Wastewater Feasibility Report

Verde Village Community Connection

Yavapai County, Arizona
February 9, 2024

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Acronyms and Abbreviations

AAC	Arizona Administrative Code
AACE	Association for the Advancement of Cost Engineering
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AMA	Aquifer Management Area
ARPA	American Rescue Plan Act
ASR	Aquifer storage and recovery
CWA	Clean Water Act
CWSRF	Clean Water State Revolving Fund
EPA	Environmental Protection Agency
FTE	Full Time Equivalent
kWh	kilowatt-hour
LF	Linear Feet
MGD	Million gallons per day
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OPCC	Opinion of Probable Construction Costs
OpEx	Operation Expenses
PW	Public Works
SBR	Sequencing Batch Reactor
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
VV	Verde Village
VVCC	Verde Village Community Connection
VVPOA	Verde Village Property Owner Association
VVWRF	Verde Village Water Reclamation Facility
YAN	Yavapai-Apache Nation
WIFA	Water Infrastructure Finance Authority
WRF	Water Reclamation Facility
WWTP	Wastewater Treatment Plant

Executive Summary

Verde Village is a residential community located in unincorporated Yavapai County, Arizona that consists of eight units that contain a total of approximately 4,482 homes and 11,385 residents. The community was developed in the 1970's with private septic tank systems on each lot to provide wastewater treatment. The Verde Village wastewater feasibility study evaluates and provides potential solutions for addressing the implications of aging and failing septic systems and their associated environmental impacts. The concerns mainly stem from system operation and maintenance of the existing septic systems, the potential for environmental impact due to a high-density septic area, and the overall impact to the public due to evolving state regulations.

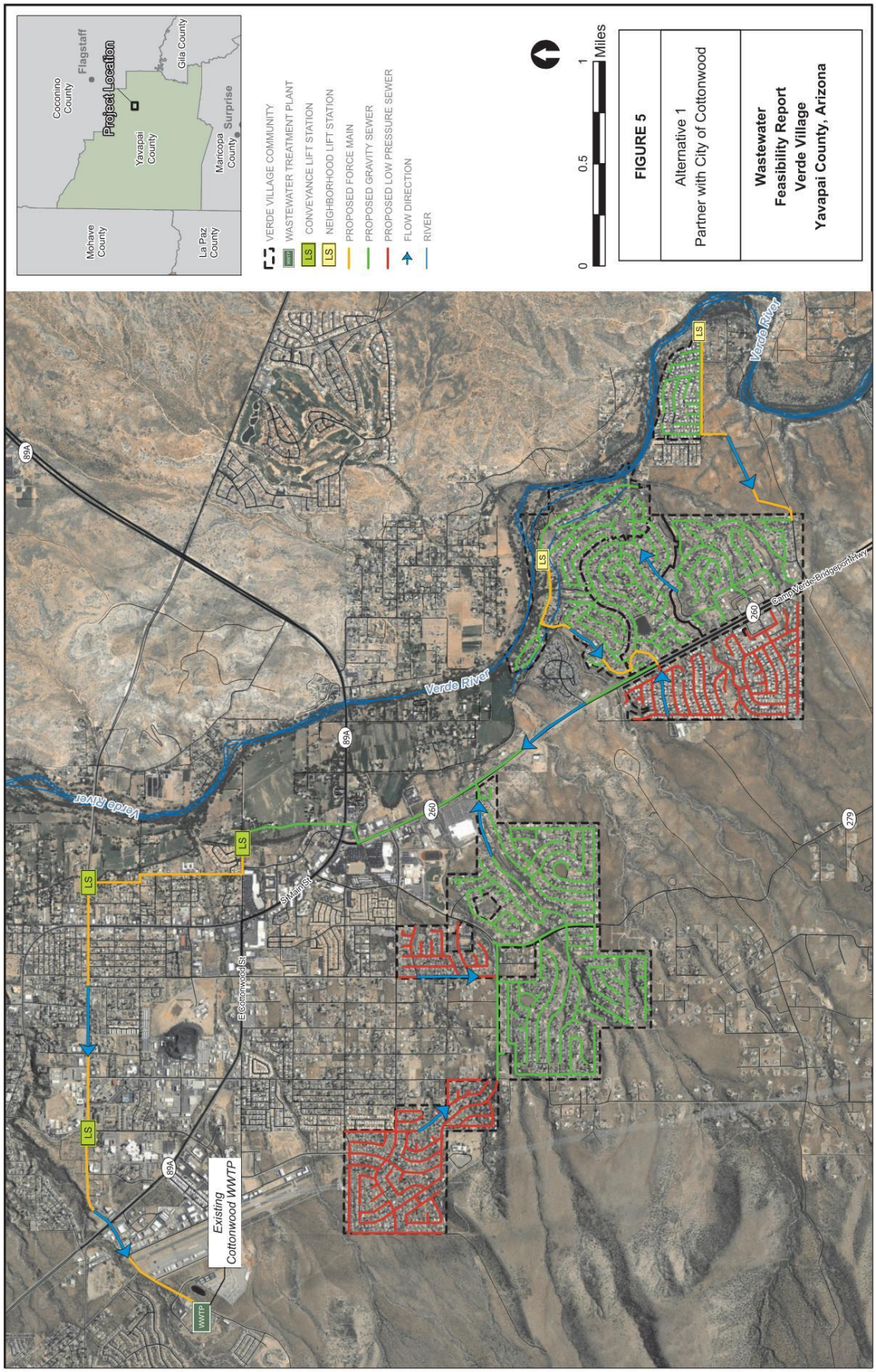
The purpose of this report is to evaluate the feasibility of converting the Verde Village community from septic systems to a conventional centralized sewer collection system. The feasibility study will cover evaluation of the collection systems, treatment systems, and beneficial reuse of the treated effluent. The closest existing wastewater treatment facilities to the community are the City of Cottonwood Mingus WWTP and the Yavapai-Apache Nation Tunlii WWTP. The projected average day wastewater flows of the Verde Village community are estimated to be 910,800 gallons per day and the projected peak daily wet flow is estimated to be 1,832,332 gallons per day based on the Arizona Administrative Code design factors. Refer to Table 0-1 for the projected wastewater flows.

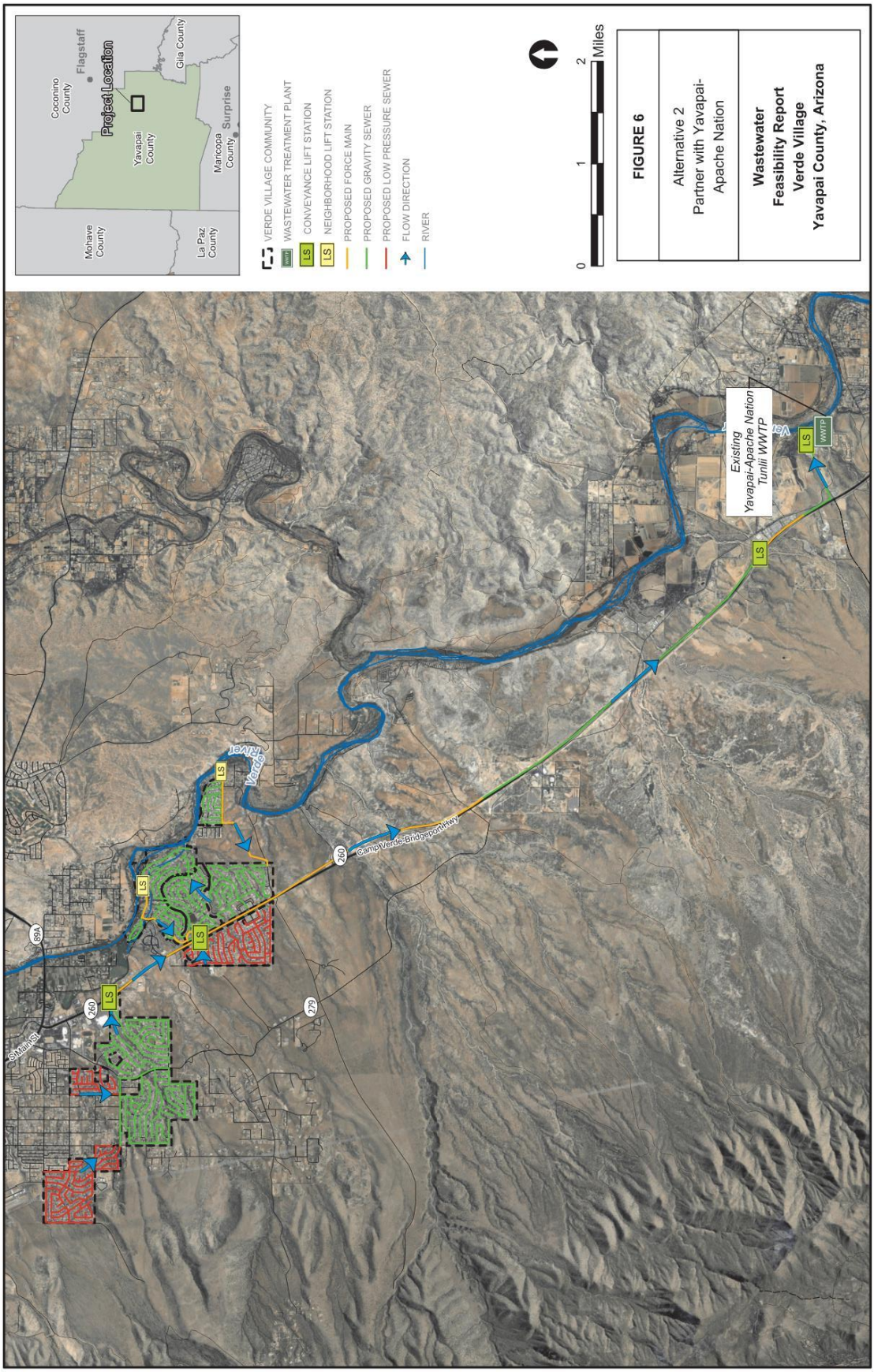
Table 0-1. Projected Wastewater Flows by Unit

Verde Village Unit	Dwelling Units	Projected Average Daily Flow (gpd)	Projected Peak Daily Dry Flow (gpd)	Projected Peak Daily Wet Flow (gpd)
1	203	41,252	75,446	82,990
2	509	103,435	189,172	208,089
3	678	137,778	251,982	277,180
4	440	89,414	163,528	179,881
5	586	119,083	217,790	239,569
6	750	152,410	278,741	306,615
7	601	122,131	223,364	245,701
8	639	129,853	237,487	261,236
Outparcels	76	15,444	28,246	31,070
Total	**4,482**	**910,800**	**1,665,756**	**1,832,332**

Four alternatives have been evaluated as part of this study. These alternatives include:

- Alternative 1: Partnering with the City of Cottonwood
- Alternative 2: Partnering with Yavapai-Apache Nation
- Alternative 3: Building a new collection system and water reclamation facility owned and operated by Verde Village
- Alternative 4: No action


Project Location
Coconino County
Flagstaff
Gila County
Yavapai County
Maricopa County
Surprise
Mohave County
La Paz County
VERDE VILLAGE COMMUNITY
WASTEWATER TREATMENT PLANT
CONVEYANCE LIFT STATION
NEIGHBORHOOD LIFT STATION
PROPOSED FORCE MAIN
PROPOSED GRAVITY SEWER
PROPOSED LOW PRESSURE SEWER
FLOW DIRECTION
RIVER
0
0.5
1
Miles
FIGURE 5
Alternative 1
Partner with City of Cottonwood
Wastewater
Feasibility Report
Verde Village
Yavapai County, Arizona
Verde River
Camp Verde-Bridgeport Hwy
E Main St
E Cottonwood St
Existing
Cottonwood WWTP
LS
WWTP
89A
260
279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VERDE VILLAGE COMMUNITY
WASTEWATER TREATMENT PLANT
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PROPOSED FORCE MAIN
PROPOSED GRAVITY SEWER
PROPOSED LOW PRESSURE SEWER
FLOW DIRECTION
RIVER
0
1
2
Miles
FIGURE 6
Alternative 2
Partner with Yavapai-Apache Nation
Wastewater
Feasibility Report
Verde Village
Yavapai County, Arizona
Existing
Yavapai-Apache Nation
Tuzlii WWTP
WWTP
LS
Verde River
Camp Verde-Bridgeport Hwy
260
279
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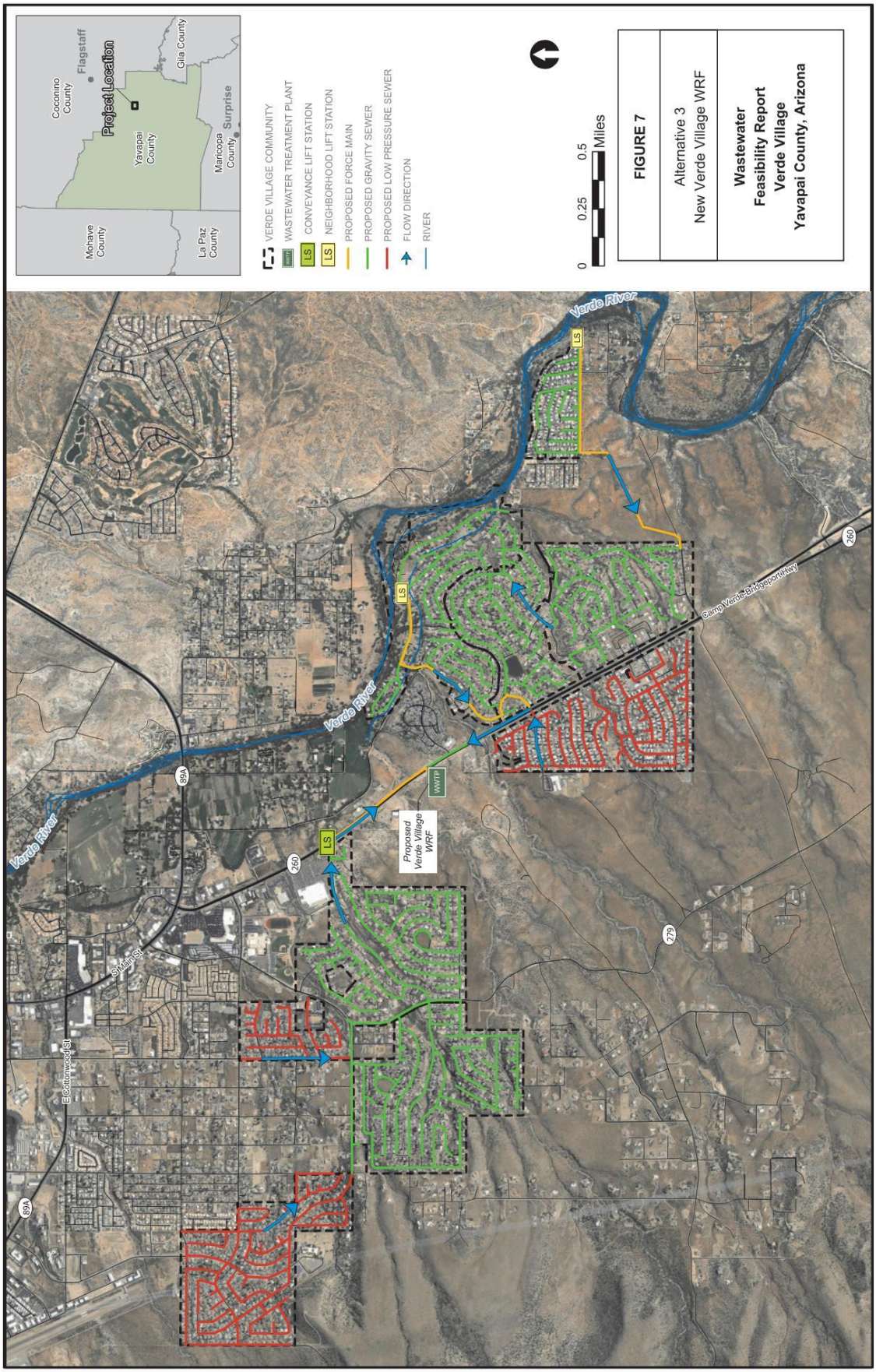
S Main St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NEIGHBORHOOD LIFT STATION
PROPOSED FORCE MAIN
PROPOSED GRAVITY SEWER
PROPOSED LOW PRESSURE SEWER
FLOW DIRECTION
RIVER
0
0.25
0.5
Miles
FIGURE 7
Alternative 3
New Verde Village WRF
Wastewater
Feasibility Report
Verde Village
Yavapai County, Arizona
Verde River
Camp Verde-Bridgeport Hwy
S Main St
E Cottonwood St
Proposed
Verde Village
WRF
WWTP
LS
89A
260
279

Alternatives 1, 2 and 3 have been evaluated in terms of capital costs, operation and maintenance costs and construction considerations. Alternative 4 was not included in the capital costs, O&M costs, 20-year life-cycle, or rating matrix since no action would be taken and the status quo maintained. Refer to Table 0-2 providing a summary of costs for each alternative.

Table 0-2. Summary of Costs for Alternatives

Alternative		Capital Cost	Annual O&M Cost	20-Yr Life Cycle Cost
1	Partnership w/ City of Cottonwood	$223 million	$2.1 million	$270 million
2	Partnership w/ Yavapai-Apache Nation	$212 million	$2.2 million	$260 million
3	New Verde Village WRF	$193 million	$1.8 million	$232 million
4	No Action[3]	-	-	-

Notes:
1. All values shown in 2022 Dollars. Subject to change during design and market conditions.
2. Present Value over 20-yr including Capital and O&M Costs. Assumes 2% discount rate, 3% inflation rate.
3. Area currently served by individual septic tanks. Maintenance and replacement are responsibility of property owner.

To facilitate the selection of a preferred alternative on an objective basis, the three alternatives for the Verde Village wastewater collection system improvements were evaluated based on key attributes, including constructability, ease of implementation, reliability, environmental impact, public support, and partner support in addition to capital costs and 20-year life cycle costs. A survey was distributed to the community asking for feedback on the importance of each criterion.

Based on a review of the three collection system alternatives presented in this report, their associated costs, and input from Verde Village Community Connection, Alternative 3 (New Verde Village WRF) has been selected as the recommended alternative.

The total capital cost of the proposed project is projected to be $193 million. Based on a 20-year life-cycle cost analysis, the present value of the proposed project, including construction costs, non-construction costs, and annual O&M costs is $232 million. The total capital cost of the project will likely increase due to inflation and volatile market conditions in the future. A variety of funding sources are available for wastewater infrastructure improvement that could be explored by Verde Village to assist with project implementation.

HDR prepared an estimate of the monthly sewer bill for each dwelling unit for the new Verde Village WRF and collection system based on what percentage of the total capital cost is funded through forgivable loans and/or grants. It should be noted that this estimate is provided for information and the actual costs could vary from what is listed here. Items that could have an impact on the monthly bill include construction market when project is constructed, current interest rates, type of treatment process ultimately selected, ongoing maintenance, etc. The monthly estimates presented below are based on the following assumptions:

- 4,482 Dwelling Units (DU)
- Capital Cost of $193M
- Annual O&M Cost of $1.8M; constant over term of loan.

- Monthly O&M Cost per DU is $33; constant throughout term of loan.
- Loan interest rate: 2%
- The 20-year loan term was selected to match the same duration as the 20-year lifecycle cost.
- The 30-year loan term was selected because it is the maximum term allowed for WIFIA loans.

Table 0-3. Estimated Monthly Bill per Dwelling Unit

% of Total Capital Cost Funded by Forgivable Loans and/or Grants	Mo. Capital Cost per DU		Est. Total Monthly Bill per DU	
	20-year Loan Term	30-year Loan Term	20-year Loan Term	30-year Loan Term
0%	$218	$159	$251	$193
10%	$196	$143	$230	$177
20%	$174	$127	$208	$161
30%	$152	$111	$186	$145
40%	$131	$95	$164	$129
50%	$109	$80	$142	$113
60%	$87	$64	$121	$97
70%	$65	$48	$99	$81
80%	$44	$32	$77	$65
90%	$22	$16	$55	$49
100%	$0	$0	$33	$33

Notes:
1. Costs are subject to change based on final construction costs and market conditions at time of project implementation that cannot be predicted.
2. Costs presented above are in 2022 dollars and are for informational purpose only.

The first step for Verde Village is to reach a consensus that the community wants to move forward with converting from septic to a centralized sewer system. If the Verde Village decides to move forward with the conversion, the next step would be to establish an intergovernmental agreement and/or sanitary district for the sewer area. Grant funding and financing may be applied for the project during this time. Detailed design and the preparation of the construction documents may start once financing and funding has been determined. The detailed design phase will consist of developing 30%, 60%, 90%, and 100% plans and specifications. The application for permits can begin once the 90% plans and specifications have been finalized. Finally, once the 100% plans and specifications have been completed, the district can solicit bids and negotiate a contract with a General Contractor. It is anticipated that the entire process from the formation of the sanitary district to startup and commissioning will take 8-10 years.

1 Introduction

1.1 Purpose of Study

The purpose of the Verde Village Wastewater Feasibility Study is threefold:

1. Evaluate feasibility and alternatives for the installation of a community wastewater collection system through the Verde Village Units 1-8 based on projected wastewater flows generated from the service area.
2. Evaluate alternatives for treatment including exploring partnerships with City of Cottonwood and the Yavapai Apache Nation, as well as a community owned and operated Water Reclamation Facility (WRF).
3. Evaluate feasibility for reuse opportunities for the treated effluent.

This feasibility study was made possible via a grant awarded by the Yavapai County as part of the 2020 American Rescue Plan Act (ARPA). This study was conducted as part of a contract between the Verde Village Property Owners' Association and HDR Engineering, Inc. executed August 2022 and fully funded by this grant.

1.2 Scope of Work

The Scope of Work included a Public Kickoff Meeting held in person at the Verde Village Community Hall on February 21, 2023. The purpose of this public kickoff meeting was to present a project overview, proposed project approach, preliminary information, and validate evaluation criteria with key stakeholders. The public kickoff meeting also captured attendees' comments and questions.

After receiving public feedback, three alternatives were developed and evaluated for the collection system, treatment process, and beneficial reuse for the community. As part of the alternatives development phase, HDR developed an evaluation system in order to establish the design criteria to evaluate and compare the treatment process, collection system, and beneficial reuse alternatives. The evaluation criteria were developed in conjunction with the Verde Village Community Connection board members. Finally, capital and operation and maintenance (O&M) costs were developed for each alternative.

This Wastewater Feasibility Report summarizes the findings, alternatives, and the evaluation criteria used to develop the recommended configuration. The capital and 20-year lifecycle costs, as well as a high-level overview of the permitting requirements, project implementation and available funding sources are included as part of the Feasibility Report.

1.3 Community Description

Verde Village is a residential community located in unincorporated Yavapai County, Arizona, which lies along AZ State Route 260 (AZ-260), immediately adjacent to and generally south and east of the City of Cottonwood, approximately 12 miles northwest of the Town of Camp Verde and 85 miles north of Phoenix. The general location of the area is shown in Appendix A – Figure 1.

The Verde Village was established in the 1970s as a retirement community. The development consists of eight units that contain a total of approximately 4,482 homes. Based on an average household size of 2.54 people per dwelling unit (2021 American Community Survey), the community

consists of approximately 11,385 residents. The community currently has a voluntary property owners association, known as the Verde Village Community Connection (VVCC) and formerly named the Verde Village Property Owner Association (VVPOA), which is managed by a Board of Directors.

The community is located centrally in the Verde Valley which includes the adjacent towns/cities of Camp Verde, Clarkdale, Cornville, Cottonwood, Jerome, Lake Montezuma, and Sedona. The Verde Valley encompasses the Verde River which is one of the largest watersheds in Arizona. The Verde River starts at Sullivan Lake and flows south-east until converging with the Salt River which ultimately flows into the Gila River west of Phoenix. The Verde River runs along the east boundary of Verde Village.

1.4 Project Background

In the late 1960's the land comprising the Verde Village community was acquired. The purchaser rapidly sold the lots after the acquisition and in the early 1970's construction of the infrastructure began for the development with residents swiftly relocating to the area. The community is located in an unincorporated area in Yavapai County and outside the city limits of Cottonwood which is the closest municipal provider. Due to the rural location of the community, private septic tank systems were installed on each lot to provide wastewater treatment for the residential dwellings.

The purpose of this report is to evaluate the feasibility of converting the Verde Village community from septic systems to a conventional centralized sewer system. The feasibility study will cover evaluation of the collection systems, treatment systems, and beneficial reuse of the treated effluent. Funding for this study was provided through the 2020 American Rescue Plan (ARPA) distributed in the form of a grant through Yavapai County. No funds from the Verde Village property owners' association were used in this study.

2 Similar Studies

Similar septic to centralized sewer conversion studies have been implemented in the State of Arizona. Three examples of these conversion studies are the Town of Chino Valley, the Tri-City Regional Sanitary District servicing a portion of the Globe/Miami area, and Lake Havasu City.

The Town of Chino Valley, located in Yavapai County, Arizona, underwent a similar wastewater feasibility study due to the Arizona Department of Environmental Quality (ADEQ) and Yavapai County requiring conversion from individual septic tanks to a centralized sewer system. Septic tanks in Chino Valley were experiencing system failures due to age, density, and maintenance which resulted in contamination of the groundwater supply. The Town of Chino Valley was required under law to convert to conventional sewer systems since septic systems were deemed unsanitary and a hazard to public health. The Town received a federal grant for a Sewer Feasibility Study and later received Water Infrastructure Finance Authority (WIFA) loans for implementing the septic to sewer conversion.

The Town of Miami and City of Globe are located in Gila County, Arizona. In unincorporated areas outside of the town and city limits, aging cesspools, septic tanks, and leach fields were failing or becoming super saturated causing public health hazards. Nearly 90% of the existing septic systems and cesspools were in violation of the Clean Water Act. This led to the formation of the Tri-City Regional Sanitary District (TRSD) to create a uniform sewer collection system and treatment facility

for the Tri-City area. The project is ongoing and is anticipated to include septic to sewer conversion for about 2,000 residential service connections. Project funding was provided by the United States Department of Agriculture (USDA) Rural Development and WIFA.

Lake Havasu City is located in Mohave County, Arizona. Due to contamination of the Lake Havasu water supply, ADEQ banned septic tanks within a 1-mile radius of four monitoring wells within the City. This ban initiated the conversion of over 25,000 septic tanks into conventional sewer collection systems and associated expansion of the City's wastewater treatment plant to provide capacity for the additional sewage flows. During one phase of the project, Lake Havasu City Public Works Department was awarded ADEQ water quality improvement grants to offset the cost of closing 3,100 residential septic tanks and the connection of the residences to the wastewater system. Funding from the grant was used to abandon the septic tanks in place in accordance with the Arizona Administrative Code (AAC) and Maricopa County Environmental Health Code. The ADEQ program that supplied the grant is funded through partnership with the U.S. Environmental Protection Agency (EPA) under the Clean Water Act.

3 Project Planning Area

3.1 Project Location

Verde Village is located along AZ-260 in unincorporated Yavapai County, Arizona. The community is located just south of the City of Cottonwood and about 12 miles northwest of the Town of Camp Verde. The planning area includes portions of Sections 7, 9, 10, 11, 12, 13, 18 within Township 15 North, Range 4 East of the Gila and Salt River Base and Meridian. Refer to Appendix A – Figure 1 for the overall study area location. The community covers approximately 8 square miles and comprises eight subdivision Units. See Table 3-1 with a summary of the approximate dwelling count per Unit and Figure 2 in Appendix A for the Verde Village Unit boundaries.

Table 3-1. Verde Village Units

Unit	Dwellings
1	203
2	509
3	678
4	440
5	586
6	750
7	601
8	639
Outparcels [1]	76
Total	**4,482**

Notes:
1. Outparcels are the adjacent parcels located near Unit 1.

The Verde Village service area is not anticipated to increase in the future. The feasibility study only accounts for the Verde Village service area and the 76 outparcels adjacent to Unit 1. However, future studies could consider the feasibility of extending service to additional outparcels that are outside of the Verde Village units but not incorporated into the City of Cottonwood.

Currently, water supply for the community is provided by the City of Cottonwood. As previously mentioned, the community does not have a centralized sewer collection system. The wastewater treatment facilities located nearest to the project site are the Mingus Wastewater Treatment Plant (WWTP), owned and operated by the City of Cottonwood, and the Tunlii WWTP, owned and operated by the Yavapai-Apache Nation (YAN). The Mingus WWTP is located about 4 miles northwest of the center of Verde Village with an elevation gain of approximately 300 feet. The Tunlii WWTP is located about 8 miles southeast of the center of Verde Village with an elevation drop of approximately 330 feet. Refer to Figure 1 in Appendix A for the locations of the City of Cottonwood WWTP and YAN WWTP relative to the Verde Village Community.

3.2 Environmental Resources

The Verde Village Community is located in the Oak Wash-Verde River watershed which is within the larger Verde Valley Watershed. This watershed plays a large role in the Lower Basin of the Colorado River Watershed since the Verde River drains southeast into the Salt River near Phoenix, then into the Gila River, which ultimately converges with the Colorado River near Yuma, Arizona. See Appendix A – Figure 3 for a map of Arizona's major waterways.

Within the study area, the portion of the Verde River from Sycamore Creek to Oak Creek is classified as an impaired waterway by EPA standards. This means the Verde River is not meeting the minimum water quality standards under the Clean Water Act. Based on the 2022 Water Quality in Arizona 305(b) Assessment Report, the impairment is caused by Escherichia Coli (E.coli). Refer to Appendix H for the Verde River impairment data. As mentioned in the EPA Waterbody Report, it is unconfirmed the exact source contributing to the impairment, however the following sources were identified in the report as potential sources: crop production, livestock, on-site treatment systems including septic systems and similar decentralized wastewater treatment systems, as well as other recreational pollution sources. Once a waterway is classified as an impaired waterbody per the Clean Water Act regulations, the EPA works with states and local government to establish a Total Maximum Daily Load (TMDL) to restore the impaired waterway. The TMDL establishes the maximum amount of a pollutant allowed in the waterbody and serves as the starting or planning tool to restore the water quality.

3.3 Wastewater Flow Projections

The study area is located within an unincorporated area of Yavapai County. Based on the project location, Yavapai County would have the ultimate jurisdiction regarding the design standards to calculate the wastewater flow projections. However, since the County does not currently have engineering design standards pertaining to wastewater, for the purposes of this study, four wastewater design methods for estimating the projected wastewater flows were reviewed and compared to determine which would be most appropriate. The four methods include the Arizona Administrative Code (AAC) R18-9 Table 1, City of Cottonwood Engineering Design Standards Manual Table 6-2, Arizona Department of Environmental Quality (ADEQ) Engineering Bulletin 11, and the Town of Camp Verde Wastewater Division – Table D. The wastewater assumptions and design factors for each method are summarized in Table 3-2.

Table 3-2. Summary of Wastewater Design Factors and Assumptions

Assumptions	Units	Value
Population	person	11,385
Dwellings	unit	4,482
Average Household Size	person/unit	2.54
AAC Method	gpd/person	80
Cottonwood Method	gpd/person	80
ADEQ Method	gpd/person	100
Camp Verde Method	gpd/unit	250

Following review, the AAC method was selected for this feasibility study to calculate the projected wastewater flows due to the design and peaking factors being within the median of the various calculation methods. Per the AAC calculations, the peak wastewater flow includes both the dry- and wet-weather peak flows. The dry-weather peaking factor is based on the system's upstream population and calculated using the equation below.

$$PF = (6.177 \times p^{-0.233}) + 1.128$$

Where: p = Upstream population

The dry-weather peaking factor is 1.83 based on the Verde Village population which results in a peak daily dry flow of 1,665,756 gallons per day. The wet-weather peak flow was calculated by adding an additional ten percent to the dry weather peak flow to account for wet weather inflow and infiltration, resulting in a peak daily wet flow of 1,832,332 gallons per day. The dry weather minimum factor was calculated per the ADEQ Engineering Bulletin 11 using the equation below:

$$Q_{min}/Q_{avg} = 0.2p^{1/6}$$

Where: p = Population in thousands

The minimum dry weather factor is 0.95 based on the population of Verde Village and results in a minimum daily flow of 863,990 gallons per day. The wastewater flow projections for Verde Village are summarized in Table 3-3. Refer to Appendix B – Wastewater Flow Projections for further calculation details.

Table 3-3. Overall Wastewater Flow Projections

	Units	Value
Average Daily Flow	gpd	910,800
Dry Weather Peaking Factor	-	1.83
Peak Daily Dry Flow	gpd	1,665,756
Peak Daily Wet Flow	gpd	1,832,332
Dry Weather Min. Factor	-	0.95
Minimum Daily Flow	gpd	863,990

Table 3-4 provides the breakdown of the projected wastewater flows per Verde Village unit.

Table 3-4. Projected Wastewater Flows by Unit

Verde Village Unit	Dwelling Units	Projected Average Daily Flow (gpd)	Projected Peak Daily Dry Flow (gpd)	Projected Peak Daily Wet Flow (gpd)
1	203	41,252	75,446	82,990
2	509	103,435	189,172	208,089
3	678	137,778	251,982	277,180
4	440	89,414	163,528	179,881
5	586	119,083	217,790	239,569
6	750	152,410	278,741	306,615
7	601	122,131	223,364	245,701
8	639	129,853	237,487	261,236
Outparcels	76	15,444	28,246	31,070
Total	**4,482**	**910,800**	**1,665,756**	**1,832,332**

4 Existing Facilities

4.1 Verde Village

The existing sewer infrastructure within the Verde Village community consists of privately owned septic systems. Many of the existing septic systems were originally installed in the 1970's and consist of one septic tank and drain field per residential dwelling. A typical septic system provides partial wastewater treatment. When waste directly from a residence enters the septic tank, heavy solids settle at the bottom of the tank and the liquid exits the top of the tank and discharges to a drain field consisting of shallow underground trenches of stone or gravel. The effluent from the septic

tank enters the drain field and disperses through the trenches and ultimately into the soil which further treats the wastewater as it percolates through the ground.

Septic tanks require inspections and maintenance every few years to maintain the efficiency and prevent failure of the system. The responsibility for maintaining septic systems remains with the homeowners since they are private systems. As outlined by the EPA, a homeowner should have a septic system professionally inspected at least every three years and pumped every three to five years; associated costs are incurred by the homeowner.

Due to age and various levels of maintenance by the homeowners, it is assumed the septic systems within Verde Village range from poor to good condition. Since the inspections and maintenance are required by individual property owners to facilitate the upkeep of their septic systems, the exact condition of each septic system is unknown.

Household wastewater contains bacteria and viruses, therefore a failing septic system increases the risk of contaminants entering the environment. When the wastewater percolates through the ground, the wastewater may ultimately enter the ground water supply. The potential for groundwater contamination increases due to the density, age, and lack of proper maintenance of septic systems. Failing septic systems have the potential to directly impact the environment and may harm local ecosystems due to the release of bacteria and viruses.

4.2 City of Cottonwood

The City of Cottonwood's Mingus WWTP is located at 1480 West Mingus Avenue in Cottonwood, Arizona. The Mingus WWTP is Cottonwood's primary treatment plant and is located approximately 4 miles to the northeast (straight-line distance) from the Verde Village community. The plant was originally built in 1988 as a sequencing batch reactor (SBR) plant and converted and upgraded to a modified University of Cape Town process in the early 2000's. Treatment is based on an activated sludge process. Treatment processes consist of influent screening, biological treatment using an advanced activated sludge process with nitrification and denitrification, clarification, followed by tertiary filtration, and ultraviolet disinfection. The facility is rated for a design flow of 1.5 million gallons per day (MGD) and was sized to provide service for a population of 13,000 residents. Treated effluent flows by gravity to an effluent storage pond and is then sent to landscape irrigation users and/or the Del Monte Wash in the Verde River Basin if the effluent discharge exceeds irrigation demands. Reclaimed water is also provided for construction activities.

The City's existing sewer system includes 60 miles of collection main lines, five sewage lift stations and a reclaimed water distribution system.

4.3 Yavapai-Apache Nation

YAN owns and operates the Tunlii WWTP located at 2650 West Tunlii Road in Camp Verde, Arizona. The facility is located approximately 8 miles southeast (straight-line distance) of the Verde Village community. The treatment plant is a packaged plant and includes influent screening, equalization basins, anoxic and aerobic treatment trains, secondary clarification, filtration, ultraviolet, and aerobic digester. The process technology is activated sludge. The current facility is designed and permitted for 160,000 gpd but only treats an average flow of 30,000 gpd.

5 Need for Project

The Verde Village wastewater feasibility study addresses the concern for future sewer requirements and implications due to aging and failing septic systems within the community. The concerns mainly stem from system operation and maintenance of the existing septic systems, the potential for environmental impact due to a high-density septic area, and the overall impact to the public due to evolving state regulations. These concerns are discussed in detail below.

5.1 System Operation and Maintenance

In the Verde Village community, septic tanks are the primary mechanisms for wastewater treatment. Septic tanks and drain fields are a common wastewater treatment technology used in areas where a centralized sewer system is not available, but they require regular maintenance and inspections to ensure they operate correctly. The lifespan of a conventional septic system typically averages 20-30 years based on concrete tanks lasting 50 years or more and drain fields between 25-30 years. Private septic systems can produce a wide range of potential problems if not properly maintained. Lack of septic pumping can cause the tank to fill up, back up into an owner's residence or surface in the drain field. Failing septic systems discharge untreated wastewater including solids and sludge into the ground. This leads to contaminants leaching through the ground and potentially entering the ground water supply. Due to the age of the existing septic systems and unknown maintenance performed, it is likely that many septic systems within the community are at or past their functional life. Replacing a conventional septic system may cost up to $25,000 based on EPA estimates and is often incurred by the homeowner. The actual cost of the system will depend on the construction market, sizing, soil conditions, etc.

5.2 Environmental Impact

Household wastewater contains nitrates, bacteria, viruses, as well as pharmaceutical and personal care products (PPCPs). A large number of septic systems within an area may exceed the treatment capacity of the regional soils which can lead to contamination of surface and ground waters. Therefore, failing septic systems increase the risk of contaminants entering the environment. When the wastewater percolates through the ground, it ultimately drains to the aquifer. The average Depth-to-Water (DTW) within the Verde Valley basin is 165 feet with a median of 116 feet per the Arizona Department of Water Resources data. The Verde Valley DTW values are relatively shallow compared to the Phoenix Aquifer Management Area (AMA) average of 237 feet and median of 213 feet.

Failing septic systems directly impact the environment and may harm local ecosystems due to the release of nitrates, bacteria, viruses, and PPCPs. Overall, if the existing Verde Village septic systems are failing the potential may exist for the Verde River to be affected due to the proximity of the groundwater supply and high density of the community.

5.3 Public Impact

The Verde Village community wastewater disposal is facilitated through onsite, individual septic systems. While these types of systems can adequately treat wastewater, environmental and human health consequences can arise over time if the systems are not designed, installed, and maintained properly. Failing septic systems can introduce pathogens into drinking water and can also negatively

impact surface water in recreational areas. Pathogens such as E. coli, which is currently present in the Verde River, can cause illness to both wildlife and the public. Drain fields that are failing can cause a public health hazard to anyone exposed and may cause illness due to untreated wastewater.

Due to the numerous potentials for public health impacts, there is potential for future regulations of septic systems by the Arizona Department of Environmental Quality (ADEQ).

6 Alternatives Considered

Several alternatives have been considered to address the environmental concerns associated with Verde Village's aging onsite wastewater treatment systems. An analysis of four alternatives is described in detail in the following sections. A rating matrix for the alternatives is included in Appendix F.

6.1 Alternative 1 – Partner with City of Cottonwood

6.1.1 Description

The first alternative includes the installation of a conventional wastewater collection system with discharge to the existing City of Cottonwood Mingus WWTP. The collection system would include the installation of approximately 290,000 linear feet (LF) of sewer line and the abandonment of approximately 4,482 septic tanks.

This alternative includes a combination of gravity sewer and low-pressure sewer collection systems within the Verde Village Community due to the topography of the area. The low-pressure sewer systems will consist of a grinder pump station and pressure sewer service lateral at each individual customer that will pump the wastewater through a series of pressure sewer force mains to the discharge point. The low-pressure collection systems will be used in regions where the topography will not allow for the construction of gravity sewer collection systems. The low-pressure sewer systems will outfall at various discharge points and combine with the gravity sewer collection system.

The gravity sewer system will operate with all flow conveyed by gravity to a discharge point. The gravity sewer system will consist of new service laterals to connect residences to the new sewer collection system. New sewer mains and manholes would be constructed mainly following existing roadway alignments.

This alterative requires five lift stations and force mains to transport flow uphill over 300 feet in elevation from the Verde Village Community to the Mingus WWTP. Two of the lift stations will be located within the neighborhoods of Verde Village, with a smaller capacity due to the size of flows and the remaining three lift stations will be located along the alignment of the sewer interceptor that leads to the Mingus WWTP. The conveyance lift stations will convey the total flow from the combined Verde Village units, therefore requiring a larger capacity. Land for each lift station will need to be acquired. The proposed layout of the sewer system is shown in Appendix A – Figure 5.

6.1.2 Upgrades to City of Cottonwood Collection System

Based on discussions with the City of Cottonwood, they do not have capacity within their existing collection network and existing lift stations for the additional wastewater flows from Verde Village.

Therefore, Verde Village will be responsible for the procurement, installation, and maintenance of the proposed sewer collection system in Alternative 1. In Alternative 1, the new collection system will be built by Verde Village and owned and operated by the City of Cottonwood.

Alternative 1 considers that the Verde Village will be responsible for installing all new sewer mains, force mains and lift stations needed to convey its flows to the Mingus WWTP. The existing Cottonwood wastewater collection infrastructure would not be used as part of this alternative.

6.1.3 Upgrades to City of Cottonwood Mingus WWTP

The available capacity within the City of Cottonwood WWTP has been evaluated based on the projected flows. The Mingus WWTP is permitted for 1.5 MGD and currently treats approximately 1.3 MGD. Based on discussions with the City's Public Works (PW) Department, a future expansion is being planned to accommodate an additional 0.5 MGD of flow that will take the Mingus WWTP to its buildout capacity of 2.0 MGD. This expansion is planned to happen within the next 3-5 years.

The wastewater flow projections from Verde Village are presented in Section 3.3. Based on the existing WWTP capacity and projected demands from Verde Village, the City of Cottonwood WWTP will require further increase in its capacity beyond the 0.5 MGD expansion already planned. The City's current PW department made it clear that Verde Village would be responsible for the capital costs of expanding the Mingus WWTP to accommodate the additional average day flow of 1.0 MGD. In addition, the Verde Village residents will be required to contribute their allocation of O&M fees to maintain the facility.

As part of the feasibility study, HDR met with the City of Cottonwood to discuss the possibility of a partnership with Verde Village. The City of Cottonwood stated that they do not have capacity for additional wastewater flow in their collection or treatment system. The City agreed to be considered as an option for the feasibility study but expressed concerns over the constructability of the collection system due to the topography of the community and extensive pumping that may be required.

6.1.4 Beneficial Reuse

City of Cottonwood owns/maintains reuse infrastructure and will retain ownership of the effluent in Alternative 1. The City of Cottonwood currently operates 1 injection well but is permitted to operate up to 4 injection wells. The City owns and operates a reclaimed water delivery system that sells reclaimed water to Mesquite Hills and Cottonwood Ranch subdivisions for landscaping irrigation. Cottonwood has partnered with Yavapai Community College to provide reclaimed water for irrigation for the Southwest Wine Center Vineyards. The City also operates a Reclaimed Water standpipe for construction and general use customers.

6.1.5 Design Criteria

The design criteria used in the development of Alternative 1 includes AAC R-18-9, ADEQ Engineering Bulletin No.11, City of Cottonwood Engineering Design Standards Manual, and Policies, Procedures, Rules and Regulations of the Town of Camp Verde Wastewater Division.

The following provides a summary of the design criteria used for this alternative:

- Septic tanks will be abandoned in place. Existing onsite septic system would be left in place and abandoned in accordance with the closure requirements found in Arizona Administrative Code R18-9-A309.

- Sewer mains will be designed to convey the projected peak wastewater flow. For the purpose of this study, the maximum capacity of the flow in the pipe is limited to d/D = 0.75.
- All sewer mains will be installed at a minimum depth of 5 feet and a maximum depth of 20 feet.
- All sewer mains will be a minimum 8-inch diameter.
- Manholes will be installed at the end of each line, at all changes in grade, size, or alignment and at all intersections. Spacing between manholes will not be greater than 400 feet.
- Mingus WWTP capacity will need to be increased by 1.0 MGD to accommodate the additional average daily flows generated by Verde Village.

6.1.6 Land Requirements

The new sewer mains and manholes will be constructed within the existing right-of-way of the roads within the project area. Additional land will be required for the locations of the lift stations. It is possible that Alternative 1 may require the acquisition of additional right-of-way or easements along the proposed sewer alignments. The actual land requirements will be determined during the engineering design phase of the improvements.

6.1.7 Construction Considerations

The following is a list of potential constructability considerations associated with Alternative 1:

- Lack of reliable record drawings of existing infrastructure within the City of Cottonwood.
- Significant traffic control will be required.
- Maintaining access for homeowners, businesses, and emergency services during construction activities.
- Narrow residential streets.
- Steep terrain. Many residences may require the installation of individual grinder pumps to connect to the main gravity sewer line.
- Construction phasing approach with combination of low-pressure and gravity systems.
- Timing of additional capacity at Mingus WWTP.

6.1.8 Engineer’s Opinion of Cost

The estimated cost for completing Alternative 1 is approximately $223 million as summarized in Table 6-1. The Opinion of Probable Construction Costs (OPCC) was developed using construction costs for recent projects with similar requirements. The OPCC includes a 20% contingency, due to fluctuation of construction costs associated with inflation, the bidding climate and other factors when actual construction is anticipated to occur.

This OPCC includes the capital costs associated with the improvements as well as the annual operation and maintenance costs that are anticipated for this alternative.

A detailed opinion of cost for this alternative is provided in Appendix C – Opinion of Construction Costs. All cost estimates in this report are only for purposes of comparing and selecting an alternative and need to be refined during the of detailed design phase.

6.1.9 Operational & Maintenance Opinion of Cost

Alternative 1 would require the Verde Village to negotiate with the City of Cottonwood in order to acquire capacity within and be served by their treatment plant. In addition to receiving treatment of the wastewater at the plant, the Verde Village could negotiate with Cottonwood to operate their collection system and bill their customers for service.

O&M costs for maintaining the sewer collection system mainly consist of the cost associated with pipe cleaning and inspection, minor repairs, as well as electricity costs for operation of the lift stations. The annual O&M costs were determined using Table 5.3 of the EPA Analysis of Operations & Maintenance Costs for Municipal Wastewater Treatment Systems (1978). The costs were updated to 2022-dollars and assumed inflation.

The O&M costs associated with Mingus WWTP are based on the current estimated Operation Expenses (OpEx) cost per gallon of water treated at Mingus. In reviewing publicly available information for the Mingus WWTP, the OpEx costs are estimated at $0.82 per gallon treated at 1.5 MGD. The annual O&M Cost is based on only the additional 1.0 MGD of Verde Village flows sent to Mingus WWTP for treatment. A detailed opinion of operation and maintenance costs for this alternative is provided in Appendix D.

Table 6-1. Summary of Costs for Alternative 1

Description	Engineer's Opinion of Cost
Capital Cost	$223,000,000
Annual O&M Cost	$2,100,000
20-Yr Life Cycle Cost	$270,000,000

Note: Values are presented in 2022 dollars.

6.1.10 Advantages/Disadvantages

Alternative 1 has the following advantages over the other alternatives considered for addressing the wastewater system issues:

- Minimizes amount of new infrastructure that would be required.
- Operations and Maintenance activities will be the responsibility of the City of Cottonwood.
- Unified billing for water and sewer service.

The disadvantages of Alternative 1 include the following:

- Mutually acceptable terms must be established.
- Verde Village will not control beneficial reuse of the treated effluent.
- Requires five lift stations to convey sewer flows to WWTP.
- Higher energy costs to convey the wastewater uphill 300ft to City of Cottonwood.

A matrix showing the rating given to the first alternative when compared to the other alternatives is provided in Appendix F.

6.2 Alternative 2 – Partner with Yavapai-Apache Nation

6.2.1 Description

The second alternative includes the installation of a wastewater collection system with discharge to the existing Yavapai-Apache Nation (YAN) Tunlii Wastewater Treatment Plant (Tunlii WWTP). The collection system would include the installation of approximately 310,000 LF of sewer line and the abandonment of approximately 4,482 septic tanks.

This alternative includes a combination of gravity sewer and low-pressure sewer collection systems within the Verde Village Community due to the topography of the area. The low-pressure sewer systems will consist of a grinder pump station and pressure sewer service lateral at each individual customer that will pump the wastewater through a series of pressure sewer force mains to the discharge point. The low-pressure collection systems will be used in regions where the topography will not allow for the construction of gravity sewer collection systems. The low-pressure sewer systems will outfall at various discharge points and combine with the gravity sewer collection system.

The gravity sewer system will operate with all flow conveyed by gravity to a discharge point. The gravity sewer system will consist of new service laterals to connect residences to the new sewer collection system. New sewer mains and manholes would be constructed mainly following existing roadway alignments.

This alternative also includes six lift stations and force mains required to transport flow from the Verde Village Community to the Tunlii WWTP. The Tunlii WWTP is located about 9 miles southeast of the Verde Village Community and is generally lower in elevation by about 300 feet. However, there are several portions of uphill elevation changes requiring lift stations. Two of the lift stations will be located within the neighborhoods of Verde Village, with a smaller capacity due to the size of flows and the remaining four conveyance lift stations will be located along the alignment of the sewer interceptor that leads to the Tunlii WWTP. The conveyance lift stations will convey the total flow from the combined Verde Village units, therefore requiring a larger capacity. Land for each lift station will need to be acquired. The proposed layout of the sewer system is shown in Appendix A – Figure 6.

6.2.2 Upgrades to Yavapai-Apache Nation Collection System

Based on discussions with a YAN representative, they do not have capacity within their existing collection network and existing lift stations for the additional wastewater flows from Verde Village. Therefore, Verde Village will be responsible for the procurement, installation, and maintenance of the proposed sewer collection system in Alternative 2. In Alternative 2, the new collection system will be built by Verde Village and operated by YAN.

Alternative 2 considers that the Verde Village will be responsible for installing all sewer mains, force mains and lift stations needed to convey its flows to the Tunlii WWTP. The existing YAN wastewater collection infrastructure would not be used as part of this alternative.

6.2.3 Upgrades to Yavapai-Apache Nation WWTP

The available capacity within the Tunlii WWTP has been evaluated based on the projected flows. The Tunlii WWTP is designed and permitted for 160,000 GPD and currently treats approximately 30,000 GPD.

The wastewater flow projections from Verde Village are presented in Section 3.3. Based on the existing WWTP capacity and projected demands from Verde Village, the Tunlii WWTP will require an increase in capacity. The treatment plant costs developed for this alternative assumes the Tunlii WWTP will be converted to an SBR plant rated at 1.0 MGD average daily flow. Conversion to an SBR will allow the facility to treat higher flows within the same footprint.

As part of the feasibility study, HDR met with representatives of Yavapai-Apache Nation to discuss the possibility of a partnership with Verde Village. YAN stated that the Tunlii WWTP does not have enough capacity for the projected flows of Verde Village but expressed interest in receiving the wastewater.

6.2.4 Beneficial Reuse

Yavapai-Apache Nation (YAN) owns/maintains reuse infrastructure and retains ownership of the effluent in Alternative 2. YAN currently sends the treated effluent to the equalization pond that is used for agricultural uses to reduce groundwater use.

6.2.5 Design Criteria

The design criteria used in the development of Alternative 2 includes AAC R-18-9, ADEQ Engineering Bulletin No.11, City of Cottonwood Engineering Design Standards Manual, and Policies, Procedures, Rules and Regulations of the Town of Camp Verde Wastewater Division.

The following provides a summary of the design criteria used for this alternative:

- Septic tanks will be abandoned in place. Existing onsite septic system would be left in place and abandoned in accordance with the closure requirements found in Arizona Administrative Code R18-9-A309.
- Sewer mains will be designed to convey the projected peak wastewater flow. For the purpose of this study, the maximum capacity of the flow in the pipe is limited to d/D = 0.75.
- All sewer mains will be installed at a minimum depth of 5 feet and a maximum depth of 20 feet.
- All sewer mains will be a minimum 8-inch diameter
- Manholes will be installed at the end of each line, at all changes in grade, size, or alignment and at all intersections. Spacing between manholes will not be greater than 400 feet.
- Convert the existing Tunlii WWTP to a 1.0 MGD SBR plant to accommodate the increased flows from Verde Village.

6.2.6 Land Requirements

The new sewer mains and manholes will be constructed within the existing right-of-way of the roads within the project area. Additional land will be required for the locations of the lift stations. It is possible that Alternative 2 may require the acquisition of additional right-of-way or easements along the proposed sewer alignments. The actual land requirements will be determined during the engineering design phase of the improvements.

It is assumed the expansion of the Tunlii WWTP can be constructed within the existing parcel without having to acquire additional land.

6.2.7 Construction Considerations

The following is a list of potential constructability considerations associated with Alternative 2:

- Caution with excavation due to possible old, abandoned, and unrecorded existing utilities.
- Common trench construction used throughout Verde Village for existing utilities.
- Significant traffic control will be required.
- Maintaining access for homeowners, businesses, and emergency services during construction activities.
- Narrow residential streets.
- Steep terrain. Many residences may require the installation of individual grinder pumps to connect to the main gravity sewer line.
- Floodway Crossings
- Construction phasing approach with combination of low-pressure and gravity systems.
- Timing of additional capacity at Tunlii WWTP.

6.2.8 Engineer's Opinion of Cost

The estimated cost for completing Alternative 2 is approximately $212 million as summarized in Table 6-2. The Opinion of Probable Construction Costs (OPCC) was developed using construction costs for recent projects with similar requirements. The OPCC includes a 20% contingency, due to fluctuation of construction costs associated with inflation, the bidding climate and other factors when actual construction is anticipated to occur.

This OPCC includes the capital costs associated with the improvements as well as the annual operation and maintenance costs that are anticipated for this alternative.

A detailed opinion of cost for this alternative is provided in Appendix C – Opinion of Capital Costs. All cost estimates in this report are only for purposes of comparing and selecting an alternative and should be refined during completion of detailed final design.

6.2.9 Operational & Maintenance Opinion of Cost

Alternative 2 would require the Verde Village to negotiate with YAN in order to acquire capacity and be served by the Tunlii WWTP. In addition to receiving treatment of the wastewater at the WWTP, the Verde Village could negotiate with YAN to operate their collection system and bill their customers for service.

O&M costs for maintaining the sewer collection system mainly consist of the cost associated with pipe cleaning and inspection, minor repairs, as well as labor and electricity costs. The annual O&M costs were determined using Table 5.3 of the EPA Analysis of Operations & Maintenance Costs for Municipal Wastewater Treatment Systems (1978). The costs were updated to 2022-dollars and assumed inflation.

The O&M costs associated with the new treatment facility expansion at Tunlii includes labor, electricity, and minor repair costs. Labor and electricity costs tend to make up the largest portion of O&M expenditures for treatment plants. Costs associated with solids handling/hauling and chemicals were not included. Costs associated with planned major equipment replacements due to equipment

reaching end-of-life is not included in the annual O&M costs. A detailed opinion of operation and maintenance costs for this alternative is provided in Appendix D.

Table 6-2. Summary of Costs for Alternative 2

Description	Engineer's Opinion of Cost
Capital Cost	$212,000,000
Annual O&M Cost	$2,200,000
20-Yr Life Cycle Cost	$260,000,000

6.2.10 Advantages/Disadvantages

Alternative 2 has the following advantages over the other alternatives considered for addressing the wastewater system issues:

- Partner with YAN which has an established WWTP facility and operators.
- O&M activities for the WWTP will be the responsibility of YAN.

The disadvantages of Alternative 2 include the following:

- Higher capital cost due to location of Tunlii WWTP which is 9 miles southeast of Verde Village Community.
- Mutually acceptable terms must be established.
- Requires 6 lift stations to convey sewer flow to WWTP.
- Verde Village will not control beneficial reuse of the treated effluent.
- Verde Village will incur the capital costs required to expand the Tunlii WWTP.

A matrix showing the rating given to the second alternative when compared to the other alternatives is provided in Appendix F.

6.3 Alternative 3 – New Verde Village WRF

6.3.1 Description

The third alternative includes the installation of a wastewater collection system with discharge to a new water reclamation facility that is owned and operated by the Verde Village. The collection system would include the installation of approximately 270,000 linear feet (LF) of sewer line and the abandonment of approximately 4,482 septic tanks.

Similar to Alternatives 1 and 2, a combination of gravity sewer and low-pressure sewer collection systems within the Verde Village Community would be required due to the topography of the area.

This alterative includes three lift stations and force mains required to transport flow from the Verde Village Community to the proposed water reclamation. Two of the lift stations will be located within the neighborhoods of Verde Village, with a smaller capacity due to the size of flows. The remaining conveyance lift station will be located along the alignment of the sewer interceptor that leads to the new Verde Village WRF and will convey the total flow from the combined Verde Village units,

therefore requiring a larger capacity. Land for each lift station will need to be acquired. The proposed layout of the sewer system is shown in Appendix A – Figure 7.

Verde Village will be required to handle operations, maintenance, and billing for the new sewer system, or will be required to hire a private company to manage the staff and operate the system.

6.3.2 Verde Village Water Reclamation Facility

A new Verde Village water reclamation facility (VVWRF) would consist of an SBR packaged treatment plant with an average day flow capacity of 1.0 MGD. The 1.0 MGD capacity would allow the community to take additional connections from outparcels. The treatment plant would be located off of AZ-260 approximately at the center of the Verde Villages near Unit 3. The footprint of this new facility is estimated to be 5 acres. The Verde Village would need to acquire the land for the wastewater treatment plant. The major facilities of the treatment plant would consist of an influent pump station, headworks and pretreatment, sequencing batch reactors, equalization tank, and UV disinfection. The VVWRF would also have dedicated solids/sludge handling at the facility. An outfall to a nearby canyon or creek and associated NPDES permit would be needed to dispose of the treated effluent if beneficial reuse options, described in Section 6.3.6, are not developed. See Appendix A – Figures 8 and 9.

6.3.3 Beneficial Reuse

The following options are considered for Verde Village to implement beneficial reuse of the treated wastewater effluent.

Verde Village Community Pond

The VVWRF effluent could be used as an alternate/supplemental water source to the existing 3-acre Verde Village community pond located in the center of Verde Village, along Del Rio Drive in Unit 4. Currently, Verde Village diverts water from the Verde River to fill the pond. It was noted during discussions with the VVCC Board that the rights to the current water source will be expiring in the next couple of years. This reuse option benefits the community with reduced cost of purchasing water to fill the pond, while maintaining a community asset. Considerations associated with this reuse option include:

- The quantity of effluent water that can be diverted to the Pond throughout the year is variable and driven by evaporation rates. Estimated monthly evaporation rates are highest in June at 560,000 gal, and lowest in December at 90,000 gal.
- Permitting requirements (Type 2 Reclaimed Water General Permit) needed to send the treated effluent to the Community Pond. Permit is valid for 5 years.
- Associated O&M Costs to pump effluent to the pond.

Wetland/Riparian Preserve

The VVWRF effluent can be sent to a constructed wetland/riparian preserve near the new treatment plant. The wetland/riparian preserve can create a wildlife viewing area for the community (similar to Sedona), provide additional treatment and polishing to the final effluent, may recharge shallow aquifers, and returns water to the Verde River.

The initial capital costs have been based on a 0.5 MGD preserve to limit the amount of land required to be purchased and keep O&M costs down. Considerations with this

beneficial reuse option include, permitting, O&M costs to maintain riparian area, community perception, and large the land requirements (±10-15 ac).

Aquifer Recharge Well

The final beneficial reuse option available to the VVWRF is construction of an aquifer storage and recovery (ASR) injection well. The injection well would be able to inject and recharge up to 1 MGD into the Verde Formation aquifer.

A preliminary design for an injection well would be for a total depth in the range of 1,200 feet. A rough estimate of the cost of a well with this depth would be $1,500 per foot. Therefore, a planning-level cost for construction of one injection well would be approximately $1.8 million. This cost does not include mechanical piping, well house, well pump (for periodic well flushing), injection pump, or other appurtenances. Well construction, coupled with these additional items, will result in a total cost of $2M to $3M for a complete injection well facility.

Benefits of this alternative include indirectly benefitting the region by providing a renewable source of water, securing long-term water supply for the area, and increasing baseflow to Verde River. Considerations of this alternative include permitting requirements, lack of Long-Term Storage Credits available (at time of writing), O&M considerations, and the ability to convert the injection well to a storage and recovery well in future.

6.3.4 Design Criteria

The design criteria used in the development of Alternative 3 includes AAC R-18-9, ADEQ Engineering Bulletin No.11, City of Cottonwood Engineering Design Standards Manual, and Policies, Procedures, Rules and Regulations of the Town of Camp Verde Wastewater Division.

The following provides a summary of the design criteria used for this alternative:

- Septic tanks will be abandoned in place. Existing onsite septic system would be left in place and abandoned in accordance with the closure requirements found in Arizona Administrative Code R18-9-A309.
- Sewer mains will be designed to convey the projected peak wastewater flow. For the purpose of this study, the maximum capacity of the flow in the pipe is limited to d/D = 0.75.
- All sewer mains will be installed at a minimum depth of 5 feet and a maximum depth of 20 feet.
- All sewer mains will be a minimum 8-inch diameter.
- Manholes will be installed at the end of each line, at all changes in grade, size, or alignment and at all intersections. Spacing between manholes will not be greater than 400 feet.
- The new VVWRF will be designed and permitted to treat 1.0 MGD using SBR process technology.
- Beneficial reuse options include sending up to 500,000 gals per month of treated water to the Community Pond, constructing a 0.5 MGD wetland/riparian area, and a 1.0 MGD injection well.

6.3.5 Land Requirements

The majority of the new sewer mains and manholes will be constructed within the existing right-of-way or existing easements; however, it is possible that Alternative 3 may require the acquisition of additional right-of-way or easements along the proposed sewer alignments. The actual land requirements will be determined during the engineering design phase of the improvements.

The Verde Village will need to acquire land for the new VVWRF which is estimated to require at least 5 acres. At the time of writing this report, land in the vicinity of AZ-260 between Verde Village Units 3 and 6 is State Trust Land owned and managed by the Arizona State Land Department and may be able to be acquired to construct the VVWRF. The construction of a wetland/riparian area for final treatment / beneficial reuse will also require about 15 acres of land acquisition.

6.3.6 Construction Considerations

Some key design and constructability issues which will need to be addressed are as follows:

- Caution with excavation due to possible old, abandoned, and unrecorded existing utilities.
- Traffic control as well as maintaining access for homeowners who live adjacent to construction activities.
- Narrow residential streets.
- Steep terrain. Many residences may require the installation of individual grinder pumps to connect to the main gravity sewer line.
- Floodway Crossings

6.3.7 Engineer's Opinion of Cost

The estimated cost for completing Alternative 3 is approximately $193 million as summarized in Table 6-3. The Opinion of Probable Construction Costs (OPCC) was developed using construction costs for recent projects with similar requirements. The OPCC includes a 20% contingency, due to fluctuation of construction costs associated with inflation, the bidding climate and other factors when actual construction is anticipated to occur.

This OPCC includes the capital costs associated with the improvements as well as the annual operation and maintenance costs that are anticipated for this alternative.

A detailed opinion of cost for this alternative is provided in Appendix C – Opinion of Capital Costs. All cost estimates in this report are only for purposes of comparing and selecting an alternative and should be refined during completion of detailed final design.

6.3.8 Operational & Maintenance Opinion of Cost

O&M costs for maintaining the sewer collection system mainly consist of the cost associated with pipe cleaning and inspection. The annual O&M costs were determined using Table 5.3 of the EPA Analysis of Operations & Maintenance Costs for Municipal Wastewater Treatment Systems (1978). The costs were updated to 2022-dollars and assumed inflation.

The O&M costs associated with the new VVWRF treatment facility includes labor, electricity, and minor repair costs. These costs tend to make up the largest portion of O&M expenditures for

treatment plants. Costs associated with solids handling/hauling, major equipment replacement, and chemicals were therefore not included.

The O&M costs associated with the community pond include electricity, minor repairs, and labor. The O&M cost associated with the constructed wetland/riparian area is primarily vegetation management, mosquito and vector control, inlet/outlet structure maintenance, and routine monitoring. Finally, the O&M costs associated with the injection well include electricity, labor, and routine maintenance of the pumping equipment. A detailed opinion of operation and maintenance costs for this alternative is provided in Appendix D.

Table 6-3. Summary of Costs for Alternative 3

Description	Engineer's Opinion of Cost
Capital Cost	$193,000,000
Annual O&M Cost	$1,800,000
20-Yr Life Cycle Cost	$232,000,000

6.3.9 Advantages/Disadvantages

Alternative 3 has the following advantages over the other alternatives considered for addressing the wastewater system issues:

- Minimize amount of new infrastructure that would be required due to central location of Verde Village water reclamation facility.
- The schedule for completion is self-driven by the community.
- Requires 3 lift stations to convey sewer flow to WWTP.
- Verde Village retains control of the treated effluent.

The disadvantages of Alternative 3 include the following:

- Self-operated and owned WRF requires initial learning and start-up guidance. Will also require hiring licensed operation staff to run and maintain plant.
- Verde Village will be required to handle operations, maintenance, permitting, and billing for the new sewer system, or will be required to hire a private company to manage the staff and operate the system.
- Need to acquire the land for the wastewater treatment plant.

A matrix showing the rating given to the third alternative when compared to the other alternatives is provided in Appendix F.

6.4 Alternative 4 – No Action

6.4.1 Description

The fourth alternative proposes taking no action to install a centralized wastewater collection system. This means no additional costs would be incurred to the community to maintain the status quo of the existing septic tank systems. Homeowners are responsible for the maintenance of the septic tank

and drain fields and incur the entire cost of repairing and or replacing their system when it reaches the end of life. Lack of maintenance and upkeep can negatively impact property values and could pose legal liability consequences per the Arizona Onsite Wastewater Recycling Association. A replacement septic system may need to be permitted by the Yavapai County and will require an on-site inspection, soil percolation tests, and application fees. There are also opportunity costs associated with this alternative. The St. Louis Fed Producer Price Index for New Industrial Building Construction shows an average increase in construction cost of 5% per year for the period between 2012-2022 and pre-pandemic values of about 2% (2010-2020). For example, a 5-year postponement would increase the total construction cost by approximately $53 to $61 million assuming 5% annual increase on the costs of the alternatives listed in Section 8. The actual increase will depend on market conditions.

This alternative was not included in the capital costs, O&M costs, 20-year life-cycle, or rating matrix since no action would be taken. This feasibility report is evaluating the options for a centralized collection system, therefore further evaluation for Alternative 4 was not investigated. Alternative 4 was not presented as an option for public feedback since the purpose of this report is to evaluate the feasibility of sewer collection system options.

7 Alternative Selection

7.1 Present-Work Life-Cycle Cost Analysis

A present-worth 20-year life-cycle cost analysis was performed for the three alternatives considered for the Verde Village's wastewater collection system improvements project. The life-cycle cost analysis examined total capital cost (including construction plus non-construction costs) and annual O&M costs for each alternative and assumed a 2% discount rate and 3% inflation rate. A summary of the life-cycle cost analysis results is provided in Table 7-1 and Appendix E contains the detailed life-cycle cost analysis. Costs are subject to change during design and market conditions.

Table 7-1. Present Worth 20-Year Life-Cycle Cost Analysis

	Alternative 1	Alternative 2	Alternative 3
Capital Cost	$223,000,000	$212,000,000	$193,000,000
Annual O&M Cost	$2,100,000	$2,200,000	$1,800,000
Total	$270,000,000	$260,000,000	$232,000,000

Notes:
1. All values shown in 2022 Dollars. Subject to change during design and market conditions.

7.2 Rating Matrix

To facilitate the selection of a preferred alternative on an objective basis, the three alternatives for the Verde Village wastewater collection system improvements were evaluated based on key attributes, including the following:

- **Capital Cost:** Engineer's opinion of probable cost to implement the alternative, presented in 2022 dollars. The more costly the alternative, the lower the alternative will score.

- **20-Year Lifecycle Cost:** Engineer's opinion of probable lifecycle cost to operate and maintain the alternative over 20 years, as applicable, presented in 2022 dollars. The more costly the alternative, the lower the alternative will score.
- **Constructability:** Considers overall construction complexity including equipment and material procurement as well as issues that may arise during the construction of the alternative. The more difficult the construction activities, the lower the alternative will score.
- **Ease of Implementation**: Considers permit acquisition and on-going renewals, intergovernmental agreements, funding availability, and land acquisition required for the alternative. The more difficult the implementation, the lower the alternative will score.
- **Reliability and Flexibility**: Considers redundancy, safety, and the ability to handle daily varying flows, new flows, or meet new regulatory requirements in the future without many modifications of the alternative. The more favorable the reliability and flexibility of the alternative once installed, the higher the alternative will score.
- **Environmental Impacts:** Considers the environmental impact to the Verde River and surrounding area during construction as well as benefits provided during the operating phase of the alternative. The less impact that an alternative will have on the environmental impact, the higher the score the alternative will receive.
- **Public Support**: Considers the overall support of the Verde Village Community for the alternative. The less impact that an alternative will have on the public, the higher the score the alternative will receive.
- **Partner Support**: The support the City of Cottonwood or Yavapai-Apache Nation will provide in connecting to their wastewater treatment plant is evaluated by this criterion. The more favorable the partner’s support of an alternative, the higher the score the alternative will receive.

In developing this feasibility study, HDR worked with the VVCC to assign a weight of 1 to 5 to each of the attributes listed above, based on the importance of the attribute in selecting the desired system. The alternative with the highest weighted score received the top rank. A survey was distributed to the community asking for feedback on the importance of each criterion.

A total of 58 responses were received on the survey over a two-week period. The survey consisted of five questions intending to provide feedback on the public opinion for each alternative, the preference for the reuse options of Alternative 3, and the order of importance of the evaluation criteria. The evaluation criteria listed for the ranking were reliability and flexibility, environmental impact, ease of implementation, constructability, and overall public support. The public feedback data received for ranking the criteria was used to calculate a weight for each evaluation criteria shown in Appendix F. The resulting alternative rating matrix and final scoring of each alternative is detailed in Table 7-2.

Table 7-2. Evaluation Matrix

		Alternative 1		Alternative 2		Alternative 3	
Criteria	Weight	Raw Score	Weighted Score	Raw Score	Weighted Score	Raw Score	Weighted Score
Constructability	15%	1	0.15	2	0.30	3	0.45
Ease of Implementation	17%	2	0.34	1	0.17	3	0.51
Reliability & Flexibility	20%	3	0.60	2	0.40	4	0.80
Environmental Impact	18%	4	0.72	4	0.72	4	0.72
Public Support	15%	3	0.45	3	0.45	3	0.45
Partner Support	15%	2	0.30	5	0.75	4	0.60
Total	**100%**	**15**	**2.56**	**17**	**2.79**	**21**	**3.53**

The results of the community feedback are summarized in Appendix G – Verde Village Survey Feedback.

8 Recommended Alternative

Based on a review of the three alternatives presented in this report, their associated costs, and input from VVCC and members of the Verde Village community, Alternative 3 (New Verde Village WRF) has been selected as the recommended alternative. This alternative was selected for the following reasons:

- Provides the lowest overall cost of all the alternatives.
- Takes advantage of the existing topography allowing the majority of the system to be served via gravity.
- Provides beneficial reuse rights to Verde Village for supplemental use of the treated effluent at the Community Pond, aquifer recharge, and/or a new wetland riparian area.

8.1 Project Design

Detailed engineering plans, specifications, and estimates will need to be prepared prior to starting construction on the project. The main components of the project will include design of the gravity collection system, lift stations, and wastewater treatment facility. In addition, it will also be important to identify all locations where easements will be required to install the sewer system and where land must be acquired. This Feasibility Report was prepared as a high-level overview of the improvements required to serve the Verde Village Community. During the detailed design phase, it will be necessary to perform a topographic survey of the area to be used as a base map for designing the system.

8.1.1 Collection System

The Verde Village Community is served by septic systems. A conventional sewer collection system will be designed and constructed to facilitate the abandonment of the existing septic systems. All properties would abandon and decommission their existing septic tanks as they connect to the centralized sewer system. This typically involves pumping out the tank, punching a hole in the bottom of the tank, backfilling the tank in place, capping the piping to the drainage leach field pipes, re-routing house plumbing to the new sanitary sewer system, and regrading the surface to drain away from the closed area.

It is anticipated the collection system will be installed within existing road right-of-way. In those areas where it is not feasible to install the sewer system in an existing right-of-way, it will be necessary to secure an easement from the property owner.

In summary, the selected alternative proposes the following for the wastewater collection system improvements:

- Abandonment of approximately 4,482 septic tanks.
- Installation of approximately 1,418 grinder pumps each serving a single home.
- Installation of 88,980 LF of low-pressure sewer pipe.
- Installation of 161,460 LF of gravity sewer pipe.
- Installation of 15,200 LF of force main.
- Installation of 408 manholes.
- Installation of two neighborhood lift stations.
- Installation of a conveyance lift station near the intersection of AZ-260 and Rio Mesa Trail.
- Installation of a new SBR wastewater treatment facility in a centralized location and land acquisition costs associated with the facility.
- Installation of an aquifer recharge well and/or constructed wetland area for beneficial reuse.

8.1.2 Lift Stations

Due to the topography of the study area, it will be necessary to install lift stations to convey the wastewater to the new Verde Village WRF. Each lift station would consist of a below-ground concrete vault (wet well), at least two submersible sewage pumps, above ground control equipment and building enclosure, standby emergency generator, and security fencing.

8.1.3 Water Reclamation Facility

The new water reclamation facility will be based on a sequencing batch reactor treatment process in a duty/standby configuration with an average day capacity of 1 MGD. The facility will require an influent pump station, headworks/screening facility, grit removal, two sequencing batch reactors, blower building, an equalization basin, filter, and a UV disinfection channel.

Additional supporting facilities may include solids handling/sludge drying beds, and administration/control room. The expected area needed for the new plant is 3 to 5 acres. See Appendix A – Figures 8 and 9.

8.1.4 Beneficial Reuse

The following options are considered for beneficial reuse of the treated effluent from the new WRF:

- Alternate and/or supplement water source for Verde Village Community Pond,
- constructed wetland/riparian preserve,
- Aquifer injection well.

The alternatives identified above are recommended to be constructed for beneficial reuse and minimize the discharge to the Verde River. However, the alternatives can be constructed using a phased approach. For comparison purpose, the alternatives are included in the Capital Cost for Alternative 3 as if they are built all at once.

8.1.5 Permits

During the design and construction phases of this project, it will be necessary to secure numerous permits. A summary of the permits that are anticipated to be required for this project are summarized in Table 8-1.

Table 8-1. Required Permits

Permit Description	Agency
Approval to Construct	ADEQ
AZPDES Construction General Permit	ADEQ
Type 2 Reclaimed Water General Permit	ADEQ
Underground Storage Facility (USF) Permit	ADWR
Constructed Underground Storage Permit	ADWR
Water Storage Permit	ADWR
Individual Aquifer Protection Permit (APP)	ADEQ
Biosolids Disposal Agreement	AZPDES
208 Individual Discharge Permit	AZPDES
Annual Operations Permit	ADEQ
Non-Title V Air Quality Permit	ADEQ

8.2 Opinion of Cost

The total project opinion of cost for implementing the selected alternative is $193 million as summarized in Appendix C - Opinion of Capital Costs. All cost values are presented in 2022 dollars and are subject to change during design and based on current market conditions. The cost estimates are Association for the Advancement of Cost Engineering (AACE) Class V estimates which are an order of magnitude cost. This means the cost estimates are used for strategic planning and concept screening at a project level of less than 5 percent. The expected accuracy range for the cost estimates are -50% to 20% on the low end and 30% to 100% on the high end.

The total capital costs include both construction costs and indirect project costs which include engineering design services, construction administration, construction observation services and legal costs. A 20 percent contingency was factored into the construction costs due to unknowns. Additional assumptions used in preparing the conceptual opinion of probable cost are summarized below.

8.2.1 Collection System Costs

The collection system costs consider the abandonment of 4,482 septic tanks in place, the installation of gravity, low pressure, and force main sewer, and the installation of 3 lift stations. The collection system costs are lower in Alternative 3 compared to the previous alternatives due to the location of the new Verde Village WRF which provides a more centralized outfall location for the collection system.

8.2.2 Treatment System Costs

The treatment system costs for Alternative 3 includes the cost of land and easement acquisition that will be required to build a centralized treatment facility in Cottonwood, Arizona. The land valuation was assumed from local real estate costs.

8.2.3 Beneficial Reuse Costs

The beneficial reuse costs for Alternative 3 accounts for the land and easement acquisition required to potentially build a wetland/riparian area. The land valuation was assumed from local real estate costs.

8.3 Annual Operations and Maintenance Costs

The annual operation and maintenance costs for implementing the selected alternative is included in Appendix D – Operation and Maintenance Costs. The O&M costs for Alternative 3 are anticipated to consist of the following components:

- Collection System O&M
- O&M for Lift Stations
- Treatment System O&M
- Beneficial Reuse O&M

The operation and maintenance of the new collection system, lift station and treatment facilities may be provided by the Verde Village, contracted out to one of the surrounding municipalities, or contracted with a private company. As the Verde Village moves forward with implementation of the project, it is recommended that the Verde Village solicit bids from interested parties to determine the most cost-effective method to provide these services to their residents. Due to the preliminary nature of this analysis, the actual O&M costs will vary based on the bids received, current market conditions, system design, etc.

8.3.1 Collection System O&M

The collection system operation and maintenance costs were calculated using the EPA *Table 5.3 – Average Cost per Capita for Various Types of Sewer Systems* and EPA *Table 5.4 – O&MR Cost per*

Mile of Gravity Sewers. Both tables were initially prepared in 1978, therefore the costs were escalated to 2022 values to account for inflation to current dollars. Based on the assumed unit value cost of $65 per capita in Table 5.3 and an assumed unit value cost of $12,485 per mile of sewer, the average collection system O&M costs for Alternative 3 is $682,138.

8.3.2 O&M for Lift Stations

The O&M costs for the neighborhood lift stations with capacity under 0.25 MGD were calculated using the EPA *Table 5.5 – Pumping Stations Cost Relationships*. The O&M costs were escalated to 2022 values which resulted in a reported value of $24,372.95 per million gallons per day in present day dollars. Based on a peak flow of 81,066 gpd that will be conveyed in the neighborhood lift stations, the total assumed O&M costs are $19,800 per year.

The O&M costs for the larger lift stations in Alternative 3 were determined using an HDR proprietary tool called CostSpace. CostSpace is a tool used to provide planning level cost estimates for construction and O&M costs. The cost data is derived from cost curves and O&M costs are calculated based on experience and from EPA cost curves. The lift station costs were calculated using the tool based on consideration of the required flow capacity and total dynamic head requirements. The HDR CostSpace estimating tool considers labor, materials, and process energy to maintain and operate a lift station based on the capacity. The annual rates and costs are summarized in Appendix D. In summary, the total O&M costs for a neighborhood lift station with capacity between 0.25 and 0.75 MGD is $64,600 per year, $48,800 per year for a conveyance lift station with capacity of 0.8 MGD, and $140,000 per year for a conveyance lift station with capacity of 1.8 MGD. The actual O&M costs for each station will vary based on the lift station capacity, system head, etc. Total lift station O&M costs for Alternative 3 is estimated to be $133,200 per year.

8.3.3 Treatment System O&M

The O&M costs associated with the new VVWRF treatment facility includes labor, electricity, and minor repair inclusive of all major treatment processes. The O&M costs were developed using the HDR CostSpace tool. The total cost for the new VVWRF sequencing batch reactor plant is $853,000 per year in 2022 dollars. This annual O&M was developed based on the following assumptions:

- 6,300 labor hours per year (equivalent to 3.0 FTEs) at $75/hr including fringe benefits,
- $175,000 in materials, parts, and minor consumables per year,
- Total annual energy consumption of 1,581,000 kWh of energy per year assuming 24/7 operations and an energy cost of $0.13 per kWh.
- $40,000 for solids handling, hauling, and disposal.

The costs listed above make up the largest portion of typical O&M expenditures for wastewater treatment plants. Costs associated with major equipment replacement and chemicals are not included.

8.3.4 Beneficial Reuse O&M

The O&M costs associated with the Community Pond include electricity, minor repairs, and labor. This cost is estimated at $2,000 per year based on to the pumping requirements needed to convey treated effluent to the Community Pond.

The O&M cost associated with the constructed wetland/riparian area is primarily vegetation management, mosquito and vector control, inlet/outlet structure maintenance, and routine monitoring. These costs are estimated to be $10,500 per year based on EPA's Wastewater Technology Fact Sheet for Free Water Surface Wetlands and adjusting to 2022 dollars.

Finally, the O&M costs associated with the injection well include electricity, labor, and routine maintenance of the pumping equipment. The annual cost is estimated to be $37,500 for the injection well. A detailed opinion of operation and maintenance costs for this alternative is provided in Appendix D.

8.4 Project Implementation

Due to the size of the study area, it is anticipated the project will be completed in phases. The exact phasing will be determined at the time of the design and be based on a project schedule and construction constraints. It is anticipated that the first phase will include the construction of the wastewater treatment plant and means for the effluent to be released whether it is via a recharge pond, recharge well and/or discharging treated water into the Verde River. Concurrently during the construction of the WWTP, the sewer mains and lift stations in one unit of Verde Village may be constructed with connection to the WWTP. Once the sewer mains, lift stations, and WWTP have been complete, the households within the unit may be connected to the sewer system and their septic systems abandoned. The process of constructing the sewer mains, lift stations, and household services will be repeated in each unit of Verde Village until all households are connected to the centralized sewer system.

Any time throughout this process, the infrastructure needed to convey the reuse water to supplement the Community Pond and constructed wetland/riparian area may be implemented to reuse the treated effluent from the WWTP.

9 Funding and Monthly Estimates

9.1 Funding and Financing Options

The following section outlines funding and financing programs that could apply to a Verde Village wastewater collection system design and construction project. This funding and financing information reviews some of the funding options from state and federal sources. No opinions or recommendations on debt or financing structures for Verde Village are provided. These decisions will need to be made in the context of Verde Village's financial situation, long-term financial plans, project costs, and funding available during the respective application period(s).

A wastewater conversion project is a significant financial undertaking, and the Verde Village must consider feasible methods of payment before moving forward with project planning and design. For large wastewater projects, most towns/cities/counties will utilize some form of debt repayment. Some projects are funded by issuing bonds that are backed by the credit and taxing power of a government entity. The EPA also offers low interest loans for wastewater and non-point pollution projects through the Water Infrastructure Finance Authority (WIFIA) and the Clean Water State Revolving Fund (CWSRF). As an unincorporated area of Yavapai County, Verde Village would have to consider forming a government agency like a utility district or partnering with a government like Yavapai County to receive loans through the EPA.

There are significant recent changes in federal infrastructure funding programs that could make the cost of a wastewater conversion project more affordable. The U.S. Congress passed the Infrastructure Investment and Jobs Act (also known as Bipartisan Infrastructure Law or BIL) in 2021. BIL is significant and provides additional funding opportunities under many of these funding programs. This document will highlight some of the opportunities related to BIL; however, some program details may change as agencies implement the programs. Many funding programs are emphasizing projects focused on climate change resiliency, clean water, and improving infrastructure in disadvantaged communities. As a project focused on reducing septic leaks that negatively impact the Verde River, some programs closely align with goals set out in the wastewater feasibility report.

Most funding programs generally cover construction costs as well as development phase activities, including preliminary engineering work and environmental document preparation, acquisition of property, legal, and engineering design including permit fees. Costs incurred prior to a funding award may be covered depending on any program-specific restrictions. Federal funding programs will have additional requirements such as Davis Bacon prevailing wages, Build America Buy America Act (BABAA) or American Iron and Steel (AIS) provisions, adherence to federal procurement (including Brooks Act), environmental review, etc. as part of assistance agreements.

It is important to consider applying to these programs as early as practical since engineering/environmental review documents must be prepared and reviewed before moving to construction. Preparing applications early ensures drafts can be reviewed by agency partners and proper permits are acquired prior to deadline requirements. Each grant has specific requirements surrounding permits and project timelines. These requirements are not always clear depending on the grant and self-administered review phases with agency partners can highlight application deficiencies. Early application may also allow for resubmittal if the initial application is not awarded or to file for additional funding as project budgets are refined. Each program's process, timeline, and requirements should be reviewed within the context of the Verde Village's overall goals, financial situation, project timelines, and debt policies. The following programs are summarized:

- State Revolving Funds (SRF)
- Water Infrastructure Finance and Innovation Act (WIFIA)
- EPA Section 319 Grants
- EPA Community Change Grants
- USDA Rural Development Water and Waste Disposal Guarantee Program
- Bureau of Reclamation WaterSMART Grants
- EPA Rura Decentralized Water Systems Grants
- Training and Technical Assistance Program for Rural, Small, and Tribal Wastewater Systems

9.1.1 State Revolving Funds (SRF)

Base Program

The SRF programs are low-interest, revolving loan programs administered by the Water Infrastructure Finance Authority (WIFA) with EPA oversight. There are two SRF

programs, the Drinking Water State Revolving Fund (DWSRF) and the Clean Water State Revolving Fund (CWSRF). The CWSRF provides funding for wastewater utility projects with a focus on improving regional effluent quality. SRF requirements in many states, including Arizona, are a mixture of federal and state level requirements based on state law or state management preferences. For example, federal statutes limit additional subsidization to disadvantaged communities, but the state SRF will have discretion on how a disadvantaged community is defined for their state program. The Arizona SRF programs operates as a direct local loan program. WIFA sets interest rates between 70 and 95 percent of the tax-exempt AAA MMD Rate of governmental entities and nonprofits. Interest rates and applicable subsidies are allocated based on WIFA's scoring of the project on the Project Priority List. Local fiscal capacity of the service area can also be considered to determine subsidies and interest rates.

Base Program Grant Assistance

Loan principal forgiveness (equivalent to a grant and referred to as a grant in some cases by the SRF program) is available in the base program to help disadvantaged communities. These are applied to applicants that intend to obtain an SRF subsidized loan.

Entities meeting the criteria for financial hardship consideration may be eligible for reduced interest rates and loan principal forgiveness. The Arizona SRF program evaluates projects for hardship consideration based on three criteria:

1. The community is a designated "colonia" community.
2. The community received 50 or more "Local Fiscal Capacity" points on the project priority list (PPL).
3. The community has a local median household income (MHI) of 90% or less of the state MHI.

After an initial review, Verde Village may qualify for pre-construction or construction hardship criteria based on having a median household income of $63,835 which is less than 90% of the 2022 state MHI. It is recommended to confirm the community's disadvantaged status eligibility with a WIFA representative.

Bipartisan Infrastructure Law Funding

BIL provides significant additional funding for the SRF programs. BIL creates five new categories of SRF funding: drinking water supplemental, wastewater supplemental, lead service line replacement, drinking water emerging contaminants, and wastewater emerging contaminants. Additional subsidization from BIL funding is in the form of principal loan forgiveness. In most categories, these subsidies are only available for entities or projects meeting the criteria for a disadvantaged community. Refer to Table 9-1 and Table 9-2 for the set aside and limits of the Arizona CWSRF program.

Table 9-1. FY2023 Arizona SRF Appropriations

Appropriation	CWSRF
Base Capitalization	$5,067,000
General Supplemental	$14,079,000
Emerging Contaminant	$1,436,000
Total	**$20,582,000**

Table 9-2. Clean Water SRF Grant and Forgivable Principal Amounts

Grant	Grant Amount	% Available as Forgivable Principle	Dollar Amount of Forgivable Principal
Base	$5,067,000	40% (only for disadvantaged or green projects)	$2,026,800
BIL-Supplemental	$14,079,00	49% (only for disadvantaged or green projects)	$6,898,710
BIL Emerging Contaminant	$1,436,000	100% (25% for disadvantaged)	$1,436,000
Total	$87,486,000		$10,361,510

Note: All Arizona BIL-CWSRF emerging contaminant funding has been allocated.

Green Project Reserve

The CWSRF program offers principal forgiveness for green projects through the Green Project Reserve (GPR). Green projects include water efficiency, energy efficiency, green stormwater, or other environmentally beneficial initiatives. For example, a project that reduces energy usage by 20 percent or reduces annual water use by utilizing reclaimed water for landscaping could be considered green. The interest rate incentive varies based on overall project costs relative to the project's green component costs. Up to 90 percent principal forgiveness may be offered based on the financial need and green project reserve eligibility.

The proposed Verde Village WRF has some elements that could qualify the project for Green Project Reserve funding. By utilizing an effluent storage pond for landscape and irrigation needs, Verde Village would reduce its water usage over time which could qualify the project as green. The construction of a wetland for beneficial use could also qualify the project for Green Project Reserve funding. Verde Village should consult WIFA about green project reserve funds and confirm project eligibility.

SRF Project Requirements

SRF federal requirements include federal cross cutters, environmental reviews, qualification-based selection of engineering services (CWSRF only), AIS, Davis-Bacon wages, and BABAA.

Federal cross cutters include environmental laws such as the Endangered Species Act, the National Historic Preservation Act, executive orders on wetland and flood plain protection, social policy authorities, and economic authorities. SRF funded projects are required to undergo environmental review to determine any potential environmental impacts caused by implementing the project. The level of review may be a categorical exclusion, environmental assessment, or environmental impact statement. Equipment or pipeline replacement and work within an existing facility footprint typically fall under a categorical exclusion and simplify the review process significantly.

AIS requirements apply to all SRF projects and stipulate that all iron and steel used in the project must be produced in the United States unless a waiver is obtained. Davis-Bacon wage requirements apply to contractors and subcontractors working on SRF funded projects. BABAA expands AIS requirements to create domestic requirements for construction materials and manufactured products in addition to iron and steel. BABAA requirements apply to all projects that are designated as federal equivalency. BABAA requirements and equivalency requirements are confusing and can result in future complications related to acquisition of materials. When applying for SRF funding, the impacts of acquiring U.S. materials and how it could impact project timelines should be considered. It is suggested that a WIFA representative be consulted regarding BABAA and federal equivalency.

SRF Schedule

The SRF process should be started early in the project schedule. In Arizona, applications for SRF funding are accepted on a rolling basis annually. Each May, WIFA publishes their draft intended use plan (IUP) outlining what projects it intends to fund for the upcoming fiscal year. Following the draft IUP publication, the document is open for public comment and finalized in late June. Refer to Table 9-3 for major SRF deadlines.

Table 9-3. SRF Schedule

SRF Timeline and Important Deadlines	
Applications	Accepted annually on a rolling basis
Draft Funding List	May
Deadline for Public Opinion	June
Committee Adopts Final IUP	Late June
Implementation of Approved IUP	July

9.1.2 Water Infrastructure Finance and Innovation Act (WIFIA)

WIFIA is a long-term, supplemental loan program administered by the EPA. This program is intended to move projects forward that need additional funding beyond the capacity of other funding programs (e.g., SRFs). WIFIA can provide direct loans and loan guarantees to eligible borrowers for water infrastructure projects. WIFIA can only fund 49 percent of project costs; other funding sources (which can include SRF funding) must be obtained for the other 51 percent. If other funding sources include additional federal programs, the total federal involvement is limited to 80 percent. Most water-related infrastructure projects are eligible under WIFIA. All SRF eligible projects are eligible under WIFIA as well. In addition to general costs associated with a project, WIFIA loans can also include debt issuance reserve funds and debt issuance costs. WIFIA is typically used for larger projects with a minimum project size of $20 million. See Table 9-4 for the highlights of the WIFIA loan program.

Table 9-4: WIFIA Highlights

Highlights of WIFIA	
• $7.5 billion in funding (2023) • Funding available for 49% of project • No more than 80% from federal sources • $20 million project minimum • Interest based on U.S. Treasury securities • Maturity up to 35 years	• Debt payments can be sculpted • Defer payments up to 5 years after substantial completion • If invited to apply after submittal of letter of interest, application fee is $100,000 (large communities) or $25,000 (small communities) • Credit assurance review fee is typically $100,000–300,000 (application fee is credited) • Service fees do apply for the life of the loan (+/- $8,000–26,000 per year)

The interest rate on WIFIA loans is based on U.S. Treasury securities and may be lower than bonds (depending on maturity, ratings, and market). One advantage of WIFIA financing is the ability to defer repayment of principal and interest for 5 years after substantial completion of the project.

Another potential advantage of WIFIA financing is the ability to “sculpt” repayments. For example, U.S. Treasury rates at longer debt maturities may be much lower than other market debt instruments at the same maturity when compared to shorter term debt where the spread may be less. At shorter maturities, the spread between private market rates and U.S. Treasury rates may not be enough to provide a significant benefit. By issuing debt at a shorter maturity in the private market (for the 51 percent of costs that WIFIA will not cover) and then pushing WIFIA debt to a longer maturity (e.g., 30–35 years), sculpting repayments may provide a potential interest saving versus issuing both sources of debt at equal, longer maturities. However, bond markets and the U.S. Treasury securities market can vary significantly, and somewhat independently, year to year. WIFIA debt can be prepaid without penalty.

EPA accepts Letters of Interest (LOI) on a rolling basis from the date listed in the Notice of Funding Availability (NOFA). Prospective borrowers can submit a LOI for review by EPA on a rolling basis from the date listed in the NOFA until the earlier of (1) the commitment of all available funding made available for that round or (2) publication of a subsequent notice cancelling or overriding the current NOFA. A rolling selection process allows EPA to provide year-round access to WIFIA funding and quicker selection decisions to prospective borrowers. The LOI is essentially a pre-application that

EPA reviews and prioritizes against other LOIs. If the project is prioritized within the funding range, EPA will invite the prospective borrower to make a formal application (the application fee is then due). Prospective borrowers must submit a formal application within a year of the invitation to apply.

9.1.3 Section 319 Grants, Arizona Department of Environmental Quality

The Arizona Department of Environmental Quality allocates money from the EPA for nonpoint source pollution and watershed protection projects. Through the Water Quality Improvement Grant Program, ADEQ administers funding focused on improving Arizona's surface and groundwater quality. Under Section 319 guidance, eligible activities include technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of nonpoint source implementation projects. Annual funding allocations from the EPA are usually low. In previous years, Arizona was only allocated $1.7 million for the entire program.

9.1.4 EPA Community Change Grants

The EPA recently announced $2 billion in funding for community driven projects focused on climate change and pollution reduction in disadvantaged communities. Projects funded under the program must create one or more of the benefits listed below:

1. Climate change adaptation and resilience
2. Reduce climate change impacts
3. Air, water and waste pollution monitoring, prevention, and remediation
4. Investments in reduced emission vehicles
5. Job development or industries that reduce greenhouse gas and air pollutant emissions
6. Reducing indoor air toxins and pollutants
7. Engaging disadvantaged communities in state and federal advisory groups, workshops, councils, and other public processes.

Eligible applicants for the grants are non-profit community-based organizations (CBO) who have partnered with either another CBO or a federally recognized tribe, local government, or institution of higher education. To formally apply for Community Grant funding, Verde Village could create a formal project partnership with The Nature Conservancy to qualify. Applications are open on a rolling basis from now until November 21, 2024, with funding expected to range from $10 - $20 million per grant.

9.1.5 The U.S. Department of Agriculture (USDA) Rural Development Water and Waste Disposal Guarantee Program

The Water and Waste Disposal Loan Guarantees program is part of USDA's larger OneRD Guarantee Loan Initiative. The program helps private lending agencies provide affordable financing to rural areas with a population of 50,000 or less. Eligible applicants for the program include public bodies, federally recognized tribes, and non-profit business. Funding through the program can be used for large sanitary sewer disposal projects.

9.1.6 Bureau of Reclamation WaterSMART Grants

WaterSMART grant funding is available for projects that create qualifiable water savings or implement renewable energy technologies. Each application is required to estimate the total amount of water that could be saved though the program. Funding varies from $500,000 to $5 million depending on the duration of the project and the non-federal cost share. To receive the maximum $5 million dollar grant, the project needs to be completed within three years and have a non-federal cost share of 50% or more. Verde Village could apply for WaterSMART grant funding if the new wastewater treatment plant includes plans to replenish groundwater or use effluent for ponds and landscaping irrigation.

9.1.7 EPA Rural Decentralized Water Systems Grant Program

If Verde Village does not elect to implement a new wastewater collection system, the Village could pursue funding to maintain and improve current septic systems though the Rural Decentralize Water Systems program. The purpose of the grant is to provide funding for non-profits to establish a revolving fund loan program to increase access to properly managed septic systems in rural areas. Eligible applicants for the program are nonprofits with expertise in water and wastewater. The nonprofit must also have legal authority as a lender and technical expertise to comply with federal and state regulations. By establishing a revolving fund program, Verde Village could provide funding to members of the community who cannot afford to maintain their septic systems.

The program requires that all loans have a 1% fixed interest rate, with a 20-year maximum term and a $15,000 maximum loan per household. The program also requires at least a 10% match of funds from the nonprofit.

9.1.8 Training and Technical Assistance Program for Rural, Small, and Tribal Wastewater Systems

The program is administered by the EPA to provide technical assistance for rural, small, and tribal communities. Technical assistance focusses on planning and accessing funding and financing. Verde Village may qualify for Priority Area 4, technical assistance for decentralized systems. Grant funding through the program would assist with training and technical assistance to support Verde Village’s decentralized water planning, development, and acquisition of financing for a new wastewater facility.

9.1.9 Summary

Based on the findings in this wastewater feasibility report, one or multiple funding programs may provide support for aspects of the project. Long term, the SRFs and WIFIA offer the largest amount of funding and can be paired together. Both programs are predominantly loan programs, but Verde Village may qualify for principal forgiveness though the SRF program that could provide project savings. Although current WIFIA interest rates are not as competitive as they were previously, the ability to defer principal payments and sculpting debt is worth consideration.

Table 9-5 summarizes grant and loan programs prioritized based on probable Verde Village eligibility and funding amounts. As an unincorporated area of Yavapai County, Verde Village would currently not qualify for some the programs below. The priority list assumes the community would either partner with an established local government or create a utility district to be eligible for federal grants and loans. Available funding was also considered for program prioritization. Some programs like the

Section 319 grants have limited pools of funding and awards may not be with the level of effort required to apply. Verde Village should consider using a cost benefit analysis approach when determining what programs are worth applying for.

Table 9-5. Summary of Funding Programs in Order of Prioritization

Program	Grant or Loan	Description
Clean Water State Revolving Fund	Loan with possible principal forgiveness	Loan interest state revolving loan program. If eligible, SRF will likely offer the lowest interest rates.
WIFIA	Loan	Loans administered for projects that are $20 million or more. Flexible repayment schedules and can be paired with SRF loans.
EPA Community Change	Grants	Loans for community-based organizations working on projects that reduce climate change impacts and pollution. This is not a recurring program and funding will likely be allocated by November 2024.
USDA Rural Development Fund	Loan	Loan program to help private lending agencies provide loans to small communities.
WaterSMART Grants	Grants	Grants for projects that would provide quantifiable water savings. Grants would be contingent on effluent reuse or energy efficiency.
Training and Technical Assistance Program for Small, Rural, and Tribal Communities	Grants/Technical Assistance	Program would provide further planning and assistance for how to implement a new centralize wastewater system.
Section 319	Grants	Funding though ADEQ for non-point pollution projects.
EPA Rural Decentralized Water Systems	Grants	Grants for communities to establish revolving loan programs for decentralized water and wastewater improvements. *Program would only be feasible if Verde Village does not proceed with implementing a new centralized wastewater system.*

9.2 Estimated Monthly Sewer Bill

HDR prepared an estimate of the monthly sewer bill for each dwelling unit for the new Verde Village WRF and collection system based on what percentage of the total capital cost is funded through forgivable loans and/or grants. It should be noted that this estimate is provided for information only and could vary from what is listed here. Items that could have an impact on the monthly bill include construction market when project is constructed, current interest rates, type of treatment process ultimately selected, etc. The monthly estimates presented below are based on the following assumptions:

- 4,482 Dwelling Units (DU)
- Capital Cost of $193M

- Annual O&M Cost of $1.8M; constant over term of loan.
- Monthly O&M Cost per DU is $33; constant throughout term of loan.
- Loan interest rate: 2%
- The 20-year loan term was selected to match the same duration as the 20-year lifecycle cost.
- The 30-year loan term was selected because it is the maximum term allowed for WIFIA loans.

Table 9-6. Estimated Monthly Bill per Dwelling Unit

% of Total Capital Cost Funded by Forgivable Loans and/or Grants	Mo. Capital Cost per DU		Est. Total Monthly Bill per DU	
	20-year Loan Term	30-year Loan Term	20-year Loan Term	30-year Loan Term
0%	$218	$159	$251	$193
10%	$196	$143	$230	$177
20%	$174	$127	$208	$161
30%	$152	$111	$186	$145
40%	$131	$95	$164	$129
50%	$109	$80	$142	$113
60%	$87	$64	$121	$97
70%	$65	$48	$99	$81
80%	$44	$32	$77	$65
90%	$22	$16	$55	$49
100%	$0	$0	$33	$33

Notes:
1. Costs are subject to change based on final construction costs and market conditions at time of project implementation that cannot be predicted.
2. Costs presented above are in 2022 dollars and are for informational purpose only.

10 Next Steps

The first step for Verde Village is to reach a consensus that the community wants to move forward with converting from septic to a centralized sewer system. If the Verde Village decides to move forward with the conversion, the next step would be to establish an intergovernmental agreement and/or sanitary district for the sewer area. Grant funding and financing may be applied for the project during this time. Detailed design and the preparation of the construction documents may start once financing and funding has been determined. The detailed design phase will consist of developing 30%, 60%, 90%, and 100% plans and specifications. The application for permits can begin once the 90% plans and specifications have been finalized. Finally, once the 100% plans and specifications have been completed, the district can solicit bids and negotiate a contract with a General Contractor. It is anticipated that the entire process from the formation of the sanitary district to startup and commissioning will take 8-10 years.

11 Conclusions and Recommendations

This report described the feasibility for the installation of a centralized sewer collection system for the Verde Village Community due to aging of existing septic tanks. Three alternatives were proposed and evaluated to provide a recommendation based on community feedback and engineering judgement. After careful consideration of the potential alternative, Alternative 3 was selected as the recommended solution for the wastewater collection system improvements. Key aspects of this recommended alternative include the following:

- Abandonment of approximately 4,482 septic tanks.
- Installation of approximately 1,418 grinder pumps each serving one home.
- Installation of 88,980 LF low-pressure sewer pipe.
- Installation of 161,460 LF gravity sewer pipe.
- Installation of 15,200 LF force main.
- Installation of 408 manholes.
- Installation of two neighborhood lift stations.
- Installation of a conveyance lift station near the intersection of AZ-260 and Rio Mesa Trail.
- Installation of a new SBR wastewater treatment facility.
- Installation of an aquifer recharge well and/or constructed wetland area for beneficial reuse.

The total capital cost of the proposed project is projected to be $193 million. Based on a 20-year life-cycle cost analysis, the present value of the proposed project, including construction costs, non-construction costs, and annual O&M costs is $232 million.

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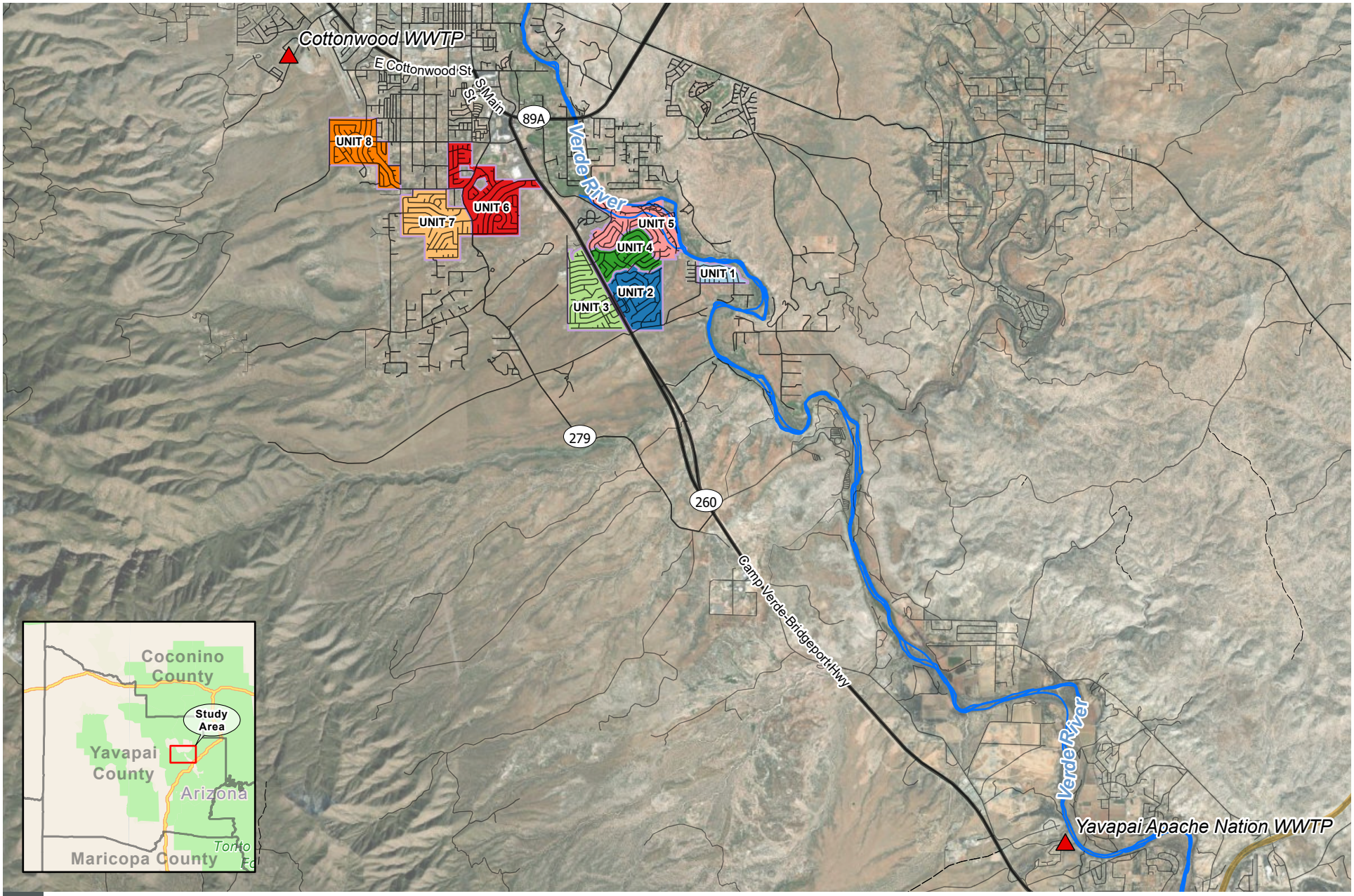
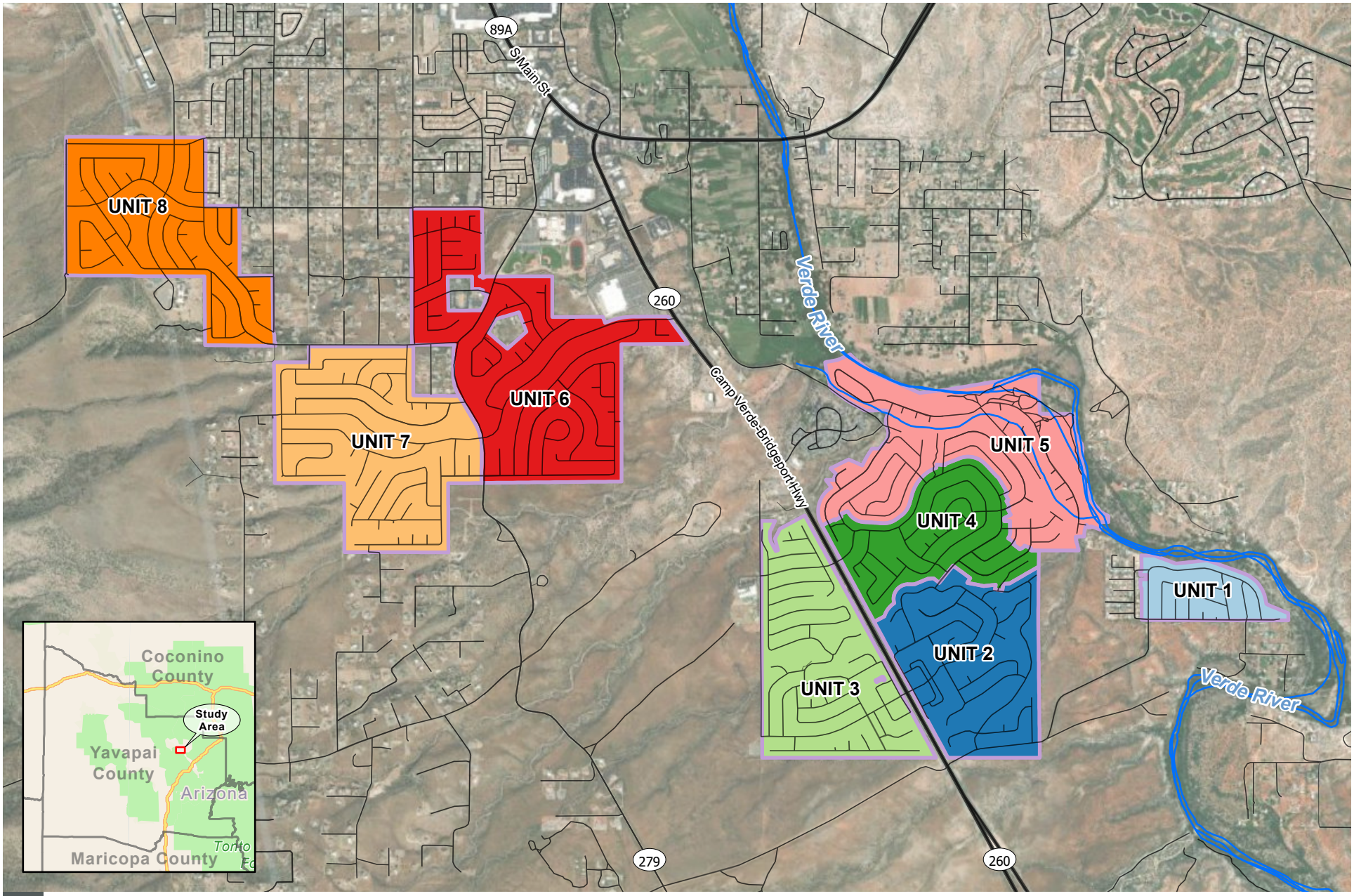
Appendix A. Figures



OVERALL STUDY AREA
Figure 1



VERDE VILLAGE COMMUNITY
Figure 2

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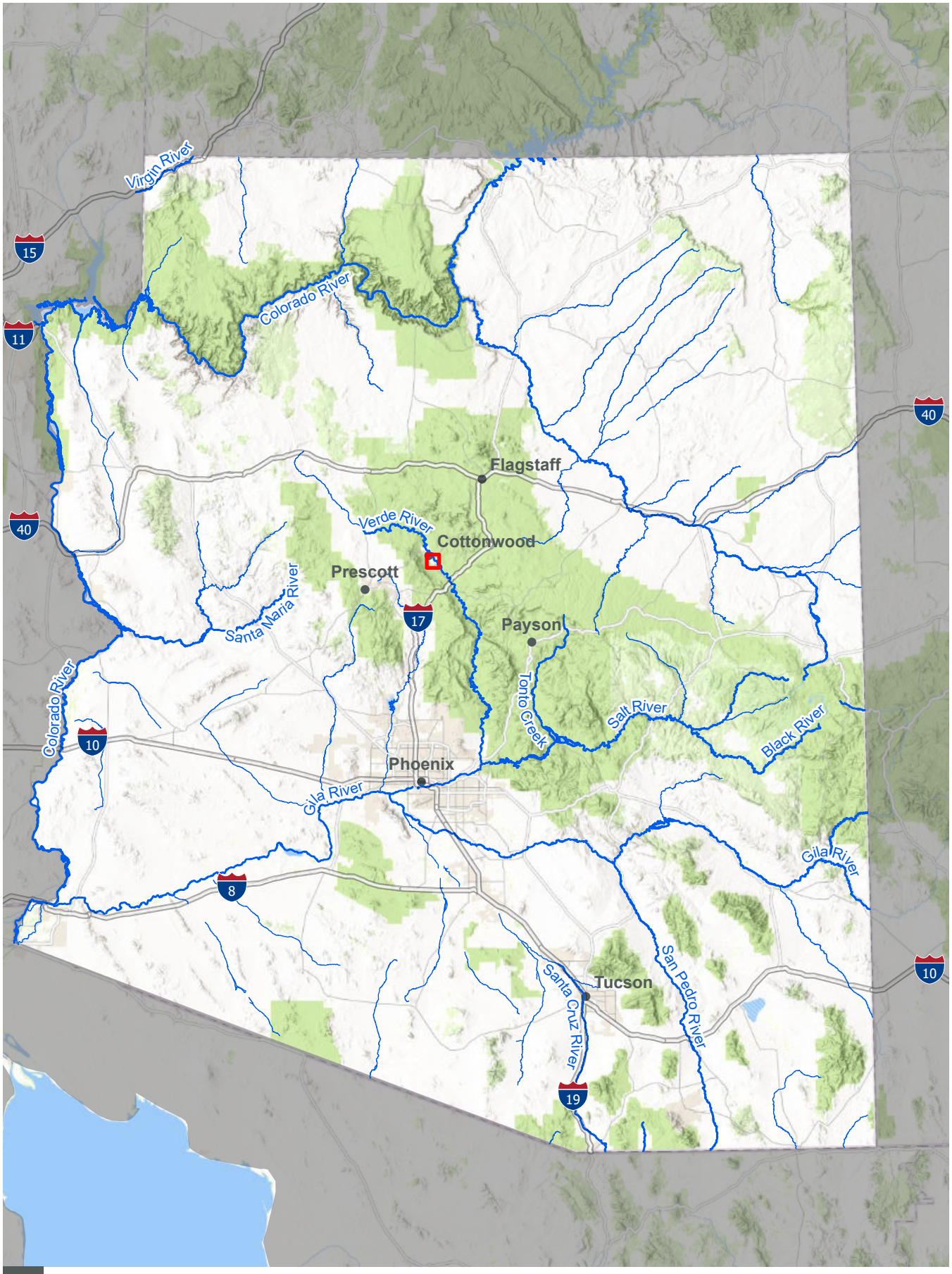

MAJOR WATERWAYS
Figure 3

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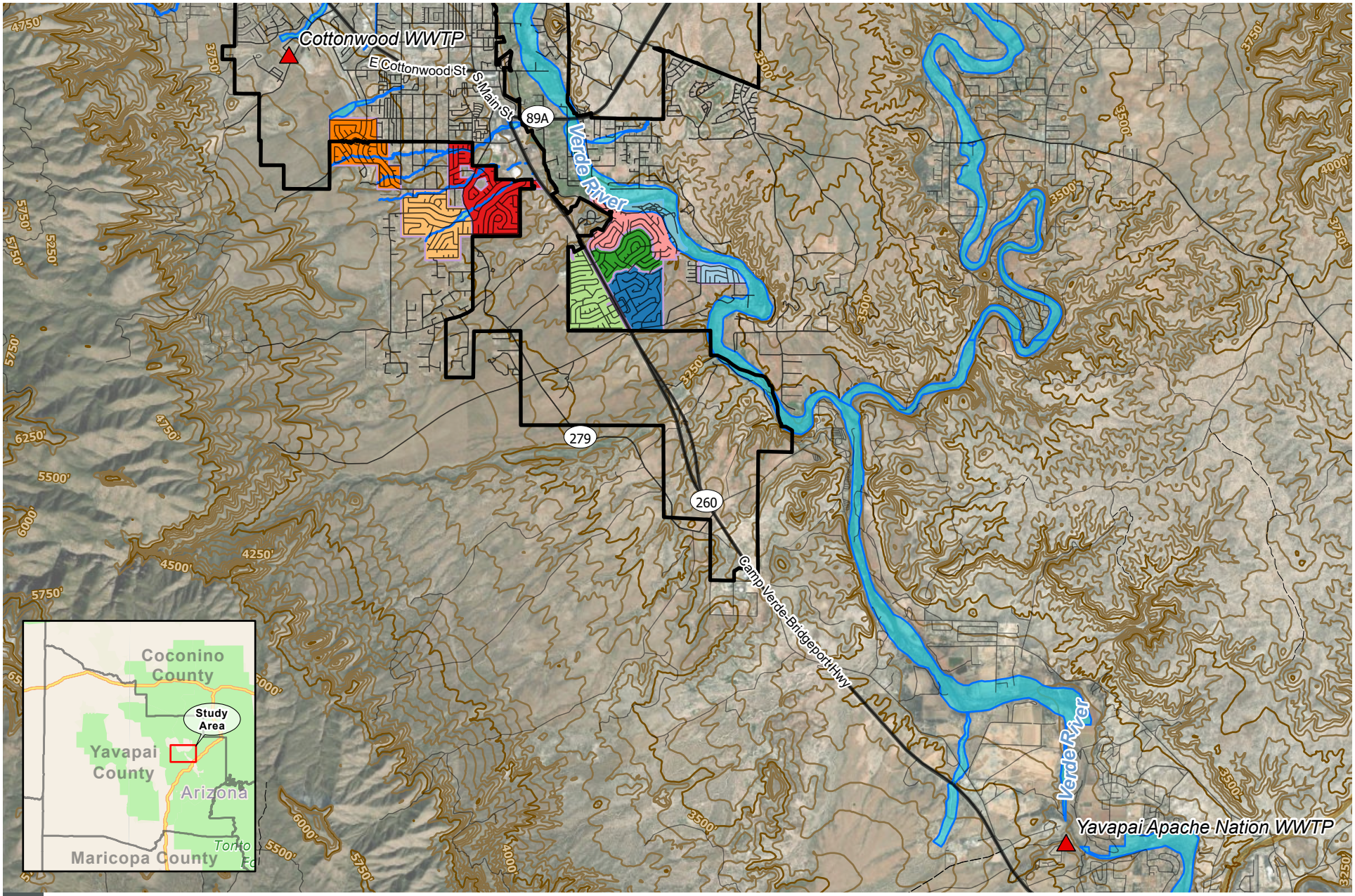
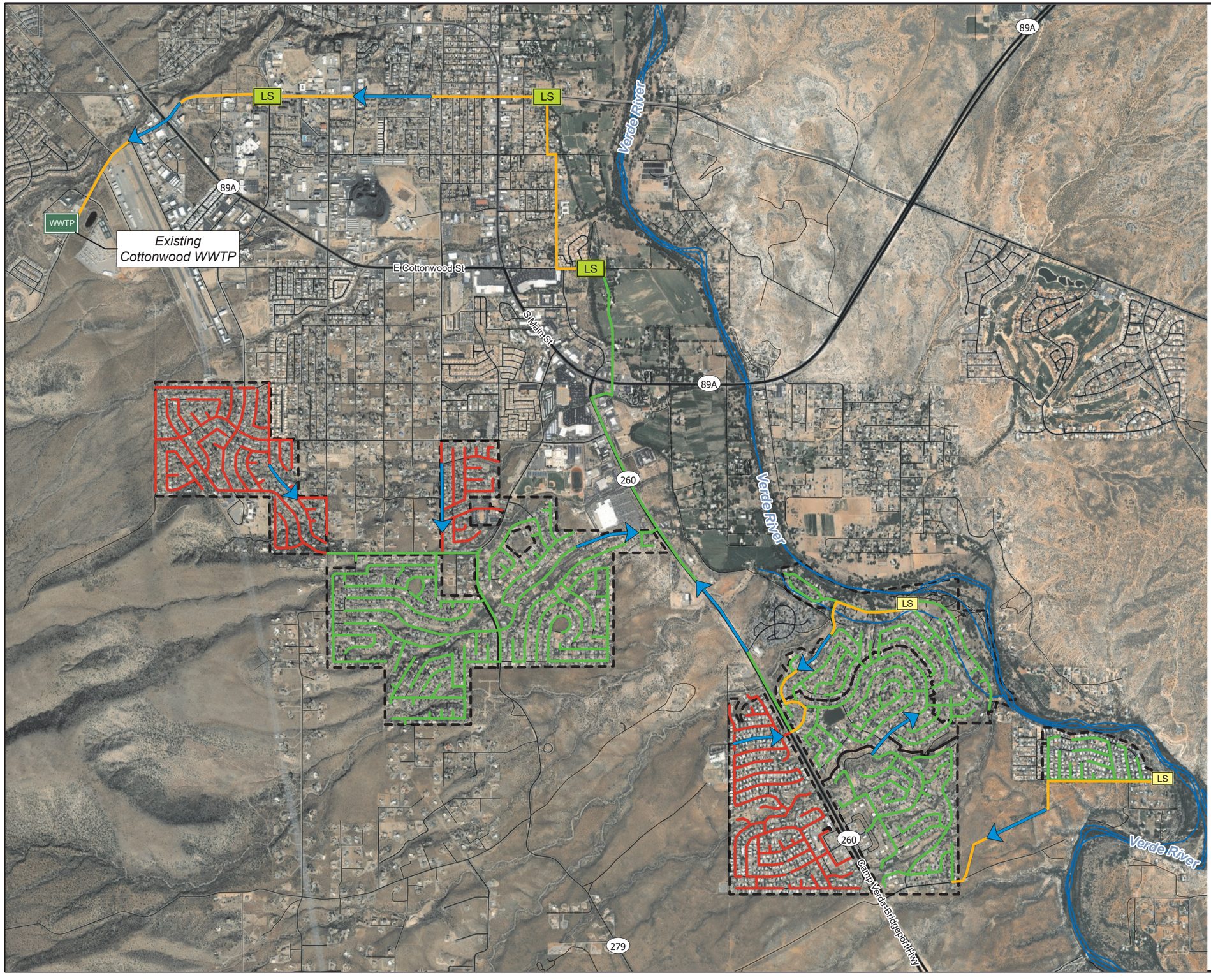


EXISTING FLOODPLAINS
Figure 4



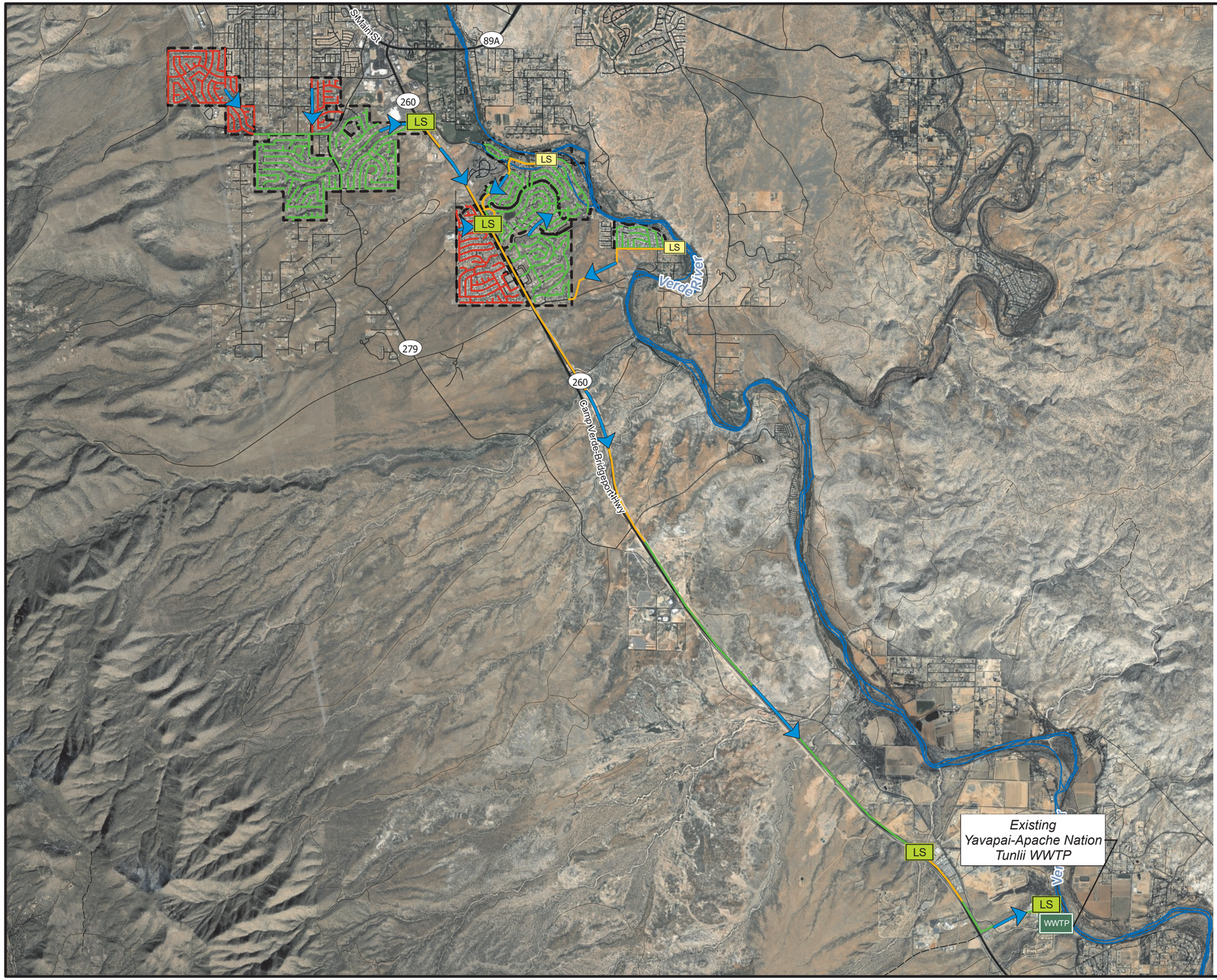
- VERDE VILLAGE COMMUNITY
- WWTP — WASTEWATER TREATMENT PLANT
- LS — CONVEYANCE LIFT STATION
- LS — NEIGHBORHOOD LIFT STATION
- PROPOSED FORCE MAIN
- PROPOSED GRAVITY SEWER
- PROPOSED LOW PRESSURE SEWER
- FLOW DIRECTION
- RIVER

0 0.5 1 Miles

FIGURE 5

Alternative 1
Partner with City of Cottonwood

Wastewater
Feasibility Report
Verde Village
Yavapai County, Arizona



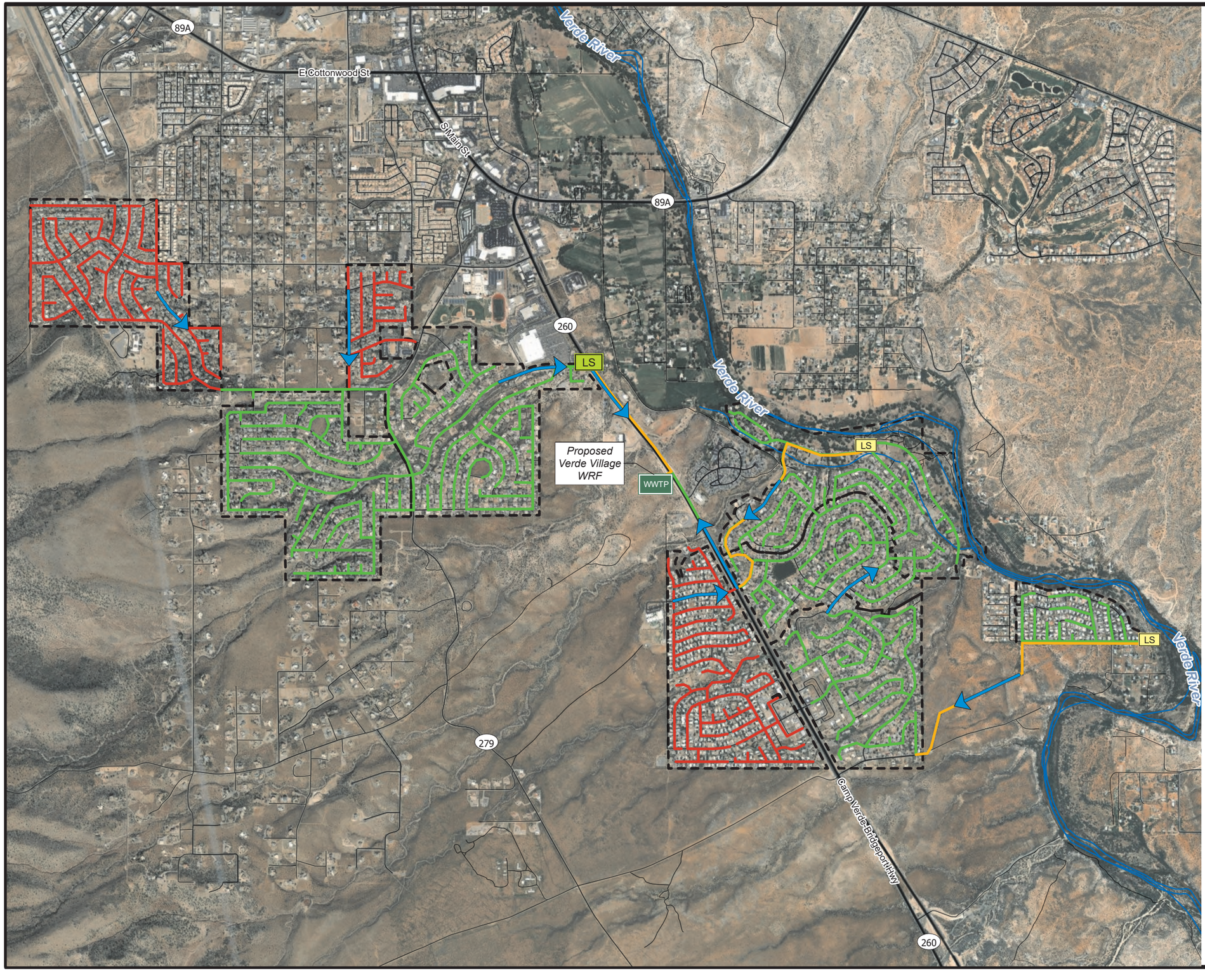
- VERDE VILLAGE COMMUNITY
- WASTEWATER TREATMENT PLANT
- LS CONVEYANCE LIFT STATION
- LS NEIGHBORHOOD LIFT STATION
- PROPOSED FORCE MAIN
- PROPOSED GRAVITY SEWER
- PROPOSED LOW PRESSURE SEWER
- FLOW DIRECTION
- RIVER

0 1 2 Miles

FIGURE 6

Alternative 2
Partner with Yavapai-Apache Nation

Wastewater Feasibility Report
Verde Village
Yavapai County, Arizona



- VERDE VILLAGE COMMUNITY
- WWTP — WASTEWATER TREATMENT PLANT
- LS — CONVEYANCE LIFT STATION
- LS — NEIGHBORHOOD LIFT STATION
- PROPOSED FORCE MAIN
- PROPOSED GRAVITY SEWER
- PROPOSED LOW PRESSURE SEWER
- FLOW DIRECTION
- RIVER

0 0.25 0.5 Miles

FIGURE 7

Alternative 3
New Verde Village WRF

Wastewater Feasibility Report
Verde Village
Yavapai County, Arizona

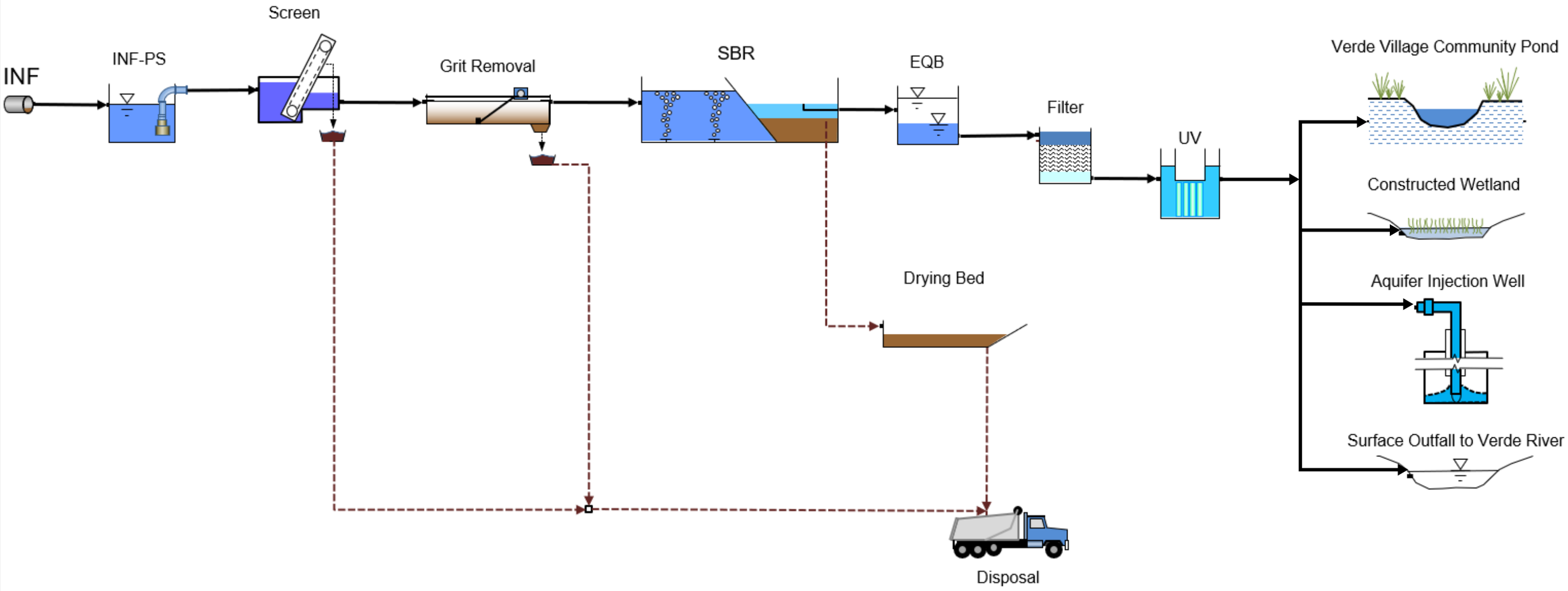


Figure 8 - SBR Process Schematic

SCALE: NTS

DATE: Dec 2023

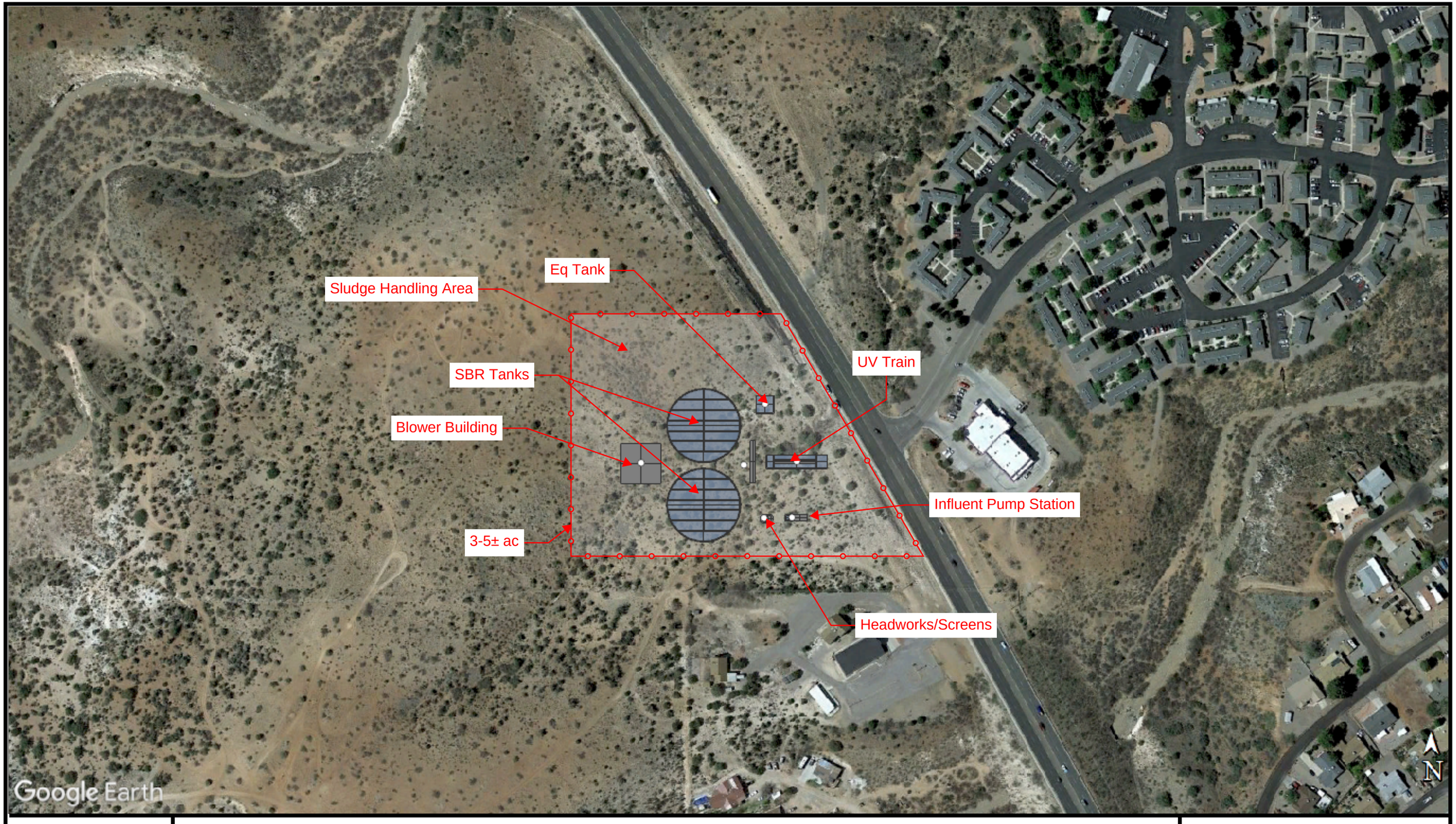


Figure 9
Conceptual Layout and Potential Location of New Verde Village WRF

SCALE: NTS

DATE: Dec 2023

Appendix B. Wastewater Flow Projections

Verde Village
Wastewater Feasibility Study
Cottonwood, AZ
PRELIMINARY CALCULATIONS

Inputs / Assumptions	Units	Value	Notes/Source
Population	person	11,385	Calculated
Dwellings	unit	4,482	Yavapai County Assessor Data
Avg Household Size	person/unit	2.54	2021 American Community Survey
AAC Method	gpd/person	80	AAC R18-9 Table 1 Unit Values - Dwellings
Cottonwood Method	gpd/person	80	City of Cottonwood Table 6-2 EDSM
ADEQ Method	gpd/person	100	ADEQ Engineering Bulletin 11
Camp Verde Method	gpd/unit	250	Wastewater Division Policy - Table D

Note: Q = flow

Q Projections AAC Method	Units	Value	Notes/Source
Average Daily Q (Qavg)	gpd	910,800	
Dry Weather Peaking Factor (PF)	-	1.83	AAC R18-9-E310(D)(1)(b)(i); No I&I assumed
Peak Daily Q Dry (Qpeak dry)	gpd	1,665,756	Qpeak dry = Qavg * PF
Peak Daily Q Wet (Qpeak wet)	gpd	1,832,332	Qpeak wet = Qpeak dry * 10%
Dry Weather Min Factor (MF)	-	0.95	Per Engineering Bulletin 11 Chapter IV - C.2
Min Daily Q (Qmin)	gpd	863,990	Qmin = Qavg * MF

Q Projections Cottonwood Method	Units	Value	Notes/Source
Average Daily Q	gpd	910,800	
Dry Weather Peaking Factor (PF)	-	2.01	AAC R18-9-E310(D)(1)(b)(i) + 10% I&I per EDSM 6.6.3
Peak Daily Q (Qpeak)	gpd	1,832,332	Qpeak = Qavg * PF
Dry Weather Min Factor (MF)	-	1.04	Per Engineering Bulletin 11 Chapter IV - C.2; Assume 10% I&I
Min Daily Q (Qmin)	gpd	950,389	Qmin = Qavg * MF

Q Projections ADEQ Method	Units	Value	Notes/Source
Average Daily Q	gpd	1,138,500	
Dry Weather Peaking Factor (PF)	-	1.05	Per Engineering Bulletin 11 Chapter IV - C.2
Peak Daily Q (Qpeak)	gpd	1,200,183	Qpeak = Qavg * PF
Dry Weather Min Factor (MF)	-	0.95	Per Engineering Bulletin 11 Chapter IV - C.2
Min Daily Q (Qmin)	gpd	1,079,987	Qmin = Qavg * MF

Q Projections Camp Verde Method	Units	Value	Notes/Source
Average Daily Q	gpd	1,120,500	
Dry Weather Peaking Factor (PF)	-	1.83	AAC R18-9-E310(D)(1)(b)(i); No I&I assumed
Peak Daily Q (Qpeak)	gpd	2,049,275	Qpeak = Qavg * PF
Dry Weather Min Factor (MF)	-	0.95	Per Engineering Bulletin 11 Chapter IV - C.2
Min Daily Q (Qmin)	gpd	1,062,912	Qmin = Qavg * MF

Harmon's Peaking Factor Check	-	2.90	PF = 1+(14/(4+(P/1000)^0.5))

Verde Village
Wastewater Feasibility Study
Cottonwood, AZ
PRELIMINARY CALCULATIONS

Inputs / Assumptions	Units	Value	Notes/Source
VV Unit 1 Dwellings	unit	203	Yavapai County Assessor Data
VV Unit 2 Dwellings	unit	509	Yavapai County Assessor Data
VV Unit 3 Dwellings	unit	678	Yavapai County Assessor Data
VV Unit 4 Dwellings	unit	440	Yavapai County Assessor Data
VV Unit 5 Dwellings	unit	586	Yavapai County Assessor Data
VV Unit 6 Dwellings	unit	750	Yavapai County Assessor Data
VV Unit 7 Dwellings	unit	601	Yavapai County Assessor Data
VV Unit 8 Dwellings	unit	639	Yavapai County Assessor Data
Unaccounted For Dwellings/Parcels	unit	76	Calculated
Total	**GPD**	**4,482**	

Proj. Qavg per VV Unit	Units	Value	Notes/Source
VV Unit 1	GPD	41,252	AAC Method; Assumes 2.54 persons/unit
VV Unit 2	GPD	103,435	AAC Method; Assumes 2.54 persons/unit
VV Unit 3	GPD	137,778	AAC Method; Assumes 2.54 persons/unit
VV Unit 4	GPD	89,414	AAC Method; Assumes 2.54 persons/unit
VV Unit 5	GPD	119,083	AAC Method; Assumes 2.54 persons/unit
VV Unit 6	GPD	152,410	AAC Method; Assumes 2.54 persons/unit
VV Unit 7	GPD	122,131	AAC Method; Assumes 2.54 persons/unit
VV Unit 8	GPD	129,853	AAC Method; Assumes 2.54 persons/unit
Unaccounted For Dwellings/Parcels	GPD	15,444	AAC Method; Assumes 2.54 persons/unit
Total	**GPD**	**910,800**	

Proj. Qpeak dry per VV Unit	Units	Value	Notes/Source
VV Unit 1	GPD	75,446	AAC Method; Assumes no I&I
VV Unit 2	GPD	189,172	AAC Method; Assumes no I&I
VV Unit 3	GPD	251,982	AAC Method; Assumes no I&I
VV Unit 4	GPD	163,528	AAC Method; Assumes no I&I
VV Unit 5	GPD	217,790	AAC Method; Assumes no I&I
VV Unit 6	GPD	278,741	AAC Method; Assumes no I&I
VV Unit 7	GPD	223,364	AAC Method; Assumes no I&I
VV Unit 8	GPD	237,487	AAC Method; Assumes no I&I
Unaccounted For Dwellings/Parcels	GPD	28,246	AAC Method; Assumes no I&I
Total	**GPD**	**1,665,756**	

Proj. Qpeak wet per VV Unit	Units	Value	Notes/Source
VV Unit 1	GPD	82,990	AAC Method; Assumes 10% I&I
VV Unit 2	GPD	208,089	AAC Method; Assumes 10% I&I
VV Unit 3	GPD	277,180	AAC Method; Assumes 10% I&I
VV Unit 4	GPD	179,881	AAC Method; Assumes 10% I&I
VV Unit 5	GPD	239,569	AAC Method; Assumes 10% I&I
VV Unit 6	GPD	306,615	AAC Method; Assumes 10% I&I
VV Unit 7	GPD	245,701	AAC Method; Assumes 10% I&I
VV Unit 8	GPD	261,236	AAC Method; Assumes 10% I&I
Unaccounted For Dwellings/Parcels	GPD	31,070	AAC Method; Assumes 10% I&I
Total	**GPD**	**1,832,332**	

Appendix C. Opinion of Capital Costs

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Project Name: **Verde Village Feasibility Study** Date: **12/11/2023**
Description: Alternative 1 - Partnership with City of Cottonwood
Level: **Class 5 (Planning Level)**

Bid Item No.	Bid Item Description	Unit	Qty	Unit Price	Extended Total
1	Mobilization/Demobilization	LS	1	5.00%	$ 5,712,076
2	Construction Staking	LS	1	1.50%	$ 1,713,623
3	Construction Surveying	LS	1	1.25%	$ 1,428,019
4	Construction Traffic Control & Barricading	LS	1	2.50%	$ 2,131,038
5	Abandon In Place Existing Septic Tank	EA	4,482	$2,500	$ 11,205,000
6	Yard Restoration	EA	4,482	$1,500	$ 6,723,000
Low Pressure Sewer System (Units 3, 8 & Portion of 6)					
7	Simplex Grinder Pump Station, including Basin, Valves, Electrical, and Connection at House, COMPLETE	EA	1,418	$8,000	$ 11,344,000
8	1.25-inch HDPE Pressure Sewer Laterals to ROW including Pipe, Valves and Connecions, COMPLETE	EA	1,418	$1,000	$ 1,418,000
9	1.25-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	548	$20	$ 10,960
10	2-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	30,531	$25	$ 763,275
11	3-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	36,071	$30	$ 1,082,130
12	4-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	13,433	$35	$ 470,155
13	6-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	7,487	$40	$ 299,480
14	8-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	910	$50	$ 45,500
15	Air/Vacuum Release Valve	EA	33	$2,000	$ 66,000
16	Cleanouts	EA	146	$1,000	$ 146,000
17	Connect to Sewer Manhole	EA	3	$1,800	$ 5,400
18	Sawcut, Remove and Replace A.C. Paving	SY	19,775	$55	$ 1,087,625
Gravity & Force Main Sewer System (Unit 1, 2, 4, 5, 7 & Portion of 6)					
19	Connect Services (New lateral to building)	EA	3,064	$3,000	$ 9,192,000
20	Backwater valves	EA	3,064	$350	$ 1,072,400
21	8-inch PVC (SDR-35) Gravity Sewer Pipe	LF	150,920	$160	$ 24,147,200
22	12-inch PVC (SDR-35) Gravity Sewer Pipe	LF	7,750	$200	$ 1,550,000
23	48-inch Manhole	EA	400	$7,000	$ 2,800,000
24	2-inch PVC (C900) Force Main	LF	6,060	$40	$ 242,400
25	6-inch PVC (C900) Force Main	LF	5,860	$80	$ 468,800
26	Neighborhood Lift Station (Capacity < 0.25 MGD)	EA	1	$100,000	$ 100,000
27	Neighborhood Lift Station (Capacity > 0.25 MGD and < 0.75 MGD)	EA	1	$620,000	$ 620,000
28	Sawcut, Remove and Replace A.C. Paving	SY	37,910	$55	$ 2,085,050
Public Sewer System (R.O.W. AZ-260 to Mingus WWTP)					
29	Conveyance Lift Station (Capacity of 1.8 MGD)	EA	3	$850,000	$ 2,550,000
30	12-inch PVC (SDR-35) Gravity Sewer Pipe	LF	5,640	$200	$ 1,128,000
31	15-inch PVC (SDR-35) Gravity Sewer Pipe	LF	7,120	$250	$ 1,780,000
32	48-inch Manhole	EA	32	$5,500	$ 176,000
32	8-inch PVC (C900) Force Main	LF	0	$100	$ -
33	10-inch PVC (C900) Force Main	LF	17,630	$130	$ 2,291,900
34	Sawcut, Remove and Replace A.C. Paving	SY	6,750	$55	$ 371,250
35	Utility Relocations	LS	1	1.00%	$ 852,415
Expanding Cottonwood Mingus WWTP					
36	Cottonwood Mingus WWTP Expansion	gal	1,000,000	$29	$ 29,000,000
				Probable Construction Bid Price (Rounded)	$ 126,000,000
				General Conditions 5.00%	$ 6,300,000
				Contingency 20.00%	$ 25,200,000
				Contractor Fee, Overhead and Profit 7.00%	$ 8,820,000
				Tax 6.40%	$ 8,064,000
				Insurance & Bonds 2.00%	$ 2,520,000
				Construction Management 5.00%	$ 6,300,000
				Permit Fee 0.50%	$ 630,000
				Total Probable Construction Bid Price (Rounded)	**$ 184,000,000**
Indirect Project Costs					
37	Engineering Design Services	LS	1	8.00%	$ 14,720,000
38	Construction Administration	LS	1	4.00%	$ 7,360,000
39	Construction Observation Services	LS	1	7.00%	$ 12,880,000
40	Legal Costs	LS	1	2.00%	$ 3,680,000
				Total Indirect Project Costs (Rounded)	**$ 39,000,000**

Total Capital Cost	**$ 223,000,000**

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Project Name: **Verde Village Feasibility Study** Date: **12/11/2023**
Description: Alternative 2 - Partnership with Yavapai-Apache Nation
Level: **Class 5 (Planning Level)**

Bid Item No.	Bid Item Description	Unit	Qty	Unit Price	Extended Total
1	Mobilization/Demobilization	LS	1	5.00%	$ 5,406,611
2	Construction Staking	LS	1	1.50%	$ 1,621,983
3	Construction Surveying	LS	1	1.25%	$ 1,351,653
4	Construction Traffic Control & Barricading, CIP	LS	1	2.50%	$ 2,253,306
5	Abandon In Place Existing Septic Tank	EA	4,482	$2,500	$ 11,205,000
6	Yard Restoration	EA	4,482	$1,500	$ 6,723,000
Low Pressure Sewer System (Units 3, 8 & Portion of 6)					
7	Simplex Grinder Pump Station, including Basin, Valves, Electrical, and Connection at House, COMPLETE	EA	1,418	$8,000	$ 11,344,000
8	1.25-inch HDPE Pressure Sewer Laterals to ROW including Pipe, Valves and Connecions, COMPLETE	EA	1,418	$1,000	$ 1,418,000
9	1.25-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	548	$20	$ 10,960
10	2-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	30,531	$25	$ 763,275
11	3-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	36,071	$30	$ 1,082,130
12	4-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	13,433	$35	$ 470,155
13	6-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	7,487	$40	$ 299,480
14	8-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	910	$50	$ 45,500
15	Air/Vacuum Release Valve	EA	33	$2,000	$ 66,000
16	Cleanouts	EA	146	$1,000	$ 146,000
17	Connect to Sewer Manhole	EA	3	$1,800	$ 5,400
18	Sawcut, Remove and Replace A.C. Paving	SY	19,775	$55	$ 1,087,625
Gravity & Force Main Sewer System (Unit 1, 2, 4, 5, 7 & Portion of 6)					
19	Connect Services (New lateral to building)	EA	3,064	$3,000	$ 9,192,000
20	Backwater valves	EA	3,064	$350	$ 1,072,400
21	8-inch PVC (SDR-35) Gravity Sewer Pipe	LF	150,920	$160	$ 24,147,200
22	12-inch PVC (SDR-35) Gravity Sewer Pipe	LF	7,750	$200	$ 1,550,000
23	48-inch Manhole	EA	400	$7,000	$ 2,800,000
24	2-inch PVC (C900) Force Main	LF	6,060	$40	$ 242,400
25	6-inch PVC (C900) Force Main	LF	5,860	$80	$ 468,800
26	Neighborhood Lift Station (Capacity < 0.25 MGD)	EA	1	$100,000	$ 100,000
27	Neighborhood Lift Station (Capacity > 0.25 MGD and < 0.75 MGD)	EA	1	$620,000	$ 620,000
28	Sawcut, Remove and Replace A.C. Paving	SY	37,910	$55	$ 2,085,050
Public Sewer System (R.O.W. AZ-260 to YAN WWTP)					
29	Conveyance Lift Station (Capacity of 0.8 MGD)	EA	1	$650,000	$ 650,000
30	Conveyance Lift Station (Capacity of 1.8 MGD)	EA	3	$850,000	$ 2,550,000
31	15-inch PVC (SDR-35) Gravity Sewer Pipe	LF	24,840	$250	$ 6,210,000
32	48-inch Manhole	EA	64	$5,500	$ 352,000
33	8-inch PVC (C900) Force Main	LF	5,640	$100	$ 564,000
34	10-inch PVC (C900) Force Main	LF	17,500	$130	$ 2,275,000
35	Sawcut, Remove and Replace A.C. Paving	SY	10,670	$55	$ 586,850
36	Utility Relocations	LS	1	1.00%	$ 901,322
Expanding Yavapai-Apache Nation WWTP					
37	New SBR Facility	gal	1,000,000	$18	$ 18,000,000
				Probable Construction Bid Price (Rounded)	$ 120,000,000
				General Conditions 5.00%	$ 6,000,000
				Contingency 20.00%	$ 24,000,000
				Contractor Fee, Overhead and Profit 7.00%	$ 8,400,000
				Tax 6.40%	$ 7,680,000
				Bonds 2.00%	$ 2,400,000
				Construction Management 5.00%	$ 6,000,000
				Permit Fee 0.50%	$ 600,000
				Total Probable Construction Bid Price (Rounded)	**$ 175,000,000**
Indirect Project Costs					
38	Engineering Design Services	LS	1	8.00%	$ 14,000,000
39	Construction Administration	LS	1	4.00%	$ 7,000,000
40	Construction Observation Services	LS	1	7.00%	$ 12,250,000
41	Legal Costs	LS	1	2.00%	$ 3,500,000
				Total Indirect Project Costs (Rounded)	**$ 37,000,000**

Total Capital Cost	**$ 212,000,000**

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Project Name: **Verde Village Feasibility Study** Date: **12/11/2023**
Description: Alternative 3 - New Verde Village WRF
Level: **Class 5 (Planning Level)**

Bid Item No.	Bid Item Description	Unit	Qty	Unit Price	Extended Total
1	Mobilization/Demobilization	LS	1	5.00%	$ 4,830,576
2	Construction Staking	LS	1	1.50%	$ 1,449,173
3	Construction Surveying	LS	1	1.25%	$ 1,207,644
4	Construction Traffic Control & Barricading, CIP	LS	1	2.50%	$ 1,965,288
5	Abandon In Place Existing Septic Tank	EA	4,482	$2,500	$ 11,205,000
6	Yard Restoration	EA	4,482	$1,500	$ 6,723,000
Low Pressure Sewer System (Units 3, 8 & Portion of 6)					
7	Simplex Grinder Pump Station, including Basin, Valves, Electrical, and Connection at House, COMPLETE	EA	1,418	$8,000	$ 11,344,000
8	1.25-inch HDPE Pressure Sewer Laterals to ROW including Pipe, Valves and Connecions, COMPLETE	EA	1,418	$1,000	$ 1,418,000
9	1.25-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	548	$20	$ 10,960
10	2-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	30,531	$25	$ 763,275
11	3-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	36,071	$30	$ 1,082,130
12	4-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	13,433	$35	$ 470,155
13	6-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	7,487	$40	$ 299,480
14	8-inch HDPE (SDR-11) Pressure Sewer Pipe	LF	910	$50	$ 45,500
15	Air/Vacuum Release Valve	EA	33	$2,000	$ 66,000
16	Cleanouts	EA	146	$1,000	$ 146,000
17	Connect to Sewer Manhole	EA	3	$1,800	$ 5,400
18	Sawcut, Remove and Replace A.C. Paving	SY	19,775	$55	$ 1,087,625
Gravity & Force Main Sewer System (Unit 1, 2, 4, 5, 7 & Portion of 6)					
19	Connect Services (New lateral to building)	EA	3,064	$3,000	$ 9,192,000
20	Backwater valves	EA	3,064	$350	$ 1,072,400
21	8-inch PVC (SDR-35) Gravity Sewer Pipe	LF	150,920	$160	$ 24,147,200
22	12-inch PVC (SDR-35) Gravity Sewer Pipe	LF	7,750	$200	$ 1,550,000
23	48-inch Manhole	EA	400	$7,000	$ 2,800,000
24	2-inch PVC (C900) Force Main	LF	6,060	$40	$ 242,400
25	6-inch PVC (C900) Force Main	LF	5,860	$80	$ 468,800
26	Neighborhood Lift Station (Capacity < 0.25 MGD)	EA	1	$100,000	$ 100,000
27	Neighborhood Lift Station (Capacity > 0.25 MGD and < 0.75 MGD)	EA	1	$620,000	$ 620,000
28	Sawcut, Remove and Replace A.C. Paving	SY	37,910	$55	$ 2,085,050
Public Sewer System (R.O.W. AZ-260 to Verde Village WRF)					
29	Conveyance Lift Station (Capacity of 0.8 MGD)	EA	1	$650,000	$ 650,000
30	12-inch PVC (SDR-35) Gravity Sewer Pipe	LF	2,790	$200	$ 558,000
31	48-inch Manhole	EA	8	$5,500	$ 44,000
32	8-inch PVC (C900) Force Main	LF	2,850	$100	$ 285,000
33	10-inch PVC (C900) Force Main	LF	430	$130	$ 55,900
34	Sawcut, Remove and Replace A.C. Paving	SY	1,350	$55	$ 74,250
35	Utility Relocations	LS	1	1.00%	$ 786,115
New Verde Village WRF					
36	New SBR Facility	gal	1,000,000	$18	$ 18,000,000
37	New Aquifer Injection Well	LS	1	$2,100,000	$ 2,100,000
38	New Constructed Wetland/Riparian Area	LS	1	$1,400,000	$ 1,400,000
				Probable Construction Bid Price (Rounded)	$ 110,000,000
				General Conditions 5.00%	$ 5,500,000
				Contingency 20.00%	$ 22,000,000
				Contractor Fee, Overhead and Profit 7.00%	$ 7,700,000
				Tax 6.40%	$ 7,040,000
				Bonds 2.00%	$ 2,200,000
				Construction Management 5.00%	$ 5,500,000
				Permit Fee 0.50%	$ 550,000
				Total Probable Construction Bid Price (Rounded)	**$ 160,000,000**
Indirect Project Costs					
39	Engineering Design Services	LS	1	8.00%	$ 12,800,000
40	Construction Administration	LS	1	4.00%	$ 6,400,000
41	Construction Observation Services	LS	1	7.00%	$ 11,200,000
42	Legal Costs	LS	1	2.00%	$ 11,000
43	Treatment Facility Land/Easement Acquisition	AC	5	$150,000	$ 750,000
44	Wetland/Riparian Area Land/Easement Acquisition	AC	15	$150,000	$ 2,250,000
				Total Indirect Project Costs (Rounded)	**$ 33,000,000**

Total Capital Cost	**$ 193,000,000**

Verde Village Wastewater Feasibility Study
Neighborhood Lift Station Construction Costs and O&M (Capacity > 0.25 MGD and <0.75 MGD)

Construction Costs						
Base Cost	**Equipment**	**Labor**	**Material**	**Other**	**Subcontract**	**Subtotal**
01 - General Requirements	$0	$0	$0	$0	$0	$0
02 - Site Construction	$4,330	$2,590	$66	$0	$0	$6,990
03 - Concrete	$533	$25,300	$14,000	$0	$0	$39,800
04 - Masonry	$0	$0	$0	$0	$0	$0
05 - Metals	$51	$937	$3,640	$0	$0	$4,630
06 - Woods & Plastics	$0	$0	$0	$0	$0	$0
07 - Thermal & Moisture Protection	$0	$0	$0	$0	$0	$0
08 - Doors & Windows	$0	$226	$1,470	$0	$0	$1,700
09 - Finishes	$0	$0	$0	$0	$0	$0
10 - Specialties	$0	$0	$0	$0	$0	$0
11 - Equipment	$157	$2,100	$22,000	$0	$2,540	$26,800
13 - Special Construction	$0	$0	$0	$0	$9,610	$9,610
14 - Conveying Systems	$0	$0	$8,360	$0	$0	$8,360
15 - Mechanical	$1,210	$13,200	$42,800	$0	$0	$57,200
16 - Electrical	$496	$5,310	$44,800	$0	$23,100	$73,700
A. Subtotal	**$0**	**$0**	**$0**	**$0**	**$0**	**$229,000**

Additions/Contingency		
Items	**Formula**	**Cost**
B. Miscellaneous and Unidentified Site Structures	(A*0.25)	$57,200
C. Unit Process Subtotal	(A+B)	$286,000
D. Sitework	(C*0.15)	$42,900
E. Demolition	(C*0.01)	$2,860
F. I&C (SCADA)	(C*0.08)	$22,900
G. Site Electrical	(C*0)	$0
H. Large Piping and Specialty piping	(C*0.05)	$14,300
J. Soil Conditions (Geotechnical requirements)	(C*0.07)	$20,000
K. Field General Conditions	(C*0.07)	$20,000
L. Mobilization and Demobilization	(C*0.05)	$14,300
M. Construction Subtotal (excluding miscellaneous items)	(C+D+E+F+G+H+J+K+L)	$423,000
N. Miscellaneous Elements not Itemized	(M*0.2)	$84,600
P. Non-Construction Fees	(P)	$0
R. Construction Subtotal (including miscellaneous items)	(M+N+P)	$508,000
S. Sales Tax	(R*0.07)	$35,600
T. General Contractor OH and Profit	((R+S)*0.08)	$43,500
U. Bonds and Insurance	((R+S+T)*0.015)	$8,810
V. Construction Price Today	(R+S+T+U)	$596,000
W. Projection to Mid-point of Construction	(V*0.035)	$20,900
X. Market adjustment factor	(V*0)	$0
Y. Location adjustment factor	(V*0)	$0
Z. Construction Bid Price	**(V+W+X+Y)**	**$617,000**

Operation & Maintenance					
Operation	**Unit Rates**	**Cost Units**	**Annual Rates**	**Annual Units**	**Annual Cost**
Building Energy					$0
Diesel					$0
Labor	75	$/hr	317.14	hr/yr	$23,800
Materials	1	$	2.86	$/yr	$553
Natural Gas					$0
Process Energy	0.15	$/kWh	268,100.00	kWh/yr	$40,200
Subtotal					**$64,600**

Verde Village Wastewater Feasibility Study
Conveyance Lift Station Construction Costs and O&M (Capacity=0.8MGD)

Construction Costs						
Base Cost	**Equipment**	**Labor**	**Material**	**Other**	**Subcontract**	**Subtotal**
01 - General Requirements	$0	$0	$0	$0	$0	$0
02 - Site Construction	$4,610	$2,760	$69	$0	$0	$7,440
03 - Concrete	$578	$27,000	$15,100	$0	$0	$42,700
04 - Masonry	$0	$0	$0	$0	$0	$0
05 - Metals	$54	$984	$3,830	$0	$0	$4,870
06 - Woods & Plastics	$0	$0	$0	$0	$0	$0
07 - Thermal & Moisture Protection	$0	$0	$0	$0	$0	$0
08 - Doors & Windows	$0	$226	$1,470	$0	$0	$1,700
09 - Finishes	$0	$0	$0	$0	$0	$0
10 - Specialties	$0	$0	$0	$0	$0	$0
11 - Equipment	$157	$2,110	$24,300	$0	$2,540	$29,100
13 - Special Construction	$0	$0	$0	$0	$10,100	$10,100
14 - Conveying Systems	$0	$0	$8,360	$0	$0	$8,360
15 - Mechanical	$1,270	$13,700	$46,100	$0	$0	$61,100
16 - Electrical	$502	$5,380	$45,300	$0	$24,300	$75,500
A. Subtotal						**$241,000**

Additions/Contingency		
Items	**Formula**	**Cost**
B. Miscellaneous and Unidentified Site Structures	(A*0.25)	$60,200
C. Unit Process Subtotal	(A+B)	$301,000
D. Sitework	(C*0.15)	$45,200
E. Demolition	(C*0.01)	$3,010
F. I&C (SCADA)	(C*0.08)	$24,100
G. Site Electrical	(C*0)	$0
H. Large Piping and Specialty piping	(C*0.05)	$15,000
J. Soil Conditions (Geotechnical requirements)	(C*0.07)	$21,100
K. Field General Conditions	(C*0.07)	$21,100
L. Mobilization and Demobilization	(C*0.05)	$15,000
M. Construction Subtotal (excluding miscellaneous items)	(C+D+E+F+G+H+J+K+L)	$446,000
N. Miscellaneous Elements not Itemized	(M*0.2)	$89,200
P. Non-Construction Fees	(P)	$0
R. Construction Subtotal (including miscellaneous items)	(M+N+P)	$535,000
S. Sales Tax	(R*0.07)	$37,400
T. General Contractor OH and Profit	((R+S)*0.08)	$45,800
U. Bonds and Insurance	((R+S+T)*0.015)	$9,270
V. Construction Price Today	(R+S+T+U)	$627,000
W. Projection to Mid-point of Construction	(V*0.035)	$21,900
X. Market adjustment factor	(V*0)	$0
Y. Location adjustment factor	(V*0)	$0
Z. Construction Bid Price	**(V+W+X+Y)**	**$649,000**

Operation & Maintenance					
Operation	**Unit Rates**	**Cost Units**	**Annual Rates**	**Annual Units**	**Annual Cost**
Building Energy					$0
Diesel					$0
Labor	75	$/hr	335.85	hr/yr	$25,200
Materials	1	$	3.2	$/yr	$619
Natural Gas					$0
Process Energy	0.15	$/kWh	153,600.00	kWh/yr	$23,000
Subtotal					**$48,800**

Verde Village Wastewater Feasibility Study
Conveyance Lift Station Construction Costs and O&M (Capacity=1.8MGD)

Construction Costs						
Base Cost	**Equipment**	**Labor**	**Material**	**Other**	**Subcontract**	**Subtotal**
01 - General Requirements	$0	$0	$0	$0	$0	$0
02 - Site Construction	$7,500	$4,470	$89	$0	$0	$12,100
03 - Concrete	$1,050	$42,500	$26,200	$0	$0	$69,800
04 - Masonry	$0	$0	$0	$0	$0	$0
05 - Metals	$73	$1,340	$5,200	$0	$0	$6,610
06 - Woods & Plastics	$0	$0	$0	$0	$0	$0
07 - Thermal & Moisture Protection	$0	$0	$0	$0	$0	$0
08 - Doors & Windows	$0	$226	$1,470	$0	$0	$1,700
09 - Finishes	$0	$0	$0	$0	$0	$0
10 - Specialties	$0	$0	$0	$0	$0	$0
11 - Equipment	$157	$2,170	$34,500	$0	$2,540	$39,400
13 - Special Construction	$0	$0	$0	$0	$13,200	$13,200
14 - Conveying Systems	$0	$0	$8,360	$0	$0	$8,360
15 - Mechanical	$1,820	$14,200	$62,400	$0	$0	$78,400
16 - Electrical	$527	$5,650	$47,600	$0	$31,700	$85,500
A. Subtotal	**$0**	**$0**	**$0**	**$0**	**$0**	**$315,000**

Additions/Contingency		
Items	**Formula**	**Cost**
B. Miscellaneous and Unidentified Site Structures	(A*0.25)	$78,800
C. Unit Process Subtotal	(A+B)	$394,000
D. Sitework	(C*0.15)	$59,100
E. Demolition	(C*0.01)	$3,940
F. I&C (SCADA)	(C*0.08)	$31,500
G. Site Electrical	(C*0)	$0
H. Large Piping and Specialty piping	(C*0.05)	$19,700
J. Soil Conditions (Geotechnical requirements)	(C*0.07)	$27,600
K. Field General Conditions	(C*0.07)	$27,600
L. Mobilization and Demobilization	(C*0.05)	$19,700
M. Construction Subtotal (excluding miscellaneous items)	(C+D+E+F+G+H+J+K+L)	$583,000
N. Miscellaneous Elements not Itemized	(M*0.2)	$117,000
P. Non-Construction Fees	(P)	$0
R. Construction Subtotal (including miscellaneous items)	(M+N+P)	$700,000
S. Sales Tax	(R*0.07)	$49,000
T. General Contractor OH and Profit	((R+S)*0.08)	$59,900
U. Bonds and Insurance	((R+S+T)*0.015)	$12,100
V. Construction Price Today	(R+S+T+U)	$821,000
W. Projection to Mid-point of Construction	(V*0.035)	$28,700
X. Market adjustment factor	(V*0)	$0
Y. Location adjustment factor	(V*0)	$0
Z. Construction Bid Price	**(V+W+X+Y)**	**$850,000**

Operation & Maintenance					
Operation	**Unit Rates**	**Cost Units**	**Annual Rates**	**Annual Units**	**Annual Cost**
Building Energy					$0
Diesel					$0
Labor	75	$/hr	475.72	hr/yr	$35,700
Materials	1	$	6.36	$/yr	$1,230
Natural Gas					$0
Process Energy	0.15	$/kWh	689,400.00	kWh/yr	$103,000
Subtotal					**$140,000**

Appendix D. Operation and Maintenance Costs

Verde Village Wastewater Feasibility Study
Collection System O&M Costs

Methods:
EPA Table 5.3: Average Cost per Capita for Various Types of Sewer Systems ($/yr-capita)
EPA Table 5.4: O&MR Cost per Mile of Gravity Sewers ($/yr-mi)

Alternative 1: Partnership with City of Cottonwood				
Method	**Unit**	**Unit Price**	**Quantity**	**Total**
EPA Table 5.3[1]	capita	$65	11,385	$ 740,025
EPA Table 5.4[2]	mi	$12,485	55	$ 686,675
			Average Collection System O&M:	**$ 713,350**
Alternative 2: Partnership with Yavapai-Apache Nation				
Method	**Unit**	**Unit Price**	**Quantity**	**Total**
EPA Table 5.3[1]	capita	$65	11,385	$ 740,025
EPA Table 5.4[2]	mi	$12,485	58	$ 724,130
			Average Collection System O&M:	**$ 732,078**
Alternative 3: New Verde Village WRF				
Method	**Unit**	**Unit Price**	**Quantity**	**Total**
EPA Table 5.3[1]	capita	$65	11,385	$ 740,025.00
EPA Table 5.4[2]	mi	$12,485	50	$ 624,250.00
			Average Collection System O&M:	**$ 682,138**

Notes:

1. EPA Table 5.3: Average Cost per Capita for Various Types of Sewer Systems, Reported Year 1978. O&M and minor repairs considered.
2. EPA Table 5.4: O&MR Cost per Mile of Gravity Sewers, Reported Year 1978. O&M and minor repairs considered.

Verde Village Wastewater Feasibility Study
Lift Station O&M Costs

Alternative 1: Partnership with City of Cottonwood				
Description	**Unit**	**Quantity**	**O&M Costs per LS**	**Total**
Neighborhood Lift Station (Capacity <0.25 MGD)[1]	EA	1	$19,800	$ 19,800
Neighborhood Lift Station (Capacity >0.25 and <0.75 MGD)[2]	EA	1	$64,600	$ 64,600
Conveyance Lift Station (Capacity = 1.8 MGD)[2]	EA	3	$140,000	$ 420,000
			Total Lift Station O&M:	**$ 504,400**
Alternative 2: Partnership with Yavapai-Apache Nation				
Description	**Unit**	**Quantity**	**O&M Costs per LS**	**Total**
Neighborhood Lift Station (Capacity <0.25 MGD)[1]	EA	1	$19,800	$ 19,800
Neighborhood Lift Station (Capacity >0.25 and <0.75 MGD)[2]	EA	1	$64,600	$ 64,600
Conveyance Lift Station (Capacity = 0.8 MGD)[2]	EA	1	$48,800	$ 48,800
Conveyance Lift Station (Capacity = 1.8 MGD)[2]	EA	3	$140,000	$ 420,000
			Total Lift Station O&M:	**$ 553,200**
Alternative 3: New Verde Village WRF				
Description	**Unit**	**Quantity**	**O&M Costs per LS**	**Total**
Neighborhood Lift Station (Capacity <0.25 MGD)[1]	EA	1	$19,800	$ 19,800.00
Neighborhood Lift Station (Capacity >0.25 and <0.75 MGD)[2]	EA	1	$64,600	$ 64,600.00
Conveyance Lift Station (Capacity = 0.8 MGD)[2]	EA	1	$48,800	$ 48,800.00
			Total Lift Station O&M:	**$ 133,200**

Notes:

1. O&M cost based on EPA Table 5.5: Pumping Stations Cost Relationships, Reported Year 1978. O&M and minor repairs considered. EPA O&M cost is $24,372.95 per million gallons per day in present day value. Small lift Station Peak flow is 81,066 gpd, which equals $19,800 O&M costs.

2. Refer to Lift Station Cost Estimates for O&M Cost breakdown.

Verde Village Wastewater Feasibility Study
Summary of O&M Costs

	Year																				
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alternative 1: Partnership with City of Cottonwood																					
Collection System O&M	$ 713,350	$ 734,751	$ 756,793	$ 779,497	$ 802,882	$ 826,968	$ 851,777	$ 877,331	$ 903,650	$ 930,760	$ 958,683	$ 987,443	$ 1,017,067	$ 1,047,579	$ 1,079,006	$ 1,111,376	$ 1,144,717	$ 1,179,059	$ 1,214,431	$ 1,250,864	$ 1,288,389
Lift Station O&M	$ 504,400	$ 519,532	$ 535,118	$ 551,171	$ 567,707	$ 584,738	$ 602,280	$ 620,348	$ 638,959	$ 658,128	$ 677,871	$ 698,208	$ 719,154	$ 740,728	$ 762,950	$ 785,839	$ 809,414	$ 833,696	$ 858,707	$ 884,468	$ 911,003
Treatment O&M [1]	$ 902,315	$ 929,384	$ 957,266	$ 985,984	$ 1,015,563	$ 1,046,030	$ 1,077,411	$ 1,109,733	$ 1,143,025	$ 1,177,316	$ 1,212,636	$ 1,249,015	$ 1,286,485	$ 1,325,080	$ 1,364,832	$ 1,405,777	$ 1,447,950	$ 1,491,389	$ 1,536,131	$ 1,582,214	$ 1,629,681
Reuse O&M[2]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total O&M:	**$ 2,120,065**	**$ 2,183,667**	**$ 2,249,177**	**$ 2,316,652**	**$ 2,386,152**	**$ 2,457,736**	**$ 2,531,468**	**$ 2,607,412**	**$ 2,685,635**	**$ 2,766,204**	**$ 2,849,190**	**$ 2,934,665**	**$ 3,022,705**	**$ 3,113,387**	**$ 3,206,788**	**$ 3,302,992**	**$ 3,402,082**	**$ 3,504,144**	**$ 3,609,268**	**$ 3,717,546**	**$ 3,829,073**
Alternative 2: Partnership with Yavapai-Apache Nation																					
Collection System O&M	$ 732,078	$ 754,040	$ 776,662	$ 799,961	$ 823,960	$ 848,679	$ 874,139	$ 900,364	$ 927,375	$ 955,196	$ 983,852	$ 1,013,367	$ 1,043,768	$ 1,075,081	$ 1,107,334	$ 1,140,554	$ 1,174,770	$ 1,210,013	$ 1,246,314	$ 1,283,703	$ 1,322,214
Lift Station O&M	$ 553,200	$ 569,796	$ 586,890	$ 604,497	$ 622,631	$ 641,310	$ 660,550	$ 680,366	$ 700,777	$ 721,801	$ 743,455	$ 765,758	$ 788,731	$ 812,393	$ 836,765	$ 861,868	$ 887,724	$ 914,355	$ 941,786	$ 970,040	$ 999,141
Treatment O&M	$ 893,079	$ 919,871	$ 947,468	$ 975,892	$ 1,005,168	$ 1,035,323	$ 1,066,383	$ 1,098,375	$ 1,131,326	$ 1,165,266	$ 1,200,223	$ 1,236,230	$ 1,273,317	$ 1,311,517	$ 1,350,862	$ 1,391,388	$ 1,433,130	$ 1,476,124	$ 1,520,407	$ 1,566,019	$ 1,613,000
Reuse O&M[2]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total O&M:	**$ 2,178,357**	**$ 2,243,708**	**$ 2,311,019**	**$ 2,380,350**	**$ 2,451,760**	**$ 2,525,313**	**$ 2,601,072**	**$ 2,679,104**	**$ 2,759,477**	**$ 2,842,262**	**$ 2,927,530**	**$ 3,015,356**	**$ 3,105,816**	**$ 3,198,991**	**$ 3,294,960**	**$ 3,393,809**	**$ 3,495,624**	**$ 3,600,492**	**$ 3,708,507**	**$ 3,819,762**	**$ 3,934,355**
Alternative 3: New Verde Village WRF																					
Collection System O&M	$ 682,138	$ 702,602	$ 723,680	$ 745,391	$ 767,752	$ 790,785	$ 814,508	$ 838,944	$ 864,112	$ 890,035	$ 916,736	$ 944,239	$ 972,566	$ 1,001,743	$ 1,031,795	$ 1,062,749	$ 1,094,631	$ 1,127,470	$ 1,161,294	$ 1,196,133	$ 1,232,017
Lift Station O&M	$ 133,200	$ 137,196	$ 141,312	$ 145,551	$ 149,918	$ 154,415	$ 159,048	$ 163,819	$ 168,734	$ 173,796	$ 179,010	$ 184,380	$ 189,911	$ 195,609	$ 201,477	$ 207,521	$ 213,747	$ 220,159	$ 226,764	$ 233,567	$ 240,574
Treatment O&M	$ 893,079	$ 919,871	$ 947,468	$ 975,892	$ 1,005,168	$ 1,035,323	$ 1,066,383	$ 1,098,375	$ 1,131,326	$ 1,165,266	$ 1,200,223	$ 1,236,230	$ 1,273,317	$ 1,311,517	$ 1,350,862	$ 1,391,388	$ 1,433,130	$ 1,476,124	$ 1,520,407	$ 1,566,019	$ 1,613,000
Reuse O&M	$ 50,060	$ 51,562	$ 53,109	$ 54,702	$ 56,343	$ 58,033	$ 59,774	$ 61,567	$ 63,415	$ 65,317	$ 67,276	$ 69,295	$ 71,374	$ 73,515	$ 75,720	$ 77,992	$ 80,332	$ 82,742	$ 85,224	$ 87,781	$ 90,414
Total O&M:	**$ 1,758,477**	**$ 1,811,231**	**$ 1,865,568**	**$ 1,921,535**	**$ 1,979,181**	**$ 2,038,557**	**$ 2,099,714**	**$ 2,162,705**	**$ 2,227,586**	**$ 2,294,414**	**$ 2,363,246**	**$ 2,434,143**	**$ 2,507,168**	**$ 2,582,383**	**$ 2,659,854**	**$ 2,739,650**	**$ 2,821,839**	**$ 2,906,495**	**$ 2,993,689**	**$ 3,083,500**	**$ 3,176,005**

Assumed inflation rate: **3.00%**

Notes:

1. O&M Cost associated for just the additional 1 MGD expansion required to accommodate Verde Village flows at Mingus. Total O&M Cost of Mingus WWTP rated @ 2.5 MGD would be approx. $2.1M. For Support Calcs see "Scratch" Tab

Appendix E. Life Cycle Cost Analysis and Monthly Sewer Bill Estimate

Verde Village Wastewater Feasibility Study
Life Cycle Cost Evaluation

	Year																				Net Present Value
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Alternative 1: Partnership with City of Cottonwood																						
Construction Costs	$ 223,000,000																					
O&M Cost		$ 2,183,667	$ 2,249,177	$ 2,316,652	$ 2,386,152	$ 2,457,736	$ 2,531,468	$ 2,607,412	$ 2,685,635	$ 2,766,204	$ 2,849,190	$ 2,934,665	$ 3,022,705	$ 3,113,387	$ 3,206,788	$ 3,302,992	$ 3,402,082	$ 3,504,144	$ 3,609,268	$ 3,717,546	$ 3,829,073	
Present Value	$223,000,000	$2,140,850	$2,161,838	$2,183,033	$2,204,435	$2,226,047	$2,247,871	$2,269,909	$2,292,163	$2,314,635	$2,337,328	$2,360,243	$2,383,383	$2,406,749	$2,430,345	$2,454,172	$2,478,232	$2,502,528	$2,527,063	$2,551,838	$2,576,856	$270,000,000
Alternative 2: Partnership with Yavapai-Apache Nation																						
Construction Costs	$ 212,000,000																					
O&M Cost		$ 2,243,708	$ 2,311,019	$ 2,380,350	$ 2,451,760	$ 2,525,313	$ 2,601,072	$ 2,679,104	$ 2,759,477	$ 2,842,262	$ 2,927,530	$ 3,015,356	$ 3,105,816	$ 3,198,991	$ 3,294,960	$ 3,393,809	$ 3,495,624	$ 3,600,492	$ 3,708,507	$ 3,819,762	$ 3,934,355	
Present Value	$212,000,000	$2,199,713	$2,221,279	$2,243,057	$2,265,047	$2,287,254	$2,309,678	$2,332,322	$2,355,187	$2,378,278	$2,401,594	$2,425,139	$2,448,915	$2,472,924	$2,497,168	$2,521,650	$2,546,372	$2,571,337	$2,596,546	$2,622,002	$2,647,708	$260,000,000
Alternative 3: New Verde Village WRF																						
Construction Costs	$ 193,000,000																					
O&M Cost		$ 1,811,231	$ 1,865,568	$ 1,921,535	$ 1,979,181	$ 2,038,557	$ 2,099,714	$ 2,162,705	$ 2,227,586	$ 2,294,414	$ 2,363,246	$ 2,434,143	$ 2,507,168	$ 2,582,383	$ 2,659,854	$ 2,739,650	$ 2,821,839	$ 2,906,495	$ 2,993,689	$ 3,083,500	$ 3,176,005	
Present Value	$193,000,000	$1,775,717	$1,793,126	$1,810,706	$1,828,458	$1,846,384	$1,864,485	$1,882,765	$1,901,223	$1,919,863	$1,938,685	$1,957,692	$1,976,885	$1,996,266	$2,015,837	$2,035,600	$2,055,557	$2,075,710	$2,096,060	$2,116,609	$2,137,360	$232,000,000

Assumed federal discout rate: 2.00%

Notes:
Year 0 is in 2023 dollars.

Verde Village
Wastewater Feasibility Study
Cottonwood, AZ

Selected Alternative:	New VV WRF		
No. of Dwellings:	4482		
Annual O&M Cost:	$1,800,000		
Capital Cost:	$193,000,000		
Mo.OM Cost per Unit	$33	Assumed Constant over length of loan	
Annual Interest Rate	2%	2%	Assumed; Recent CA SRF Loan as of 11/2023 was 1.7%
Loan Term	20	30	years
Monthly Payment	$976,355	$713,366	

	Mo. Capital Cost per DU		Est. Total Monthly Bill per DU	
Forgivable Loans and/or Grants as % of Total Capital Cost	20 yr Loan Term	30 yr Loan Term	20 yr Loan Term	30 yr Loan Term
0%	$218	$159	$251	$193
10%	$196	$143	$230	$177
20%	$174	$127	$208	$161
30%	$152	$111	$186	$145
40%	$131	$95	$164	$129
50%	$109	$80	$142	$113
60%	$87	$64	$121	$97
70%	$65	$48	$99	$81
80%	$44	$32	$77	$65
90%	$22	$16	$55	$49
100%	$0	$0	$33	$33

Appendix F. Alternative Rating Matrix

Verde Village
Wastewater Feasibility Study
Cottonwood, AZ

Alternatives	
Alternative 1	Partnership with City of Cottonwood
Alternative 2	Parnership with Yavapai-Apache Nation
Alternative 3	Verde Village WRF

Raw Score	Description
1	Least Desirable; Lowest Preference
2	
3	Equally Desirable; Equal Rank
4	
5	Most Desirable; Highest Preference

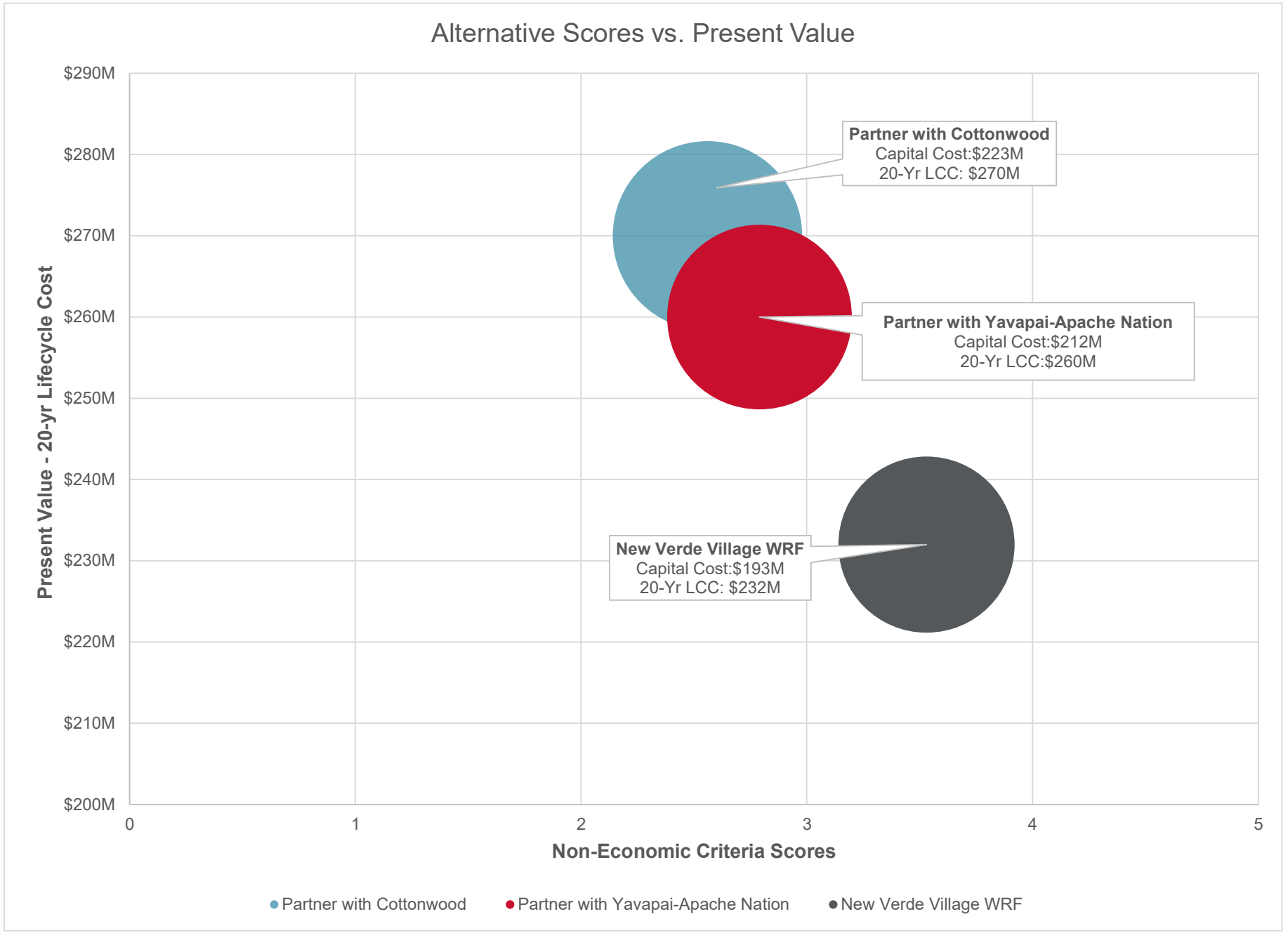
Criteria	Description
Constructability	Considers overall construction complexity including procurement, topography, and the overall alignment of the alternative.
Ease of Implementation	Considers permit acquisition and on-going renewals, intergovernmental agreements, funding availability, and land acquisitions for the alternative.
Reliability & Flexibility	Considers redundancy, safety, and the ability to handle varying daily flows, additional future flows, or meet new potential regulatory requirements in the future.
Environmental Impact	Considers the environmental impact to the Verde River and surrounding community during construction and operation of the alternative.
Public Support	Considers the overall support of the Verde Village Community for the Alternative.
Partner Support	Considers overall support from the City of Cottonwood or Yavapai-Apache Nation in partnering with the Verde Village Community.

Evaluation Matrix

		Alternative 1		Alternative 2		Alternative 3	
Criteria	Weight	Raw Score	Weighted Score	Raw Score	Weighted Score	Raw Score	Weighted Score
Constructability	15%	1	0.15	2	0.30	3	0.45
Ease of Implementation	17%	2	0.34	1	0.17	3	0.51
Reliability & Flexibility	20%	3	0.60	2	0.40	4	0.80
Environmental Impact	18%	4	0.72	4	0.72	4	0.72
Public Support	15%	3	0.45	3	0.45	3	0.45
Partner Support	15%	2	0.30	5	0.75	4	0.60
Total	100%	15	2.56	17	2.79	21	**3.53**

Notes:

- Total Score highlighted in blue is the recommended alternative.


Alternative Scores vs. Present Value
$290M
$280M
$270M
$260M
$250M
$240M
$230M
$220M
$210M
$200M
Present Value - 20-yr Lifecycle Cost
0
1
2
3
4
5
Non-Economic Criteria Scores
Partner with Cottonwood
Capital Cost:$223M
20-Yr LCC: $270M
Partner with Yavapai-Apache Nation
Capital Cost:$212M
20-Yr LCC:$260M
New Verde Village WRF
Capital Cost:$193M
20-Yr LCC: $232M
Partner with Cottonwood
Partner with Yavapai-Apache Nation
New Verde Village WRF

Verde Village
Wastewater Feasibility Study
Cottonwood, AZ

Ranking System	Description
1	Least Desirable; Lowest Preference
2	
3	Equally Desirable; Equal Rank
4	
5	Most Desirable; Highest Preference

	Ranking Value per Survey Feedback						
Evaluation Criteria	**5**	**4**	**3**	**2**	**1**	**Total Votes x Ranking Value**	**% of Total**
Reliability & Flexibility	19	12	12	11	4	205	20%
Environmental Impact	18	12	5	10	13	186	18%
Ease of Implementation	6	15	16	15	6	174	17%
Constructability	3	12	17	15	11	155	15%
Overall Public Support	12	7	8	7	24	150	15%
					Subtotal	870	
Partner Support	Not included in Survey; Assumed 15% weight.					154	15%
					Total	1024	100%

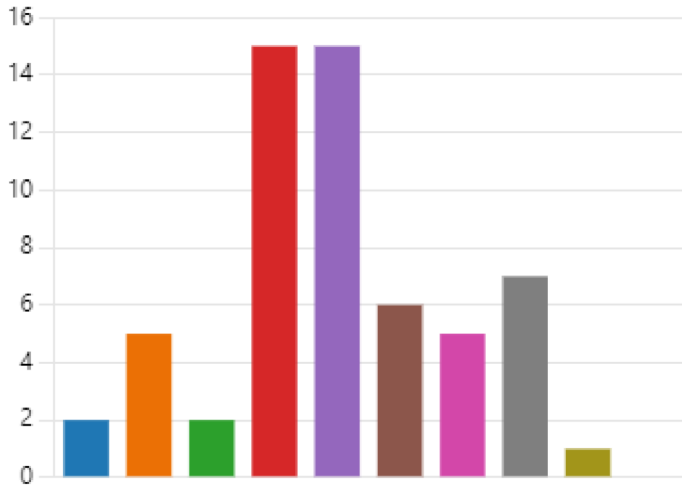
Appendix G. Verde Village Survey Feedback

Verde Village Community Connection - Sewer Feasibility Study Feedback

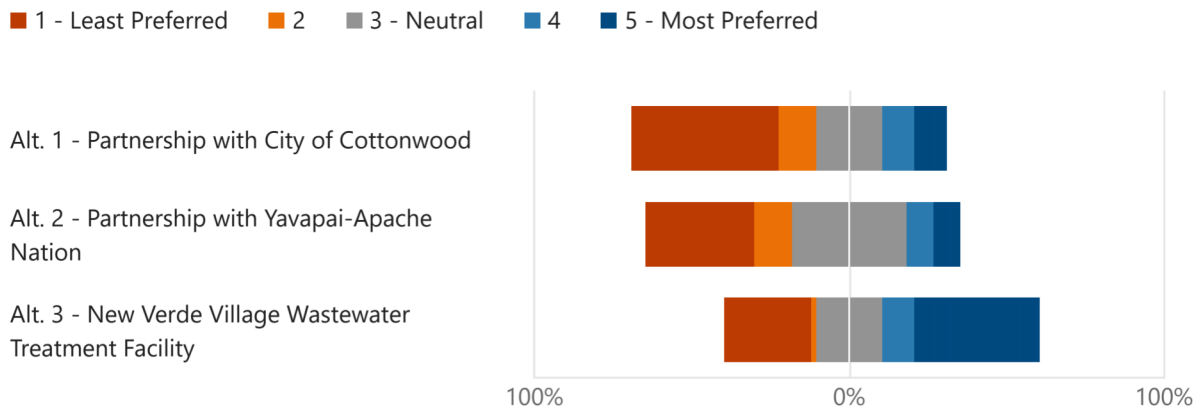
58	07:21	Closed
Responses	Average time to complete	Status

1. **In the drop down box below, please select what Verde Village Unit you reside in. Refer to the picture for unit boundaries.**

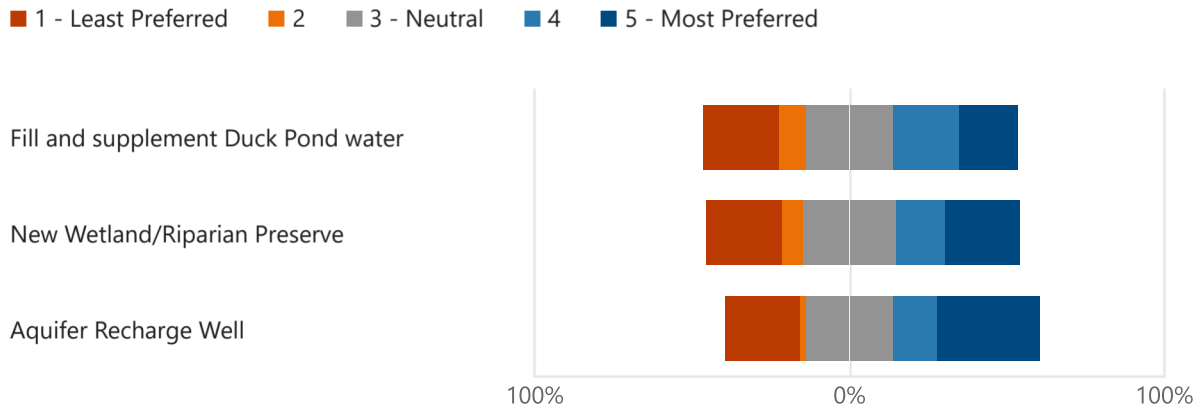
Unit 1	2
Unit 2	5
Unit 3	2
Unit 4	15
Unit 5	15
Unit 6	6
Unit 7	5
Unit 8	7
Outside of a designated Verde ...	1
Other	0



2. **Without considering cost, please indicate your preference for each Alternative:**



3. **If a new Verde Village Wastewater Treatment Facility is constructed, please indicate your preference for each option below:**



4. **Please rank the following qualitative criteria in order of importance based on the descriptions noted below:**

5. Any additional comments/feedback for HDR?

- Being in unit 8 and having a oversized under used septic system, we have no desire to switch to sewer.
- Cost to homeowners
- Cottonwood City Management in the past has made bad choices on its sewer management planning and cost overrun cost. In choosing to tie into their system we would be buying in to paying for their poor management and cost of that system. Placement of a sewer on top of a hill and pumping it all up hill is just one point of poor management. Second to pump into the ground without checking if the soil system is another and last the pumping over to Fair Grounds from River Front Park another costly project. This was all scraped and is now a teaching center as I understand it. I was told that the old plant only needed a few millions in repairs to make it able to operate to capacity. However, Cottonwood chose to do the River Front project without outside guidance. This is not a City Management I would choose to be tied to. Cottonwood City only wants Verde Village to help with their budget problem and been working against Verde Village for years and will not give the support we need to for the future. Thank
- Since I could not attend the meeting, I'm not sure what the cost would be to us homeowners. Right now the City of Cottonwood has control of our water. It would be great to have our own water system again like when I moved here in 2001.
- Is there a geological report we can refer to in order to determine if this is even necessary?
- this is a waste of time. it will not happen without great cost to the homeowners
- In complete support of VV sewer system
- Please do not enter into any agreement with the City of Cottonwood; it a seriously flawed track record and some of the city management is just plain untrustworthy. I speak for myself; however, I am not alone in my opinion and others feel any attempt to ally with the city may result in litigation. Stand-alone management of the Sewer proposition leaves the decisions soley with the residents of Verde Village and leaves the city to mismanagement itself, wastewater treatment facility as example. By-the-way, this survey is outstanding: construction, content and simplicity.
- It’s going to cost homeowners way too much money and no one wants that extra bill each month. It will be harder to sell the house with that bill. Don’t fix what isn’t broken. Sounds like the people it benefits the most are construction companies and crews.
- there was an increase of E. coli septis following the rains and flooding on Commanche. I'm not a rocket scientist and I live way above the verde river, but if Commanche floods, their leach lines flow into the verde.... You may live high but those along the river are contaminating the verde...
- Good luck, this is a massive undertaking. It is much needed and well worth the effort. Thank you!
- My household is totally against being forced to hook up to any type of public sewer system. One of the reasons our home was chosen and purchased in the Verde Village County area

was to be free from the public sewer system. The financial hardship this forced connection will bring to many Verde Village households will be devastating and damaging.

- What are the actual findings of the study ?
- No additional comments
- Lake Havasu residence had a choice to pay 2k for a hook up to the sewer that the city paid for, or not to participate at all. if you are trying to get the homeowners here in Verde Village to foot this Construction to build a sewer and a plant, that a city Would ordinarily pay for, then I think you're looking at facing a class action lawsuit. You can't just take a consensus, each individual homeowner must decide for themselves whether they want to buy into paying for something like this and have an option to decline, or you will face legal action. Whoever started, this needs to be voted off the Island. This is something for people who have city backing, not our small community with a bulk of the expense would fall on us. You can't depend on Grants. Once you sign over the rights to get started, there's no end in sight with this could cost. Use common sense. We don't need this. Best to drop it now, rather than face legal action later.
- thank you...
- I feel that the sooner this project is started the less impact to the environment and a minimizing cost advantage to all our residents.
- I actually think we should do NOTHING at this point in time. Individual home owners can install holding tanks that can be pumped and transported to places that want the waste water. The Verde Villages do not need to have municipal sewer services with almost infinite piping destinations.
- Are there cost estimates for individual homeowners yet? What is the timeline for completion of the project?
- Outstanding presentation and slides. Explained extremely well. Your timelines are impressive. Don't leave us hanging to be indecisive. Well done survey. I am not favorable to opening up to other residents (i.e. Bridgeport, Verde-Santa Fe) because lots of work and expense has been put forth by VVCC
- Thank you for allowing public input.
- We are happy to be a part of this conversation in order to not be in violation of clean water and the Verde River, which is a huge water source throughout the state. It's an important step forward and hopefully not too late, considering how long it will take and the cost.
- PAPER FORM 1: I've absolutely nothing.
- PAPER FORM 2: Don't do a damn thing!!
- PAPER FORM 3: We need a sewer system. Worried about septic tank reaching the end of it's life.
- PAPER FORM 4: No Comments.

- PAPER FORM 5: None of these (Alternatives in Question 2). We are just fine with everything as it is. Hoping everything remains as is currently, so none of these 3 (Alternatives in Question 3) items would apply. We are low density with most households one or two occupants. Many retired with social security as main income. The current economy, high inflation is not the time to approach this, even with funding.

Appendix H. Verde River Impairment Data

longer impaired. All Category 4 delists are partial delists which means the waterbody remains impaired for at least one other parameter.

Table 2-5. 2022 Assessment Delists.

WBID	Name	Use	Parameter	Full Delist?	Type	Miles / Acres
Category 5 (Impaired – No TMDL)						
15020010-0180	BLACK CANYON LAKE	AWC	AMMONIA-NITROGEN	PARTIAL	Lake	37.376
15050100-012B	MINERAL CREEK (MIN)	AWW	SELENIUM	PARTIAL	Stream	0.8
15050100-014A	QUEEN CREEK	AWW	SELENIUM	PARTIAL	Stream	9.9
15050202-008	SAN PEDRO RIVER	AWW	DISSOLVED OXYGEN (DO)	PARTIAL	Stream	28.3
15050301-008A	SANTA CRUZ RIVER	AWE DW	AMMONIA-NITROGEN	PARTIAL	Stream	4.8
15050301-013C	SONOITA CREEK	AWW	DISSOLVED OXYGEN (DO)	PARTIAL	Stream	9
15060106B-0300	CHAPARRAL PARK LAKE	PBC	ESCHERICHIA COLI	PARTIAL	Lake	12.529
15060202-025	VERDE RIVER	AWW	DISSOLVED OXYGEN (DO)	PARTIAL	Stream	25.2
15060203-022C	EAST VERDE RIVER	DWS	ARSENIC	FULL	Stream	25.8
15070102-023	AGUA FRIA RIVER	AWW	SELENIUM	PARTIAL	Stream	9.8
Category 4A (Not Attaining - TMDL Complete)						
15030202-005A	BOULDER CREEK	AWW	BERYLLIUM	PARTIAL	Stream	1.4
15030202-005A	BOULDER CREEK	AWW	COPPER	PARTIAL	Stream	1.4
15030202-005A	BOULDER CREEK	FBC	MANGANESE	PARTIAL	Stream	1.4
15030202-005A	BOULDER CREEK	AGL	PH	PARTIAL	Stream	1.4
15030202-005A	BOULDER CREEK	AWW	PH	PARTIAL	Stream	1.4
15030202-005A	BOULDER CREEK	FBC	PH	PARTIAL	Stream	1.4
15050301-558B	THREE R CANYON	AWW	BERYLLIUM	PARTIAL	Stream	1.3
15050301-558C	THREE R CANYON	AWE	CADMIUM	PARTIAL	Stream	2.9
15050301-558C	THREE R CANYON	AWE	ZINC	PARTIAL	Stream	2.9
15050301-561B	ALUM GULCH	AGL	ZINC	PARTIAL	Stream	1.4
15050302-0760	LAKESIDE LAKE	AWW	AMMONIA-NITROGEN	PARTIAL	Lake	14.46
15050302-0760	LAKESIDE LAKE	AWW	PH	PARTIAL	Lake	14.46
15050302-0760	LAKESIDE LAKE	PBC	PH	PARTIAL	Lake	14.46
15050302-0760	LAKESIDE LAKE	AWW	DISSOLVED OXYGEN (DO)	PARTIAL	Lake	14.46
15060105-353	CHRISTOPHER CREEK	FBC	ESCHERICHIA COLI	PARTIAL	Stream	8
15070102-036B	TURKEY CREEK	AWW	COPPER	PARTIAL	Stream	21
15070103-007A	HASSAYAMPA RIVER	AGI	PH	PARTIAL	Stream	11.3
Category 4B (Not Attaining – Pollution Control)						
15050301-001	SANTA CRUZ RIVER	AWE DW	AMMONIA-NITROGEN	PARTIAL	Stream	8.6

How's My Waterway?

Explore, Discover and Learn about your water.

Waterbody Report

Verde River, from Sycamore Creek to OAK CREEK

Assessment Unit ID: AZ15060202-025_00

Waterbody Condition: Impaired (Issues Identified)

Existing Plans for Restoration: No

303(d) Listed: Yes

Year Reported: 2022

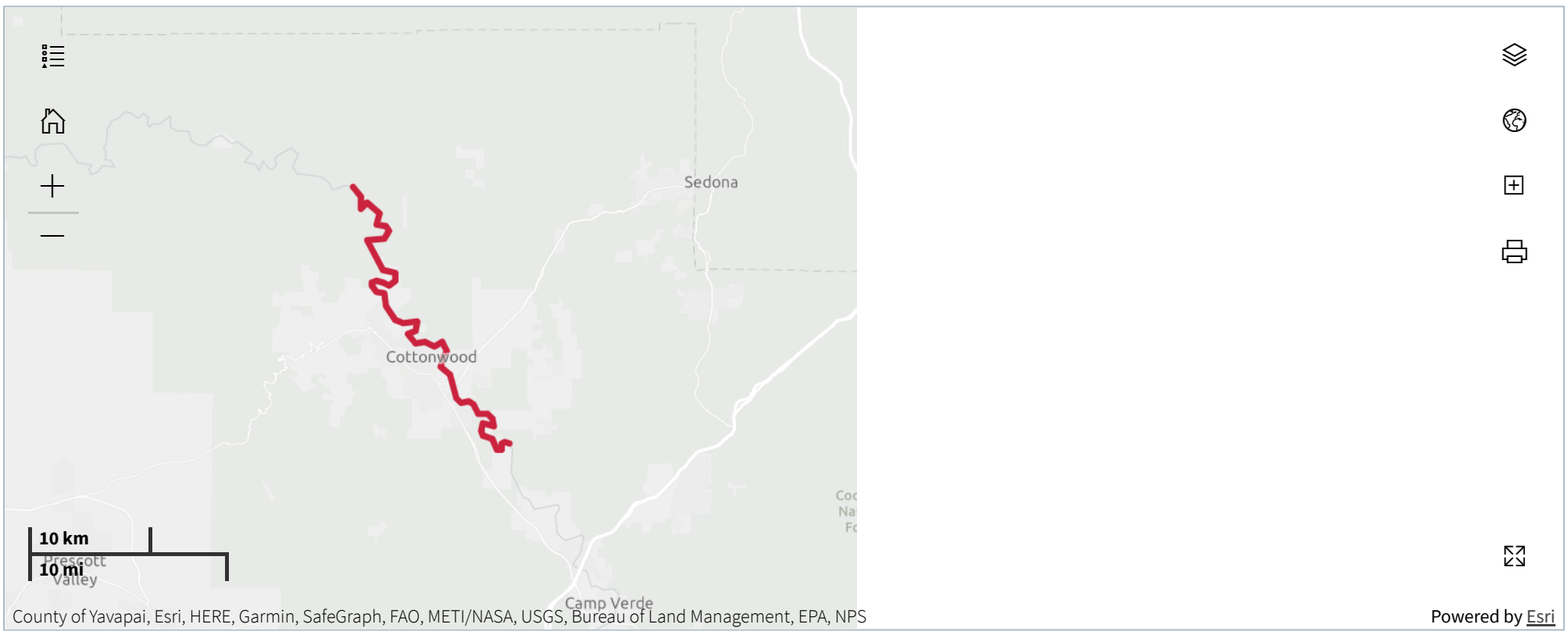
Organization Name (ID): Arizona (21ARIZ)

What type of water is this?

Stream (25.225 Miles)

Where is this water located?

HUC: 15060202



Assessment Information from 2022

State or Tribal Nation specific designated uses:

Information on Water Quality Standards Collapse All

Agricultural Irrigation	Good
Agricultural Livestock Watering	Good
Aquatic and Wildlife (Warmwater Fishery)	Good
Fish Consumption	Good
Full Body Contact	Impaired

Identified Issues for Use

Impaired Parameters	Plan in Place
Escherichia Coli (E. coli)	No

Other Water Quality Parameters Evaluated

Assessed Good

- Antimony
- Arsenic
- Barium
- Beryllium
- Boron
- Cadmium
- Chromium
- Copper
- Fluoride
- Lead
- Manganese
- Mercury
- Nickel
- pH
- Selenium
- Thallium
- Uranium
- Zinc

Other Characteristics Observed

- Silver

Probable sources contributing to impairment from 2022:

Click a column heading to sort...

Clear Filters

Source ↑	Parameter	Confirmed
Filter...	Filter...	Filter...
Crop Production (Irrigated)	Escherichia Coli (E. coli)	No
Livestock (Grazing or Feeding Operations)	Escherichia Coli (E. coli)	No
On-Site Treatment Systems (Septic Systems and Similar Decentralized Systems)	Escherichia Coli (E. coli)	No
Other Recreational Pollution Sources	Escherichia Coli (E. coli)	No

Click a column heading to sort...

Clear Filters

Assessment Documents

No documents are available

Plans to Restore Water Quality

What plans are in place to protect or restore water quality?

No plans specified for this waterbody.

Arizona’s 2024 Water Quality Assessment Dashboard

DecisionParameter	Use	Core	CharacteristicName	Fraction	Met	Not	Tot	Binomial	ImpairmentType	Comment	paramcarryforward	usecarryforward	Season	COREANDSEASON
Meeting criteria	AGI		ANTIMONY	Total	11	0	11	Yes	No	No comment	Current	Current		
Meeting criteria	AGI		ARSENIC	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGI	Y	BORON	Total	12	0	12	Yes	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AGI		CADMIUM	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGI		CHROMIUM	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGI		COPPER	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGI		LEAD	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGI	Y	MANGANESE	Total	12	0	12	Yes	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AGI	Y	PH	Total	120	0	120	Yes	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AGI		SELENIUM	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGI		ZINC	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGL		ANTIMONY	Total	11	0	11	Yes	No	No comment	Current	Current		
Meeting criteria	AGL		ARSENIC	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGL		CADMIUM	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGL		CHROMIUM	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGL	Y	COPPER	Total	12	0	12	Yes	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AGL	Y	LEAD	Total	12	0	12	Yes	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AGL		MERCURY	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGL	Y	PH	Total	120	0	120	Yes	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AGL		SELENIUM	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AGL		ZINC	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AWWAcute		ANTIMONY	Dissolved	1	0	1	No	No	No comment	Current	Current		
Meeting criteria	AWWAcute		ARSENIC	Dissolved	1	0	1	No	No	No comment	Current	Current		
Meeting criteria	AWWAcute		BERYLLIUM	Dissolved	1	0	1	No	No	No comment	Current	Current		

DecisionParameter	Use	Core	CharacteristicName	Fraction	Met	Not	Tot	Binomial	ImpairmentType	Comment	paramcarryforward	usecarryforward	Season	COREANDSEASON
Meeting criteria	AWWAcute	Y	CADMIUM	Dissolved	1	0	1	No	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AWWAcute	Y	COPPER	Dissolved	1	0	1	No	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AWWAcute		LEAD	Dissolved	1	0	1	No	No	No comment	Current	Current		
Meeting criteria	AWWAcute		MERCURY	Dissolved	1	0	1	No	No	No comment	Current	Current		
Meeting criteria	AWWAcute	Y	ZINC	Dissolved	1	0	1	No	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AWWChronic		AMMONIA-NITROGEN	Total	5	0	5	No	No	No comment	Current	Current		
Meeting criteria	AWWChronic		ANTIMONY	Dissolved	11	0	11	No	No	No comment	Current	Current		
Meeting criteria	AWWChronic		ARSENIC	Dissolved	11	0	11	No	No	No comment	Current	Current		
Meeting criteria	AWWChronic		BERYLLIUM	Dissolved	12	0	12	No	No	No comment	Current	Current		
Meeting criteria	AWWChronic	Y	CADMIUM	Dissolved	12	0	12	No	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AWWChronic		CHROMIUM	Dissolved	3	0	3	No	No	No comment	Current	Current		
Meeting criteria	AWWChronic	Y	COPPER	Dissolved	12	0	12	No	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AWWChronic	Y	DISSOLVED OXYGEN (DO)	Dissolved	117	0	117	Yes	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AWWChronic		IRON	Dissolved	3	0	3	No	No	No comment	Current	Current		
Meeting criteria	AWWChronic		LEAD	Dissolved	12	0	12	No	No	No comment	Current	Current		
Meeting criteria	AWWChronic		MERCURY	Dissolved	8	0	8	No	No	No comment	Current	Current		
Meeting criteria	AWWChronic		NICKEL	Dissolved	4	0	4	No	No	No comment	Current	Current		
Meeting criteria	AWWChronic		NITROGEN	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	AWWChronic	Y	PH	Total	120	0	120	Yes	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AWWChronic	Y	PHOSPHORUS	Total	12	0	12	Yes	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	AWWChronic		SELENIUM	Total	12	0	12	No	No	No comment	Current	Current		
Meeting criteria	AWWChronic		THALLIUM	Dissolved	3	0	3	No	No	No comment	Current	Current		
Meeting criteria	AWWChronic	Y	ZINC	Dissolved	12	0	12	No	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Not enough information	AWWChronic		SILVER	Dissolved					No	No comment	Carry Forward - Parameter	Current		

DecisionParameter	Use	Core	CharacteristicName	Fraction	Met	Not	Tot	Binomial	ImpairmentType	Comment	paramcarryforward	usecarryforward	Season	COREANDSEASON
Not enough information	AWWChronic		SUSPENDED SEDIMENT CONCENTRATION (SSC)	Suspended					No	No comment	Carry Forward - Parameter	Current		
Meeting criteria	FBC		ANTIMONY	Total	11	0	11	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		ARSENIC	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		BARIUM	Total	11	0	11	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		BERYLLIUM	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		BORON	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		CADMIUM	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		CHROMIUM	Total					No	No comment	Carry Forward - Parameter	Current		
Meeting criteria	FBC		COPPER	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		FLUORIDE	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		LEAD	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		MANGANESE	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		MERCURY	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		NICKEL	Total	4	0	4	Yes	No	No comment	Current	Current		
Meeting criteria	FBC	Y	PH	Total	120	0	120	Yes	No	Full Core and Seasonal Distribution Coverage	Current	Current		Yes
Meeting criteria	FBC		SELENIUM	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		SILVER	Total	3	0	3	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		THALLIUM	Total	4	0	4	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		URANIUM	Total	4	0	4	Yes	No	No comment	Current	Current		
Meeting criteria	FBC		ZINC	Total	12	0	12	Yes	No	No comment	Current	Current		
Not meeting criteria	FBC	Y	ESCHERICHIA COLI	Total	3	4	7	No	Existing Impairment	Remains impaired. Needs more data over all seasons. Additional data from VRI with exceedances. Data needs needs to be entered into the database., Insufficient Information - Missing Core Parameter Coverage and/or Seasonal Distribution	Current	Current		No
Meeting criteria	FC		ANTIMONY	Total	11	0	11	Yes	No	No comment	Current	Current		
Meeting criteria	FC		ARSENIC	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FC		BERYLLIUM	Total	12	0	12	Yes	No	No comment	Current	Current		

DecisionParameter	Use	Core	CharacteristicName	Fraction	Met	Not	Tot	Binomial	ImpairmentType	Comment	paramcarryforward	usecarryforward	Season	COREANDSEASON
Meeting criteria	FC		CADMIUM	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FC		NICKEL	Total	4	0	4	Yes	No	No comment	Current	Current		
Meeting criteria	FC		SELENIUM	Total	12	0	12	Yes	No	No comment	Current	Current		
Meeting criteria	FC		SILVER	Total	3	0	3	Yes	No	No comment	Current	Current		
Meeting criteria	FC		THALLIUM	Total	4	0	4	Yes	No	No comment	Current	Current		
Meeting criteria	FC		ZINC	Total	12	0	12	Yes	No	No comment	Current	Current		