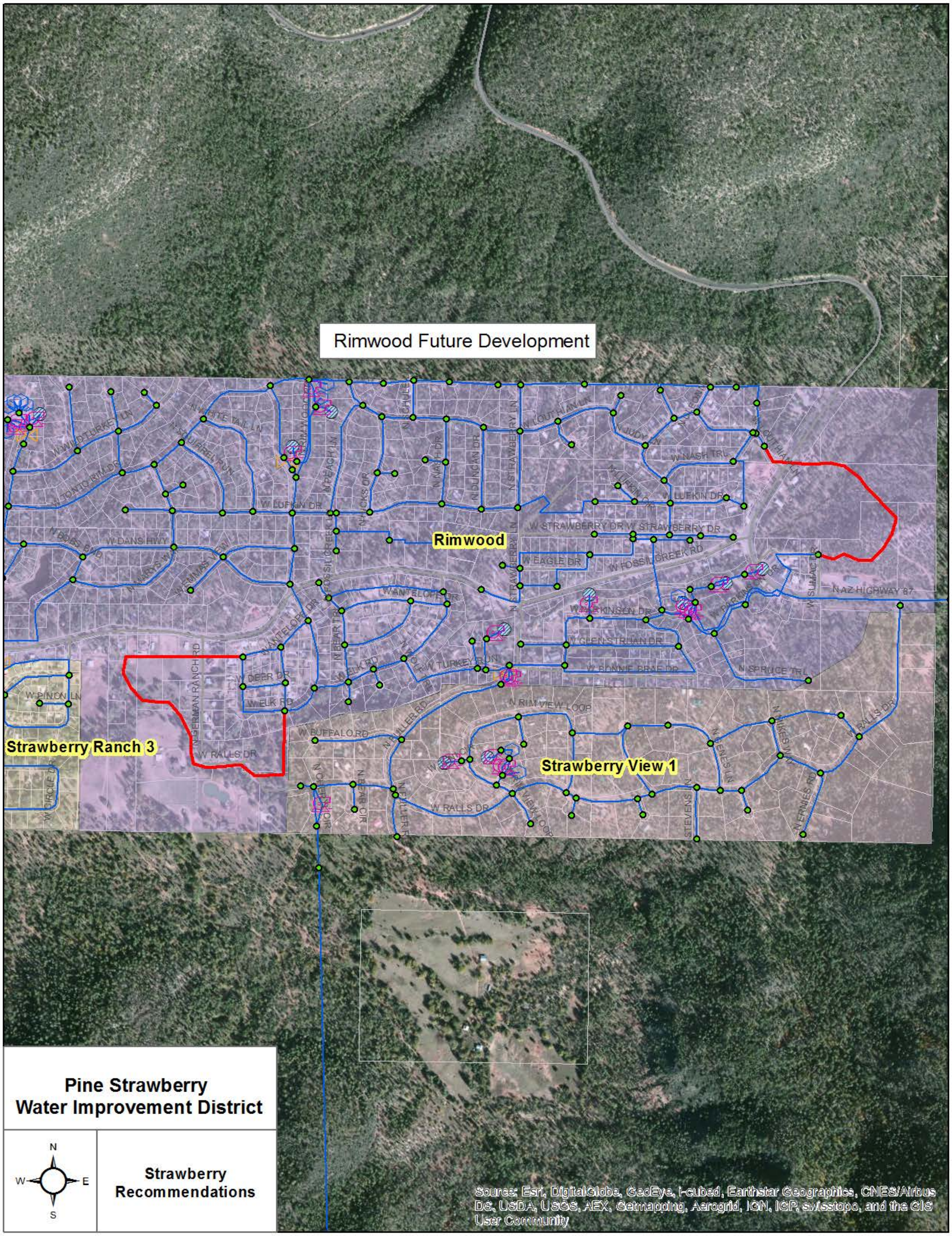


FIGURE 4-42
Rehab Milk Ranch to 300 K

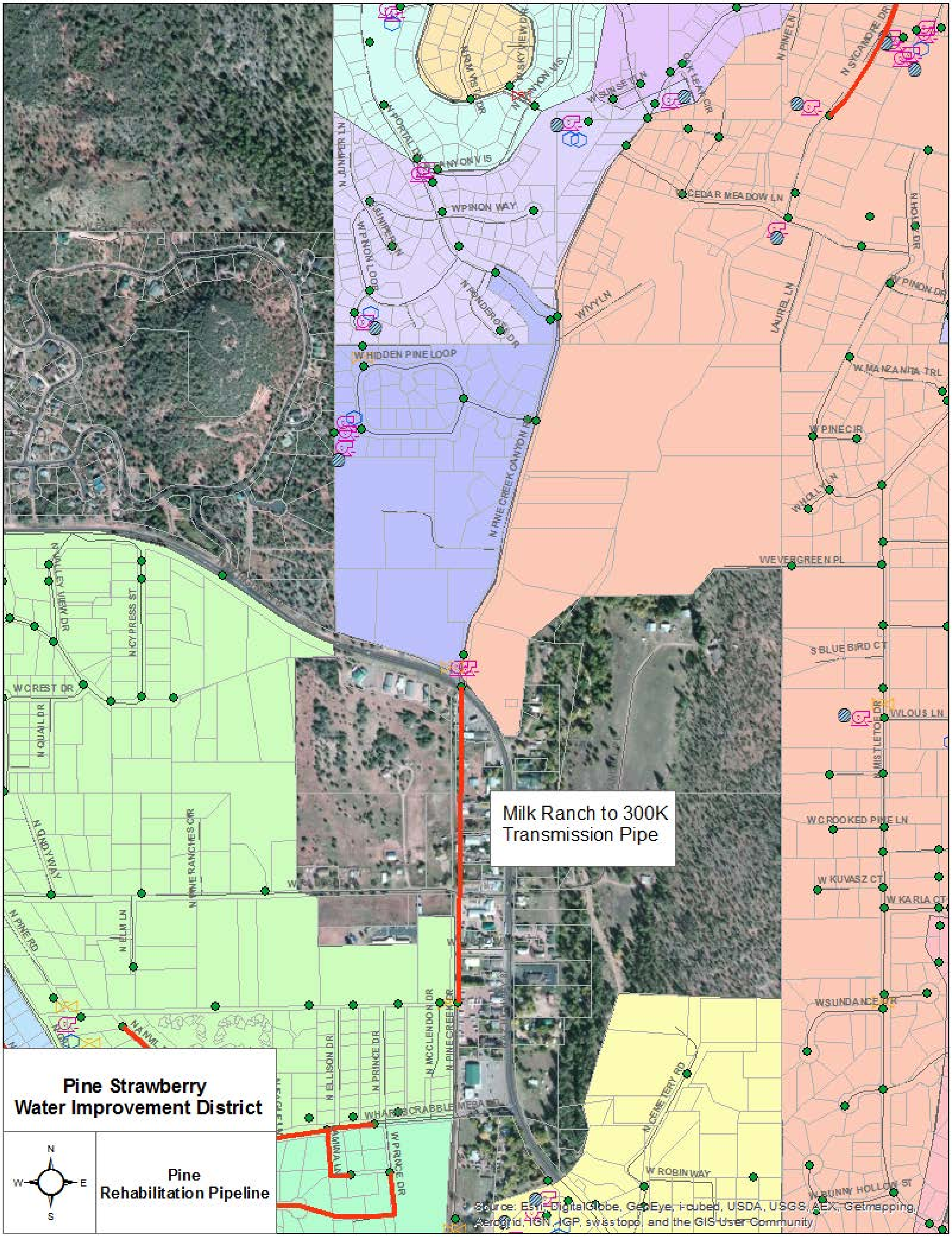


FIGURE 4-43
Rehab Old County

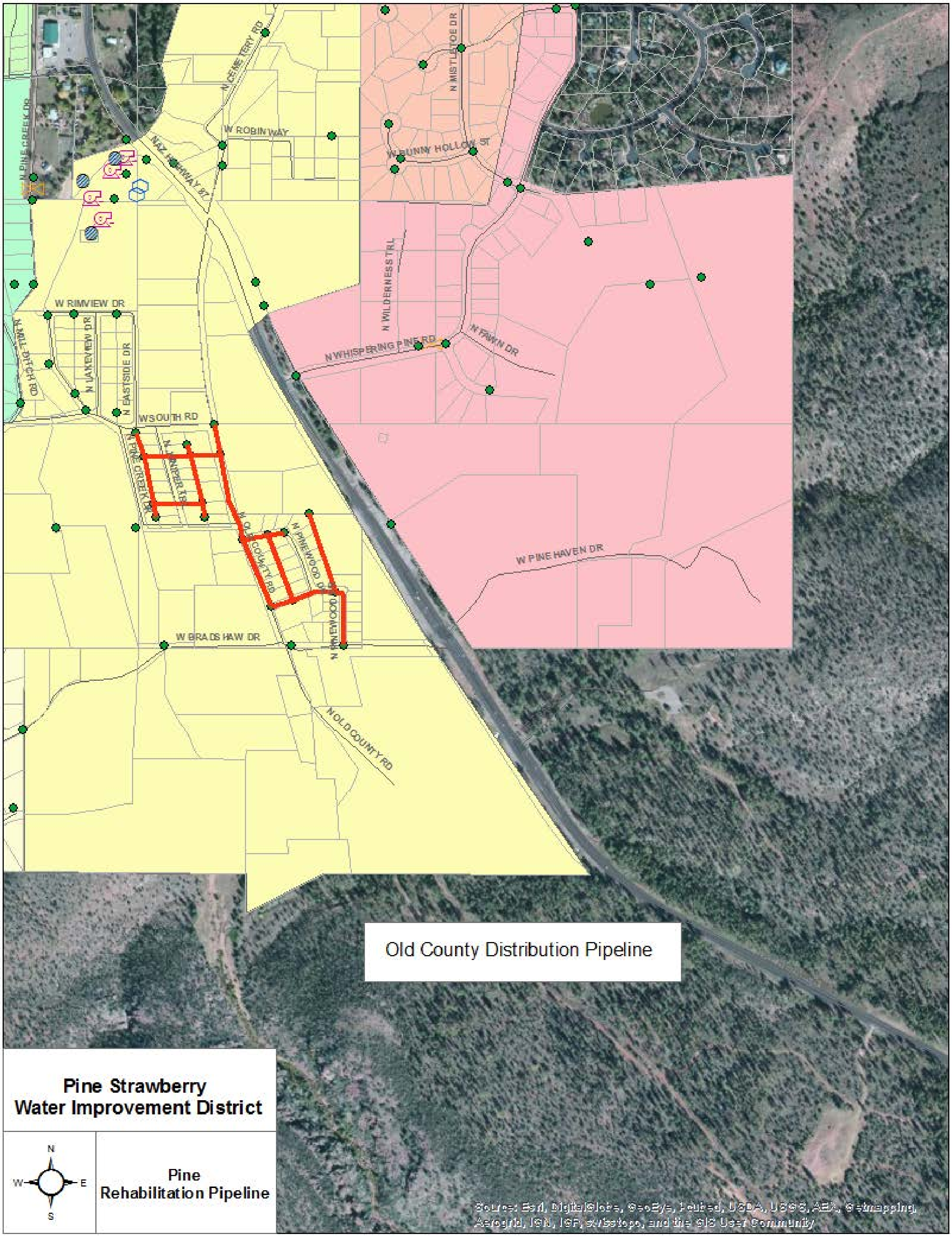


FIGURE 4-44
Rehab Tall Pines

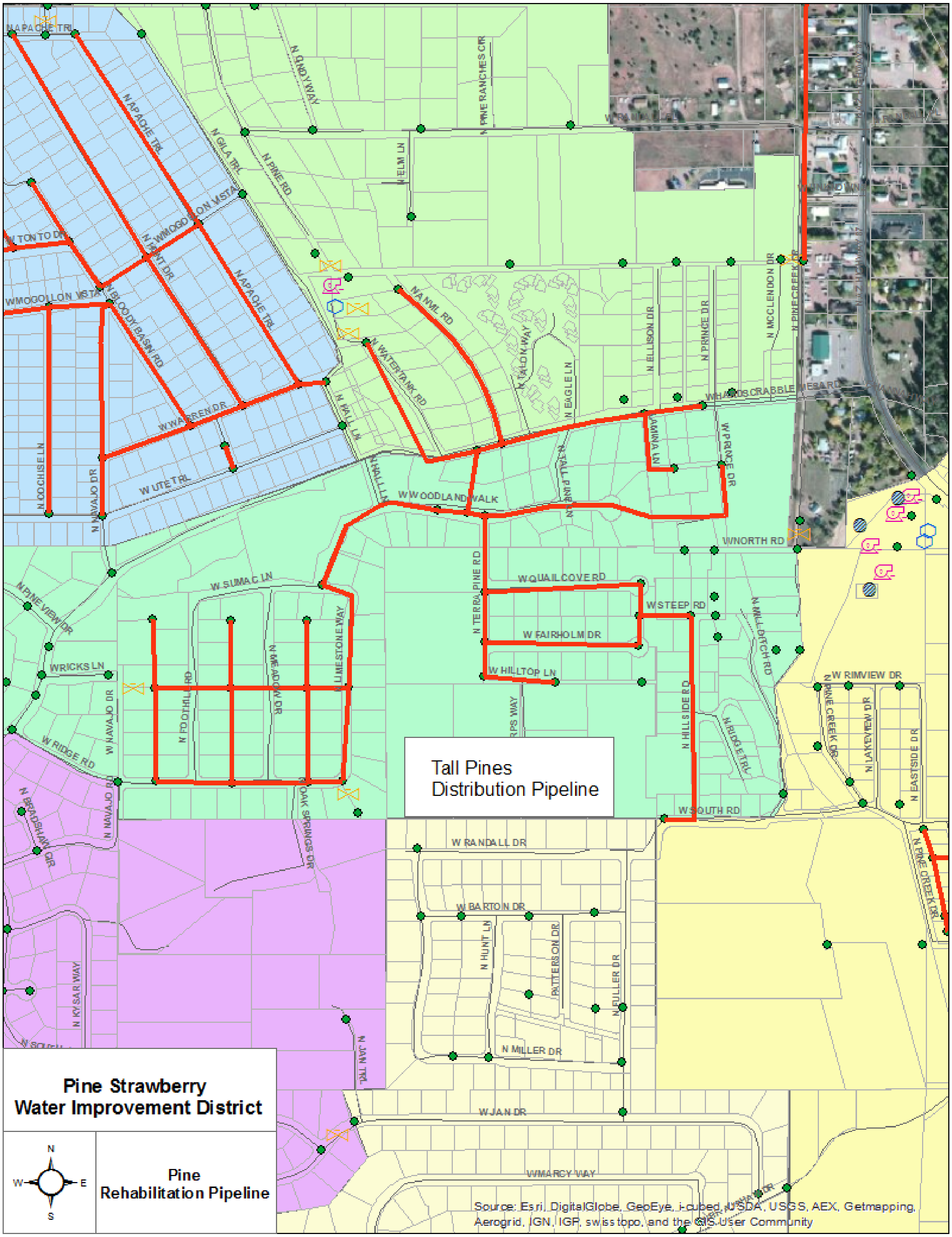


FIGURE 4-45
Rehab Canyon Tank Portal 3 Lower

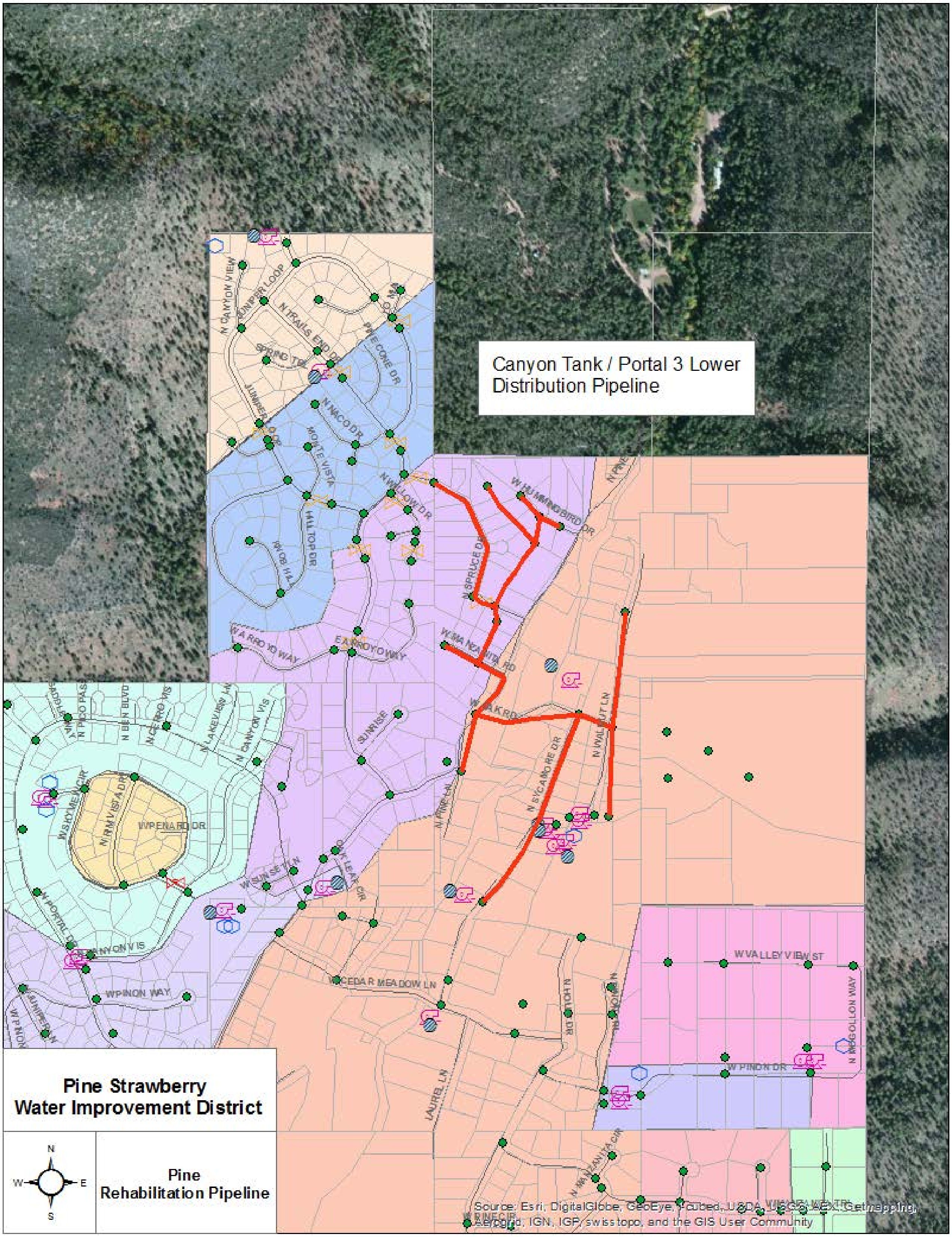


FIGURE 4-46
Rehab Cool Pines Estates

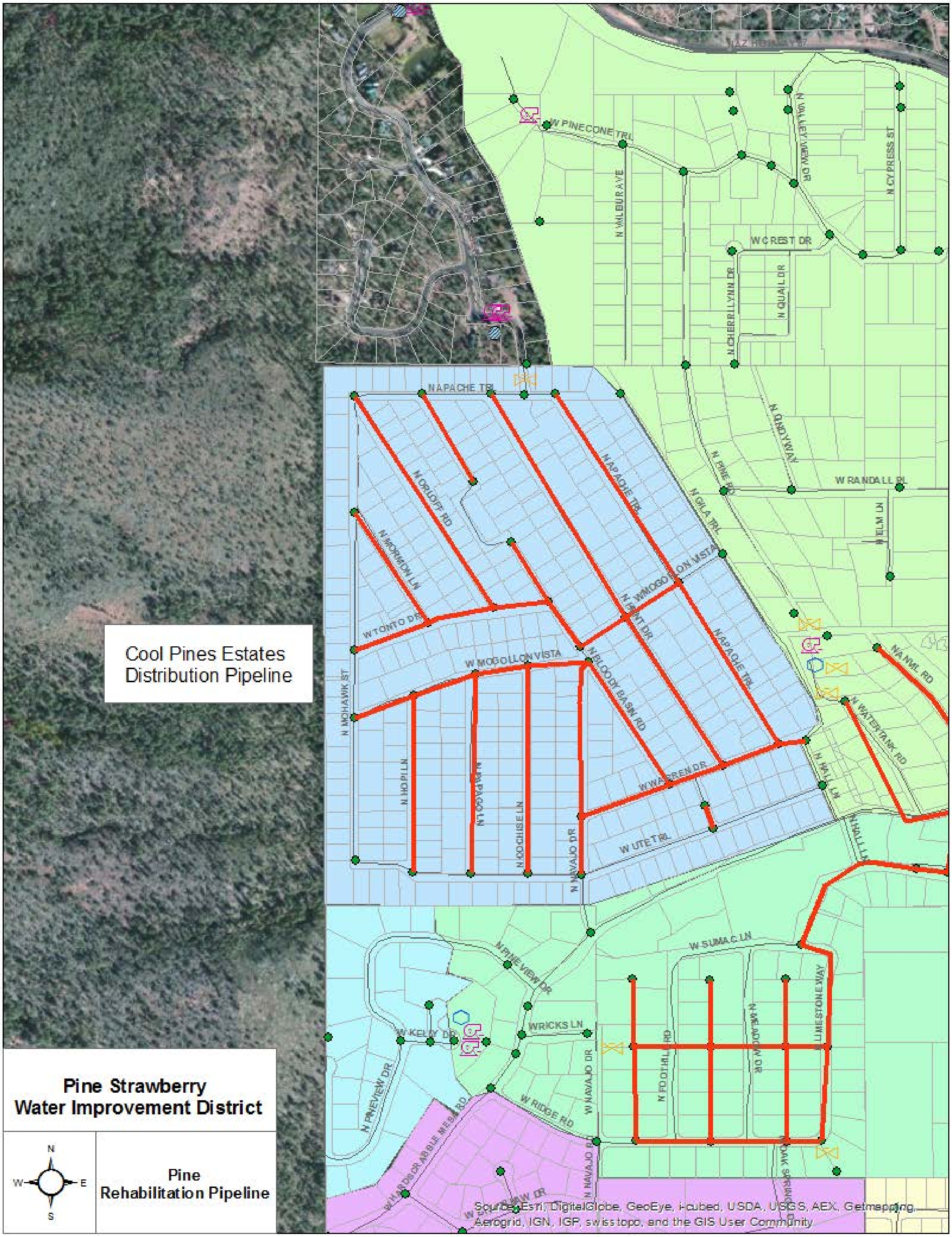


FIGURE 4-47
Rehab Rimwood

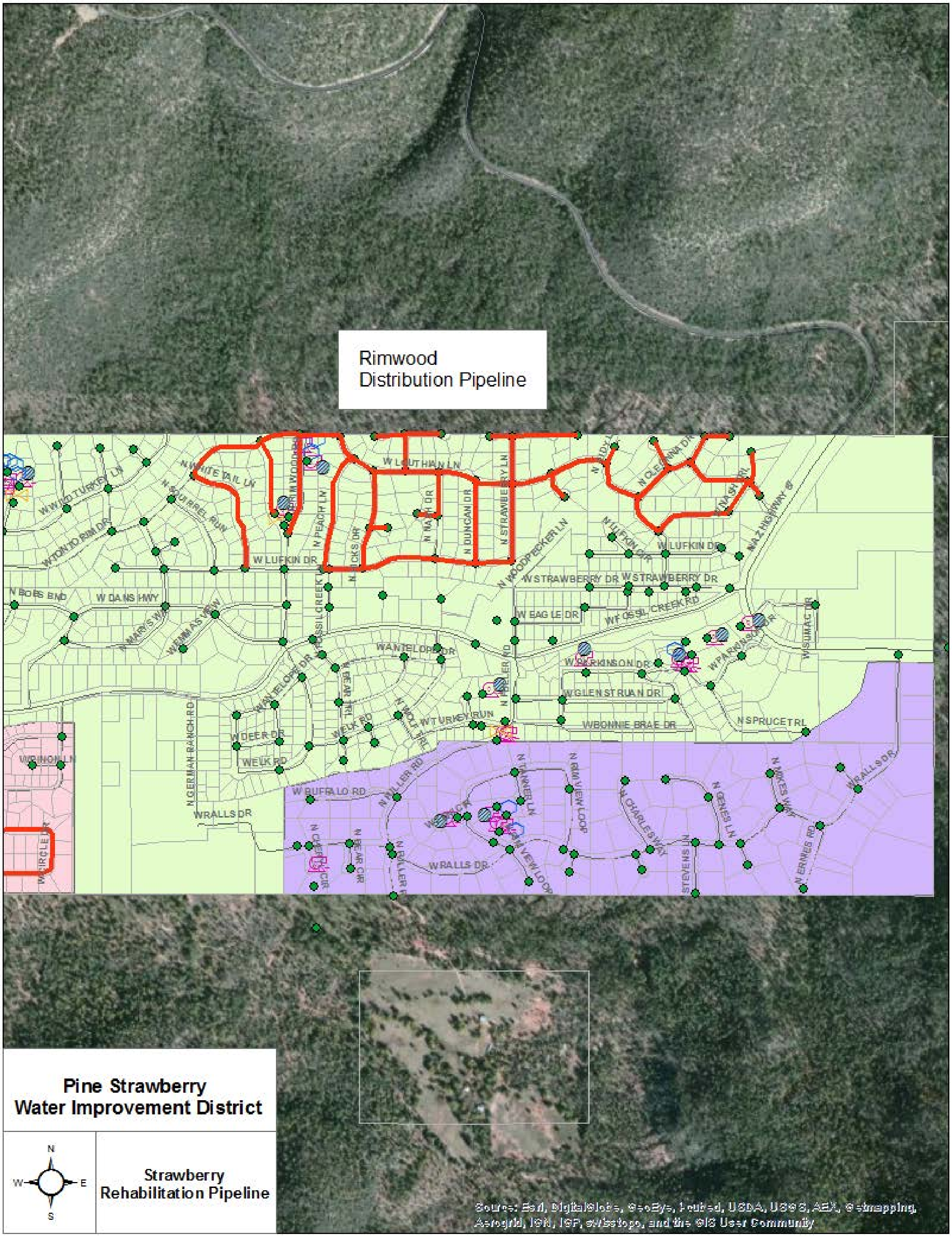


FIGURE 4-48
Rehab Strawberry Ranch 3

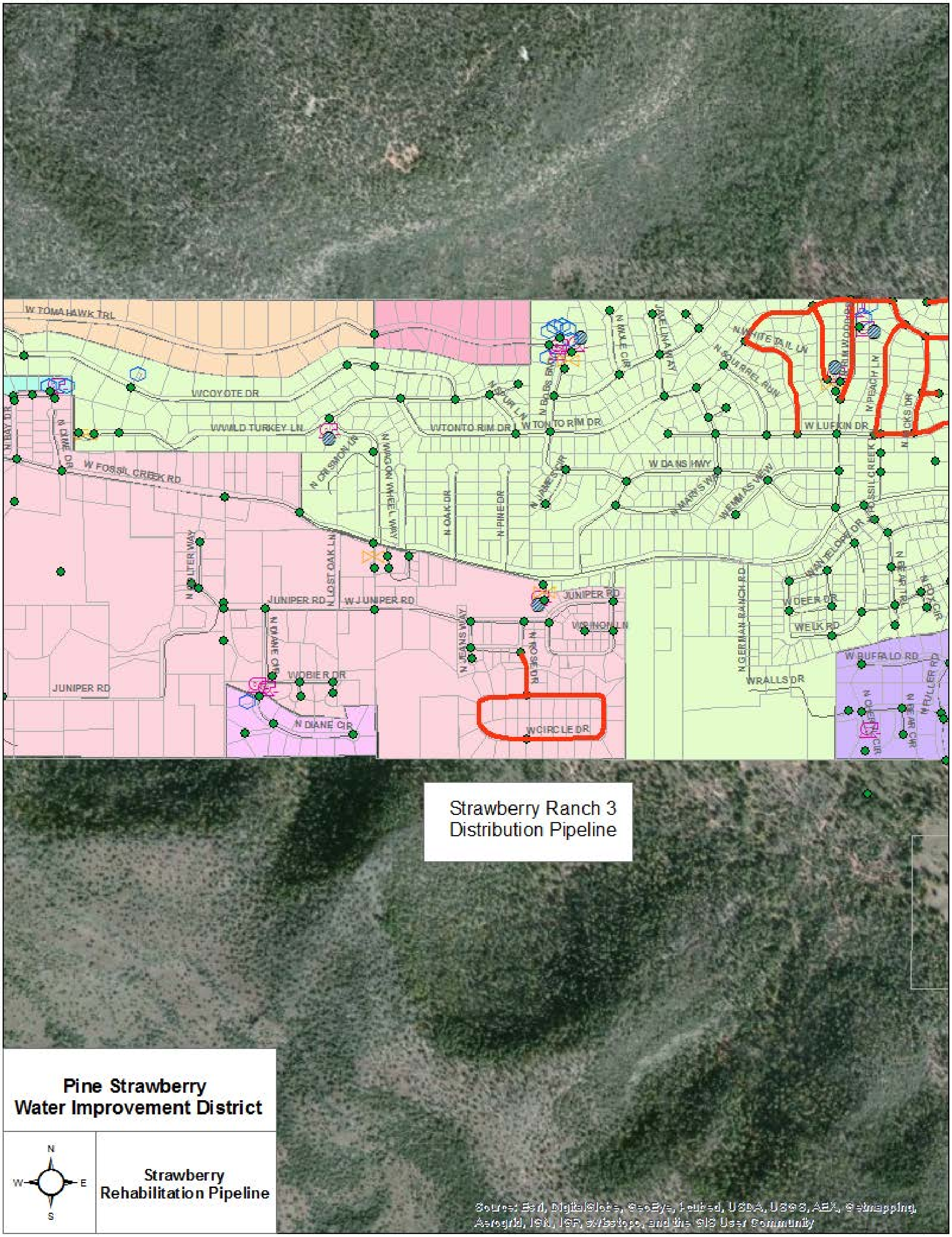


FIGURE 4-49
Project Benefit Scores

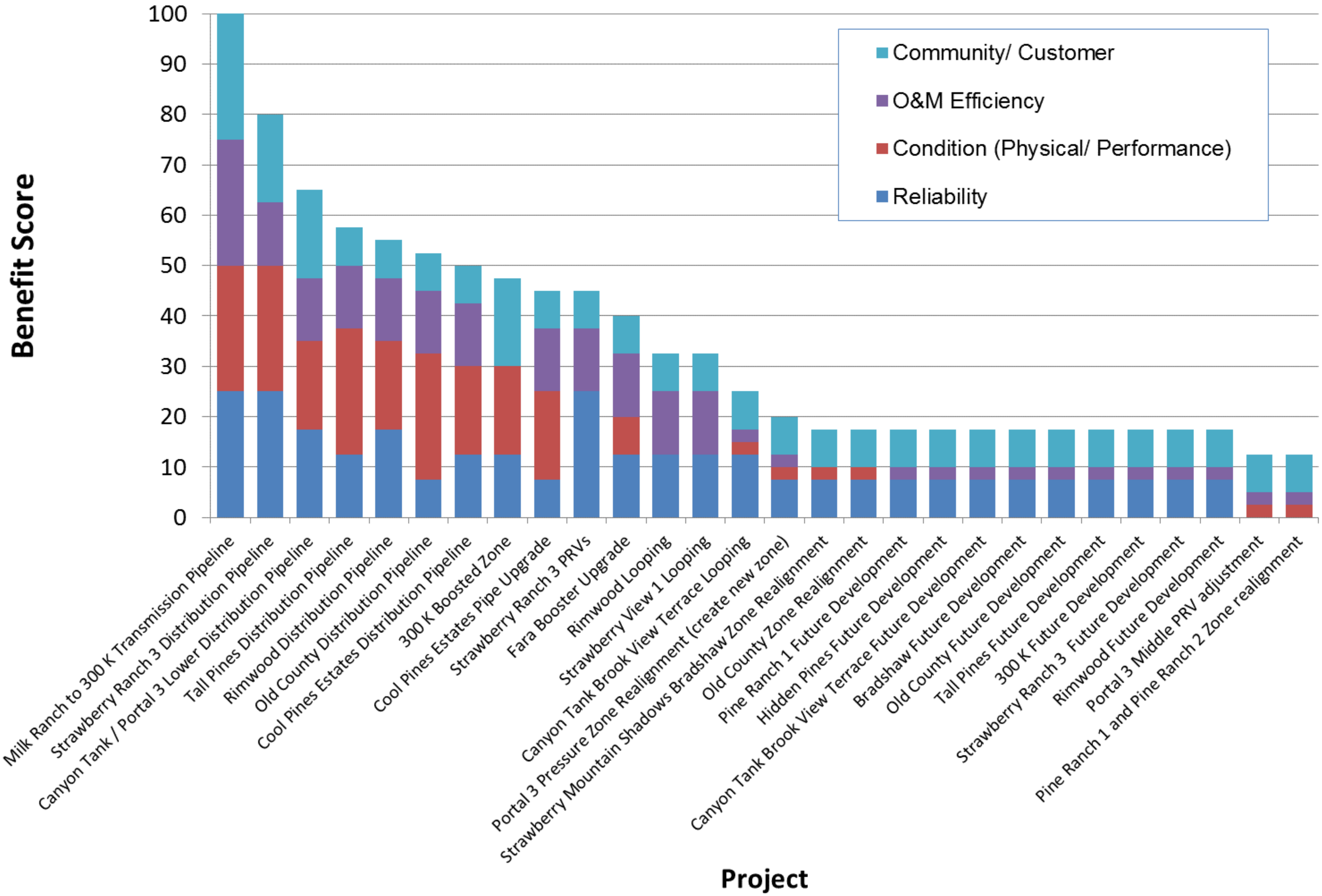
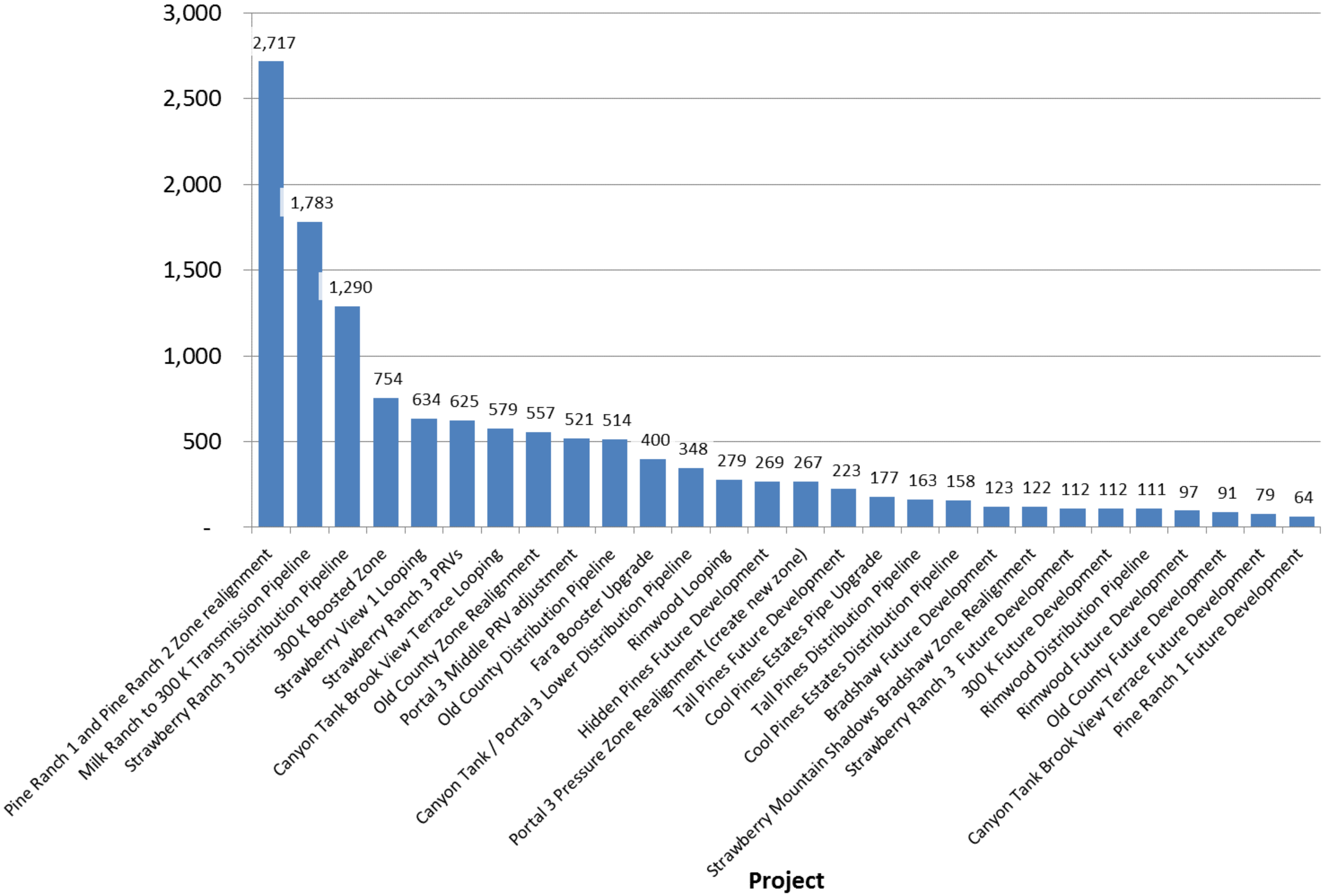


FIGURE 4-50
Project Benefit Cost Scores



Appendix A
Planning Framework

Town of Payson General Plan

Prepared by TischlerBise and the Berkeley Group in 2013.

Chapter 1: General Plan and Planning Framework

- 1.2 General Plan Update 2014-2024 Development Process
  - General Plan Water Resources Element: "Water Supply. Take action to ensure sufficient long-term and high quality water resources for the Town."

Chapter 2: Introduction: Payson, Arizona

- 2.3 Population and Households
  - The Town experienced a 12 percent growth rate between 2000 and 2010. Gila County grew at a much slower rate of 4 percent during the same decade.
  - Per the 2010 Decennial Census, the median age of Payson residents is 53.
  - In 2010, 77 percent (6,860) of Payson's 8,958 housing units were households (permanent homes). With a total population of 15,301, the average household size in Payson is 2.23 persons.
- 2.5 Housing Demographics
  - The median home value is $210,000.
- 2.6 Household Demographics
  - Single family homes averaged 2.35 persons. Multi-family homes averaged 1.77 persons. According to the 2011 ACS estimates, 77 percent of the housing units were permanently occupied.
- 2.9 Travel and Tourism Industry
  - Travel and tourism play an extremely important role in the economic health of Payson and its region. Payson also serves as the Travel and Tourism activity hub for Gila County.

Chapter 4: Water Resources Element

- 4.1 Overview
  - Through active conservation efforts, the Town maintains a suitable supply of ground water to serve demand. A reliable and high quality supply is a pillar for the continued success and prosperity of the community. The Town has secured a water allocation of up to 3,000 acre feet per year from the C.C. Cragin Reservoir as an additional and permanent water source. The Town's existing ground water source provides a "Safe Yield" of 2,681 acre feet per year. In 2010, the Town used approximately 60 percent of its "Safe Yield".
  - Existing Town wells are relatively shallow at 300 to 1,000 feet deep.
  - The Town has 42 active wells and a total storage capacity of 8.7 million gallons.
  - The Town implements the "Safe Yield" concept using the average rainfall of 22 inches with a 20 percent safety factor. This level of precipitation results in an annual recharge of 2,681 acre feet.
  - The Town adopted a water conservation ordinance in an effort to promote sensible water use in the community. The following uses are prohibited:
    1. New turf areas or the expansion of existing turf areas
    2. Outside water features larger than 50 gallons
    3. Permanent outdoor swimming pools

4. Spray or flood irrigation
5. Watering native plants
6. New spas for commercial rooming establishments
7. Evaporative coolers for commercial buildings larger than 3,000 square feet

- 4.2 Critical Issues
  - Only two critical issues relating to water supply were expressed by the community:
    1. Maintain conservative policies to preserve water supply
    2. Pay for the new water resource infrastructure
  - The Town currently uses 1,600 acre feet annually. The 3,000 acre feet from C.C. Cragin will double the Town's permanent supply, and will support a "build-out" population of 40,000 to 45,000 residents.
  - As of 2013, the Town residents used an average of 68 gallons per person per day compared to the City of Phoenix's use of 300 gallons per person per day.
- 4.3 Goals and Strategies
  - Continue to promote Safe Yield and conservation of water resources through policies and practices
  - Complete the C.C. Cragin Reservoir pipeline
  - Retire the pipeline debt through the responsible sale of water
  - Maximize the use of reclaimed wastewater whenever it is safe and economical
  - Coordinate with the Sanitary District to provide infrastructure to new development

Master Water Plan for Waterworks System serving the Town of Payson

Tetra Tech, April 2011

History

- Water system purchased in August 1980
- First Master Plan 1981 (Dashney, Steel and Jensen Inc.)
  - 14 wells, 1,295 gpm, 8 storage tanks-1.44 million gallons.
- Updated Master Plan 1989 (Burgess and Niples Engineers and Architects)
  - Total-36 wells, 1,940 gpm, 8 storage tanks, 3.65 million gallons, 8 booster stations, 10 pressure zones, serving 8,125 people.
- 1983 Northern Gila County Sanitary District (NGCSD) formed
- 1996 Green Valley Park recharge lakes built
- 1998 Long term sage yield of TOP aquifer-2,253 acre feet per year (Southwest Groundwater Consultants) to serve a population of 20,000 to 25,000.
- Estimate build-out population 36,000 to 44,000
- Dec 2002 TOP pass Resolution No. 1742—broad water conservation measures (pages 7 and 8 of Mater Water Plan)
- February 2005 Arizona Water Settlement Act Salt River Project

- 3,500 acre feet distributed to North Gila County
    - 3,000 acre feet distributed to Town of Payson
    - 500 for other communities

Future Planned Conditions-Payson

- Population 2012 census 15,215
- TOP constructing the C.C. Cragin pipeline and water treatment plant
- Deliver 3,000 acres feet (2,154 gpm) for 9 months of the year with no groundwater pumping
    - Recommendations include
        - Installing backup generators
        - Replacing small diameter pipe to improve fire flow
        - Replace old pipe
        - Address low and high pressure areas
        - Address valve locations and types
- Delivery of the 3,000 acre feet of water will include an Aquifer Storage and Recovery (ASR) system recharging 4 wells in the Town for 9 months.

Current Town of Payson Water System

- 42 active wells
- Water pipe sizes between 1.25- to 16-inch
- 12 welded steel tanks with 8.6 million gallons of storage
- 10 booster stations
- Assorted valves
- 960 Fire hydrants
- 25 Pressure zones (page 23 of Master Plan)

Master Water Plan Update

- TOP water distribution system is contained on a new Bentley WaterGEMS hydraulic computer modeling system with GIS coordination by Tetra Tech
- Current Master Plan is a living document
- Input into the model include
    - TOP water system pipe and fittings
    - TOP topographic information
    - TOP Land Use zoning boundaries
    - Landuse weighted demands outlined in the *Northern Gila County Sanitary District- Sanitary Sewer Collection System Master Plan Landuse Flow Conversion Factor Analysis and Update 2007* prepared by Tetra Tech Inc.
    - Storage Tank Information, PRV's Data, Well pressures and flows, Booster Stations, peaking factors, C.C. Cragin water flow after completion, and TOP Build-out conditions

Landuse

- Town of Payson Landuse is the basis for estimating the water system demand for each junctions in the WaterGEMS model
- NGCSD Update based on TOP water usage and shows an average daily water consumption of 70.5 gallons per day
- Summary of TOP Landuse and Flow Conversion shown on page 29, Table 5-1-2-3
- Maximum daily demand calculated to be 2.5 of average daily demand

Modeling Scenarios

- Remaining of Master Water Plan deals with different "scenarios" for the EPS of the Bentley WaterGEMS computer model which included:
  - Establishing a Diurnal Curve using TOP water department records
  - Incorporating the C.C. Cragin water supply and different scenarios for average and daily peak demands, ASR, and the American Gulch by pass
  - Identify problem and errors with in the Bentley WaterGEMS computer model
  - Comparing the existing fire flows and the future C.C. Cragin fire flows within the Town limits;
  - Last scenario was set to include full build-out of the Town of Payson using future landuse as defined in the Town of Payson General Plan Update

Recommendation for Town of Payson Infrastructure

- Future storage tanks and locations;
- Review of TOP Infrastructure recommendations;
- Maintain the Bentley WaterGEMS model to keep an accurate, up to date hydraulic model

Gila County Comprehensive Plan

Prepared by LVA Urban Design Studio and Kimley-Horn and Associates in mid-2000

Chapter 2: Land Use Element

- 2.C History and Trends
  - Gila County covers approximately 4,769 square miles. Approximately 194 square miles (4.07 percent) is privately owned.
  - Growth in Gila County has been moderate. The 2000 census estimated 51,350 residents, representing a 3 percent annual growth since 1990. Annual growth in unincorporated areas was estimated at slightly less than 2 percent. Most of the new development in Gila County has occurred in the incorporated areas of Payson, Globe, and Star Valley, and the unincorporated areas of Pine, Strawberry, and Tonto Basin.
- 2.I Community Land Use Plans—Application Summary
  - 2.I.1 Strawberry Community Plan
    - Strawberry enjoys a four-season climate and is a popular destination for seasonal residents and retirees. The median resident age in 2000 was 53.9 years old. Population in 2000 was estimated at 1,028 with 1,165 housing units. Approximately 55 percent of the housing units are seasonal units. Water supply is provided by Brooke Utilities, PSWID, community wells, and private wells. For community issues, water supply, storage, and delivery is listed first.

- 2.I.2 Pine Community Plan (attached)
    - Pine also enjoys a four-season climate and is a popular destination for seasonal residents and retirees. The median resident age in 2000 was 52.8 years old. Population in 2000 was estimated at 1,931 with 2,242 housing units. Approximately 55 percent of the housing units are seasonal units. For community issues, water supply and delivery is listed first.

Mogollon Rim Water Resources Management Study Management Study and Report of Findings

Prepared by the U.S. Department of the Interior, Bureau of Reclamation, Phoenix Area Office, 2008.

Chapter I: Introduction

- I.A. Background
  - Study area is bounded by Gila county boundary on the west and north, Christopher and Tonto Creeks on the east, and Latitude 34° 09' (4 miles south of Payson) on the south.
  - 68% of the study population and 1% of the land mass is within the Town of Payson.
- I.B.1 Need for the Study
  - The ability to meet existing water demands has been seriously compromised by the current drought which began in 1997. Existing developed water resources are inadequate to reliably support future water supply needs.
  - Most of the communities experience one or more of the following:
    - Water shortages for daily needs
    - Exhausting existing supplies during periods of drought
    - Placing residents under severe water use restrictions
    - Inadequate water supplies to sustain increased growth
  - Nearly all the water comes from shallow well fields that are either fully developed or annually exhausted, many of which are at risk of contamination from septic systems.
- I.B.2 Purpose of the Study
  - The study period is from 2005 to 2040. It is assumed that "build-out" will occur by 2040. High rate of growth in the Phoenix area along with in-migration of retirees leads to more demand for second homes in the study area.

Chapter II: Current Conditions of the Study Area

- II.D.1 Surface Water Hydrology
  - Fossil Creek
    - Average annual precipitation is 18- to 20-inches.
    - Spring flows are relatively constant at 46 cfs and has varied little with respect to time.
    - Total annual flow during a 2 year recurrence interval is 32,230 acre feet per year and 68,510 acre feet per year during a 5-year recurrence interval.
- **Chapter III: Study Participants Current Conditions**
- IIIB.1 Sub-Region 1

– IIIB1.1 Sub-Region 1, Cluster 1

- This area includes water providers for Pine and Strawberry. In addition to limited groundwater recharge, water shortages occur as a result of demand spikes associated with the influx of summertime and holiday residents, when maximum demand may be 2 to 4 times a typical summer day. The demand is exacerbated by a tendency for these visitors to wash driveways and decks, and irrigate lawns, landscaping, and native vegetation.
- A study commissioned by the PSWID concluded water production is limited by the hydraulic characteristics of water flowing through fractures to the wells. Initial good yield progressively decreases as pumping rates increase and groundwater levels decrease.
- Historic Shortages of water have occurred during extended periods of above average precipitation. These shortages resulted from demand exceeding production capacity of the wells. This is particularly true in the Pine area which has less favorable aquifer characteristics than Strawberry.

1. Pine

a. Pine is served by five water providers.

b. Pine Water Company, Inc. (PSWID-Pine)

   i. It provides about 87 percent of the water used in Pine and the service area is nearly built out: 2,111 of the 2,798 parcels are developed. Population in 2002 was 1,889 and the associated water demand supplied by PWC was estimated at 159 acre feet.

   ii. PWC has suffered numerous water outages over the years resulting in water use restrictions and resulting service complaints. PWC attempted to improve service by:

      1. Upgrading the infrastructure
      2. Developing water sharing agreements with private well owners
      3. Drilling five new wells and deepening two existing wells
      4. Developing a 1.8-mile pipeline between Pine and Strawberry to deliver water to Pine
      5. Adding 100,000 gallons of storage
      6. Hauling water

2. Strawberry

   a. The 2002 population in Strawberry was 1,062. Water supply in Strawberry has been adequately provide by two water providers.

      1. Strawberry Water Company, Inc. (PSWID-Strawberry)

         a. In 2002, SWC served 1,002 customers. With an associated demand of 100 acre feet per year. Water use rate was 90 gpcpd. SWC operates nine wells. There are approximately 25 private wells in the service area. Total annual demand is about 100 acre feet per year.

         b. The pipeline connecting Pine to Strawberry initially relieved shortages in Pine. More recently the pipeline has been used to relieve water shortages in Strawberry.

      2. Pine/Strawberry Water Improvement district (PSWID)

a. PSWID was formed to represent the interests of the communities in securing long-term and reliable sources of water by:

   i. Investigating current and potential sources of water

   ii. Investigating the costs associated with maintaining or expanding current and potential sources of water

   iii. Formulating plans and possible funding for improving present water sources

   iv. Consulting with other Government Agencies concerning development of water sources for the communities

b. A study commissioned by the PSWID concluded that groundwater resources are inadequate to support existing demands and does not offer potential for population growth in the area. Over the last five years, new deep wells in the area have yielded substantial volumes of “new” water.

c. The PSWID did not have any customers in 2002.

Chapter IV: Alternative Formulation, Analysis and Evaluation

- IV.A.1.1 Sub-Region 1, Cluster 1
  - Table IV.1 provides a summary of current and future population and water demands for the study communities
    - Pine Water Co. (PSWID-Pine)
      - This community is 25 percent built out. Assuming all lots are developed, the projected 2040 population will be 8,393, an increase of 6,504. The future water demand will increase to 1,128 acre feet per year, an increase of 969 acre feet per year based on a usage rate of 120 gpcd.
    - Strawberry Water Co. (PSWID-Strawberry)
      - By 2040, the service area will be built out and population will increase by 400 percent to 5,002. Water demand increase will be between 672 acre feet per year (120 gpcd) and 840 acre feet per year (150 gpcd). The additional water supply required will be between 571 acre feet per year and 739 acre feet per year.

Appendix B
Water Demand Analysis Spreadsheet

Appendix B is located on the CD.

Appendix C
Supply Demand Balance

Appendix C is located on the CD.

Appendix D
Hydraulic Model Documentation

Appendix D is located on the CD.

Appendix E
Project Cost Estimates

PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT
WATER MASTER PLAN IMPROVEMENTS
ENGINEER'S ESTIMATE OF COST
Project No. 13-39
December 12, 2014

ID No.	Description	Quantity	Unit	Unit Cost	Total Cost
	PINE				
Project ID No. 1-Protal 3 Midle PRV Adjustment					
1	6" Pressure Reducing Valve, Vault, and Cover	2	EA.	$12,000.00	**$24,000**
Project ID No. 2-Pine Ranch 1 and Pine Ranch 2 Realignment					
1	6" PVC Waterline	120	L.F.	$30.00	$3,600
2	6" Valve, Box, and Cover	1	EA	$1,000.00	$1,000
	Total Project ID No. 2-Pine Ranch 1 and Pine Ranch 2 Realignment				**$4,600**
Project ID No. 3-Portal 3 Pressure Zone realignment (create new zone)					
1	6" Pressure Reducing Valve, Vault, and Cover	1,228	L.F.	$30.00	$36,840
2	6" Valve, Box, and Cover	2	EA.	$1,000.00	$2,000
3	6" Pressure Reducing Valve, Vault, and Cover	3	EA	$12,000.00	$36,000
	Total Project ID No. 3-Portal 3 Pressure Zone realignment (create new zone)				**$74,840**
Project ID No. 4-Cool Pines Estates Pipe Upgrade					
1	6" PVC Waterline	8470	L.F.	$30.00	**$254,100**
Project ID No. 5-Strawberry Mtn. Shadows, Bradshaw Zone Realignment					
1	8" PVC Waterline	635	L.F.	$35.00	$22,225
2	6" Valve, Box, and Cover	1	EA	$1,000.00	$1,000
3	3" Pressure Reducing Valve, Vault, and Cover	2	EA	$10,000.00	$20,000
4	50 gpm Pump-145' TDH	2	EA	$50,000.00	$100,000
	Total Project ID No. 5-Strawberry Mtn. Shadows, Bradshaw Zone Realignment				**$143,225**
Project ID No. 6-300 K Booster Zone					
1	6" PVC Waterline	333	L.F.	$30.00	$9,990
2	6" Valve, Box, and Cover	3	EA	$1,000.00	$3,000
3	20 gpm Pump-85' TDH	1	EA	$50,000.00	$50,000
	Total Project ID No. 6-300 K Booster Zone				**$62,990**
Project ID No. 7-Old County Zone Realignment					
1	6" PVC Waterline	580	L.F.	$30.00	$17,400
2	6" Valve, Box, and Cover	2	EA	$1,000.00	$2,000
3	6" Pressure Reducing Valve, Vault, and Cover	1	EA	$12,000.00	$12,000
	Total Project ID No. 7-Old County Zone Realignment				**$31,400**
Project ID No. 8-Canyon Tank Brook View Terrace Looping					
1	6" PVC Waterline	1760	L.F.	$30.00	**$43,200**
Project ID No. 9 - Pine Ranch 1 Future Development					
1	6" PVC Waterline	9050	L.F.	$30.00	**$271,500**
Project ID No. 10 - Hidden Pines Future Development					
1	6" PVC Waterline	2170	L.F.	$30.00	**$65,100**
Project ID No. 11 - Canyon Tank Book View Terrace Future Development					
1	6" PVC Waterline	7380	L.F.	$30.00	**$221,400**

ID No.	Description	Quantity	Unit	Unit Cost	Total Cost
Project ID No. 12 - Bradshaw Future Development					
1	6" PVC Waterline	4750	L.F.	$30.00	**$142,500**

Project ID No. 13 - Old County Future Development					
1	6" PVC Waterline	6380	L.F.	$30.00	**$191,400**

Project ID No. 14 - Tall Pines Future Devlopment					
1	6" PVC Waterline	2610	L.F.	$30.00	**$78,300**

Project ID No. 15 - 300 K Future Devlopment					
1	6" PVC Waterline	4480	L.F.	$30.00	**$156,800**

Project ID No. 16 - Fara Booster Upgrade					
1	10 gpm Pump-205' TDH	2	EA.	$50,000.00	**$100,000**

STRAWBERRY

Project ID No. 17 - Rimwood Looping					
1	6" PVC Waterline	3880	L.F.	$30.00	**$116,400**

Project ID No. 18 - Strawberry Ranch 3 PRV's					
1	6" PVC Waterline	1600	L.F.	$30.00	$48,000
2	6" Pressure Reducing Valve, Vault, and Cover	2	EA	$12,000.00	$24,000
Total Project ID No. 18-Strawberry Ranch 3 PRV"s					**$72,000**

Project ID No. 19 - Strawberry View 1 Looping					
1	6" PVC Waterline	1710	L.F.	$30.00	**$51,300**

Project ID No. 20 - Strawberry Ranch 3 Future Development					
1	6" PVC Waterline	5220	L.F.	$30.00	**$156,600**

Project ID No. 21 - Tank Farm Future Development					
1	8" PVC Waterline	4002	L.F.	$0.00	**$0**

Project ID No. 22 - Rimwood Future Development					
1	6" PVC Waterline	6025	L.F.	$30.00	**$180,750**

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PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT
WATER MASTER PLAN REHABILITATION
ENGINEER'S ESTIMATE OF COST
Project No. 13-39
December 17, 2014

No.	Description	Quantity	Unit	Unit Cost	Total Cost
	PINE				
	Project ID No. R1-Milk Ranch to 300 K Transmission Pipeline				
1	6" PVC Waterline	1,870	L.F.	$30.00	**$56,100**
	Project ID No. R2 - Old County Distribution Pipeline				
1	2" PVC Waterline	514	L.F.	$20.00	$10,280
2	3" PVC Waterline	3,435	L.F.	$20.00	$68,700
3	6" PVC Waterline	774	L.F.	$30.00	$23,220
	Total Project ID No. R2 - Old County Distribution Pipeline				**$102,200**
	Project ID No. R3 - Tall Pines Distribution Pipeline				
1	2" PVC Waterline	9,535	L.F.	$20.00	$190,700
2	4" PVC Waterline	5,207	L.F.	$25.00	$130,175
3	6" PVC Waterline	1,056	L.F.	$30.00	$31,680
	Total Project ID No. R3 - Tall Pines Distribution Pipeline				**$352,555**
	Project ID No. R4 - Canyon Tank / Portal 3 Lower Distribution Pipeline				
1	2" PVC Waterline	824	L.F.	$20.00	$16,480
2	3" PVC Waterline	1,470	L.F.	$20.00	$29,400
3	6" PVC Waterline	4,697	L.F.	$30.00	$140,910
	Total Project ID No. R4 - Canyon Tank / Portal 3 Lower Distribution Pipeline				**$186,790**
	Project ID No. R5 - Cool Pines Estates Distribution Pipeline				
1	2" PVC Waterline	15,820	L.F.	$20.00	**$316,400**
	STRAWBERRY				
	Project ID No. R6-Strawberry Ranch 3 Distribution Pipeline				
1	3" PVC Waterline	3,100	L.F.	$20.00	**$62,000**
	Project ID No. R7 - Rimwod Distibution Pipeline				
1	2" PVC Waterline	1,346	L.F.	$20.00	$26,920
2	3" PVC Waterline	1,614	L.F.	$20.00	$32,280
3	4" PVC Waterline	2,645	L.F.	$25.00	$66,125
4	6" PVC Waterline	13,205	L.F.	$30.00	$396,150
	Total Project ID No. R7 - Rimwod Distibution Pipeline				**$494,555**

F:\00_Projects\13-39 PSWID Master Plan\Engineering\Engineers Cost Estimation No 2 - 12-2-14 Page 1 of 1

Appendix F
Project Prioritization

TABLE F-1
Project Prioritization

Category	Project Name	Evaluation Criteria: Condition (Physical/ Performance)	Reliability	O&M Efficiency	Community/ Customer
Hydraulic Improvements	Portal 3 Middle PRV adjustment	1.00	0.00	1.00	3.00
Hydraulic Improvements	Pine Ranch 1 and Pine Ranch 2 Zone realignment	1.00	0.00	1.00	3.00
Hydraulic Improvements	Portal 3 Pressure Zone Realignment (create new zone)	1.00	3.00	1.00	3.00
Hydraulic Improvements	Cool Pines Estates Pipe Upgrade	7.00	3.00	5.00	3.00
Hydraulic Improvements	Strawberry Mountain Shadows Bradshaw Zone Realignment	1.00	3.00	0.00	3.00
Hydraulic Improvements	300 K Boosted Zone	7.00	5.00	0.00	7.00
Hydraulic Improvements	Old County Zone Realignment	1.00	3.00	0.00	3.00
Hydraulic Improvements	Canyon Tank Brook View Terrace Looping	1.00	5.00	1.00	3.00
Growth	Pine Ranch 1 Future Development	0.00	3.00	1.00	3.00
Growth	Hidden Pines Future Development	0.00	3.00	1.00	3.00
Growth	Canyon Tank Brook View Terrace Future Development	0.00	3.00	1.00	3.00
Growth	Bradshaw Future Development	0.00	3.00	1.00	3.00
Growth	Old County Future Development	0.00	3.00	1.00	3.00
Growth	Tall Pines Future Development	0.00	3.00	1.00	3.00
Growth	300 K Future Development	0.00	3.00	1.00	3.00
Hydraulic Improvements	Fara Booster Upgrade	3.00	5.00	5.00	3.00
Hydraulic Improvements	Rimwood Looping	0.00	5.00	5.00	3.00
Hydraulic Improvements	Strawberry Ranch 3 PRVs	0.00	10.00	5.00	3.00
Hydraulic Improvements	Strawberry View 1 Looping	0.00	5.00	5.00	3.00
Growth	Strawberry Ranch 3 Future Development	0.00	3.00	1.00	3.00

TABLE F-1
Project Prioritization

Category	Project Name	Evaluation Criteria: Condition (Physical/ Performance)	Reliability	O&M Efficiency	Community/ Customer
Growth	Rimwood Future Development	0.00	**3.00**	**1.00**	**3.00**
Rehab	Milk Ranch to 300 K Transmission Pipeline	**10.00**	**10.00**	**10.00**	**10.00**
Rehab	Old County Distribution Pipeline	**10.00**	**3.00**	**5.00**	**3.00**
Rehab	Tall Pines Distribution Pipeline	**10.00**	**5.00**	**5.00**	**3.00**
Rehab	Canyon Tank / Portal 3 Lower Distribution Pipeline	**7.00**	**7.00**	**5.00**	**7.00**
Rehab	Cool Pines Estates Distribution Pipeline	**7.00**	**5.00**	**5.00**	**3.00**
Rehab	Strawberry Ranch 3 Distribution Pipeline	**10.00**	**10.00**	**5.00**	**7.00**
Rehab	Rimwood Distribution Pipeline	**7.00**	**7.00**	**5.00**	**3.00**

APPENDIX I

PINE-STRAWBERRY WATER IMPROVEMENT DISTRICT	
PROJECTED BUDGET REPORT FOR FY 6/30/2021	
	Approved Budget
Revenue (Cash In)	FY 2020/2021
Property Tax Levies	$844,362
Customer Sales	$2,094,400
Miscellaneous Revenues	$95,000
TOTAL REVENUE	$3,033,762
Expenses (Cash Out)	
Operations	$425,000
Field Labor & Burden	$410,000
Admin	$485,000
Board	$60,000
Capital Projects & Infrastructure Repairs	$545,899
Equipment Replacement	$100,000
TOTAL EXPENSES	$2,025,899
Depreciation Estimate	$415,000
Total Operating Expenses	$2,440,899
Net Operating Income	$592,863
Add Back Depreciation Expense	$415,000
Total Operating Income	$1,007,863
1. Revenue assumptions are calculated using 1.5% inflation rate.	
2. Expense assumptions are calculated using 1.5% inflation rate.	

Arizona State Museum-Cultural Letter

APPENDIX J

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:

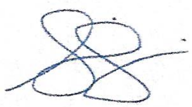
1. The Arizona Antiquities Act (AAA; A.R.S. §41-841 *et seq.*) protects cultural resources and human remains on "lands owned or controlled by the state of Arizona, by any public agency or institution of the state, or by any county or municipal corporation within the state." Should any of the proposed 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:

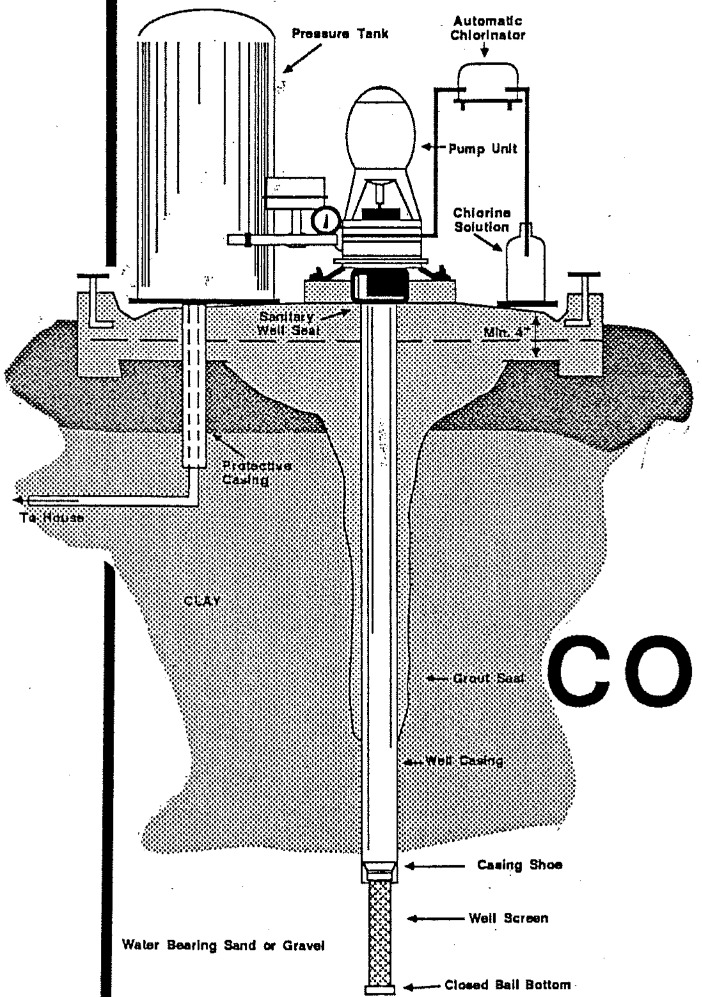
Davis, Erin
2014 *A Class III Cultural Resources survey of 0.63 Acre for 11 Pedestrian Shelters, In Pine and Strawberry, Gila County, Arizona*. Logan Simpson Design, Inc., Tempe, Arizona.

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 K

engineering bulletin no. 10



GUIDELINES FOR THE CONSTRUCTION OF WATER SYSTEMS

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

MAY 1978

Maximum pressures of as much as 100 pounds per square inch can be allowed in small, low-lying areas not subject to high flow rates and surge pressures. Areas of excessively high or low pressures require that the system be divided into multiple pressure levels, or that pressure reducing and pressure relief valves be installed. Where multiple-level systems are required, it is desirable to establish the lines of separation so that the pressures in each system will approach the optimum range of 40 to 75 pounds per square inch.

All water mains and service lines should be designed for a minimum normal internal working pressure of 150 pounds per square inch plus appropriate allowances for water hammer.

In cases where greater than the above noted maximum pressures are required for effective operation, all elements of the system shall be designed accordingly. Responsibility for pressure reduction, if necessary, shall be specifically defined to be either the responsibility of the supplier of water or the customer.

3. SIZE OF PIPE MAINS. Pipe sizes shall be designed to provide a minimum system pressure of 20 psi, as noted above. The Arizona Corporation Commission requires that water mains serving fire hydrants be a minimum of 6 inches in diameter, or larger, as necessary to serve general service and fire flow requirements. The minimum size of water main shall be 4 inches in diameter, except for the following reasons:

a. Temporary services to be replaced later with large mains.

b. For secondary parallel mains.

c. In wide or paved streets to avoid long and expensive service connections or pavement cuts to the principal mains.

d. Short mains, not for fire service, in courts or cul-de-sacs.

The length of run of mains smaller than 6" should be determined by local conditions but in no case should they exceed the following:

I.D. Size	Dead-ended	Circulating
2 inch	300 feet	600 feet
3 inch	500 feet	1000 feet
4 inch	1300 feet	2600 feet

e. As justified by the Engineer.

Rural Development Funded Project Maps

APPENDIX L

PINE WATER SYSTEM

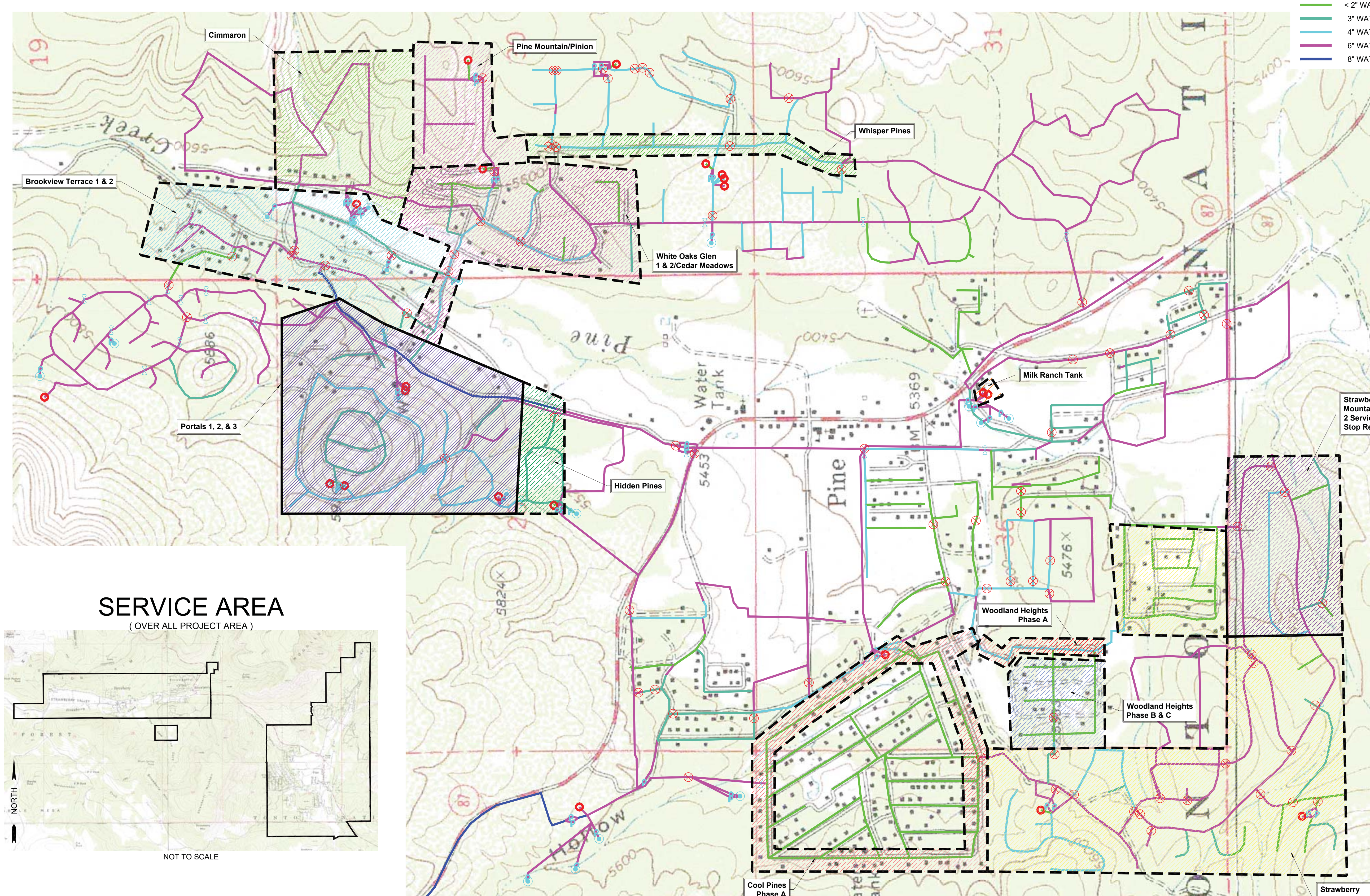
A PORTION OF SECTIONS 20 THRU 29, 35, AND 36, TOWNSHIP 12 NORTH, RANGE 8 EAST AND A PORTION OF SECTIONS 19, 30, AND 31, TOWNSHIP 12 NORTH, RANGE 9 EAST AND A PORTION OF SECTIONS 19 AND 20, TOWNSHIP 11.5 NORTH, RANGE 9 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

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

LEGEND

RURAL DEVELOPMENT FUNDED PROJECT
(COLOR VARIES)

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



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

Sep 11, 2020 4:08pm V:\CAD\Pine Strawberry\16-058 Water System Map\Production Drawings\Proposed\PSWID Proposed Projects Pipes-Valves Exhibit 09-11-2020.dwg

msafari

EPS GROUP
125 S. Avondale Blvd., Suite 115
Avondale, AZ 85323
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PINE STRAWBERRY WATER IMPROVEMENT DISTRICT
WATER SYSTEM - PROPOSED PROJECTS
PINE AND STRAWBERRY, ARIZONA

RURAL DEVELOPMENT FUNDED PROJECTS

REVISIONS:

DESIGNER: EPS
DRAWN BY: EPS

NOT FOR CONSTRUCTION

JOB NO.
16-058
04-15-2019

SHEET NO.
1 OF 1

FIGURE 4.1

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

msafari Sep 11, 2020 4:12pm V:\CAD\Pine Strawberry\16-058 Water System Map\Production Drawings\Proposed\PSWID Proposed Projects Pipes-Valves Exhibit 09-11-2020.dwg

STRAWBERRY 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
- RURAL DEVELOPMENT FUNDED PROJECT (COLOR VARIES)

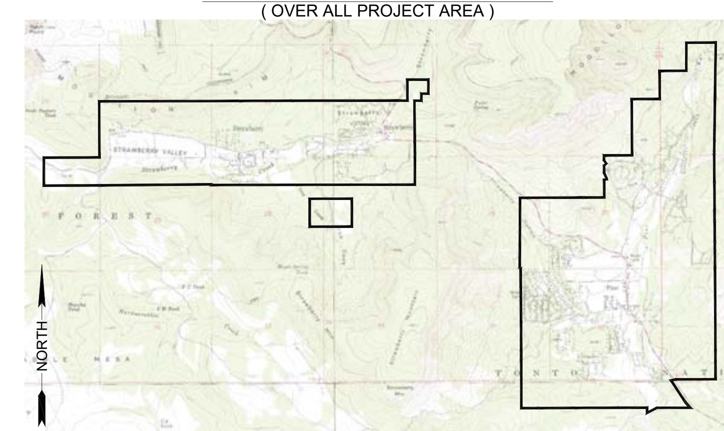
NORTH

0 500' 1000'

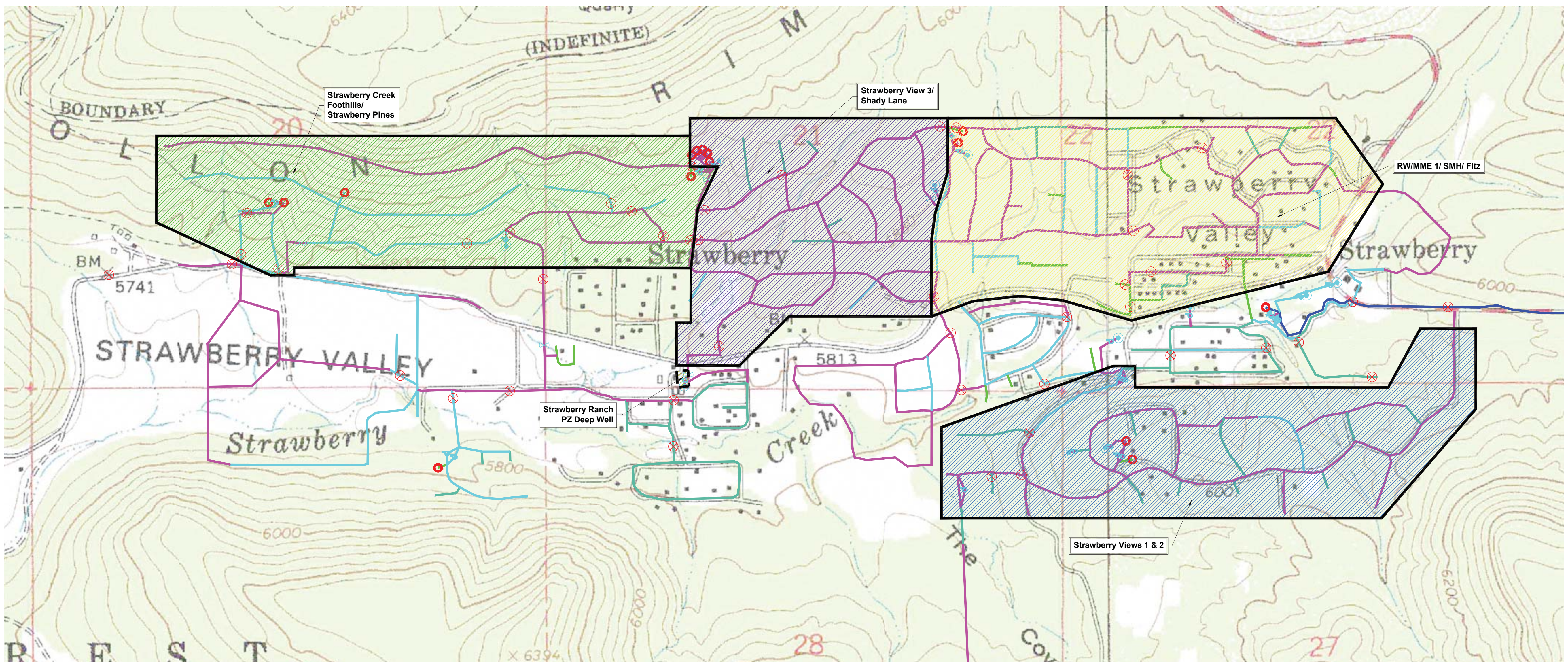
SCALE: 1"=500'

SERVICE AREA

(OVER ALL PROJECT AREA)



NOT TO SCALE



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EPS GROUP

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

RURAL DEVELOPMENT FUNDED PROJECTS

REVISIONS:

CONTACT ARIZONA 811 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

04-15-2019

SHEET NO.
1
OF 1

FIGURE 4.2