Hazen

PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

Water Resources Master Plan

Final Report
Hazen Project Number 70039-003
June 2022

Table of Contents

List of Appendixes

List of Tables

List of Figures

1. Background

The Denver Southeast Suburban Water and Sanitation District, doing business as the Pinery Water and Wastewater District (District), provides water and wastewater services to approximately 13,000 residents in northeastern Douglas County. The District, initially formed to serve one master-planned single family residential community, began serving its first customers in 1971. The current service area, which is located approximately six miles east of I-25 and 25 miles south of Denver along Cherry Creek and State Highway 83, is shown in **Figure 1-1**. The District currently serves the communities of the Pinery, Timbers, Misty Pines, Pinery Glen, High Prairie Farms, Pradera, Vistancia, and Colorado Golf Club. The population within the District's service area is expected to grow, slowly and steadily, over 17,000 people by buildout sometime after 2050.

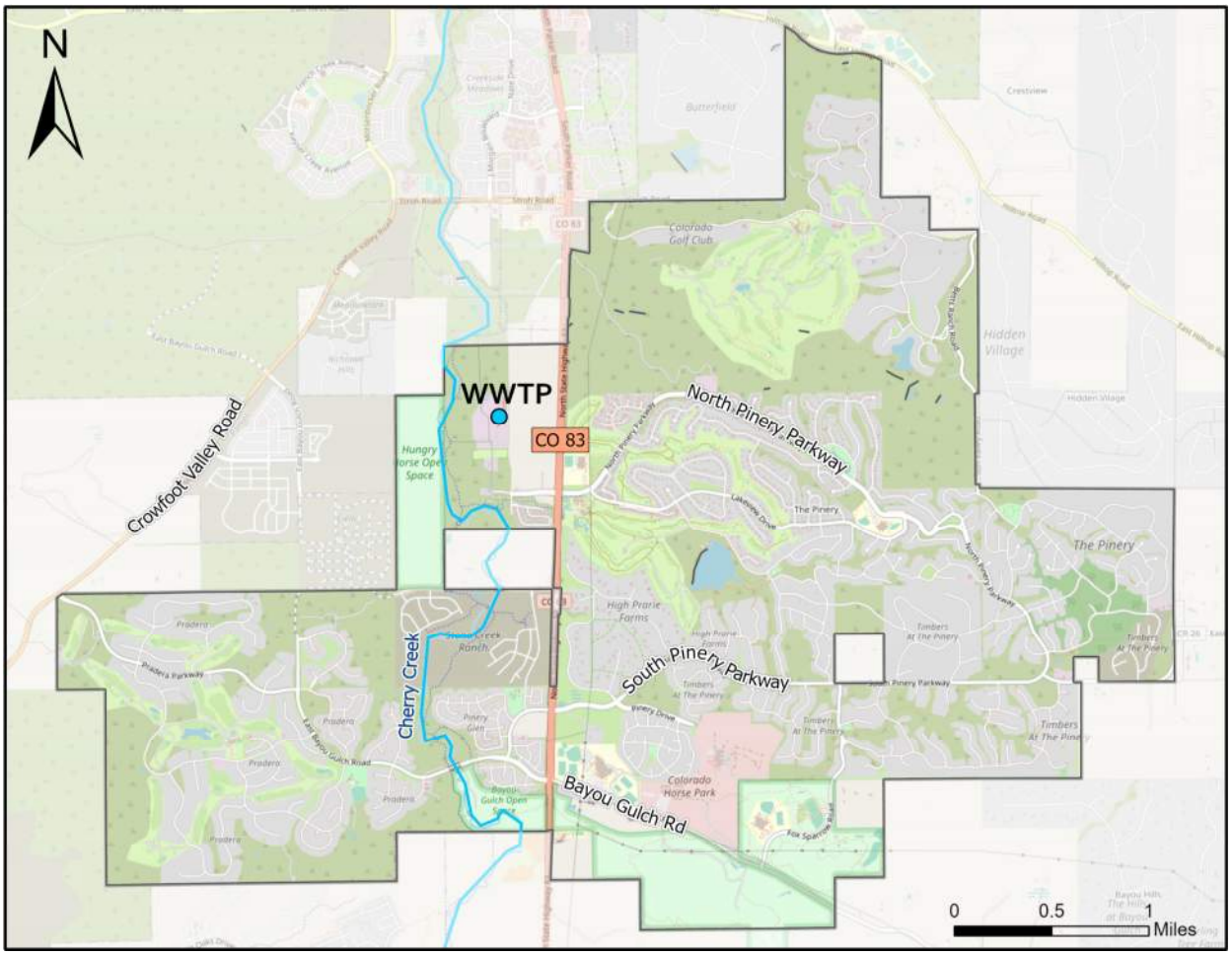


Figure 1-1. The District's Service Area

2. Plan Purpose and Planning Horizon

The 2022 Integrated Master Plan is a comprehensive, concise document that addresses the District's current and future water, wastewater and associated infrastructure needs over a 20-year planning horizon. By highlighting system vulnerabilities, deficiencies, and constraints, the Master Plan provides an actionable, achievable, roadmap for capital improvement projects and planning efforts.

The Master Plan will not only serve as a guide for planning, operating, and maintaining the District's water systems, but will also provide guidance on how staff—presently or in the future—fit into the District's organization and planning goals. This document will be continually updated to showcase the direction the District is working towards.

3. Existing Water System

The District owns, operates and maintains a raw water and treated water distribution system within the District's service area. The water system is comprised of groundwater wells, pump stations, storage tanks, pipelines, and five water treatment facilities co-located at pump station locations (**Figure 3-1**). This section describes the existing water supply portfolio, as well as the raw water and distribution system facilities.

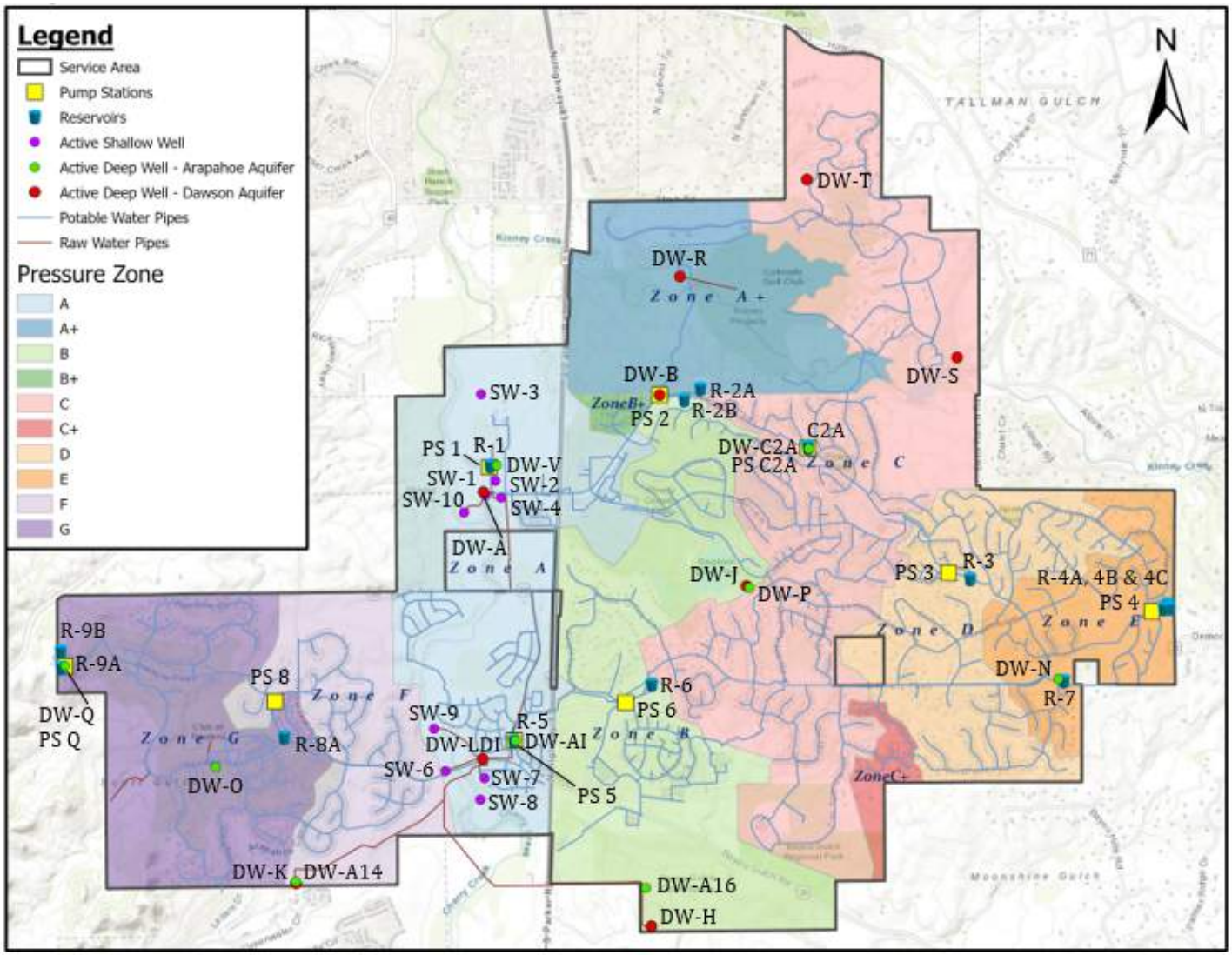


Figure 3-1. General Vicinity Map of Raw Water & Distribution System.

3.1 Water Supply

3.1.1 Water Supply Portfolio

The District's water supply comes from two primary sources: nonrenewable, nontributary, groundwater from the Denver Basin aquifer and tributary—renewable—groundwater pumped from Cherry Creek alluvial wells. Additional sources include annual deliveries of WISE water and water associated with the Cherry Creek Project Water Authority, further discussed below. **Table 3-1** provides a general overview of the District's decreed water supply portfolio coupled with the average historical yield over the past 5 years.

Table 3-1. Overview of the Water Supply Portfolio

Source: Type of Water	Decreed Amount (af/yr)	Average Historical Yield[A] (af/yr)
Cherry Creek: Tributary		
Haley & Harrison Ditch	1,220	1,168
Junior Water Rights[B]	Variable	932[C]
Denver Basin: Non-Tributary		
Inside District	12,320	1,214
Evans Ranch	1,146	0
Broe Augmentation Plan	351	0
Cherry Creek Project Water Authority (21.4% Ownership)		
Denver Basin – Augmentation	6,914	128
Tributary Surface Water & Groundwater Augmentation Rights	2,667	75
Surface Water		
WISE Deliveries	500	215[D]
Total	**25,118**	**3,733**

[A] Average from 2017 through 2021 unless noted otherwise
[B] Junior tributary rights include in-priority diversions and augmented pumping
[C] In-priority and augmented
[D] WISE delivery started in 2020; therefore, based on 2-year (2020-2021)

The District also has the decreed right to the most senior augmentation plan in the Cherry Creek Basin (Case No. W-6268). Operation under this plan enables the District to pump tributary groundwater water from Cherry Creek out-of-priority and replace the associated depletions annually (April 1- March 31). Out-of-priority depletions are replaced using consumptive-use credits, treated municipal effluent discharged to Cherry Creek, and lawn irrigation return flows (LIRFs).

In addition to this augmentation plan, the District also operates under a more junior augmentation plan that requires weekly replacement of the out-of-priority depletions to Cherry Creek (Case No. 11CW0198). Both the Denver Basin nontributary groundwater and the District's WISE water are key replacement supplies for these augmentation plans. As such, the District first uses these supplies to meet municipal demands and, subsequently, uses the associated return flows—including both wastewater and LIRFs—to replace out-of-priority depletions under the augmentation plans. In turn, although the majority of the District's raw water supply is nonrenewable, the majority of the District's treated water deliveries (approximately 70%) come

from renewable rights (i.e., reusable effluent and senior tributary) on Cherry Creek. **Table 3-2** summarizes the proportion of renewable and nonrenewable water produced annually in the District since 2002.

Table 3-2. Annual Proportion of Renewable & Non-Renewable Water Produced

Year	Tributary (%)	Non-Tributary (%)
2002	71	29
2003	72	28
2004	84	16
2005	76	24
2006	77	23
2007	80	20
2008	71	29
2009	76	24
2010	65	35
2011	77	23
2012	63	37
2013	59	41
2014	67	33
2015	73	27
2016	68	32
2017	70	30
2018	65	35
2019	64	36
2020	58	42
2021	64	36
Average	**70**	**30**

The non-renewable portion of groundwater rights owned by the District is located in the Denver Basin aquifer system. This prehistoric ground water is found in four distinct aquifer layers. The layers are found in the following order (listed from most shallow to deepest) Dawson, Denver, Arapahoe, and Laramie Fox-Hills. **Table 3-3** shows the proportional breakdown of the nontributary groundwater rights owned solely by the District.

Table 3-3. Breakdown of the Nontributary Supply

Aquifer	Percent of Nontributary Supply (%)
Dawson	22.6
Denver	17.3
Arapahoe	40.7
Laramie Fox-Hills	19.4
Total	**100**

3.1.2 WISE Water

WISE, which stands for the Water Infrastructure and Supply Efficiency, is a regional water supply partnership between Aurora Water, Denver Water, and the South Metro WISE Authority. The WISE agreement was established in 2009 with the goal of reducing groundwater reliance and bolstering renewable water supplies to the South Metro area, while maximizing the use of existing water assets belonging to Aurora and Denver Water. Under the WISE agreement, unused water supplies from Denver and Aurora Water coupled with excess capacity in Aurora Water's Prairie Waters Project is shared with the South Metro WISE Authority participants—including the District. In July 2018, the District began receiving its pro-rata share of WISE water that will average to 500 acre-feet each year.

3.1.3 Cherry Creek Project Water Authority

The Cherry Creek Project Water Authority ("CCPWA") is an organization of water providers in the Cherry Creek basin located upstream of Cherry Creek Reservoir. The CCPWA was established in 2005 to acquire and share both water rights and supplies among the members. Current members include Castle Rock Water ("Castle Rock"), the Cottonwood Water and Sanitation District, the Inverness Water and Sanitation District, and the District. Key CCPWA water rights and facilities include Denver Basin groundwater rights, Cherry Creek tributary groundwater rights, changed historical consumptive use credits, and Walker Reservoir. The District currently holds 21.4% ownership interests in the CCPWA assets.

Additionally, the Castle Rock Water and the District have a water supply interconnect. Pursuant to the Intergovernmental Agreement (Cherry Creek Project Water Authority Water Delivery Agreement) dated May 18, 2022. District diverts, treats, and delivers Castle Rock's pro-rata portion of CCPWA water through the interconnect. Specifically, the District must supply Castle Rock a minimum baseflow of 0.25 million gallons per day (mgd) up to 0.50 mgd—pending available capacity. In turn, the District manages Castle Rock's pro-rata storage in Walker Reservoir, as further discussed below in **Section 3.2.2**.

The District currently receives water piped direct from CPPWA wells and will be able to receive water directly from Walker Reservoir upon completion in 2023.

3.2 Raw Water Infrastructure

3.2.1 Groundwater Production Wells

Nontributary Wells. The District currently owns and operates 18 nontributary groundwater wells ("Deep Wells") located in the Denver Basin—which is a bedrock aquifer comprised of four different layers as shown in **Figure 3-2**.

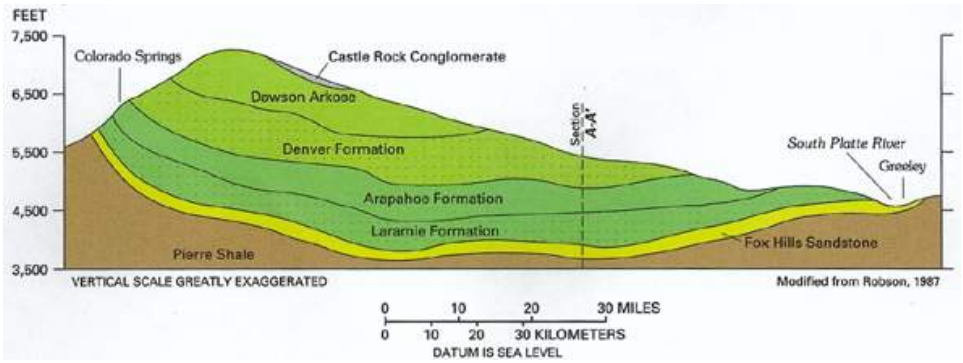


Figure 3-2. Denver Basin Aquifers[1]

Progressing from top to bottom, the aquifers within the Denver Basin include the Dawson, Denver, Arapahoe, and Laramie-Fox Hills formations. The District pumps from the Dawson and Arapahoe formations and, although they have decreed rights to pump from the Denver and Laramie-Fox Hills formations, they choose not to due to lower production in the area and poor water quality associated with deep pumping from the Laramie-Fox Hills formation.

Water pumped from the District's nontributary wells is used primarily as a replacement supply to Cherry Creek under the District's augmentation plans and to meet peak demands. **Table 3-4** includes detailed information on the active Denver Basin nontributary production wells.

[1] *Source: USGS*

Table 3-4. Active Denver Basin Nontributary Production Wells

Name of Well	Aquifer	Relative Location within District	Casing Diameter (in)	Depth of Well (ft)	Depth of Pump (ft)	Pump Horsepower (H.P)	Approx. Delivery Rate (gpm)
DW-A	Dawson	North System	8.6	575	541	30	85
DW-A-I	Arapahoe	South System	12.75	1,796	1,595	250	375
DW-A14	Arapahoe	South System	12.75	1,927	1,853	300	450
DW-A16	Arapahoe	South System	12.75	1,930	1,842	147	250
DW-B	Dawson	South System	8.6	740	664	30	125
DW-C2A	Arapahoe	North System	12.75	2,048	1,958	304	275
DW-H	Dawson	South System	8.6	880	862	25	80
DW-J	Dawson	North System	8.6	779	748	30	80
DW-K	Dawson	South System	8.6	731	639	40	150
DW-LDI	Dawson	South System	8.6	680	640	25	70
DW-N	Arapahoe	South System	12.75	2,176	2,095	350	325
DW-O	Arapahoe	South System	12.75	1,942	1,892	228	260
DW-P	Arapahoe	North System	8.6	1,926	1,857	228	275
DW-Q	Arapahoe	South System	12.75	2,196	2,024	300	325
DW-R	Dawson	North System	8.6	604	566	30	110
DW-S	Dawson	North System	8.6	726	707	30	95
DW-T	Dawson	North System	8.6	662	638	30	85
DW-V	Arapahoe	North System	10.0	1,794	1,740	275	400

South System is located East of Hwy 83

Wells R, S, and T currently have dedicated usage to the Colorado Golf Club, wells J and P supply Bingham Lake, and well O serves the Pradera Golf Course. Two new wells, L and A-6) will be brought online in 2023. Well L, drilled in the Dawson aquifer, will be routed to the Pradera Golf Course, and Well A-6—drilled in the Arapahoe Aquifer—will be routed to Betts Lake to help with irrigation demands from the Colorado Golf Club.

Tributary Wells. In addition to nontributary groundwater wells, the District owns and operates 7 Cherry Creek alluvial wells ("Shallow Wells"). **Table 3-5** provides additional details on the active alluvial wells owned by the District.

Table 3-5. Active Cherry Creek Alluvial Wells

Name of Well	Relative Location within District	Casing Diameter (in)	Depth of Well (ft)	Pump Horsepower (H.P)	Approx. Delivery Rate (gpm)
SW-1	North System	12	58	15	520*
SW-2	North System	24	69	25	700
SW-4	North System	16	66	30	650
SW-6	South System	12	60	50	800
SW-7	South System	24	69	30	500
SW-9	South System	24	55	30	700
SW-10	North System	24	55	30	775

South System is located East of Hwy 83
** Winter rate. Note, delivery rates fluctuate in the summer.*

A general location of the District's wells in shown in **Figure 3-3**.

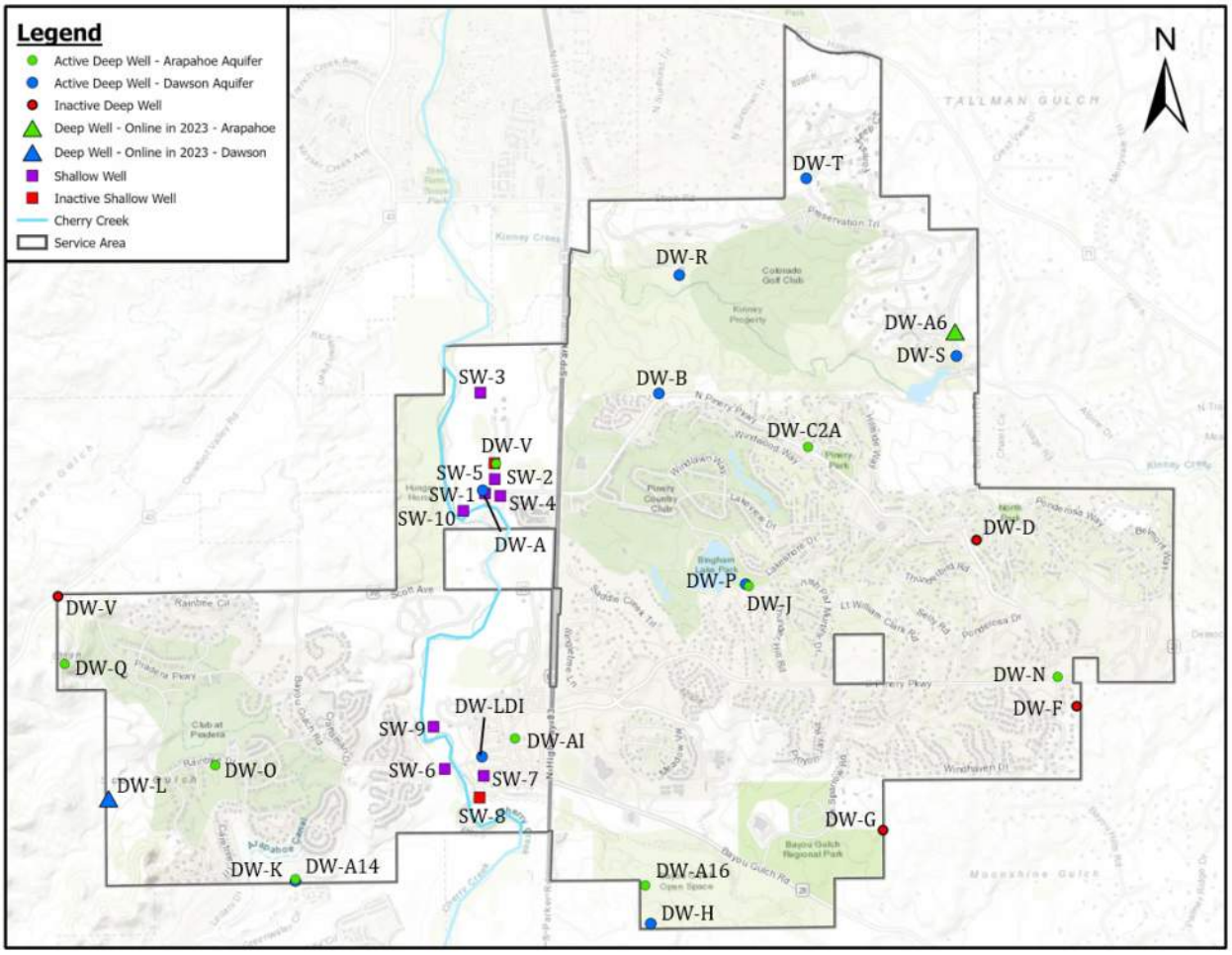


Figure 3-3. District's Alluvial and Nontributary Wells

A decreed summary of the District's wells, current and future, can be found in **Table** 3-6**.**

Table 3-6. Decreed Summary by Well

Well Name	WDID Permit Number	Source	Status	Associated Decreed	Max Permitted Pumping Rate (gpm)	Max. Historical Pumping Rate (gpm)	Decreed Avg. Annual Volumetric Limit (af)	Decreed Combined Volumetric Limit (af)
Tributary Wells								
1	0807820 R20705-RF	Cherry Creek	Producing	W-6268 W-6266	450	328		
2	0807910 20675-R-R	Cherry Creek	Producing	W-6268	1200	799		
4	0807586 R19483-RF	Cherry Creek	Producing	W-6268 79CW297	1075	654	4	
5	0807482 R19514-RF		Inactive	W-6268 81CW132	1200	NA	115	
6	0808156 R-19916-RF	Cherry Creek	Producing	W-6268	1,500	869		
7	0808146 18707-S-R	Cherry Creek	Producing	W-6268	800	644	968	
9	0811393 053149-F	Cherry Creek	Producing	11CW198	1,500	718	900	3,500
10	0811394 053148-F	Cherry Creek	Producing	11CW198	1,500	777	900	3,500
11			Future	11CW198	1,500			3,500
12			Future	11CW198	1,500			3,500
13			Future	11CW198	1,500			3,500
14			Future	11CW198	1,500			3,500
15			Future	11CW198	1,500			3,500
Non-Tributary Wells								
A	805918 016008-F	Dawson	Producing	W-6268	206	91		
A-I	0811551 53230-F	Arapahoe	Producing	11CW198	800	396		1085
A-6			New well in 2022	11CW198	750	NA		
A-14	0805357 78509-F	Arapahoe	Producing	11CW198	500	368		
A-16	0815197 78322-F	Arapahoe	Producing	11CW198	600	263		
B	0805919 16009-F	Dawson	Producing	W-6268	251	140		
C2A	0809704 34638-F	Arapahoe	Producing	W-6268	400	359		
H	0805836 17932-FR	Dawson	Producing	W-6268	200	90		
J	0807821 01505-RF	Dawson	Producing	W-6268	300	104		
K	0805832 17928-F-R	Dawson	Producing	W-6268	350	202	270	
LDI	0805834 17930-FR	Dawson	Producing	W-6268	225	63	260	
L	17934-F	Dawson	New well in 2022	W-6268	350	NA	100	279

Well Name	WDID Permit Number	Source	Status	Associated Decreed	Max Permitted Pumping Rate (gpm)	Max. Historical Pumping Rate (gpm)	Decreed Avg. Annual Volumetric Limit (af)	Decreed Combined Volumetric Limit (af)
Non-Tributary Wells (continued)								
N	0811392 051782-F	Arapahoe	Producing	11CW198	800	301	480	1,202
O	0813380 058881-F	Arapahoe	Producing	11CW198	800	372	275	1,085
P	0813381 056524-F	Arapahoe	Producing	11CW198	800	389	1,202	1,202
Q	0813382 056521-F	Arapahoe	Producing	11CW198	800	300	330	1,085
R	0815194 65696-F	Dawson	Producing	11CW198	350	108	120.75	483
S	0815195 65694-F	Dawson	Producing	11CW198	350	103	120.75	483
T	0815196 65695-F	Dawson	Producing	11CW198	350	83	120.75	483
V	0815198 68625- F	Arapahoe	Producing	11CW198	500	403	275	1,085

Note: Maximum Historical Pumping Rate = Maximum 24-hr pumping rate in past 2 years (2020-2021)

3.2.2 Raw Water Storage

Bingham Lake, owned by the District and managed by Douglas County Parks and Trails Division, provides operational storage and recreation for the community—including fishing. The lake has a capacity of approximately 315 acre-feet and is used as operational storage for the nearby golf course. Although the District owns storage rights for the lake, the lake does not have the infrastructure to be used as traditional raw water storage.

As part of CCPWA, Walker Reservoir—a mined gravel pit currently under construction—will have an approximate total capacity of 650 acre-feet. Of the total capacity, the District owns 300 acre-feet of storage, and Castle Rock owns 150 acre-feet. As noted in **Section 3.1.3**, the District will also manage Castle Rock's storage—resulting in a total relative storage of 450 acre-feet. Water will be delivered to Walker Reservoir directly from CCPWA's nearby alluvial wells and/or piped from CCPWA's nontributary wells.

3.3 Potable Water Treatment

The District currently treats water pumped from the active nontributary groundwater wells and the Cherry Creek alluvial wells at five locations. Two facilities, Pump Station 1 and Pump Station 5, treat water year-round. During high demand seasons (May through October) the District has three seasonal water treatment facilities located at Deep Wells C2A, Q, and N. The Districts' raw water is treated with phosphoric acid to prevent lead and copper dissolution in the distribution system, is disinfected with chlorine, and then dosed with Liquid Ammonium Sulfate to form chloramines before its delivered to customers. AQUA MAG® is also added as an iron and manganese sequestrant. The treated water meets or exceeds all applicable drinking

water standards and is satisfactory to customers—with the exception of occasional high water hardness complaints.

WISE water is treated at Aurora Water's Binney Purification facility before being delivered to the District via drinking water distribution system interconnect. Therefore, no further treatment is needed.

3.4 Distribution System

A schematic illustrating the existing water system hydraulic profile is shown in **Figure 3-4** followed by additional detailed information pertaining to the specific elements—including the pressure zones, reservoirs, pumpstations and system control valves.

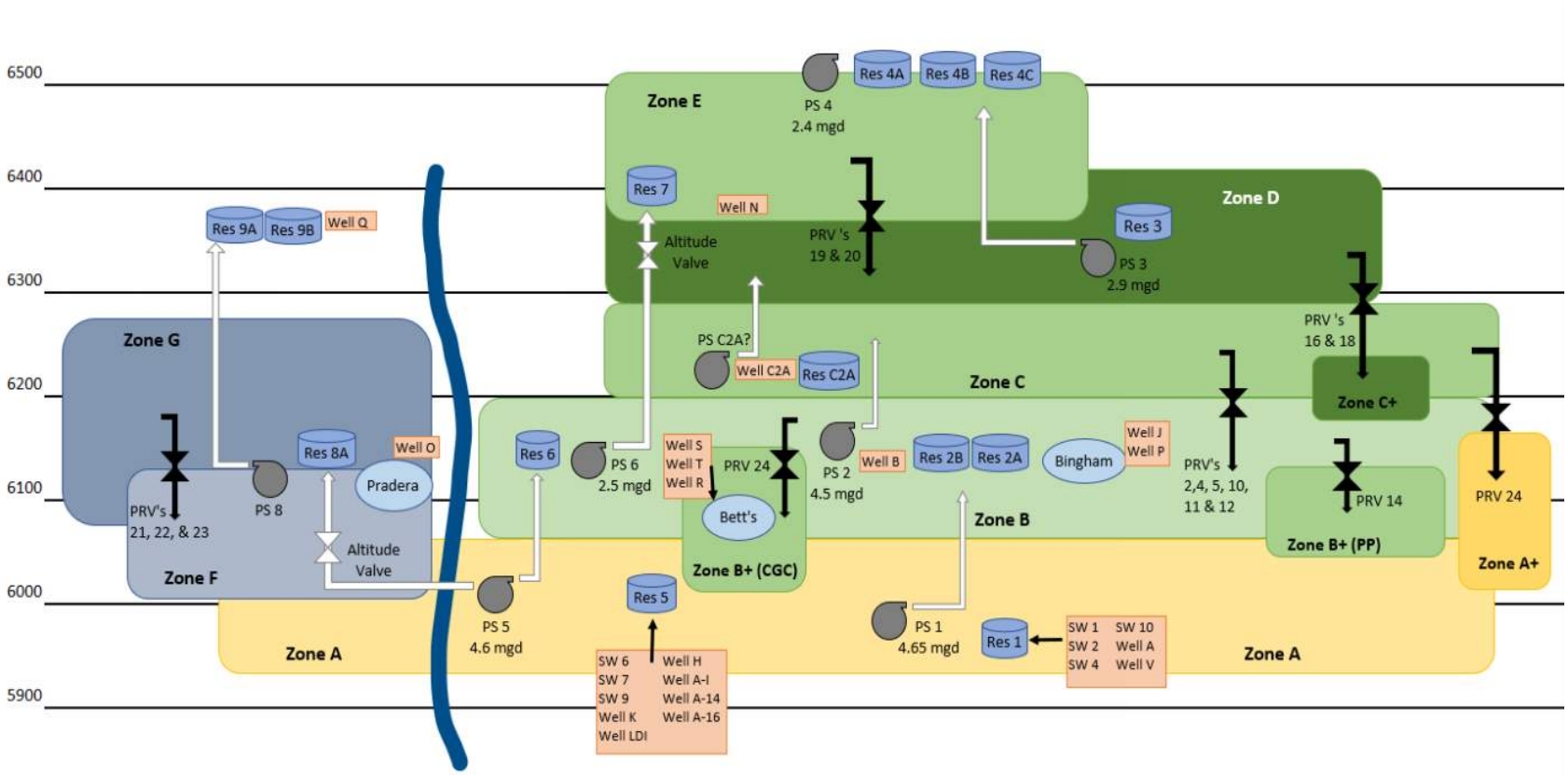


Figure 3-4. Existing Water System Hydraulic Profile

3.4.1 Pressure Zones

The District straddles Cherry Creek and rises steeply in elevation to the west and east of the creek. Due to this increase in elevation, the District is divided into 10 hydraulic zones. Zone A, located at the lowest elevation along Cherry Creek, is the lowest pressure zone followed by Zones B, C, D, and E—respectively listed from low to high elevations. Zone F is the lowest pressure zone located west of Cherry Creek followed by Zone G. Three of the zones, Zones A+, B+, and C+, are hybrid zones that are located between two pressure zones and feed through a pressure reducing valve. Within Zone B+, there are two subzones—referred to as B+ (CGC) and B+ (PP)—that serve areas requiring unique pressure ranges, including Colorado Golf Club and Pinery Point.

Table 3-7 provides a general overview of the District's pressure zones.

Table 3-7. Water Distribution Pressure Zones

Pressure Zone	Range of Ground Elevation (ft)	Pressure Head (ft)	Feeds from Reservoir	Available Storage (mg)
A	5,930 – 6,065	6,165	Res 2A, 2B, 6, 8	3.82
A+	6,017 – 6,160	6,298	Res 2A, 2B	
B	6,065 – 6,200	6,297	Res 3, 7	2.83
B+ (CGC)	6,017 – 6,160	6,298	Res 3, 7	
B+ (PP)	6,047 – 6,124	6,253	Res 3, 7	
C	6,200 – 6,290	6,400	Res 3, 7	
C+	6,180 – 6,239	6,394	Res 3, 7	
D	6,290 – 6,420	6,527	Res 4A, 4B, 4C	1.99
E*	6,370 – 6,510	6,618	Res 4A, 4B, 4C	
F	6,006 – 6,127	6,270	Res 9A, 9B	1.46
G	6,072 – 6,274	6,388	Res 9A, 9B	

** E is pressure zone charged by Pump Station #4*

The pressure zones are interconnected by pressure reducing valves (PRVs) and pump stations—further discussed below.

3.4.2 Reservoirs (Storage Tanks)

The District currently has 13 underground water storage tanks with a combined capacity of 10.5 million gallons. A summary of the reservoirs—including elevation, material, and capacity—is provided below in **Table 3-8**.

Table 3-8. Water Distribution Reservoirs (Storage Tanks)

Reservoir Name	Feeds Pressure Zone	Water Elevation (ft)	Material	Capacity (gal)	Depth (ft)	Year Constructed	Associated Pump Station
1	Clearwell Only	5,953.00	Concrete	140,113	9.50	2017	PS 1
2A	A	6,145.30	Concrete	651,000	19.70	1972	PS 2
2B	A	6,145.30	Concrete	2,096,680	19.70	2015	PS 2
3	B & C	6,376.30	Concrete	2,001,600	23.70	1972	PS3
4A	D & E	6,507.40	Concrete	168,439	18.86	1978	PS 4
4B	D & E	6,507.40	Concrete	966,166	18.86	1980	PS 4
4C	D & E	6,507.40	Concrete	853,487	18.86	2005	PS 4
5	Clearwell Only	5,988.50	Concrete	257,000	18.75	2000	PS 5
6	A	6,146.50	Concrete	833,000	18.75	2000	PS 6
7	B & C	6,381.50	Concrete	833,000	18.75	2000	-
8A	A	6,146.25	Concrete	233,000	18.75	2003	PS 8
9A	G	6,371.92	Concrete	604,279	16.08	2003	-
9B	G	6,371.92	Concrete	852,127	16.08	2005	-
C2A (Building)	Clearwell Only	6,226	Concrete	9,520	6.42	1976	Well C2A Booster Pump
C2A (Remote)	Clearwell Only	6,226	Concrete	14,910	8.1	1976	Well C2A Booster Pump
			Total	**10,514,321**	**-**	**-**	**-**

Note, C2A is comprised of two interconnected clearwells. Additionally, a new tank comparable to 8A expected to come online in 2023.

3.4.3 Pump Stations

Pump stations are used to pump water from lower pressure zones to higher pressure zones. The District currently maintains and operates eight pump stations. As previously noted, there are two permanent treatment facilities located at Pump Stations 1 and 5. A list of the District's pump stations and associated

parameters is included in **Table 3-9**. The total capacity represents the total design flow of all pumps at the facility. Firm capacity is defined as the pump station's capacity with the largest pump out of service.

Table 3-9. Pump Stations

Pump Station	Number of Pumps	Design Flow (mgd)	Total Capacity (mgd)	Firm Capacity (mgd)	Max. Pump Rate (gpm)	Floor Elevation (ft)	From Location	To Location	Pressure Zone Served
1	1	1.16	4.65	4.65	3,300	5,959	Reservoir 1	Reservoir 2	A
	2	1.16							
	3	1.16							
	4	1.16							
2	1	1.15	4.46	3.20	3,100	6,132	Reservoir 2	Reservoir 3 & 7	B & C
	2	1.15							
	3	1.15							
	4	1.15							
3	1	1.08	2.88	2.16	2,000	6,350	Reservoir 3	Reservoir 4A, 4B, & 4C	D
	2	1.08							
	3	1.08							
4	1			2.88	1,700	6,499	Reservoir 4A, 4B, & 4C	Zone E	E
	2								
	3								
	4								
C2A Booster Pump	1	0.45	1.08	0.61	750	6,226	C2A clearwells	Reservoir 3 & 7	B & C
	2								
5	1		5.76	4.60	4,000	6,010	Reservoir 5	Reservoir 6 & 8A	A
	2								
	3								
	4								
	5								
6	1		2.52	1.87	1,750	6,120	Reservoir 6 & 8A	Reservoir 3 & 7	B & C
	2								
	3								
8	1		2.68	1.74	1,860	6,110	Reservoir 6 & 8A	Reservoir 9A & 9B	F & G
	2								
	3								
	4								

3.4.4 Pipelines

The water system is comprised of approximately 113 miles of distribution and transmission pipelines, which convey water from the supply sources to the water system facilities and meters. Pipe diameters range from less than 4'' to 24" with most of the system comprised of 8" diameter pipelines. Nearly three quarters of the pipes are made from Polyvinyl Chloride Pipe (PVC) followed by Asbestos Cement (AC), Ductile Iron (DIP) and High-Density Polyethylene (HDPE). The following tables, charts, and maps provide data on pipeline material, size, and year of installation.

Table 3-10. Summary of the Water Distribution Pipelines by Material

Material	Total Length (ft)	Total Length (miles)	Total Length (%)
AC	115,863	22	19.5
DIP	44,151	8	7.4
HDPE	511	0	0.1
PVC	429,522	81	72.4
Steel	28	0	0.0
Unknown	3,411	1	0.6
Total	**593,486**	**112**	**100.0**

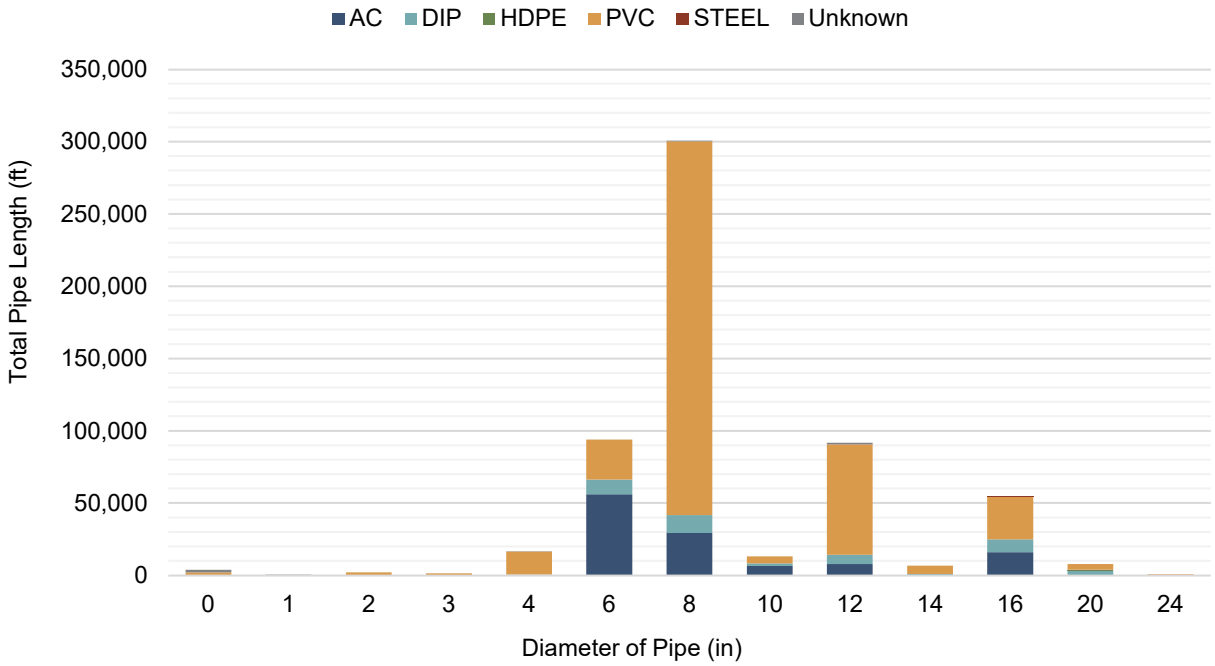


Figure 3-5. Raw Water and Distribution Pipelines by Material and Diameter

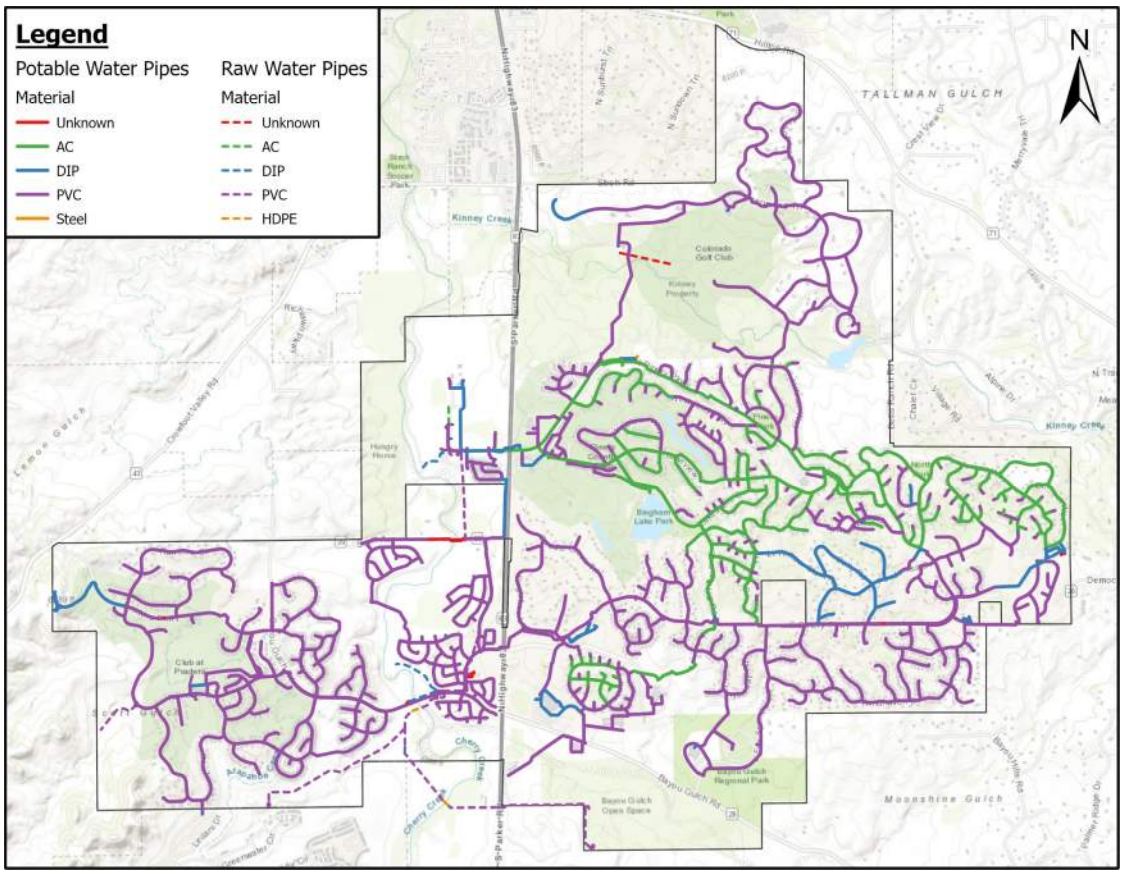


Figure 3-6. Raw Water and Distribution Pipelines by Material

Table 3-11. Summary of the Water Distribution Pipelines by Size

Diameter (in)	Length of AC (ft)	Length of DIP (ft)	Length of PVC (ft)	Length of High HDPE (ft)	Length of Steel (ft)	Length of Unknown (ft)	Total Length (ft)	Total Length (miles)	Total Length (%)
<=4	193	269	21,813	0	0	1,838	24,114	4.6	4.1
6	56,063	10,189	27,618	0	0	0	93,870	17.8	15.8
8	29,301	12,360	258,602	0	0	328	300,590	56.9	50.6
10	6,403	1,890	4,938	0	0	0	13,230	2.5	2.2
12	7,805	6,410	76,316	0	0	1,245	91,777	17.4	15.5
14	84	789	5,935	0	0	0	6,808	1.3	1.1
16	16,014	8,882	29,627	0	28	0	54,551	10.3	9.2
20	0	3,362	3,985	511	0	0	7,857	1.5	1.3
24	0	0	689	0	0	0	689	0.1	0.1
Total	**115,863**	**44,151**	**429,522**	**511**	**28**	**3,411**	**593,486**	**112.4**	**100**

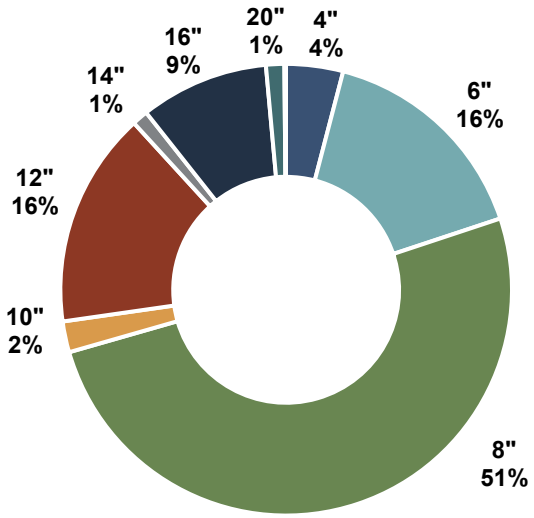


Figure 3-7. Raw Water and Distribution Pipelines by Diameter.

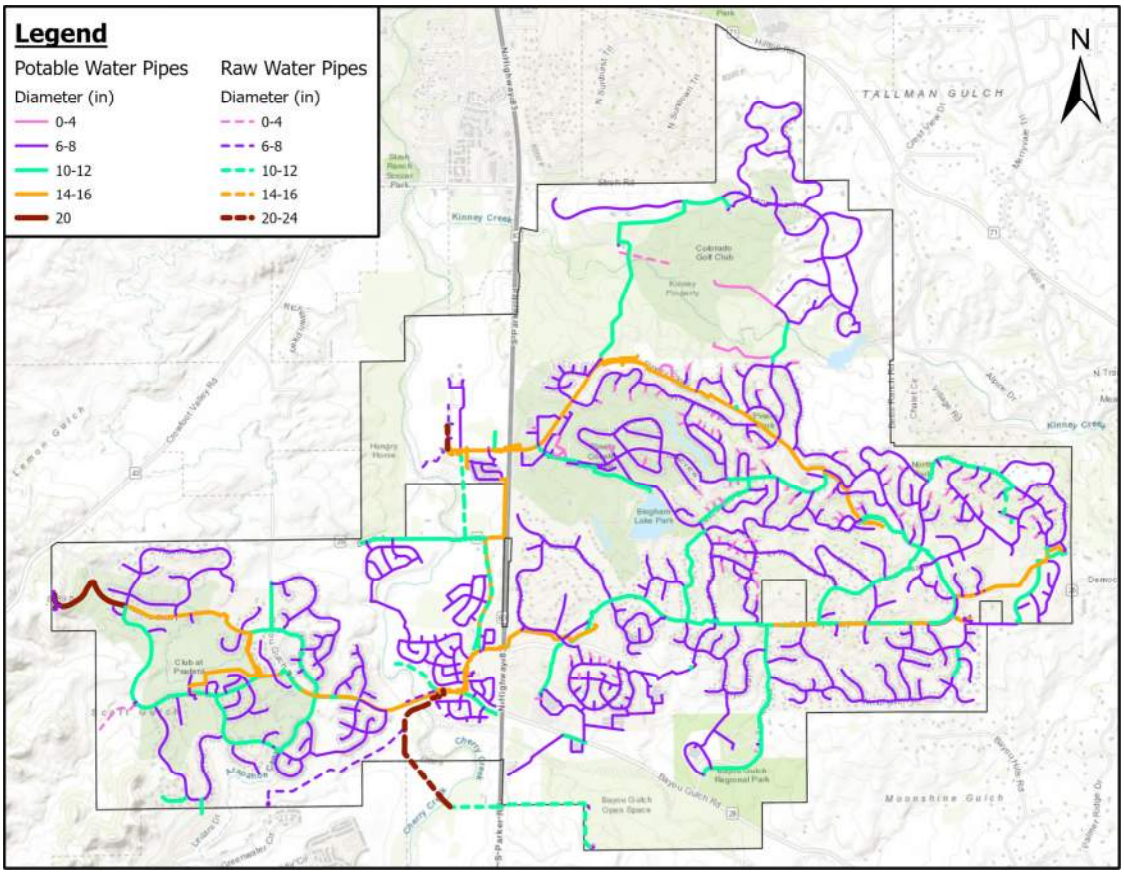


Figure 3-8. Raw Water and Distribution Pipelines by Diameter.

Table 3-12. Summary of the Water Distribution Pipelines by Age

Year Installed	Length of Pipe (ft)	Length of Pipe (Miles)	Length of Pipe (% of Total)
Unknown	1,575	0.3	0.27
1970-1979	151,932	28.8	25.60
1980-1989	36,115	6.8	6.09
1990-1999	125,538	23.8	21.15
2000-2009	190,730	36.1	32.14
2010-2020	87,596	16.6	14.76
Grand Total	**593,486**	**112.4**	**100**

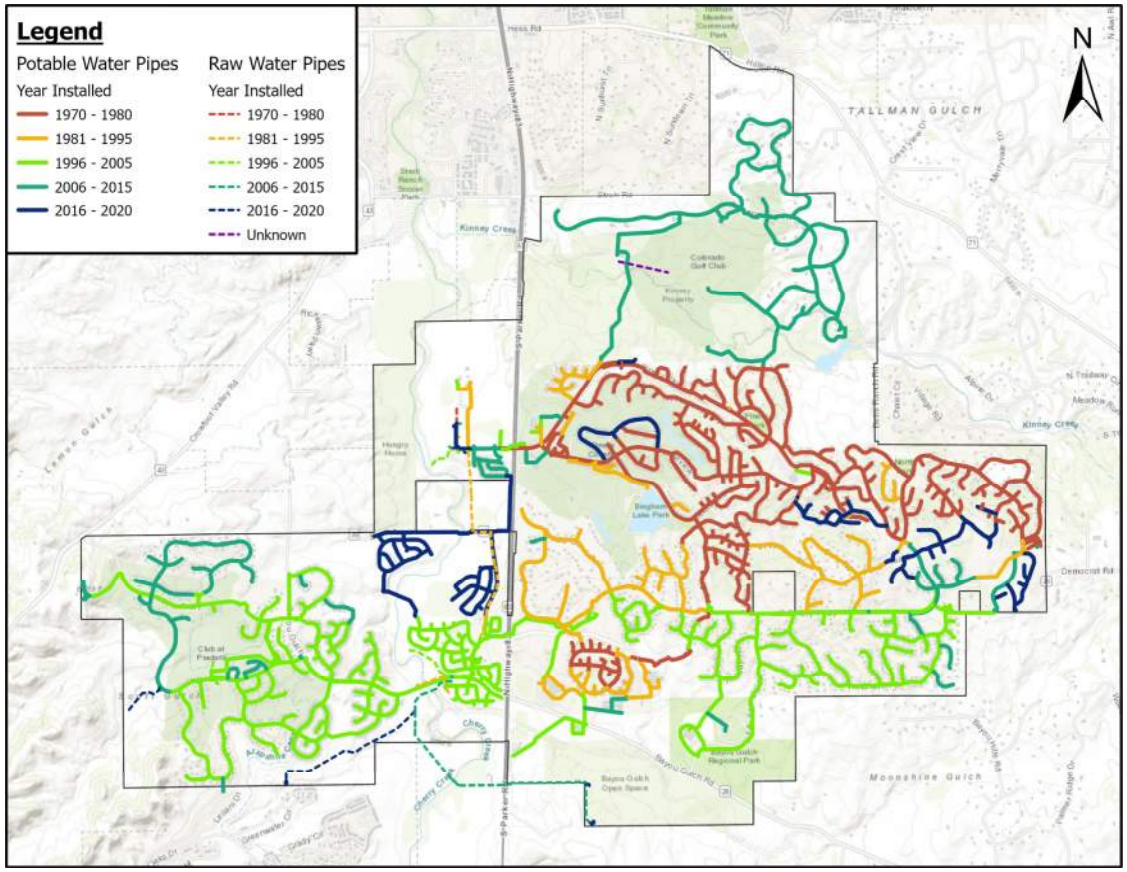


Figure 3-9. Raw Water and Distribution Pipes by Installation Year.

3.4.5 Meters

The District has approximately 5,283 active meter accounts and tracks water consumption by customer and revenue class. **Table 3-13** provides a summary of the accounts per customer class. The majority of the District's accounts/meters are residential, followed by large irrigator, commercial, and golf courses.

Table 3-13. Water Meter Summary

Customer Class	Number of Metered Accounts	% Metered Accounts
Residential	4,952	93.9
Commercial[1]	26	0.5
Vacant Lots	233	4.4
Larger Irrigator[2]	56	1.1
Golf Course[3]	9	0.2
Total	**5,276**	**100.0**

1) Includes indoor only and a combination of indoor and outdoor accounts
2) Includes outdoor only accounts, except for golf courses
3) Includes municipal diversion valves and dedicated wells.

3.4.6 System Control Valves

System control valves are used throughout the water system to perform various functions. Pressure reducing valves are used to transfer water from higher pressure zones into lower pressure zones. Pressure reducing valves modulate and maintain a set downstream pressure regardless of upstream (upper pressure zone) conditions. A summary of the system's PRVs is provided below in **Table 3-14**.

Table 3-14. System Control Valves

PRV	Ground Elevation (ft)	Watermain Size (in/out)	PRV Size	Inlet PSI	Outlet PSI	Zone
2	6,200	8"/8"	6"/2.5"	87	47	B & C
4	6,160	6"/6"	6"/2.5"	104	59	B & C
5	6,155	8"/8"	6"/2.5"	106	66	B & C
10	6,162	12"/12"	8"/1.5"	103	64	B & C
11	6,164	12"/12"	6"/1.5"	102	61	B & C
12	6,153	12"/12"	6"/1.5"	106	69	B & C
14	6,124	8"/8"	6"/2.5"	120	56	A+ & B+
16	6,280	8"/8"	6"/2.5"	107	75	C+ & D
19	6,409	8"/8"	4"/1.5"	88	51	D & E
20	6,414	8"/8"	4"/1.5"	86	49	D & E
21	6,104	12"/12"	8"/1.5"	123	72	F & G
22	6,130	12"/12"	6"/1.5"	112	61	F & G
23	6,149	12"/12"	6"/1.5"	103	52	F & G
24	6,160	8"/8"	6"/2"	103	66	A+ & C

Other types of system control valves integrated in the District's water distribution system include altitude valves and gate valves. The District currently has 4 altitude valves for Reservoirs 2, 6, 7, and 8, and 1,229 gate valves.

4. Existing Sewer System

The District owns, operates, and maintains a sanitary sewer collection system to serve the residents and businesses within their service area. The sewer service area, shown in **Figure 4-1**, also includes portions of the towns of Castle Rock and Franktown. The existing sewer system consists of gravity pipelines and manholes that deliver wastewater within the District's service area to the Pinery Wastewater Treatment Plant (WWTP). Effluent from the WWTP is discharged to Cherry Creek either directly or through percolation ponds.

Note, the District's sewer collection system is comprised entirely of gravity mains and, therefore, does not include pump stations or pressure mains. The current permitted hydraulic capacity of the WWTP is 2.0 million gallons per day, with an average flow daily of approximately 1.0 million gallons per day (mgd). The District has a fully functional and calibrated sanitary sewer system model that was developed and updated by Stantec in 2021.

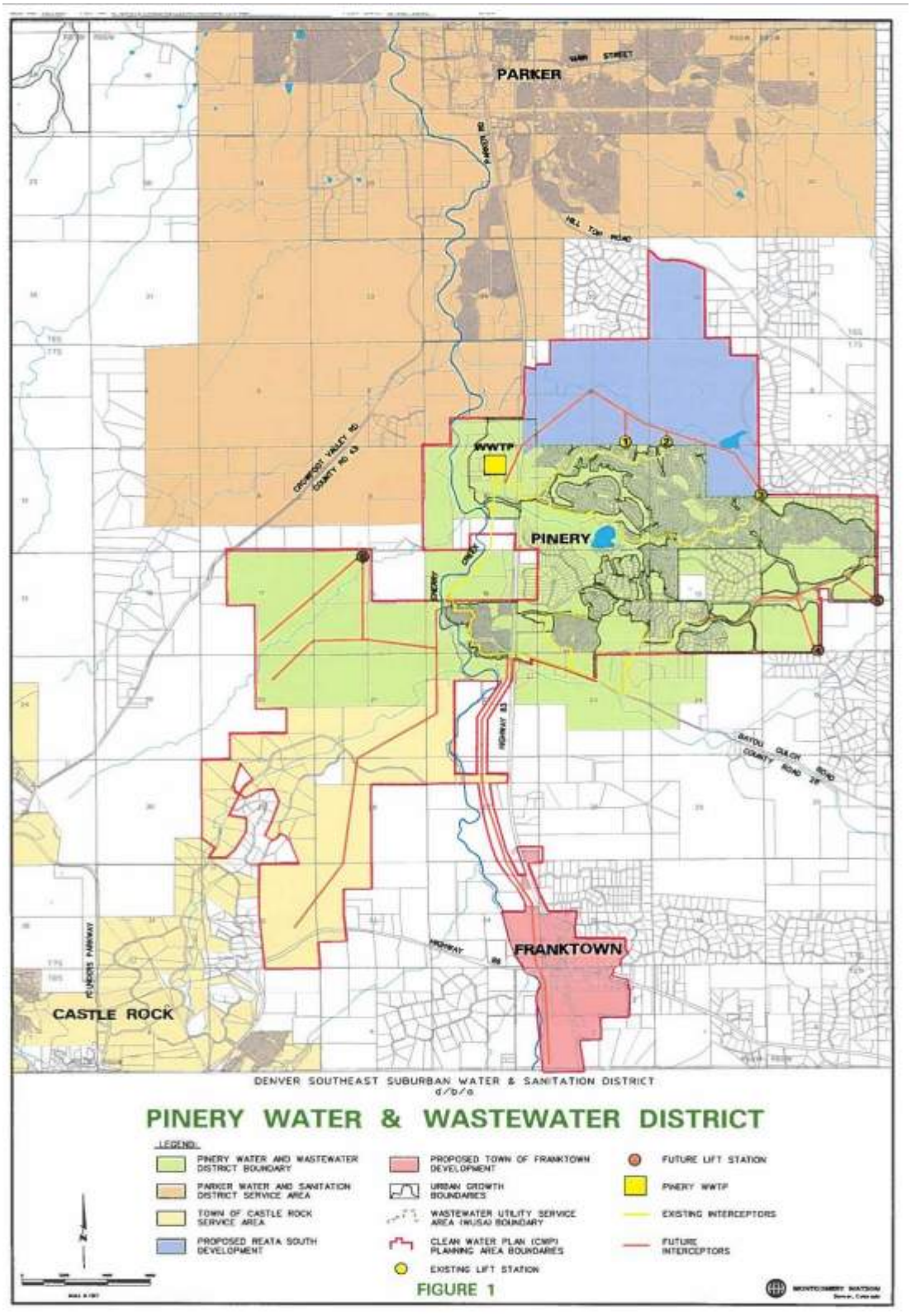


Figure 4-1. Sewer Service Area

4.1 Infrastructure

4.1.1 Pipelines

The existing sewer collection system consists of approximately 499,500 linear feet—equivalent to nearly 95 miles—of gravity pipeline ranging from 4 inches to 21 inches in diameter. Most of the system is comprised of polyvinyl chloride (PVC) pipe with small amounts of Asbestos Cement (AC), Reinforced Concrete Pipe (RCP) and Vitrified Clay Pipe (VCP). The following tables, charts, and maps provide detailed information on the sewer distribution pipelines by material, size, and installation year.

Table 4-1. Summary of the Sewer Pipelines Material

Material	Abbreviation	Total Length (feet)	Total Length (miles)	% of System
Asbestos Cement	AC	10,990	2	2
Polyvinyl Chloride Pipe	PVC	459,238	87	92
Reinforced Concrete Pipe	RCP	14,549	3	3
Vitrified Clay Pipe	VCP	14,703	3	3
	Total	**499,480**	**95**	**100**

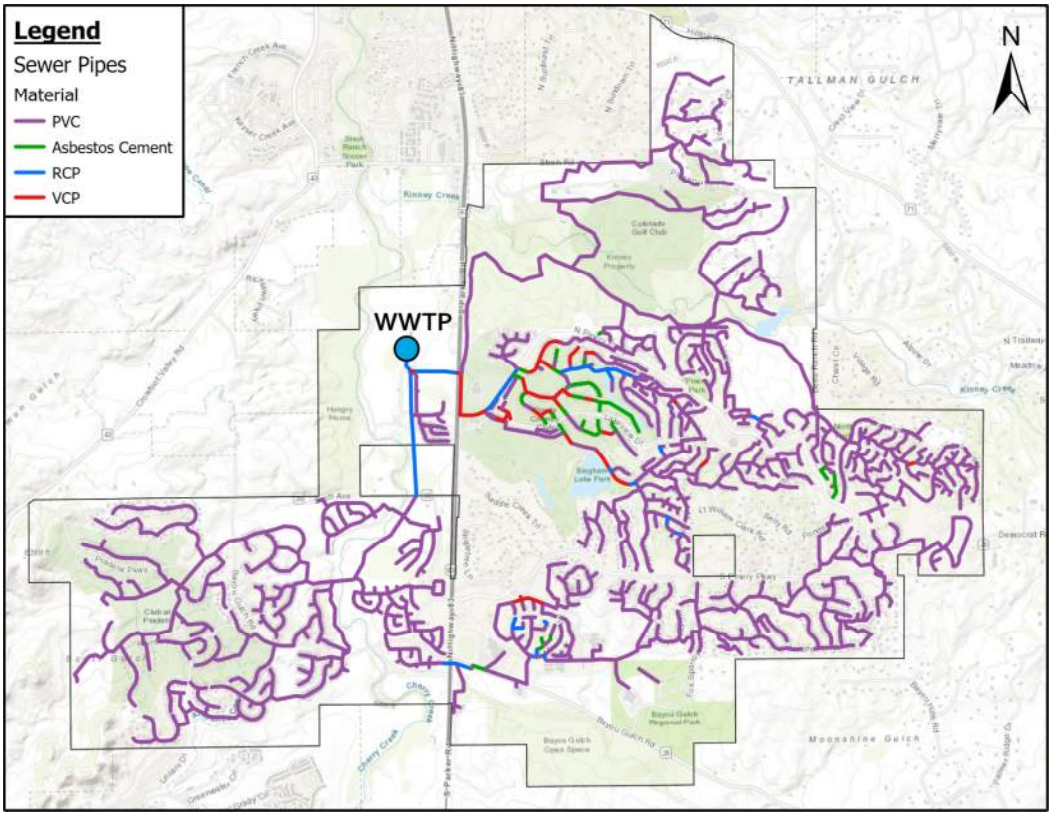


Figure 4-2. Sewer Pipelines by Material

Table 4-2. Summary of the Sewer Pipelines by Size

Diameter (inches)	Total Length (feet)	Total Length (miles)	% of System (by length)
4	428	0.1	0.09
6	2,718	0.5	0.54
8	433,246	82.1	86.74
10	16,338	3.1	3.27
12	20,787	3.9	4.16
15	7,532	1.4	1.51
18	6,616	1.3	1.32
21	11,816	2.2	2.37
Total	**499,481**	**94.6**	**100**

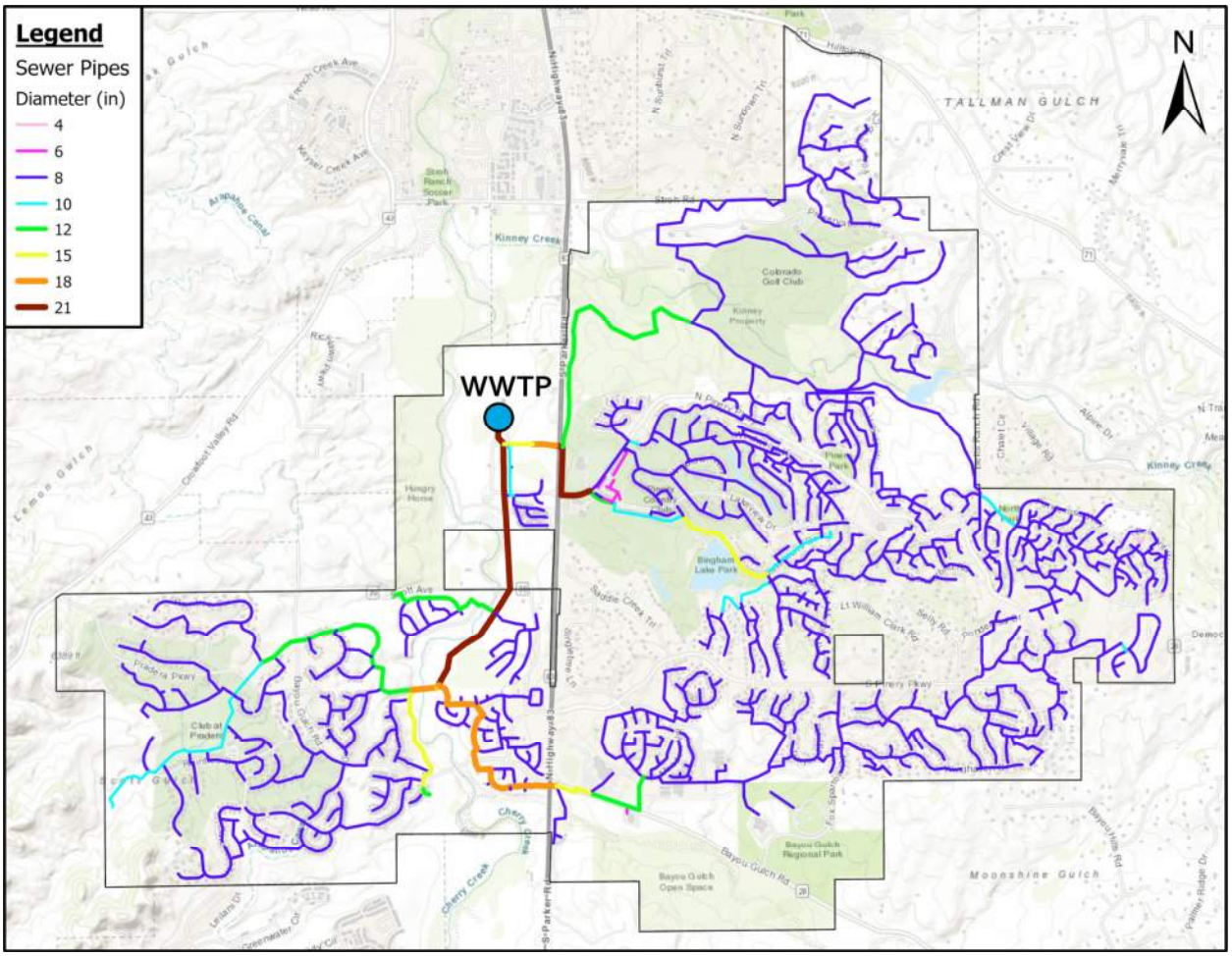


Figure 4-3. Sewer Pipelines by Size

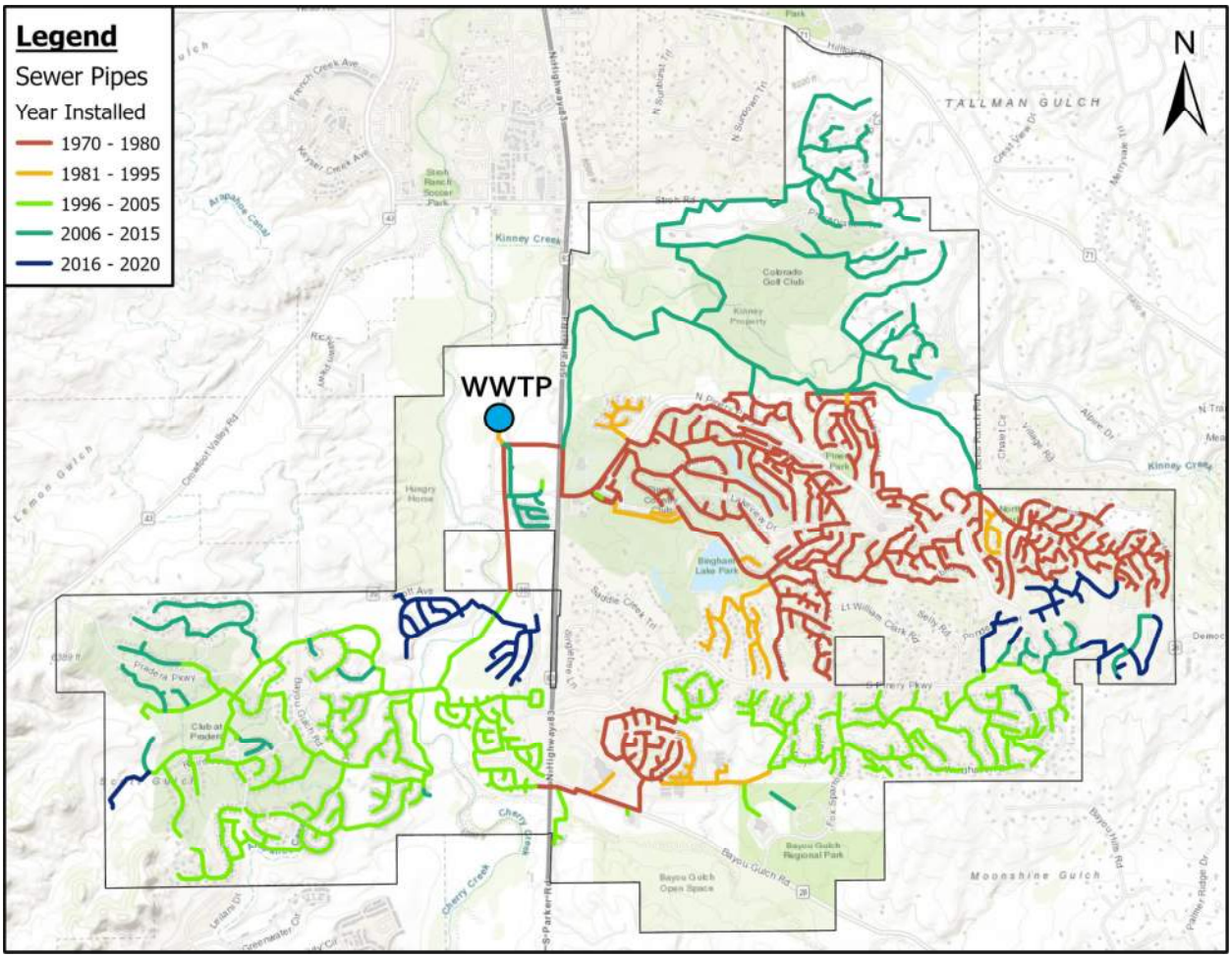


Figure 4-4. Sewer Pipe Locations by Year Installed

4.1.2 Manholes

The District maintains approximately 2,401 manholes in the sanitary sewer system. Of these manholes, 53 are drop manholes with heights ranging from 6 to over 26-feet.

4.2 Treatment

The Pinery's WWTP is a mechanical oxidation ditch that was built in 1991 to replace aerated lagoons. Major upgrades were made in 2009 to increase the hydraulic and organic loading capacity of the facility. Tertiary filtration was also added to meet stringent phosphorous removal requirements. Currently the WWTP has primary, secondary, and tertiary liquid treatment processes that utilize aerated sludge storage, belt press dewatering, and air drying for solids handling processes. Effluent from the WWTP is discharged to Cherry Creek either directly or through percolation ponds. A process flow diagram for the WWTP is provided in **Figure 4-5**.

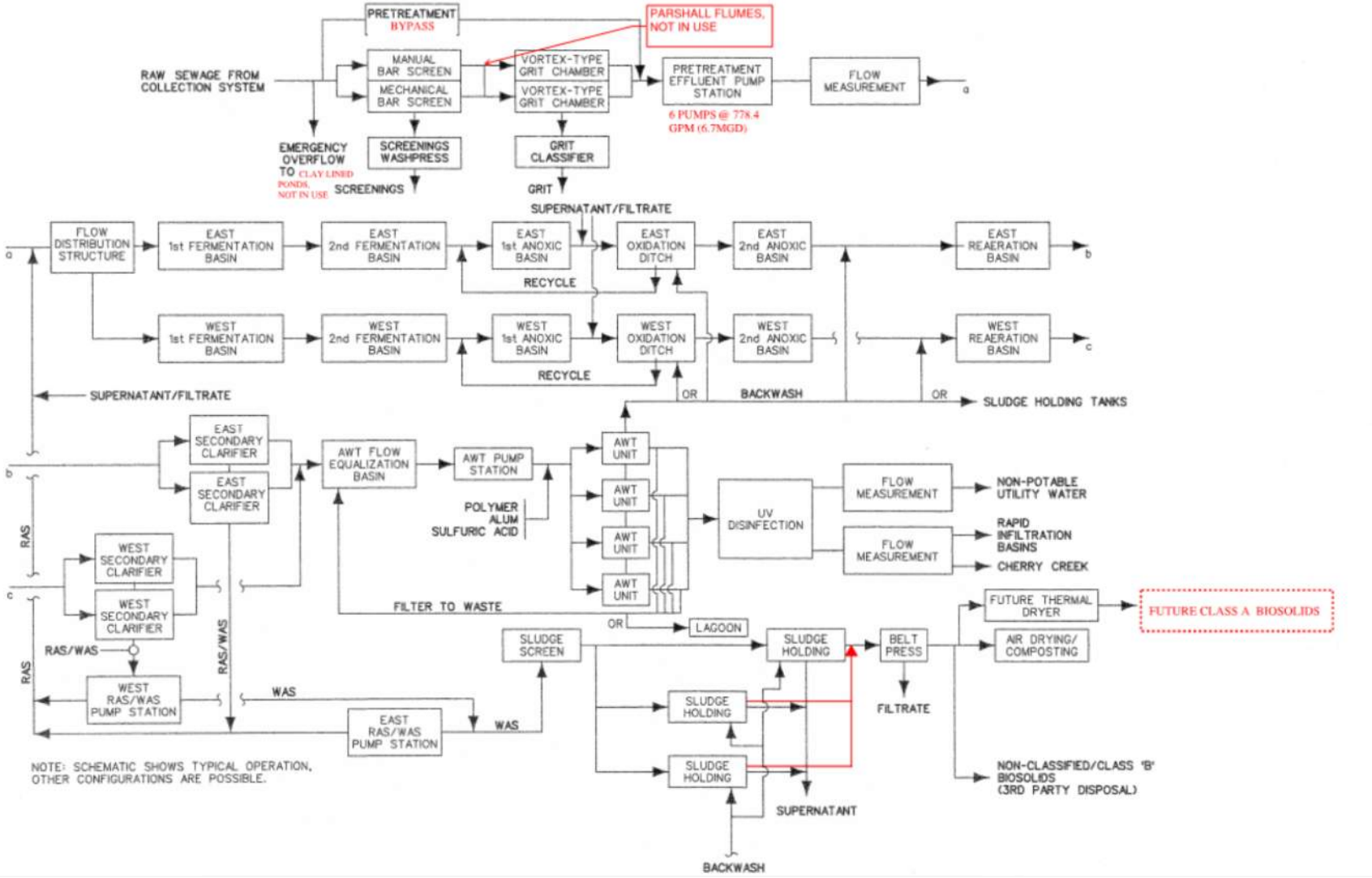


Figure 4-5. Pinery WWTP Process Flow Diagram from (Burns & McDonnell 2019)

5. Demands

This section summarizes existing demands, future demand projections, and the associated peaking factors. Historically, peak demands occur during the summer irrigation season from April to October. June, July, and August are typically the peak months, with the peak day occurring in early July.

Water usage is tracked in the District's billing system for the following customer classes:

- **Residential[2]:** The District provides water to single family residences within its service area. This water is used for both indoor and outdoor uses.
- **Commercial:** The District provides water to commercial establishments located along the Parker Road corridor—including local churches, homeowner associations and four schools—for indoor and outdoor use.
- **Large irrigator**: The District supports the irrigation of numerous parks and green spaces owned and maintained by both Douglas County and various homeowner associations. These customers are separate from the commercial water users and are only provided water seasonally for irrigation. The District also provides construction water on a temporary basis for dust control, make-up water and other uses to developers on an as-needed basis.
- **Golf Course**: The District provides water to three local golf courses—the Pinery, Pradera, and Colorado Golf—through both dedicated Denver Basin wells and treated water from all sources. The water provided to the golf courses is stored in a series of small lakes and ponds and, as a result, the amount of water consumptively used in any particular year does not always equal the amount depleted from the tributary and nontributary sources.

Note, the District transitioned to monthly metering in 2013; therefore, monthly billing data is only available from 2013 to present.

5.1 Potable Water Demands

5.1.1 Summary of Existing Demands

Water use data was obtained from the District's monthly Water System Reports to estimate current demands by customer class. The monthly Water System Reports summarize both system and customer usage.

Error! Reference source not found., shown below, provides a summary of the historical average annual water deliveries for each customer class from 2007 through 2021. Based on the 5-year historical average from 2017 through 2021, the District delivered an annual average of 3,154 acre-feet—of which, approximately 67% of the District's annual water delivery is attributed to residential use followed by water delivered to the three golf courses (21%), commercial (10%) and non-revenue (3%).

[2] The district tracks residential use for water and sewer customers as well as water only.

Table 5-1. Historical Average Water Deliveries by Customer Class from 2007-2021

Customer Class	% of Total Annual Water Deliveries	Average Demand	
		mg	af
Residential	67	685	2,103
Commercial	10	99	303
Golf Course	21	214	657
Non-Revenue	3	30	91.3
Total	**100**	**1,028**	**3,154**

Figure 5-1 shows the total annual historical demands followed by a detailed summary of annual historical demands summarized in **Table 5-2**.

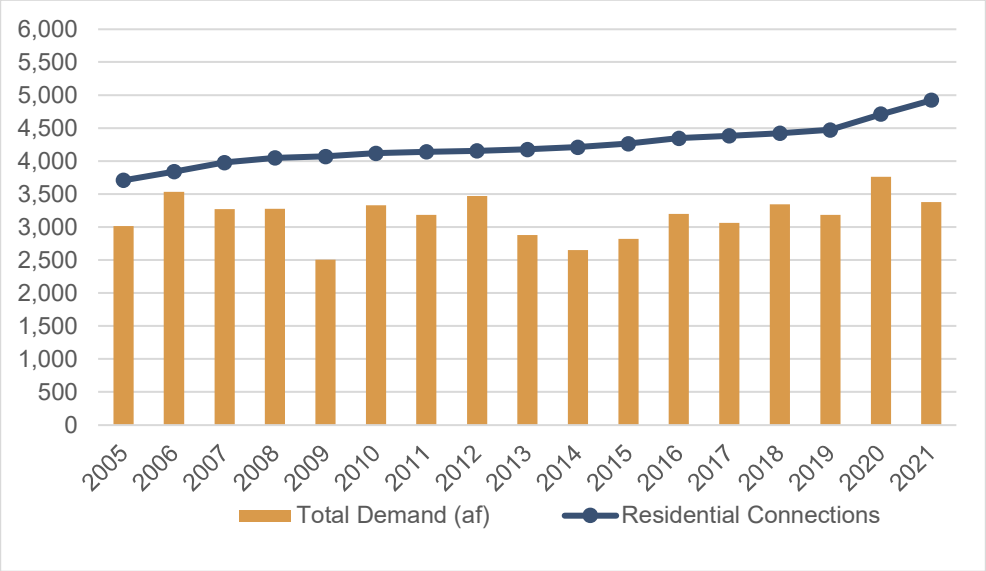


Figure 5-1. Historical Summary of Total Annual Demand (af)

Table 5-2. Annual Water Usage (million gallons) by Customer Class

Customer Class	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	5-Yr Avg.
Residential	673	691	547	708	673	745	629	586	622	717	677	702	697	833	779	737
Commercial	95	92	70	93	104	104	87	83	83	100	99	138	121	125	90	115
Golf-Course	267	255	170	254	232	252	192	164	184	195	192	221	190	238	202	209
Non-Revenue Water	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Total	**1,066**	**1,067**	**817**	**1,085**	**1,038**	**1,131**	**939**	**864**	**918**	**1,041**	**998**	**1,090**	**1,037**	**1,226**	**1,100**	**1,090**

A monthly summary of the total gallons pumped from 2014 through 2021 is shown in **Figure 5-2**, followed by **Figure 5-3** which compares the monthly volume pumped in 2021 relative to the historical (2014-2021) average. As shown below, peak pumping occurs during the irrigation season (June-September). Additionally, monthly pumping in 2021 is higher than the historical average for during the peak season.

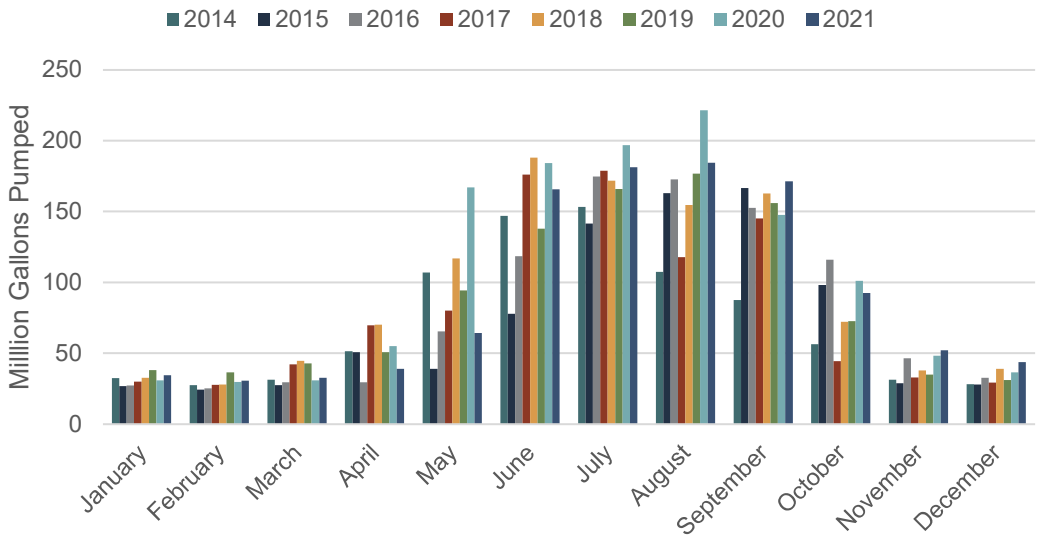


Figure 5-2. Summary of Monthly Pumping from 2014-2021

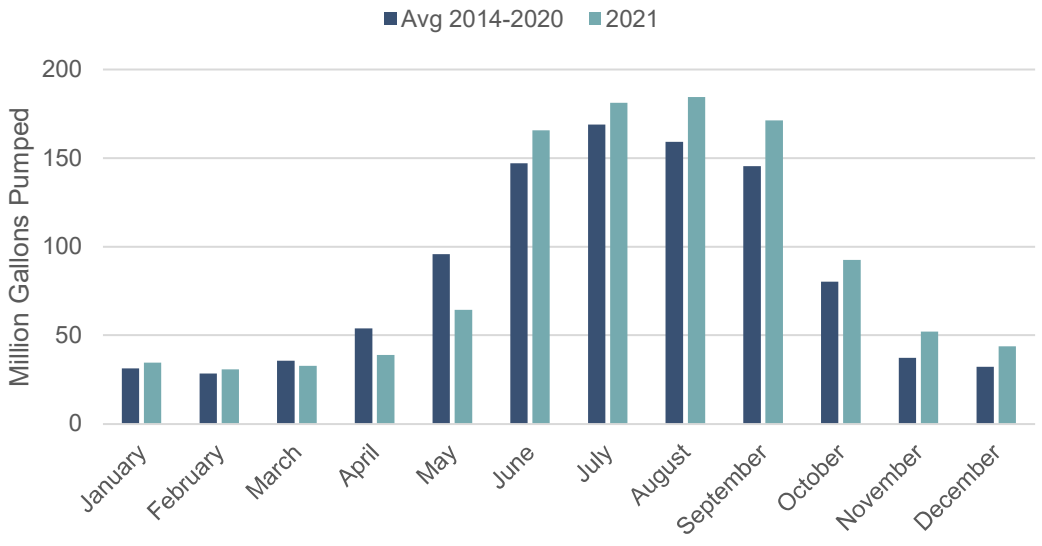


Figure 5-3. Comparison of Monthly Pumping in 2021 Relative to Historical Average (2014-2021)

Table 5-3 highlights the annual demand, average day demand, max day demand and relative peaking factor for the past 5 years.

Table 5-3. Annual Water Demands from 2017-2020

Year	2017	2018	2019	2020	2021	Average
Demand (acre-feet/yr)	3,062	3,345	3,184	3,762	3,377	3,346
Average Day Demand (mgd)	2.83	3.06	2.83	3.41	2.98	3.02
Maximum Day Demand (mgd)	3.78	4.58	4.01	4.62	4.02	4.20
Peaking Factor	1.34	1.50	1.42	1.36	1.35	1.39

The District has developed various water conservation efforts that have been documented in the 2010 Water Conservation Plan and the 2018 Water Efficiency Plan. These efforts, summarized below, focus on educating and informing residents on water conservation and water use efficiency.

- **Water Efficient Fixtures**. Pursuant to the Douglas County Plumbing codes, the District mandates low-flow indoor plumbing fixtures and maintains a list of certified water-saving plumbing fixtures.
- **Watering Schedule**. The District developed and implemented a voluntary outdoor watering schedule, which recommends residents water every-other-day based on address number; no watering for the entire community occurs on Friday; and watering only occurs before 10 am or after 6 pm. The District promotes the voluntary watering schedule by including reminders on customer bills and posting signs throughout the community during the irrigation season.
- **Education**. The District also mails monthly newsletters promoting wise water use, improved outdoor watering practices, Xeriscaping, and other water conservation practices. As part of the District's education efforts, water conservation kits containing low-flow plumbing fixtures and at-home water audit supplies are made available to all homeowners. Furthermore, the Districts supports K-12 education via the South Metro Water Supply Authority's "Water Ambassadors" program.

5.1.2 Future Demands

The Pinery's District boundary with future developments is shown in **Figure 5-4**. As can be seen, future developments within Pinery District boundaries are outlined in a solid red line, and future developments outside of District boundaries are outlined in a dashed red line. At projected build out, the District will serve an estimated 5,865 SFUs—of which, 90% (5,260 SFUs) will be located within the District's service area and the remaining 10% (605 SFUs) will be located outside the boundary. The new buildout within the district is planned for east of Parker Road, with minimal potential buildout located outside the District boundary planned for west of Parker Road.

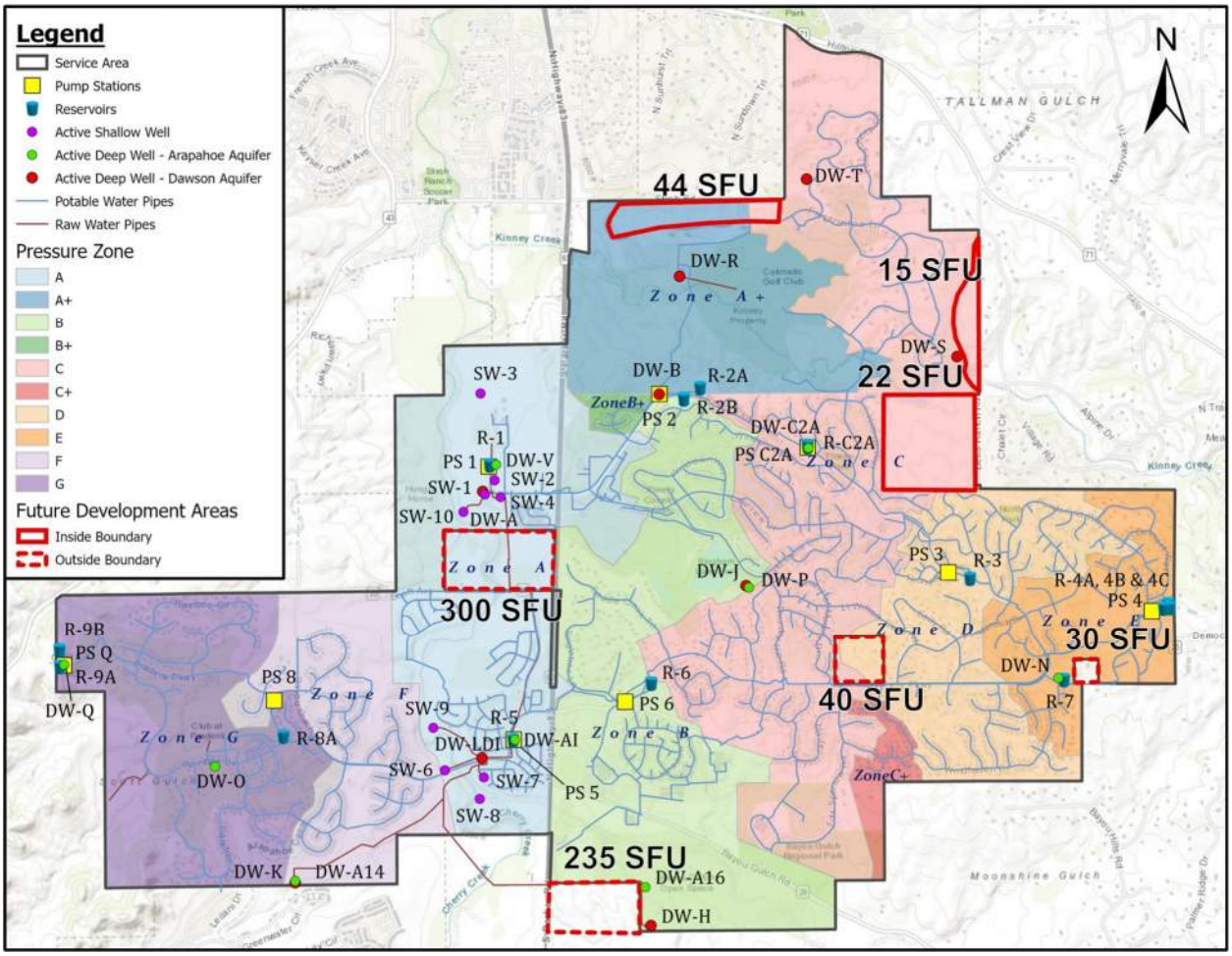


Figure 5-4. Map of Pinery's Water District Boundary with Future Developments

Figure 5-5 shows three plausible future demand scenarios for full buildout—including the potential buildout located outside of the District boundary. These three scenarios—low, baseline, and high—build upon the 5-yr historical average annual demand. Specially, the baseline demand scenario builds upon the historical 5-year average demands from 2017 through 2021 and includes the projected buildout of 5,865 SFUs coupled with a 10% increase in golf course demand, 5% increase in commercial demand, and a 10% safety factor. The low demand scenario assumes 20% decrease in residential demand due to conservation, while the high demand scenario accounts for a 15% increase in residential buildout. At buildout, the low demand scenario is 14.3% less than the baseline scenario, and the high demand scenario is 10.7% higher than baseline—resulting in total projected demands of 3,851, 4,493 and 4,975 acre-feet, respectively.

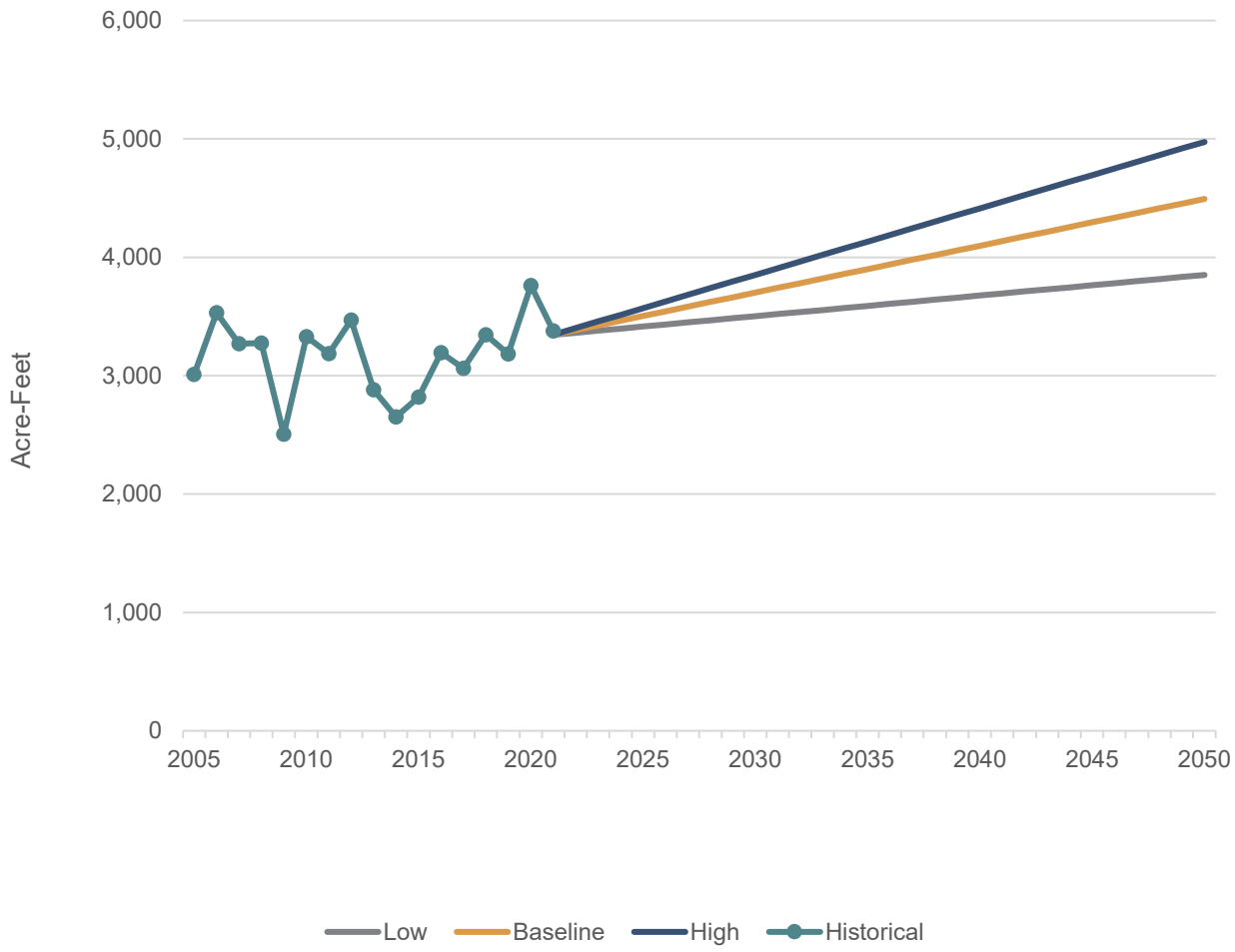


Figure 5-5. Historical & Future Projected Total Water Demand.

A summary of the baseline projected total demands at buildout is presented in **Table 5-4**, followed by a detailed annual breakdown of the projected demand by sector for each scenario is shown in **Table 5-5** through **Table 5-4**.

Table 5-4. Estimated Water Demand at Buildout

Year	At Buildout
Demand (acre-feet/yr)	4,493
Average Day Demand (mgd)	4.00
Maximum Day Demand (mgd)	10.29
Peaking Factor	2.57

Table 5-5. Low Demand Scenario — Projected Water Demand Through Buildout (af).

Year	Within District Boundary						Outside District Boundary			Total
	Residential	Golf Course	Commercial	Unaccounted	Safety Factor	Subtotal	Additional Demand	Safety Factor	Subtotal	
2022	1830	615	322	91	285	3143	210	21	232	3363
2023	1839	618	324	91	286	3159	212	21	233	3380
2024	1849	621	326	91	288	3174	213	21	234	3398
2025	1858	625	327	91	289	3190	214	21	235	3415
2026	1868	628	329	91	291	3206	215	21	236	3433
2027	1877	631	331	91	292	3222	216	22	237	3450
2028	1887	634	332	91	294	3238	217	22	239	3467
2029	1896	637	334	91	295	3253	218	22	240	3485
2030	1906	640	336	91	296	3269	219	22	241	3502
2031	1915	644	337	91	298	3285	220	22	242	3520
2032	1925	647	339	91	299	3301	221	22	243	3537
2033	1934	650	341	91	301	3317	222	22	245	3555
2034	1943	653	342	91	302	3332	224	22	246	3572
2035	1953	656	344	91	304	3348	225	22	247	3589
2036	1962	660	346	91	305	3364	226	23	248	3607
2037	1972	663	347	91	307	3380	227	23	249	3624
2038	1981	666	349	91	308	3396	228	23	251	3642
2039	1991	669	351	91	310	3411	229	23	252	3659
2040	2000	672	352	91	311	3427	230	23	253	3677
2041	2010	675	354	91	313	3443	231	23	254	3694
2042	2019	679	356	91	314	3459	232	23	255	3711
2043	2029	682	357	91	316	3475	233	23	257	3729
2044	2038	685	359	91	317	3490	234	23	258	3746
2045	2048	688	361	91	319	3506	236	24	259	3764
2046	2057	691	362	91	320	3522	237	24	260	3781
2047	2067	695	364	91	322	3538	238	24	261	3798
2048	2076	698	366	91	323	3554	239	24	263	3816
2049	2086	701	367	91	324	3570	240	24	264	3833
2050	**2095**	**704**	**369**	**91**	**326**	**3586**	**241**	**24**	**265**	**3851**

Table 5-6. Baseline Demand Scenario — Projected Water Demand Through Buildout (af).

Year	Within District Boundary						Outside District Boundary			Total
	Residential	Golf Course	Commercial	Unaccounted	Safety Factor	Subtotal	Additional Demand	Safety Factor	Subtotal	
2022	1973	531	278	91	285	3158	227	23	250	3385
2023	1996	537	281	91	288	3194	230	23	253	3425
2024	2019	543	285	91	292	3229	232	23	255	3464
2025	2042	549	288	91	295	3265	235	23	258	3504
2026	2065	555	291	91	298	3301	238	24	261	3543
2027	2088	562	294	91	302	3337	240	24	264	3583
2028	2111	568	298	91	305	3373	243	24	267	3623
2029	2135	574	301	91	308	3409	246	25	270	3662
2030	2158	580	304	91	312	3444	248	25	273	3702
2031	2181	586	307	91	315	3480	251	25	276	3741
2032	2204	593	311	91	318	3516	253	25	279	3781
2033	2227	599	314	91	322	3552	256	26	282	3820
2034	2250	605	317	91	325	3588	259	26	285	3860
2035	2273	611	320	91	328	3624	261	26	288	3900
2036	2296	617	324	91	332	3660	264	26	290	3939
2037	2319	624	327	91	335	3695	267	27	293	3979
2038	2342	630	330	91	338	3731	269	27	296	4018
2039	2365	636	333	91	342	3767	272	27	299	4058
2040	2388	642	337	91	345	3803	275	27	302	4097
2041	2411	648	340	91	348	3839	277	28	305	4137
2042	2434	655	343	91	352	3875	280	28	308	4177
2043	2457	661	346	91	355	3911	283	28	311	4216
2044	2481	667	350	91	358	3946	285	29	314	4256
2045	2504	673	353	91	362	3982	288	29	317	4295
2046	2527	679	356	91	365	4018	291	29	320	4335
2047	2550	686	359	91	368	4054	293	29	323	4374
2048	2573	692	363	91	372	4090	296	30	326	4414
2049	2596	698	366	91	375	4126	299	30	328	4454
2050	**2619**	**704**	**369**	**91**	**378**	**4162**	**301**	**30**	**331**	**4493**

Table 5-7. High Demand Scenario — Projected Water Demand Through Buildout (af).

Year	Within District Boundary						Outside District Boundary			Total
	Residential	Golf Course	Commercial	Unaccounted	Safety Factor	Subtotal	Additional Demand	Safety Factor	Subtotal	
2022	2059	481	252	91	286	3170	237	24	261	3402
2023	2093	489	257	91	290	3221	241	24	265	3458
2024	2127	497	261	91	295	3271	245	24	269	3514
2025	2161	505	265	91	300	3322	249	25	273	3570
2026	2195	513	269	91	304	3373	253	25	278	3626
2027	2229	521	273	91	309	3424	256	26	282	3683
2028	2263	529	277	91	314	3475	260	26	286	3739
2029	2297	537	282	91	319	3526	264	26	291	3795
2030	2331	545	286	91	323	3577	268	27	295	3851
2031	2365	553	290	91	328	3627	272	27	299	3907
2032	2399	561	294	91	333	3678	276	28	304	3964
2033	2433	569	298	91	337	3729	280	28	308	4020
2034	2468	577	302	91	342	3780	284	28	312	4076
2035	2502	585	307	91	347	3831	288	29	316	4132
2036	2536	593	311	91	352	3882	292	29	321	4188
2037	2570	601	315	91	356	3933	296	30	325	4245
2038	2604	609	319	91	361	3983	299	30	329	4301
2039	2638	617	323	91	366	4034	303	30	334	4357
2040	2672	625	327	91	370	4085	307	31	338	4413
2041	2706	633	332	91	375	4136	311	31	342	4469
2042	2740	641	336	91	380	4187	315	32	347	4525
2043	2774	648	340	91	385	4238	319	32	351	4582
2044	2808	656	344	91	389	4288	323	32	355	4638
2045	2842	664	348	91	394	4339	327	33	360	4694
2046	2876	672	352	91	399	4390	331	33	364	4750
2047	2910	680	357	91	403	4441	335	33	368	4806
2048	2944	688	361	91	408	4492	339	34	372	4863
2049	2978	696	365	91	413	4543	342	34	377	4919
2050	**3012**	**704**	**369**	**91**	**418**	**4594**	**346**	**35**	**381**	**4975**

5.2 Wastewater Generation

5.2.1 Summary of Existing Wastewater Generation

The WWTP has a hydraulic capacity of 2.0 mgd, with a planned future hydraulic capacity equal to 2.6 mgd. The District operates and maintains one flow meter at the headworks of the WWTP that measures hourly wastewater flows. A summary of this data from 2017-2020 is presented below in **Table 5-8**, followed by **Figure 5-6** which shows the average (2017-2020) daily influent flow in gallon per minute (gpm) to the WWTP. **Figure 5-7** shows the hourly WWTP influent for 2019 relative rainfall. Note, the 2020 wastewater flow rates were higher than average due to the Covid-19 Pandemic.

From 2017 to 2020, average wastewater influent flow was around 548 gpm. Excluding 2020 data (which is likely skewed due to the stay-at-home orders issued due to the COVID-19 pandemic), average influent flow was 535 gpm. The maximum influent flow typically occurs in early spring or late fall, with an average maximum annual flow equal to 1,073 gpm.

Table 5-8. Summary of Historical WWTP Influent Flow (gpm) from 2017-2020

Month	Average Maximum	Year 2017	2018	2019	2020
January	Average	572	594	611	547
	Maximum	976	983	997	1005
February	Average	566	558	557	541
	Maximum	886	880	863	1021
March	Average	512	537	561	636
	Maximum	**981**[1]	966	918	1003
April	Average	482	583	580	605
	Maximum	830	**1082**[1]	915	895
May	Average	553	570	612	600
	Maximum	945	907	904	879
June	Average	532	550	467	613
	Maximum	838	814	850	838
July	Average	456	528	540	556
	Maximum	868	843	786	818
August	Average	501	579	482	580
	Maximum	810	772	756	886
September	Average	470	484	518	605
	Maximum	854	837	862	913
October	Average	508	560	545	600
	Maximum	898	866	**1048**[1]	835
November	Average	486	559	502	563
	Maximum	848	859	847	**1181**[1]
December	Average	480	519	612	563
	Maximum	886	1028	1013	847

1. *Denotes the maximum annual flow*

Source: Stantec Consulting Services. Wastewater Services Project. (2021).

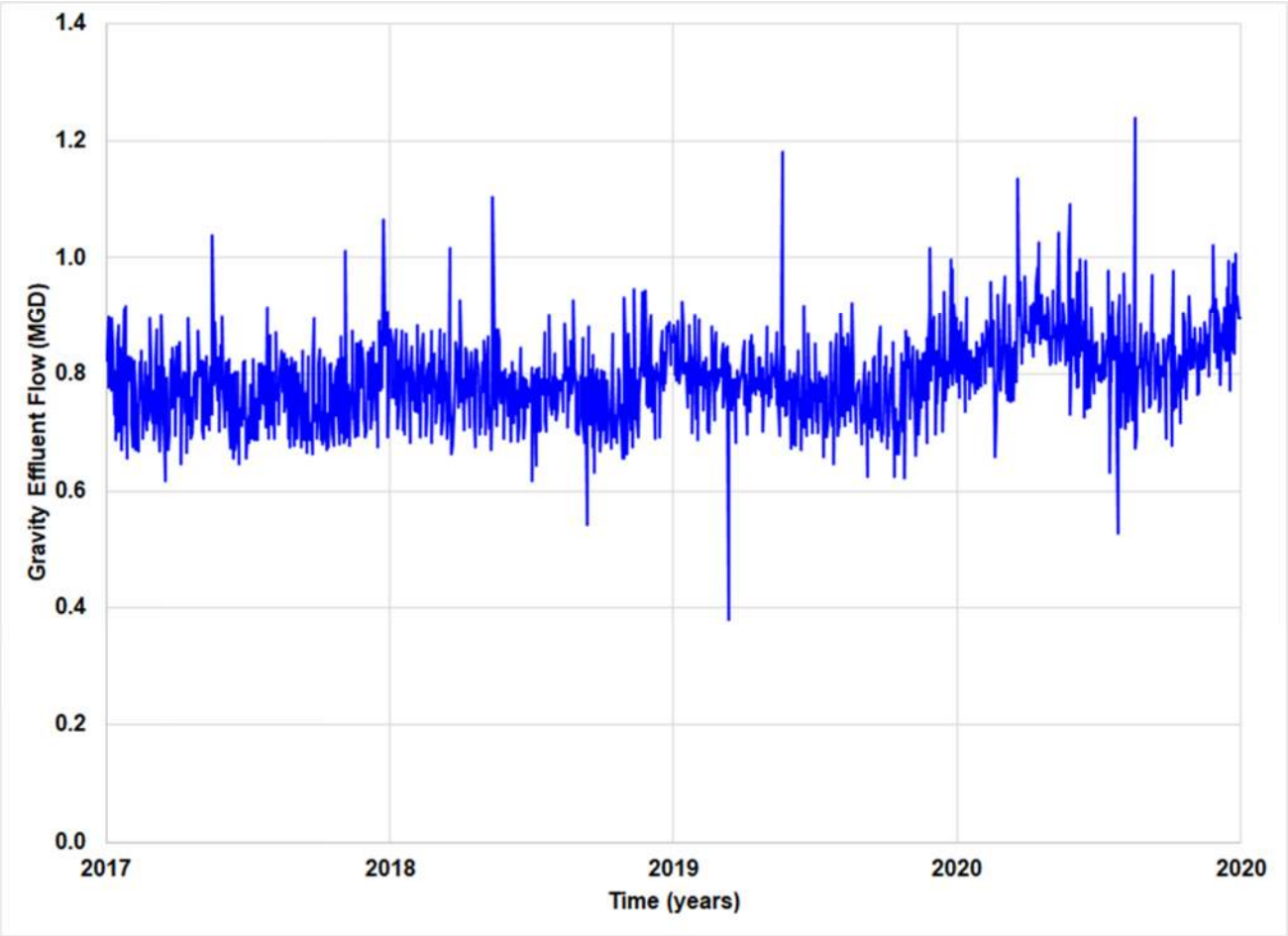


Figure 5-6. 2017-2020 Daily Gravity WWTP Influent Flow (Stantec 2021)

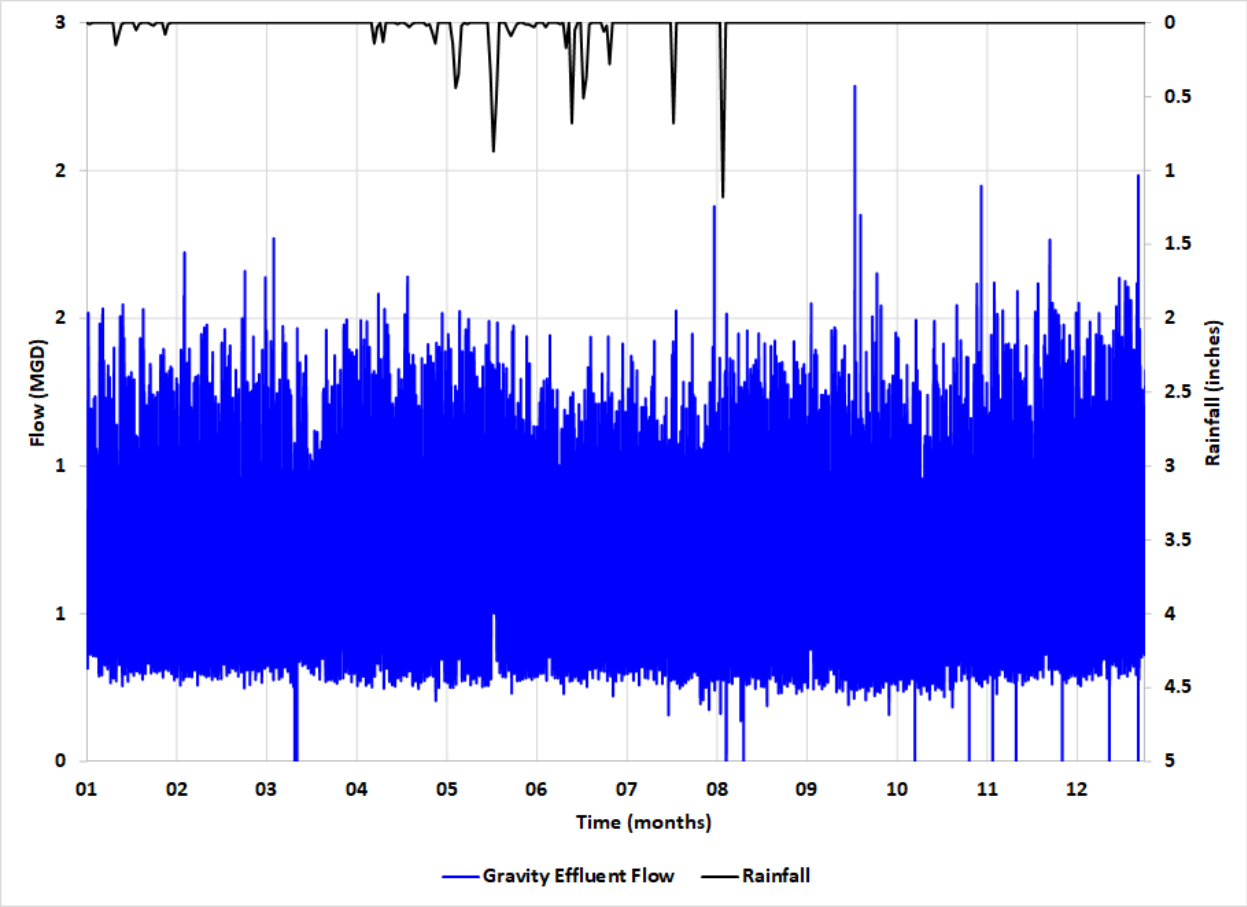


Figure 5-7. 2019 Hourly Gravity WWTP Influent (Stantec 2021)

5.2.2 Future Wastewater Generation Demands

Figure 5-8 shows the Pinery's sewer District boundary with future developments. As noted, the District has a projected total buildout of 5,865 SFU's, which is expected to occur around 2050.

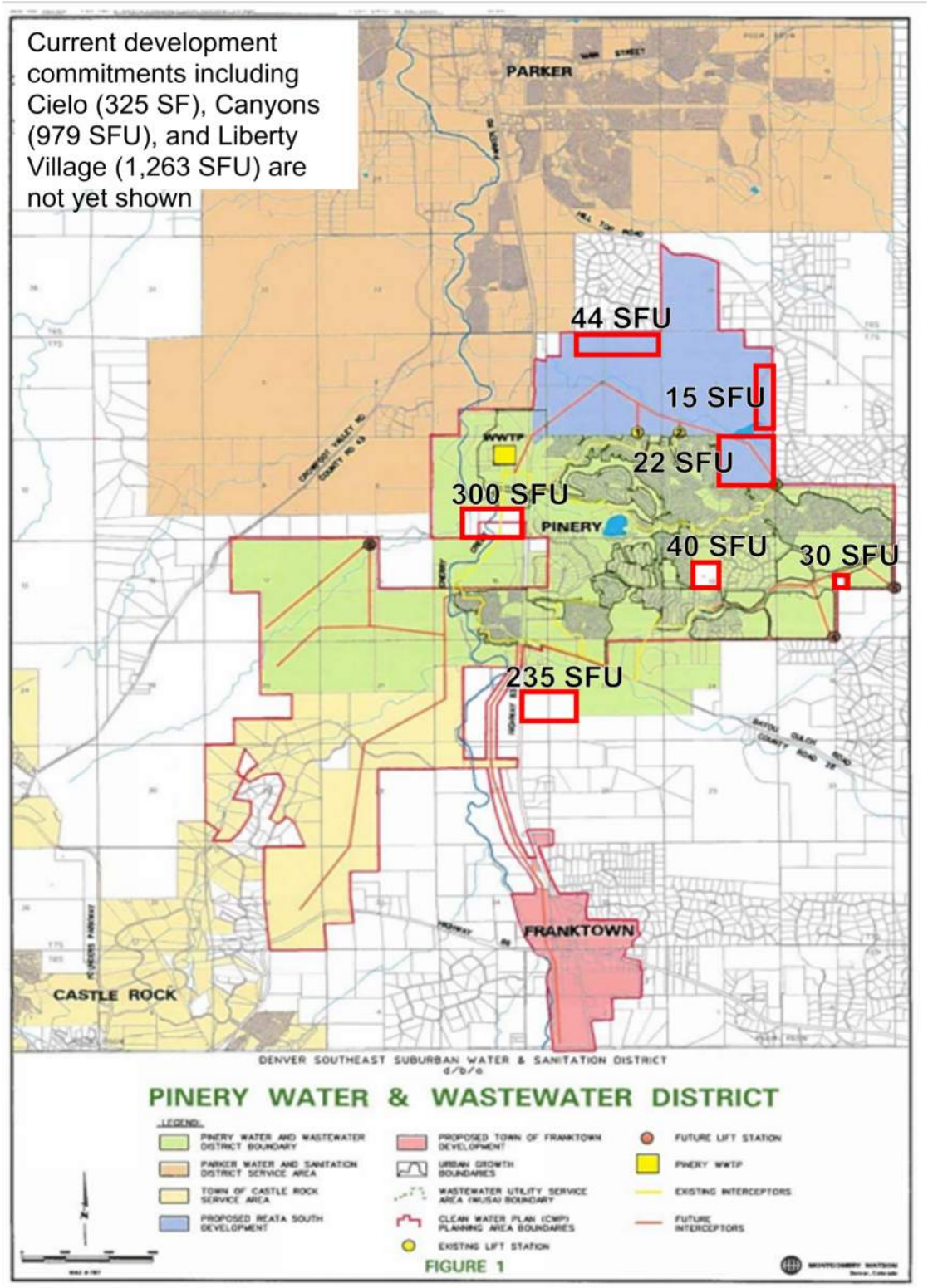


Figure 5-8. Map of Pinery's Sewer District Boundary with Future Developments

In addition to the projected total buildout, the District has committed providing wastewater services to the following developments (**Table 5-9**):

Table 5-9. SFU Projections

Development	SFU
Cielo	325
Liberty Village	1,263
Canyons	979
Total Committed SFUs	**2,567**

Assuming an occupancy of 2.6 persons per SFU and an average daily sewage flow of 75 gallons per person per day, the estimated wastewater demand at full buildout—including the current additional development commitments—is 1.53 mgd. Under buildout conditions, not including potential commitments outside of the District boundary, the District will be at 76% of permitted hydraulic capacity. The estimated wastewater demand at full buildout including additional potential commitments outside of the District boundary is 1.64 mgd. This represents 82% of permitted hydraulic capacity. **Table 5-10** highlights the projected wastewater flows under buildout conditions.

Table 5-10. Projected Wastewater Flows under Buildout Conditions

	Input Value	Estimated Demand (mgd)	Estimated Demand (afy)	% Current Capacity of WWTP
Estimated Occupancy (person/SFU)	2.6	-	-	-
Average Daily Sewage Flow (gallons/person/day)	75	-	-	-
Buildout within Boundary (SFU)	5,260	1.03	1,149	51%
Current Development Commitments (SFU)	2,567	0.50	561	25%
Subtotal	**7,827**	**1.53**	**1,710**	**76%**
Additional Potential Commitments Outside Boundary	605	0.12	132	6%
Total	**8,432**	**1.64**	**1,842**	**82%**

6. Service Level Assumptions

Service level assumptions (SLA) are often used in long-term planning and serve as performance metrics to measure current system performance. These assumptions are typically based on current operating guidelines and practices. The following SLAs—developed in collaboration with District staff and Board—reflect how the District is operating its system and are subsequently used to assess current system performance as well as future system performance under changing conditions.

A summary of the selected service level assumptions is presented below in **Table 6-1.** The target values listed in the table are targets that the Districts would like to achieve in the next 10 years.

Table 6-1. Service Level Assumptions

Service Level Assumption	Description	Current Value	Target Value	Notes
Raw Water System				
21-Day Supply (Max Day) *(mgd)*	Amount of water that can be delivered consistently for 21 days straight without moisture during the irrigation season	8.5	9.5	Calculated with the largest non-tributary well and the largest alluvial well offline, Walker Reservoir aids with this supply
Reusable Supply *(% of supply)*	Percent of treated water supple comes from renewable rights	70	75	Storage dependent – will be increased when Walker Reservoir is brought online
Interconnects with Other Utilities *(# interconnects)*	Number of interconnects with surrounding utilities	3	3	Can be used to deliver water supplies and as emergency backups
Water Loss *(%)*	Amount of raw water that is lost at well heads and pump stations before making it to the distribution system.	5	5	Water loss less than 10% is considered acceptable
Drinking Water Treatment				
Regulatory Compliance *(%)*	Percentage of time each year the District meets all health-related drinking water standards and regulations.	100	100	Equals the number of days the utility is in full compliance with all applicable regulations divided by 365 days
Distribution System				
Mainline Leaks & Breaks per 100 Miles *(leaks + breaks per 100 miles of pipe)*	Used to assess condition of the water distribution system to gauge system integrity.	5.1	4.5	Equals the sum of the total number of mainline leaks and breaks times 100, divided by the total miles of distribution piping
Service Line Leaks & Breaks per 100 Miles *(leaks + breaks per 100 miles of pipe)*	Used to assess condition of the water distribution system to gauge system integrity.	21.9	15	Equals the sum of the total number of leaks and breaks times 100, divided by the total miles of distribution piping

Service Level Assumption	Description	Current Value	Target Value	Notes
Distribution System (continued)				
Disruptions of water service lasting more than 6 hours *(outages/1,000 accounts)*	Number of planned and unplanned water service disruptions by duration. The disruption of water service lasting longer than 6 hours per 1,000 accounts.	12	5	Equals 1,000 times the total number of disruptions that lasted more than 6 hours divided by the total number of active and nonresidential accounts
Water Age *(days)*	Water quality goals in the distribution system.	20 - 40	20 - 30	Water age should be less than 40 days in the winter
Pressures by Zone (%)	Water pressure in the system should not fall below 55 psi	40-110	55-100	Percent of time per year the pressure is above 55 psi.
Wastewater System				
Sewer Overflow Rate *(%)*	Total number of sewer overflow events per year created by conditions under the control of the District.	0	0	Equals the number of sewer overflow events during the year divided by the total miles of collection system piping, times 100.
Regulatory Compliance *(%)*	Percent of time each year that the District meets all wastewater standards and regulations.	100	100	Equals total number of compliance events per the District's permit minus the number of events out of compliance, divided by the total number of compliance events per the District's permit.
Disruptions of wastewater service lasting more than 6 hours *(outages/1,000 accounts)*	Number of planned and unplanned water service disruptions by duration. The disruption of water service lasting longer than 6 hours per 1,000 accounts.	0	0	Equals 1,000 times the total number of disruptions that lasted more than 6 hours divided by the total number of wastewater accounts.

7. System Gaps and Proposed Capital Improvement Projects

System gaps were identified after evaluating SLAs and Capital Improvement Plan (CIP) projects. The District is currently meeting or exceeding nearly all of its SLAs. The SLAs that the District is not currently meeting are its 21-Day Supply and Reusable Supply goals. These gaps can be filled by tailoring the timing of its CIP projects and/or developing more projects. A full listing of the proposed CIP projects can be found in Appendix B.

7.1 Water Supply System

7.1.1 Water Supply Portfolio

Based on average historical yields, the District is currently capable of producing 3,733 af/yr of water. As **Section 5.1.2** illustrates, there are three plausible future demand scenarios for full buildout: low, baseline, and high demand; the resulting projected demands are 3,851, 4,493, and 4,975 af/yr respectively. In order to meet these future demands, the District will need to invest in CIP projects that bolster the capacity of their water supply. There are several projects that will achieve this in coming years such as the redrilling of shallow wells 2 and 8, construction of shallow well 14 and Lower Dawson well A-8, and the restoration of shallow well 5. The District is also planning to construct two new reservoirs, 7B and 8B, which will contribute to the 21-Day Supply gap. Additionally, the District has an Aquifer Storage and Recovery (ASR) Program in its CIP projects that will focus on permitting and equipping wells O, P, V, and C2A to meet the Reusable Supply goals.

Depending on which future demand scenario comes to fruition, the District may be able to cut back on some of these CIP projects. Focusing on water conservation efforts to reduce the District's demands at full buildout will mean that the District will be able to use the money that would have been spent on the projects in other areas.

7.1.2 Raw Water Quality

As reuse in the area increases, the total dissolved solids (TDS) of raw water will subsequently increase. The District's Reusable Supply SLA is evidence that there is a growing interest in reuse in the area and as a result there is likely to be future impacts on raw water quality.

This issue will not only affect the District, but will also impact one of its water suppliers, WISE. To combat this issue, WISE has developed a plan to reduce TDS in their unblended water. The District will be responsible for a 5% pro rata share of the capital cost of this TDS solution.

7.1.3 Raw Water Storage

The construction of Walker Reservoir will provide the District additional operational flexibility to increase the amount of reusable supply. Walker Reservoir will be approximately 650 acre-feet; the District owns 300 acre-feet of storage, and Castle Rock owns 150 acre-feet. (As noted in **Section 3.1.3**, the District will also manage Castle Rock's storage—resulting in a total relative storage of 450 acre-feet.) Water will be

delivered to Walker Reservoir directly from CCPWA's nearby alluvial wells and/or piped from CCPWA's nontributary wells.

7.2 Potable Water Treatment

As of now, the District is able to minimally treat their raw water as it is coming from groundwater sources. The District does have plans to design and construct a surface water treatment plant (SWTP) in the next 10 years. The trigger for this project would be more wells being designated as groundwater under the direct influence of surface water (GWUDISW). Raw water from wells that have been classified as GWUDISW must undergo additional treatment such as filtration or be disconnected from the system. The District has had one well identified as possibility being GWUDISW by the EPA, future testing will determine if the designation is correct. However, if more wells are classified as GWUDISW, the District will need to focus on supporting their SWTP project. This will allow the District able to continue meeting their Regulatory Compliance SLA.

7.3 Distribution System

The District is currently meeting its SLAs for its distribution system, however aging infrastructure has the potential to create gaps in this area. Stantec is currently developing a hydraulic model for the District and will likely find gaps that need to be filled with additional CIP projects. This could include replacing AC pipelines, adding 12" piping for increased fire flows, and connecting pressure zones. Outcomes from Stantec's modeling should be examined as results become available.

7.4 Sewer Collection System

The District is currently meeting its SLAs for its Wastewater collection system but has not reached full buildout yet. The District does have a Pipe Bursting Project lined up to increase their main sizes from 6" to 8", this will be completed in 2025. Stantec's modeling efforts will likely identify additional project in the future in order to continue meeting the District's Wastewater specific SLAs.

7.5 Wastewater Treatment

Currently the District is meeting its Wastewater Regulatory Compliance SLA, however based on the Burns and MacDonnell Wastewater Capacity Evaluation, the District will likely need upgrades to their current facility in the future to continue meeting regulations. At buildout the WWTP will be at or near the hydraulic and biological limit. Therefore, the District has two CIP projects planned to add necessary improvements to their WWTP and increase capacity to 2.6 mgd. The WWTP upgrade is expected to be completed in 2024, however, the exact timing of the expansion will be dependent on the flows to the WWTP.

Appendix A:

Capital Improvement Plan Project Sheets

Capital Improvement Plan Project Sheets

This document includes one-page descriptions of the projects currently included in the Pinery's Capital Improvement Plan (CIP). These pages will provide information on the location, description, and justification for each project in the CIP. Please use the legend below to help better understand the information listed on each page.

Table 1. Usage Categories and Descriptions

Usage Category	Category Description
Water	All facilities associated with pumping, treatment, and storage of drinking water supplies
Wastewater	All facilities associated with the treatment and discharge of wastewater flows
Distribution System	Infrastructure required to convey drinking water throughout the system
Collection System	Infrastructure required to convey wastewater flows from the system to the WWTP
Water Resources	Infrastructure required to purchase, store, and convey raw water flows to the system
Wells	Infrastructure required to pump groundwater supplies into the water system

Table 2. Priority Levels and Descriptions

Priority Level	Description
1	Mandatory projects to meet contractual or regulatory requirements
2	Strategic projects to enhance service level capabilities or meet growing demands
3	Projects that maintain the current levels of service in the system
4	Discretionary projects that can enhance capabilities but are not currently required

Service Level Assumptions: Service level assumptions (SLAs) are used as performance metrics to measure the current system performance. Specific descriptions of each SLA can be found in the presentation slides and Master Plan document.

CIP Project Sheet

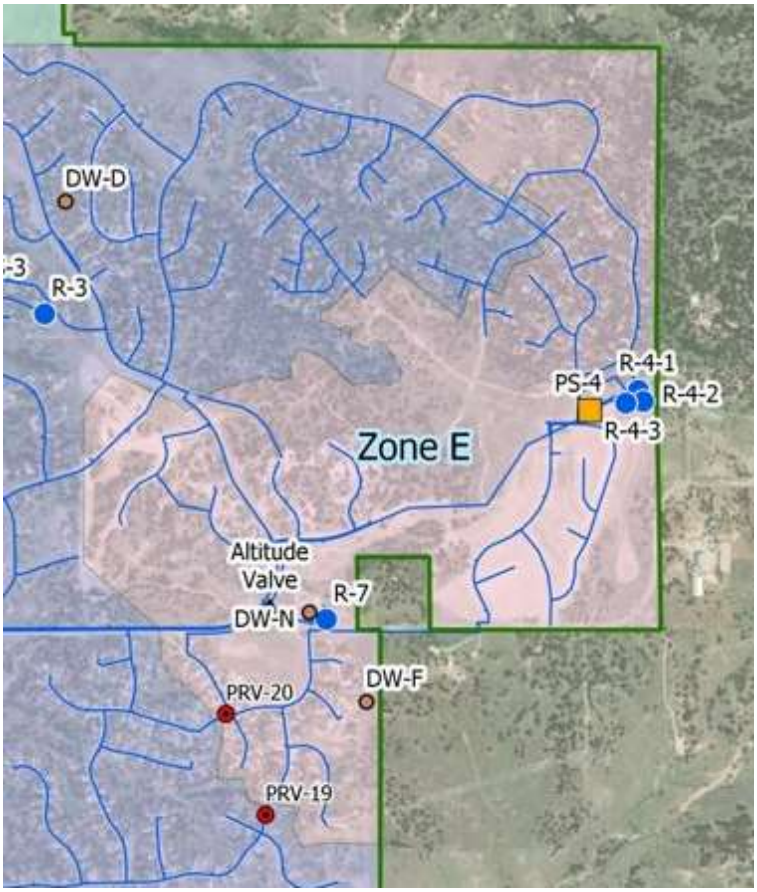
PINERY WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 1	**Project Name:** Zone E Pipeline Project
Priority Level: 2	**Asset Location:** Ponderosa Way from Derby Way to Ponderosa Court

Usage: Distribution System

Project Description:
Addition of 12" piping to allow for increased fire flows.

Project Justification:
Needed to provide increased fire flow.



Total Project Cost: $431,200

Start Year: 2023

Duration: 2

Service Level Assumption: Disruptions of Service

CIP Project Sheet

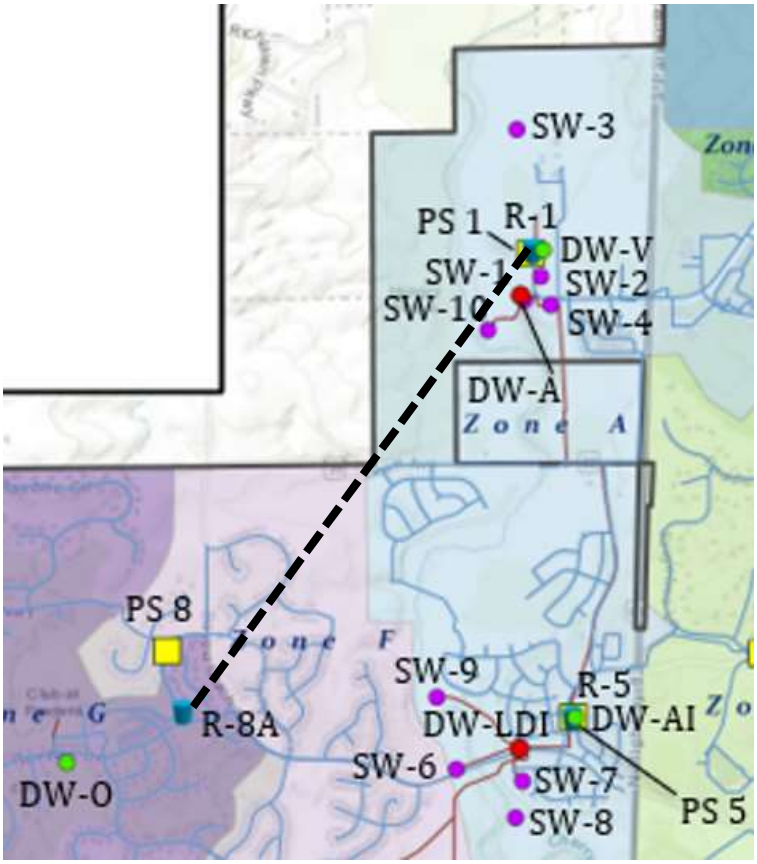
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 2	**Project Name:** PS1 to Res 8 pipeline
Priority Level: 2	**Asset Location:** Throughout Pinery District

Usage: Distribution System

Project Description:
Pipeline to connect A and F zones.

Project Justification:
Provides redundancy and decreases water age for chlorine residual/nitrifcation potential.



Total Project Cost: $2,000,000

Start Year: 2023

Duration: 2

Service Level Assumption: Water Age

CIP Project Sheet

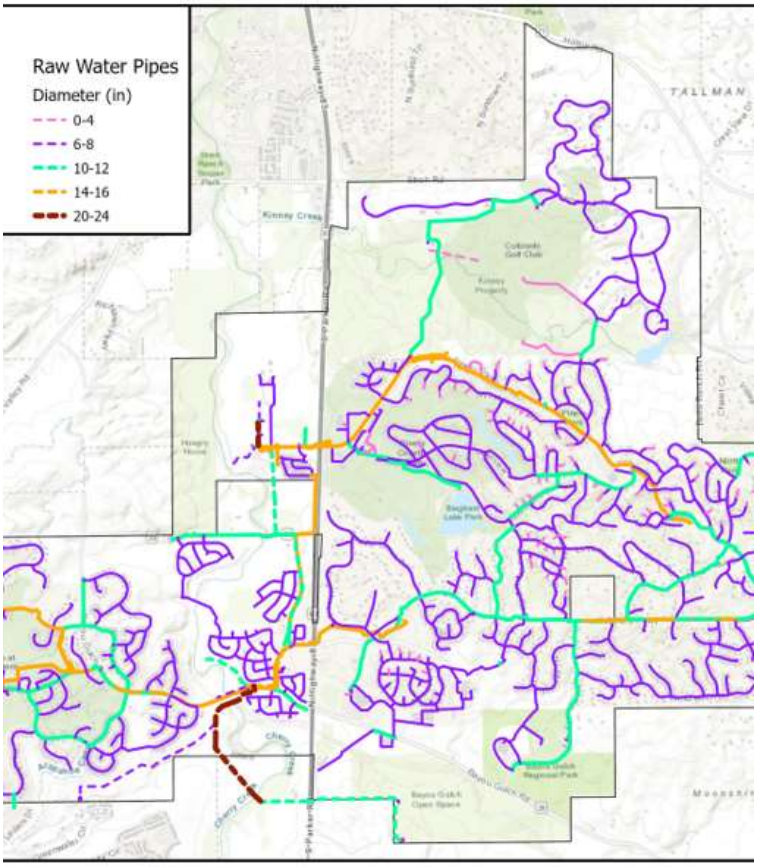
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 3	**Project Name:** Potable Pipeline Replacement Project
Priority Level: 3	**Asset Location:** Throughout Pinery District

Usage: Distribution System

Project Description:
Replacing potable pipelines. Replacement are descrete projects.

Project Justification: If the District wants to continue an additional section for design, the District could then bid all in a future year. There is some risk with expired plans and new County comments / approval.



Total Project Cost: $5,500,000

Start Year: 2023

Duration: 2

Service Level Assumption: Mainline Leaks and Breaks

CIP Project Sheet

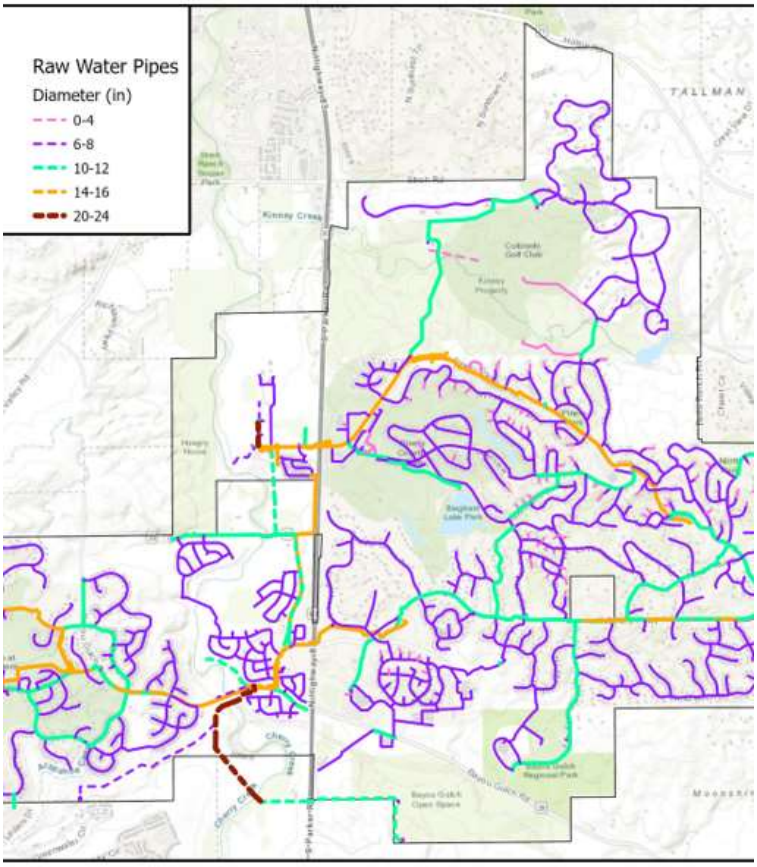
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 4	**Project Name:** Pipe Bursting Project
Priority Level: 2	**Asset Location:** Throughout Pinery District

Usage: Collection System

Project Description:
Increase main size from 6" to 8".

Project Justification:
Approximately 2100 of 6" burst to 8" with approxmately 60 service taps, 20 new/rebuilt manholes/ includes Pinery townhomes area.



Total Project Cost: $1,400,000

Start Year: 2024

Duration: 2

Service Level Assumption: Mainline Leaks and Breaks, Service Lines Leaks and Breaks

CIP Project Sheet

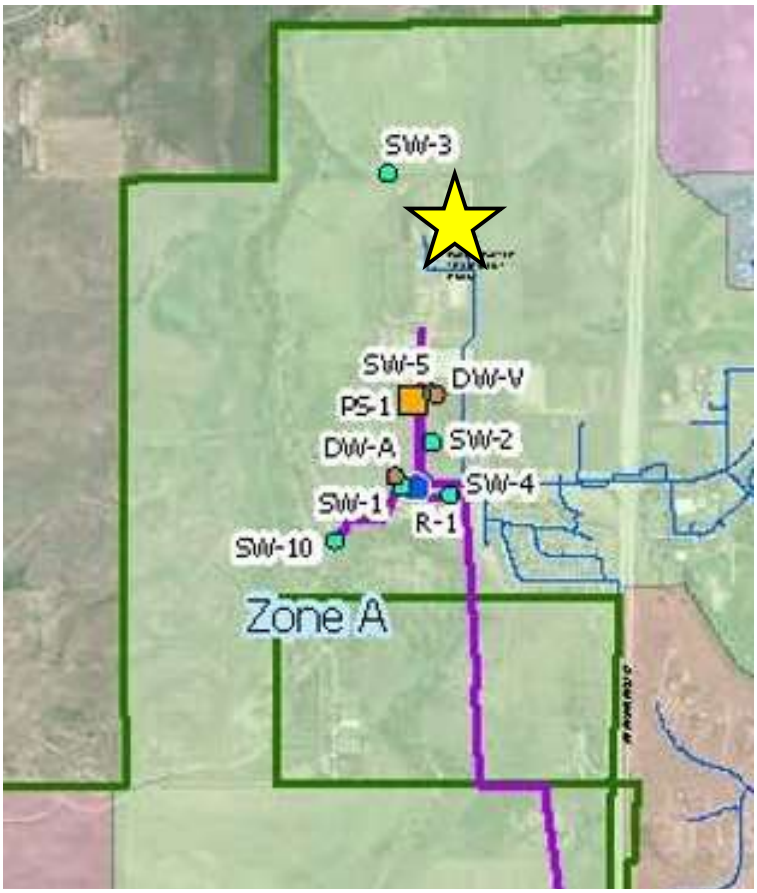
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 5	**Project Name:** WWTP Capacity
Priority Level: 1	**Asset Location:** Pinery WWTP

Usage: Wastewater

Project Description:
Increase capacity to 2.6 MGD.

Project Justification: Per 2019 Burns & McDonnell Capacity Evaluation.



Total Project Cost: $2,200,000

Start Year: 2031

Duration: 3

Service Level Assumption: Sewer Overflow Rate, Regulatory Compliance

CIP Project Sheet

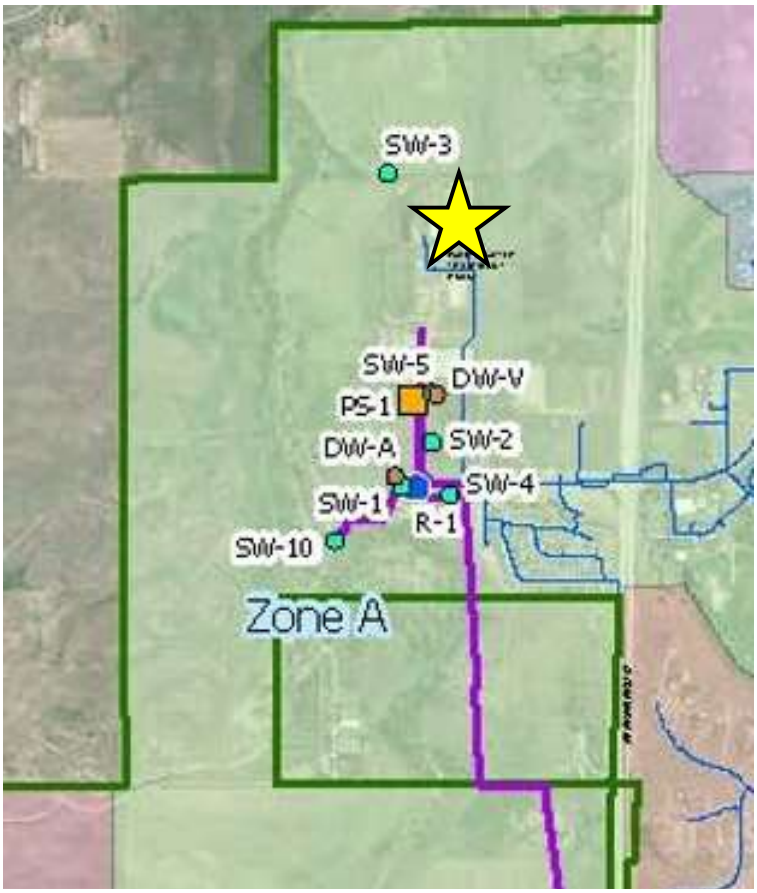
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 6	**Project Name:** WWTP Efficiency
Priority Level: 3	**Asset Location:** Pinery WWTP

Usage: Wastewater

Project Description:
Add aeration, replace bar screen, replace UV system (technology outdated), influent pumps.

Project Justification:
Necessary improvements to keep WWTP running.



Total Project Cost: $1,700,000

Start Year: 2023

Duration: 2

Service Level Assumption: Regulatory Compliance

CIP Project Sheet

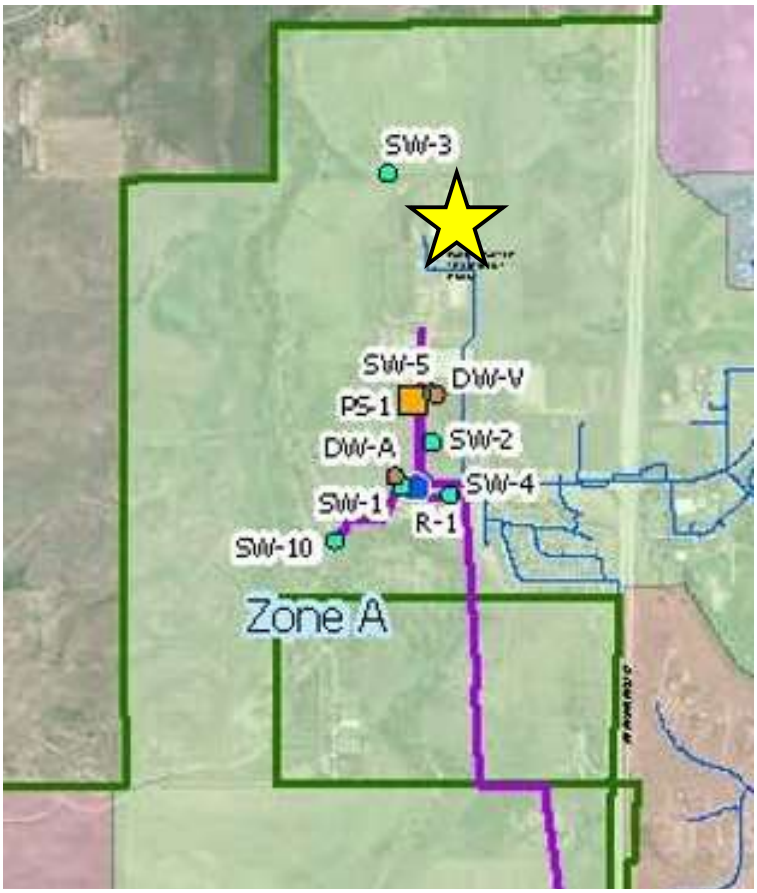
PINERY WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 7	**Project Name:** East Lagoon Liner
Priority Level: 3	**Asset Location:** East Lagoon

Usage: Wastewater

Project Description:
Liner for East Lagoon.

Project Justification:
Needed to control seepage into the groundwater.



Total Project Cost: $300,000

Start Year: 2023

Duration: 2

Service Level Assumption: Regulatory Compliance

CIP Project Sheet

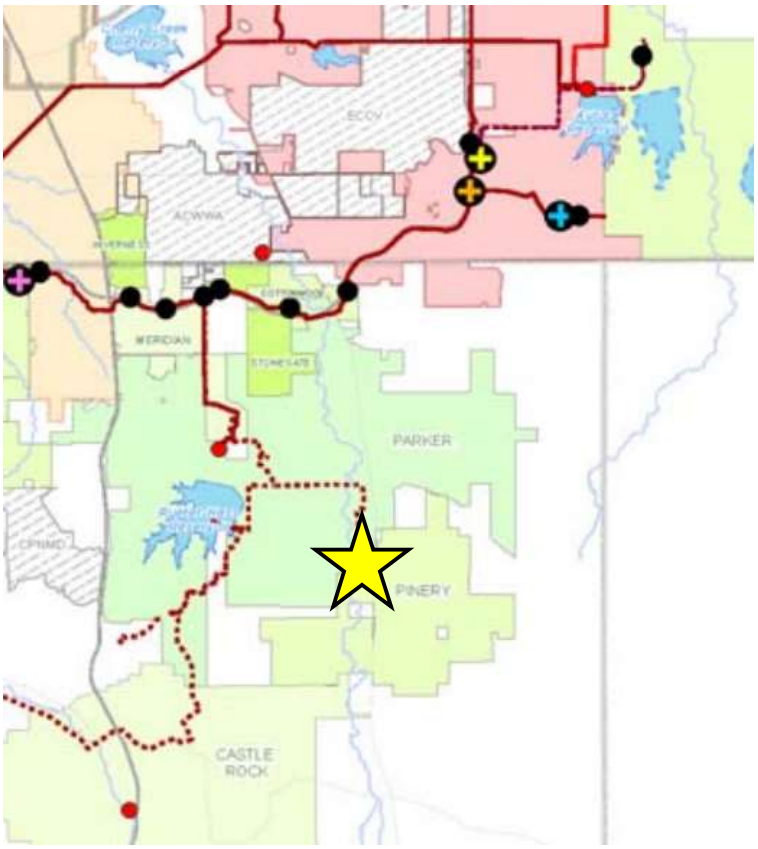
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 8	**Project Name:** TDS Solution
Priority Level: 1	**Asset Location:** Outside of Pinery District

Usage: Water

Project Description:
WISE related project to reduce TDS in unblended water.

Project Justification: 5% pro rata share of capital for TDS solution of unblended WISE water.



Total Project Cost: $2,787,500

Start Year: 2028

Duration: 2

Service Level Assumption: Regulatory Compliance

CIP Project Sheet

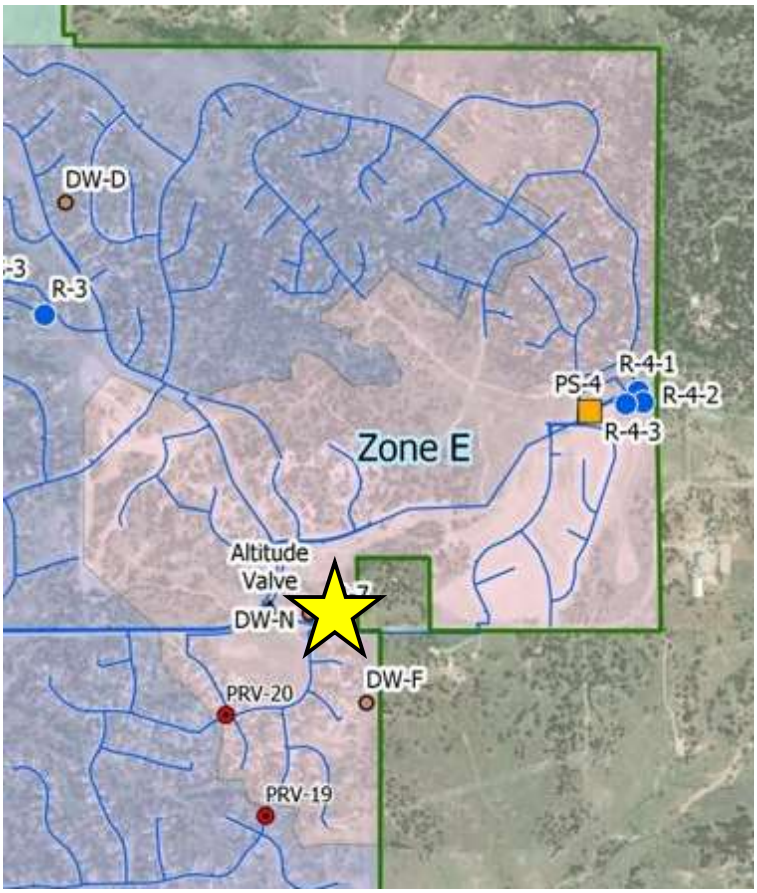
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 9	**Project Name:** Reservoir 7B
Priority Level: 2	**Asset Location:** Near reservoir 7

Usage: Water

Project Description:
Construction of a reservoir.

Project Justification: To have additional storage for future developments.



Total Project Cost: $2,000,000
Start Year: 2026
Duration: 2

Service Level Assumption: 21-Day Supply

CIP Project Sheet

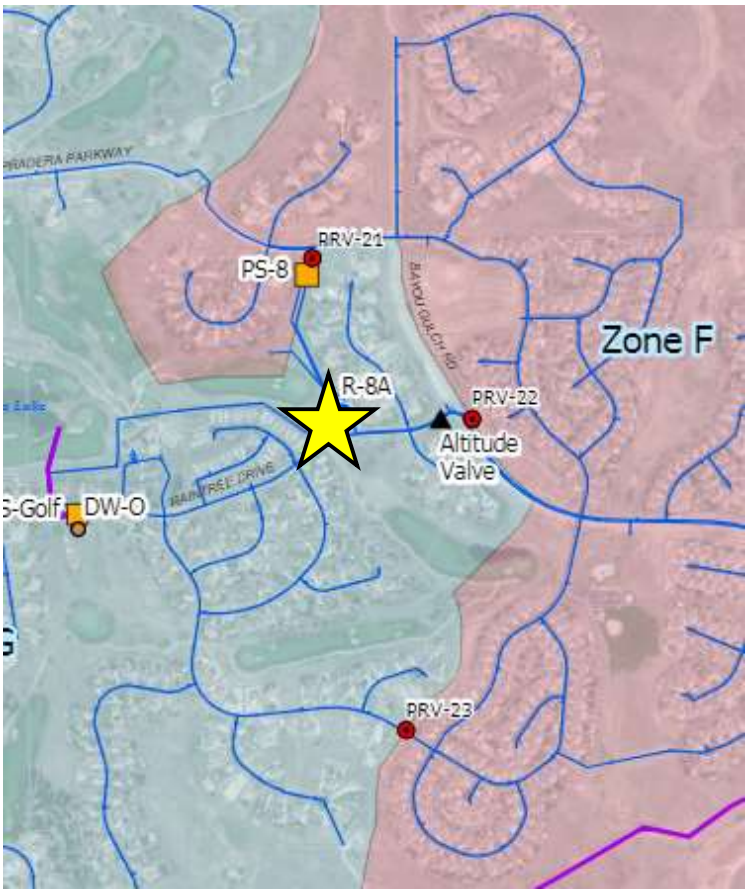
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 10	**Project Name:** Reservoir 8B
Priority Level: 2	**Asset Location:** Near reservoir 8

Usage: Water

Project Description:
Construction of a reservoir.

Project Justification: To have additional storage for future developments.



Total Project Cost: $2,000,000

Start Year: 2022

Duration: 2

Service Level Assumption: 21-Day Supply

CIP Project Sheet

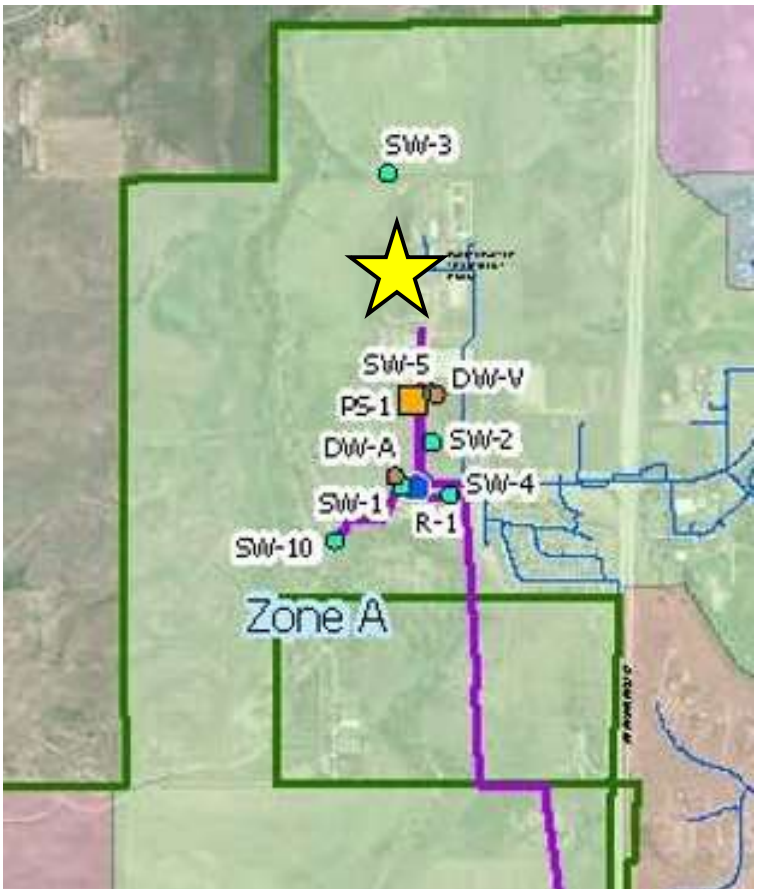
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 11	**Project Name:** SWTP Construction
Priority Level: 1	**Asset Location:** Near WWTP

Usage: Water

Project Description:
10 MGD plant needed to bolster the resiliency of the District's water system.

Project Justification:
Currently water is treated at 5 wells and pump stations throughout the District.



Total Project Cost: $30,000,000
Start Year: 2031
Duration: 2

Service Level Assumption: Regulatory Compliance

CIP Project Sheet

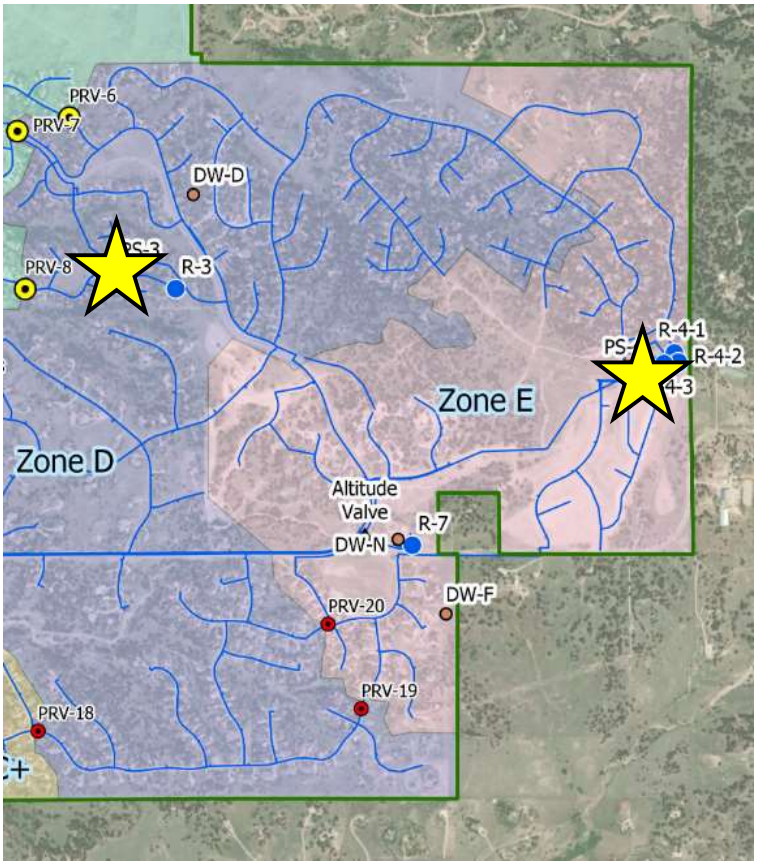
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 12	**Project Name:** Mag Meters
Priority Level: 3	**Asset Location:** Pump Station 4 and Pump Station 3

Usage: Water

Project Description:
New mag meters are needed at PS3, PS4 and PS5.

Project Justification:
Current Prop meters are inaccurate.



Total Project Cost: $60,000

Start Year: 2023

Duration: 1

Service Level Assumption: Pressure by Zone

CIP Project Sheet

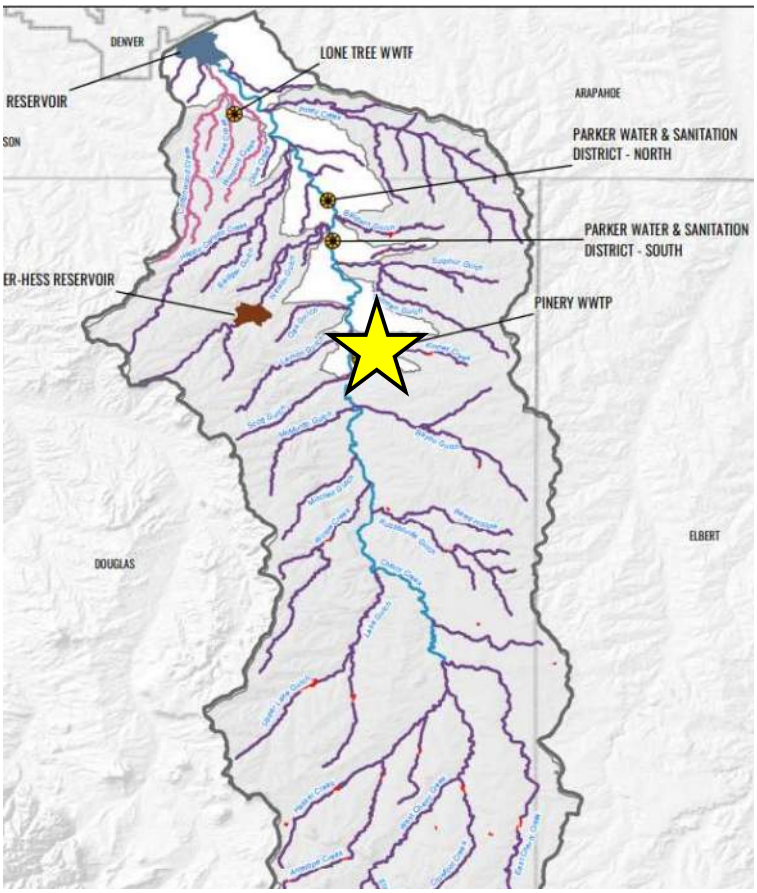
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 13	**Project Name:** Stevens Pipeline
Priority Level: 1	**Asset Location:** Outside of Pinery District

Usage: Water Resources

Project Description:
Common collection pipeline to convey pumped water to Walker Reservoir. Becomes CCPWA Pipeline.

Project Justification:
CCPWA project needed to develop the CCPWA water supply project.



Total Project Cost: $100,000
Start Year: 2023
Duration: 1

Service Level Assumption: 21-Day Supply

CIP Project Sheet

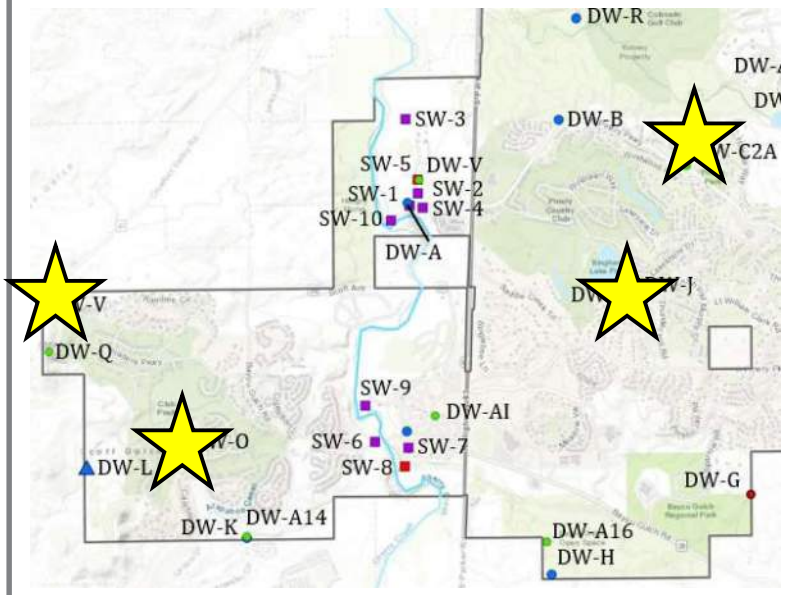
PINERY WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 14	**Project Name:** ASR Program
Priority Level: 2	**Asset Location:** Wells O, P, V, and C2A

Usage: Water Resources

Project Description:
Aquifer storage and recovery program.

Project Justification:
Includes permitting, and equipping wells O, P, V, and C2A.



Total Project Cost: $600,000
Start Year: 2030
Duration: 2

Service Level Assumption: Reuseable Supply

CIP Project Sheet

PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 15	**Project Name:** SW 5
Priority Level: 2	**Asset Location:** Shallow well 5

Usage: Wells

Project Description:
Shallow well 5 is drilled but currently not in use. This project is to get the well back to a useable condition.

Project Justification:
Having additional wells available to use will bolster the resiliency of the Pinery's system.

Total Project Cost: $350,000

Start Year: 2023

Duration: 1

Service Level Assumption: 21-Day Supply

CIP Project Sheet

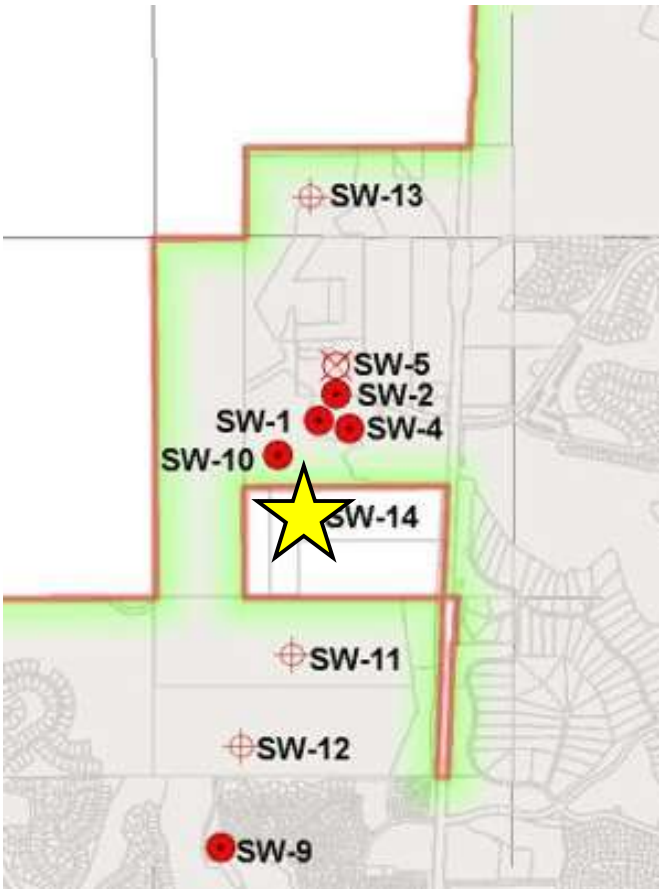
PINERY WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 16	**Project Name:** SW 14
Priority Level: 2	**Asset Location:** Shallow well 14

Usage: Wells

Project Description:
Installation of new shallow well for new aug plan water.

Project Justification: Will need more new aug plan capacity to withdraw the District's pro rata share of CCPWA water during the summer.



Total Project Cost: $700,000
Start Year: 2023
Duration: 1

Service Level Assumption: 21-Day Supply

CIP Project Sheet

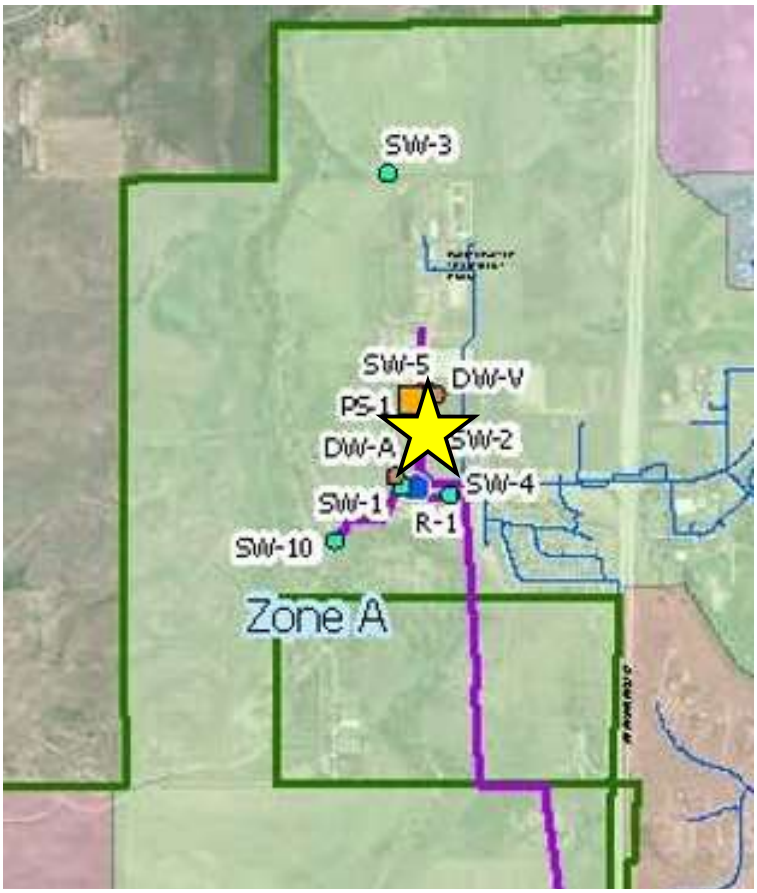
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 17	**Project Name:** SW 2 Redrill
Priority Level: 2	**Asset Location:** Shallow well 2

Usage: Wells

Project Description:
Redrilling shallow well 2 so that it can be used again.

Project Justification:
Making the water supply system more robust and utilitizing permits.



Total Project Cost: $500,000

Start Year: 2025

Duration: 1

Service Level Assumption: 21-Day Supply

CIP Project Sheet

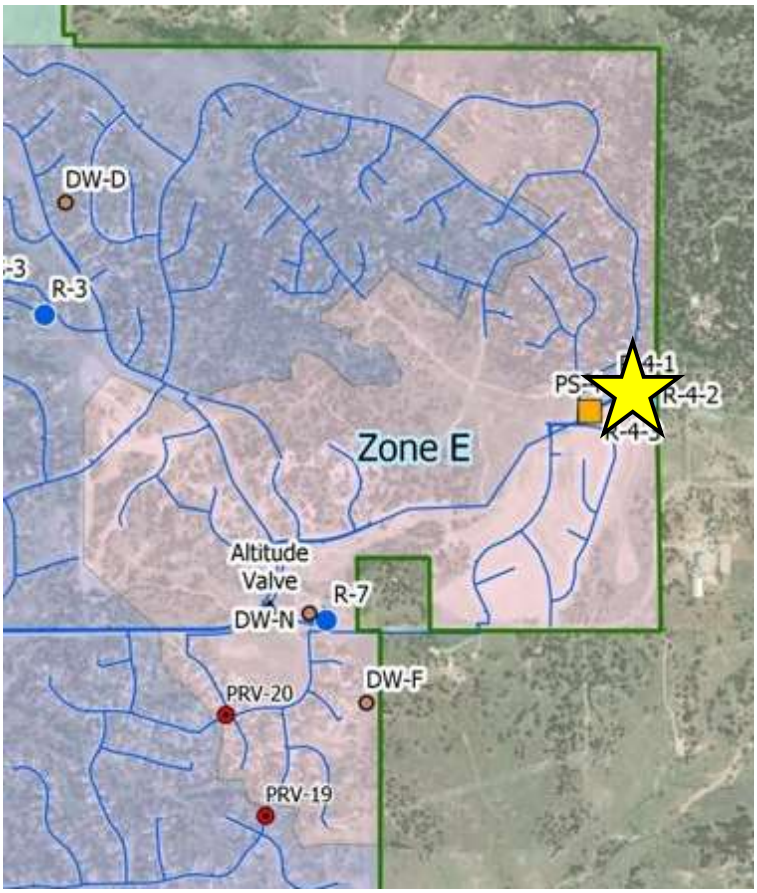
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 18	**Project Name:** Well A-8
Priority Level: 2	**Asset Location:** Near reservoir 4

Usage: Wells

Project Description:
Drilling well A-8 that will draw from the Lower Dawson Aquifer.

Project Justification:
Having additional wells available to use will bolster the resiliency of the District's system.



Total Project Cost: $2,150,000
Start Year: 2025
Duration: 3

Service Level Assumption: 21-Day Supply

CIP Project Sheet

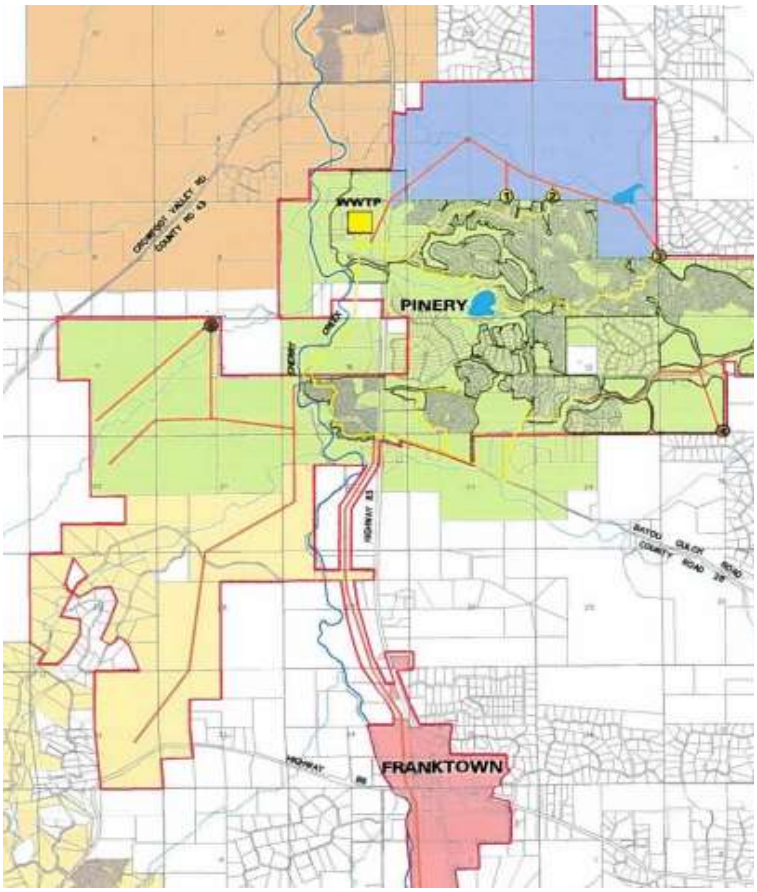
PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 19	**Project Name:** Alluvial Wells
Priority Level: 1	**Asset Location:** Walker Reservoir

Usage: Wells

Project Description:
CCPWA project, 3 wells total.

Project Justification:
Assumes 20% participation at 400 AF. Capture of flows associated with the CCPWA's tributary water rights, would be accomplished by construction of Cherry Creek alluvial wells in the vicinity of Walker Reservoir.



Total Project Cost: $570,000
Start Year: 2022
Duration: 2

Service Level Assumption: 21-Day Supply

CIP Project Sheet

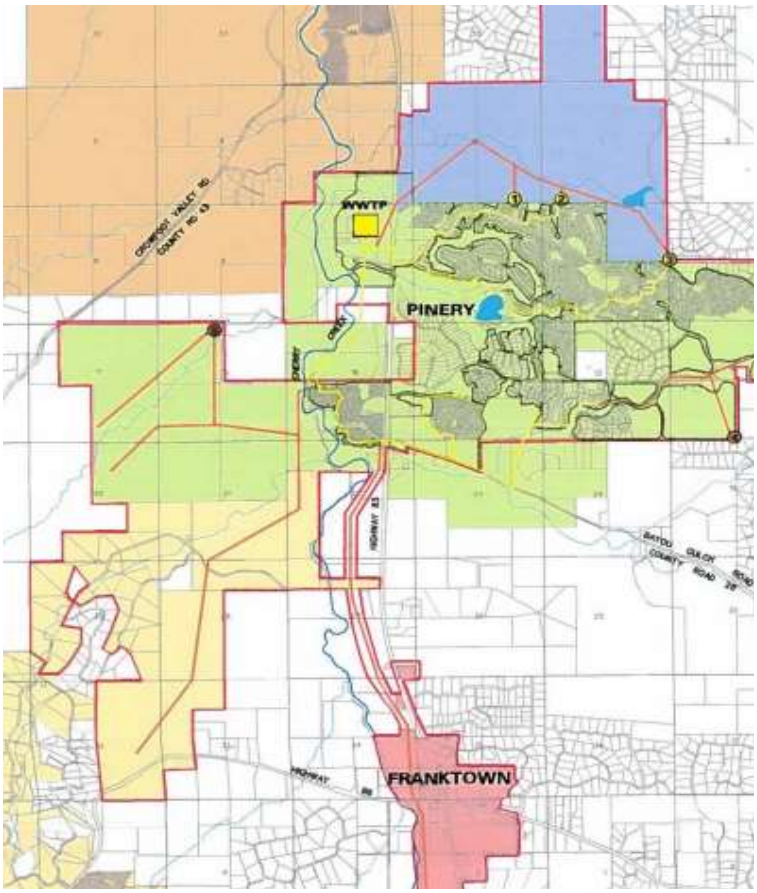
PINERY WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 20	**Project Name:** Denver Basin Wells
Priority Level: 1	**Asset Location:** TBD

Usage: Wells

Project Description:
CCPWA project, 1 well total. Assume 20% of project cost at $2MM. Update as projects advance.

Project Justification:
Assumes 20% participation at 400 AF. Total project cost at $2M, the District is responsible for 20% of total cost. Water associated with the CCPWA's Denver Basin ground water rights would be used conjunctively with alluvial water to provide more consistent delivery.



Total Project Cost: $400,000
Start Year: 2026
Duration: 4

Service Level Assumption: 21-Day Supply

CIP Project Sheet

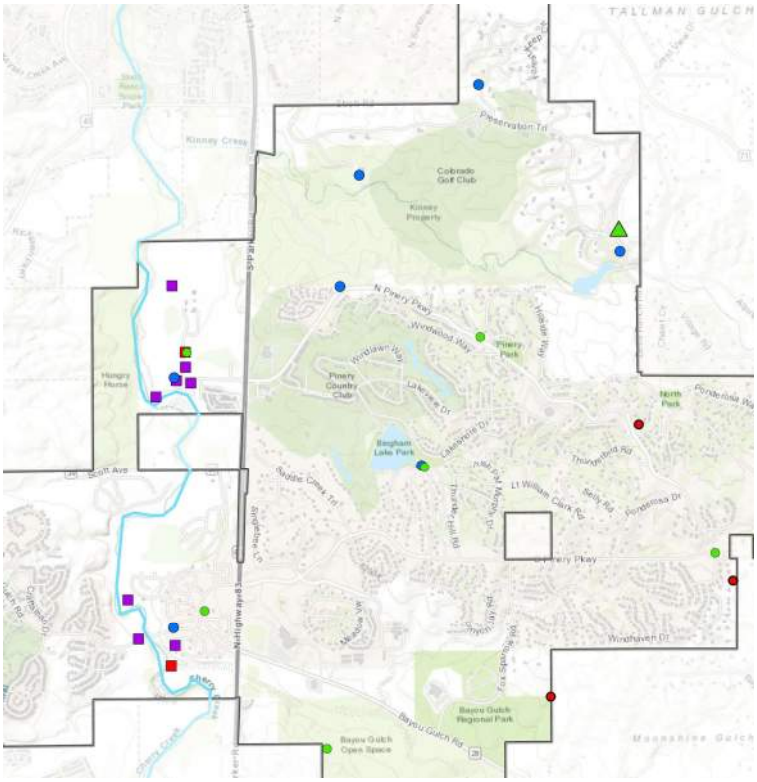
PINERY WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 21	**Project Name:** Well Sites
Priority Level: 3	**Asset Location:** Well sites

Usage: Wells

Project Description:
Add manual transfer switches at remaining well sites.

Project Justification:
Needed for mobile generator backup power.



Total Project Cost: $30,000
Start Year: 2023
Duration: 1

Service Level Assumption: 21-Day Supply

CIP Project Sheet

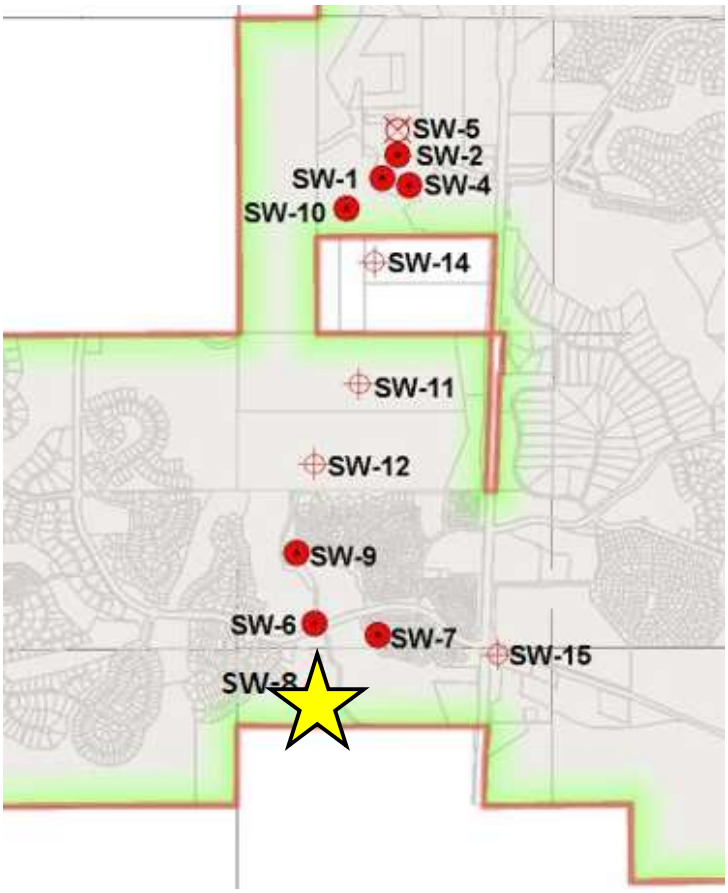
PINERY WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 22	**Project Name:** SW 8 Redrill
Priority Level: 3	**Asset Location:** Well 8

Usage: Wells

Project Description:
Current SW 8 is in peat bog and has iron issues. Relocation of SW 8 to address water quality issues.

Project Justification:
Needed to improve water quality supply and use of well source.



Total Project Cost: $400,000
Start Year: 2023
Duration: 1

Service Level Assumption: 21-Day Supply

CIP Project Sheet

PINERY WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 23	**Project Name:** SWTP Design
Priority Level: 1	**Asset Location:** Current Pump Station 1 property

Usage: Water

Project Description:
Design services for surface water treatment plant.

Project Justification:
Needed to treat wells that become designated as GWUDI to meet regulatory compliance.

Total Project Cost: $3,000,000

Start Year: 2028

Duration: 1

Service Level Assumption: Regulatory Compliance

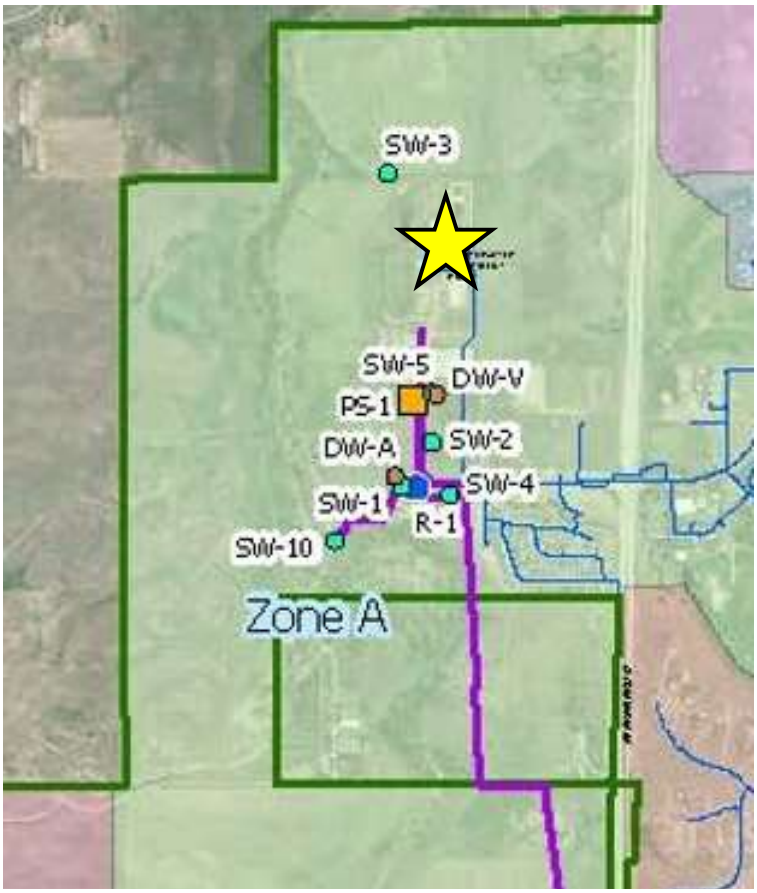
CIP Project Sheet

PINERY WATER & WASTEWATER DISTRICT
Quality Water for Life

CIP ID: 24	**Project Name:** Fleet Storage Facility
Priority Level: 2	**Asset Location:** WWTP

Usage: Wastewater

Project Description:
Covered storage and capture of spills to avoid stormwater permit issues.



Project Justification: The WWTP currently maintains a No Exposure CDPS Certification that excludes it from CDPS Stormwater Permitting. Covered parking and/or storwater quality improvements need to be made to continue to quality for the exclusion.

Total Project Cost: $1,500,000
Start Year: 2027
Duration: 1

Service Level Assumption: Regulatory Compliance

Appendix B:

Capital Improvement Plan Spreadsheet

Spreadsheet Information

Tab Information:

CIP Projects - Contains information on current and future CIP projects.

Recurring Cost Projects - Contains information on projects that occur yearly for service level maintenance.

Total Summary - Contains summary data tables that pulls information from the CIP Projects and Recurring Cost Projects sheets.

Overall Chart - Contains charts depicting the number, cost, and priority of projects over the next 15 years.

5 Year Outlooks - Contains charts showing the cost of CIP + recurring projects over 5 year intervals.

How to use this workbook:

To add new CIP projects to the **CIP Projects** tab, start in the next unfilled row. Select a usage catagory from the list using the dropdown arrow to the right. Create a unique project name and fill out the project description and justification. Select a priority number between 1 and 4 for the project based on the catagory decriptions:
1 - Mandatory / Contractural
2 - Strategic / Growth
3 - Service Level Maintenance
4 - Discretionary
Enter the total estimated project cost, duration of project in years, and the expected start year for the project. The annual cost and end year will be calcuated based on these inputs. Finally include the asset location and SLA/KPI that the project is linked to. To remove a CIP project that has been completed or is no longer needed, select the entire row that the project is in (click on the row number to the left) and delete the row (right click and select delete).

To add a new recurring project to the **Recurring Cost Projects** tab, again begin in the next unfilled row. Similar to the CIP Projects tab, select a usage catagory from the list using the dropdown arrow to the right. Create a unique project name and fill out the project description and justification. Enter the annual project cost, asset location, and SLA/KPI information. To remove a recurring project that is no longer needed, select the entire row that the project is in (click on the row number to the left) and delete the row (right click and select delete).

The **Total Summary** tab will need to be updated when CIP projects are planned for beyond the year 2036. To update these tables add the desired year(s) to the row(s) below 2036 and drag the formulas down. Charts in the **Overall Chart** and **5 Year Outlooks** will need to be updated to capture this new data.

Assumptions:

The projects in this speadsheet came from CIP files shared by the Pinery Water and Wastewater District:
- 10-yr capital plan 2022-2031 - 2022 Budget version.xlsx
- 2020_pinery_ratesfees_draftreport_20201210.pdf
- 2022 Budget - v2 - 091432.xlsx

and the Risk and Resiliency Report completed by Hazen and Sawyer for the Pinery:

Table of CIP Projects

CIP Projects

Usage	Project Name	Project Description	Project Justification	Priority	Total Project Cost	Annual Cost	Duration (years)	Start Year	End Year	Asset Location	SLA/KPI	Source
Distribution System	Zone E Pipeline Project	Addition of 12" piping to allow for increased fire flows	Needed to provide increased fire flow	2	$ 431,200	$ 215,600	2	2023	2024	Ponderosa Way from Derby Way to Ponderosa Court	Disruptions of Service	1400 ft at $308 per linear foot
Distribution System	PS1 to Res 8 pipeline	Pipeline to connect A and F zones.	Provides redundancy and decreases water age for chlorine residual/nitrifcation potential	2	$ 2,000,000	$ 1,000,000	2	2023	2024	Throughout Pinery District	Water Age	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Distribution System	Potable Pipeline Replacement Project	Replacing potable pipelines. Replacement are descrete projects.	If we want to continue an additional section for design, believe we could then bid all in a future year. There is some risk with expired plans and new County comments / approval.	3	$ 5,500,000	$ 2,750,000	2	2023	2024	Throughout Pinery District	Mainline Leaks and Breaks	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Collection System	Pipe Bursting Project	Increase main size from 6" to 8"	Approximately 2100 of 6" burst to 8" with approxmately 60 service taps, 20 new/rebuilt manholes/ includes Pinery townhomes area	2	$ 1,400,000	$ 700,000	2	2024	2025	Throughout Pinery District	Mainline Leaks and Breaks, Service Lines Leaks and Breaks	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Wastewater	WWTP Capacity	Increase capacity to 2.6 MGD	Per 2019 Burns & McDonnell Capacity Evaluation	1	$ 2,200,000	$ 733,333	3	2031	2033	Pinery WWTP	Sewer Overflow Rate, Regulatory Compliance	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Wastewater	WWTP Efficiency	Add aeration, replace bar screen, replace UV system (technology outdated), influent pumps	Necessary improvements to keep WWTP running	3	$ 1,700,000	$ 850,000	2	2023	2024	Pinery WWTP	Regulatory Compliance	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Wastewater	East Lagoon Liner	Liner for East Lagoon	Needed to control seepage into the groundwater.	3	$ 300,000	$ 150,000	2	2023	2024	East Lagoon	Regulatory Compliance	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Water	TDS Solution	WISE related project to reduce TDS in unblended water	5% pro rata share of capital for TDS solution of unblended WISE water	1	$ 2,787,500	$ 1,393,750	2	2028	2029	Outside of Pinery District	Regulatory Compliance	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Water	Reservoir 7B	Construction of a reservoir	To have additional storage for future developments.	2	$ 2,000,000	$ 1,000,000	2	2026	2027	Near reservoir 7	21-Day Supply	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Water	Reservoir 8B	Construction of a reservoir	To have additional storage for future developments.	2	$ 2,000,000	$ 1,000,000	2	2022	2023	Near reservoir 8	21-Day Supply	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Water	SWTP Construction	10 MGD plant needed to bolster the resiliency of the Pinery's water system	Currently water is treated at 5 wells and pump stations throughout the District	1	$ 30,000,000	$ 15,000,000	2	2031	2032	Near WWTP	Regulatory Compliance	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Water	Mag Meters	New mag meters are needed at PS3, PS4 and PS5	Current Prop meters are inaccurate.	3	$ 60,000	$ 60,000	1	2023	2023	Pump Station 4 and Pump Station 3	Pressure by Zone	2022 Budget - v2.xlsx
Water Resources	Stevens Pipeline	Common collection pipeline to convey pumped water to Walker Reservoir. Becomes CCPWA Pipeline.	CCPWA project needed to develop the CCPWA water supply project.	1	$ 100,000	$ 100,000	1	2023	2023	Outside of Pinery District	21-Day Supply	2020_pinery_ratesfees_draftreport_20201210.pdf
Water Resources	ASR Program	Aquifer storage and recovery program	Includes permitting, and equipping wells O, P, V, and C2A	2	$ 600,000	$ 300,000	2	2030	2031	Wells O, P, V, and C2A	Reuseable Supply	2020_pinery_ratesfees_draftreport_20201210.pdf
Wells	SW 5	Shallow well 5 is drilled but currently not in use. This project is to get the well back to a useable condition.	Having additional wells available to use will bolster the resiliency of the Pinery's system.	2	$ 350,000	$ 350,000	1	2023	2023	Shallow well 5	21-Day Supply	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx

Table of CIP Projects Cont.

CIP Projects

Usage	Project Name	Project Description	Project Justification	Priority	Total Project Cost	Annual Cost	Duration (years)	Start Year	End Year	Asset Location	SLA/KPI	Source
Wells	SW 14	Installation of new shallow well for new aug plan water	Will need more new aug plan capacity to withdraw Pinery's pro rata share of CCPWA water during the summer.	2	$ 700,000	$ 700,000	1	2023	2023	Shallow well 14	21-Day Supply	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Wells	SW 2 Redrill	Redrilling shallow well 2 so that it can be used again	Making the water supply system more robust and utilitizing permits.	2	$ 500,000	$ 500,000	1	2025	2025	Shallow well 2	21-Day Supply	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Wells	Well A-8	Drilling well A-8 that will draw from the Lower Dawson Aquifer	Having additional wells available to use will bolster the resiliency of the Pinery's system.	2	$ 2,150,000	$ 716,667	3	2025	2027	Near reservoir 4	21-Day Supply	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Wells	Alluvial Wells	CCPWA project,3 wells total	Assumes 20% participation at 400 AF. Capture of flow sassociated with the CCPWA's tributary water rights would be accomplished by construction of Cherry Creek alluvial wells in the vicinity of Walker Reservoir.	1	$ 570,000	$ 285,000	2	2022	2023	Walker Reservoir	21-Day Supply	2020_pinery_ratesfees_draftreport_20201210.pdf
Wells	Denver Basin Wells	CCPWA project, 1 well total. Assume 20% of project cost at $2MM. Update as projects advance	Assumes 20% participation at 400 AF. Total project cost at $2M, Pinery responsible for 20% of total cost. Water associated with the CCPWA's Denver Basin ground water rights would be used conjunctively with alluvial water to provide more consistent deliveries, and increase the overall yield of the project.	1	$ 400,000	$ 100,000	4	2026	2029	TBD	21-Day Supply	2020_pinery_ratesfees_draftreport_20201210.pdf
Wells	Well Sites	Add manual transfer switches at remaining well sites	Needed for mobile generator backup power	3	$ 30,000	$ 30,000	1	2023	2023	Well sites	21-Day Supply	
Wells	SW 8 Redrill	Current SW 8 is in peat bog and has iron issues. Relocation of SW 8 to address water quality issues	Needed to improve water quality supply and use of well source	3	$ 400,000	$ 400,000	1	2023	2023	Well 8	21-Day Supply	
Water	SWTP Design	Design services for surface water treatment plant	Needed to treat wells that become designated as GWUDI to meet regulatory compliance	1	$ 3,000,000	$ 3,000,000	1	2028	2028	Current Pump Station 1 property	Regulatory Compliance	
Wastewater	Fleet Storage Facility	Covered storage and capture of spills to avoid stormwater permit issues	The WWTP currently maintains a No Exposure CDPS Certification that excludes it from CDPS Stormwater Permitting. Covered parking and/or storwater quality improvements need to be made to continue to quality for the exclusion.	2	$ 1,500,000	$ 1,500,000	1	2027	2027	WWTP	Regulatory Compliance	This is a shared cost with Water and Wastewater

Table of Recurring Projects

Recurring Cost Projects

Useage	Project Name	Project Description	Project Justification	Annual Cost	Asset Location	SLA/KPI	Source
Wells	Well Rehab & Inspection	General maintanence and inspection.	In order to keep wells functional, they must be maintained and inspected on a regular basis. Shallow wells are inspected every 3 years. 300k annually has been typical, but this could drop to 150k now that wells older than 10 years have gone through full rehab and inspection	$ 150,000	All wells	Water Loss	10-yr captial plan 2022-2031 - 2022 Budget version.xlsx
Collection System	Curb Stop	Replacement of curb stops	General maintenance	$ 40,000	Throughout Pinery District	Misc.	2022 Budget - v2.xlsx
Distribution System	Fire Hydrant	Replacement	General replacements	$ 15,000	Throughout Pinery District	Misc.	2022 Budget - v2.xlsx
Wastewater	WWTP Repairs	Misc repairs, asphalt repairs	General facility repairs	$ 340,000	Pinery WWTP	Disruptions of Service	2022 Budget - v2.xlsx
Distribution System	Replacing potable pipelines	Redesign of potable pipelines is a recurring cost.	Repair and replacement costs of aging pipelines	$ 200,000	Throughout Pinery District	Mainline Leaks and Breaks	
Distribution System	Upgrades to air vac valves.	Upgrades to air vac valves.	Needed for general repair and replacement	$ 5,000	Throughout Pinery District	Mainline Leaks and Breaks	2022 Budget - v2.xlsx
Distribution System	Upgrades to the system valves	Upgrades to the system valves	Needed for general repair and replacement	$ 100,000	Throughout Pinery District	Water Loss	2022 Budget - v2.xlsx
Wastewater	WWTP SCADA	Upgrades and additions to SCADA		$ 15,000	HQ	Disruptions of Service	
Water	Water SCADA	Upgrades and additions to SCADA		$ 45,000	HQ	Disruptions of Service	
Water Resources	Cybersecurity Upgrades	Attend to Priority 1 and 2 controls identified in the AWWA Cybersecurity Tool, especially controls that are Planned and Not Implemented	Cyberattack on PCS to alter treatment operations; cyberattack on SCADA or non-SCADA digital assets	$ 30,000	HQ	Disruptions of Service	Risk and Resiliancy Report
Water	Electrical System	Upgrades to the electrical system	Needed for general repair and replacement	$ 25,000		Disruptions of Service	2022 Budget - v2.xlsx

CIP Summary Tables and Recurring Project Summary Table

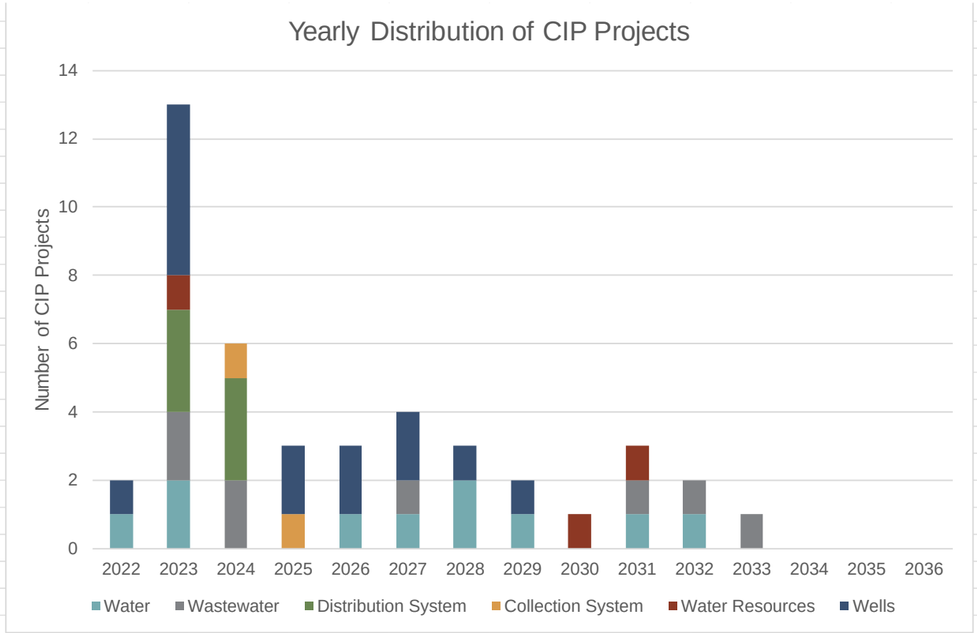
Number of CIP Projects	All	Water	Wastewater	Distribution System	Collection System	Water Resources	Wells	Cost of CIP + Recurring Projects	All	Water	Wastewater	Distribution System	Collection System	Water Resources	Wells
2022	2	1	0	0	0	0	1	2022	$ 2,250,000	$ 1,070,000	$ 355,000	$ 320,000	$ 40,000	$ 30,000	$ 435,000
2023	13	2	2	3	0	1	5	2023	$ 8,855,600	$ 1,130,000	$ 1,355,000	$ 4,285,600	$ 40,000	$ 130,000	$ 1,915,000
2024	6	0	2	3	1	0	0	2024	$ 6,630,600	$ 70,000	$ 1,355,000	$ 4,285,600	$ 740,000	$ 30,000	$ 150,000
2025	3	0	0	0	1	0	2	2025	$ 2,881,667	$ 70,000	$ 355,000	$ 320,000	$ 740,000	$ 30,000	$ 1,366,667
2026	3	1	0	0	0	0	2	2026	$ 2,781,667	$ 1,070,000	$ 355,000	$ 320,000	$ 40,000	$ 30,000	$ 966,667
2027	4	1	1	0	0	0	2	2027	$ 4,281,667	$ 1,070,000	$ 1,855,000	$ 320,000	$ 40,000	$ 30,000	$ 966,667
2028	3	2	0	0	0	0	1	2028	$ 5,458,750	$ 4,463,750	$ 355,000	$ 320,000	$ 40,000	$ 30,000	$ 250,000
2029	2	1	0	0	0	0	1	2029	$ 2,458,750	$ 1,463,750	$ 355,000	$ 320,000	$ 40,000	$ 30,000	$ 250,000
2030	1	0	0	0	0	1	0	2030	$ 1,265,000	$ 70,000	$ 355,000	$ 320,000	$ 40,000	$ 330,000	$ 150,000
2031	3	1	1	0	0	1	0	2031	$ 16,998,333	$ 15,070,000	$ 1,088,333	$ 320,000	$ 40,000	$ 330,000	$ 150,000
2032	2	1	1	0	0	0	0	2032	$ 16,698,333	$ 15,070,000	$ 1,088,333	$ 320,000	$ 40,000	$ 30,000	$ 150,000
2033	1	0	1	0	0	0	0	2033	$ 1,698,333	$ 70,000	$ 1,088,333	$ 320,000	$ 40,000	$ 30,000	$ 150,000
2034	0	0	0	0	0	0	0	2034	$ 965,000	$ 70,000	$ 355,000	$ 320,000	$ 40,000	$ 30,000	$ 150,000
2035	0	0	0	0	0	0	0	2035	$ 965,000	$ 70,000	$ 355,000	$ 320,000	$ 40,000	$ 30,000	$ 150,000
2036	0	0	0	0	0	0	0	2036	$ 965,000	$ 70,000	$ 355,000	$ 320,000	$ 40,000	$ 30,000	$ 150,000

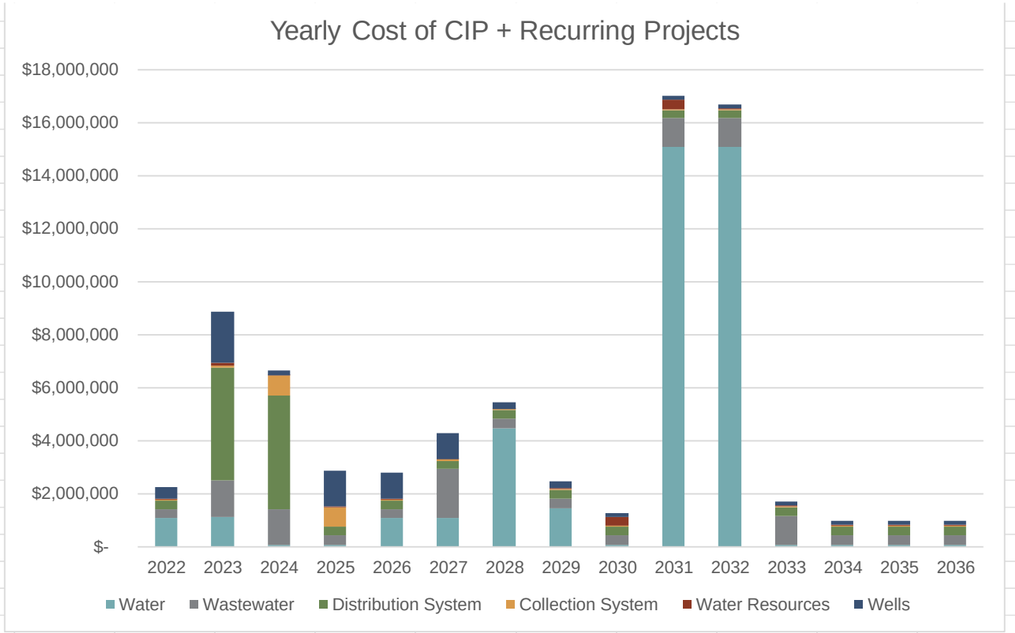
Priority of CIP Projects	1 Mandatory / Contractural	2 Strategic / Growth	3 Service Level Maintenance	4 Discretionary
2022	1	1	0	0
2023	2	5	6	0
2024	0	3	3	0
2025	0	3	0	0
2026	1	2	0	0
2027	1	3	0	0
2028	3	0	0	0
2029	2	0	0	0
2030	0	1	0	0
2031	2	1	0	0
2032	2	0	0	0
2033	1	0	0	0
2034	0	0	0	0
2035	0	0	0	0
2036	0	0	0	0

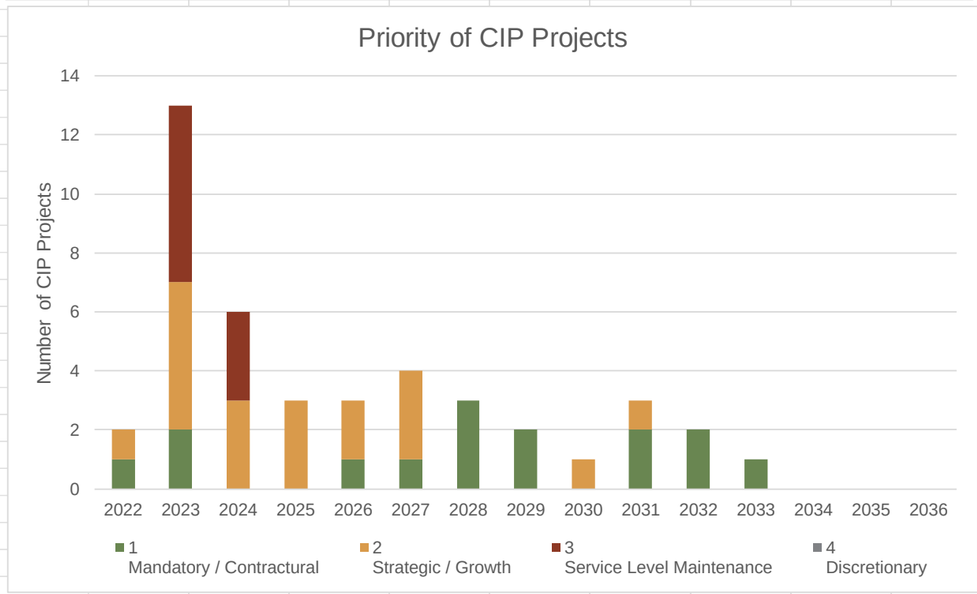
Recurring Costs Summary Table

Useage	Annual Cost
Water	$ 70,000
Wastewater	$ 355,000
Distribution System	$ 320,000
Collection System	$ 40,000
Water Resources	$ 30,000
Wells	$ 150,000
Total	**$ 965,000**

CIP Summary Graphs







CIP Future Outlooks Graphs