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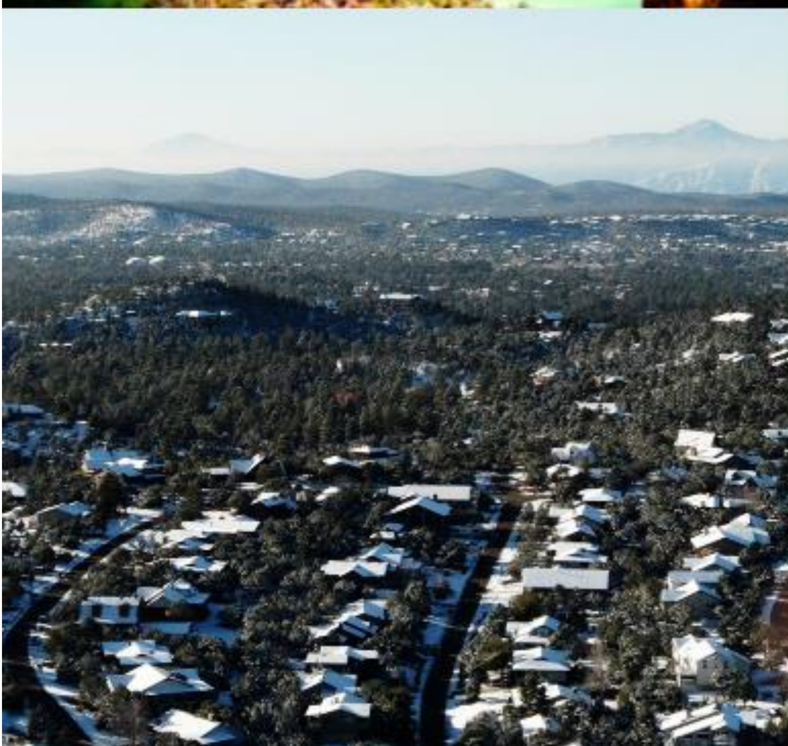

Central Arizona Governments

Gila County Septic Use Study

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CAG
Central Arizona Governments
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EXECUTIVE SUMMARY

This report attempts to identify, quantify, and qualify the presence of onsite septic systems, and their impact of septic system discharges into nearby water sources that serve residents of rural Gila County. The study geography includes all of Gila County where septic systems are present. The purpose of the report is to provide an illustrative, high level analysis regarding Nitrate levels of tested well site locations in relation with onsite septic system in order to recommend remediation measures and possible funding opportunities that will protect groundwater sources for drinking water supplies.

A broad review of septic system related studies demonstrate that throughout the United States, septic systems, if not maintained properly, often contribute in the degradation of groundwater quality. Existing regulations brought forth by the Arizona Department of Environmental Quality (ADEQ) and the Division of Safe Drinking Water provide a basis for Gila County to implement mitigation measures to protect groundwater resources.

The data was collected by a collaborative effort of Central Arizona Governments (CAG) member communities, counties, utility companies, and assorted partner agencies.

The goal of this report is to identify correlations among existing septic systems and nitrate levels and spur opportunities to see grants and other funding for remediation and prevention projects. The identification of contaminated flows and the identification of best practices for effective operation and remediation are critical to improving the overall water quality for the CAG region.

CHAPTER

1

Introduction

The Central Arizona Governments (CAG) was incorporated in 1975 and is one of six regional planning districts, or Councils of Government (COGs), which was established by Executive order 70-2 and signed by the Governor of Arizona to provide effective regional planning services to Gila and Pinal Counties. The goal of Executive Order 70-2 was to promote a "community of interest" and to preserve the boundaries of the region. The Executive Order established a population base throughout the region sufficient to support a number of planning activities, while complying with federal planning requirements and addressing the concerns of local government officials. The CAG Region is comprised of Gila and Pinal Counties, and includes the 17 incorporated communities of Apache Junction, Casa Grande, Coolidge, Eloy, Florence, Globe, Hayden, Kearny, Marana, Mammoth, Maricopa, Miami, Payson, Queen Creek, Star Valley, Superior, and Winkelman. The Ak-Chin Indian Community, Gila River Indian Community, San Carlos Apache Tribe, and White Mountain Apache Tribe are also members of the region. The region's population in total was 510,369 (Pinal County = 455,210; Gila County = 55,159) as of July 1, 2019 according to the Arizona Office of Economic Opportunity and covers an approximate total area of 10,170 square miles (Pinal County = 5,374; Gila County = 4,796).

In 1976, the Arizona Department of Environmental Quality (ADEQ) certified the 208 amendment for CAG to become the regional water quality management agency for Pinal and Gila Counties. The ertified amendment was forwarded by ADEQ to Region IX EPA to approve CAG as the Designated Management Agency (DPA) for both counties. As the DPA, CAG is to author and update a regional 208 Water Quality Management Plan on an as needed basis and therefore acts as a facilitator and coordinator of the planning process for water quality issues within the region. The responsibilities as a DPA includes the following activities:

- Overseeing the implementation of the water quality management plan and coordinate necessary amendments;
- Ensure that proposed construction of wastewater treatment facilities and water quality permits conform to the regional 208 Plan in accordance with the State's Continuing Planning Process;
- Identify existing and proposed wastewater treatment facilities to meet the anticipated municipal and industrial waste treatment needs of an area over a 20-year period.


Salt River Canyon

- Provide general planning guidance for nonpoint source pollution, sludge, storm water and other activities that might impact water quality; and
- Facilitate public participation in the regional planning process.

CAG provides liaison services between the region and ADEQ to the greatest extent possible. As the DPA, CAG activities for Pinal and Gila Counties have largely been focused on the review and consistency of regional wastewater treatment and reclamation facilities to the CAG 208 Water Quality Management Plan. Activities focused on the use of onsite septic systems, unfortunately, are not part of the Plan's consistency review process, and have not received the attention needed in order to understand their contribution to non-point source pollutants in the nearby water supplies. This study is the first attempted step to begin assessing the impacts that septic systems are having on water quality within the CAG Region. The work done within this study was largely focused on identifying onsite septic systems locations in Gila County and making a general correlation with the nitrate levels of nearby wells.

1.1 BACKGROUND

Over the years, the CAG Region has generally been considered very "rural" in nature, more so within Gila County. However, since the early 2000's, portions of Pinal County had experienced a phase of rapid growth. Although areas of growth in Pinal County led to denser populations and land uses, allowing for sewer connection opportunities, Gila County has not experienced the same kind of growth. Therefore, there are still several areas within Gila County that have onsite septic systems that have been used for decades. Since onsite septic systems are not part of the consistency review process in the CAG 208 Water Quality Management Plan to help manage water quality issues, CAG wanted to begin researching onsite septic systems within the Region, starting with Gila County, to better understand their impacts on water quality.

Therefore, CAG took advantage in applying for a $60,000 grant that was announced by ADEQ for the 604(b) Water Quality Management Program for State Fiscal Year 2019 that focused on water quality management planning activities. One of the eligible activities of the grant involves the use of septic systems. There are many aspects and ambitions that CAG would like to research and document regarding onsite septic systems that would improve planning practices. However, very limited data exists or is not easily accessible within the time and funding constraints of the grant. Hence, CAG is making its first attempt to collect as much data, to the extent possible, regarding onsite septic systems.

1.2 STUDY PURPOSE

The purpose of this Study is primarily to create a database that will identify, quantify, and qualify, to the greatest extent possible, the presence of onsite septic systems, and their impact of septic system discharges into nearby water sources, that serve residents of Gila County. The Study may also serve an indirect purpose to allow the proper agencies and/or citizen groups to create an overall plan for remediation projects, new installations in underserved areas, and a public education campaign for best management practices for onsite septic system users. By doing so, possible funding opportunities can be identified that will protect water sources for drinking water supplies.

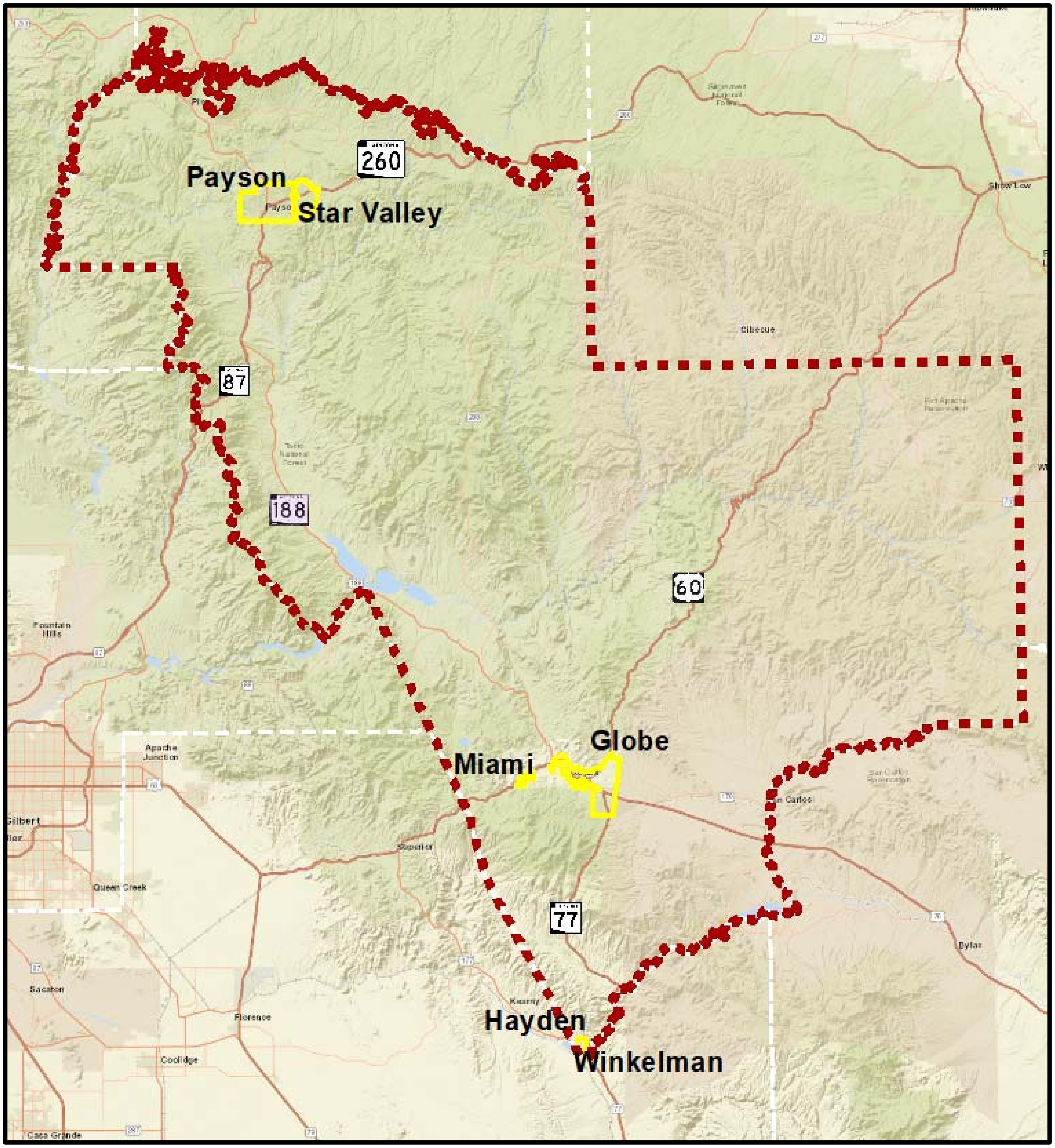
The intention of the database being constructed in the Study is to begin establishing a planning tool for local and regional developments to appropriately size and locate onsite and/or regional sewer systems. The database becomes the genesis for future planning endeavors. Ultimately, the data being collected (now and Post-Study activities) will be used to apply for various grant programs and seek leverage funding to address older onsite septic systems that no longer meet current guidelines as acceptable wastewater processing systems.

1.3 STUDY AREA

The study area is the entire land area within Gila County, which is approximately 4,796 square miles and that is not served by a sanitary sewer system. **Figure 1-1** displays the study area of Gila County and the incorporated boundaries within.

Figure 1-1

Study Area



CHAPTER

2

Septic System & Related Pollution

The purpose of this chapter is to provide a brief overview of the history and effectiveness septic systems have had over the years.

2.1 GENERAL HISTORY

A French homeowner in the mid-1800s, by the name of John Mouras is believed to have designed the first septic tank. He had built a properly functioning prototype that was constructed from concrete and stone that required no treatment or maintenance. The piping connecting his home to the system was fabricated from clay and mud. When sewage overflowed from the tank, it was released into a cesspool. Nearly 10 years had passed since the system was installed before John Mouras decided to open the tank and see how his prototype was holding up. To his amazement, the tank was virtually empty of any solid organic waste and contained only liquid effluent that had a thin layer of scum floating on the top. He later submitted an application for a patent which was granted in 1881. The onsite septic system was then later introduced to the United States of America in 1883.

In the 1940s, septic systems became cheaper and even more popular during the post-World War II economic boom. By the 1950s effluent from the concrete tanks that filtered into specified drain fields became the norm. However, when the 1960s came around, the older septic systems began failing, advancing the need of sewage treatment plants. The construction of sewage treatment plants could not keep up with the rapid growth of cities and towns. Since a septic system is a process that, if not handled properly, can become harmful to people and the environment, installations and usage of septic systems became highly regulated. Many cities began to regulate system sizing and design in the 1970s, along with requiring a permit for any new onsite septic system installations to ensure they are designed and installed properly. Today, almost twenty-five percent of homes use a septic system made of plastic, fiberglass, or concrete. Several changes have occurred to septic system design over the years to make them what they are today. The newer septic systems now have technological advancements, such as septic tank risers, effluent filters, filter alarms, etc., allowing systems to become a safer and more effective alternative to a regional sewage system.

Roosevelt Dam Bridge

2.2 EFFECTIVENESS OF SEPTIC SYSTEMS

What John Mouras stumbled across when he designed the first onsite septic system was the process that today is referred to as the anaerobic digestion process. The human body produces a natural occurring coli from type of bacteria that creates an action within a septic tank that helps to break down the solids in the wastewater, creating a byproduct of carbon dioxide and effluent or water. The gradual process that the organic solid waste undergoes is an anaerobic digestion. This is a natural and basic process in which microorganisms break down biodegradable solid organic material in an environment where oxygen is not present. The process is also widely used in community wastewater treatment plants in treating house hold wastewater sludge's and organic wastes that would otherwise be destined to be deposited in landfills or incinerators. Without the anaerobic digestion process, wastewater would find its way into our freshwater lakes, streams, rivers and watersheds causing disease, contamination, and a variety of health and environmental hazards.

However, if septic systems are designed, installed and maintained correctly, they can be an effective means of preventing the spread of pathogens and other harmful substances. Septic systems functions well when considering the parameters within which they are intended to operate, but they are not perfect wastewater disposal systems. They can't remove 100 percent of the pollutants associated with residential wastewater and therefore are discharged to the environment (HAL, 2016) Septic systems rely on two primary stages of treatment to remove contaminants from wastewater (**See Figure 2-1: TYPICAL SEPTIC SYSTEM**):

1. Within the septic tank, solids are removed and microorganisms break down contaminants; and
2. In the septic drain field, further degradation and filtering of effluent occurs.

This treatment process has the ability to remove most contaminants, however, it's highly dependent on the system itself and soil conditions to function properly.

Contaminants that are not removed from the wastewater through this process may enter groundwater and potentially contaminate down gradient surface waters. Therefore, septic systems can potentially contribute to bacteria and nutrient loading in surface waters causing eutrophication and public health risks from water contact recreation.

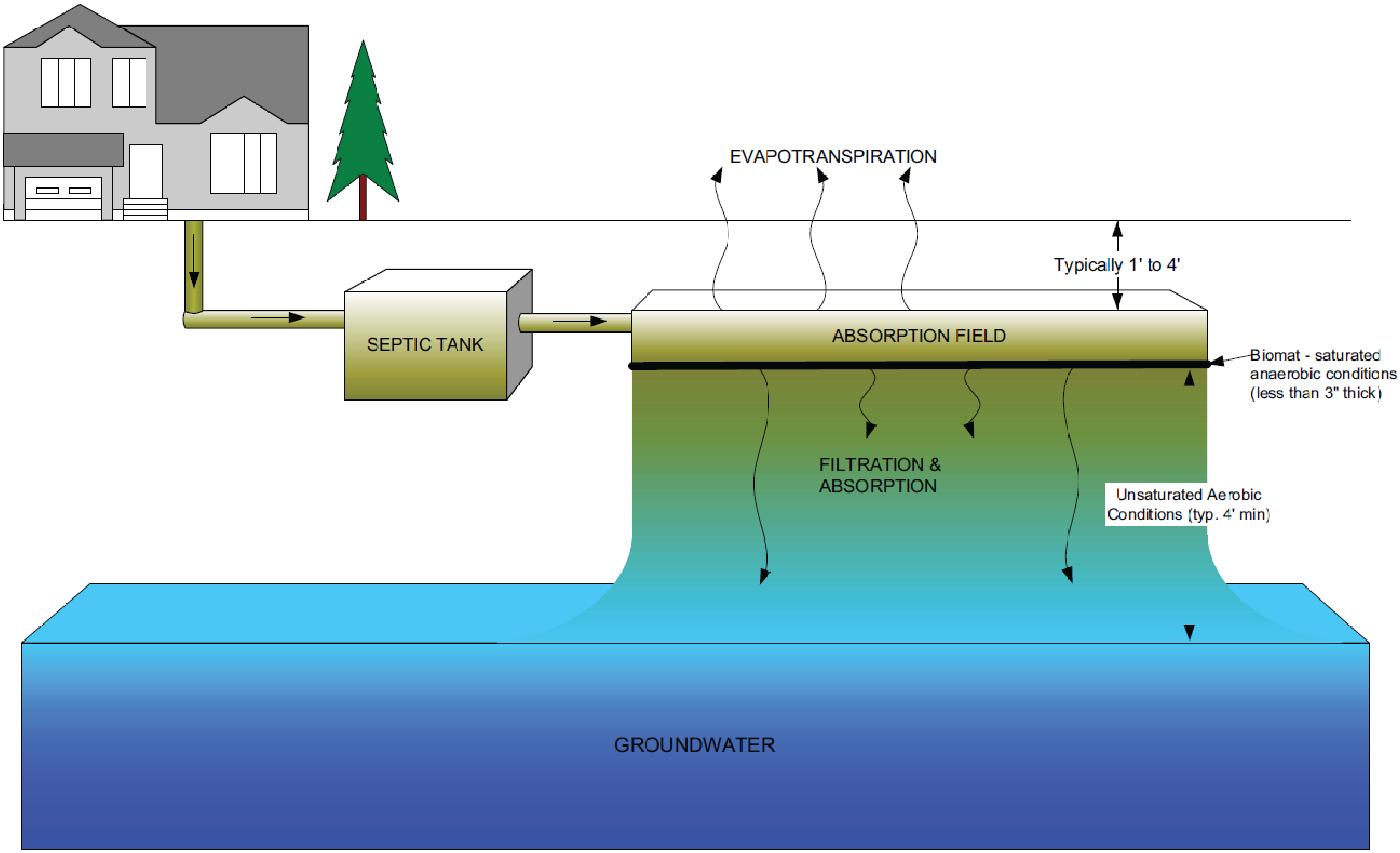
Regulators, planners, and designers then have to figure out how to deal with the discharged pollutants to help ensure that public health and the environment are protected to acceptable levels. In part the answer lies in the old adage – *"Dilution is the Solution to Pollution,"* – meaning that there must be sufficient groundwater available to decrease, or dilute, the concentration of remaining pollutants to an acceptable level.

Therein lies the dilemma with onsite septic systems. Although they can be an effective alternative for waste disposal to a regional sewage system, at what point do they become problematic? As with many planning questions, it depends. The assimilative capacity of the underlying groundwater resource is a key factor and will be dependent on the determination of appropriate septic system densities (number of septic systems per unit of land area). The U.S. Congress Office of Technology Assessment (OTA) stated that:

> *"Major factors affecting the potential of septic systems to contaminate groundwater in general are the density of systems per unit area and hydrogeological conditions. Areas with a density of more than 40 systems per square mile (1 unit per 16 acres) are considered regions with potential for contamination."*

Appropriate densities help maintain adequate dilution potential in the underlying groundwater. The lower the development density, the higher the dilution potential will be. As this Study is primarily being conducted to identify, quantify, and qualify the presence of onsite septic systems and their impacts to nearby water sources, the density will be a contributing factor.

FIGURE 2-1
TYPICAL SEPTIC SYSTEM



CHAPTER

3

Regulatory Considerations

The purpose of this chapter is to briefly outline the laws and regulations used for groundwater quality standards, the permitting process for discharges, and the administration of onsite septic systems in order to understand how they may relate to one another when trying to identify the source of pollutants.

Water quality management planning, wastewater treatment, and disposal practices must conform to established water quality rules and laws. The Clean Water Act (CWA), administered under the Environmental Protection Agency (EPA), establishes the overarching structure for regulating discharges of pollutants into the waters of the United States and regulating surface and groundwater quality standards. However, the Arizona Department of Environmental Quality (ADEQ) is tasked with monitoring surface and groundwater quality on non-tribal lands throughout Arizona, as well as reporting this data required by the CWA. Since onsite septic systems are more tied with groundwater sources, this Study will focus on groundwater quality.

3.1 MONITORING OF GROUNDWATER QUALITY

The ADEQ also conducts a groundwater monitoring program for the 51 groundwater basins found throughout the state. Studies are done on a basin-by-basin approach. In a selected basin, samples are collected from a variety of wells (e.g., private, irrigation, production) and analyzed for various pollutants, including Safe Drinking Water Act (SDWA) inorganic analyses and oxygen and hydrogen. Samples for radiochemistry and radon analysis are also frequently collected while Volatile Organic Compounds (VOCs), currently registered pesticides, banned pesticides, perchlorate, and other types of samples are collected in areas where these pollutants are likely to be encountered. The ground water sampling program provides general basin-side information about water quality to residents using private wells that do not have the benefit of the regular sampling required at public water supplies.

3.2 PERMITTING

Groundwater

Discharges to groundwater require permits issued by the ADEQ. Discharges below ground are regulated with Aquifer Protection Permits (APPs). Responsibilities of the applicant range from simple notification to a full engineering review, depending on the type of required permit. Permit types range from individual site-specific permits to general permits that may cover a geographic region or area. General permits are typically issued to a category of discharges, or for operations that have similar types of discharges and pose little environmental risk. Individual permits are issued for operations that pose significant environmental risk, or when an operation currently under a general permit expands or exceeds the pre-set limits for that type of general permit.

For groundwater discharges, ADEQ requires an Aquifer Protection Permit (APP) under the following circumstances:

> *"If you own or operate a facility that discharges a pollutant either directly to an aquifer or to the land surface or the vadose zone (the area between an aquifer and the land surface In such a manner that there is a reasonable probability that the pollutant will reach an aquifer."*

APPs are issued as either individual or general permits. The following facilities are considered to be "discharging" and require permits, unless exempted or ADEQ determines that there will be no migration of pollutants directly to the aquifer or to the vadose zone:

- Surface impoundments, pits, ponds, and lagoons;
- Solid waste disposal facilities (generally regulated by the solid waste management section, except for mining overburden and wall rock that has not been subject to min leaching operations);
- Injection wells;
- Land treatment facilities;
- Facilities adding pollutants to a salt dome, salt beds, or salt formations, drywells, underground caves, or mines;
- Mine tailings piles and ponds;
- Mine leaching operations;
- **Septic Tank Systems**;
- Underground water storage facilities (if wastewater – effluent is used); and/or
- Sewage or wastewater treatment facilities.

Some types of facilities or activities are exempt from the APP process. For a complete list of exemptions, see https://legacy.azdeq.gov/environ/water/permits/download/exemptions.pdf.

More detailed information on the permitting process and all types of ADEQ permit types are available online at http://www.azdeq.gov/function/permits/index.html.

See A.R.S. §49-241 thru §49-252 and A.A.C. R18-9-101 thru 404 for statutes and rules related to APPs. Rules for the reclaimed water program are found in A.A.C. R18-9-601 thru 720

Onsite Septic Systems

In 2001 and 2005, Arizona adopted extensive regulations regarding onsite septic systems (A.A.C. R18-9-A301-317). Any person selling or transferring ownership of a property served by an onsite wastewater treatment facility (which includes a conventional septic tank system or alternative onsite wastewater treatment facility) must retain a qualified Inspector to inspect the facility within six months prior to transferring ownership of the property (A.A.C. R18-9-A316).

Typically, such an inspection is triggered by the resale of a home by an owner. The Inspector prepares a Report of Inspection form for the Seller. The Seller provides the complete Report of Inspection form to the Buyer before the property is transferred. The Buyer is then responsible for completing and submitting the Notice of Transfer form within 15 days after the date of property transfer. The agency that the

Notice of Transfer form will be submitted to will depend on the system's date of construction. For systems constructed and operated before January 1, 2001, submission will be to ADEQ. For systems constructed and operated after January 1, 2001, submission will be to the delegated county environmental or health department (or Pinal and Gila Counties in regards to this study). Gila County has a document posted within their website that has a more detailed description of the Notice of Transfer process that was produced through Arizona Cooperative Extension with the University of Arizona at the following link:
https://www.gilacountyaz.gov/documents/docs/Transfer_Info_Document_az1554___March_2012.pdf

Also, A.A.C. R18-9-A309(A)(4) prohibits the use of cesspools for the disposal of sewage. The regulations also provide for specific design and setbacks for onsite systems, which should result in fewer failures in the future. These regulations may provide opportunities for regional tracking and identification of areas of failing systems or cesspools. Model ordinances could be developed, which if adopted by local jurisdictions, could require repair of substandard or failing systems.

3.3 GILA COUNTY REGULATIONS

GILA COUNTY WASTEWATER DIVISION

The Gila County Wastewater Division within the Community Development Department is delegated by ADEQ for carrying out all aspects of permitting and inspections of conventional (up to 24, 200 GPD) and alternative (up to 3,000 GPD) onsite wastewater disposal systems. The most common services offered by the Wastewater Division include:

- Clearance Letters;
- System Designer & Contractors Installer List;
- Gray Water Information;
- Information on Maintenance & Care of Your Septic System;
- Public Records Request (Non-Commercial & Commercial)
- Setback Requirements;
- Soil Evaluation and Perc Testing (Site Investigations)
- Transfer of Ownership;
- Wastewater Education Training; and
- Water Wells.

Documents and forms to carry out the permitting and inspection process can be obtained at the following link:
https://www.gilacountyaz.gov/documents/wastewater_docs.php.

The Gila County Wastewater Ordinance Number 2014-02 can also be read in Appendix A.

Tonto Natural Bridge

CHAPTER

4

Nitrate Contaminants as indicator of Septic System Failure

The purpose of this chapter is to briefly discuss nitrate contaminants as a potential indicator from failed onsite septic systems and the health risks of high nitrate levels in groundwater if not addressed.

4.1 NITRATES

Nitrate is an inorganic compound that occurs under a variety of conditions in the environment, both naturally and synthetically, generally when nitrogen combines with oxygen or ozone. Nitrate is a composed of one atom of nitrogen (N) and three atoms of oxygen (O) to form the chemical symbol NO3. A chemical process called reduction can take nitrate (NO3) to form nitrite (NO2) which can then cause health problems. The most common sources of nitrate in groundwater include fertilizer, animal waste, and sewage wastes from humans. Onsite septic systems in particular can elevate groundwater nitrate concentrations because they remove only half of the nitrogen in wastewater, leaving the remaining half to percolate to groundwater (McCasland, et al).

Nitrogen is one of four well understood pollutants from onsite septic systems that can be used as an indicator on the effect it has on the environment – pathogens, organic compounds, and phosphorus would round out the other three. However, a wide variety of research that is available has indicated that pathogens, organic contaminants and phosphorus all have significant limitations as indicators and that nitrate nitrogen is one of the more reliable indicators of potential pollution from onsite septic systems. The advantages of using nitrate as an indicator includes:

- Excessive concentrations of nitrate in drinking water present a well-documented health hazard.
- Nitrate is an effective indicator of human activity because the major sources of nitrate in groundwater are associated with wastewater disposal and application of fertilizer to land.
- Nitrate concentrations are relatively easy to measure.
- A reliable historical groundwater quality data base exists.
- Attenuation of nitrate in groundwater in productive aquifers is not very likely to occur except by dilution.

Therefore, as this study attempts to identify the location of onsite septic systems, the study will also be looking at areas with higher levels of nitrogen to see if the onsite septic systems could be nitrogen loading the groundwater sources. High concentrations of onsite septic systems, coupled with high levels of nitrate levels in groundwater sources may indicate the likelihood of multiple failing systems.

4.2 NITROGEN LEVEL STANDARDS & RELATED HEALTH RISKS

Nitrate in drinking wat is measured either in terms of the amount of nitrogen present or in terms of both nitrogen and oxygen. The federal standard for nitrate in drinking water is 10 milligrams per liter (10 mg/l) nitrate-N, or 45 mg/l nitrate-NO3 when the oxygen is measured as well as the nitrogen. Unless otherwise specified, nitrate levels usually refer only to the amount of nitrogen present, and the usual standard, therefore is 10 mg/l.

Since nitrate is one of the most common groundwater contaminants in rural areas, short-term exposure to drinking water with a nitrate level at or just above the health standard of 10 mg/l nitrate-N is a potential health problem primarily for infants. Babies consume large quantities of water relative to their body weight, especially if water is used to mix powdered or concentrated formulas or juices. Also, their immature digestive systems are more likely than adult digestive tracts to allow the reduction of nitrate (NO3) to nitrite (NO2). The presence of nitrite in the digestive tract of newborns can lead to a disease called methemoglobinemia, or "blue baby" disease (McCasland, et al).

Methemoglobinemia is the most significant health problem associated with nitrate in drinking water. Blood contains an iron-based compound called hemoglobin, which carries oxygen. When nitrate is present, hemoglobin can be converted to methemoglobin, which cannot carry oxygen. For adults, this is generally not an issue as methemoglobin levels normally don't exceed one percent (1%), as enzymes continually convert methemoglobin back to hemoglobin. Newborn infants, on the other hand, have lower levels of these enzymes, and their methemoglobin level is usually one to two percent (1%-2%). Anything above that level is considered methemoglobinemia (McCasland, et al).

Few clear-cut symptoms are associated with methemoglobin levels between one and 10 percent (1%-10%). At higher levels symptoms of cyanosis usually appear. Babies with this condition have bluish mucous membranes and may also have digestive and respiratory problems. If levels reach to 20 to 30 percent (20%-30%), the blood's oxygen-carrying capacity is severely reduced and is referred to as anoxia, or a total depletion in the level of oxygen. Although some form of permanent damage may have occurred if one is diagnosed with Methemoglobin and as reached the anoxia stage, it can be readily reversed. Levels around 50 to 70 percent (50%-70%), brain damage or death can occur (McCasland, et al).

Consuming drinking water with nitrate levels near the drinking water standard does not normally increase the methemoglobin level of humans beyond infancy. Nitrate in drinking water starts affecting the health of the general populace at levels in the range of 100 to 200 mg/l nitrate-N, but the effect on any given person depends on many factors, including other sources of nitrate and nitrite in the diet. Some of the nitrate consumed can be converted in the body to nitrite, which under appropriate circumstances can combine with amines (portions of protein molecules often found in foods, medications, cigarette smoke, decaying plants, soil and sometimes water) to form nitrosamines, which are well documented cancer-causing substances. To date, the only studies linking nitrate in drinking water with cancer have involved nitrate levels that are quite high (at or above 100-200 mg/l nitrate-N) (McCasland, et al).

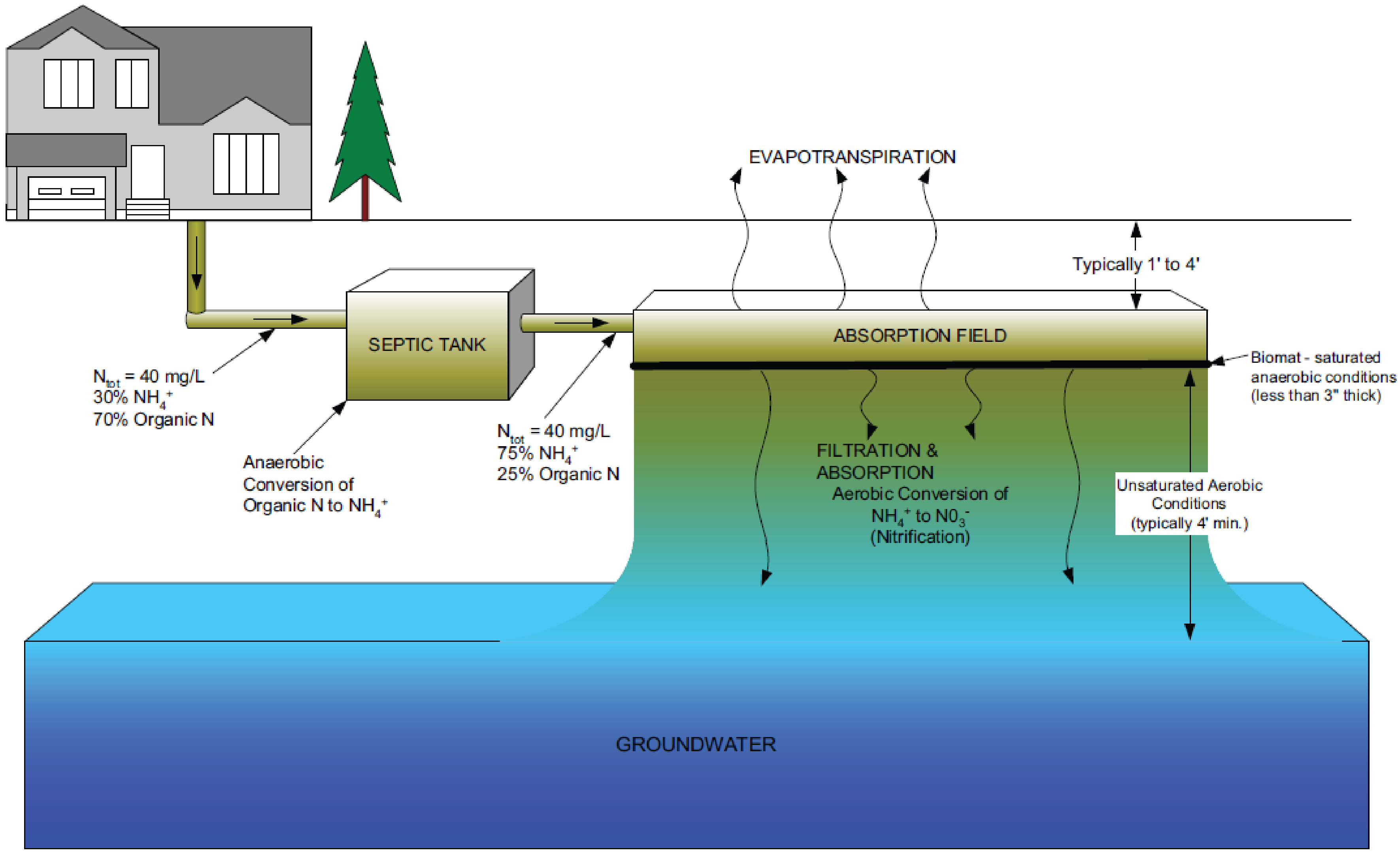
4.3 ONSITE SEPTIC SYSTEMS & NITROGEN

Onsite septic systems have generally been found to be relatively ineffective in removing nitrogen from the wastewater stream. **Figure 4-1: FATE OF NITROGEN COMPOUNDS IN A TYPICAL SEPTIC SYSTEM** created for the "Tooele County Septic System Density Study" in Utah, schematically illustrates the effect of a typical onsite septic system on the associated nitrogen compounds. Nitrogen entering the septic system is typically 70 percent organic nitrogen and 30 percent ammonia. The anaerobic environments in the septic tank transforms most of the organic nitrogen to ammonia nitrogen. The nitrogen leaving the septic tank is typically 25 percent organic nitrogen and 75 percent ammonia. A properly functioning absorption system has a biomat which forms at the soil interface directly below the absorption system. The biomat has a greatly reduced permeability and provides an unsaturated zone below the absorption system. This unsaturated zone is critical for the removal of pathogens. The unsaturated zone typically is an aerobic environment in which the ammonia is oxidized to nitrate (nitrification). An adequate depth of unsaturated flow, necessary for bacteriological treatment and for phosphorus removal, also establishes conditions which allow for rapid nitrification which converts ammonia and organic nitrogen to nitrate (Canter and Knox, 1985, as cited in HAL, 2016).

The fate of nitrogen compounds associated with septic systems is represented in Figure 4-2: FORM & FATE OF NITROGEN COMPOUNDS ASSOCIATED WITH SEPTIC SYSTEMS. When nitrate reaches the underlying groundwater, it becomes very mobile because of its solubility and anionic form. Nitrate moves with groundwater with minimal transformation. Nitrates can be removed from groundwater through two mechanisms: (1) direct uptake by plants, and (2) denitrification. Direct plant nitrate uptake adjacent to an absorption field is negligible if the drain field is installed properly so that an adequate unsaturated soil depth is maintained (HAL, 2016).

Denitrification, or the bacteriological transformation of nitrate to nitrogen gas, requires a low oxygen or an oxygen free (anaerobic) environment. Conditions that may lead to a low oxygen environment include low permeability aquifer materials, oxygen demand associated with the septic system contaminant plume, and increasing depth below the groundwater potentiometric surface. Most aquifers that yield significant quantities of high quality drinking water to wells consist of high permeability sands and gravels that tend to result in a more oxygenated groundwater. As a result, denitrification in these aquifers is less likely to occur. However, if the density of septic systems is large enough that biological oxygen demand (BOD) from septic system discharges uses up the dissolved oxygen in the water, the aquifer could become anaerobic (HAL, 2016).

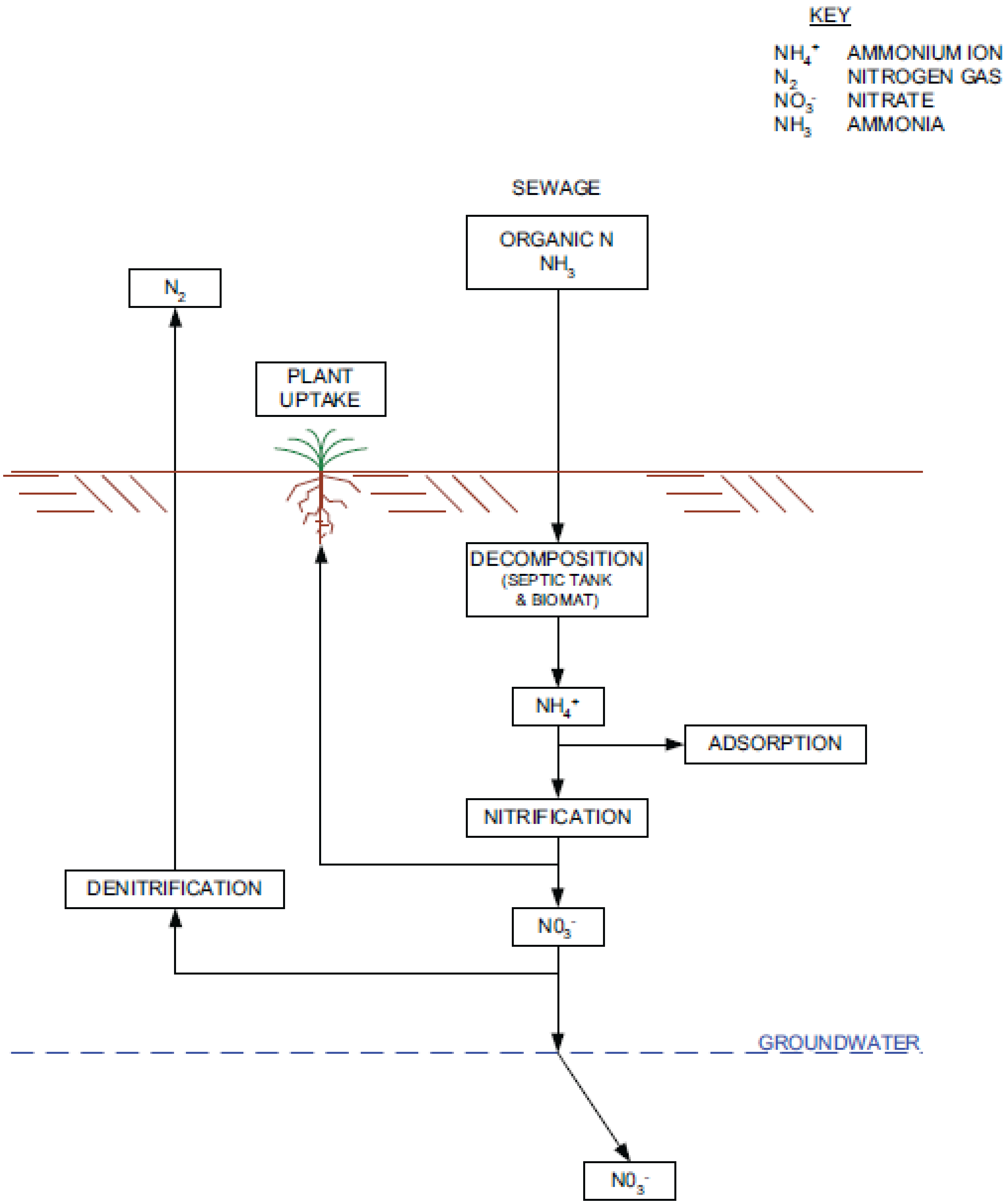
FIGURE 4-1
FATE OF NITROGEN COMPOUNDS IN A TYPICAL SEPTIC SYSTEM



Source: Tooele County Septic System Density Study – Hansen Allen & Luce, Inc. Enginee

FIGURE 4-2

FORM & FATE OF NITROGEN COMPOUNDS ASSOCIATED WITH SEPTIC SYSTEMS



Source: Tooele County Septic System Density Study – Hansen Allen & Luce, Inc. Engineers: Adapted from Canter & Knox (1985)

CHAPTER

5

Septic System Locations & Analysis

The purpose of this chapter is to discuss the data collection process, methodology, and analysis of onsite septic systems.

5.1 DATA COLLECTION & METHODOLOGY

The goal of the data collection is to, at a minimum, identify the County's Assessor Parcel Number (APN) that had an onsite septic system while identifying the age of the system itself, as well as plot tested well data that measured nitrate levels.

Tested well data points were downloaded through the Arizona Department of Water Resources (ADWR). The number of years since the last test of each well ranges significantly, however, it is the only data available for specific site locations. The data provides nitrate levels per well.

CAG requested the Geographical Information System (GIS) APN shapefile from Gila County to be used as the base data file in which to assign the centroid point of the parcel to identify the approximate location of an onsite septic system(s) for a given property. Each point that is generated is then assigned a year associating it with the year that the onsite septic system is understood to be installed. Each point that is generated will also have the ability to have additional information attributed to that specific septic location as funding allows for further data collection in the future.

Gila County Data

The lack of consolidated data within Gila County with regards to onsite septic system reporting was challenging in determining the locations of onsite septic systems. With Gila County's APN shapefile documenting approximately 35,100 APNs for the county, the first step was to eliminate those parcels that we reasonably believed would not have a septic system. Through the outreach with Gila County staff, CAG was able to also obtain a list of APNs, through the Assessor's office, that were coded as vacant land. This allowed CAG staff to quickly eliminate approximately 6,200 APNs that didn't need to be researched due to the non-existence of development on those parcels according to the Gila County Assessor's Office.

For the second step, CAG staff began to reach out to the Cities/Towns, as well as sanitary districts, in order to obtain the billing addresses of properties that had a sewer connection that could also be eliminated from the overall APNs. Although a billing address was obtained, the APN was not associated within the billing. Therefore, CAG staff researched each individual address provided, using the Gila County Assessor's website in order to obtain the APN. Sewer Data was obtained from the Cities/Towns of Globe, Hayden, Miami, and Winkelman, as well as from the Northern Gila County Sanitary District and Pine Meadows Utilities. CAG was able to eliminate approximately an additional 12,750 APNs that is reasonably believed to not have an onsite septic system. The remaining APNs, however, does not necessarily indicate that they all have onsite septic systems. The address data collected from some of the sewer providers only were able to provide active accounts and therefore will have to assume other properties not listed are inhabited with services disconnected until occupied.

The third step involved "Notice of Transfer," (NOT) data that CAG received from Gila County. NOTs, as discussed in **Section 3.2**, is the permitting mechanism for inspections of onsite septic systems as a property is being sold or transferred to a new owner. The data collected was not all inclusive of onsite septic systems as reporting of such data was not required until 2005. Therefore, all properties that have not changed ownership prior to 2005 would not be captured through the NOTs. The NOT data collected contained an address, which again, had to be researched individually through the Gila County's Assessor's website in order to obtain the APN. Within the Assessor's record of the address researched from the NOT, many had a link(s) labeled "Extra Feature" and provided a description of "Septic Tank" that also provided the "Actual Year Built" or "Effective Year Built." For those NOT properties that did not have an "Extra Feature" link, the built year of the primary structure was used as its assumed occupancy could not take place until the onsite septic system was installed. There were approximately 3,270 final records from the NOTs that were used to determine onsite septic systems, accounting for approximately 32.1 percent of all identified locations.

The fourth and final step involved the approximate 12,880 APNs that have not been either eliminated or researched after the first three steps were completed. The remaining APNs were then researched on the Gila County Assessor's website to determine if an "Extra Feature" link was provided for a description of a Septic Tank. If so, that APN was then identified with an onsite septic system and assigned a year based on the "Actual Year Built" or "Effective Year Built" date. For those APNs that did not have an "Extra Feature" link, the APN was assumed to be vacant or has a sewer connection that is inactive. However, it is important to note that the Gila County Assessor's records may not have an "Extra Feature" record for a particular APN as was the case for many of the NOT records researched. Out of the remaining 12,880 left over parcels, nearly 51.7 percent had an "Extra Feature" record. The majority of the remaining 6,200 APNs were made up of Rights-of-Way from local agencies, Homeowner's Association ownership, and varies things of the sort. However, it is believed that approximately 15-20 percent (930 – 1,240 APNs) may have septic but was not captured due to unavailable or unconfirmed information.

5.2 ANALYSIS

The analysis conducted for this Study attempts to make correlations based on spatial observations of the data collected and processed. The series of maps over the next several pages will provide the following analytical tools:

1. The locations of identified onsite septic systems;
2. Symbolization of the onsite septic system by age of installation;

3. Well data symbolizing nitrate levels with a 1/2-mile radius location point boundary buffer; and
4. Groundwater basin boundaries (Fact Sheets and detailed reports on each groundwater basin can be found on ADEQ's website at: www.azdeq.gov/node/882).

The Lower San Pedro groundwater basin was not mapped as there is no data within Gila County to be analyzed.

FIGURE 5-1

ARIZONA GROUNDWATER BASINS INTERSECTING WITHIN GILA COUNTY

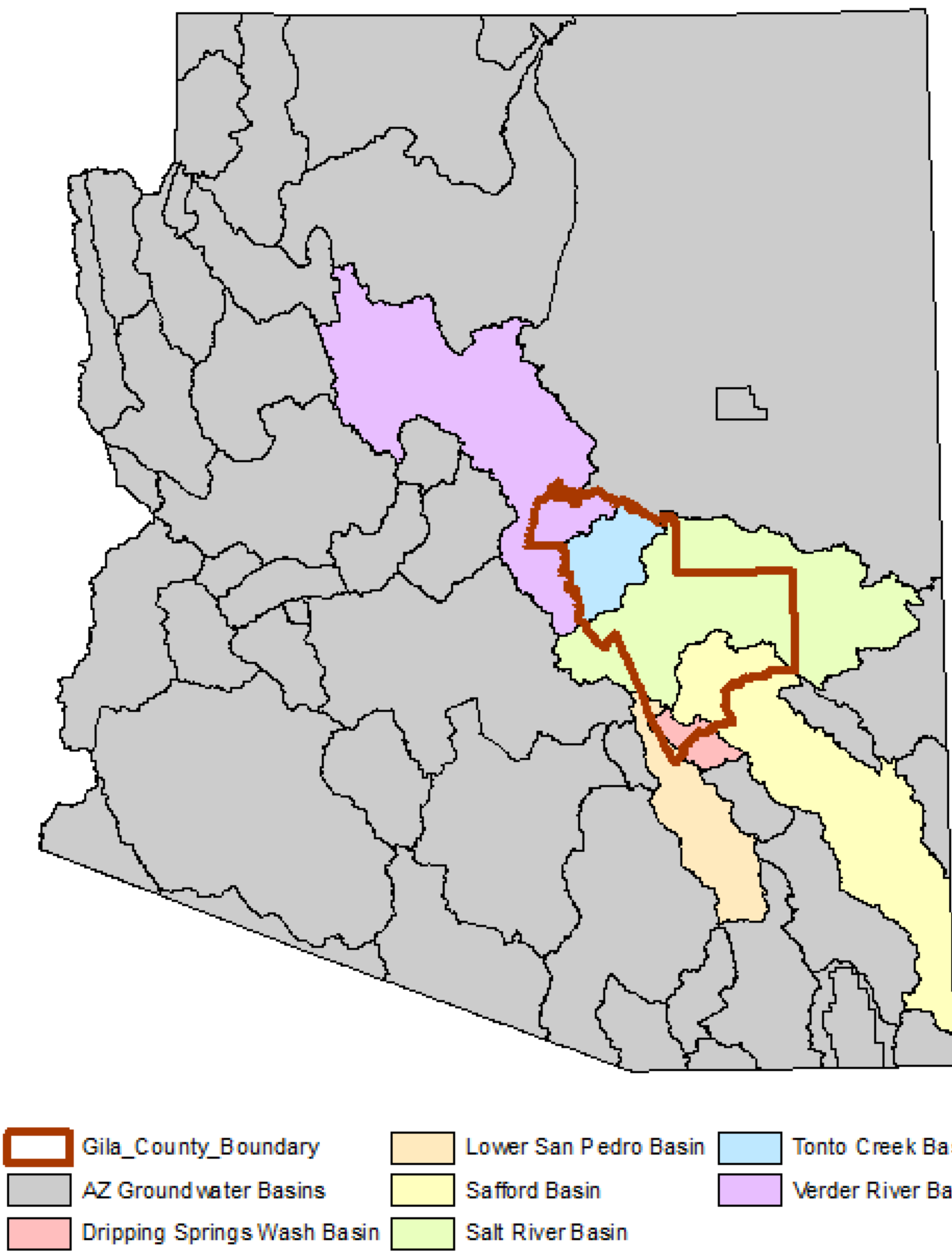


FIGURE 5-2: DRIPPING SPRINGS WASH GROUNDWATER BASIN - ONSITE SEPTIC SYSTEM ANALYSIS

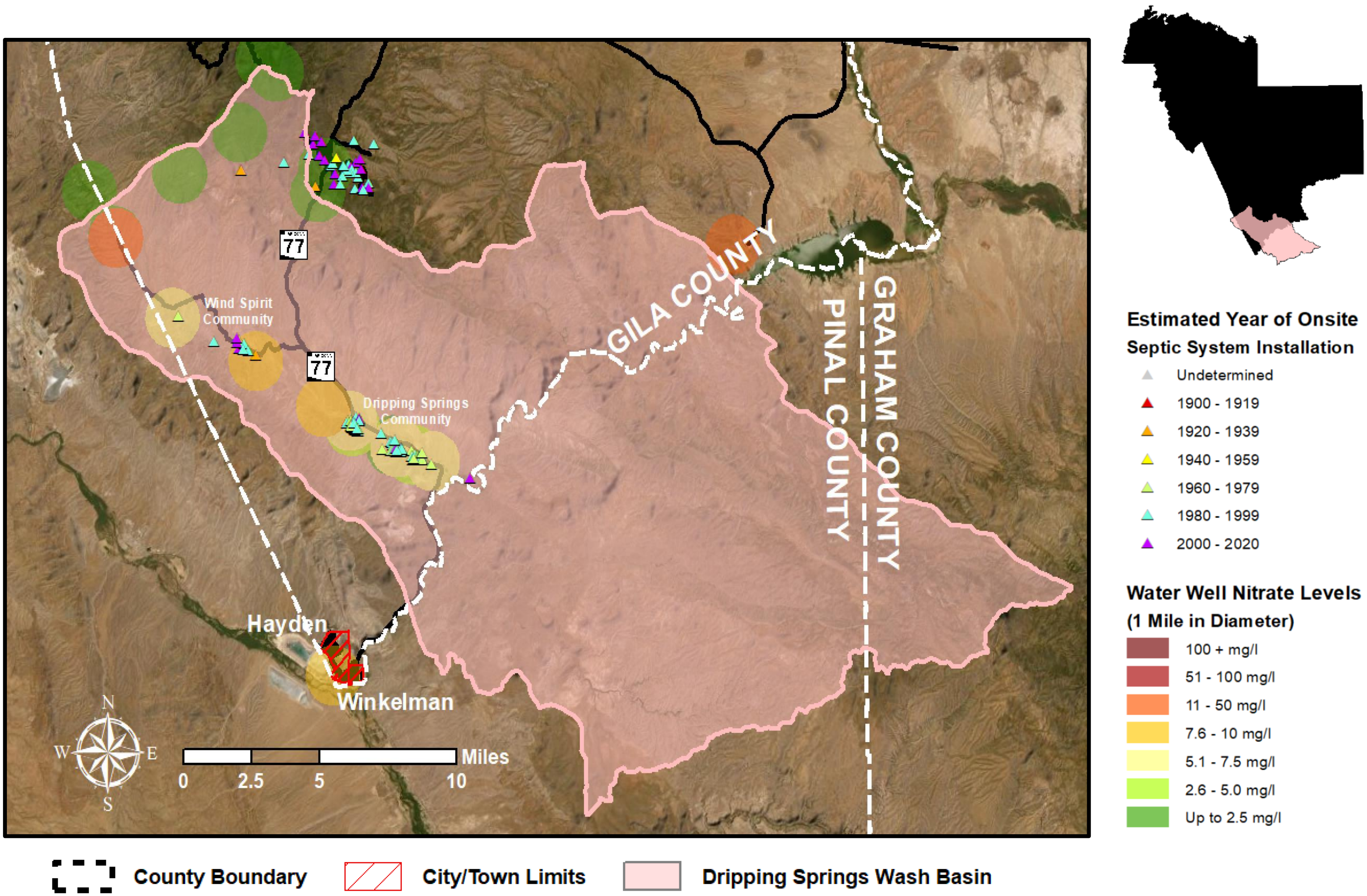


FIGURE 5-3: DRIPPING SPRINGS COMMUNITY

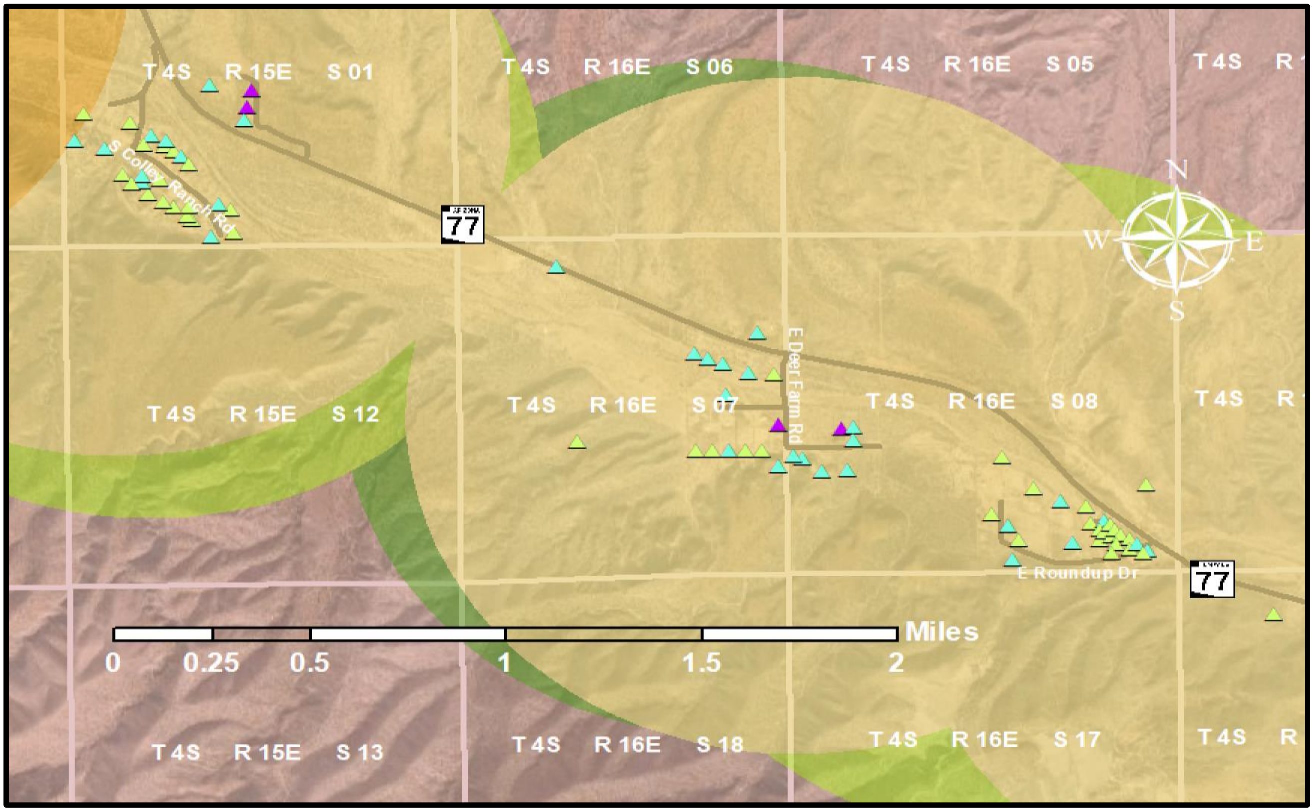


FIGURE 5-4: WIND SPIRIT COMMUNITY

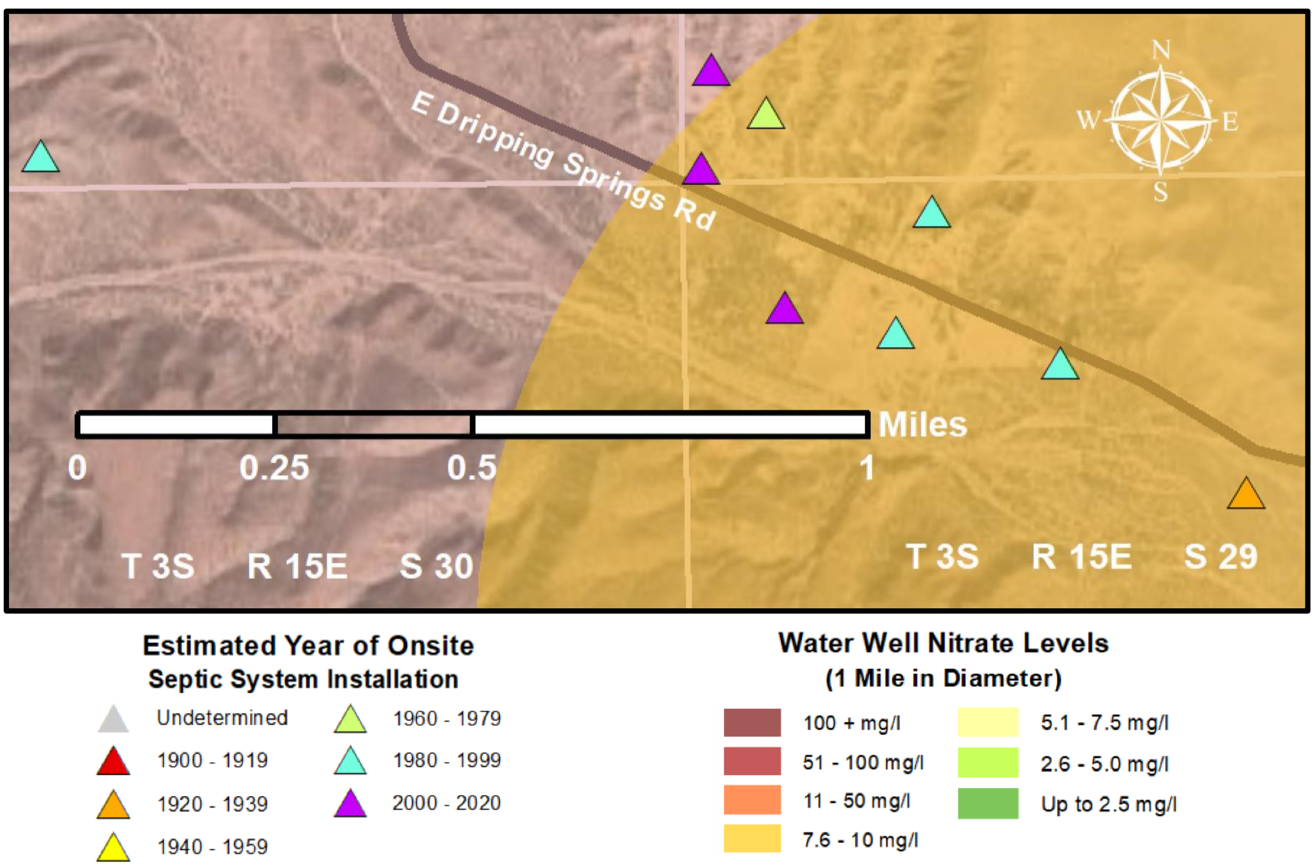


FIGURE 5-5: SAFFORD GROUNDWATER BASIN - ONSITE SEPTIC SYSTEM ANALYSIS

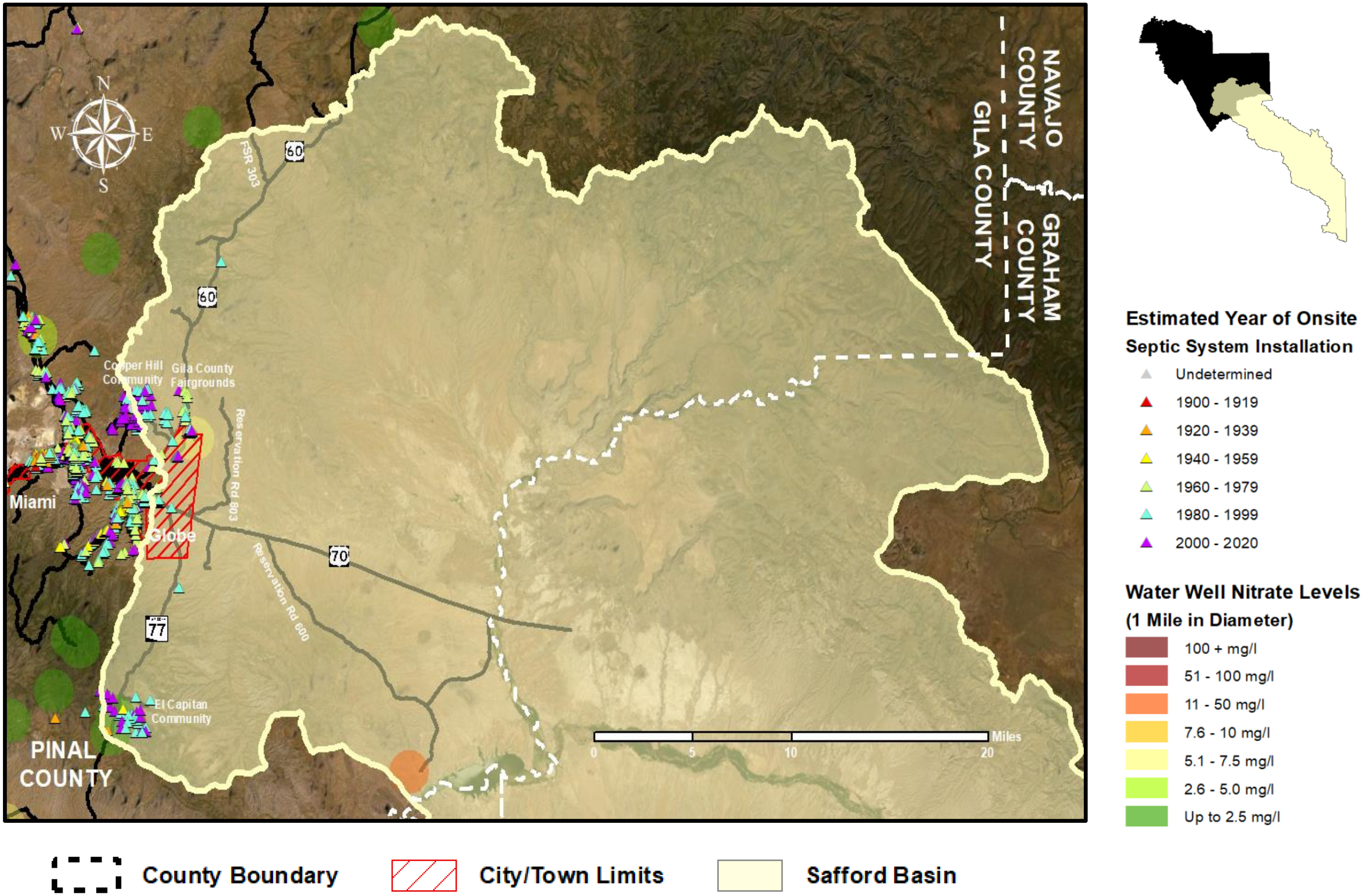


FIGURE 5-6: (GILA COUNTY FAIRGROUNDS)

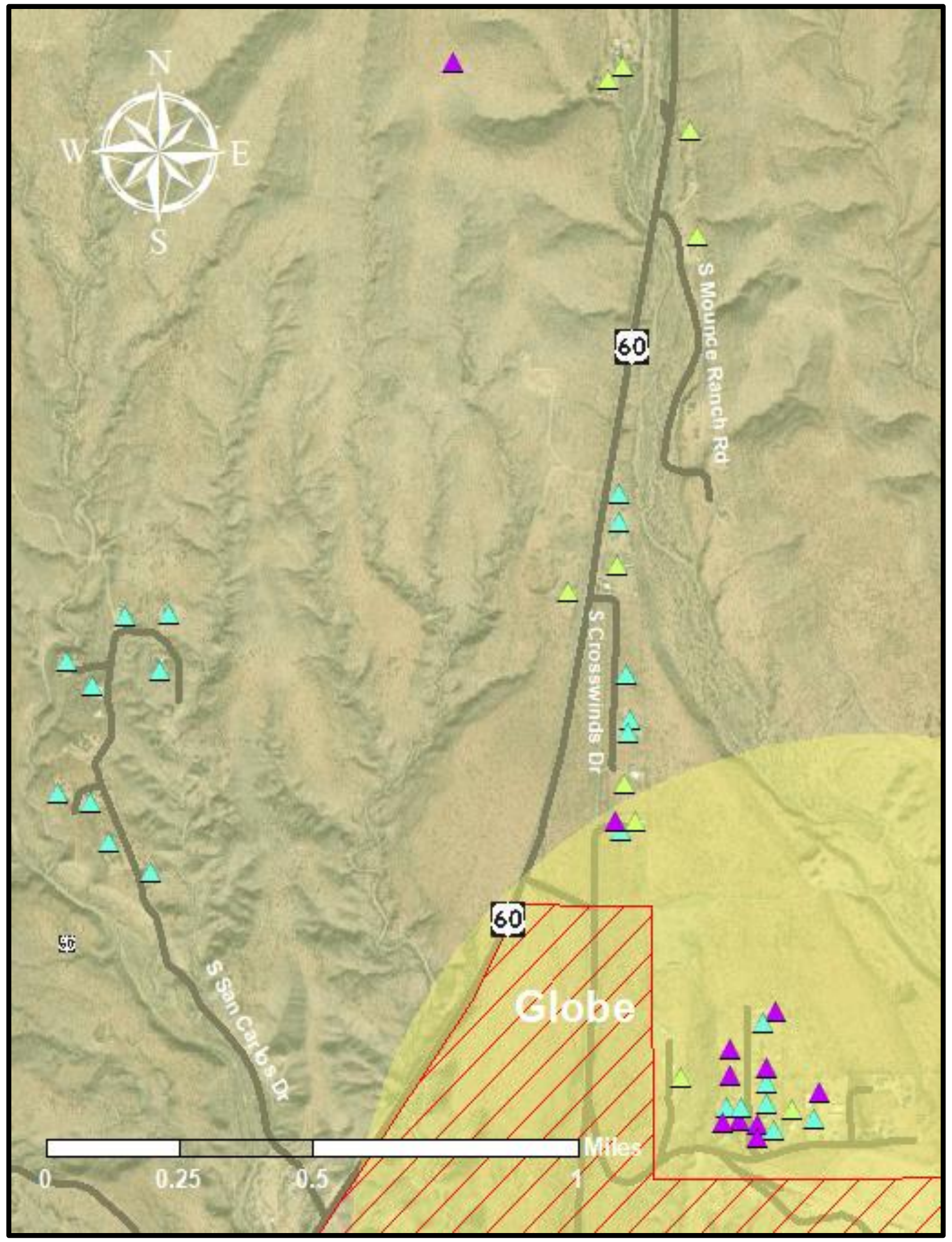


FIGURE 5-7: EL CAPITAN COMMUNITY

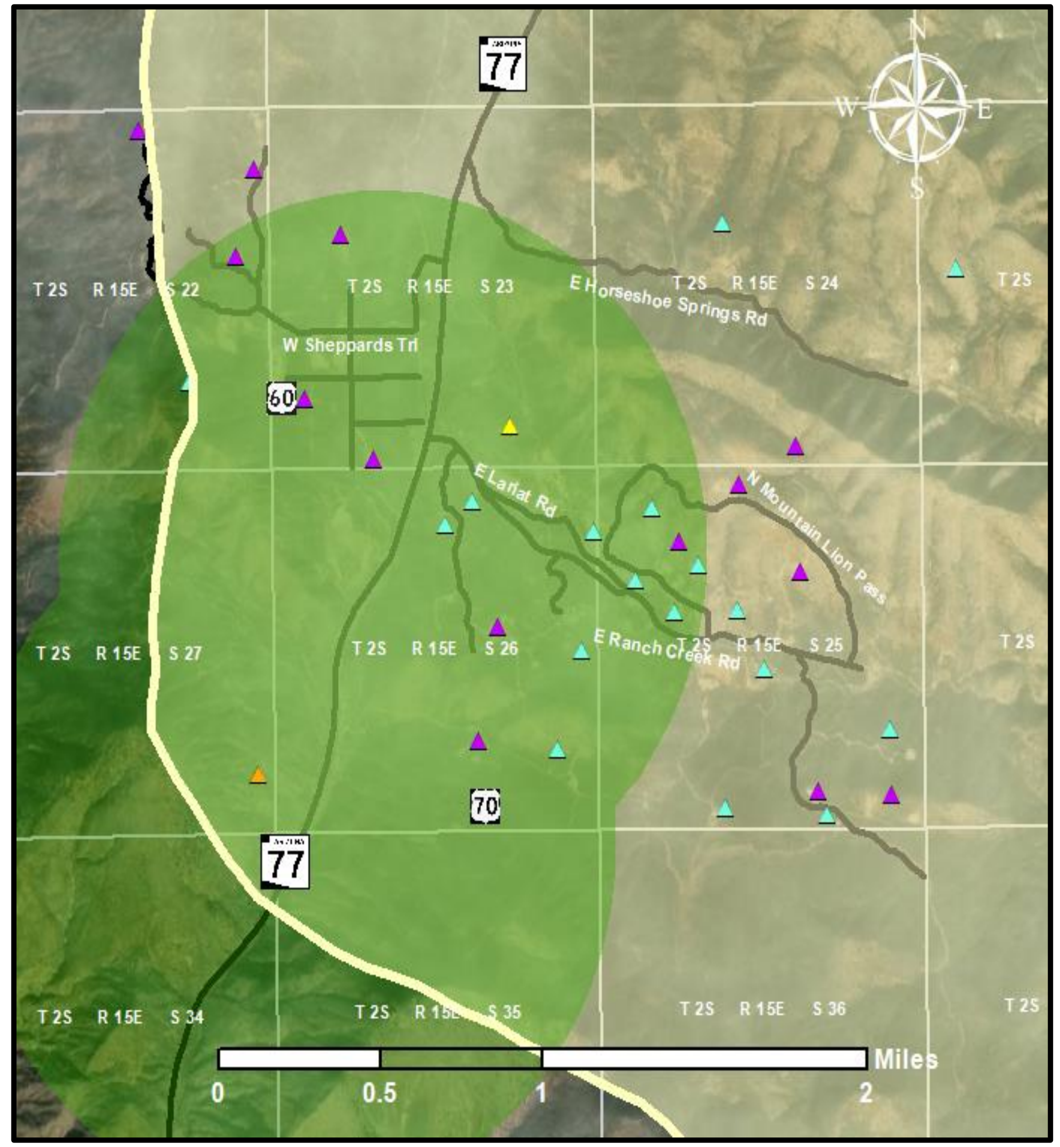
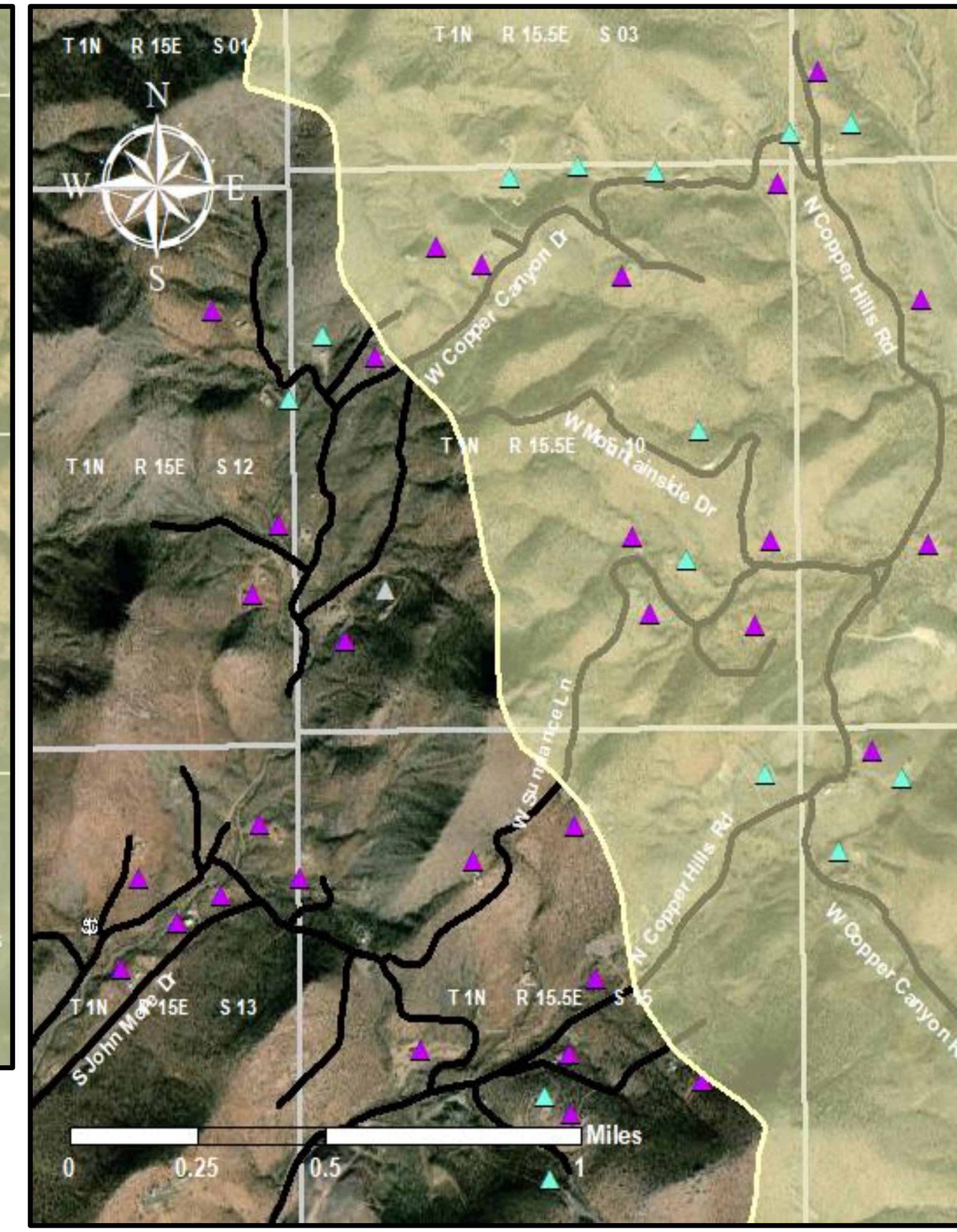


FIGURE 5-8: COPPER HILL COMMUNITY



Estimated Year of Onsite Septic System Installation

- Undetermined
- 1900 - 1919
- 1920 - 1939
- 1940 - 1959
- 1960 - 1979
- 1980 - 1999
- 2000 - 2020

Water Well Nitrate Levels (1 Mile in Diameter)

- 100 + mg/l
- 51 - 100 mg/l
- 11 - 50 mg/l
- 7.6 - 10 mg/l
- 5.1 - 7.5 mg/l
- 2.6 - 5.0 mg/l
- Up to 2.5 mg/l

FIGURE 5-9: SALT RIVER GROUNDWATER BASIN - ONSITE SEPTIC SYSTEM ANALYSIS

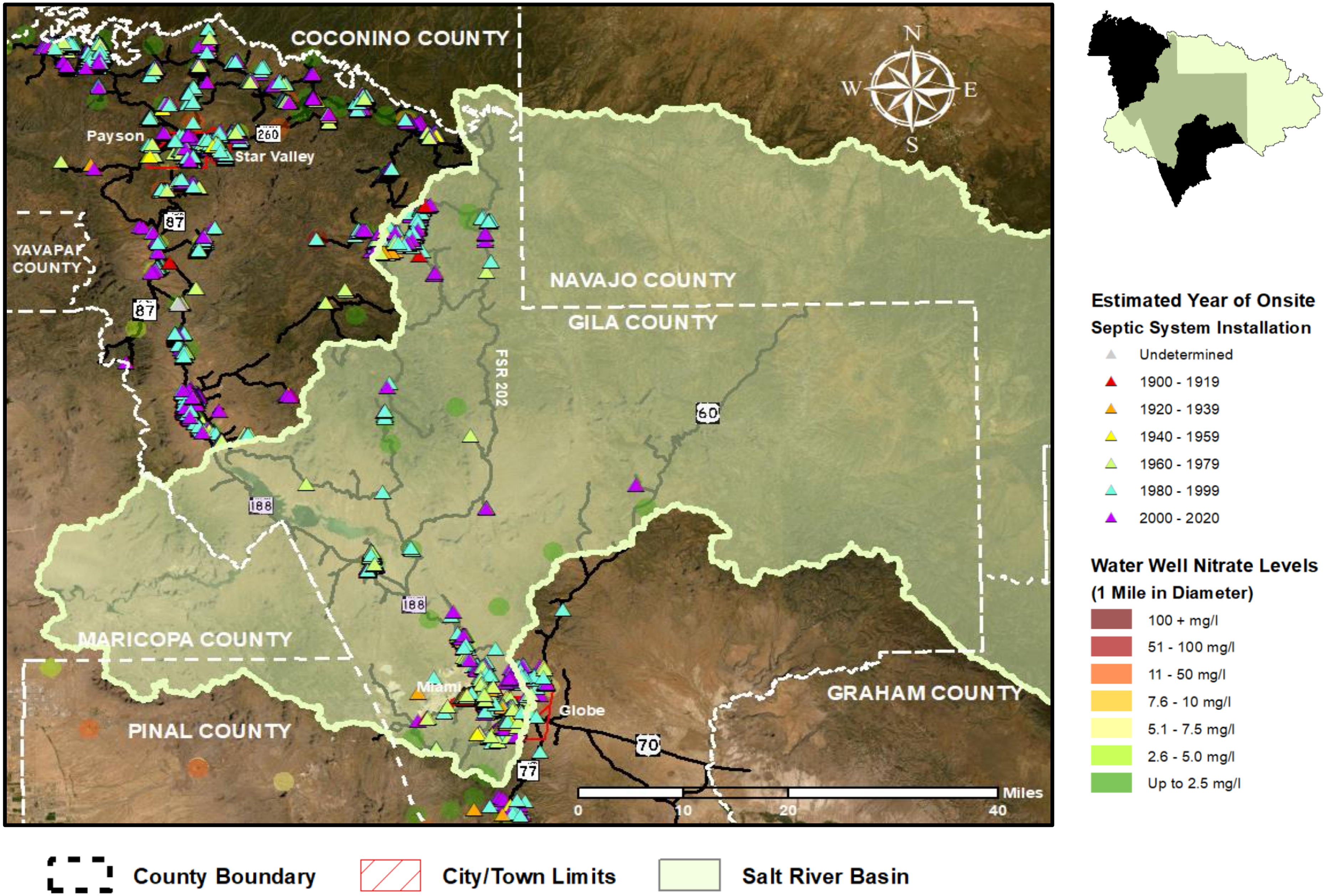


FIGURE 5-10: (ICE HOUSE CANYON RD)

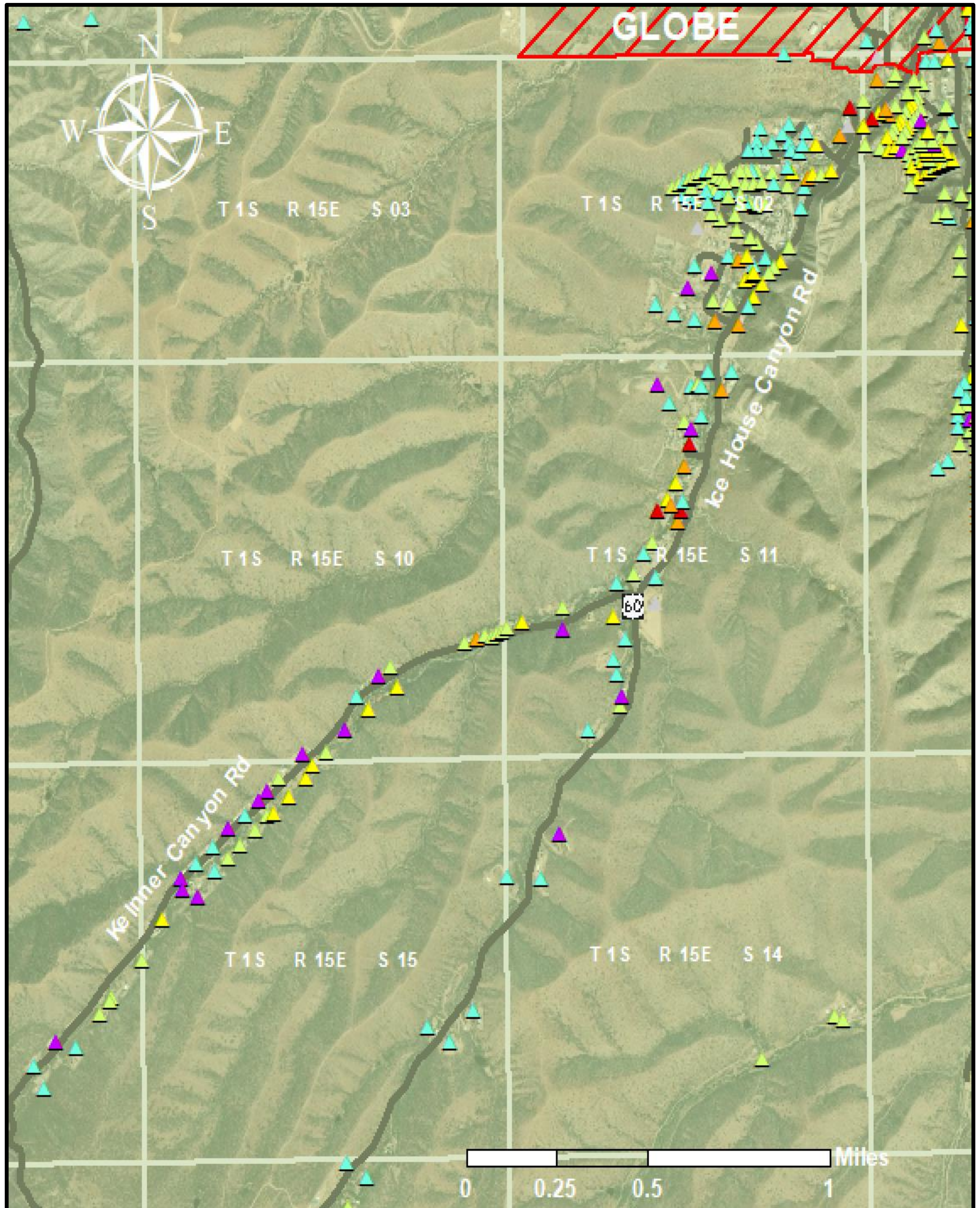


FIGURE 5-11: (SIX SHOOTER CANYON RD)

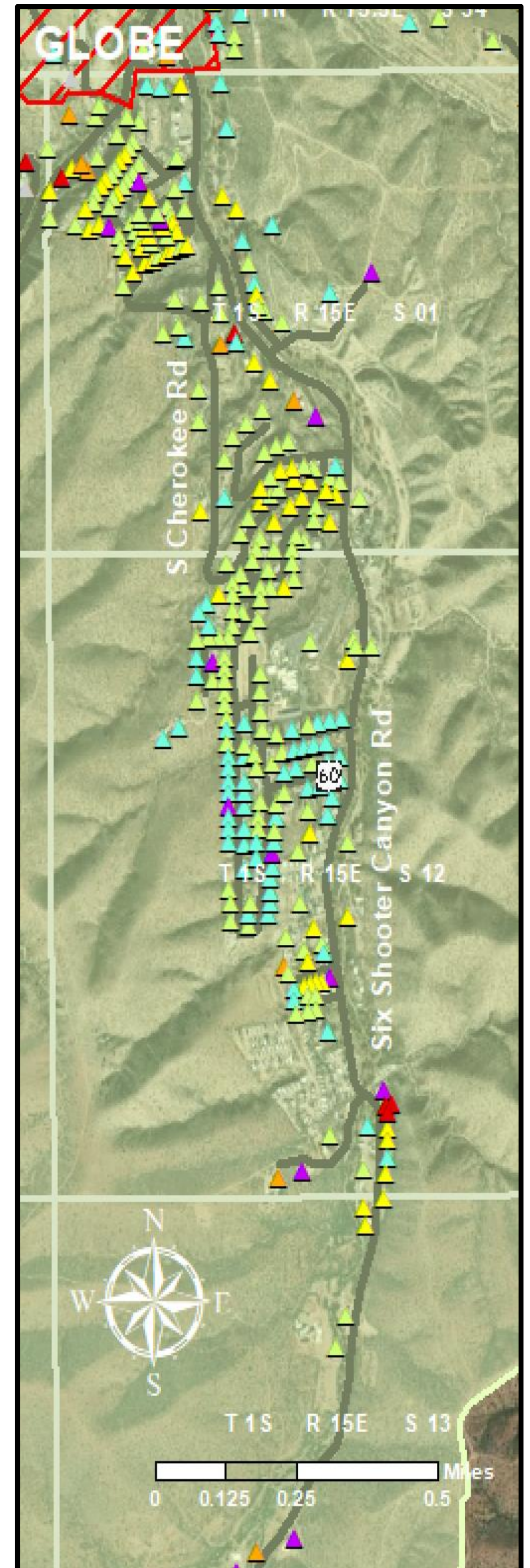
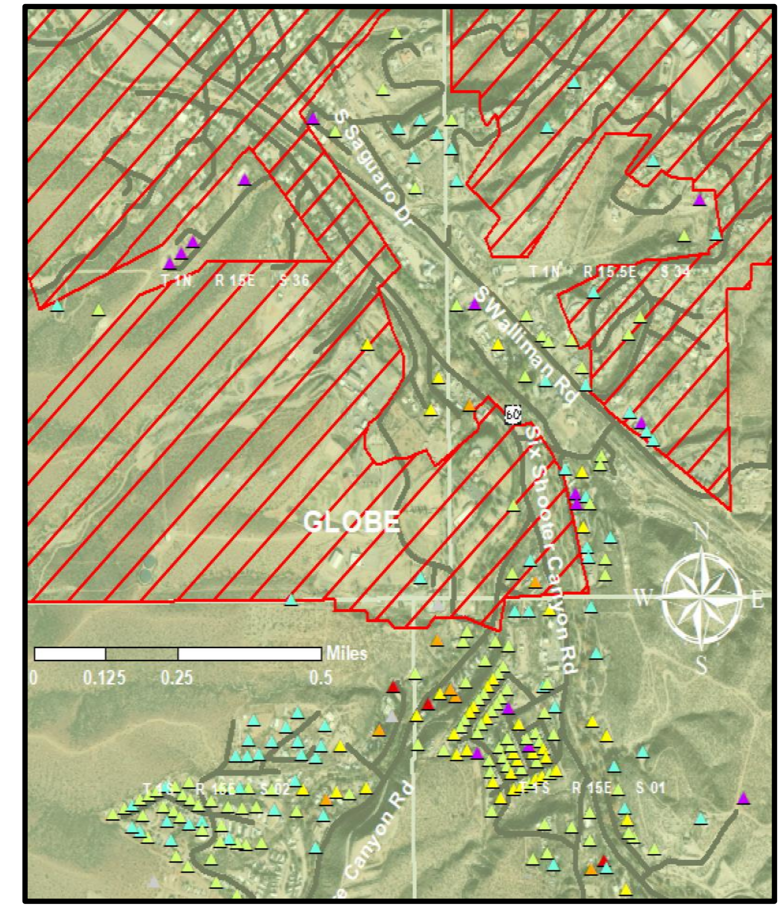


FIGURE 5-12: (SOUTHCENTRAL OF GLOBE)



Estimated Year of Onsite Septic System Installation

- Undetermined
- 1900 - 1919
- 1920 - 1939
- 1940 - 1959
- 1960 - 1979
- 1980 - 1999
- 2000 - 2020

Water Well Nitrate Levels (1 Mile in Diameter)

- 100 + mg/l
- 51 - 100 mg/l
- 11 - 50 mg/l
- 7.6 - 10 mg/l
- 5.1 - 7.5 mg/l
- 2.6 - 5.0 mg/l
- Up to 2.5 mg/l

FIGURE 5-13: (SOUTHEAST OF GLOBE)

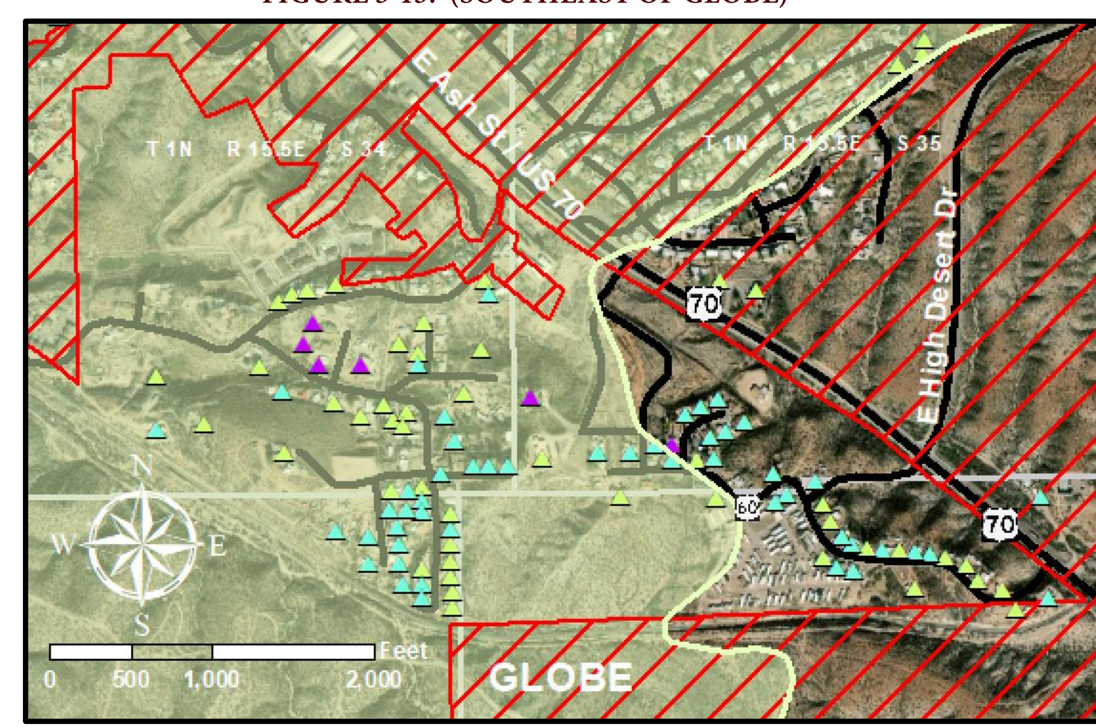


FIGURE 5-14: (NORTHWEST OF GLOBE)

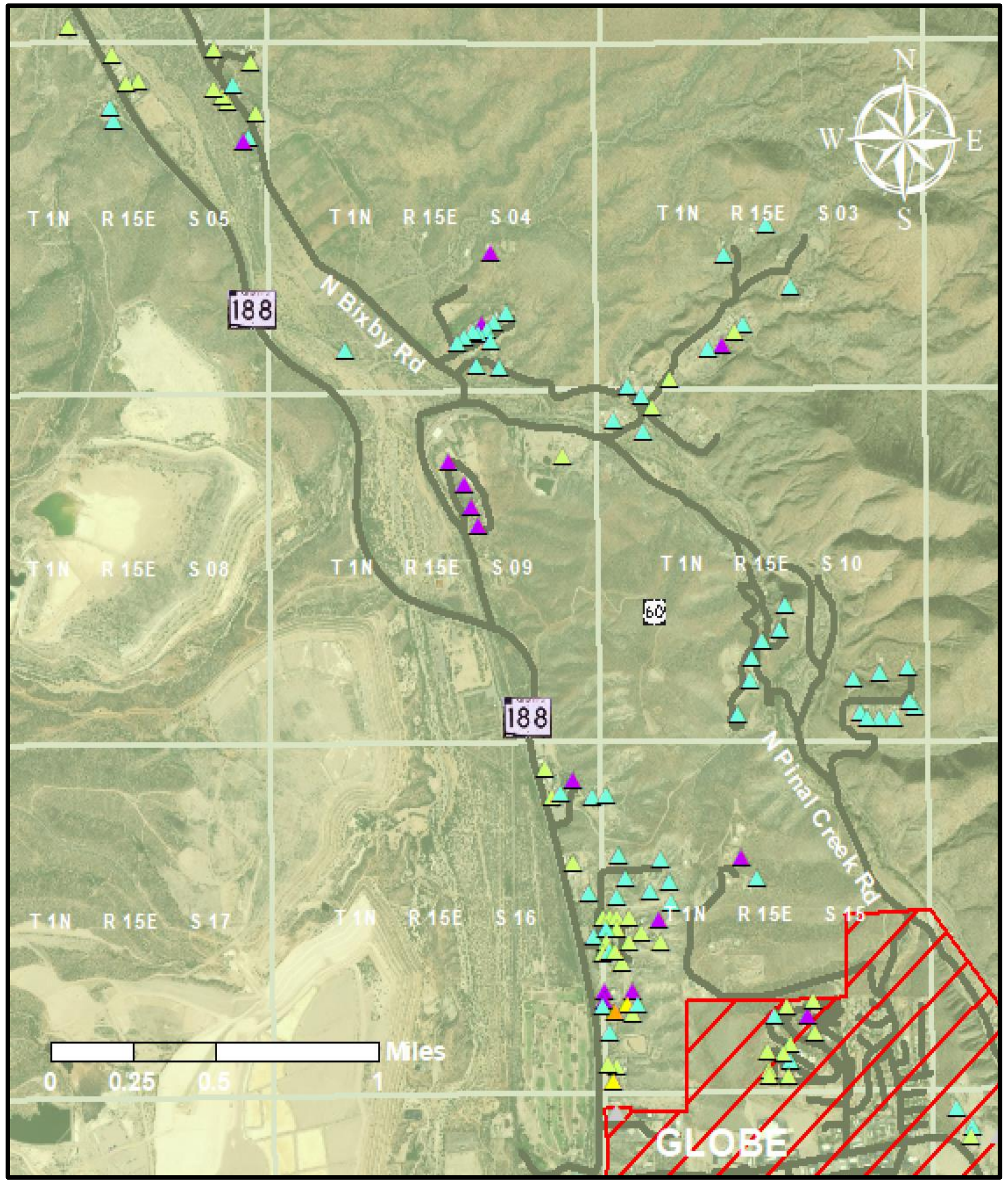


FIGURE 5-15: (ASH SPRING WASH / WILL BANKS RD)

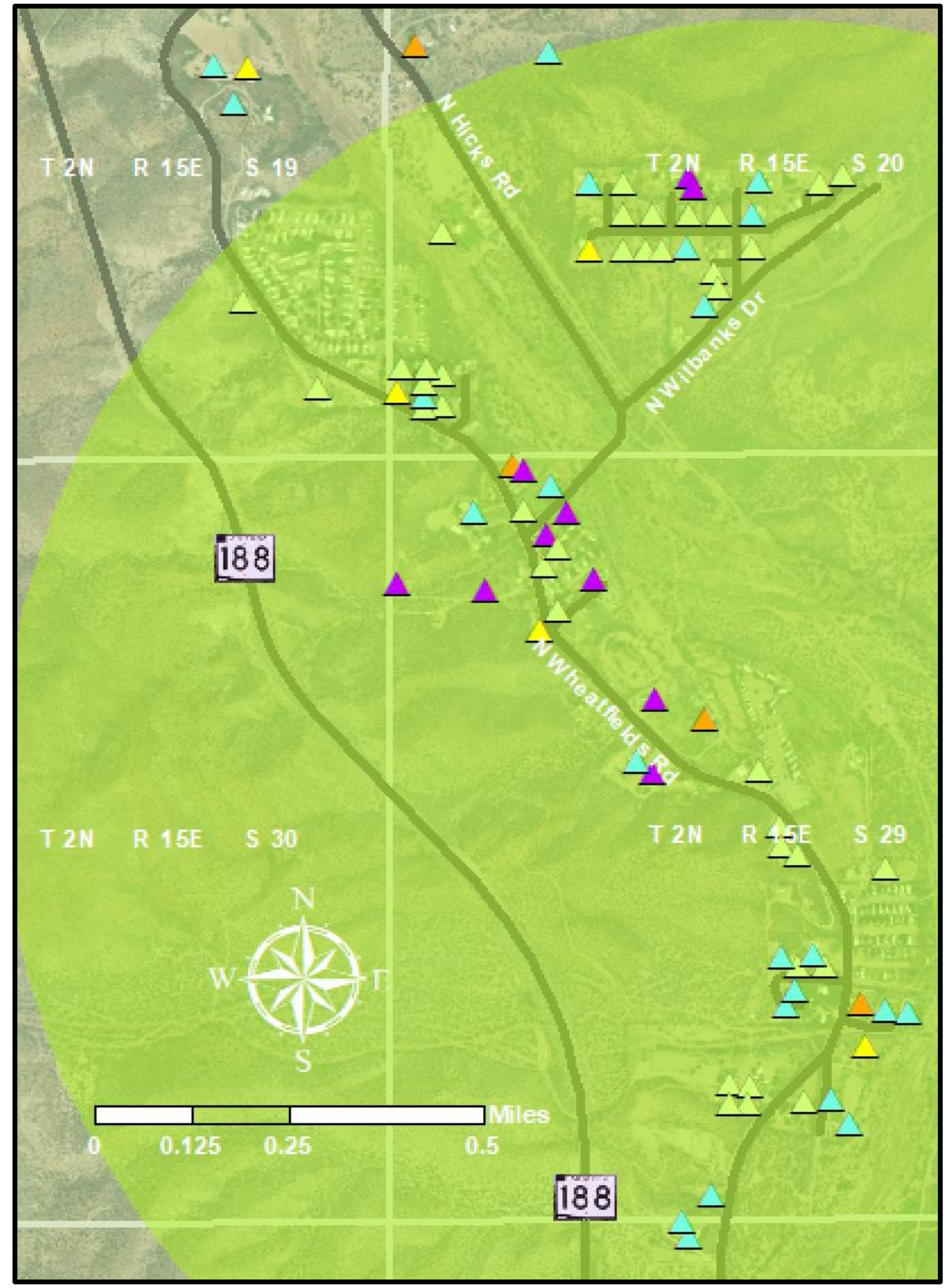
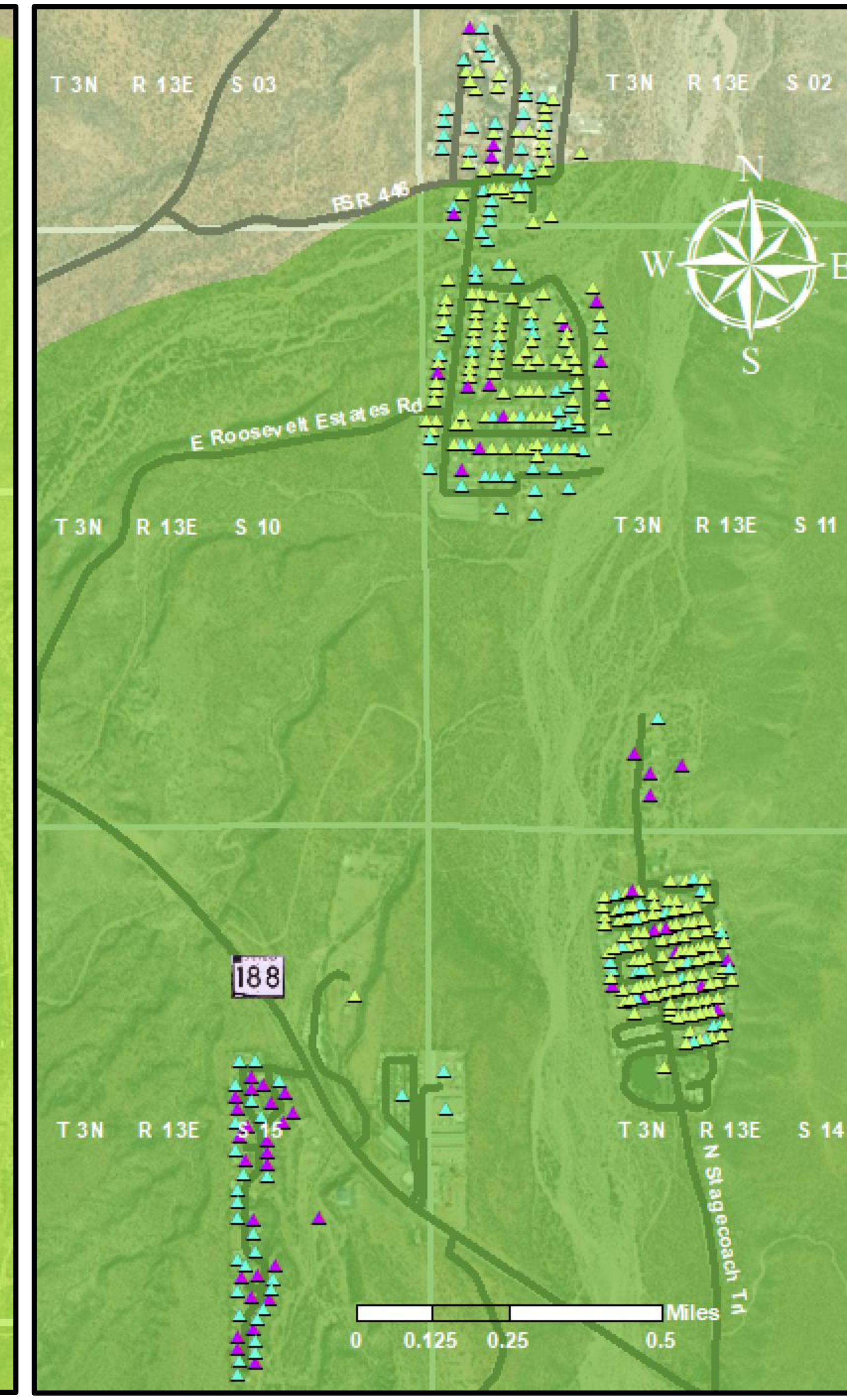


FIGURE 5-16: ROOSEVELT ESTATES



Estimated Year of Onsite Septic System Installation

- Undetermined
- 1900 - 1919
- 1920 - 1939
- 1940 - 1959
- 1960 - 1979
- 1980 - 1999
- 2000 - 2020

Water Well Nitrate Levels (1 Mile in Diameter)

- 100 + mg/l
- 51 - 100 mg/l
- 11 - 50 mg/l
- 7.6 - 10 mg/l
- 5.1 - 7.5 mg/l
- 2.6 - 5.0 mg/l
- Up to 2.5 mg/l

FIGURE 5-17: CLAYPOOL

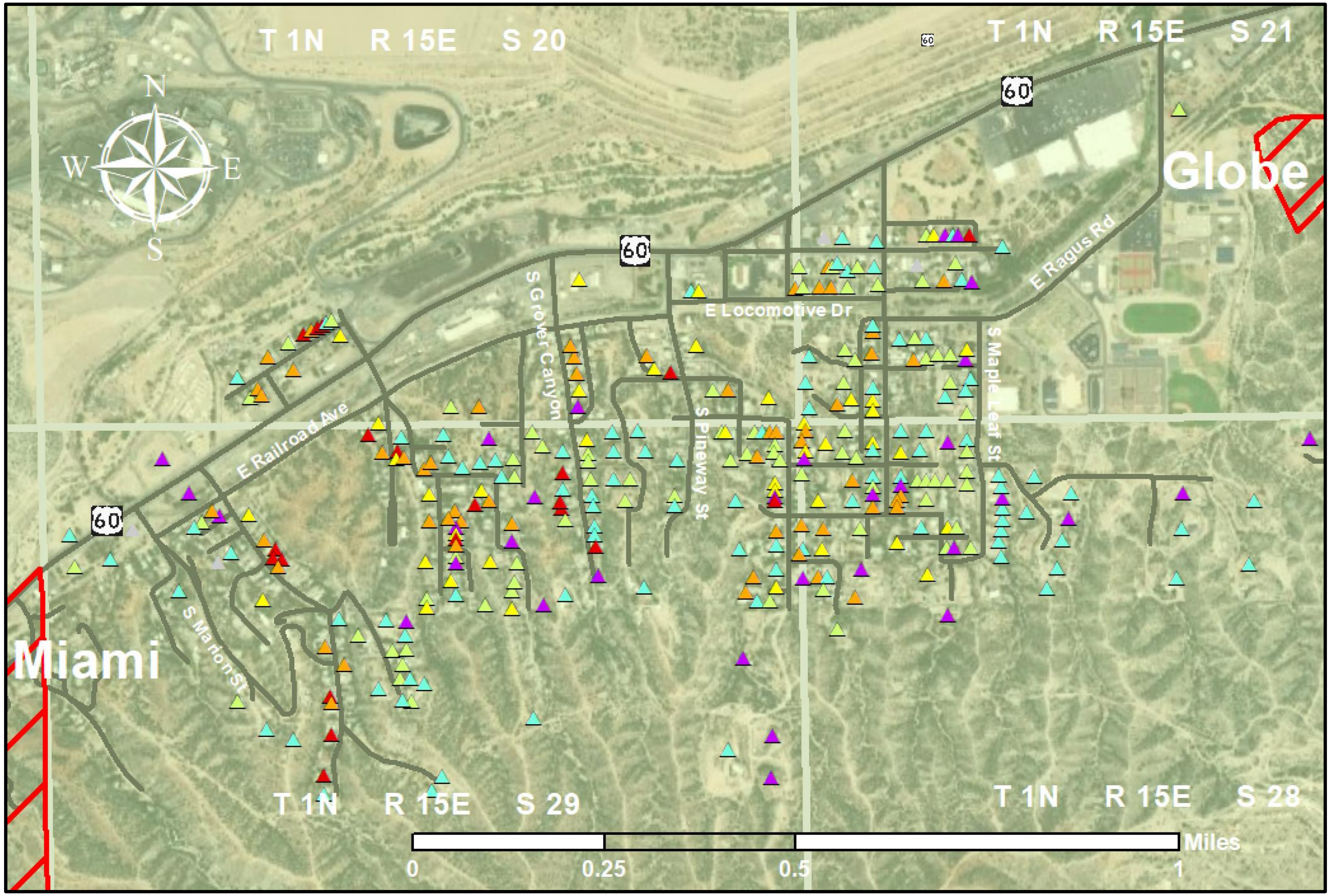
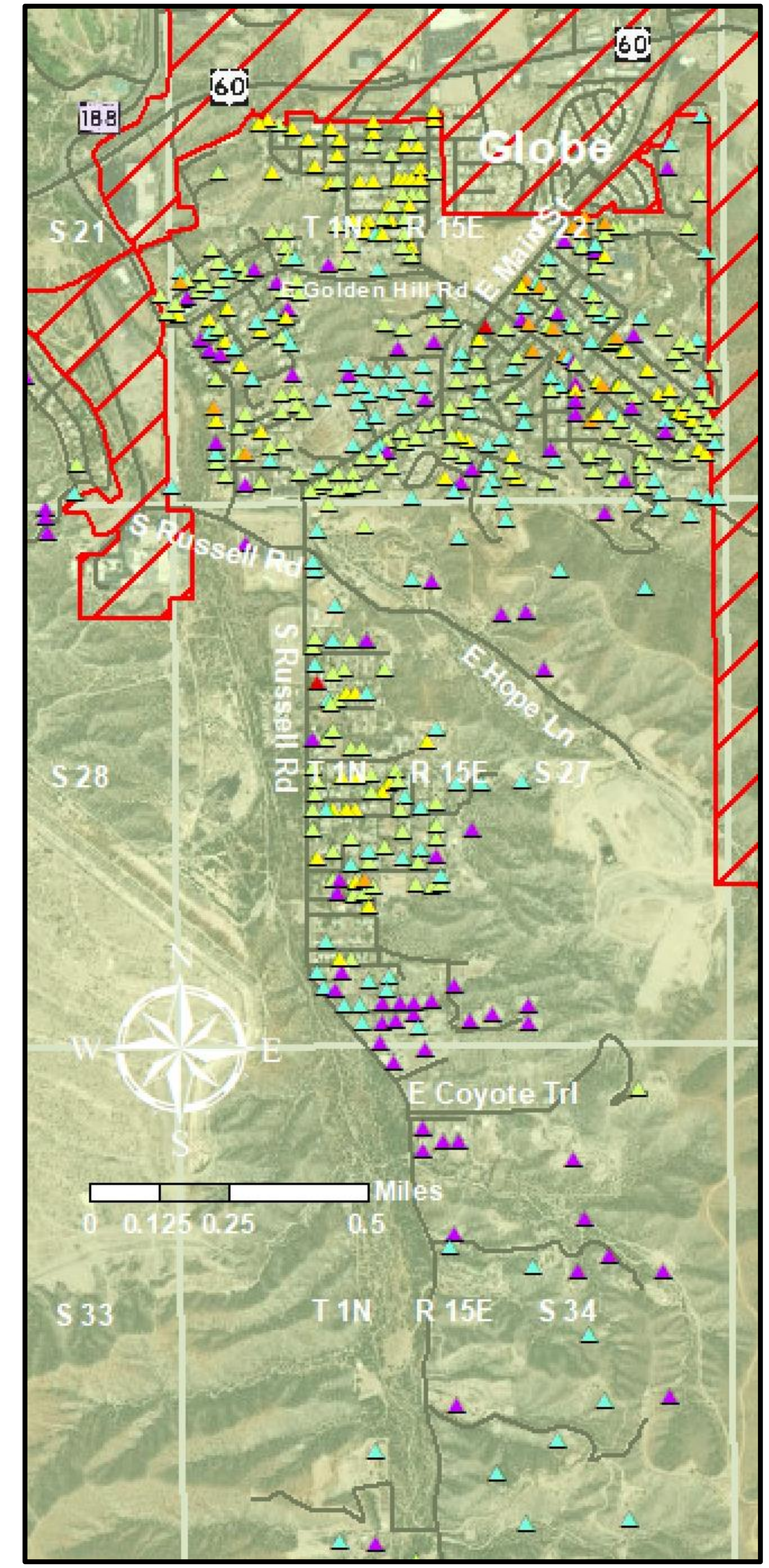


FIGURE 5-18: CENTRAL HEIGHTS / MIDLAND CITY



Estimated Year of Onsite Septic System Installation

- Undetermined
- 1900 - 1919
- 1920 - 1939
- 1940 - 1959
- 1960 - 1979
- 1980 - 1999
- 2000 - 2020

Water Well Nitrate Levels (1 Mile in Diameter)

- 100 + mg/l
- 51 - 100 mg/l
- 11 - 50 mg/l
- 7.6 - 10 mg/l
- 5.1 - 7.5 mg/l
- 2.6 - 5.0 mg/l
- Up to 2.5 mg/l

FIGURE 5-19: YOUNG, AZ

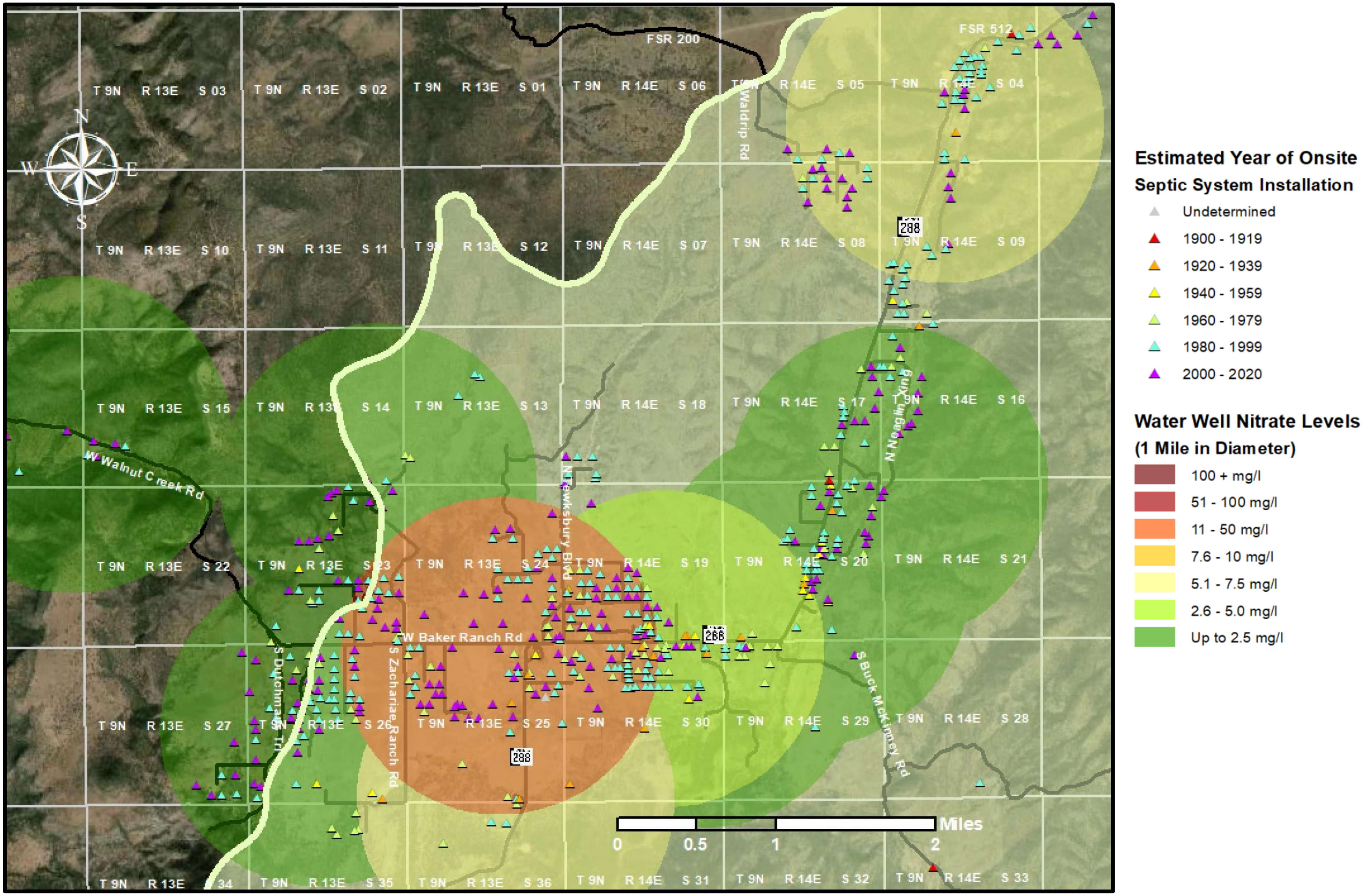


FIGURE 5-20: TONTO CREEK GROUNDWATER BASIN - ONSITE SEPTIC SYSTEM ANALYSIS

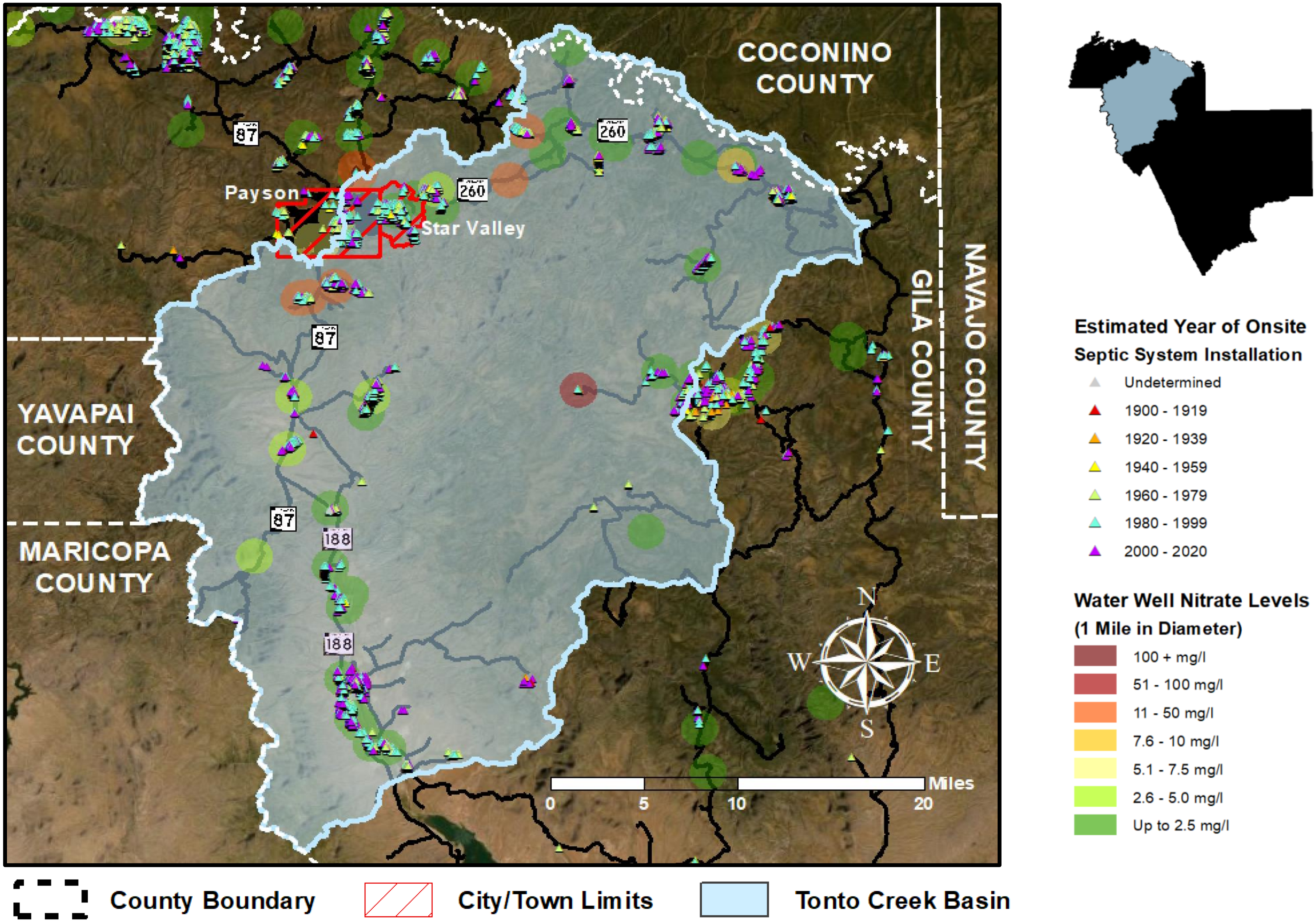


FIGURE 5-21: PAYSON, AZ

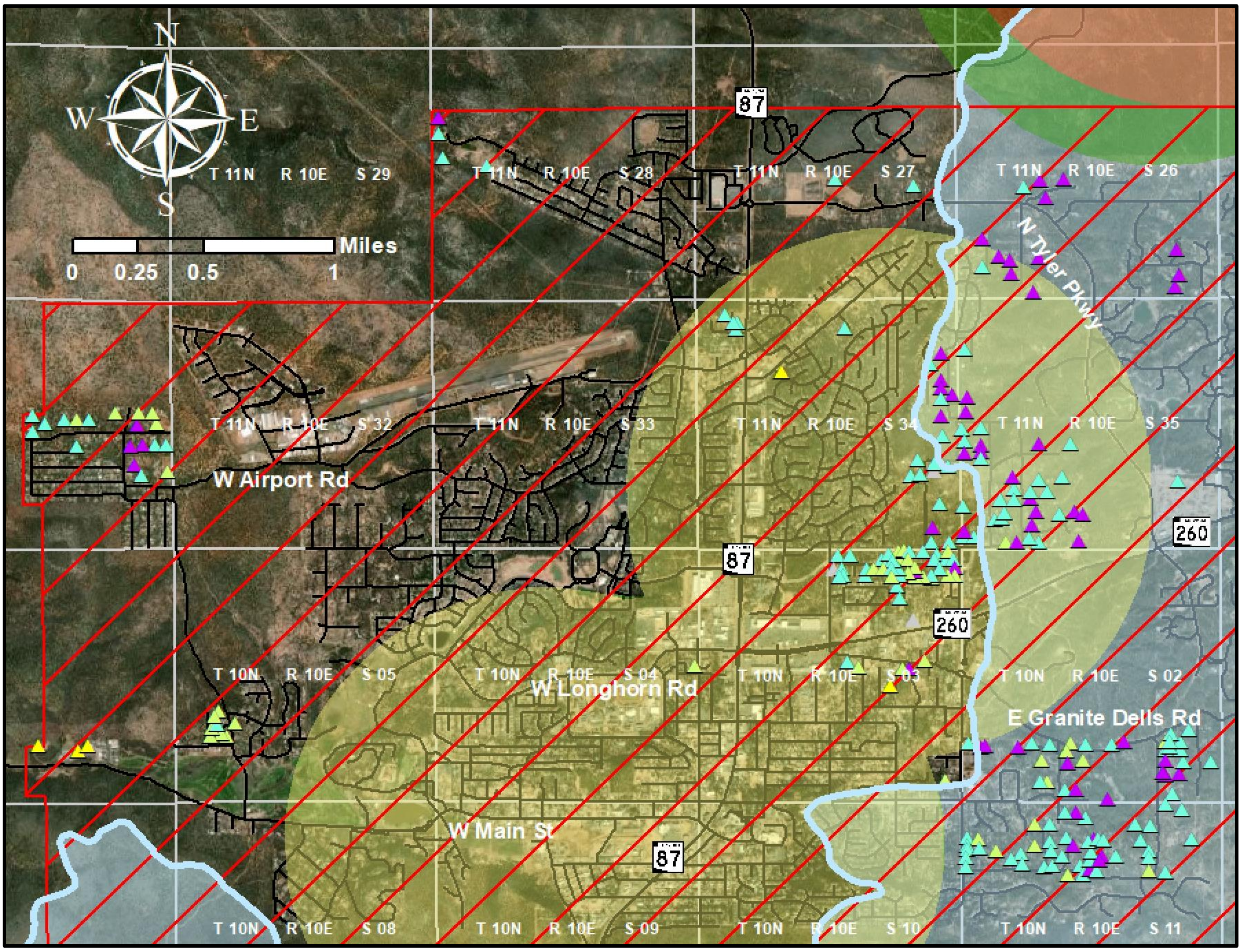


FIGURE 5-22: OXBOW ESTATES

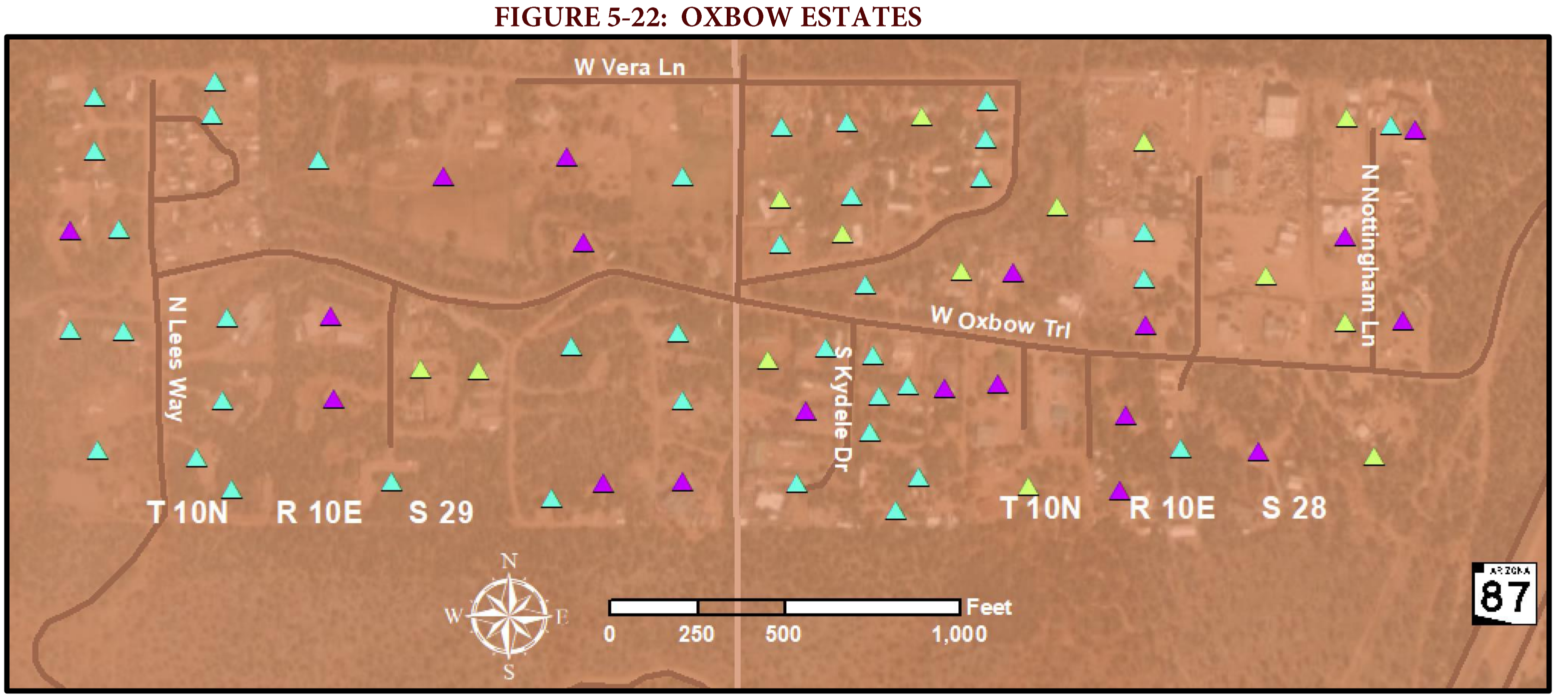
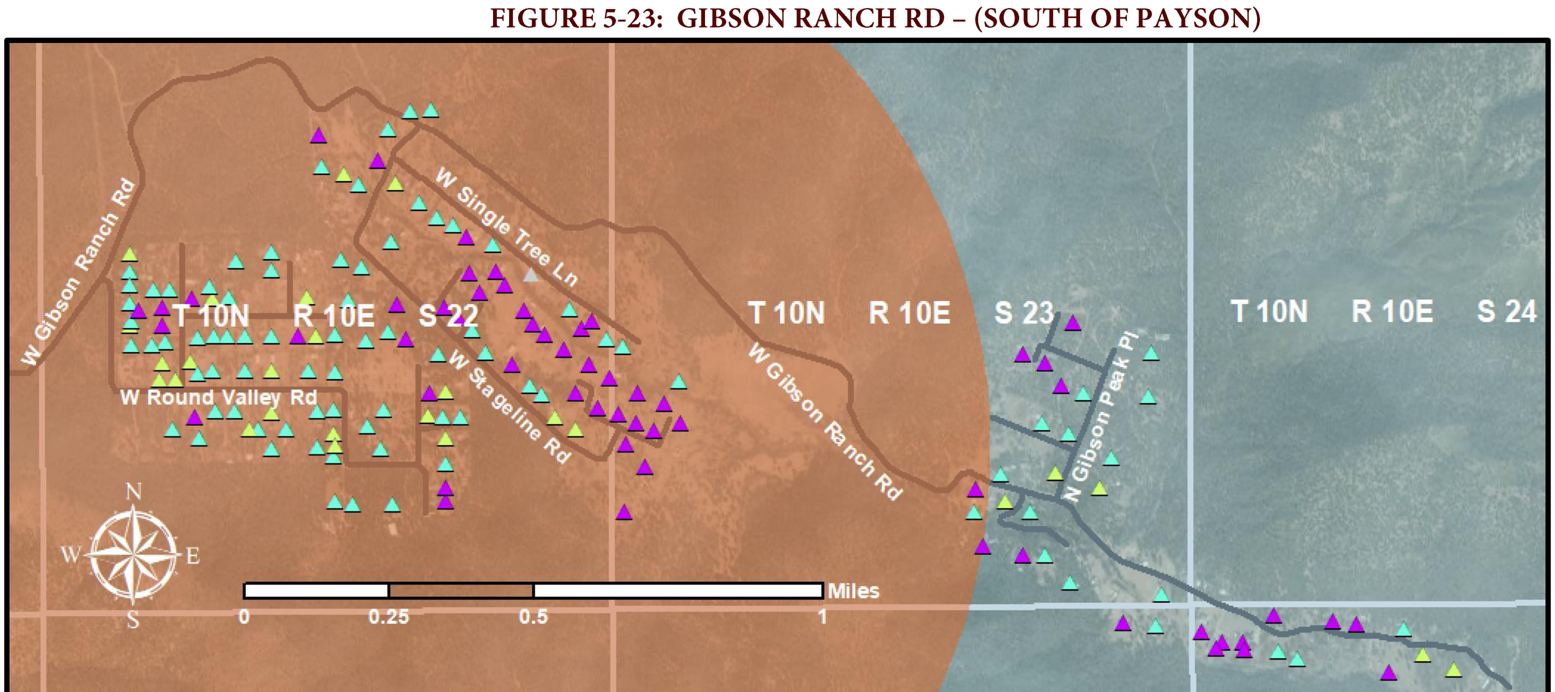


FIGURE 5-23: GIBSON RANCH RD – (SOUTH OF PAYSON)



Estimated Year of Onsite Septic System Installation

- Undetermined
- 1900 - 1919
- 1920 - 1939
- 1940 - 1959
- 1960 - 1979
- 1980 - 1999
- 2000 - 2020

Water Well Nitrate Levels (1 Mile in Diameter)

- 100 + mg/l
- 51 - 100 mg/l
- 11 - 50 mg/l
- 7.6 - 10 mg/l
- 5.1 - 7.5 mg/l
- 2.6 - 5.0 mg/l
- Up to 2.5 mg/l

FIGURE 5-24: STAR VALLEY, AZ

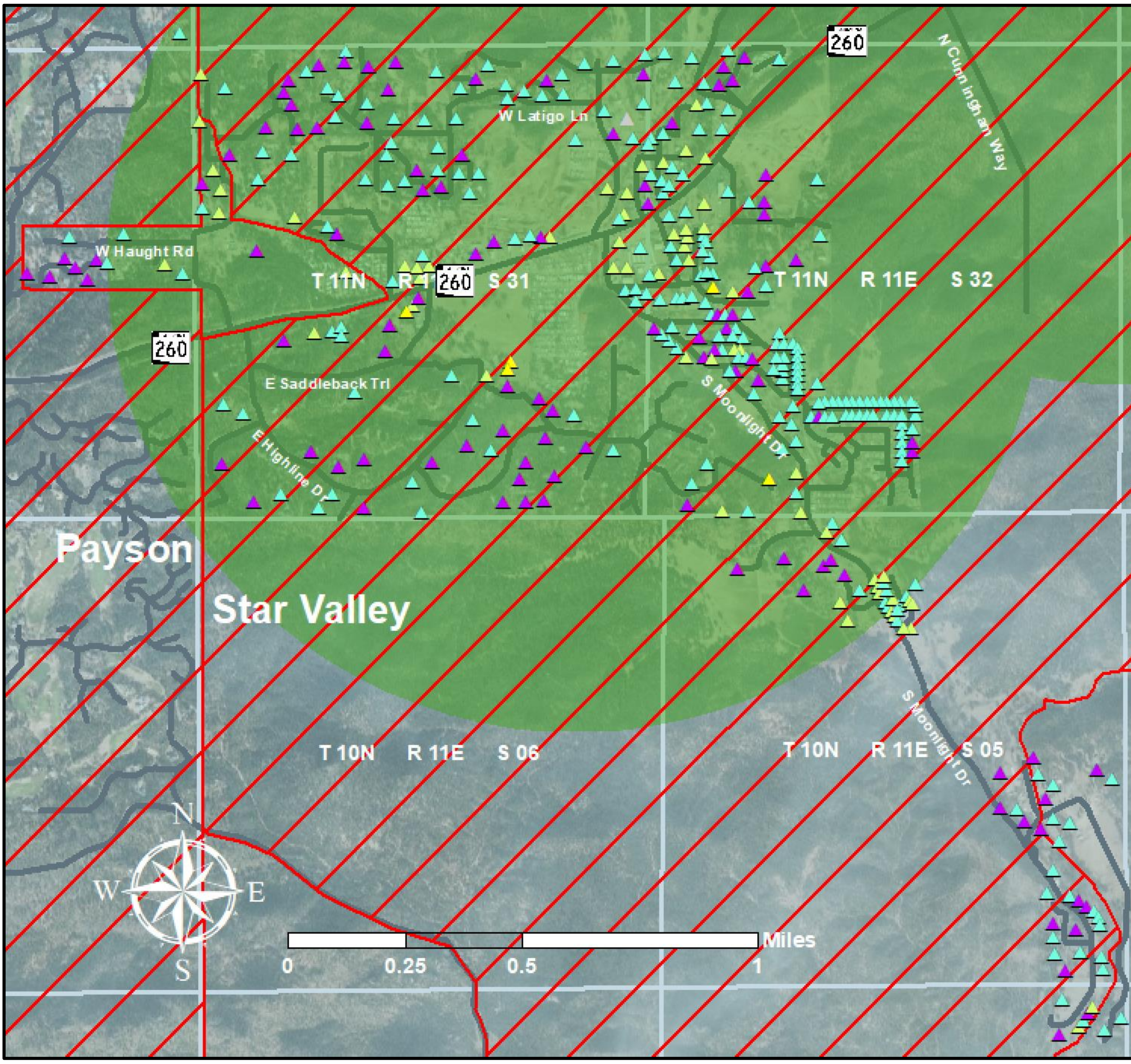


FIGURE 5-25: DIAMOND POINT SHADOWS COMMUNITY

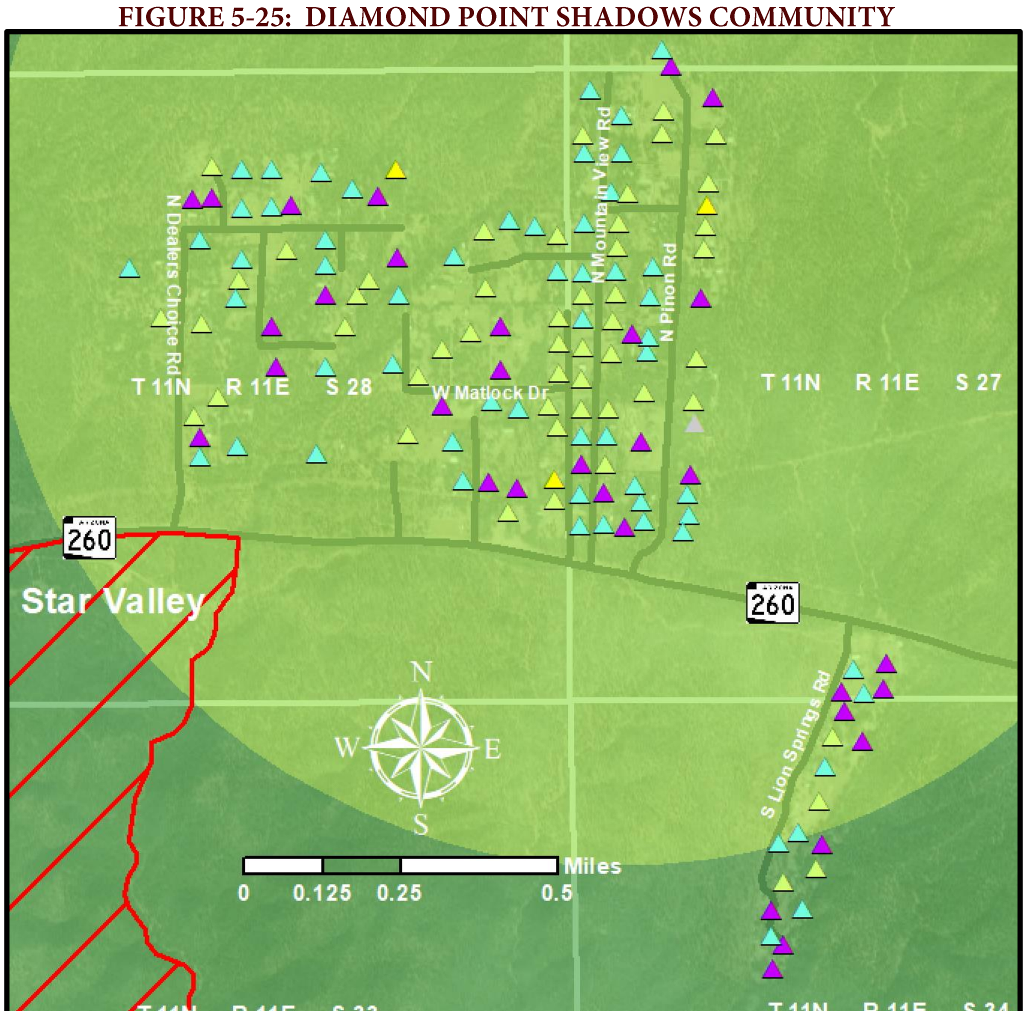
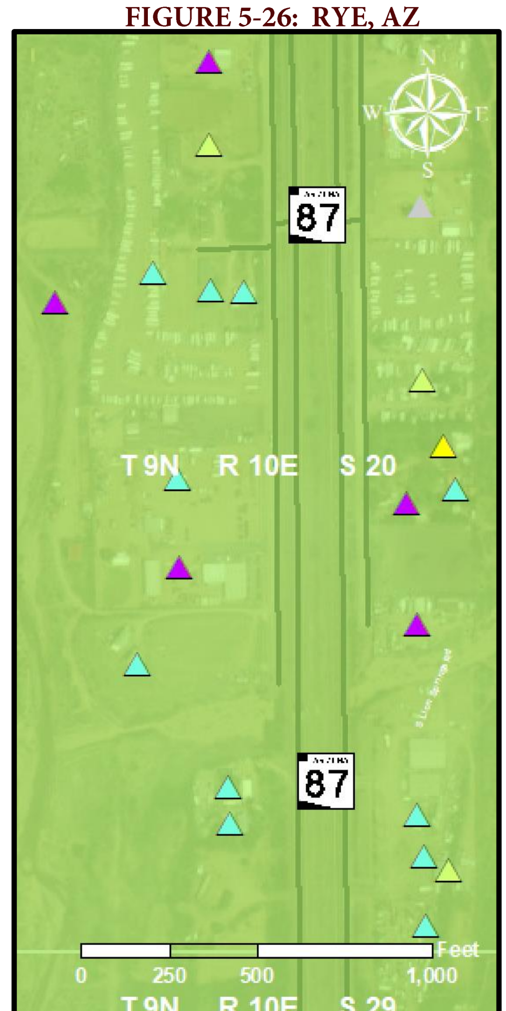


FIGURE 5-26: RYE, AZ



Estimated Year of Onsite Septic System Installation

- Undetermined
- 1900 - 1919
- 1920 - 1939
- 1940 - 1959
- 1960 - 1979
- 1980 - 1999
- 2000 - 2020

Water Well Nitrate Levels (1 Mile in Diameter)

- 100 + mg/l
- 51 - 100 mg/l
- 11 - 50 mg/l
- 7.6 - 10 mg/l
- 5.1 - 7.5 mg/l
- 2.6 - 5.0 mg/l
- Up to 2.5 mg/l

FIGURE 5-27: KOHLS RANCH ESTATES (WEST)

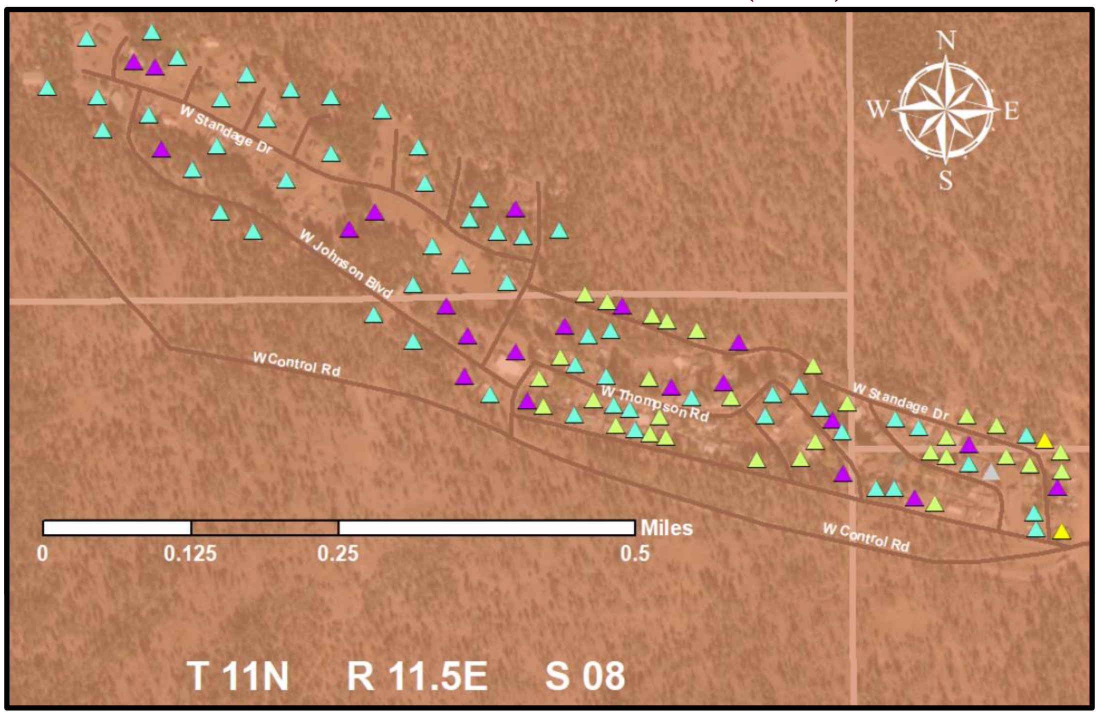


FIGURE 5-28: KOHLS RANCH ESTATES (EAST)

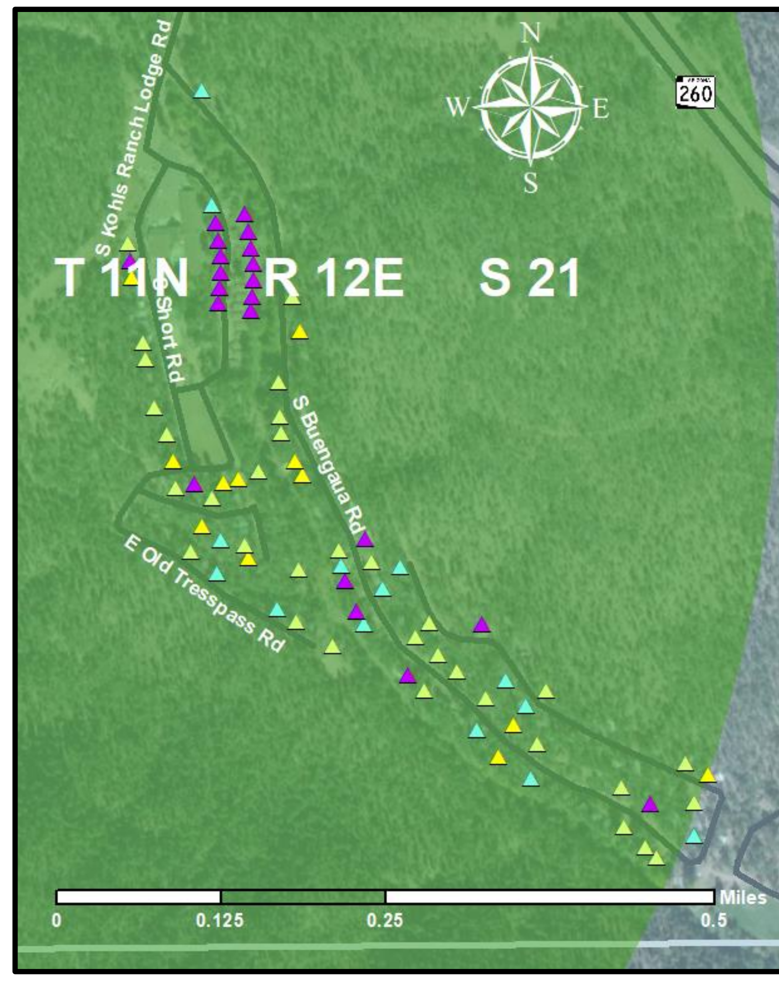


FIGURE 5-29: CHRISTOPHER CREEK, COMMUNITY

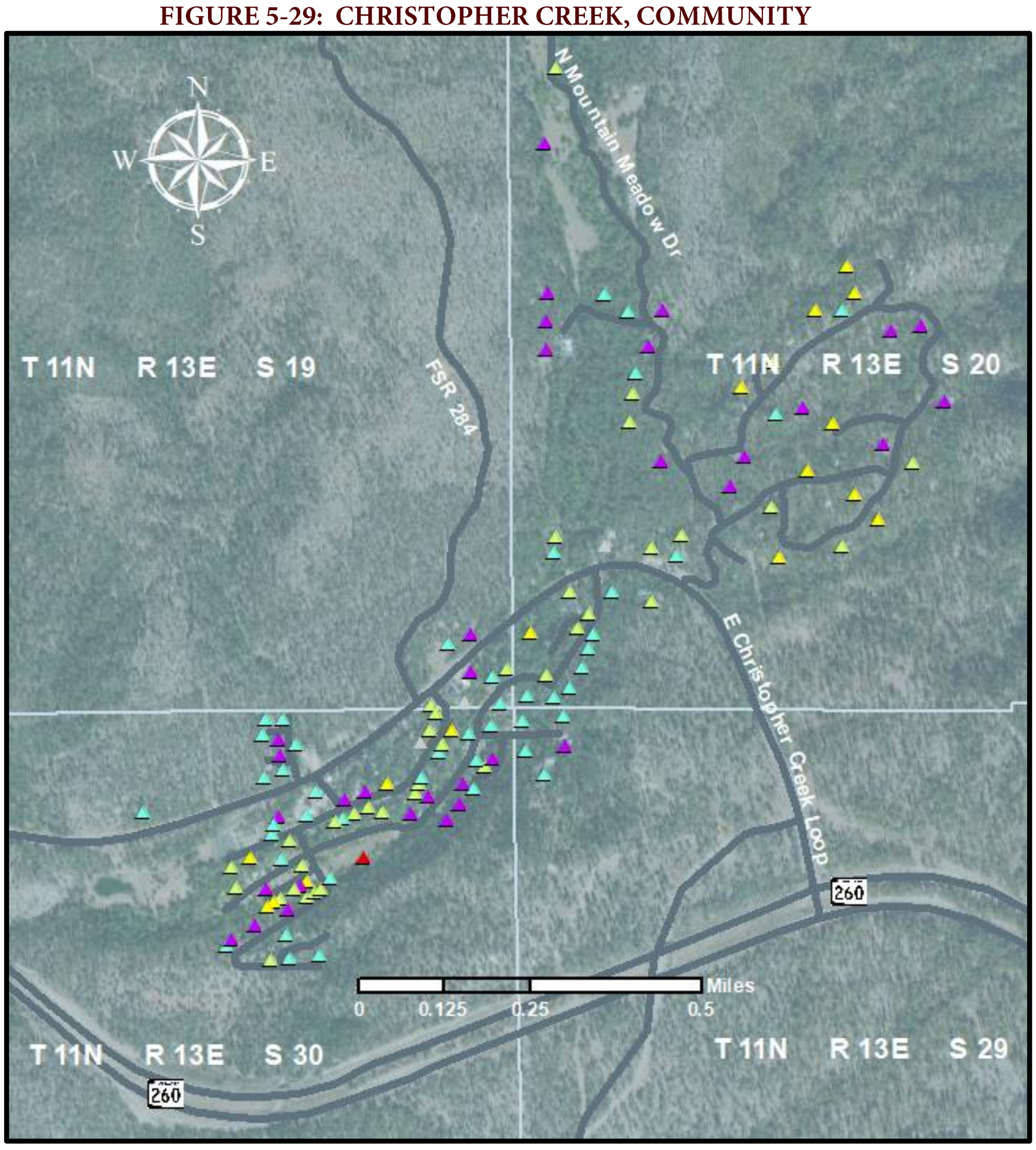


FIGURE 5-30: HAIGLER CREEK COMMUNITY

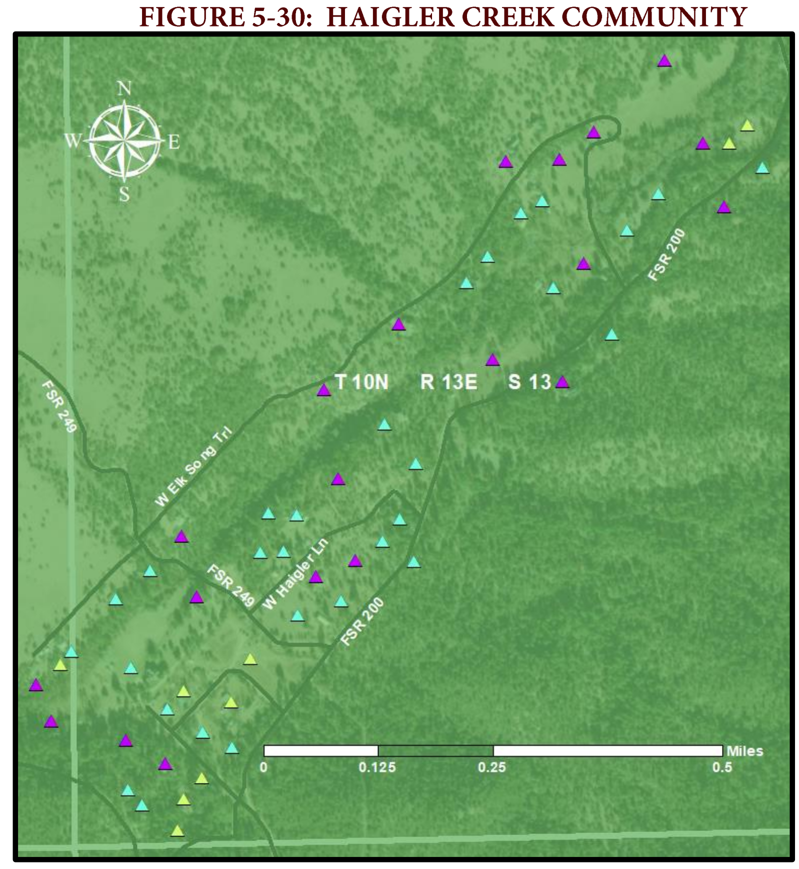
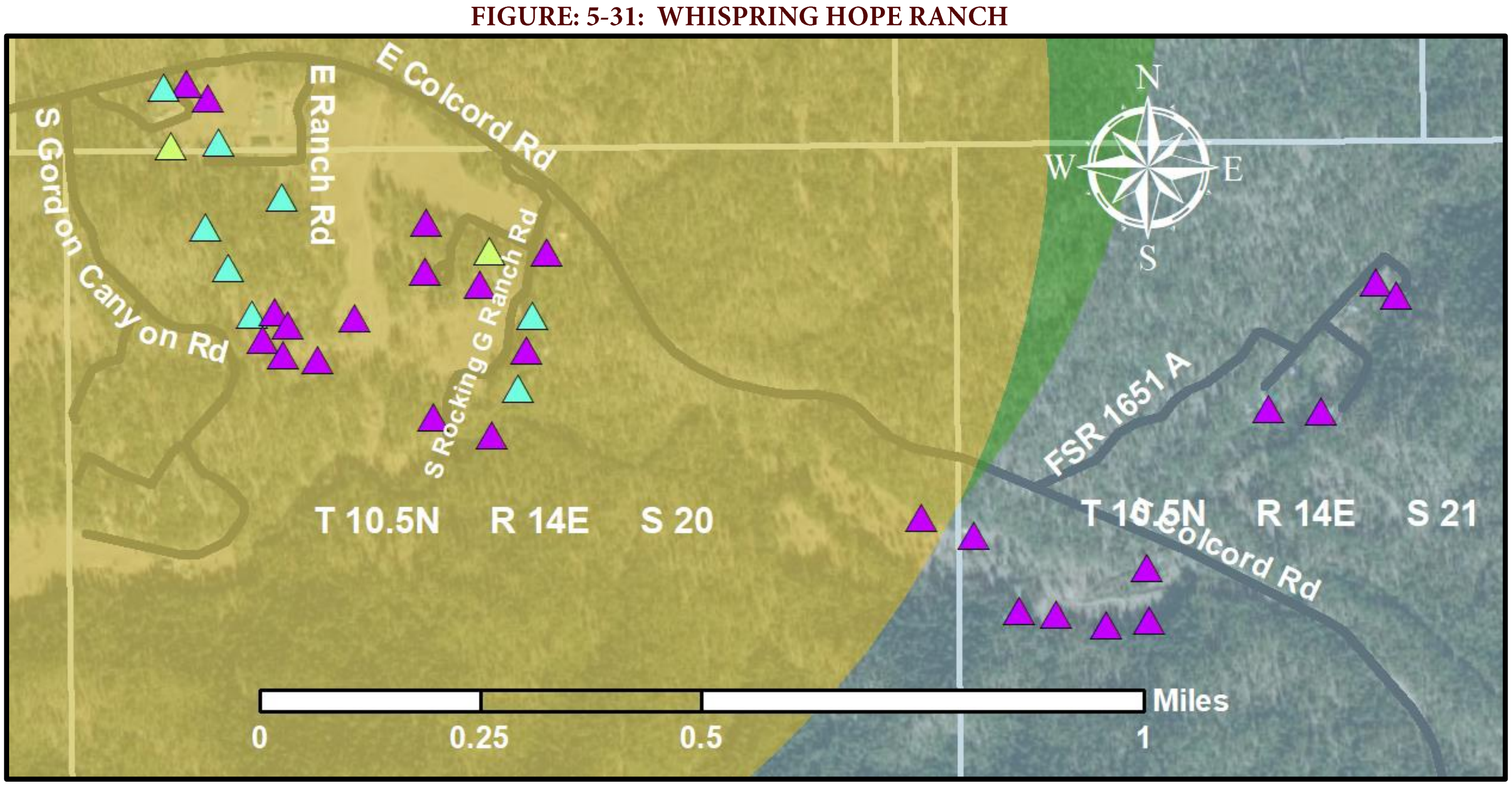


FIGURE: 5-31: WHISPRING HOPE RANCH



Estimated Year of Onsite Septic System Installation

- Undetermined
- 1900 - 1919
- 1920 - 1939
- 1940 - 1959
- 1960 - 1979
- 1980 - 1999
- 2000 - 2020

Water Well Nitrate Levels (1 Mile in Diameter)

- 100 + mg/l
- 51 - 100 mg/l
- 11 - 50 mg/l
- 7.6 - 10 mg/l
- 5.1 - 7.5 mg/l
- 2.6 - 5.0 mg/l
- Up to 2.5 mg/l

FIGURE 5-32: (NEAR CHRISTOPHER-KOHL'S FIRE DISTRICT STATION #53)

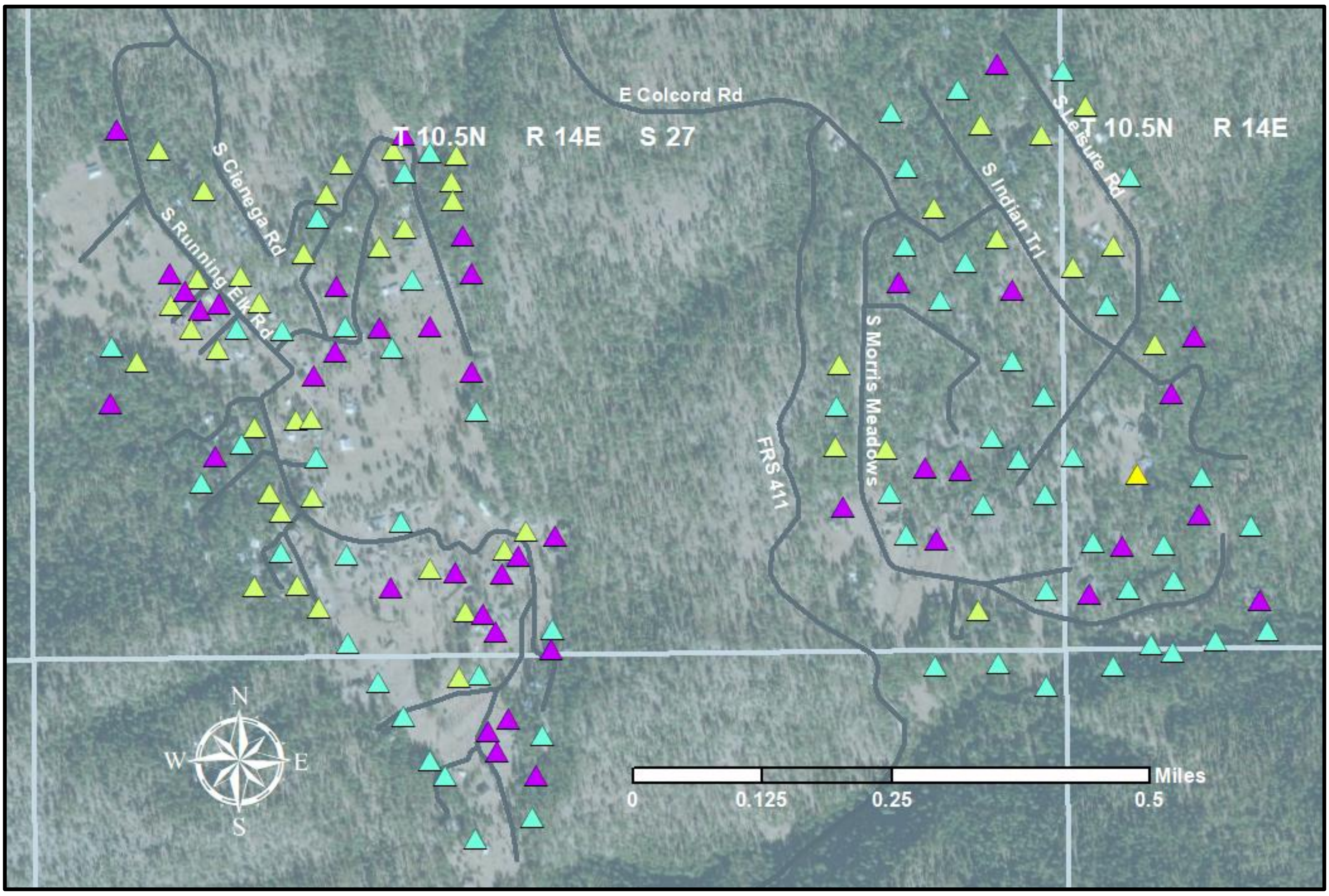


FIGURE 5-33: GISELA, AZ

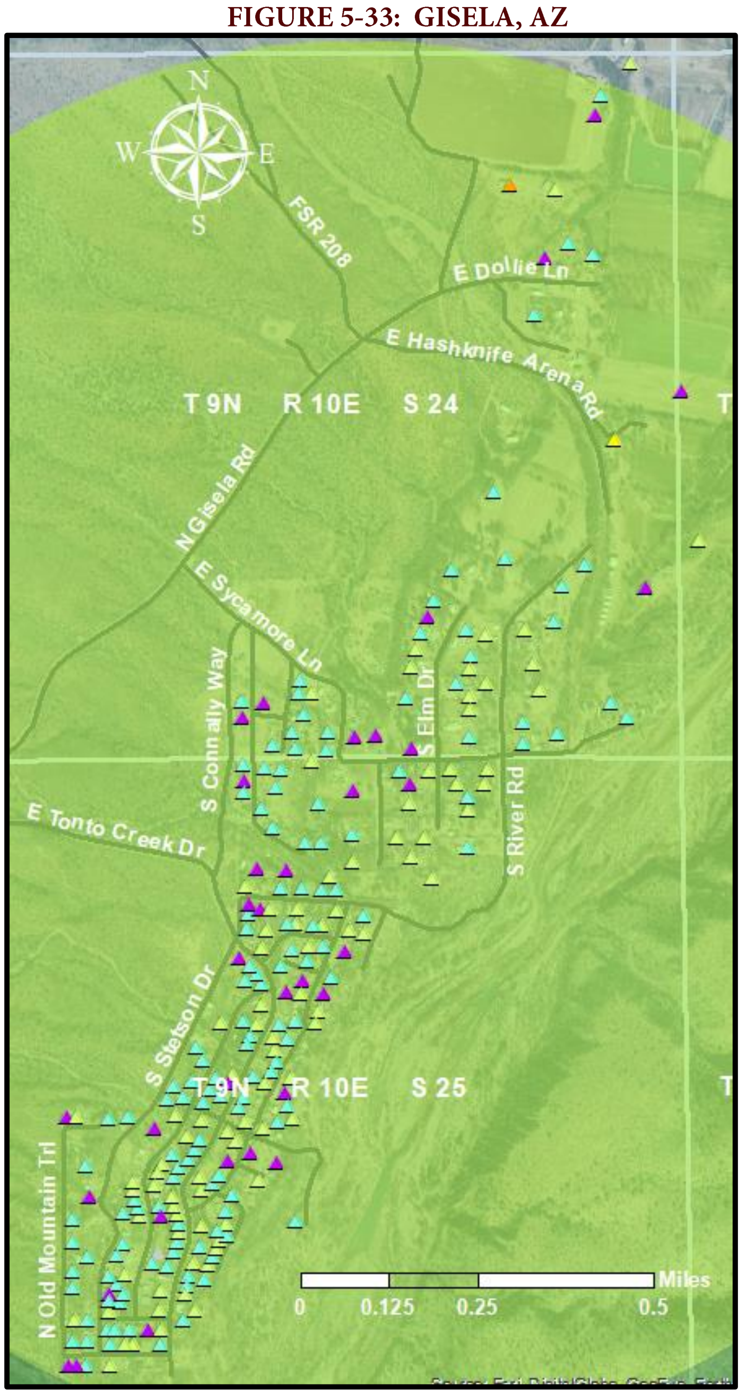
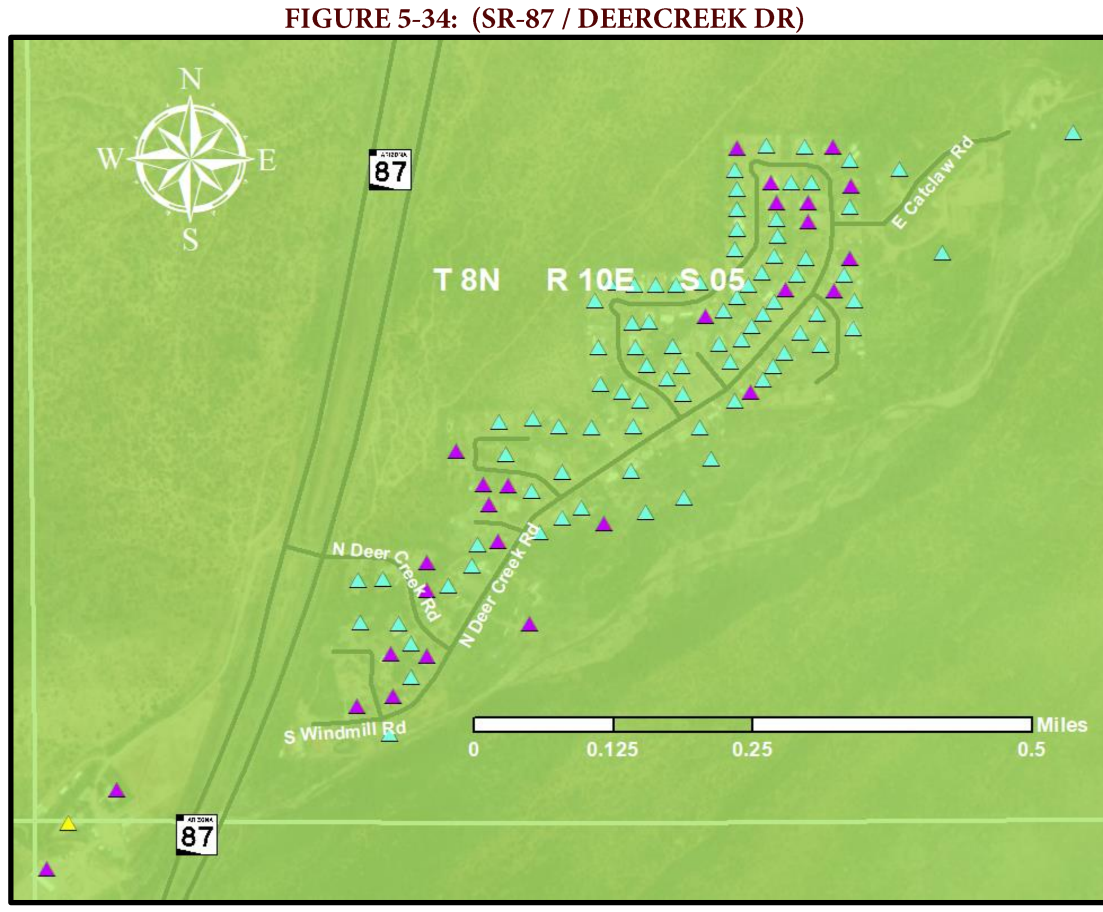


FIGURE 5-34: (SR-87 / DEERCREEK DR)



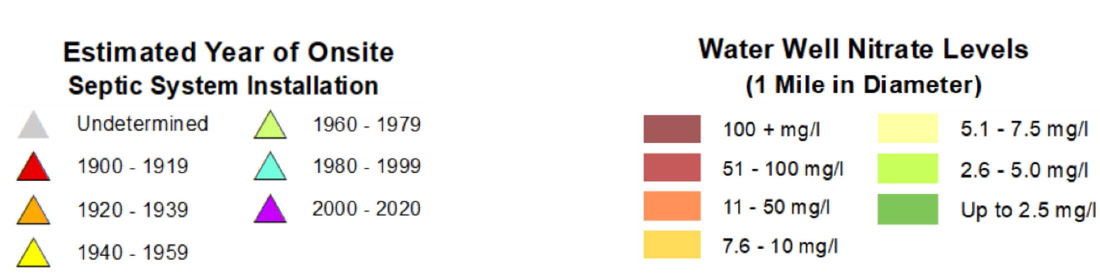


FIGURE 5-35: PUNKIN CENTER COMMUNITY

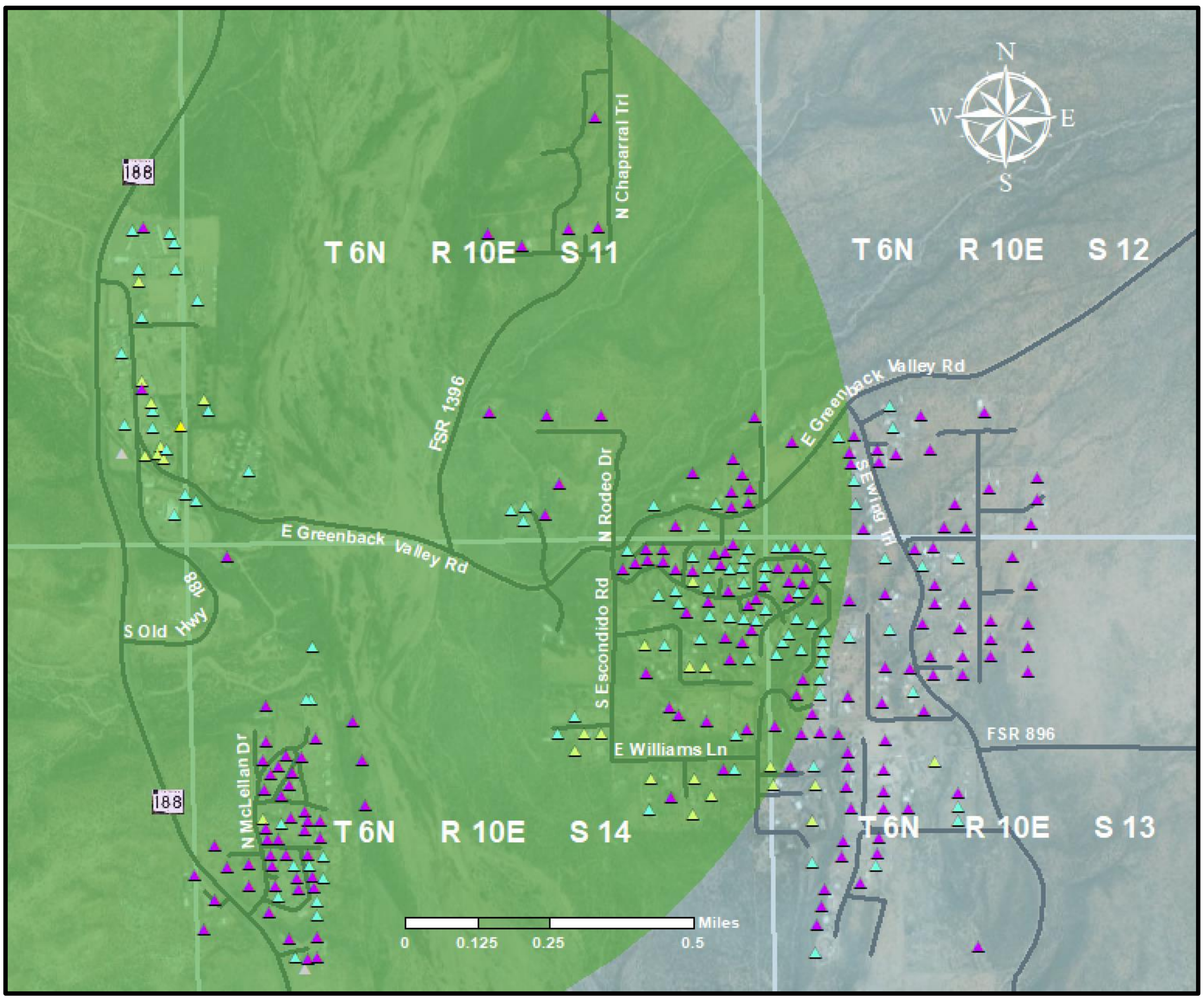
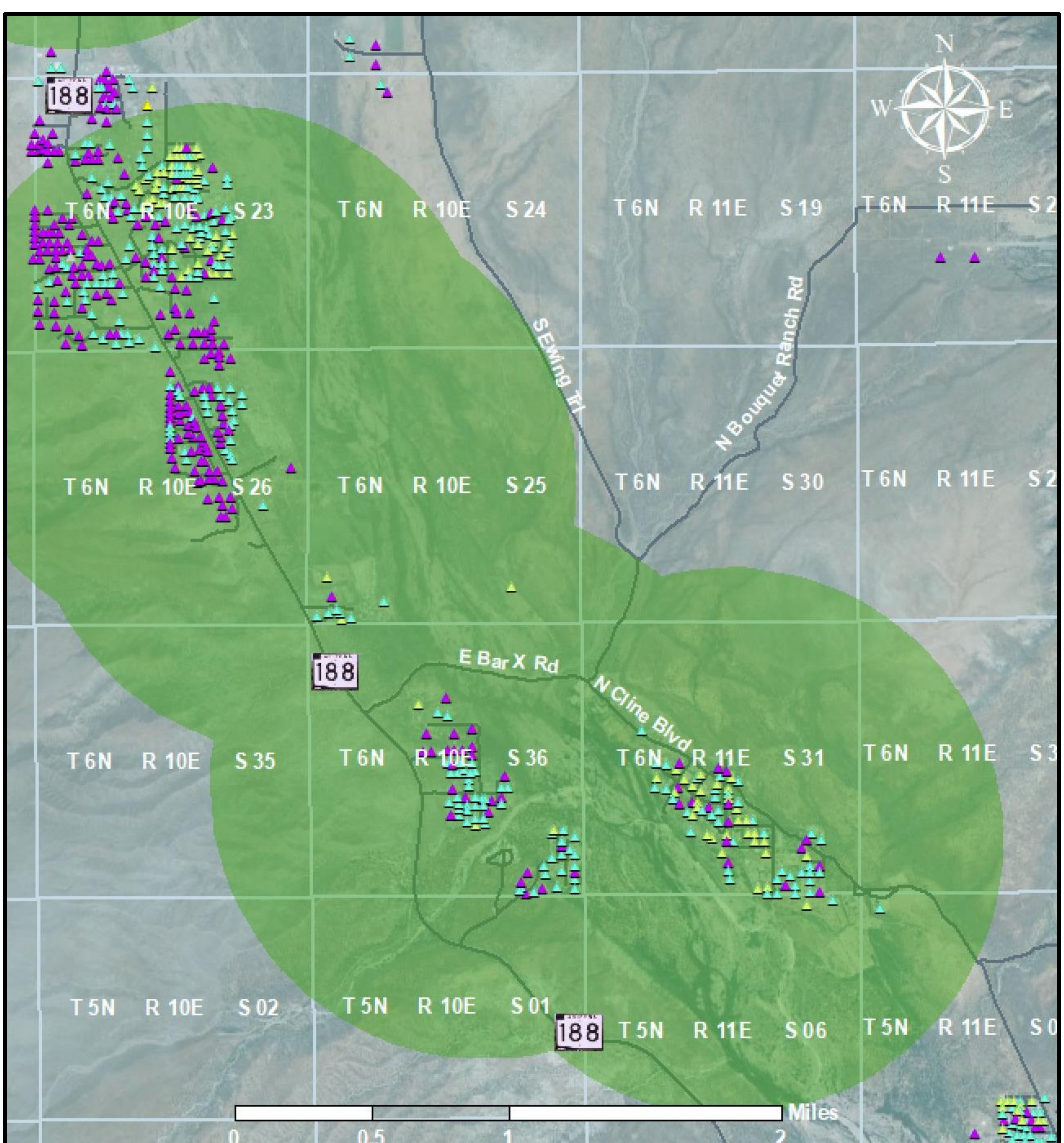


FIGURE 5-36: TONTO BASIN, AZ



Estimated Year of Onsite Septic System Installation

- Undetermined
- 1900 - 1919
- 1920 - 1939
- 1940 - 1959
- 1960 - 1979
- 1980 - 1999
- 2000 - 2020

Water Well Nitrate Levels (1 Mile in Diameter)

- 100 + mg/l
- 51 - 100 mg/l
- 11 - 50 mg/l
- 7.6 - 10 mg/l
- 5.1 - 7.5 mg/l
- 2.6 - 5.0 mg/l
- Up to 2.5 mg/l

FIGURE 5-37: VERDE RIVER GROUNDWATER BASIN - ONSITE SEPTIC SYSTEM ANALYSIS

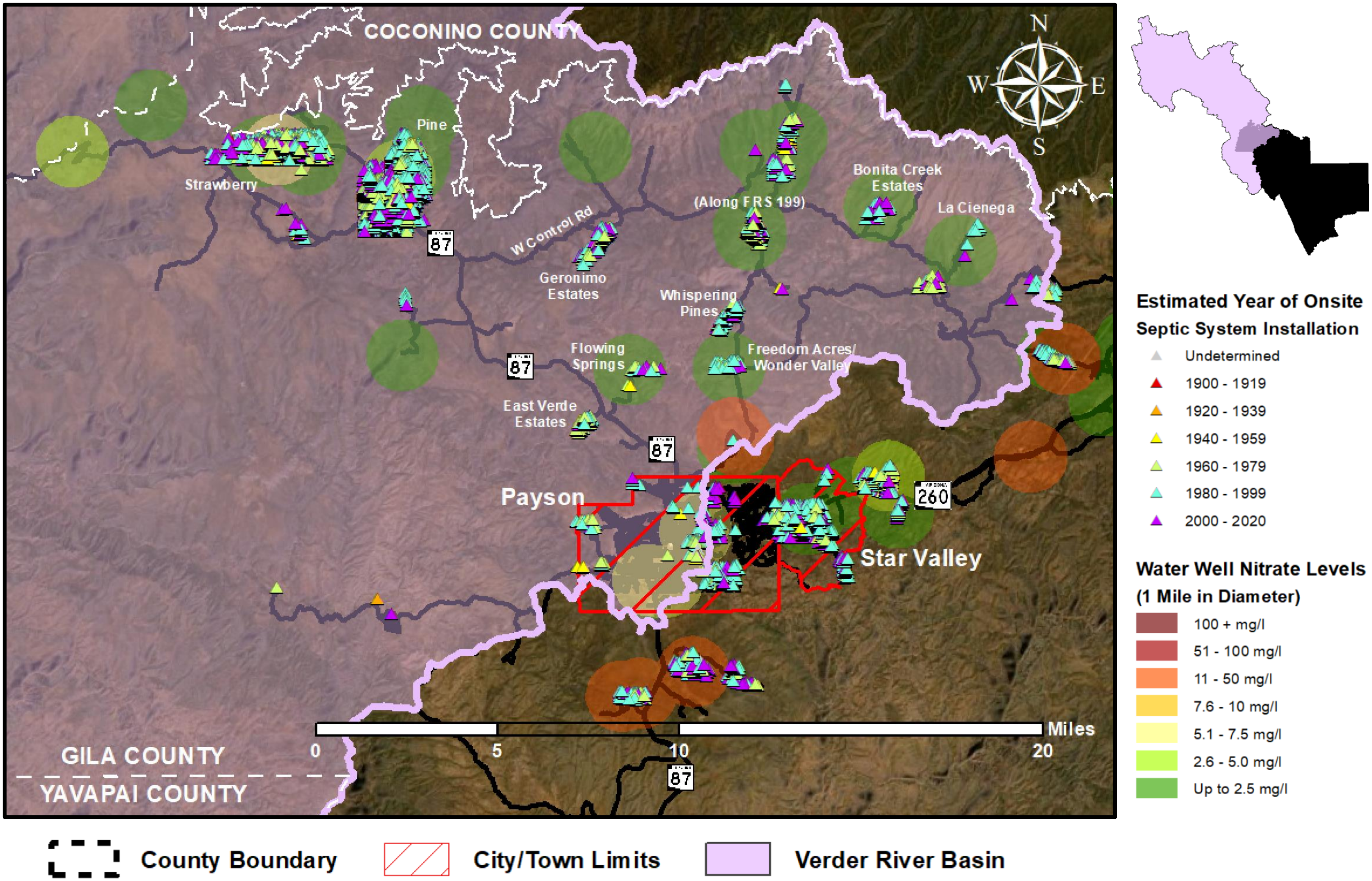


FIGURE 5-38: PINE, AZ

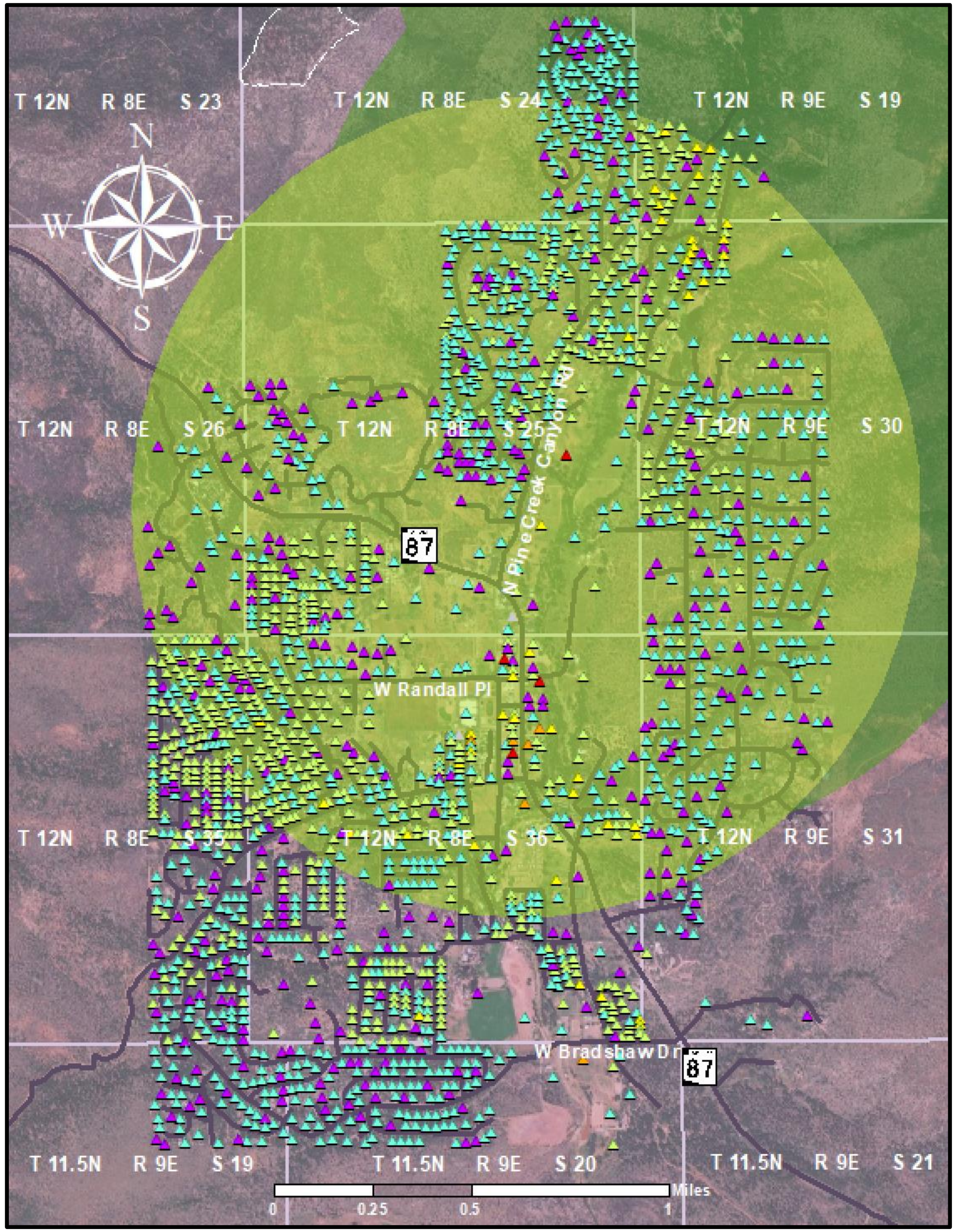
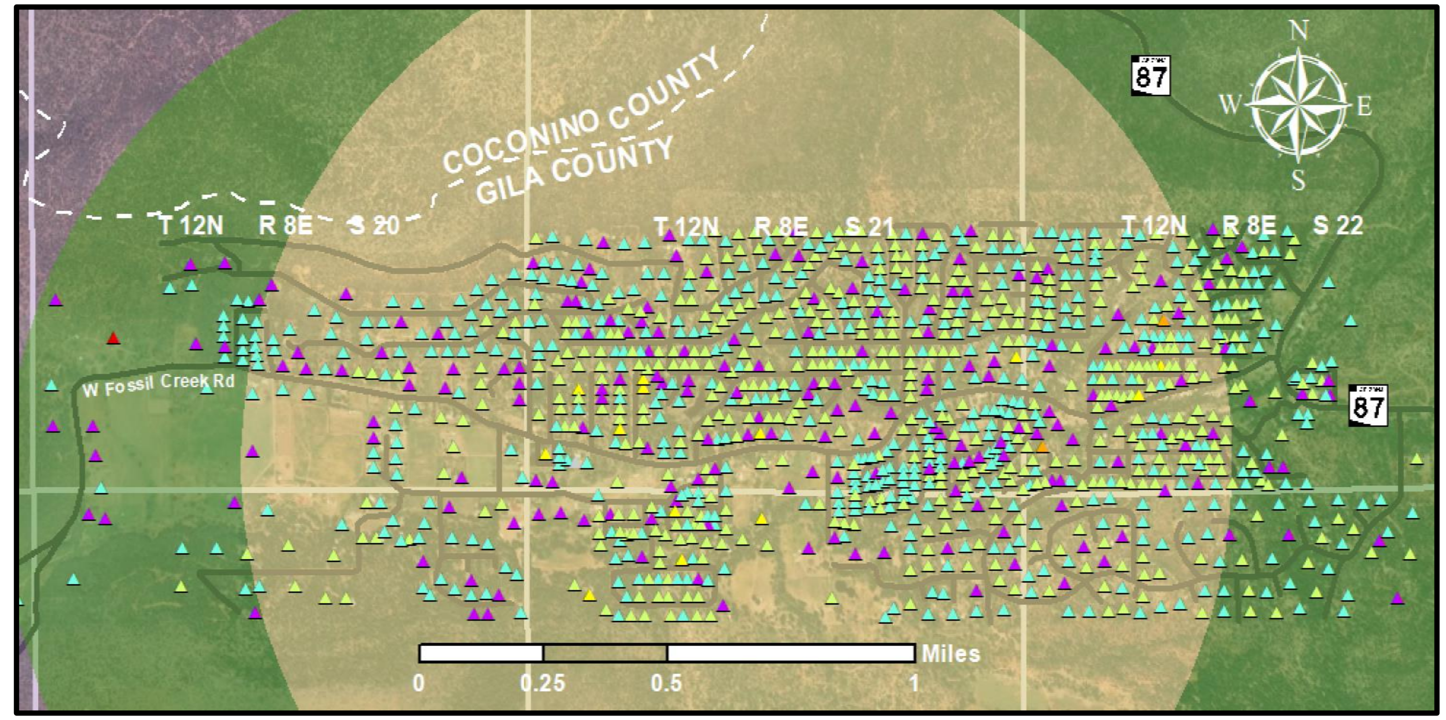


FIGURE 5-39: STRAWBERRY, AZ



Estimated Year of Onsite Septic System Installation

- Undetermined
- 1900 - 1919
- 1920 - 1939
- 1940 - 1959
- 1960 - 1979
- 1980 - 1999
- 2000 - 2020

Water Well Nitrate Levels (1 Mile in Diameter)

- 100 + mg/l
- 51 - 100 mg/l
- 11 - 50 mg/l
- 7.6 - 10 mg/l
- 5.1 - 7.5 mg/l
- 2.6 - 5.0 mg/l
- Up to 2.5 mg/l

FIGURE 5-40: GERONIMO ESTATES

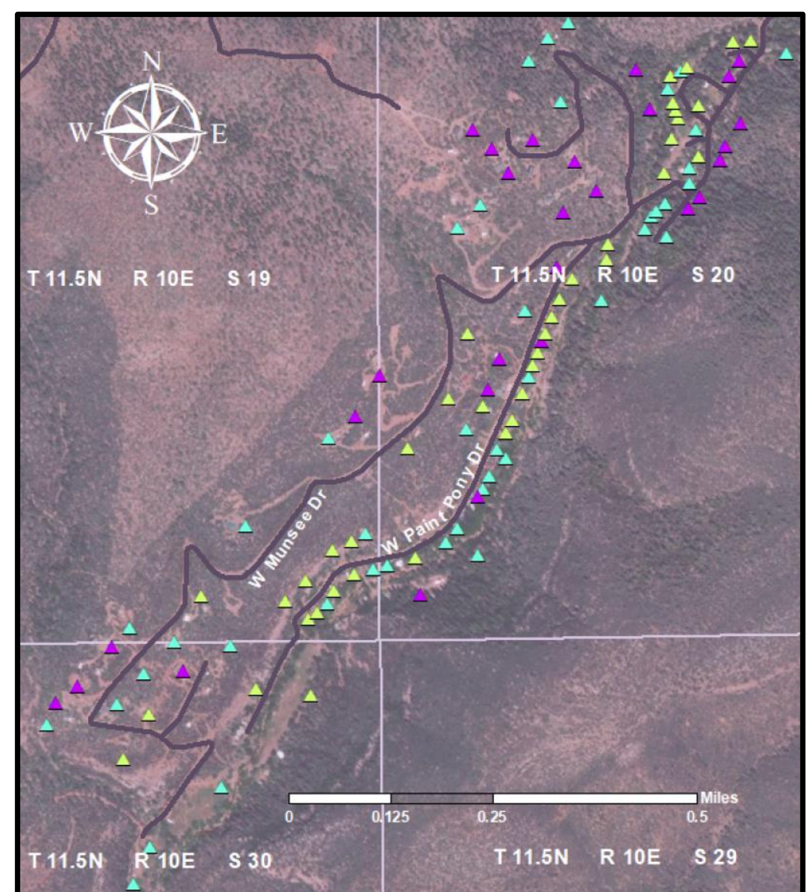


FIGURE 5-41: WHISPERING PINES ESTATES

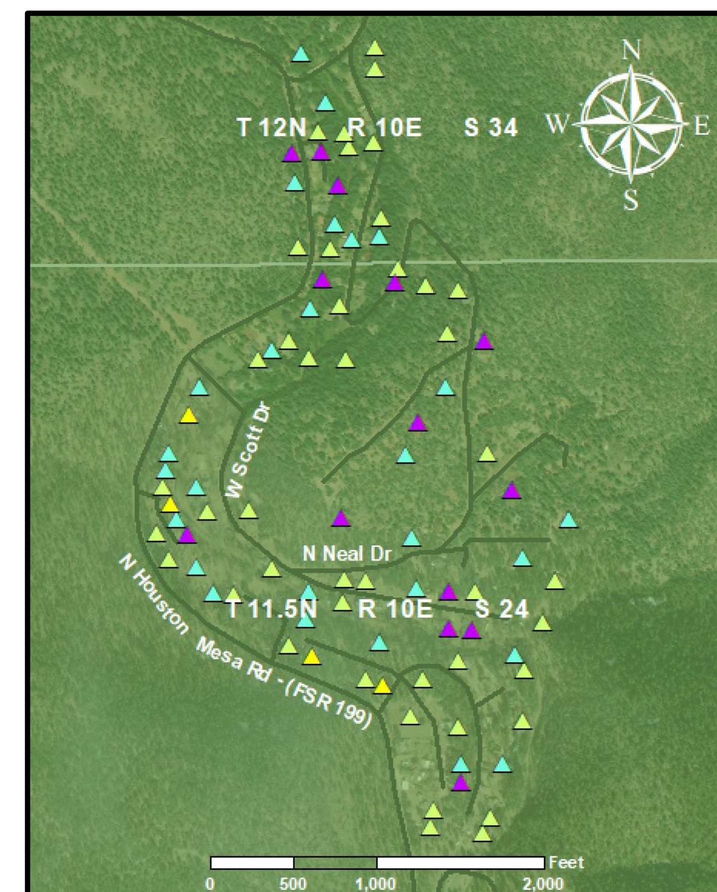


FIGURE 5-42: FLOWING SPRINGS

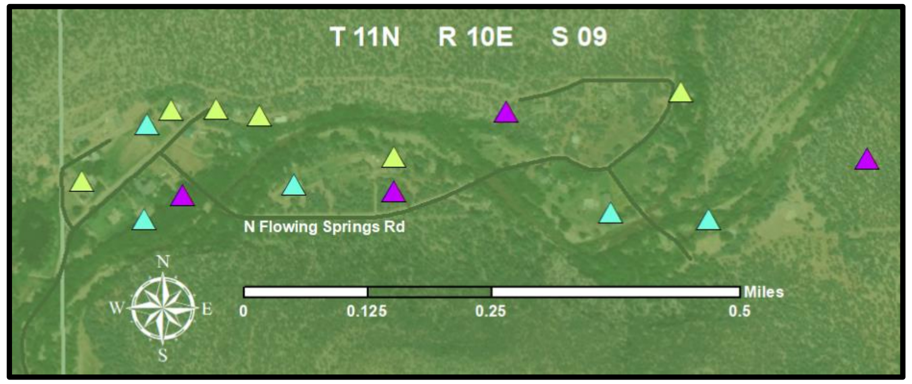
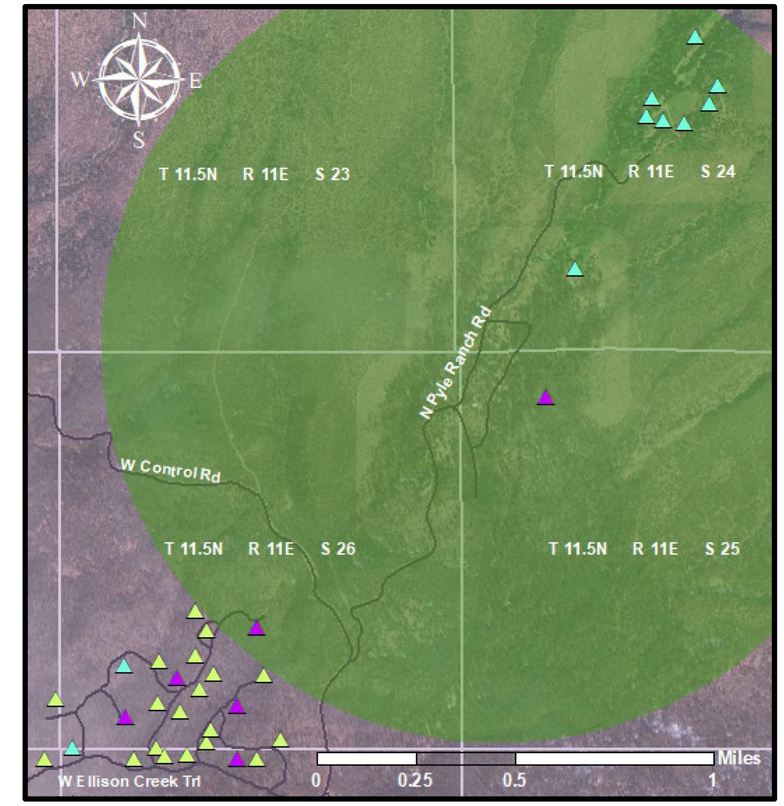


FIGURE 5-43: EAST VERDE ESTATES

FIGURE 5-44: (LA CIENEGA AREA)



Estimated Year of Onsite Septic System Installation

- Undetermined
- 1900 - 1919
- 1920 - 1939
- 1940 - 1959
- 1960 - 1979
- 1980 - 1999
- 2000 - 2020

Water Well Nitrate Levels (1 Mile in Diameter)

- 100 + mg/l
- 51 - 100 mg/l
- 11 - 50 mg/l
- 7.6 - 10 mg/l
- 5.1 - 7.5 mg/l
- 2.6 - 5.0 mg/l
- Up to 2.5 mg/l

FIGURE 5-45: FSR – 199

(BETWEEN WHISPERING PINES & WASHINGTON PARK)

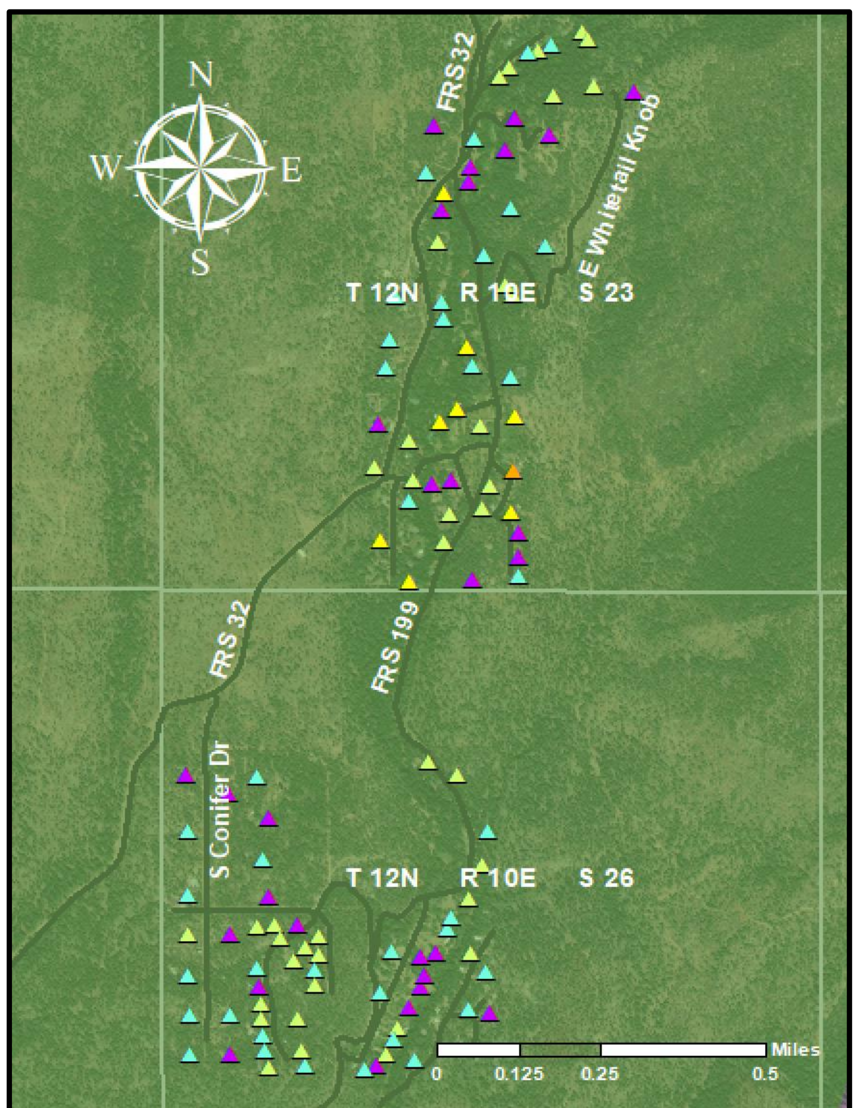


FIGURE 5-46: BONITA CREEK ESTATES

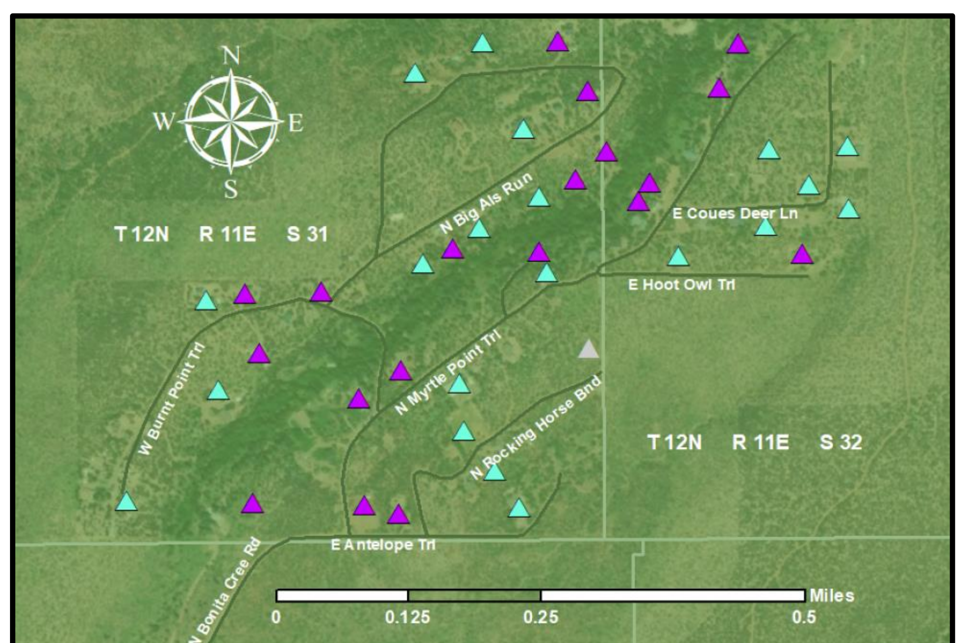
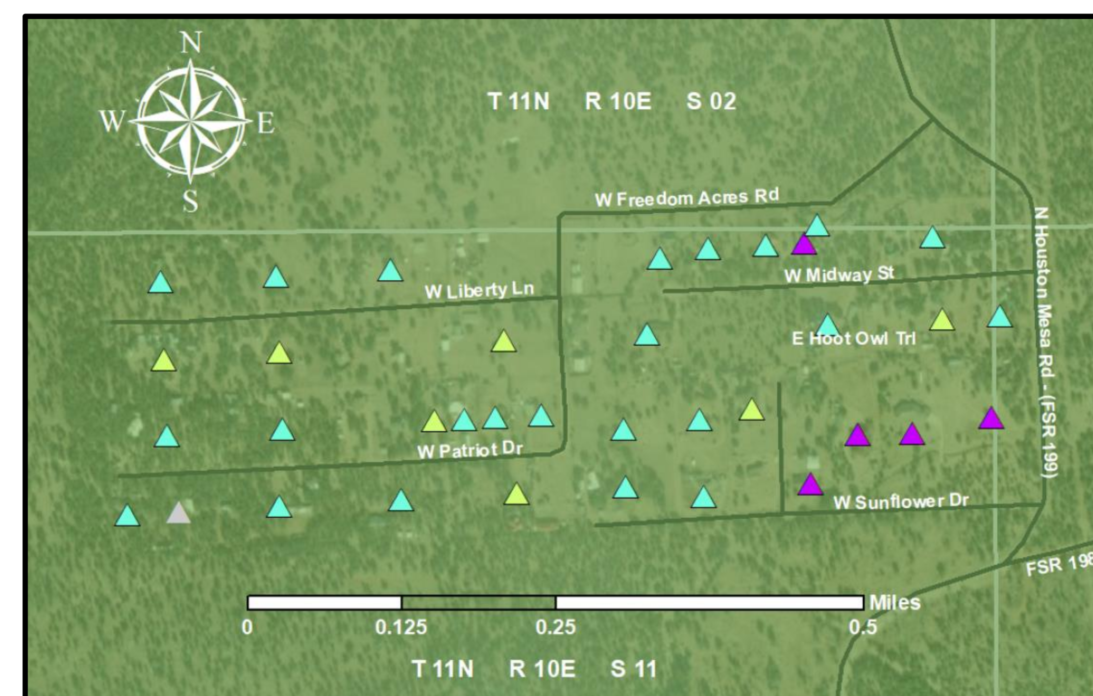


FIGURE 5-47: FREEDOM ACRES / WONDER VALLEY COMMUNITY



CHAPTER

6

Recommendations

The purpose of this chapter is to recommend strategies that either help maintain a more accurate set of records on current onsite septic systems, better access to current data, as well as potential funding options/strategies that may help to mitigate environmental hazards to groundwater drinking supplies.

6.1 STRATEGIES

1. Develop a web portal to conduct Online Septic Search Tool to look up specific septic records by NOT Permit Number, APN, or Address, etc. (e.g. https://www.maricopa.gov/2581/Online-Septic-Research)

2. Provide free or discount on septic inspections for systems over a specific or determined age.

3. Offer a contest that is advertised through the utility companies for a free or discounted repair or inspection.

4. Set aside funding (grant generated or locally funded) to replace a set number of failing systems gratis with possibly conditions that it must be inspected within a certain amount of time within a given timeframe.

5. Send out a short brochure on septic systems maintenance with the utility bills once a year or a determined set of time to keep up with reminders.

6. Consider forming a Sanitary District in areas that have a high density of onsite septic systems, converting them to sewer, more specifically in areas where tested well water has a high level of nitrate.

7. Acquire funding to connect properties on septic to connect with the nearby sewer system. If grant funding is acquired with a local match, property owner only pays for the local match portion that can also be financed.

Even though onsite septic systems are not monitored by the EPA, they have developed several documents outlining their mission, priorities, regulatory authorities, guidance, and technical information to help communities establish comprehensive onsite septic management program (www.epa.gov/septic).

6.2 POTENTIAL FUNDING OPTIONS

Funding sources that are available appear to be far few and in between, but they do exist. Below are potential funding options that can be used to solve failed onsite septic systems:

1. USDA Rural Development's Home Repair Loan Grant Program – (Section 504 Home Repair Program) - https://www.rd.usda.gov/programs-services/single-family-housing-repair-loans-grants

2. EPA Clean Water State Revolving Fund (CWSRF)
   The CWSRF funds water quality protection projects for wastewater treatment, control of nonpoint sources of pollution, decentralized wastewater treatment, and watershed and estuary management through low interest loans to a variety of borrowers.

3. EPA Nonpoint Source Section 319 Grants
   Under section 319 of the Clean Water Act, EPA provides grants to states to control nonpoint sources of pollution from a variety of sources such as agricultural runoff, mining activities, and malfunctioning onsite septic systems. Some, but not all, states use these grants to construct, upgrade, or repair onsite systems. Note that individual homeowners are not eligible to directly receive grant assistance through this program, as the grants are typically provided to watershed organizations that are actively implementing watershed-based plans to restore impaired waterbodies. For more information, contact your state's nonpoint source coordinator.

4. EPA Water Finance Clearinghouse
   The Water Finance Clearinghouse is an easily navigable web-based portal to help communities locate information and resources that will assist them in making informed decisions for their drinking water, wastewater, and stormwater infrastructure needs.

5. EPA Environmental Finance Center Network
   EPA grant funding started 10 university-based environmental finance centers, the Environmental Finance Center Network, which work together with the public and private sectors to fund environmental programs.

6. U.S. Department of Agriculture, Rural Development
   Funding covers repair and maintenance of onsite systems.

7. U.S. Department of Housing and Urban Development (HUD)
   HUD provides funds to states through community development block grants. The grants fund various projects, including rehabilitation of residential and nonresidential structures, construction of public facilities, and improvement of water and sewer facilities.

8. U.S. Economic Development Administration (EDA)
   EDA administers various funding programs to promote collaborative regional innovation, public/private partnerships, national strategic priorities, global competitiveness, and environmentally sustainable development.

9. EPA Clean Water Indian Set-Aside (CWISA) Grant Program
   Provides funding for wastewater infrastructure to Indian tribes and Alaska Native Villages. EPA administers this program in cooperation with the Indian Health Service (HIS). Tribes must identify their wastewater needs to the IHS Sanitation Deficiency System to receive funding.

10. EPA Environmental Protection in Indian Country - Grants
    Provides information for tribes about EPA and other federal grant resources and regulations and policies for applying for assistance.

11. U.S. Department of Housing and Urban Development - Resources for Native Americans
    The Indian Housing Block Grant Program is a formula grant that funds various activities, include housing development, assistance to housing developed under the Indian Housing Program, housing services to eligible families and individuals, crime prevention and safety, and model approaches to solving affordable housing problems.

12. U.S. Department of Health and Human Services: Administration for Native Americans Environmental Regulatory Enhancement
    Provides financial assistance to tribes and Native American nonprofit organizations for projects that address environmental regulatory enhancement, including formulating ordinances, implementing laws, and training community members to manage natural resources.

13. Arizona Revised Statutes – Title 48; Chapter 6 – County Improvement Districts

14. Arizona Revised Statutes – Title 48; Chapter 14 – Sanitary Districts

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APPENDIX A

GILA COUNTY WASTEWATER ORDINANCE NO. 2014-02

Gila County Wastewater Ordinance No. 2014-02 (The Ordinance) took effect on April 1, 2014, that replaced Gila County Wastewater Ordinance No. 01-2 that was adopted by the Gila County Board of Supervisors on December 4, 2001. The Ordinance reads as follows:

AN ORDINANCE TO AMEND AND REPLACE GILA COUNTY WASTEWATERORDINANCE NO. 01-2 ADOPTED BY THE BOARD OF SUPERVISORS ON DECEMBER 4, 2001, THAT ESTABLISHED MINIMUM QUALIFICATION STANDARDS FOR PERSONS PERFORMING SOIL CHARACTERIZATIONS, PERCOLATION TESTS, SITE INVESTIGATIONS, AND ONSITE WASTEWATER TREATMENT FACILITY DESIGN; PROHIBITING PERFORMANCE OF SUCH SERVICES BY PERSONS WITH A DOCUMENTED HISTORY OF REPORTING INACCURATE RESULTS, PRODUCING INADEQUATE DESIGNS, OR OTHER POTENTIALLY UNETHICAL OR UNACCEPTABLE BEHAVIOR; ADDITIONAL NOTICE OF INTENT TO DISCHARGE, DESIGN AND INSTALLATION REQUIREMENTS; REPAIR OF EXISTING ONSITE WASTEWATER TREATMENT FACILITIES; PENALTIES; AND THE APPEALS PROCESS.

WHEREAS, The Gila County Board of Supervisors is empowered to make and enforce all sanitary regulations not in conflict with general law, pursuant to A.R.S. §11-251(31), and may adopt ordinances necessary or proper to carry out the county's responsibilities not otherwise limited or conflicting with other laws, pursuant to A.R.S. §11-251.05(A); and

WHEREAS, the State of Arizona has adopted technical and procedural standards for the practice of site investigation, soil characterization, percolation testing, system selection and design of onsite wastewater treatment facilities having a design flow of less than 24,000 gallons per day, but has not set minimum qualification standards for the individuals performing these function; and

WHEREAS, the preservation of the health and welfare of the citizens of Gila County, and the efficient and effective performance of Gila County's delegated regulatory duties is dependent upon how well these tasks are performed; and

WHEREAS, minimum qualification standards are necessary to ensure that the individuals performing these function have the technical knowledge and skills necessary to conform with the required technical and legal standards and procedures for these tasks; and

WHEREAS, it is necessary to provide the regulated community with an avenue to appeal the onsite wastewater treatment facility licensing decisions made by the Gila County staff; and

WHEREAS, the Board of Supervisors has properly noticed this ordinance in compliance with A.R.S. §11-251.05(C);

NOW, THEREFORE, be it ordained by the Board of Supervisors of Gila County, Arizona, as follows:

SECTION 1: APPLICATION

This ordinance establishes the minimum qualifications for persons performing soil characterizations, percolation tests, site investigations, onsite wastewater treatment facility design; and prohibiting performance of such services by persons with a documented history of reporting inaccurate results, producing inadequate designs, or other potentially unethical or unacceptable behavior.

Also included in this ordinance is the notice of intent to discharge; design and installation requirements; repair of existing onsite wastewater treatment facilities; penalties; and the appeals process.

SECTION 2: QUALIFICATIONS REQUIRED

Soil characterizations; percolation tests; site investigations; onsite wastewater treatment facility design; persons authorized to perform; additional notice of intent to discharge; design and installation requirements; and repair of existing onsite wastewater treatment facilities.

A. All site investigations, percolation testing, soil characterizations, system selection and design of onsite wastewater treatment facilities shall be conducted in accordance with Arizona Administrative Code Title 18, Chapter 9, Articles 1 and 3.

B. The services referenced in Section 2(A) shall be performed only by the following persons:
   1. Professional engineers or geologists licensed by the Arizona Board of Technical Registration pursuant to A.R.S. §32-121 et seq, with knowledge of and competence with the preparation of the design documents and submittals for such systems, unless excepted under A.R.S. §32-144(A)(6).
   2. Sanitarians registered with the Arizona Sanitarians' Council pursuant to A.R.S. §36-136.01, with knowledge of and competence with the preparation of the design documents and submittals for such systems.
   3. Persons who have demonstrated proficiency in site investigations and soil characterizations, and the selection and design of onsite wastewater systems, and who have met all the following requirements:

a. Successful completion of "Gila County Listing Course" and/or other specified classes presented by the Gila County Community Development Division along with their associated prerequisite courses. Those persons who have successfully completed the "Gila County Listing Course" presented by the Gila County Community Development Division or have within the two years following their most recent listing, successfully completed a specified "Re-Listing Course" and its associated prerequisites, if any, shall be considered qualified to perform the tasks specified in this section. The Gila County Community Development Division shall expressly state whether or not any classes it presents, along with the associated prerequisite courses, if any, to the regulated community after the effective date of this ordinance will qualify the prospective attendees to perform the services referenced in this section.

b. Maintained a satisfactory history of producing accurate results and adequate designs.

4. The Gila County Community Development Division reserves the right to not accept results from persons or firms with a documented history of reporting inaccurate results, producing inadequate designs, or other actions that may result in violations of the provisions of Arizona Administrative Code Title 18, Chapter 9, Articles 1 and 3.

   a. A "documented history" is defined as three written notices of reporting inaccurate results, producing inadequate designs, or other actions that resulted or may result in violations of the provisions of Arizona Administrative Code Title 18, Chapter 9, Articles 1 and 3 issued to the person or firm over the cumulative time of listing of that person or entity.

   b. An alleged violator shall be entitled to an administrative hearing on any decision of the Gila County Community Development Division not to accept results from persons or firms with a documented history of reporting inaccurate results, producing inadequate designs, or other actions that may result in violations of the provisions of Arizona Administrative Code Title 18, Chapter 9, Articles 1 and 3 as provided in Gila County Ordinance No. 05-01 titled Gila County Hearing Officer Rules of Procedure.

SECTION 3: SITE INVESTIGATIONS, PERCOLATION TESTING, AND SOIL CHARACTERIZATIONS

A. All site investigations, percolation testing, soil characterizations pertaining to onsite wastewater treatment facilities shall be witnessed by a member of the Gila County Community Development Division staff in order to be valid. Any results of such activities, which are performed without being witnessed by Gila County Community Development Division staff may be considered invalid.

   1. The Gila County Community Development Division may require percolation testing to resolve disputes in those instance where the site investigator and the Gila County Community

Development Division staff are unable to reach an agreement on the soil's ability to absorb water as determined by soil characterization methods.

2. The Gila County Community Development Division may require percolation testing when the soil type and structure are such that the soil characterization methods are difficult to apply properly. Such soil types and structures include, but are not limited to, composed granite, fractured shale, fractured sandstone, etc.

SECTION 4: WASTEWATER TREATMENT FACILITY DESIGN

A. Conventional onsite wastewater treatment facilities regulated under Arizona Administrative Code R18-9-E302 (General Permit 4.02) and Composting Toilet & Gray Water System facilities regulated under Arizona Administrative Code R18-9-E303 (General Permit 4.03) may be designed by any person qualified under Section 2(B) of this ordinance.

B. Alternative onsite wastewater treatment facilities regulated under Arizona Administrative Code R18-9-E304 through R18-9-E323 (General Permits 4.04 through 4.23) shall be designed by professional engineers licensed by the Arizona Board of Technical Registration pursuant to A.R.S. §32-121 et seq, with knowledge of and competence with such systems. Site Plans for Low Pressure and STEP Systems may be designed by any person qualified under Section 2(B) of this ordinance. The pump and low pressure piping portions of these systems are considered to be alternative onsite wastewater treatment facilities as defined in this paragraph and shall be designed by professional engineers licensed by the Arizona Board of Technical Registration pursuant to A.R.S. §32-121 et seq, with knowledge of and competence with such systems.

C. Surveying performed for the purposes of establishing property boundaries, corners and bench mark elevations shall be performed by or under the direct supervision of a professional land surveyor registered by the Arizona Board of Technical Registration pursuant to A.R.S. §32-121 et seq. Any other surveying for the purpose of establishing surface slopes or topographical grades shall be performed by or under the direct supervision of a person qualified to perform the tasks specified in section 2(B) of this ordinance.

D. A Gila County Septic Compliance Report and a Gila County Floodplain Status Report shall accompany each onsite wastewater treatment facility notice of intent to discharge form submitted to the Gila County Community Development Division.

E. The Gila County Community Development Division may deny requests made for an alternative feature of design, installation, or operational feature under Arizona Administrative Code R18-9-A312(G) when the applicant is unable to demonstrate that the proposed alternative feature satisfies both of the following criteria specified in Code R18-9-A312(G):

1. The proposed alternative feature addresses site or system conditions more satisfactory than the general permit requirement, and;
2. The proposed alternative feature achieves equal or better performance compared with the general permit requirement.

F. The Gila County Community Development Division may expressly require a person requesting an alternative feature of design, installation or operational feature under Arizona Administrative Code R18-9-A312(G) to submit written documentation prepared by a professional engineer (other than the original designer of the onsite wastewater treatment facility), a registered geologist with a strong background in hydrology, registered by the Arizona Board of Technical Registration pursuant to A.R.S. §32-121 et seq, or other qualified professional as necessary to demonstrate conformance with Arizona Administrative Code Title 18, Chapter 9, Articles 1 and 3.

SECTION 5: WASTEWATER TREATMENT FACILITY INSTALLATION

A. A property owner or applicant may not install an alternative onsite wastewater treatment facility regulated under Arizona Administrative Codes R18-9-E303 through R18-9-E323 (General Permits 4.03 through 4.23) for his or her own use, unless the property owner or applicant possesses a valid license issued by the Arizona Registrar of Contractors which would allow the homeowner or applicant to contract to install an onsite wastewater treatment facility.

B. No person shall repair an existing onsite wastewater treatment facility, unless they have met all of the following requirements:

1. They meet one or more of the qualification requirements given in Section 2.
2. They obtain an onsite wastewater treatment facility permit from the Gila County Community Development Division before beginning the repair or replacement.
3. The repair or replacement conforms to Arizona Administrative Code Title 18, Chapter 9, Articles 1 and 3 to the maximum extent practicable.

SECTION 6: VIOLATIONS/PUBLIC NUISANCE

A. The following conditions constitute environmental nuisances dangerous to the public health and the environment:

1. All sewage, human excreta, wastewater, gray water or other organic wastes deposited, stored, discharged or exposed so as to be a potential instrument or medium in the transmission of disease to or between any person or persons.

2. Any vehicle or container used in the transportation of human excreta which is defective and allows leakage or spillage of contents.

3. The maintenance of any overflowing septic tank or cesspool of which the content may be accessible to flies and other insects and rodents.

4. The use of the contents of privies, cesspools or septic tanks or the use of sewage or sewage plant effluents for fertilizing or irrigation purposes for crops or gardens except by specific approval of the Arizona Department of Environmental Quality or the Arizona Department of Health Services.

5. The pollution or contamination of any domestic waters that is a direct result of the conditions listed above.

B. Abatement of environmental nuisances dangerous to the public health and the environment:

1. If an environmental nuisance exists on private property, the Gila County Community Development Division may order the owner or occupant to remove the nuisance within twenty-four (24) hours, as authorized under §49-143 of the Arizona Revised Statutes (A.R.S.), at the expense of the owner or occupant. This order will be in the form of a notice of violation served as required by law and delivered to the owner and/or occupant of the property. If the owner or occupant fails or refuses to comply with the order, the Gila County Community Development Division may take any or all of the following actions:

   a. Remove or have the nuisance removed using the methods and procedures prescribed in Gila County Ordinance No. 08-02, title Clean and Lien Ordinance.

   b. Notify the water utility company so they may disconnect water service to the property to prevent the danger to the public health from increasing.

   c. Where water to the property is provided by a private well with a pump supplied with power furnished by a utility company, notify the power utility company so they may disconnect power to the property to prevent the danger to the public health from increasing.

   d. Charge the owner or occupant who caused the nuisance with a violation of this section.

SECTION 7: ADMINISTRATION AND ENFORCEMENT

A. It shall be the duty of the Gila County Community Development Division Wastewater Department Manager to administer and enforce this ordinance. In accordance with the prescribed procedures of this jurisdiction and with the concurrence of the appointing authority, the Community Development Division Director shall have the authority to appoint the related technicians, sanitarians, inspectors and other employees as necessary to assist the Wastewater Department Manager. Such employees shall have the powers as delegated by the Board of Supervisors through the Community Development

Division Director. All Gila County law enforcement officials and agencies shall, whenever requested by the Wastewater Department Manager, enforce this ordinance and any sections of A.R.S. Title 36 or Title 49 granting authorities or assigning duties and responsibilities to the director of a county environmental department or any State of Arizona statute or code delegated to the Gila County Development Division, to the extent that they are lawfully authorized.

B. If the Gila County Community Development Division Wastewater Department Manager has reason to believe that a person has violated any Gila County wastewater, health, environmental or sanitary ordinance or any sections of A.R.S. Title 36 or Title 49 granting authorities or assigning duties and responsibilities to the director of a county environmental department or any State of Arizona statute or code delegated to the Gila County Development Division, the Wastewater Department Manager may issue a notice of violation and demand for compliance by certified or registered mail or by hand delivery to the respondent. Violations of any of the aforementioned ordinances, statutes or codes shall be processed pursuant to Gila County Ordinance No. 05-01, titled Gila County Hearing Officer Rules or Procedures.

SECTION 8: PENALTIES; REMEDIES

A. Criminal Penalties: Any person, firm or corporation, whether as principal, owner, applicant, agent, tenant, employee or otherwise, who violates any provision of this ordinance or violates or fails to comply with any order or regulation made hereunder is guilty of a Class 1 Misdemeanor. Each and every day during which the illegal activity, use or violation continues is a separate offense.

B. Civil Penalties: Any person, firm or corporation, whether as principal, owner, applicant, agent, tenant employee or otherwise, who violates any provisions of this ordinance shall be subject to a civil penalty. Each day of a continuing violation is a separate violation for the purpose of imposing a separate penalty. The civil penalty for violations of this ordinance shall be pursuant to Gila County Ordinance No. 05-01, titled Gila County Hearing Officer Rules of Procedures. An alleged violator shall be entitled to an administrative hearing on his liability, and a review by the Board of Supervisors as provided in the Ordinance No. 05-01.

C. Remedies: An alleged violator who is served with the Notice of Violation subject to civil penalty shall not be subject to a criminal prosecution for the same factual situation. However, all other remedies provided for herein shall be cumulative and not exclusive. The conviction and punishment of any person hereunder shall not relieve such persons from the responsibility to correct prohibited conditions or improvements nor prevent the enforcement, correction or removal thereof. In addition to the other remedies provided in the article, the Board of Supervisors, the County Attorney, the Inspector, or any adjacent or neighboring property owner who shall be damaged by the violation of any provision of this ordinance, may institute, in addition to the other remedies provided by law, injunction, mandamus, abatement or any other appropriate action, proceeding or proceedings to prevent or abate or remove such unlawful erection, construction, reconstruction, alteration, maintenance or use.

SECTION 9: APPEALS

Nothing in this ordinance shall preclude any individual, company or corporation from seeking redress through the courts concerning any portion of this ordinance or any ruling made by the Gila County Community Development Division. The method of appealing a civil penalty imposed by the Gila County Hearing Officer is outlined in Gila County Ordinance No. 05-01, titled Gila County Hearing Officer Rules of Procedures. An alleged violator shall be entitled to an administrative hearing on his liability, and a review by the Board of Supervisors as provided in Ordinance No. 05-01. The method of appealing verdicts of a criminal penalty is outlined in the State of Arizona Rules of Criminal Procedure.

SECTION 10: SEVERABILITY

Should any section, paragraph, sentence, clause, or phrase of this ordinance be declared unconstitutional or invalid for any reason, it is the intent of the Board of Supervisors that the remainder of this ordinance shall not be affected thereby, and shall continue in full force and effect.

SECTION 11: EFFECTIVE DATE AND TERRITORIAL APPLICABILITY

A. This ordinance shall apply to all services denoted in Section 1 which are performed on or after 30 days after the adoption of his ordinance.

B. This ordinance shall be effective in all unincorporated areas of Gila county, and shall be effective in any incorporated city or town which may approve, by resolution, the application or enforcement of this ordinance within the city's or town's boundaries, pursuant to A.R.S. §11-251.05(D).