KACHINA VILLAGE IMPROVEMENT DISTRICT

CITIZENS ADVISORY COMMITTEE WORKSHOP

OCTOBER 17, 2017

Overview of the Water and Wastewater Master Plans

Status of the KVID Secondary Clarifier Upgrade Project

Prepared by:

Civiltec Engineering, Inc.

CIVILTEC engineering inc.

Kachina Village Improvement District

PURPOSE OF UTILITY MASTER PLANS

- Provides an “In-Depth” review of the current utility assets and condition
- Provides guidance for making future utility infrastructure decisions
- Provides information about population, growth, and potential impact areas
- Utilizes input from staff and management to prioritize infrastructure improvements and investment
- Combines several independent data sources into one cohesive document

GOALS OF UTILITY MASTER PLANS

- Establish accurate utility system mapping into a GIS platform
- Use the GIS platform to prepare computer models to determine:
  - *Current and future operating conditions*
  - *Simulate fire event scenarios*
  - *Quantify pipeline flows, velocity, and capacity*
  - *Determine problem areas in wastewater collection systems*
  - *Quantify projected flows that will be received at the WWTP*
- Identify deficient areas of the utility systems
- Prepare a comprehensive “Capital Improvement Program” and distribute expenditures into a manageable budget
- Create a foundation upon which future master planning efforts can be based

KEY MASTER PLAN INDICATOR
CURRENT & FUTURE POPULATION

- One of the initial steps in Master Planning is to prepare an accurate count on the existing population and the water consumption and wastewater generation on a Per Capita basis.
- Kachina Village is primarily residential development!
- 2010 population = 2,622 people , 2014 population = 2,684 people
- Current population estimated at 2,700 people
- Ultimate Buildout population: 3,095 people so the community is effectively at 87% buildout
- **Future water demand and wastewater generation is expected to increase by about 10%**

WATER MASTER PLAN COMPONENTS

- Research and Data Acquisition
- Land Use Analysis and Potable Water Requirements
- Establishment of Evaluation Criteria
- GIS Base Mapping
- Water Supply and System Analysis
- Water System Computer Modeling
- Energy Analysis
- Potable Water Facility Analysis
- Water Distribution System Analysis
- Water Quality Requirements
- Capital Improvement Plan (CIP) Preparation
- Final Report Delivery
- Presentation to the Board of Supervisors

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WASTEWATER MASTER PLAN COMPONENTS

- Research and Data Acquisition
- Land Use Analysis
- Sewer System Service Area Review
- Establishment of Evaluation Criteria
- GIS Base Mapping
- Energy Analysis
- Wastewater Facility Analysis
- Sewer System Hydraulic Modeling
- Water Quality Requirements
- Planning Analysis
- Capital Improvement Plan (CIP) Preparation
- Final Report Delivery
- Board of Supervisors Presentation

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WATER SYSTEM CONDITION ASSESSMENT

- All Booster Pump Stations are in very good condition (New pumps)
- Some water wells may need rehabilitation (Low energy efficiency)
- Water Storage Tanks are in very good condition
- Pressure Reducing Valves (PRV's) need replacement (Not working)
- Small diameter waterlines do not allow for community annexation
- System was never designed to NFPA Fire Protection Standards
- Future water well required for system redundancy
- Overall operation is run very well!

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- Existing KVID Water Wells are fairly reliable but are getting older.
- The existing wells have a total combined pumping capacity of about 350 GPM.
- Water wells have a limited life-expectancy just like any piece of mechanical equipment.
- A replacement well is built into the CIP budget to prepare for future retirement of one or more of the existing KVID water wells.
- Newer technologies are highly beneficial in selecting the best locations for construction of new water wells.

NEW WATER WELL

PIPELINE REPLACEMENT PROJECTS

- The majority of water and wastewater pipelines in Kachina Village are at least 50-years old.
- Pipelines have a limited Life-expectancy.
- Plastic pipelines are relatively intact, but some sewer lines are in need of replacement.
- Approximately 30% of all sewer manholes are in need of replacement due to age, corrosion, and types of construction materials.
- Some appurtenances to the pipelines must also be replaced (valves, bends and fittings, water service connections, pressure regulating valves.
- Most Arizona utilities have some form of on-going main replacement program. Those that do not are living on borrowed time.
- Pipeline replacements are programmed to occur in Phases over several years to optimize the expenditures.

COMMUNITY FIRE PROTECTION SERVICES

- Water distribution system was never designed to NFPA Standards
- Largest waterline diameter in the system is 6”
- Smallest waterline diameter in the system is 2”
- NFPA Fire Flow Requirement is 1,000 GPM for Residential and 1,500 GPM for Commercial
- Booster Pump Stations have limited pumping capacity
- BPS can keep up with daily water demands, but were not designed for fire flows of 1,000 GPM or more
- Existing BPS have flow ranges of 300 to 400 GPM Maximum
- A very significant investment in infrastructure would need to be made to make the Community meet the NFPA Code requirements

KVID WATER SYSTEM CIP

Water Wells	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
WELL 1B (OLD) PHASE-IN AUTOMATION	$ 15,000																		
PUMP, SUBMERSIBLE WELL (4) 50HP					$ 90,000														
DESIGN FEES, FIELD GEOPHYSICS, & HYDROGEOLOGY FOR NEW WELL		$ 125,000																	
CONSTRUCT NEW WATER WELL W/WIFA LOAN		$ 800,000																	
WELL CONSTRUCTION LOAN REPAYMENT (10-YEAR PAYBACK)			$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000							
WELL HOUSE 1A VAULT (CONCRETE)				$ 12,000															

Water Storage Tanks	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
STORAGE RESERVOIR REHAB (BS1)			$ 65,600																
STORAGE RESERVOIR REHAB (BS2)								$ 28,600											
NORTH STORAGE RESERVOIR REHAB														$ 100,000					

Booster Pump Stations	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
ADD 3 ADDITIONAL PUMPS AT NORTH STORAGE **(DEVELOPER FUNDED)**		$ 75,000																	
BACKUP GENERATOR FOR NORTH STORAGE								$ 75,000											

Water Distribution System (Piping, Valves, Hydrants)	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
PURCHASE LEAK DETECTION EQUIPMENT	$ 10,000																		
REPLACE EXISTING NORTH ZONE TO SOUTH ZONE PRV"S (2 LOCATIONS)		$ 30,000																	
ADDITION OF CHECK VALVES ON CUSTOMERS SIDE OF METER (100/Yr)			$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 40,000	$ 40,000			
WATER INFRASTRUCTURE PIPING UPGRADES	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000
Annual Totals	**$ 55,000**	**$1,060,000**	**$ 215,600**	**$162,000**	**$240,000**	**$150,000**	**$150,000**	**$253,600**	**$150,000**	**$150,000**	**$150,000**	**$150,000**	**$70,000**	**$170,000**	**$ 70,000**	**$70,000**	**$30,000**	**$ 30,000**	**$30,000**

Note: Yellow cells indicate funding from sources other than KVID

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WASTEWATER SYSTEM CONDITION ASSESSMENT

- 20%-30% of existing manholes need major rehabilitation (Age)
- Some segments of collection system piping need upsizing to 8”
- WWTP needs an additional Secondary Clarifier and new Aerobic Digester
- Staff needs training in WWTP Laboratory Procedures
- <u>Overall operation is run very well!</u>

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KVID WASTEWATER CIP

Wastewater Treatment Plant CIP	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
CONSTRUCT PHASE 1 WWTP IMPROVEMENTS		$ 445,200																	
CONSTRUCT PHASE 2 WWTP IMPROVEMENTS			$ 361,800																
CONSTRUCT PHASE 3 WWTP IMPROVEMENTS				$ 458,400															
GENERATOR, BACKUP 175KW WW PLANT																	$ 75,000		
HOLDING POND LINER REPLACEMENT																	$ 57,000		

Wastewater Collection System CIP (Pipes & M	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
WASTEWATER MANHOLE REHABILITATION					$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000					
WASTEWATER PIPELINE REPLACEMENT											$ 120,000	$ 120,000	$ 120,000						
LINE ROUND ROCK SEWER LINE					$ 25,000														

Wastewater Lift Stations CIP	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
CHACO LIFT STATION REHABILITATION - 10' DEEP		$ 35,000																	
KONA LIFT STATION REHABILITATION - 12' DEEP				$ 35,000															
MESA LIFT STATION REHABILITATION - 10' DEEP		$ 35,000																	

Annual Totals	$ -	$515,200	$361,800	$493,400	$105,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$200,000	$200,000	$200,000	$80,000	$-	$-	$132,000	$-	$-

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KVID CLARIFIER UPGRADE PROJECT

- Project goal is to add a second clarifier for process redundancy
- An existing concrete structure can be rehabilitated as a new clarifier saving the utility money
- A new Aerobic Digester will need to be constructed above ground
- Upgrades to piping systems, pumps, and process controls will also be incorporated
- Preliminary Budget: $1.265M
- Engineering and Construction Drawings have been completed

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SECONDARY CLARIFIER PURPOSE

- Clarifiers allow a quiescent area for solids to settle to the bottom of a circular or rectangular basin.
- The solids are collected and scraped beneath the water surface to a collection hopper.
- The solids are pumped back to the head of the plant to aid in the overall treatment process.
- A portion of the solids are harvested for drying and disposal at landfills
- Treatment plants need to have redundant equipment in case of equipment breakdown. **KVID has only one clarifier!**

WWTP CLARIFIER UPGRADE
PHASE 1 AND 2 COST ESTIMATES

Phase 1 - New Aerobic Digester		
Item #	*Description*	*Estimated Cost*
1	Digester Slab and Foundation	$53,000.00
2	Digester Tank	$180,000.00
3	Digester Appurtenances	$30,000.00
4	Digester Aeration System	$30,000.00
5	Aeration Piping	$6,500.00
6	Scum Piping	$10,500.00
7	RAS Piping	$1,000.00
8	WAS Piping	$2,000.00
9	Decant Piping	$3,000.00
10	WAS Pump	$10,000.00
11	Scum Pump	$5,000.00
12	Solids Processing Equipment Relocation	$20,000.00
13	Electrical Improvements	$20,000.00
	Subtotal	**$371,000.00**
	Construction Contingency (20%)	*$74,200.00*
	Estimated Phase 1 Cost	**$445,200.00**

Phase 2 - Old Clarifier Upgrade		
Item #	*Description*	*Estimated Cost*
1	Old Clarifier Demolition	$ 25,000.00
2	New Clarifier Mechanism (Installed)	$ 195,000.00
3	New RAS Pumps	$ 20,000.00
4	New Scum Pump	$ 5,000.00
5	ML Piping	$ 11,000.00
6	SE Piping	$ 2,500.00
7	RAS Piping	$ 3,000.00
8	Clarifier Appurtenances	$ 20,000.00
13	Electrical Improvements	$ 20,000.00
	Subtotal	**$ 301,500.00**
	Construction Contingency (20%)	*$ 60,300.00*
	Estimated Phase 2 Cost	**$ 361,800.00**

Phase 3 - Existing Clarifier & Equipment Upgrades		
Item #	***Description***	***Estimated Cost***
1	Existing Clarifier New Internal Mechanism	$ 125,000.00
2	Existing Clarifier Structural Repairs	$ 35,000.00
3	RAS Scada Improvements	$ 15,000.00
4	Rotary Sludge Press Upgrade	$ 65,000.00
5	New Grit Channel Skimmer	$ 5,000.00
6	Rehabilitation of Screenings Compactor	$ 12,000.00
7	Slide Gate Replacements	$ 10,000.00
8	Backup Pump for Effluent Pump Station	$ 25,000.00
9	Backup Aeration Blower	$ 90,000.00
	Subtotal	**$ 382,000.00**
	Construction Contingency (20%)	*$ 76,400.00*
	Estimated Phase 3 Cost	**$ 458,400.00**

WWTP CLARIFIER UPGRADE PHASE 3 COST ESTIMATES

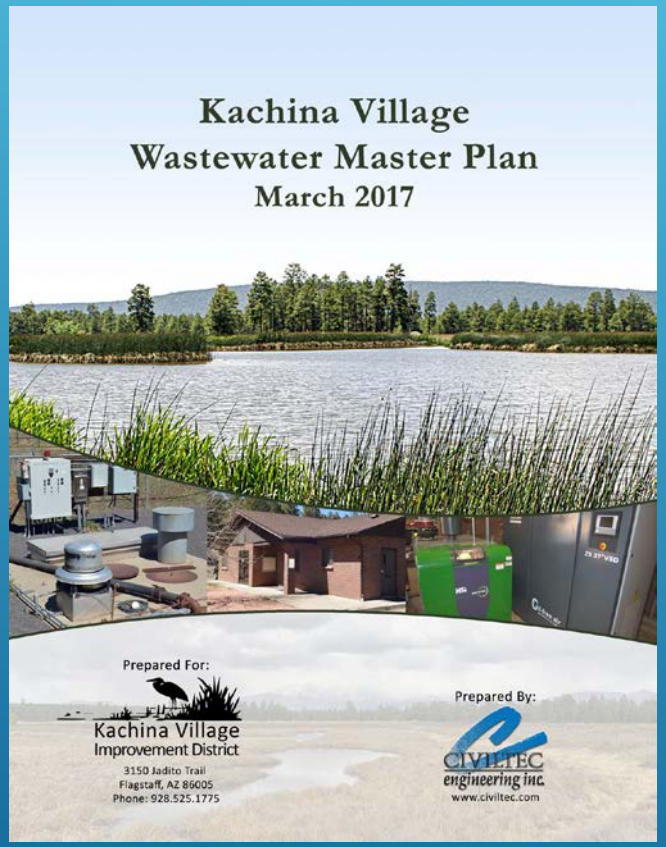
AEROBIC DIGESTERS

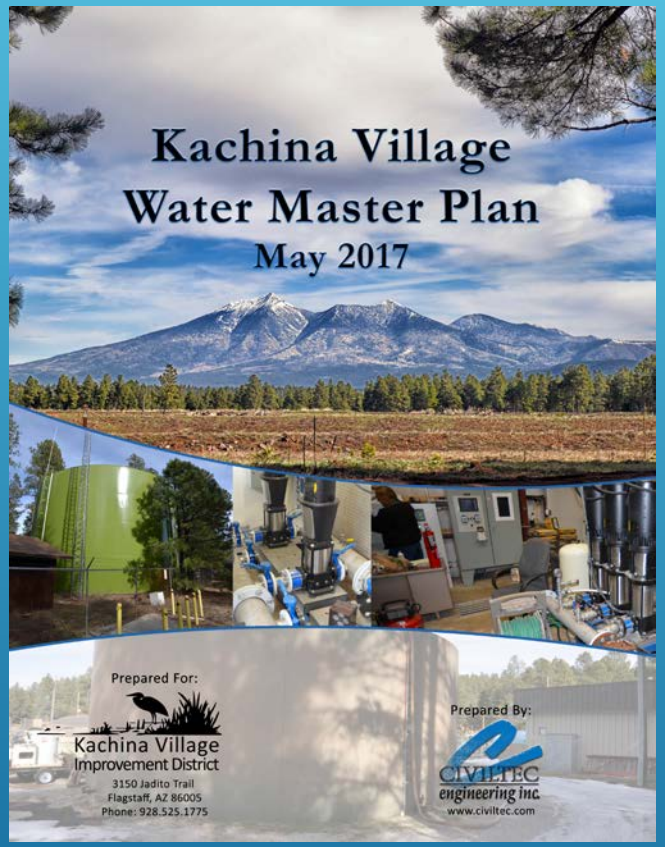
- Aerobic Digesters are used to further breakdown the biological matter in wastewater solids prior to dewatering and disposal.
- All biological activity must be completed before disposal can occur otherwise you have offensive odors and problems disposing of the dried solids.
- KVID needs a new Aerobic Digester because we are converting the existing one into a 2nd Secondary Clarifier.
- The new KVID Aerobic Digester will be a fabricated glass-lined steel tank located above ground colored Forest Green.

KVID EVAPORATION PONDS/AQUATIC WETLANDS

- Disposal source for treated wastewater effluent
- Approximately 100-Acres as 9 partitioned basins
- Operating depths of 0 to 4 feet
- Basins 1 & 2 typically in use running at about 3 – 4 foot depth
- Used by local residents for walking, hiking, bird observation, photography, and relaxation
- Requires periodic maintenance to comply with ADEQ permits

QUESTIONS ?


Kachina Village
Wastewater Master Plan
March 2017
Prepared For:
Kachina Village
Improvement District
3150 Jadito Trail
Flagstaff, AZ 86005
Phone: 928.525.1775
Prepared By:
CIVILTEC
engineering inc.
www.civiltec.com


Kachina Village
Water Master Plan
May 2017
Prepared For:
Kachina Village
Improvement District
3150 Jadito Trail
Flagstaff, AZ 86005
Phone: 928.525.1775
Prepared By:
CIVILTEC
engineering inc.
www.civiltec.com