

CAPITAL IMPROVEMENT PLAN REPORT

for

WATER AND WASTEWATER SYSTEMS

Prepared for:

**PERRY PARK WATER AND SANITATION
DISTRICT**

CAPITAL IMPROVEMENT PLAN
REPORT

FOR

WATER AND WASTEWATER SYSTEMS

PROJECT NO. 2024-059.100

DRAFT: SEPTEMBER 2025

OWNER:

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- Appendix C – Capital Improvement Plan Cost Summary Matrix
- Appendix D – Detailed Cost Estimates for Recommended Improvements

SECTION I

EXECUTIVE SUMMARY

This Capital Improvement Plan (CIP) report has been prepared for the Perry Park Water and Sanitation District's (PPWSD) water and wastewater systems. The purpose of this report is to present the findings and recommendations for a comprehensive CIP over the next 20 years. Recommendations within this report also take into account population projections over the period of review.

The PPWSD is located in central Colorado in Douglas County. The service area is generally located approximately 8 miles southwest of Castle Rock and west of the Town of Larkspur. PPWSD has provided water and sewer services since the late 1960's and currently serves approximately 1,566 water customers and 1,268 sewer customers. The service area is generally split into an east side (East Perry Park) and west side (West Perry Park).

The PPWSD currently derives its water supply from three active shallow groundwater wells and four active deep groundwater wells, with a fifth deep groundwater well nearing completion. The District has two water treatment plants (WTPs); the Sageport WTP, located in East Perry Park, and the Glen Grove WTP, located in West Perry Park. A single 12-inch water main connects the two sides of the PPWSD service area which allows East Perry Park to supply the vast majority of potable water for West Perry Park.

The PPWSD has two separate wastewater collection systems and wastewater treatment facilities (WWTFs), one for East Perry Park and one for West Perry Park. Both WWTFs discharge into nearby creeks, with the Sageport WWTF in East Perry Park discharging into East Plum Creek and the Waucondah WWTF in West Perry Park discharging into Bear Creek.

The infrastructure within the District includes treatment plants, wells, storage tanks, lift stations, PRV vaults, and booster pump stations, most of which have been in continuous operation for more than 40 years. This CIP evaluates the condition and remaining service life of these facilities, excluding the water distribution system and wastewater collection system pipelines, which were not included in this review. The plan identifies necessary capital projects to sustain service quality, ensure regulatory compliance, and reasonably accommodate anticipated growth.

The CIP outlines both near-term needs such as control system replacements, tank rehabilitation, and equipment replacement, and longer-term needs including well redevelopment, treatment plant upgrades, and potential new infrastructure. The CIP emphasizes proactive asset management to reduce the risk of service interruptions and costly emergency repairs. A prioritized capital improvement schedule and costs are summarized in the Capital Improvements Plan Cost Summary Matrix in Appendix C. The CIP should be considered a living document that must be regularly updated to continue to provide valuable planning information to the District each year into the future.

SECTION II

INTRODUCTION

A. PURPOSE AND SCOPE

This Capital Improvement Report has been prepared for the Perry Park Water and Sanitation District's water and wastewater system infrastructure. This report focuses on the major equipment and components which operate in the water and wastewater systems. It does not evaluate the District's water distribution piping network or the labyrinth of wastewater collection system piping and manholes. Since its inception, the District has not had a formal capital improvements plan. This report aims to fill that gap and to:

- 1) Assess the condition of facilities for purposes of maintenance and replacement
- 2) To anticipate capacity expansions due to growth.

The purpose of this report is to present the findings and recommendations for a comprehensive Capital Improvement Plan (CIP) over the next 20 years. The CIP will provide planning information for the District to anticipate and proactively prepare for future system needs. Details of the recommended improvements and a prioritized schedule of improvements are presented in this report to ensure long term, reliable and safe water and wastewater systems.

The report goes into great detail on each system component evaluated, with a field inventory of all components reviewed included in the appendices, and that information may assist the District with its asset management system. Although this report is not intended to be a complete asset management system tool, it can be correlated to, and work in tandem with, an asset management system. The report also projects future water demands and wastewater loadings to aid in master planning efforts for infrastructure in both East and West Perry Park. This report is not intended to be master plan document; however, it can assist in updating master plan elements for the District. The information in this report is intended to provide critical details on the water and wastewater system needs in order for the District to effectively budget the cost of the systems from year to year. The CIP report is also intended

to be a living document which can be modified and regularly updated to maintain its relevance with future planning and budgeting efforts.

B. BACKGROUND

Perry Park Water and Sanitation District provides water and wastewater services to an unincorporated area in Douglas County, Colorado. The District has been providing water and wastewater services since 1960s. The District boundaries are generally located south of the City of Castle Rock and northwest of the Town of Larkspur. The District's total service area is generally split into an east side, known as East Perry Park, and a west side, known as West Perry Park. The entire PPWSD service area is served by two water treatment plants (WTPs) and two wastewater treatment facilities (WWTFs). The Sageport WTP and Sageport WWTF are located on the far east side of the District in East Perry Park. The Glen Grove WTP and the Waucondah WWTF are located in West Perry Park.

On the water system, the Sageport WTP is located near the northeast corner of East Perry Park and produces the majority of the treated water for the entire District. The Glen Grove WTP is located near the southeast corner of West Perry Park and produces a comparatively smaller portion of the treated water for only the West Perry Park portion of the District. The Glen Grove WTP cannot typically meet the maximum demand of West Perry Park on a regular basis; therefore, a single pipeline that connects East and West Perry Park delivers treated water to West Perry Park to meet West Perry Park's additional demand. East Perry Park contains four wells serving the Sageport WTP, five pressure reducing vaults, and one water storage tank. It is also noted that the District is constructing a new fifth well to serve the Sageport WTP. West Perry Park contains four wells serving the Glen Grove WTP, two pressure reducing vaults, one booster pump station, and four water storage tanks.

For the wastewater system, the Sageport WWTF is located near the Sageport WTP in the northeast corner of East Perry Park and treats wastewater collected from the east side of the service area. The Waucondah WWTF is located in the east central part of West Perry Park and treats wastewater collected from the west side of the service area. The east and west sides of the District act completely separately from each other when it comes to wastewater collection and treatment. There are no temporary, permanent or emergency connections between the wastewater systems of East Perry Park and West Perry Park. Due to the varying

terrain across the service area, East Perry Park contains one lift station and West Perry Park contains two lift stations.

This CIP report focuses on the water and wastewater system facilities listed above, excluding the water distribution and wastewater collection system piping. A thorough review of the system components has been performed and subsequent sections of the report provide the details of those investigations, as well as the findings and recommendations for improvements and replacements. The recommended improvements and replacements also include cost estimates to provide the district with a complete view of scope and costs to be addressed over a 20-year period from 2025 through 2045. A capital improvements matrix has also been developed to categorize and summarize the recommended improvement costs.

C. SERVICE AREA

Perry Park is an unincorporated community in Douglas County, Colorado. Water and wastewater services for the community are provided by PPWSD. The PPWSD service area is located south of the City of Castle Rock and northwest of the Town of Larkspur. The general location of the District's entire service area is shown with respect to neighboring communities in Figure 1. Figure 1 has been taken from the U.S. Geological Survey's mapping of the State of Colorado which is compiled at a scale of 1-inch equals approximately 8 miles. It can be seen in Figure 1 that the bulk of the District's service area is generally comprised of two halves connected in the middle by a thinner portion of the District boundary, similar to a dumbbell shape. Due to its shape, the District has referred to its service area in terms of two portions, West Perry Park and East Perry Park. These two areas are generally divided by the path of Highway 105 as it passes through the District. The District's boundaries, along with the delineated East and West Perry Park service areas, are depicted in Figure 2, which is taken from the US Geological Survey quadrangle map. It depicts street configurations, the general density of the development within the general area, and District's water treatment plants and wastewater treatment facilities.

The District's 2016 Master Plan identified several potential future developments, including Remuda Ranch, Sandstone Ranch, and Meribel Village. Two of these developments, Remuda Ranch and Sandstone Ranch, were incorporated into the District in 2007-2008 but

have not progressed as originally planned due to the economic downturn that followed. The locations of these planned development areas are shown in Figure 3.

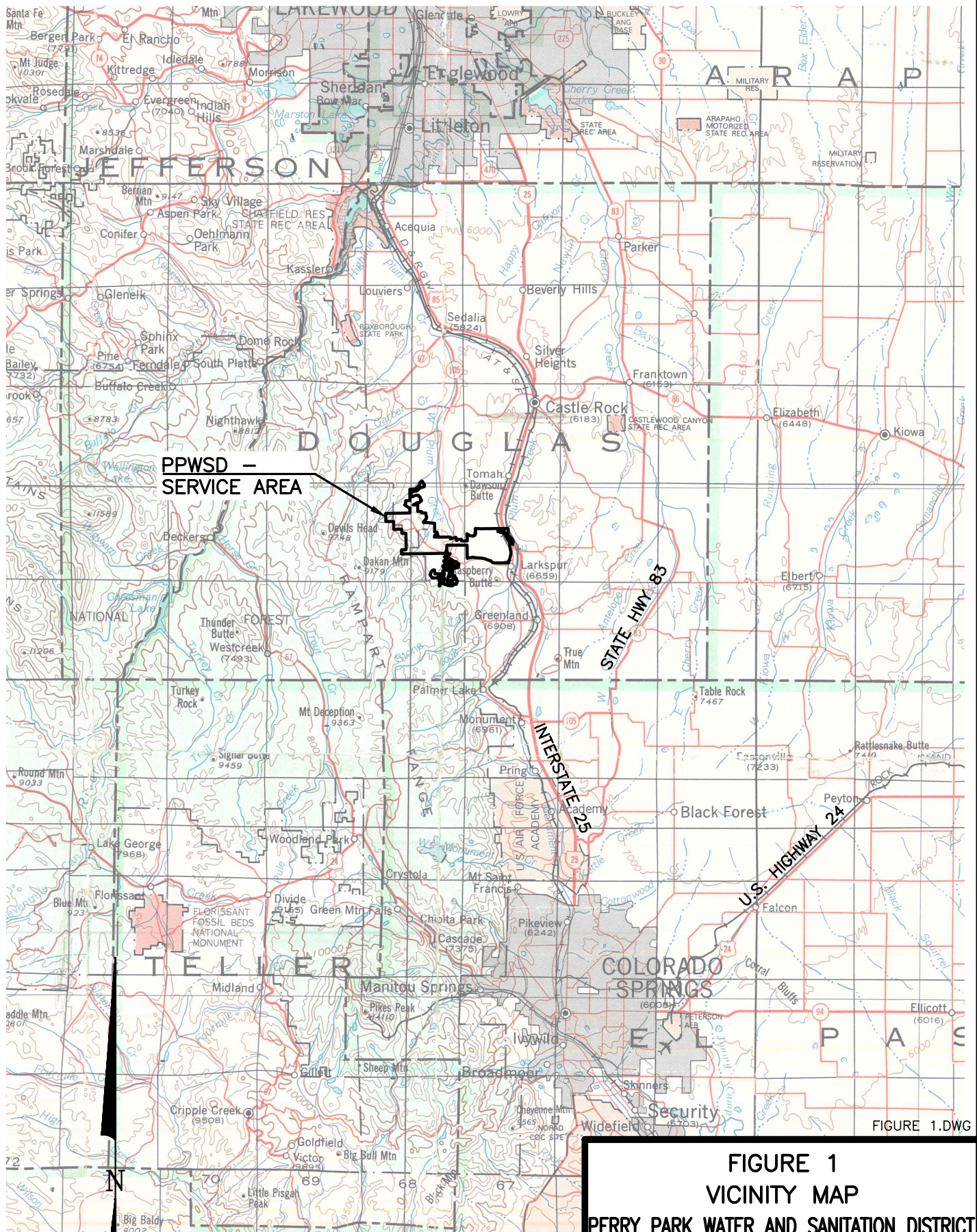


FIGURE 1.DWG

SCALE: 1" = 8miles
(approximate)

SOURCE: USGS MAP OF COLORADO

FIGURE 1
VICINITY MAP
PERRY PARK WATER AND SANITATION DISTRICT

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MAY 2025

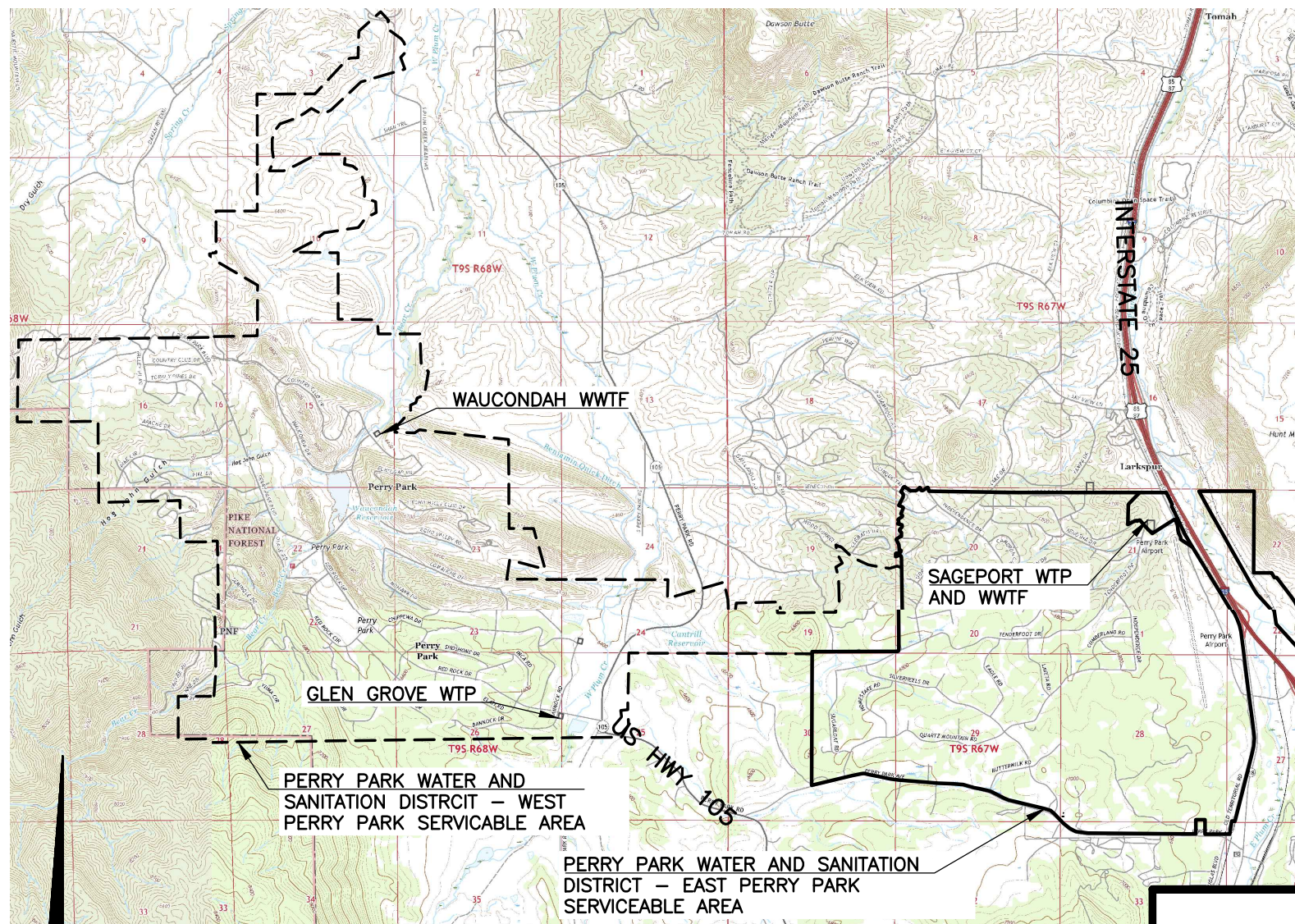


FIGURE 2.DWG

FIGURE 2 SERVICE AREA MAP PERRY PARK WATER AND SANITATION DISTRICT

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MAY 2025

SCALE : 1' = 5,000'

MAP SOURCE: USGS DAKAN MOUNTAIN,
DAWSON BUTTE, DEVILS HEAD AND
LARKSPUR QUADRANGLE MAPS

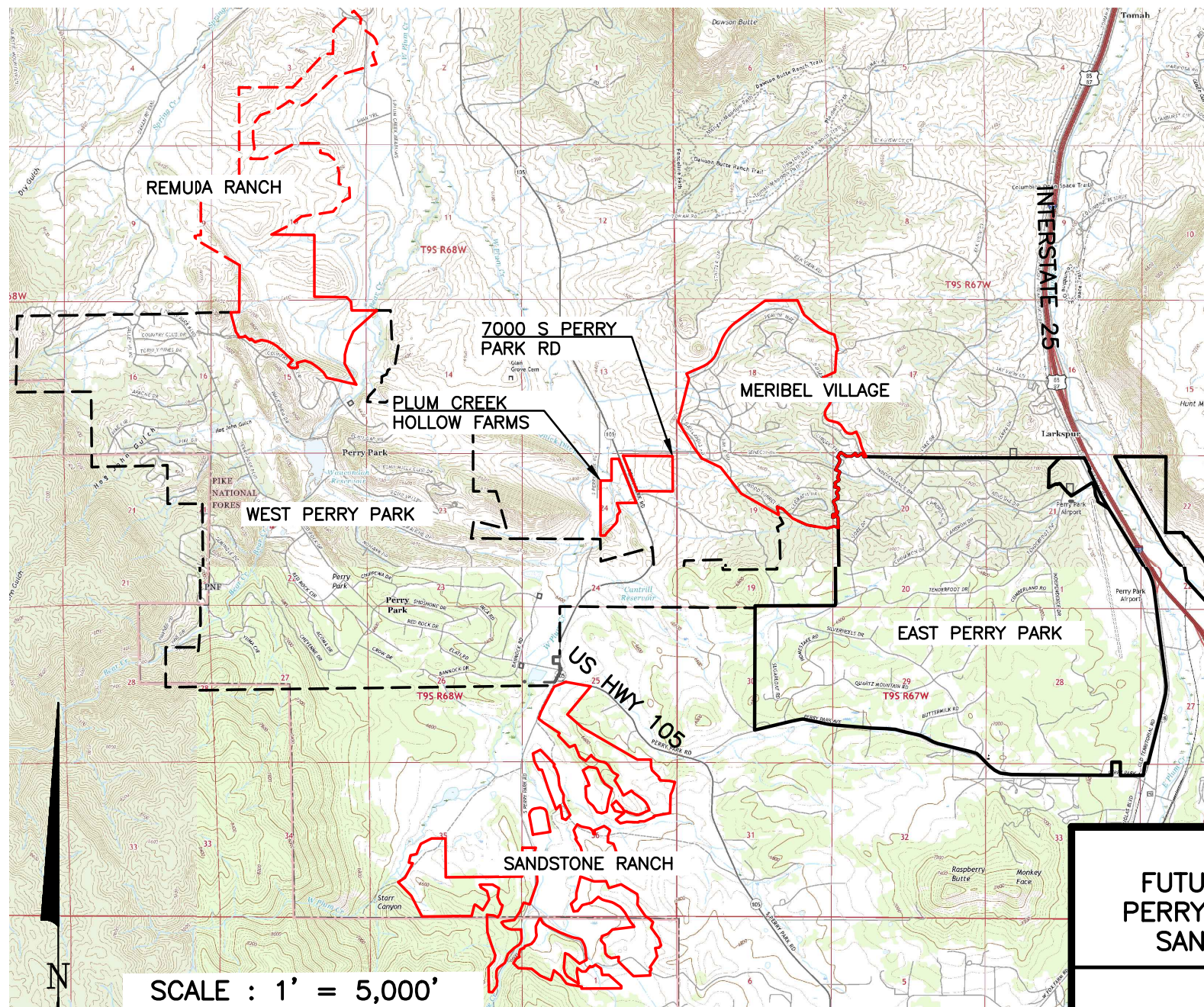


FIGURE 3.DWG

FIGURE 3
FUTURE DEVELOPMENT
PERRY PARK WATER AND
SANITATION DISTRICT

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COLORADO SPRINGS, COLORADO 80903

MAY 2025

SECTION III EXISTING SETTING

A. LOCATION

The service area for PPWSD is located in central Douglas County, Colorado, approximately 0.5 miles northwest of the Town of Larkspur and approximately 7 miles south of the City of Castle Rock. The service area is roughly bordered to the east by Interstate 25, the Burlington Northern and Santa Fe (BNSF) Railway, and East Plum Creek. The PPWSD service area is bordered to the west by the Rampart Range and is bisected north-south by State Highway 105 (South Perry Park Road) and West Plum Creek. The District's total service area is generally split into an east side, known as East Perry Park, and a west side, known as West Perry Park. West Perry Park is bisected by Bear Creek.

B. WATER RESOURCES

The PPWSD provides potable water service as well as central sanitary sewage collection and treatment services. Groundwater within this area of the state is the primary source of potable water supply. The water resources help determine the treatment needs to meet water quality standards for the District. The District's potable water supply is derived from four active deep wells (plus a fifth well under construction) and four shallow wells (three active and one inactive) that tap the alluvial groundwater associated with West Plum Creek. Two WTPs treat the source water and deliver it to the distribution system. The District utilizes five treated water storage tanks for reserves and to maintain distribution pressures, four of which are located within West Perry Park and one is located in East Perry Park. The District also has two surface water discharging WWTFs, the Waucondah WWTF and the Sageport WWTF.

The Water Quality Control Commission (WQCC) designates the classifications associated with surface waters throughout the state. Water features within the District include West Plum Creek, East Plum Creek, and Bear Creek. Under WQCC's Regulation No. 38 for the South Platte River basin, as amended, April 30, 2024, the segment of West Plum Creek that PPWSD's alluvial wells draw from and the segment of East Plum Creek that the Sageport

WWTF discharges to have been designated as Stream Segment 10 of the Upper South Platte River basin. The following classifications have been assigned to these Creek Segments:

- Agriculture
- Aquatic Life, Warm, Class 1
- Recreation, Class E
- Water Supply

The current version of Regulation 38 indicates that Segment 10 of the Upper South Platte River basin has a temporary modification for chronic arsenic limits. The chronic arsenic standard is temporarily set to 0.02 µg/L. This modification is set to expire December 31, 2029, but may be extended by the WQCC. Other contaminants of concern in Segment 10 are acute and chronic uranium and chronic phosphorus. As specified in Regulation 38, Section 38.5 (3) part A, uranium levels are required to follow the basic standards, unless it is specified by a water quality standard applicable to a particular segment. Part B states that uranium levels in surface waters shall be maintained at the lowest practicable level. Part C states that uranium levels in waters assigned a Water Supply classification shall not be increased by any cause attributable to municipal, industrial, or agricultural discharges. As specified in Regulation 38, Section 38.5 (4), total nitrogen and phosphorus values will be considered for adoption in limited circumstances. This section contains a table listing all permitted domestic and non-domestic WWTFs that are subject to Regulation 85 effluent limits. The Sageport WWTF is included on this list. The Sageport WWTF is also specified as having an annual allowable wasteload of point source phosphorus as allocated by Regulation No. 73 - Chatfield Reservoir Control Regulation.

Under Regulation No. 38 for the South Platte River Basin, as amended, April 30, 2024, the segment of Bear Creek that the Waucondah WWTF discharges to has been designated as Stream Segment 12 of the Upper South Platte River basin. The following classifications have been assigned to these Creek Segments:

- Agriculture
- Aquatic Life, Warm, Class 1
- Recreation, Class E
- Water Supply

The current version of Regulation 38 indicates that Segment 12 of the Upper South Platte River basin has a temporary modification for chronic arsenic limits. The chronic arsenic standard is temporarily set to 0.02 µg/L. This modification was set to expire December 31, 2029, but may be extended by the WQCC. Another contaminant of concern in Segment 12 is acute and chronic uranium. As specified in Regulation 38, Section 38.5 (3) part A, uranium levels are required to follow the basic standards, unless it is specified by a water quality standard applicable to a particular segment. Part B states that uranium levels in surface waters shall be maintained at the lowest practicable level. Part C states that uranium levels in waters assigned a Water Supply classification shall not be increased by any cause attributable to municipal, industrial, or agricultural discharges. Similar to the Sageport WWTF, the Waucondah WWTF has been allocated a specified annual allowable waste load of point source phosphorus for the facility.

C. ENVIRONMENT

The following subsections provide preliminary environmental information that would be valuable if the District chooses to pursue state or federal funding. This information helps identify potential environmental challenges that a proposed project may encounter and supports early planning and decision-making efforts.

1. Physiography, Topography and Soils

Douglas County falls within the physiographic province of the Front Range. As such, the western edge of the District's service area is bordered by the base of the Rampart Range portion of the Front Range mountains. Elevations in the PPWSD service area range from a high of 7,200 feet on the west side of the service area to a low of approximately 6,400 between East and West Perry Park. For the most part, the relief of West Perry Park is generally to the north and the relief of East Perry Park is generally northeast. Both sides also have some relief toward the Highway 105 corridor. Figure 2 shows the general topography in and around the Perry Park service area. In West Perry Park, the Hog John and Echo Hills water storage tanks are situated at elevations of 7,080 and 6,760 respectively. In East Perry Park, the School House tank is situated at an elevation of 7,050. The Sageport WWTF is located just west of Interstate 25 off of

Tenderfoot Drive, at approximately 6,620 feet in elevation. The Waucondah WWTF is located east of Bear Creek, at the intersection of Perry Park Boulevard and Country Club Drive at approximately 6,350 feet in elevation.

The US Department of Agriculture, through the Natural Resources Conservation Service (NRCS), has compiled detailed soil information for Douglas County. This data is available on the NRCS' soil service website. Soils in the area are generally deep to bedrock. The most prominent soil types in the PPWSD service area are Kettle loamy sand, Plome loamy sand, and Rock land-Lonetree complex. The following figures 4A through 4E display the soils in the NRCS mapping of the area.

2. Climate

The semi-arid climate of Douglas County is typical of the Southern Rocky Mountains, modified by the effect of the mountains to the west. The region's climate is influenced by a combination of geographic conditions. The relatively high elevation of the service area moderates the high summer temperatures compared to the plains areas to the east. Its distance from large bodies of water and semi-arid climate keeps humidity low. The Palmer Divide to the south creates a barrier to storm systems from the south and creates an area of microclimate. Winters are cold, average high temperatures typically ranging from a low of 20 degrees to a high of 40 degrees and can be snowy and windy. The summer months are moderate with an average low of 55 degrees and an average high of 82 degrees.

3. Floodplains

Floodplain mapping for the unincorporated parts of Douglas County have been prepared by the Federal Emergency Management Agency (FEMA) dated September 30, 2005. Figure 5 shows the approximate 100-year Floodplains for East Plum Creek, West Plum Creek, and Bear Creek. Bear Creek is designated as Zone A, indicating a 100-year floodplain that was illustrated using approximate methods and has no base flood elevations. The floodplain map delineates the floodplain for Bear Creek at 150 to 380 feet wide through West Perry Park. Both East and West Plum Creek are designated as Zone AE, indicating floodplain elevations are defined for both Creeks. Floodplain maps

delineate the 100-year floodplain for West Plum Creek at 250 to 1,080 feet wide between West and East Perry Park; and East Plum Creek at 500 to 1,000 feet wide on the east side of the PPWSD boundary.

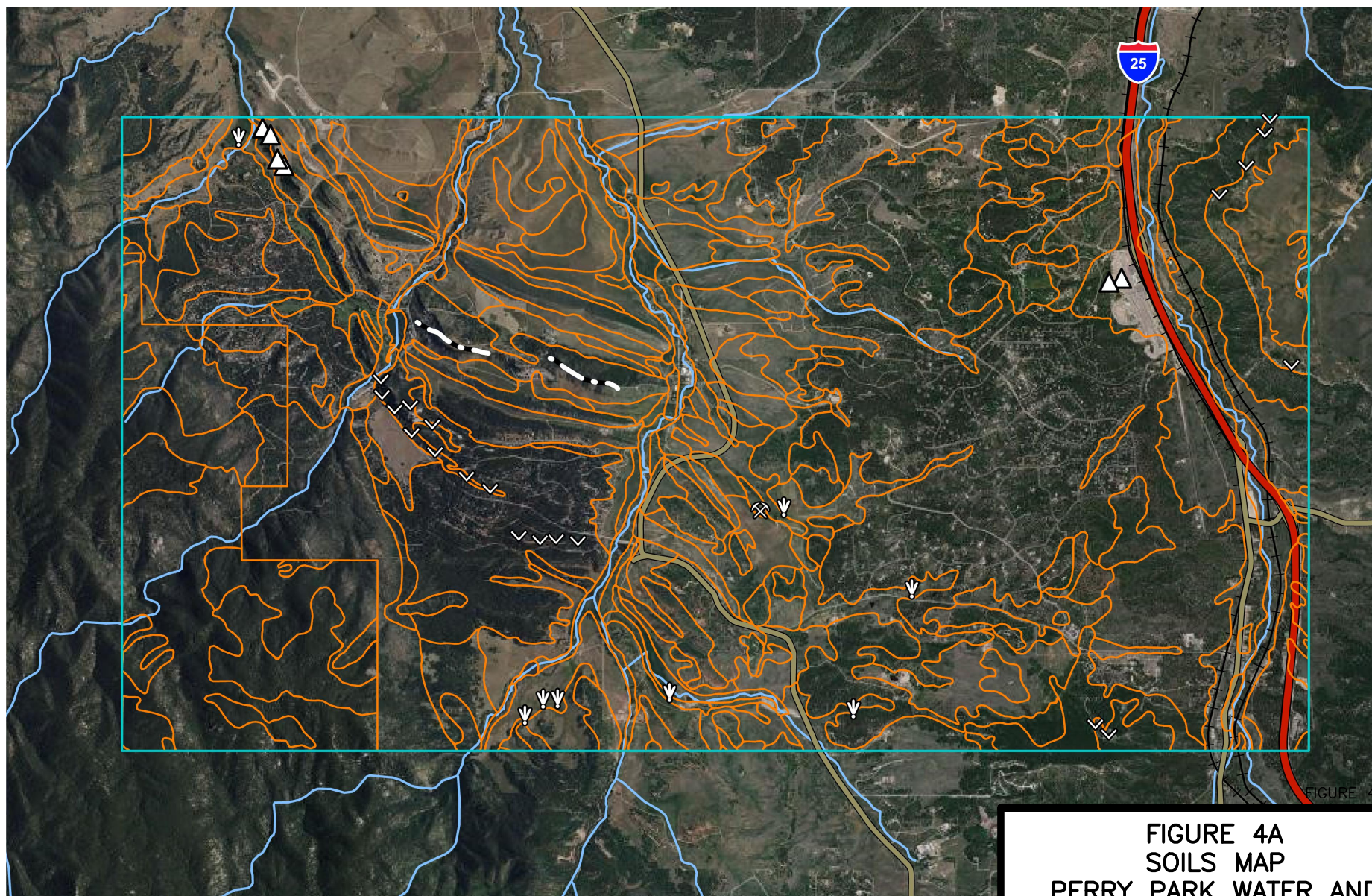


FIGURE 4A.DWG

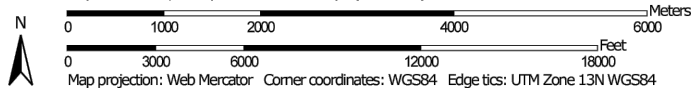
**FIGURE 4A
SOILS MAP
PERRY PARK WATER AND
SANITATION DISTRICT**

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COLORADO SPRINGS, COLORADO 80903

JUNE 2025

Map Scale: 1:67,600 if printed on A landscape (11" x 8.5") sheet.



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Castle Rock Area, Colorado

Survey Area Data: Version 17, Aug 29, 2024

Soil Survey Area: Pike National Forest, Eastern Part, Colorado, Parts of Douglas, El Paso, Jefferson, and Teller Counties

Survey Area Data: Version 11, Aug 29, 2024

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 1, 2020—Jun 12, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

FIGURE 4B.DWG

FIGURE 4B
SOILS MAP LEGEND
PERRY PARK WATER AND
SANITATION DISTRICT

GMS, INC.
CONSULTING ENGINEERS
611 N. WEBER, SUITE 300
COLORADO SPRINGS, COLORADO 80903
JUNE 2025

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Bo	Blakeland-Orsa association, 1 to 4 percent slopes	20.7	0.1%
BrB	Bresser sandy loam, cool, 1 to 3 percent slopes	235.2	1.2%
BsE	Bresser-Louviers complex, 7 to 30 percent slopes	90.4	0.5%
BvD	Brussett loam, 3 to 9 percent slopes	261.1	1.3%
CoG	Coni rocky loam, 3 to 100 percent slopes	179.5	0.9%
CrE	Crowfoot-Tomah sandy loams, 5 to 25 percent slopes	1,475.7	7.4%
En	Englewood clay loam	100.2	0.5%
GaE	Garber gravelly sandy loam, 5 to 30 percent slopes	176.7	0.9%
GP	Pits, gravel	10.5	0.1%
He	Heldt clay	4.3	0.0%
JuF	Juget rocky complex, 20 to 65 percent slopes	654.4	3.3%
Ka	Kassler gravelly sandy loam	437.1	2.2%
KeE	Kettle loamy sand, 5 to 25 percent slopes	3,545.7	17.8%
KfF	Kettle-Falcon complex, 9 to 65 percent slopes	241.2	1.2%
KnE	Kippen loamy sand, 1 to 20 percent slopes	578.0	2.9%
KtE	Kutch sandy loam, 5 to 20 percent slopes	25.5	0.1%
KuD	Kutch clay loam, 4 to 8 percent slopes	93.4	0.5%
LaD	Larkson fine sandy loam, 3 to 9 percent slopes	82.1	0.4%
Lo	Loamy alluvial land	124.8	0.6%
Lw	Loamy wet alluvial land	312.9	1.6%
NsE	Newlin-Satanta complex, 5 to 20 percent slopes	40.2	0.2%
PdE	Perrypark sandy loam, 3 to 20 percent slopes	146.0	0.7%
PeD	Peyton sandy loam, 3 to 9 percent slopes	39.0	0.2%
PpE	Peyton-Pring-Crowfoot sandy loams, 5 to 25 percent slopes	1,803.8	9.0%

FIGURE 4C,DWG

FIGURE 4C
SOILS MAP UNIT LEGEND
PERRY PARK WATER AND
SANITATION DISTRICT

GMS, INC.

CONSULTING ENGINEERS
611 N. WEBER, SUITE 300
COLORADO SPRINGS, COLORADO 80903

JUNE 2025

G:\Perry Park WSP\2024-059\110\Figure 4D.dwg, 8.5x11, 6/8/2025 11:06:40 AM, enc, DWG To PDF.pc3, 1:1

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
PsE	Plome loamy sand, 5 to 25 percent slopes	1,078.8	5.4%
PvE	Pring and Kippen gravelly sandy loams, 1 to 25 percent slopes	279.2	1.4%
RaE	Razor clay, 3 to 25 percent slopes	537.5	2.7%
RdD	Rednun loam, 3 to 10 percent slopes	104.5	0.5%
ReE	Rednun-Redridge complex, 8 to 40 percent slopes	199.4	1.0%
RgF	Redridge-Chaseville gravelly sandy loams, 10 to 70 percent slopes	105.7	0.5%
RIE	Redtom-Lonetree complex, 5 to 25 percent slopes	1,089.5	5.5%
RtG	Rock land-Lonetree complex, 10 to 100 percent slopes	869.5	4.4%
Sa	Sampson loam	118.3	0.6%
Se	Sandy wet alluvial land	270.2	1.4%
SrD	Satanta loam, calcareous variant, 3 to 9 percent slopes	160.2	0.8%
SrE	Satanta loam, calcareous variant, 9 to 25 percent slopes	142.4	0.7%
Su	Stony rough land	4.9	0.0%
Sv	Stony steep land	507.3	2.5%
Sw	Stony steep land, cold	571.0	2.9%
TaF	Tarryall gravelly loam, 10 to 50 percent slopes	373.8	1.9%
TcE	Tinytown-Cheesman complex, 5 to 30 percent slopes	544.4	2.7%
W	Water	25.8	0.1%
Subtotals for Soil Survey Area		17,660.5	88.6%
Totals for Area of Interest		19,934.8	100.0%

FIGURE 4D.DWG

**FIGURE 4D
SOILS MAP UNIT LEGEND
PERRY PARK WATER AND
SANITATION DISTRICT**

GMS, INC.

CONSULTING ENGINEERS
611 N. WEBER, SUITE 300
COLORADO SPRINGS, COLORADO 80903

JUNE 2025

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Boyett-Frenchcreek complex, 2 to 15 percent slopes	84.3	0.4%
7	Catamount-Rock outcrop complex, 15 to 70 percent slopes	94.3	0.5%
22	Kassler very gravelly coarse sandy loam, 5 to 35 percent slopes	53.6	0.3%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
24	Legault very gravelly coarse sandy loam, 5 to 40 percent slopes	4.0	0.0%
42	Sphinx gravelly coarse sandy loam, 15 to 40 percent slopes	452.2	2.3%
43	Sphinx gravelly coarse sandy loam, 40 to 70 percent slopes	559.5	2.8%
46	Sphinx-Rock outcrop complex, 15 to 80 percent slopes	1,021.5	5.1%
Subtotals for Soil Survey Area		2,269.5	11.4%
Totals for Area of Interest		19,934.8	100.0%

FIGURE 4E.DWG

**FIGURE 4E
SOILS MAP UNIT LEGEND
PERRY PARK WATER AND
SANITATION DISTRICT**

GMS, INC.

CONSULTING ENGINEERS
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COLORADO SPRINGS, COLORADO 80903

JUNE 2025

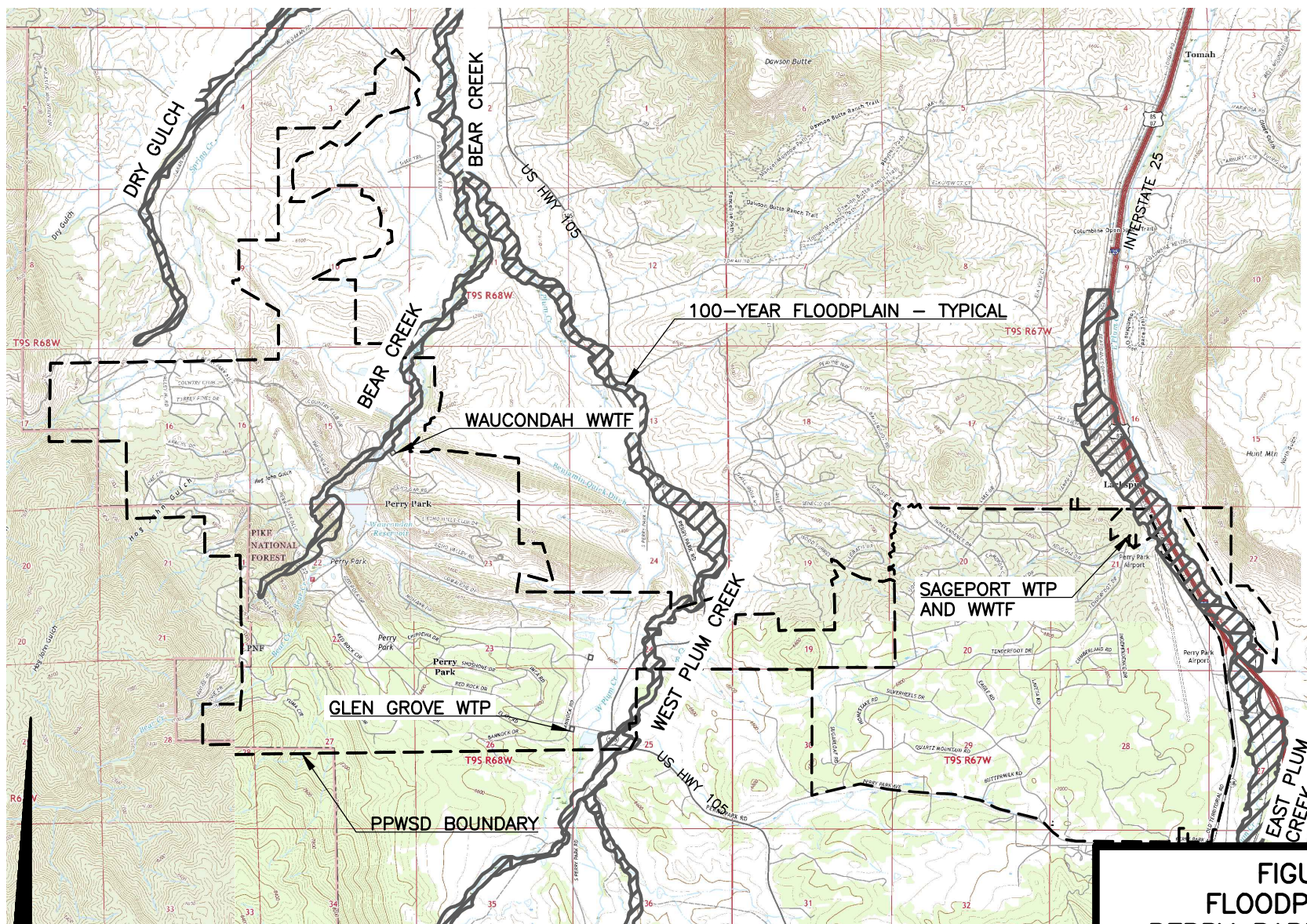


FIGURE 5.DWG

FIGURE 5 FLOODPLAIN MAP PERRY PARK WATER AND SANITATION DISTRICT

GMS, INC.

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COLORADO SPRINGS, COLORADO 80903

JUNE 2025

SCALE : 1' = 5,000'

MAP SOURCE: USGS DAKAN MOUNTAIN,
DAWSON BUTTE, DEVILS HEAD AND
LARKSPUR QUADRANGLE MAPS

 = FLOODPLAIN BOUNDARY

The current WQCD design criteria for wastewater treatment works, WPC-DR-1, requires that structures and equipment are accessible, able to discharge, and protected from physical damage during the 100-year flood. The map shows that the 100-year floodplain associated with East Plum Creek is generally contained to the east side of Interstate 25 and does not encroach into the service area where any structures or equipment are located. Therefore, accessibility and ability to discharge during, and protection from, a 100-year flood are sufficient according to FEMA maps. The 100-year floodplain map of Bear Creek shows that the Waucondah WWTF is located within the delineated floodplain. However, the floodplain near the WWTF site was scrutinized for the Waucondah Phase 2 Improvement Project as part of the Douglas County site approval process. That detailed effort demonstrated that the Waucondah WWTF site and its structures are actually situated just outside the 100-year floodplain.

4. Wetlands

The U.S. Fish and Wildlife Service National Wetlands Inventory Mapping was reviewed to determine the types and locations of wetlands within the planning area. The mapping indicates that the significant wetlands identified within the vicinity of the PPWSD service area are mainly associated with Bear Creek, West Plum Creek, and East Plum Creek. These wetlands are classified as Riverine with spots of Freshwater Forested/Shrub Wetlands, Freshwater Ponds, and Freshwater Emergent Wetlands along the banks of the Creeks. The Waucondah Reservoir, located near the center of West Perry Park is classified as a Lake. There are several streams that branch out from the creeks and reservoir in both East and West Perry Park. The delineated wetlands within the PPWSD service area are shown in the following Figure 6.

5. Vegetation

A majority of the land around the service area is forested, with some areas of shrubland and pastureland. Native vegetation in the area consists of a variety of short and mid-tall grasses, including Blue Grama, Galleta, Alkali Sacaton, Buffalo Grass, Salt Grass and Sand Dropseed, Ponderosa Pine, Gambel Oak, and Juniper. Small portions of wetlands are more common closer to the main branches of the creeks, which is where riparian vegetation can be found.

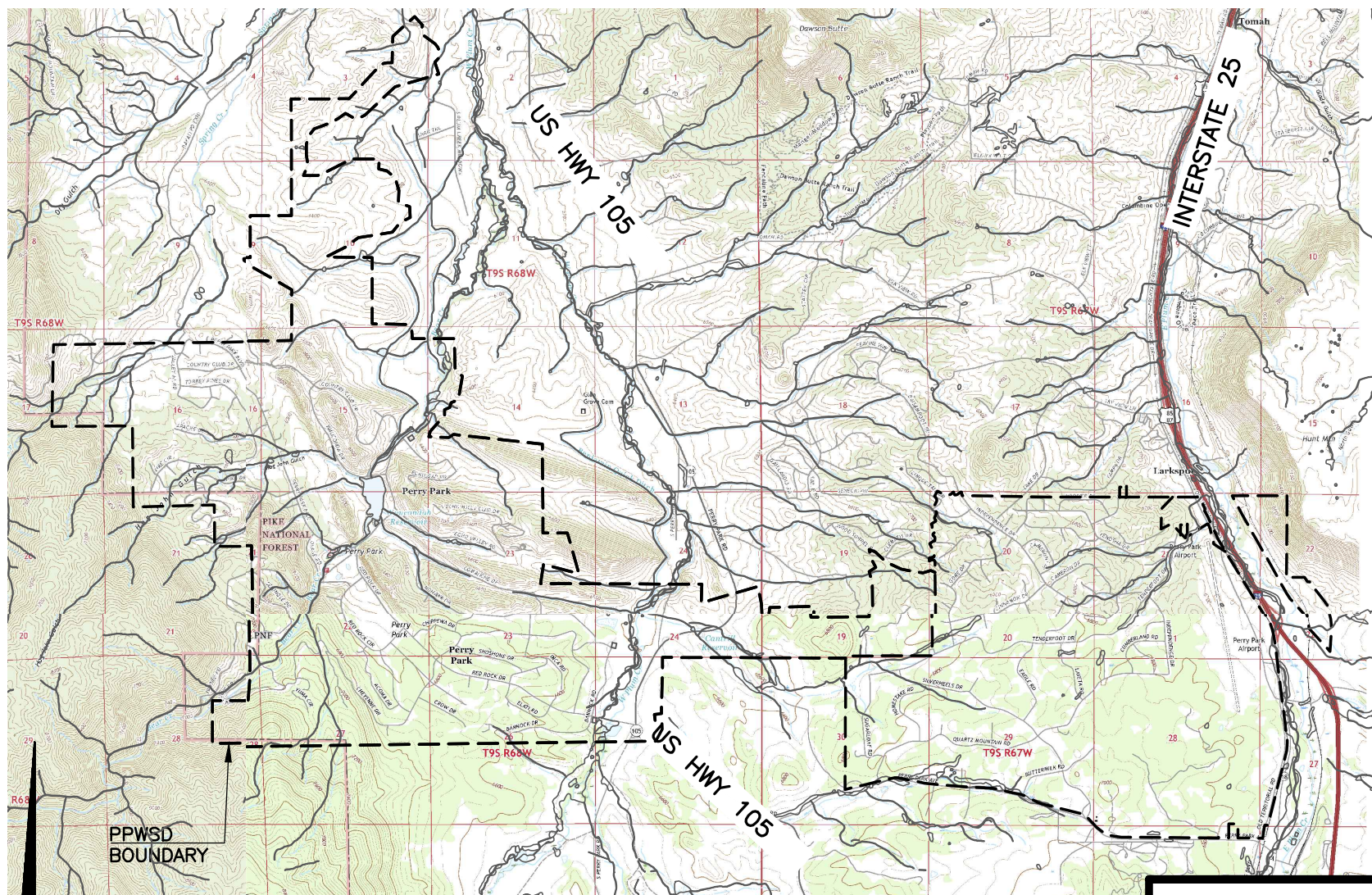


FIGURE 6.DWG

**FIGURE 6
WETLAND MAP
PERRY PARK WATER AND
SANITATION DISTRICT**

GMS, INC.

CONSULTING ENGINEERS
611 N. WEBER, SUITE 300
COLORADO SPRINGS, COLORADO 80903

JUNE 2025

— = WETLAND BOUNDARY

SCALE : 1' = 5,000'

MAP SOURCE: USGS DAKAN MOUNTAIN,
DAWSON BUTTE, DEVILS HEAD AND
LARKSPUR QUADRANGLE MAPS

6. Wildlife

Most of the undeveloped land in the service area is forested, which may offer habitat for many species of wildlife. Using the U.S. Fish and Wildlife Service Information for Planning and Consulting (IPaC) database, threatened and endangered species that may inhabit the planning area were identified. These species include three mammals (Gray Wolf, Preble's Meadow Jumping Mouse, Tricolored Bat), three birds (Mexican Spotted Owl, Piping Plover, and Whooping Crane), two fish species (Greenback Cutthroat Trout and Pallid Sturgeon), and one insect (Monarch Butterfly). Specific critical habitat areas for the Mexican Spotted Owl and the Preble's Meadow Jumping Mouse were identified. The Mexican Spotted Owl's critical habitat is located on the west edge of the service area. The Preble's Meadow Jumping Mouse's critical habitat is located in various areas throughout the District's service area. The Bald Eagle was also noted by the IPaC analysis as a species of migratory bird that may be present in the area. The analysis noted that the Bald Eagle is not a Bird of Conservative Concern in the area, but attention to the habitat for this species is warranted.

7. Air Quality and Noise

Perry Park is a relatively small community located in the central Front Range region. The region surrounding Perry Park experiences negligible industrial activity. Air quality pollutants of concern in Colorado include ground-level ozone (O_3), particulate matter of particles smaller than 10 micrometers in diameter (PM_{10}), and particulate matter of particles smaller than 2.5 micrometers in diameter ($PM_{2.5}$). According to the EPA's website, the closest monitoring location that records year-round comprehensive data for ozone and particulate matter is located approximately 22 miles north of Perry Park at Chatfield Lake. Assuming data from this monitoring location is representative of Perry Park, air quality in the Perry Park area is generally viewed as good, with exceptions occurring during wildfire seasons. Air quality is predicted to continue at acceptable levels into the foreseeable future unless wildfires become more prominent.

The noise generated within the community is limited to noise associated with normal domestic activities that occur within a typical residential community. No significant noise generation occurs within the area. The community is bordered to the east by Interstate

25 and the BNSF Railroad. These transportation corridors generate limited associated noise and air quality impacts. Overall, the Perry Park area does not contain any noise or air quality problems, nor are anticipated in the future.

D. POPULATION

1. Historic Population

Perry Park is an unincorporated community located in Douglas County. The County is within Colorado Planning District No. 3. The Planning District is in the northcentral portion of the state and includes the counties of Boulder, Gilpin, Clear Creek, Broomfield, Adams, Denver, Arapahoe, Jefferson, and Douglas. According to census data compiled by the Colorado State Demographer's Office, this Planning District had a population base of 2,798,757 in 2010. The base population increased to a total of 3,251,127 in the 2020 census. This increase amounted to a population gain of 16.2%. Most counties within the Planning District experienced a significant increase over this 10-year period. Most counties in Planning District 3 have also experienced consistent increases in population over every census periods from 1950 to 2020.

Douglas County had a census population of 285,465 in 2010 and 357,978 in 2020 showing a 25.4% increase. The growth which has occurred within Douglas County in the last decade has been seen all throughout the county including Castle Pines, Castle Rock, Larkspur, Lone Tree, Parker, part of Aurora and Littleton, and the unincorporated areas.

Perry Park is an unincorporated community in Douglas County and appears as a census designated place (CDP) in the census starting in 2000. The boundary for the CDP of Perry Park corresponds with boundaries similar to West Perry Park but does not represent the entirety of the PPWSD service population.

The following table presents the eight previous census periods for Douglas County, the unincorporated areas of Douglas County, and the CDP of Perry Park. As can be seen in the table, population change for the County has remained significantly high over the last 70 years.

TABLE 1
PERRY PARK WATER AND SANITATION DISTRICT
HISTORIC POPULATION

Year	Douglas County ¹⁾	Unincorporated Areas of Douglas County ²⁾	Perry Park CDP
1950	3,507	2,766	-
1960	4,816	3,664	-
1970	8,407	6,876	-
1980	25,153	20,801	-
1990	60,391	46,001	-
2000	175,766	126,877	1,180
2010	285,465	171,176	1,646
2020	357,978	200,813	1,932

1) Data from the U.S. Census.

2) Excludes the incorporated Towns of Larkspur, Lone Tree, Parker, Castle Rock, and Castle Pines.

2. Population Projections

The State Demographer's office compiles population projections for both counties and regions. They do not compile any statistical projections for individual communities or unincorporated portions of individual counties. Population projections are based on the regional statistical data for births, deaths and migration into and out of an area. The most recent population projection data available from the State Demography Office, dated October 2023, reflects a continued increasing population trend for Douglas County.

According to the State Demographer's projections, the population for Douglas County over the period from 2025 to 2045 is projected to increase from 393,899 to 462,589. While the County's population is projected to grow through 2045, the projected annual growth rate will steadily decrease over time. The growth rate is expected to decline from 1.8% annually between 2020 and 2025 to 1.3% per year from 2025 to 2030, 0.9% per year from 2030 to 2035, 0.6% per year from 2035 to 2040, and 0.4% per year from 2040 to 2045. This indicates that population growth has spiked and is anticipated to gradually taper off. The overall average County population forecast is projected to increase by 17.4% over the 20-year planning period, with a compound annual growth rate (CAGR) of 0.81% per year.

The PPWSD staff provided data about the current number of customers which included a yearly account of the number of historical water taps added to the system. A review of the historical tap data provided by the District was done in order to determine historic population growth. The following table presents the annual number of water taps added to the PPWSD system for the period of 2010 to 2024. Over the 14-year period, the total number of taps increased by a total of 19.1%, resulting in a CAGR of 1.26% per year.

TABLE 2
PERRY PARK WATER AND SANITATION DISTRICT
HISTORICAL SERVICE AREA TAP NUMBERS

Year	Water Taps Served by PPWSD	Taps Added in Previous Year
2010	1,306	7
2011	1,315	9
2012	1,324	9
2013	1,343	19
2014	1,357	14
2015	1,378	21
2016	1,401	23
2017	1,429	28
2018	1,456	27
2019	1,469	13
2020	1,491	22
2021	1,508	17
2022	1,529	21
2023	1,544	15
2024	1,556	12

Since the growth rate derived from the historic tap data for PPWSD is slightly higher, population projections will conservatively be based on this data. As a result, a growth rate of 1.26% per year was determined to be reasonable for future population projections.

Actual population data specific to the PPWSD service area is not available. The population for the service area was determined by using the number of active taps in the area given by PPWSD, along with an average household size of 2.34 from the State Demographer's Office for the census designated place of Perry Park. As of September

2024, the PPWSD has 1,556 active residential taps and 10 active commercial taps. Using the State Demographer's accepted household density of 2.34 people per house and 1,556 households, approximately 3,641 people are estimated to reside in the service area. The population for the PPWSD service area was projected out to 2045 and the values are shown in the table below.

TABLE 3
PERRY PARK WATER AND SANITATION DISTRICT
POPULATION PROJECTION ESTIMATES

Year	Douglas County ¹	PPWSD Water Taps	PPWSD Water Service Area Population ²	PPWSD Sewer Connections	PPWSD Sewer Service Area Population ²
2024	387,991	1,556	3,641	1,268	2,967
2025	393,751	1,576	3,687	1,284	3,005
2030	417,198	1,677	3,925	1,367	3,199
2035	436,588	1,786	4,179	1,455	3,405
2040	451,300	1,901	4,449	1,549	3,625
2045	460,723	2,024	4,736	1,649	3,860

1) Data developed by the State Demography Office, October 2023.

2) Population calculated based on the average household size in the Perry Park CDP of 2.34 people, as developed by the State Demography Office.

The above population projections through the year 2045 are seen as reasonably conservative. The population growth for the PPWSD service area and associated planning period from 2025 to 2045 equates to 28.5%. These figures are used in subsequent future scenarios within this report.

E. LAND USE AND DEVELOPMENT

Perry Park is an unincorporated community in Douglas County, Colorado. Water and wastewater services for the community are provided by PPWSD. Major employers in the area include the Warren Oil Co., M&K Enterprises, Golden Equine Solutions, as well as commercial and retail businesses in the nearby Town of Larkspur.

The majority of the developed land immediately within the PPWSD service area is zoned residential, although the service area is surrounded by cultivated agricultural land. Few commercial activities occur within the area. The most significant commercial activity in the area is a golf course, with surrounding area commercial activities including a retired airport,

a campground, and schools operated by the Douglas County School District. No major departures are envisioned from the current land use patterns established within the community.

In the future, the District is expecting to provide water services and accept wastewater from additional parcels in areas of new development within Perry Park. However, these developments are not expected to accelerate the service area growth above the rate predicted in the previous section within the 2024 – 2045 time period. Figure 3 indicates the locations of these future developments.

F. PUBLIC FACILITIES AND SERVICES

Initial growth in the Perry Park area began in the mid-1800s due to its convenient location along the route between Denver and Colorado Springs for stagecoaches. After the construction of several hotels and a rail line in the area, residential settlement began in the 1870s. Sustained growth was not achieved until the 1960s, when the Perry Park Water and Sanitation District was established.

The PPWSD provides sewage collection and treatment and potable water services to its customers. Schools are run by Douglas County School District. Fire protection is provided by Larkspur Fire Protection District. Police services are provided by Douglas County Sheriff's Office. Electricity is provided by CORE Electric Cooperative (formerly IREA). Natural gas for home heating is provided by Black Hills Energy. Telephone and internet are provided by Century Link. These available utility services facilitate development in Perry Park.

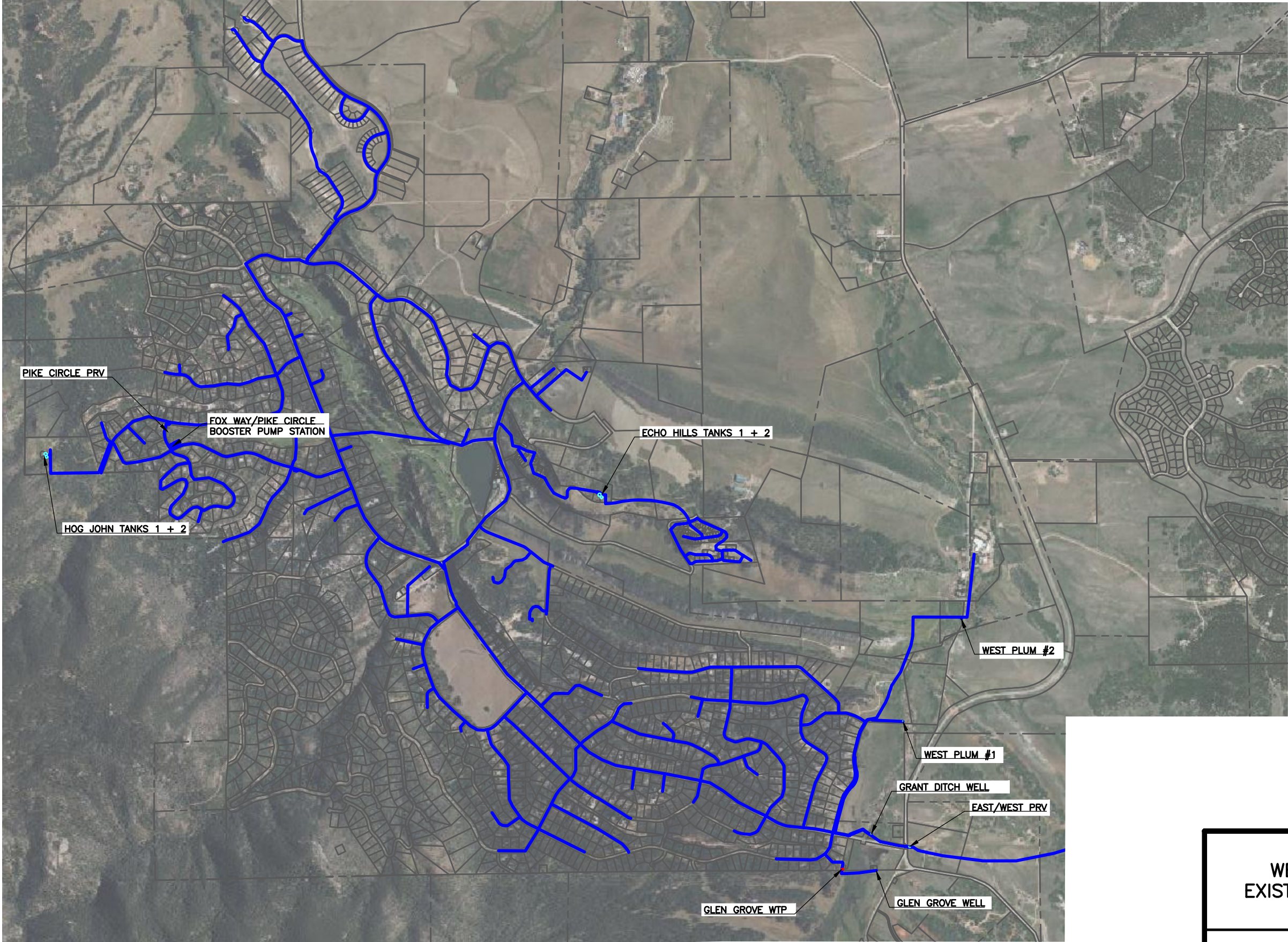
SECTION IV EXISTING WATER SYSTEM

A. BACKGROUND

This Section provides a summary and description of the existing water system facilities. A field review of major components of the PPWSD's existing water system infrastructure was undertaken within the course of this study effort. As previously stated, PPWSD has maintained its own water system since its establishment in the late 1960s. Distribution system piping ranges in size from 4-inch diameter to 16-inch diameter and consists of polyvinyl chloride (PVC), ductile iron (DI), cast iron (CI), and asbestos cement (AC) piping. East and West Perry Park are connected by a single pipeline that provides West Perry Park with a significant portion of the treated water it requires. In total, the PPWSD water system has seven (7) active wells, one (1) inactive well, one (1) new well under construction, two (2) water treatment plants, seven (7) pressure-reducing vaults, one (1) booster pump station, and five (5) water storage tanks. The following figures depict PPWSD's existing potable water system, with Figure 7A illustrating the West Perry Park Water System and Figure 7B showing the East Perry Park Water System. The system maps has been compiled from the District's GIS mapping data. A detailed inventory of the facilities and their observed condition is provided in Appendix A.

B. WELLS

The District derives its water supply from groundwater sources. PPWSD actively pumps water from three shallow alluvial wells and four deep non-tributary wells. The shallow alluvial wells are located along West Plum Creek in West Perry Park and serve as source water for the Glen Grove WTP. The three active alluvial wells are the Grant Ditch Well, Glen Grove Well, and West Plum No. 2 Well. The West Plum No. 1 Well has not been used for the last five years, at least, because it produces water with a very high concentration of iron which poses treatability issues at the Glen Grove WTP. Water rights for the District's alluvial wells have been decreed in Division 1 Water Court, Case No. 89CW225. The combined average annual amount of groundwater to be appropriated by the above-listed wells and four (4) other alluvial wells that were never constructed was decreed to not exceed 1,600 acre-feet.



SCALE : 1" = 1,500'

FIGURE 7.DWG

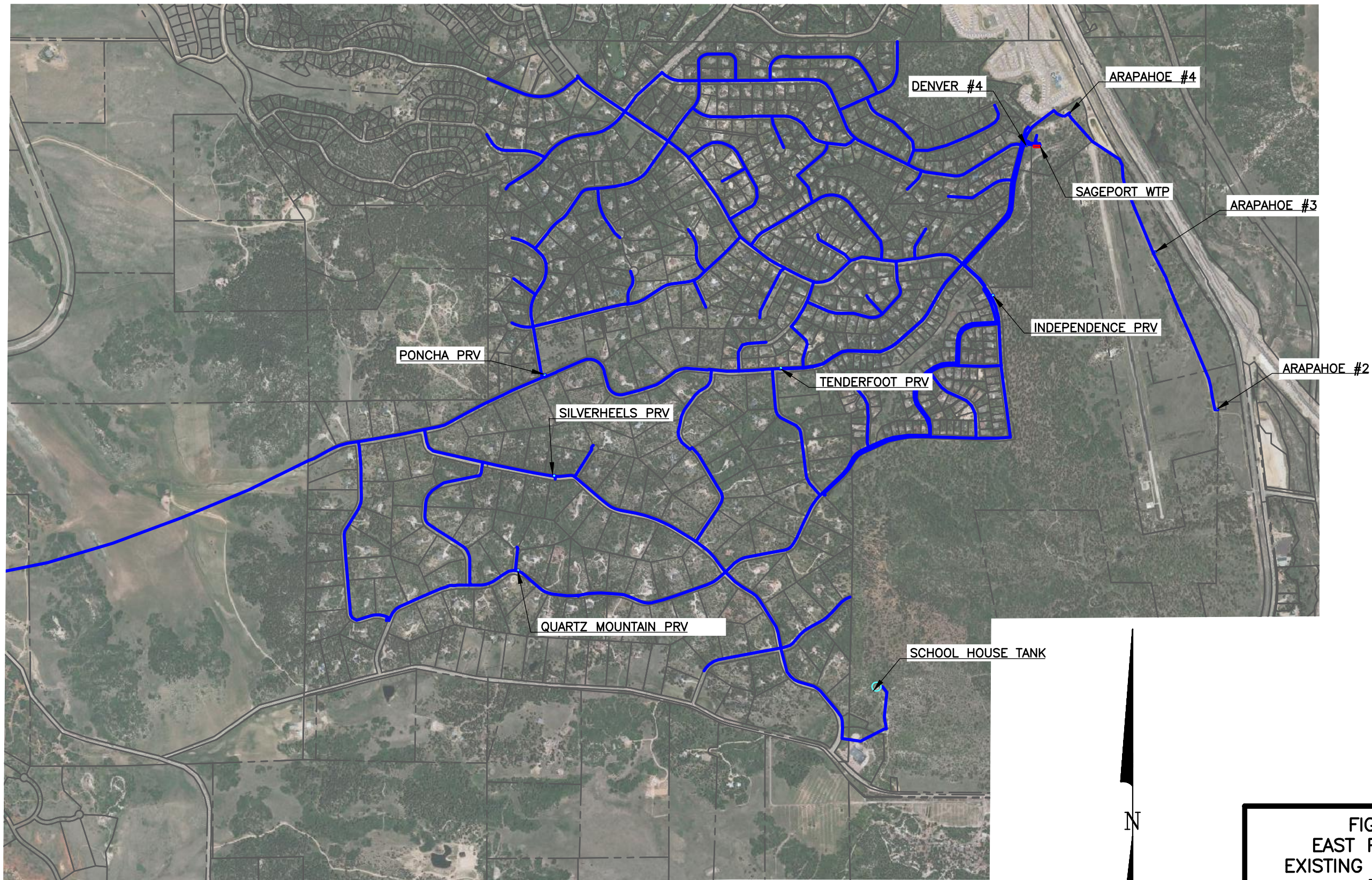
FIGURE 7A
WEST PERRY PARK
EXISTING WATER SYSTEM
PPWSD

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611 N. WEBER, SUITE 300
COLORADO SPRINGS, COLORADO 80903

MAY 2025

MAP SOURCE: PERRY PARK WATER
AND SANITATION DISTRICT'S GIS MAP



SCALE : 1" = 1,500'

MAP SOURCE: PERRY PARK WATER
AND SANITATION DISTRICT'S GIS MAP

FIGURE 7.DWG

**FIGURE 7B
EAST PERRY PARK
EXISTING WATER SYSTEM
PPWSD**

GMS, INC.

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611 N. WEBER, SUITE 300
COLORADO SPRINGS, COLORADO 80903

MAY 2025

1. Glen Grove Well

The original Glen Grove well was drilled in 1997, replaced in 2006, and is currently operating under permit 48447-F-R. According to available Colorado Division of Water Resources records, the well is limited to a maximum pumping rate of 400 gpm. Its current pumping rate is reported to be 100 gpm. The permit does not note an annual withdrawal limit for this individual well but, along with the seven other alluvial wells, the combined average annual amount of groundwater to be appropriated shall not exceed 1,600 acre-feet as identified in water court case no. 89CW225. The well depth is 59-feet deep and is equipped with a 5-hp Goulds submersible pump. The well utilizes a 4-inch galvanized steel drop pipe for raw water conveyance. Raw water is metered with a Seametrics flow meter located at the Glen Grove WTP.

The top section of the Glen Grove well, down to 19 feet, is encased in a 24-inch steel casing pipe. Inside that, a 10 $\frac{3}{4}$ -inch steel casing pipe runs from the top down to a depth of 56 feet. Between depths of 39 feet and 54 feet, a 10 $\frac{3}{4}$ -inch 304 stainless steel casing with perforations was installed. An Eaton Enclosed SVX VFD (variable frequency drive) serves as the motor driver for the well pump and is located at the well site. From available records, it appears these items are from the installation in 2006.

2. Grant Ditch Well

The Grant Ditch well was drilled in 2002 and operates under permit 48448-F-R. The current well replaced the original Grant Ditch well which operated under permit 16255-F. The well is assigned a maximum pumping rate of 150 gallons per minute (gpm) in the permit, with a current pumping rate at 65 gpm. No annual withdrawal limit is listed on the permit, but along with the seven other alluvial wells, the combined average annual amount of groundwater to be appropriated shall not exceed 1,600 acre-feet as identified in water court case no. 89CW225. The well depth is 52-feet deep and is equipped with a 5-hp Burekely submersible pump. The well utilizes a 3-inch galvanized steel drop pipe for raw water conveyance. A Water Spec flow meter is located in a manhole south of the well.

The top section of the Grant Ditch well, down to 7 feet, is encased in a 30-inch steel casing pipe. Inside that, a 10 ¾-inch steel casing pipe runs from the top down to a depth of 50 feet. Between depths of 31 feet and 46 feet, a 10-inch stainless steel casing with 75-slot perforations is installed. The well pump motor is driven by an Eaton Enclosed SVX VFD located at the well site.

3. West Plum No. 1

The West Plum No. 1 well was drilled in 1997 and operates under permit 48268-F. The maximum permitted pumping rate of the well is 448 gpm, with an actual pumping rate of 100 gpm. The permit does not note an annual withdrawal limit for this individual well but, along with the seven other alluvial wells, the combined average annual amount of groundwater to be appropriated shall not exceed 1600 acre-feet as identified in water court case no. 89CW225. The well depth is 57-feet deep and is equipped with a 7.5-hp Goulds submersible pump. The West Plum No. 1 Well is not currently used by the PPWSD because it produces water with a very high concentration of iron which poses treatability issues at the Glen Grove WTP.

The West Plum No. 1 well is constructed with a 10-inch steel casing pipe from the surface to a depth of 37 feet. From 37 feet to 52 feet, a 10-inch stainless steel screen with 75-slot perforations is installed, followed by a 10-inch steel casing from 52 feet to 57 feet.

4. West Plum No. 2

The West Plum No. 2 well was drilled in 2001 and operates under permit 56469-F. The maximum permitted pumping rate of the well is 448 gpm, with an actual pumping rate of 100 gpm. The well has an average annual withdrawal appropriation of 721 acre-feet as presented in the 2001 well permit. Although the well has its own appropriation, it is assumed this value must be in compliance with water court case no. 89CW225 where the combined average annual amount of groundwater to be appropriated shall not exceed 1600 acre-feet for all eight wells named in the court case. The well depth is 58-feet and it is equipped with a 10-hp Goulds submersible pump. The well utilizes a 3-

inch galvanized steel drop pipe for raw water conveyance. A Sensus flow meter is located in a wood framed pit west of the well that has since collapsed.

The top section of the West Plum No. 2 well, down to 55 feet, is encased in a 10 ¾-inch steel casing pipe. Between the depths of 38 feet and 53 feet, a 10-inch stainless steel casing with 75-slot perforations was installed. An Eaton Enclosed SVX VFD is located at the well site to drive the well pump motor.

The deep non-tributary wells draw from the Denver and Arapahoe aquifers in the Denver Basin. They are located in East Perry Park and serve as source water for the Sageport WTP. The four deep wells are Arapahoe No. 2, Arapahoe No. 3, Arapahoe No. 4, and Denver No. 4 wells. PPWSD is currently constructing a new well in East Perry Park northwest of the Sageport WTP. Two additional existing non-tributary wells that PPWSD operates are not currently in use for potable service due to water quality issues. Water rights for the Arapahoe aquifer wells have been decreed in Division 1 Water Court, Case No. 81CW308. The decreed maximum annual withdrawal for PPWSD's Arapahoe aquifer wells is 1,118 acre-feet. Water rights for the Denver aquifer wells have been decreed in Division 1 Water Court, Case No. 82CW181. The decreed maximum annual withdrawal for PPWSD's Denver aquifer wells is 1,844 acre-feet.

5. Arapahoe No. 2

The Arapahoe No. 2 (A-2) well is a drilled well installed in 2007 as a replacement to the Sageport DA-2 well, and operates under Permit No. 36577-F-R. The well is assigned a maximum pumping rate of 184 gpm, with an actual pumping rate of approximately 170 gpm. An annual pumping limitation of 295 ac-ft/yr is presented in the 2006 replacement well permit. The well depth is 1,710 feet and it is equipped with a 75-hp Grundfos submersible pump that was installed in November of 2014. The well utilizes a 4 ½-inch J55 steel drop pipe for raw water conveyance. A Neptune flow meter is located in a pit south of the well.

The top section of the A-2 well, down to 40 feet, is encased in a 26-inch steel casing pipe. Inside that, a 10 ¾-inch steel casing pipe runs from two feet below the top of

casing to a depth of 1,690 feet. Between depths of 1,345 feet and 1,670 feet, the casing pipe becomes a 10-inch stainless steel casing with 40-slot perforations.

The well's programmable logic controller (PLC) is manufactured by Palmer Drives Controls and System, Inc. A new Rockwell Automation variable frequency drive (VFD) was installed in 2024. The new VFD controls the well pump output by adjusting the pump speed based on the water level in the School House Water Tank in East Perry Park.

6. Arapahoe No. 3

The Arapahoe No. 3 (A-3) well is a drilled well installed in 2004 and operates under Permit No. 60190-F. The well is assigned a maximum pumping rate of 350 gpm, with an actual pumping rate of approximately 200 gpm. An annual pumping limitation of 301 ac-ft/yr is presented in the 2003 well permit. The well depth is 1,750 feet and it is equipped with a 75-hp Grundfos submersible pump that was installed in October 2004. The well utilizes a 4-inch steel drop pipe for raw water conveyance. An Invensys flow meter is located in a manhole southwest of the well.

The top section of the A-3 well, down to 40 feet, is encased in a 24-inch steel casing pipe. Inside that is a 10 ³/₄-inch steel casing pipe which transitions to a 10-inch stainless steel casing with 40-slot perforations.

The well's PLC is manufactured by Palmer Drives Controls and System, Inc. A new Rockwell Automation VFD was installed in 2024. The new VFD controls the well pump by relying on the water level in the School House Water Tank in East Perry Park. A 1999 Generac 2000 Series emergency standby generator is located at the Arapahoe No. 3 well site. It is a diesel engine generator that provides power to the well to pump water to the Sageport WTP during loss of utility power.

7. Arapahoe No. 4

The Arapahoe No. 4 (A-4) well is a drilled well installed in 2000 as a replacement to the Sageport DA-4 well and operates under Permit No. 36576-F-R. The well is assigned a

maximum pumping rate of 197 gpm, with an actual pumping rate of approximately 195 gpm. An annual pumping limitation of 320 ac-ft/yr is presented in the 2000 well permit. The well depth is 1,685 feet deep and it is equipped with a 120-hp Summit submersible pump that was installed in May 2019. The well utilizes a 4 ½-inch J55 steel drop pipe for raw water conveyance. A Master Meter flow meter was installed when the well was originally constructed. It appears that the meter has since been replaced with a Hersey Meter.

The top section of the A-4 well, down to 40 feet, is encased in a 20-inch steel casing pipe. Inside that is a 10 ¾-inch steel casing pipe which has a lower section of 10-inch stainless steel casing with 40-slot perforations.

The A4 well building is located approximately 85-feet west of the well head and contains the controls for the well. Inside the well building is a main electric panel, a transformer, a VFD, and a SOLA surge suppressor. A radio antenna is positioned on the southeast corner of the well building for communication with the Supervisory Control and Data Acquisition (SCADA) equipment located at the Sageport WTP.

8. Denver No. 4

The Denver No. 4 (D-4) well is a drilled well installed in 1994 and operates under Permit No. 46600-F. The well is assigned a maximum pumping rate of 350 gpm, with an actual pumping rate of approximately 280 gpm. An annual pumping limitation of 564 ac-ft/yr is presented in the 1996 well permit. The well is 1,150 feet deep and equipped with a 75-hp PI Pumps submersible pump. The well utilizes a 4 ½-inch J55 steel drop pipe for raw water conveyance. A Sensus flow meter was installed when the well was originally constructed. It appears that the original meter has since been replaced.

The top section of the D-4 well, down to 40 feet, is encased in a 20-inch steel casing pipe. Inside that is a 10 ¾-inch steel casing pipe and finally a 10-inch stainless steel screen with 40-slot perforations was installed.

A new Rockwell Automation VFD will be installed in 2024 for the D4 well located along the outside of the west wall of the Sageport WTP building. The new VFD will control the

well pump based on the water levels in the School House Water Tank in East Perry Park. The well site has a single solar panel that powers the controls for Well D4.

9. Poncho Arapahoe Well

The District constructed a new deep well in 2024, which is the fifth active non tributary well to provide source water to the Sageport WTP. This well is located northwest of the Sageport WTP and includes a raw water line from the well site to the WTP. This new well will operate under permit number 89120-F. The permit assigns a maximum pumping rate of 350 GPM, with an annual withdrawal limit of 301 acre feet per year. The well is 1,740 feet deep and designed to produce 120 GPM with a 100-hp Baker Hughes Flex 47 submersible pump. Once the well is placed into service its actual production rates can be verified.

The well is constructed with 30-inch steel casing from the surface to a depth of 40 feet. A 12-inch steel casing extends from 2 feet deep to 1,405 feet. A 12-inch stainless steel screen with 40-slot perforations installed in intervals of 5 to 20 feet at depths of 1,352 to 1,372 feet, 1,386 to 1,396 feet, 1,405 to 1,410 feet, and 1,445 to 1,450 feet.

The following table presents a summary of the well details for each of the alluvial wells and the deep wells described above. The table includes only those existing wells which have been completed, it does not include information on the new Poncho Road Arapahoe Well which is currently under construction.

TABLE 4
PERRY PARK WATER AND SANITATION DISTRICT
EXISTING WELL INFORMATION

Well	Year Well Drilled	Permit No.	Aquifer Type	Well Depth (ft)	Submersible Pump	Year Pump Installed	Drop Pipe Material & Diameter	Well Casing Material & Diameter	Meter Brand
Glen Grove	2006	48447-F-R	Alluvial	59	5-hp Goulds	2007	4-inch Galvanized Steel	10 3/4-inch Steel	Seametrics
Grant Ditch	2002	48448-F-R	Alluvial	52	5-hp Burekely	2002	3-inch Galvanized Steel	10 3/4-inch Steel	Water Spec
West Plum No. 1	1997	48268-F	Alluvial	57	7.5-hp Goulds	1998	10-inch Steel	-	Unknown
West Plum No. 2	2001	56469-F	Alluvial	58	10-hp Goulds	2003	4 1/2-inch J55 Steel	10 3/4-inch Steel	Sensus
Arapahoe No. 2	2007	36577-F-R	Deep Non-Tributary	1,710	75-hp Grundfos	2014	4-inch Steel	10 3/4-inch Steel	Neptune
Arapahoe No. 3	2004	60190-F	Deep Non-Tributary	1,750	75-hp Grundfos	2004	4 1/2-inch J55 Steel	10 3/4-inch Steel	Invensys
Arapahoe No. 4	2000	36576-F-R	Deep Non-Tributary	1,685	120-hp Summit	2019	4 1/2-inch J55 Steel	10 3/4-inch Steel	Hersey
Denver No. 4	1994	46600-F	Deep Non-Tributary	1,150	75-hp PI Pumps	2014	4 1/2-inch J55 Steel	10 3/4-inch Steel	Sensus

C. SAGEPORT WATER TREATMENT PLANT

The Sageport WTP receives and treats water from PPWSD's four active deep groundwater wells. Figure 8 below illustrates the East Perry Park wells and raw water metering vault in relation to the Sageport Water Treatment Plant. The plant was likely constructed circa late 1960s or early 1970s with the primary treatment objectives of removing iron and manganese. The treatment processes at the Sageport WTP includes dosing water with chlorine and potassium permanganate to oxidize iron and manganese ahead of filtration. Water then flows through an upflow contact clarifier and gravity greensand filter before being

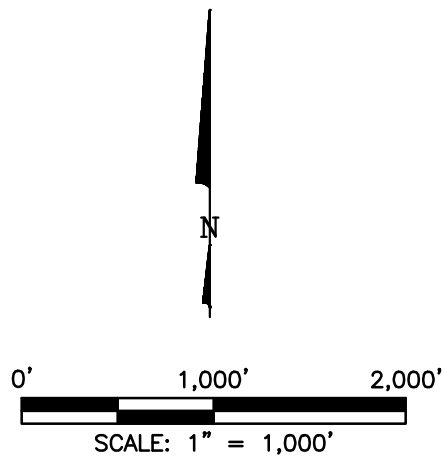
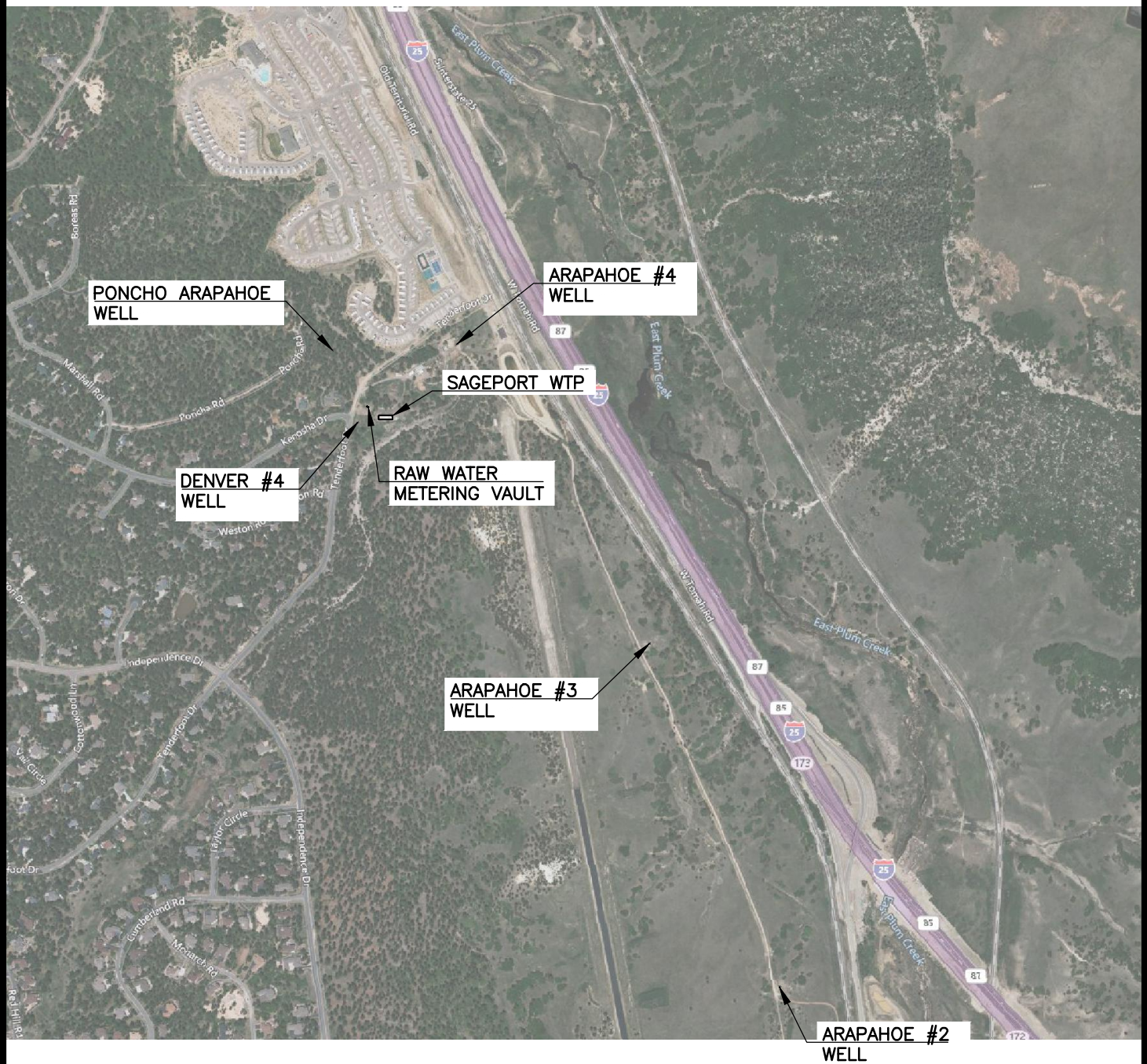


FIGURE 8.DWG

FIGURE 8
SAGEPORT WTP VICINITY MAP
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disinfected with chlorine. Finally, the treated water will flow into a below-grade clearwell and then enter the distribution system.

The Sageport WTP was originally constructed with two package gravity filters with upflow clarifiers. The WTP has since undergone several improvement projects, resulting in the expansion of the WTP. In 1999, filters 3 and 4 were added to the WTP as part of the first expansion project. In 2002, the existing WTP underwent a second expansion where the building was expanded to add filters 5 and 6. Finally, in 2020, filter 7 was added as the third expansion of the WTP. The building addition completed in 2002 and the three filter units now sitting in that space is referred to as the “new side” and the original building with the four filter units sitting in that area is referred to as the “old side”. Each “side” has its own PLC controlling the associated filter units and their equipment. Recent automation upgrades have improved communications, operations and controls between the two sides and implemented automated operations of the wells feeding the WTP. The following Figures 9A and 9B present the floor plan and process flow diagram of the Sageport WTP.

The following paragraphs describe the components of the Sageport WTP:

1. Exterior

The Sageport WTP shares a site with the Sageport WWTF. The facilities are encompassed by a chain link perimeter fence around the combined plant sites. It has one entry gate which serves as a secured entry point to the combined site. The gate is locked and secured to limit access to operations personnel only. Water from the PPWSD’s four wells is directed through a raw water metering vault, where total raw water influent is measured. The vault is a simple 7.5-foot by 14-foot building located approximately 85-feet northwest of the Sageport WTP. Raw water from the East Perry Park wells combine into a single raw water line outside of the metering vault and is measured inside the vault with a McCrometer flow meter. Raw water can also be bypassed around the flow meter in case of repairs or maintenance or even released to atmosphere.

Radio communication equipment for the Sageport WTP is located on the roof of the building. The nontributary wells (A-2, A-3, A-4, and D-4) and the School House water storage tank send radio communications to the Sageport WTP where the SCADA is

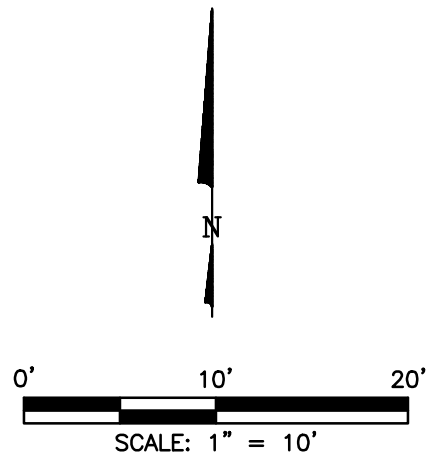
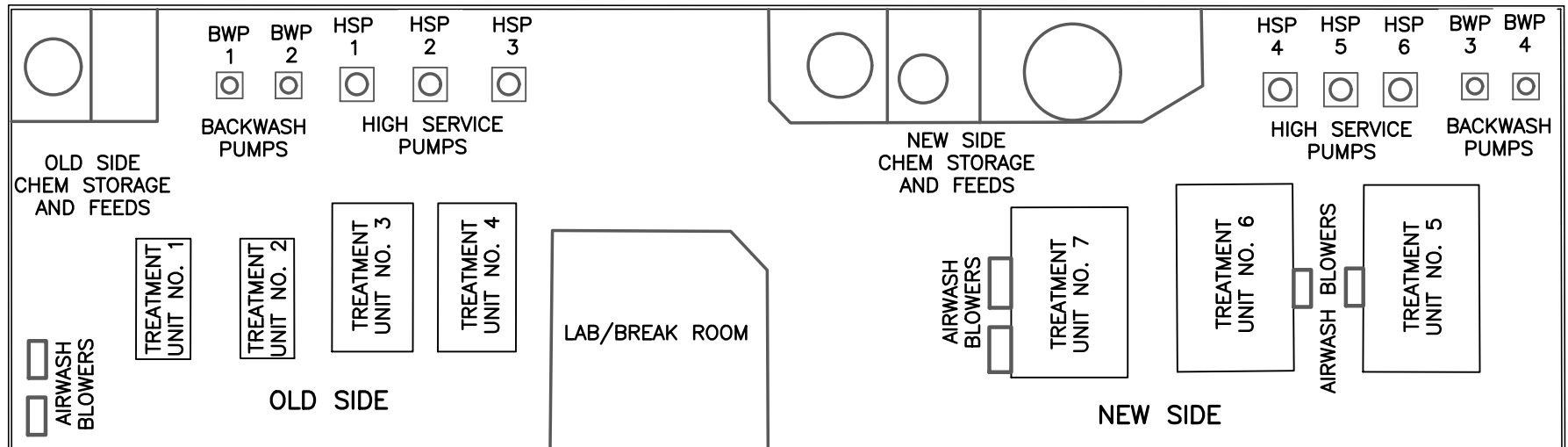


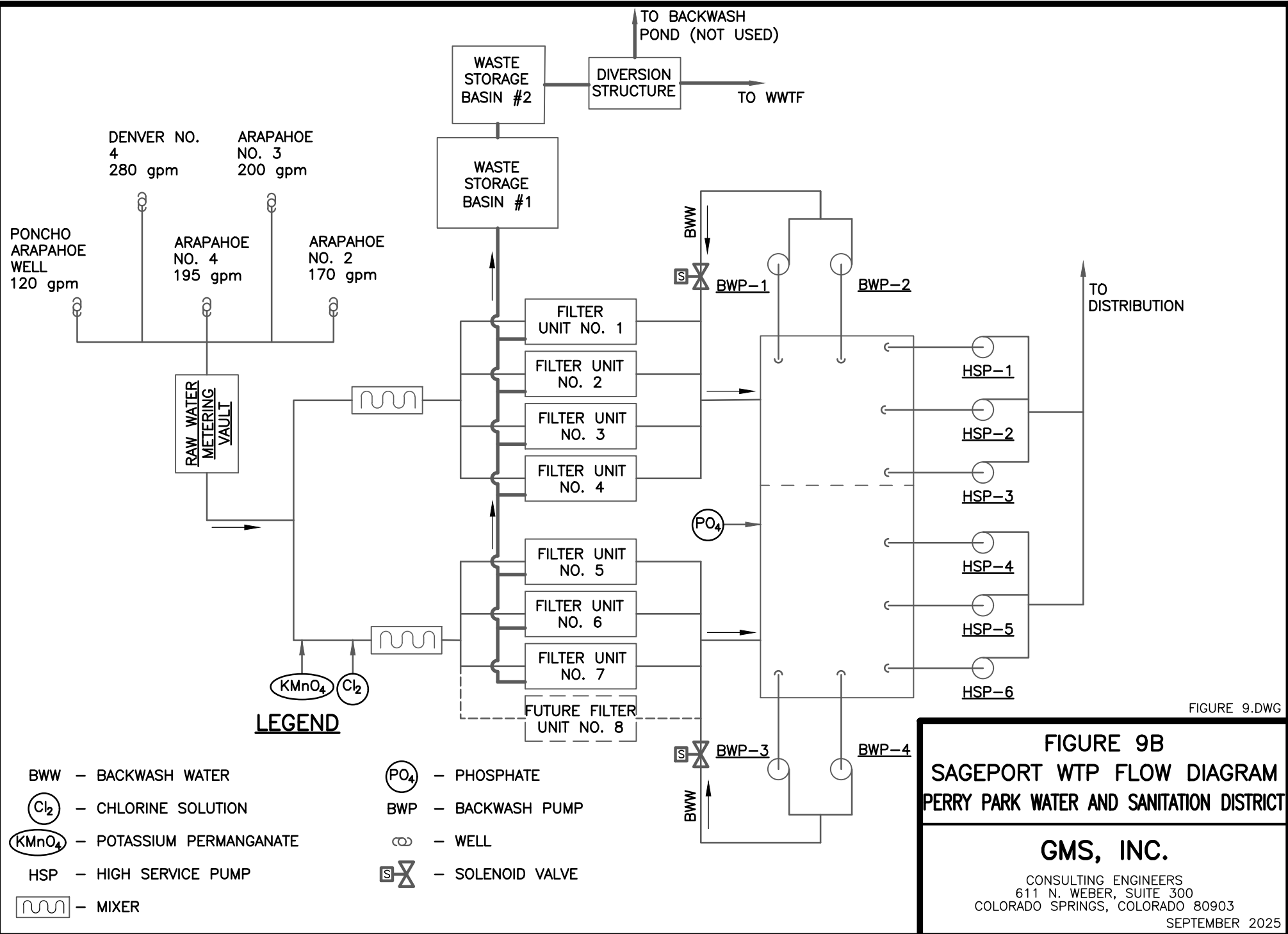
FIGURE 9.DWG

FIGURE 9A
SAGEPORT WTP FLOOR PLAN
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located. There is an emergency generator for the WTP located just east of the building. It is a diesel-powered Cummins generator that is approximately 17.9 feet by 6.8 feet, rated at 450kW and was installed around May of 2020.

2. Pretreatment

The single raw water line on the downstream side of the raw water metering vault splits into two lines before entering the WTP. One line feeds the old side of the WTP, and one line feeds the new side. Both sides of the WTP are set up to pretreat raw water as it comes in to the facility. {confirm old side pretreatment tank size and separate pretreatment operation from new side}

Historically, both sides pretreat raw water with potassium permanganate and sodium hypochlorite. The old side currently has a 200-gallon high density polyethylene (HDPE) tank for sodium hypochlorite. On the new side, the potassium permanganate is contained within a 150-gallon HDPE tank, and the sodium hypochlorite is contained within a 750-gallon steel tank. The new side potassium permanganate tank also has a Lightning tank mixer.

There are three (3) chemical feed metering pumps for each of the pretreatment tanks, one on the old side and two on the new side. All three chemical feed pumps are similar model Stenner Pump Company metering pumps. Since pretreatment on the old side has been disconnected, that pump is not currently in use.

3. Filtration

After pretreatment, the raw water is distributed between several greensand filter units. The Sageport WTP has seven (7) filter units; there are four (4) on the old side and three (3) on the new side. The incoming pretreated water is metered prior to treatment at each individual filter unit. During the most recent WTP improvements project in 2020 all of the existing filter units were sandblasted and repainted with a new epoxy coating. Additionally, the filter media was replaced in all the existing filters. On the old side, filter units 1 and 2 are original to the WTP construction in the late 1960s or early 1970s, and filter units 3 and 4 are original to the first WTP expansion project in 1999. Filter units 1

and 2 have similar magnetic meter models installed on both filter inlet pipes, and both use floats and probe level transmitters to monitor water levels in the filters. Filter units 3 and 4 have manometer flow gauges installed on both filter inlet pipes, and they also use floats and probe level transmitters to monitor water levels in the filters.

On the new side, filter units 5 and 6 are original to second WTP building expansion project which constructed the new side in 2002. Both filters have Water Specialties McCrometer propeller meters on the filter inlet pipes and use Siemens SITRANS LU150 ultrasonic level transmitters to monitor water levels in the filters. Filter 7 was installed in 2020 with the most recent WTP upgrades under the third expansion project. The filter inlet pipe has an Endress + Hauser promag 400 electromagnetic flow meter and uses a Vegapuls WL 61 ultrasonic level transmitter to monitor water levels in the filter.

The filter backwash process consists of air scouring and water backwash combination. The Sageport WTP has six air wash blowers that supply air scour and four backwash pumps. On the old side, there are two Ametek Rotron air wash blowers located in the southwest corner of the WTP building. On the new side there are four air wash blowers connected to the sides of the filter units. There is one Lafert blower connected to the west side of filter unit 5, one Lafert blower connected to the east side of filter unit 6, and two Motori Bonora blowers connected to the west side of filter unit 7. There are two backwash pumps on each side of the Sageport WTP that pull water from the clearwell for filter backwash. The two backwash pumps on the old side are 7.5-hp Simflo pumps and the two backwash pumps on the new side are 15-hp Simflo pumps.

4. Clearwell

Filtered water is collected in the below-grade, reinforced concrete clearwell. The original WTP building has a 26-feet by 24.7-feet clearwell that spans a portion of the length and width of the WTP floor. When the building was expanded in 2002, another 26-feet by 47-feet clearwell was also constructed under the floor of the new side. The two clearwells are not touching as there is a 13-foot space between the two structures, but there is an existing equalization pipe connecting the two clearwells hydraulically. Both sides of the clearwell have float switches and each side also has ultrasonic level sensors. The clearwell on the new side also has a Milltronics Probe ultrasonic level monitor.

Polyphosphate (Seaquest) is added to the finished water in the clearwell as a sequestering agent to inhibit corrosion effects on the system piping and equipment. A 275-gallon HDPE tank, located on the new side, holds the Seaquest solution. A chemical feed metering pump from Stenner Pump Company is used to inject the Seaquest solution into the clearwell.

5. Finish Water

Treated water is pumped from the clearwells into the water system by six (6) high service pumps, three (3) of which are located on the old side and three (3) are located on the new side of the WTP. On the old side, there are two (2) 50-hp Goulds Pumps that were replaced during the 2020 WTP upgrades, and the third pump is a 20-hp Simflo pump that was recently installed between 2012 and 2015. The new side has three (3) 50-hp Simflo pumps original to the addition of the new side of the WTP. The finished water on both sides of the WTP is metered by two (2) McCrometer FlowCom meters, one located on each side of the WTP, before it is pumped into the PPWSD distribution system.

6. Controls

The Sageport WTP has two motor control centers (MCC), one on the old side and one on the new side. The MCC on the old side is original to the WTP with minor upgrades over the years. Interior upgrades and replacements of the old side MCC were completed in early 2025 as part of the automation upgrades for the WTP. The MCC on the new side was installed in 2002 when the WTP building addition was completed. Upgrades were made to the new MCC in 2020 when filter unit 7 was added to the WTP. Both MCCs have blank spaces available for improvements or expansions in the future.

Each side of the Sageport WTP also has its own PLC unit to monitor, operate and control its treatment processes and equipment. The old side PLC controls filter units 1 through 4, while the new side PLC controls filter units 5 through 7. The basic operational objective of the WTP is to maintain sufficient levels in the School House tank which feeds West Perry Park, and at times provides supplemental water to East Perry Park. As water levels in the tank drop, the WTP will increase water production to maintain the tank level within the desired range. Conversely, as tank levels increase, the WTP will

decrease output in response to lower demands and maintain the desired tank water levels. This control scheme is achieved through the PLC units and plant SCADA (supervisory control and data acquisition) system communicating with the tank level instruments.

Each PLC unit was historically in independent control of its side of the WTP. An automation upgrade project was completed in early 2025 that integrated the two PLC units together and connected the four wells into the overall control scheme of the WTP. The automation improvements allowed for better communication between the two sides and a fully coordinated operation of the treatment processes.

D. GLEN GROVE WATER TREATMENT PLANT

The Glen Grove WTP receives and treats groundwater from PPWSD's three active shallow groundwater wells. Figure 10 below shows the shallow alluvial wells in relation to the Glen Grove WTP. The plant was constructed circa 1980 with the primary treatment objectives of removing iron and manganese. In the original treatment process at the plant, water was dosed with chlorine and potassium permanganate to oxidize dissolved iron and manganese ahead of filtration. Water would then flow into pressure filters with greensand filter media before being disinfected with chlorine. Finally, the treated water would flow into a below-grade serpentine clearwell and then enter the distribution system.

In 2010, the Colorado Department of Public Health and Environment (CDPHE) determined the source water for Glen Grove WTP to be classified as groundwater under the direct influence of surface water (GWUDI). Modifications were consequently made to the water treatment plant. The WTP was re-classified as an in-line filtration process and a coagulant aid polymer, Nalco Cat-Floc 8102 Plus, was dosed ahead of filtration. As a result of the re-classification, the CDPHE rated capacity was significantly reduced to 142 gpm with one filter out of service. At this rated capacity, the plant has insufficient capacity to solely meet the demands of West Perry Park. Supplemental water is provided from the Sageport WTP via a one-way transfer pipeline from East Perry Park to West Perry Park. In addition to the process changes necessary to accommodate the GWUDI classification, potassium permanganate is no longer dosed at the WTP as it was found to be ineffective at removing



FIGURE 10.DWG

FIGURE 10
GLEN GROVE WTP VICINITY MAP
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iron from the source water. No other substantial changes have been made to the original treatment process.

The following Figures 11A and 11B present the floor plan and process flow diagram of the Glen Grove WTP.

The following paragraphs describe the components of the Glen Grove WTP:

1. Exterior

The WTP site is completely surrounded by a chain link perimeter fence and has one main access gate which is locked to maintain site security. The WTP consists of two separate buildings located next to each other. One building is the process building and the other is a chemical storage building. The only other above ground item on the site is the emergency backup generator. The emergency generator is located approximately 40 feet north of the WTP building near the site entry gate. The unit is a diesel powered Generac 2000 series generator and is approximately 9.2-feet by 3.3-feet. The generator is rated at 60kW and was installed in November of 1999. The monitoring and control panel for the generator is located in the northeast corner of the interior of the WTP building.

2. Pretreatment

Two raw water lines collect water from the three wells and enter the building in the process room. The two pipes combine into a single line which is monitored by a Sensus flow meter to measure the raw water coming into the WTP. The raw water is then treated with chlorine, SeaQuest, and a coagulant aid polymer before flowing through a Koflo Corporation static mixer.

The Glengrove WTP stores the chemicals for pretreatment in the chemical storage building just south of the process building. The exception being the chlorine gas which is stored in a separate room within the process building. The chemical storage building has one 50-gallon HDPE tank for SeaQuest with a Neptune Chemical Pump Co. tank mixer. The polymer is contained in a 60-gallon HDPE tank with a Brawn Mixer, Inc. tank

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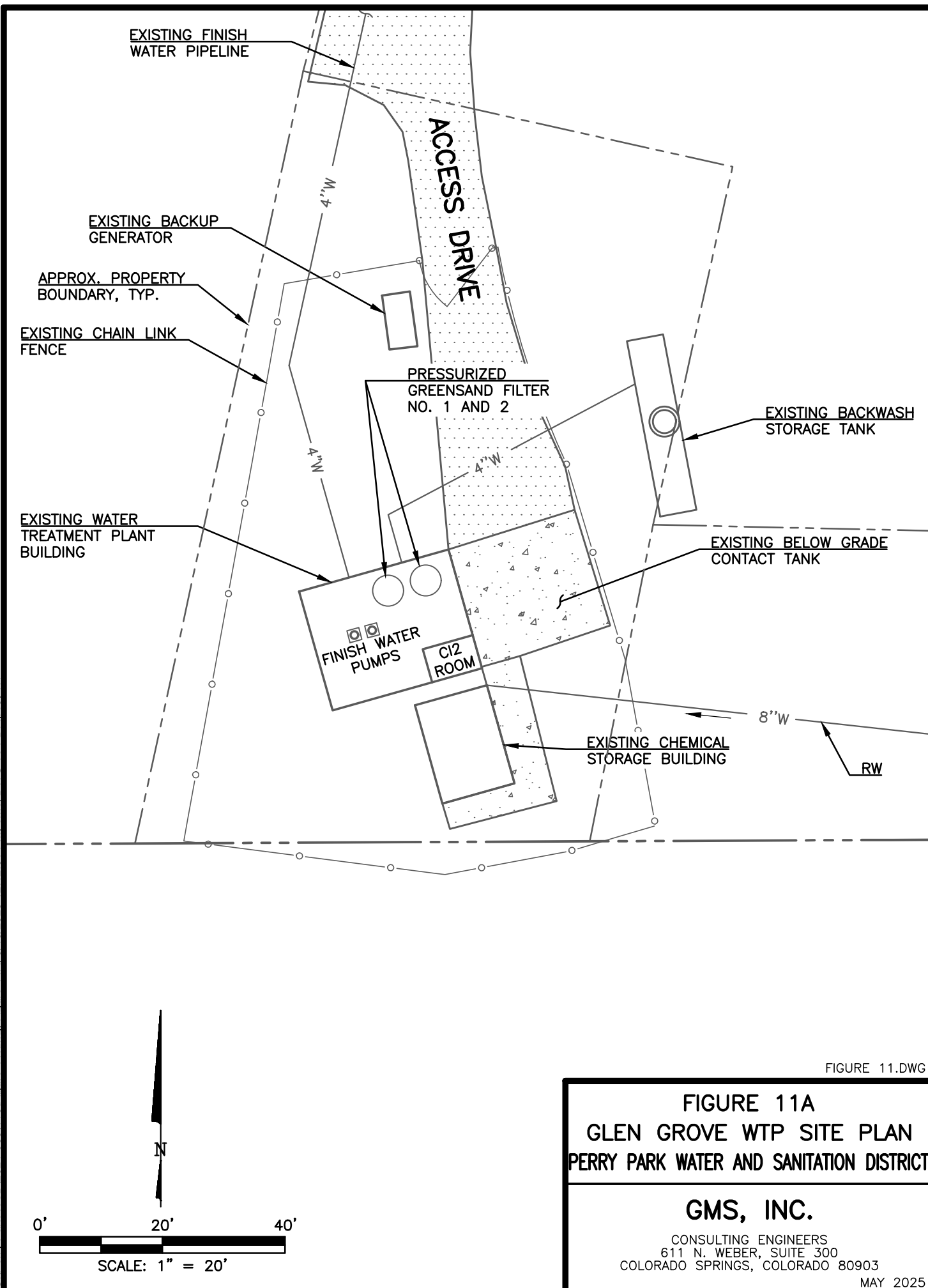


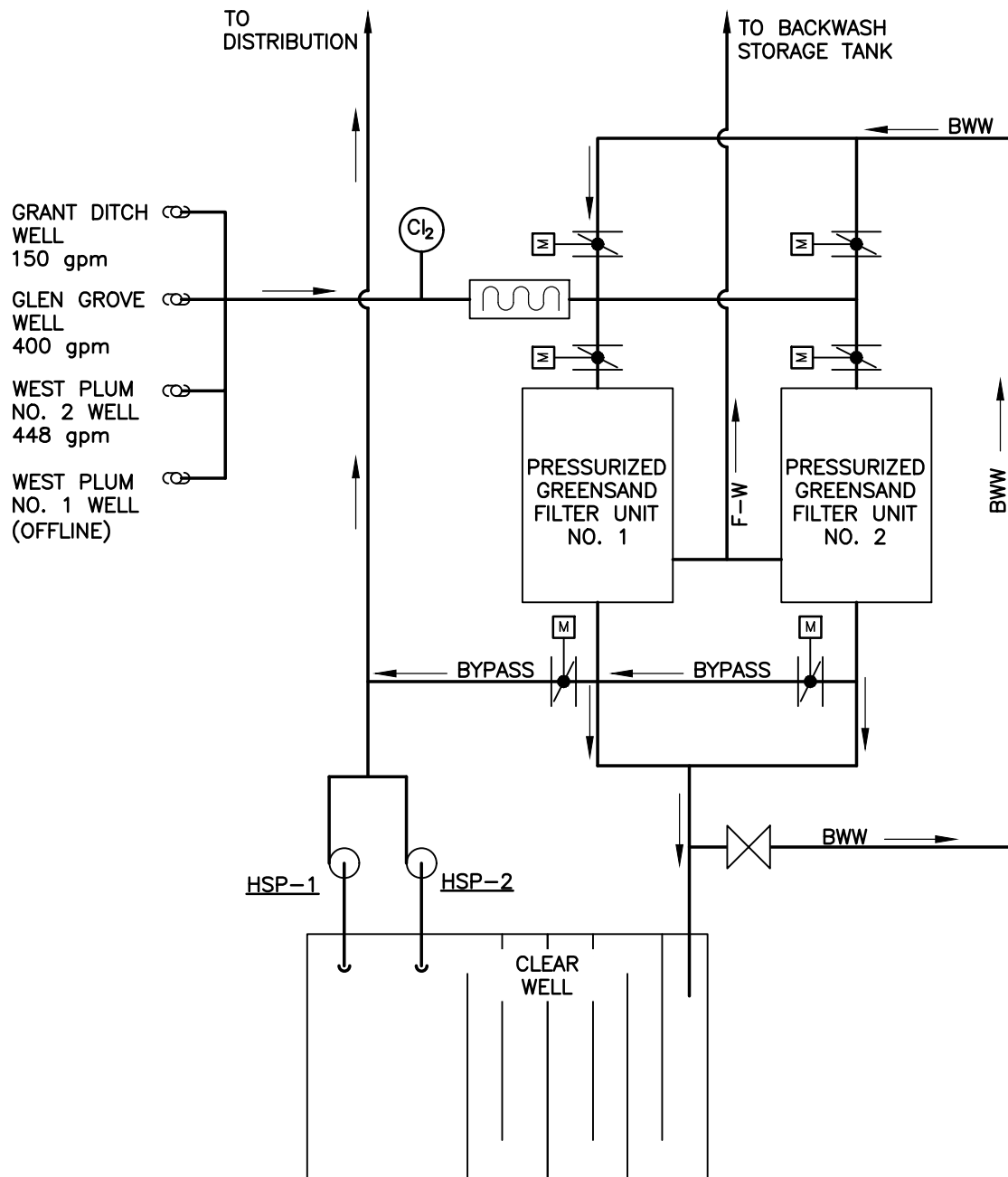
FIGURE 11.DWG

FIGURE 11A
GLEN GROVE WTP SITE PLAN
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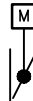
- BWW - BACKWASH WATER
- Cl₂ - CHLORINE SOLUTION
- F-W - FILTER TO WASTE
-  - MIXER
- HSP - HIGH SERVICE PUMP
-  - WELL
-  - BUTTERFLY VALVE W/
ELECTRIC ACTUATOR

FIGURE 11.DWG

FIGURE 11B
GLEN GROVE WTP FLOW DIAGRAM
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mixer. Both tanks also have 30 GPD Pulsatron electronic metering pumps for injection into the process.

The gas chlorine cylinders are kept in a separate enclosed space within the existing WTP process building. Two cylinders are kept on a scale that measures the remaining chlorine in the cylinders. One of the cylinders is the active cylinder that is connected to the feed controller and piping that goes through the wall for injection into the raw and treated water. The other cylinder is the stock cylinder for use when the first cylinder is emptied or experiences a malfunction.

3. Filtration

After pretreatment, the raw water is split between two pressurized greensand filter units. Pretreated water enters the filters near the top and exits out the bottom. The filtered water is metered with a Sensus flow meter and turbidity is measured with a Hach 1720E Turbidimeter prior to entering the clearwell. The filter units are original to the WTP construction around 1980. Both filter units appear to be in fair condition with no signs of structural issues and limited places where the paint on the exterior is peeling.

The filter backwash process consists of an air scouring and water backwash combination. The Glen Grove WTP has one air wash blower located along the northeast wall of the WTP process building behind the filter units that supplies air scour. The filter backwash is a manual process that the operators perform on a daily basis. To begin the backwash process, the operators manually adjust a series of valves on the raw water line, clearwell lines and backwash lines.. Backwash water is taken from the clearwell with the treated water pumps and directed to the filter outlet pipe through a 4-inch water line. Backwash water is directed up and out of the filters and out of the WTP process building through the waste line. Backwash water waste is metered through a Sensus flow meter as it is directed to the external, buried backwash storage tank.

4. Clearwell

Finished water is collected in a below-grade, serpentine clearwell. The original clearwell is approximately 18.5-feet by 27.9-feet and located under the floor of the existing WTP

process building. In 2014, the clearwell was expanded an additional 22.5-feet east of the WTP building. The two portions of the clearwell act as one single tank with access shared through the existing clearwell hatch near the southwest corner of the WTP process building. Float switches are utilized in the clearwell to monitor water levels and control the high service pumps.

5. Finish Water

Treated water is pumped from the clearwell to water system by two high service pumps rated at 200 gpm each located in the northwest part of the WTP building. The control system for the pumps allows only one pump to run at a time. Gas chlorine is added to the finished water as it is pumped into the PPWSD water system. There is no meter on the finished water pipe inside the building.

6. Controls

The electrical power and control equipment for the Glen Grove WTP are located along the southern wall of the building and are original to the WTP construction circa 1980. The WTP is operated manually and does not have a SCADA system for monitoring and control. There does not appear to be spare equipment or spare sections of existing power distribution or control panels to accommodate future improvements or expansions.

E. PRESSURE REDUCING VAULTS

The PPWSD has seven pressure reducing valve (PRV) vaults located throughout their water system. Five of the PRV vaults are located in East Perry Park, with only two located in West Perry Park. Each PRV location is a below-grade vault and contains two separate PRV valves in parallel. Under normal conditions, service is provided through the smaller PRV. The larger PRV provides for additional flow during high demand periods or fire flow events. The transition from normal flow PRV to high flow PRV is made through the pilot system of each PRV valve. When high demand is experienced, the pilot systems sense the pressure changes and activate the larger PRV. When high demands cease, the pilot systems sense the pressure changes and return to the normal flow condition through the smaller PRV. The

locations of the PRV vaults throughout the system are shown in previously presented Figures 7A and 7B.

1. Independence PRV

The Independence PRV vault is located on Independence Drive, approximately 600 feet southeast of Tenderfoot Drive. The PRV vault is a below-grade vault and appears to be in good condition. The vault contains an 8-inch ductile iron pipe equipped with a PRV for large demands, and a 2 ½-inch copper water line fitted with its own PRV for the normal service demands. A pressure gauge is located on either end of the 8-inch water main where the smaller 2 ½" line connects back into the 8-inch main. The Independence PRV operating pressure is set at 130-135 psi. The vault is configured with electronic communications that allows the operators to monitor the upstream and downstream pressures accurately from their cell phones.

2. Tenderfoot PRV

The Tenderfoot PRV vault is located on Tenderfoot Drive, approximately 100 feet east of La Veta Road. The PRV vault contains an 8-inch ductile iron pipe equipped with a PRV and a single pressure gauge located on the PRV. A 2 ½-inch galvanized steel water line fitted with its own PRV and a single pressure gauge connects to the 8-inch line on either side of the larger PRV. Portions of the 2 ½-water line have been repaired with PVC. The 8-inch water main appears to have been coated at one point but is now rusting. The Tenderfoot PRV operating pressure is set at 78-86 psi.

3. Poncha PRV

The Poncha PRV vault is located on the northeast corner of the intersection of Tenderfoot Drive and Poncha Drive. The PRV vault appears to be in good condition but has approximately 1 inch of standing water in the bottom of the vault. The vault contains an 8-inch ductile iron pipe equipped with a PRV and a 2 ½-inch galvanized steel water line that is fitted with its own PRV. The smaller PRV has a single pressure gauge connected directly to it. Another pressure gauge is located on the 8-inch water main downstream of where the smaller water line connects back into the 8-inch main. The Poncha PRV operating pressure is set at 95-100 psi.

4. Silverheels PRV

The Silverheels PRV vault is located on Silverheels Drive, approximately 300 feet northwest of Silverheels Place. The PRV vault contains an 8-inch galvanized steel pipe equipped with a PRV and a 2 ½-inch PVC line that is fitted with its own PRV. There are two pressure gauges, one located on the 2 ½-inch line, and one located on the 8-inch pipe downstream of where the smaller line connects back into the 8-inch main. The 8-inch water main, the PRV on the 8-inch line, and the PRV on the 2 ½-inch line are all show signs of exterior rusting. The Silverheels PRV operating pressure is set at 77-82 psi.

5. Quartz Mountain PRV

The Quartz Mountain PRV vault is located on the northeast corner at the intersection of Quartz Mountain Drive and Homestake Court. The PRV vault appears to be in fair condition and contains a PRV with two pressure gauges directly connected to it on an 8-inch ductile iron pipe. There is a 2 ½-inch galvanized steel water line with a back pressure regulator. The Quartz Mountain PRV operating pressure is set at 65-75 psi.

6. East-West PRV

The East-West PRV vault is located east of the intersection of Red Rock Drive and Perry Park Road on the water main that connects the East Perry Park water system to the West Perry Park water system. The PRV vault is equipped with a stairwell that leads to a large underground vault that appears to be in good condition. The vault contains a 12-inch ductile iron pipe equipped with two PRVs with a single pressure gauge directly connected to each PRV. There is a 3-inch ductile iron pipe that is fitted with its own PRV, two pressure gauges connected directly to the PRV, and a flow meter. The East-West PRV operating pressure is set at 140-150 psi. The vault is configured with electronic communications that allows the operators to monitor the upstream and downstream pressures accurately from their cell phones.

7. Pike Circle PRV

The Pike Circle PRV vault is located on the southeast corner of the intersection of Pike Circle and Fox Way. The PRV vault appears to be in good condition containing an 8-inch ductile iron pipe equipped with two PRVs in series and a 3-inch ductile iron pipe that is fitted with its own PRV. There are two pressure gauges located on either side of the PRV on the 3-inch line. There are also two pressure gauges located on either side of the PRVs on the 8-inch line. The Pike Circle PRV operating pressure is set at 75-82 psi.

F. FOX WAY/PIKE DRIVE BOOSTER PUMP STATION

The booster pump station is located in an 18-foot by 18-foot building on the northeast corner of the intersection of Fox Way and Pike Drive. Both the interior and the exterior of the building appear to be in good condition. Inside, two 175 GPM Goulds pumps stand side-by-side on a poured concrete platform, boosting water up to the Hog John water storage tanks. The concrete platform holding the pumps is showing signs of spalling. The booster station only runs one pump at a time, with one pump manually switched off during operation. There are three (3) parallel 4-inch lines each with a PRV and a Micro Switch. A McCrometer flow meter measures the volumetric flow rate as the water leaves the booster station. The following Figure 12 shows a site plan of the booster pump station.

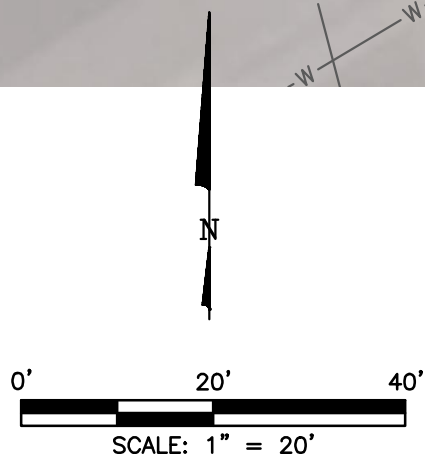
The electrical and control equipment are located along the eastern wall of the building. A chart recorder provides a local record of tank levels, with alarms signaling high or low levels in the Hog John tanks. Pump operation can be controlled via a manual on/off switch, as well as a selector switch with on, off, and auto positions. When in auto mode, the pump starts automatically in response to low water levels in the Hog John tanks. An antenna on the eastern corner of the roof likely enables remote monitoring of the booster station.

G. WATER STORAGE TANK

The PPWSD owns and operates five potable water storage tanks at three different locations with a combined storage capacity of 2,283,000 gallons. Four tanks are located in West

FIGURE 12
FOX WAY/PIKE DRIVE
BOOSTER STATION SITE PLAN
PERRY PARK WATER AND SANITATION DISTRICT

SEPTEMBER 2025



Perry Park, the two Echo Hills tanks and the two Hog John tanks. The fifth tank is located in East Perry Park, it is the School House tank. Both tank sites in West Perry Park each have two water storage tanks, which provides not only additional storage capacity but also a certain degree of redundancy to allow for maintenance or repair of one tank while maintaining service using the other tank. The previously presented Figures 7A and 7B show the locations of the five water storage tanks throughout the District.

The following paragraphs describe the water storage tanks:

1. School House Tank

The School House Tank is a 65-foot diameter, 40-foot-high welded steel storage tank located inside a locked chain link fence approximately 1,000 feet north of the Larkspur Elementary School. The tank was erected at an approximate ground elevation of 7,040 feet in 1963 and has a nominal storage capacity of 1,000,000 gallons. The ladder for hatch access is located on the south side of the tank behind a second locked gate and the radio antenna is located at the top of the ladder. The tank has a domed roof with a vent pipe located in the center. There are separate inlet and outlet pipes and the tank is operated in conjunction with the Sageport WTP and its source wells using a pressure sensor that is located in a valve vault south of the tank. The exterior of the tank is rusting in spots where it looks like the tank overflowed. It is believed that the last time the interior and exterior of the tank was sandblasted and recoated was at least 25 years ago. The tank has a Bell Protectifier cathodic protection system to help prevent corrosion of the steel tank. The tank access road extends north off of Perry Park Avenue just east of the school. Electrical power for Well A-1, which is not currently in service, is routed up the tank access road from Perry Park Avenue. Although Well A-1 does not share the tank site, it does have underground power lines running up the tank access road.

2. Echo Hills Tanks No. 1 and No. 2

The Echo Hills Tanks No. 1 and 2 are located next to each other inside a locked chain link fence approximately 1,700 feet northwest of the intersection of Echo Village Drive and Echo Hills Club Drive. A gravel access road runs north of the tank site from Echo Hills Club Drive. The tank site is enclosed by a chain link fence perimeter fence with a

locked gate for security. The tank site has an approximate ground elevation of 6,760 feet. The Echo Hills Tank No. 1 is the eastern tank with dimensions of 45 feet diameter by 28 feet high. It is a welded steel storage tank in good condition with a nominal storage capacity of 500,000 gallons. The ladder for hatch access is located on the east side of the tank behind a second locked gate. The tank has a center pitched roof with a vent pipe in the center and there is a common inlet and outlet pipe inside the tank. The tank has a Corrosion Service, Inc. cathodic protection rectifier to help prevent corrosion of the steel tank.

The Echo Hills Tank No. 2 is a concrete tank in good condition with a diameter of 53 feet, height of 28 feet and a nominal storage capacity of 333,000 gallons. The ladder for hatch access is located on the west side of the tank behind a second locked gate. The tank has a domed concrete roof with a vent pipe in the center and there is a common inlet and outlet pipe inside the tank. A cathodic protection system was not installed in the tank, likely due to the fact that the tank is primarily constructed of concrete.

3. Hog John Tanks No. 1 and No. 2

The Hog John tanks No. 1 and No. 2 are located next to each other on a site with a chain link fence and locked entry gate to maintain site security. The site is approximately 1,300 feet southwest of the intersection of Pike Drive and Pike Circle at an approximate ground elevation of 7,080 feet. The gravel access road winds its way up to the tank site from Pike Circle. The Hog John tank No. 1 is the northern tank and is a 36-foot diameter, 40-foot-tall, welded steel storage tank erected in 1980 with a nominal storage capacity of 300,000 gallons. The ladder for hatch access is located on the south side of the tank and entry onto the ladder is via a locked hatch. The tank has a flat roof with a vent pipe in the center and there are separate inlet and outlet pipes inside the tank. The tank appears to be in good condition.

The Hog John tank No. 2 is a 26-foot diameter, 40-foot-tall, welded steel storage tank erected in 2004 with a nominal storage capacity of 150,000 gallons. The ladder for hatch access is located on the north side of the tank with another lock on the hatch. The tank has a flat roof with a vent pipe in the center and there are separate inlet and outlet pipes inside the tank. The tank appears to be in good condition.

A valve vault is located on the site, northeast of the tanks. Solar panels are located on the roof of the Hog John No. 1 tank and the control panels for the solar power are located just east of the tanks ladder.

SECTION V

HISTORICAL AND PROJECTED WATER CONSUMPTION

An assessment of the historical and projected water demands for the PPWSD is presented in this section. Historical well pumping records and total water sales were used to establish the baseline water use parameters for the District. The baseline water use parameters essentially set the current demand conditions. These parameters were then used to project future demands on the water system based on service area population projections. The future demands may play a role in the capital improvement recommendations if the increase in demand on a certain component of the system warrants an increase in capacity. If that capacity increase is projected to occur prior to end-of-life replacement or other major improvements to that component, the capacity expansion will become a capital improvement need that must be planned for earlier than normal life cycle considerations.

The total monthly well production data for the alluvial wells and nontributary wells was provided for the period of January 2020 through November 2024. The total number of water system taps within the District's service area has risen over this period rising from 1,482 in 2021 to 1,556 in 2024. The following table presents the total monthly water production for 2020 through 2024 for the District.

TABLE 5
PERRY PARK WATER AND SANITATION DISTRICT
HISTORICAL WATER SYSTEM PRODUCTION

Month	2020 Water Production, gal.	2021 Water Production, gal.	2022 Water Production, gal. ¹⁾	2023 Water Production, gal.	2024 Water Production, gal.
January	11,108,261	9,348,013	9,348,013	10,805,219	8,960,903
February	9,029,331	9,384,835	9,384,835	11,196,240	8,671,873
March	9,511,591	8,017,890	8,017,890	8,299,425	8,880,091
April	9,837,442	8,124,117	8,124,117	8,641,569	8,985,993
May	17,491,682	10,232,047	10,232,047	12,710,796	11,139,216
June	21,538,751	19,335,998	19,335,998	12,711,448	18,775,209
July	23,080,026	21,055,188	21,055,188	18,840,705	24,109,715
August	23,080,026	20,292,045	20,292,045	17,530,784	22,088,136
September	18,146,642	18,754,028	18,754,028	18,797,041	20,411,958
October	15,969,958	13,646,966	13,646,966	12,841,788	18,519,416
November	9,546,131	8,394,248	9,233,966	8,990,229	10,017,963
December	9,521,040	9,221,583	9,322,271	9,066,478	-
Total, gal	177,860,881	155,806,959	156,747,365	150,431,721	160,560,473
Average Daily, gpd ²⁾	485,959	426,868	429,445	412,142	479,285
Service Population ³⁾	3,489	3,529	3,578	3,613	3,641
System Production, gpcd ⁴⁾	139	121	120	114	132

1) Water production data from January through October is the same as the water data from 2021. This is likely an administrative error that occurred during recording of the data.

2) Gallons per day.

3) Estimated service area population based on water service area taps provided by PPWSD and the average household size in the Perry Park CDP of 2.34 people, as developed by the State Demography Office.

4) Gallons per capita per day.

Total well production was 177.9 million gallons in 2020, 155.8 MG in 2021, 156.7 MG in 2022, 150.4 MG in 2023, and 160.6 MG from January through November of 2024. The current average daily well production is 446,218 gallons per day, or 1.4 acre-feet/day.

The total monthly water sales data was provided for the period of January 2020 through November 2024. The following table presents the historical total monthly water sales for residential and commercial customers between 2020 and 2024.

TABLE 6
PERRY PARK WATER AND SANITATION DISTRICT
HISTORICAL WATER SYSTEM SALES

Month	2020		2021		2022	
	Residential Sales, gal. ¹⁾	Commercial Sales, gal. ²⁾	Residential Sales, gal. ¹⁾	Commercial Sales, gal. ²⁾	Residential Sales, gal. ¹⁾	Commercial Sales, gal. ²⁾
January	5,296,000	64,000	5,177,000	66,000	4,869,000	55,000
February	5,950,000	71,000	5,851,000	95,000	5,360,000	69,000
March	4,765,000	83,000	4,862,000	85,000	5,512,000	104,000
April	6,679,000	43,000	6,038,000	96,000	6,314,000	151,000
May	8,002,000	121,000	5,299,000	168,000	6,515,000	184,000
June	15,741,000	165,000	11,518,000	441,000	13,911,000	198,000
July	14,271,000	226,000	11,946,000	440,000	11,109,000	169,000
August	19,625,000	174,000	16,154,000	242,000	14,472,000	155,000
September	11,181,000	153,000	12,073,000	272,000	9,798,000	325,000
October	13,819,000	108,000	13,881,000	119,000	11,825,000	120,000
November	6,674,000	121,000	6,201,000	130,000	5,640,000	72,000
December	6,630,000	59,000	6,890,000	95,000	6,529,000	117,000
Total, gal	118,633,000	1,388,000	105,890,000	2,249,000	101,854,000	1,719,000
Average Daily, gpd ³⁾	324,134	3,792	290,110	6,162	279,052	4,710
Unaccounted-for-water, %	32.5%		30.6%		33.9%	
Service Population ⁴⁾	3,489		3,529		3,578	
Residential System Sales, gpcd ⁵⁾	94		84		79	

1) Residential customers are billed bi-monthly.

2) Commercial customers are billed monthly.

3) Gallons per day.

4) Estimated service area population based on water service area taps provided by PPWSD and the average household size in the Perry Park CDP of 2.34 people, as developed by the State Demography Office.

5) Gallons per capita per day.

TABLE 6 CONT.
PERRY PARK WATER AND SANITATION DISTRICT
HISTORICAL WATER SYSTEM SALES

Month	2023		2024	
	Residential Sales, gal. ¹⁾	Commercial Sales, gal. ²⁾	Residential Sales, gal. ¹⁾	Commercial Sales, gal. ²⁾
January	5,007,000	53,000	4,912,000	37,000
February	5,369,000	52,000	5,636,000	70,000
March	4,524,000	76,000	4,238,000	59,000
April	5,747,000	81,000	5,635,000	65,000
May	5,184,000	104,000	5,682,000	142,000
June	8,404,000	161,000	11,267,000	137,000
July	8,731,000	158,000	11,859,000	420,000
August	15,251,000	230,000	16,472,000	202,000
September	9,168,000	189,000	10,243,000	227,000
October	11,354,000	169,000	13,176,000	155,000
November	6,032,000	76,000	6,784,000	56,000
December	5,606,000	112,000	-	-
Total, gal	90,377,000	1,461,000	95,904,000	1,570,000
Average Daily, gpd ³⁾	247,608	4,003	286,281	4,687
Unaccounted-for-water, %	39.0%		39.3%	
Service Population ⁴⁾	3,613		3,641	
Residential System Sales, gpcd ⁵⁾	70		80	

1) Residential customers are billed bi-monthly.

2) Commercial customers are billed monthly.

3) Gallons per day.

4) Estimated service area population based on water service area taps provided by PPWSD and the average household size in the Perry Park CDP of 2.34 people, as developed by the State Demography Office.

5) Gallons per capita per day.

Unaccounted-for-water represents water pumped for the District's system that is not measured by the District's customer meters. Unaccounted-for-water is primarily attributed to unmetered uses such as fire hydrant usage, storage tank overflows, meter inaccuracies, as well as pipeline leaks and breaks within the distribution system. Depending on several factors such as system age, pipe age, pipe material, pipe bedding and construction methods and prevalent soil types, unaccounted-for-water value of 10% to 20% may be reasonable. Values of 30% to 40% are more common in older systems with aging pipes, poor pipe bedding and rocky soils. The American Water Works Association (AWWA) has historically recommended an unaccounted-for-water goal

of 10% with proactive efforts taken to reach this goal. The PPWSD had an unaccounted-for-water percentage of 32.5% in 2020, 30.6% in 2021, 33.9% in 2022, 39.0% in 2023, and 39.3% in 2024. The average water loss percentage for the past five years is 35.0%. The District meters water at several additional points, including the influent raw water and high service pump discharge at the WTPs, water flow through the east-west pipeline at the east-west PRV, and water pumped at the booster station. However, this water data was not included in this report, making it difficult to track exact sources of water loss. Although the District's unaccounted-for-water percentage is relatively high, a portion of the calculated water loss can be attributed to backwashing at the WTPs. However, that use is likely a small percentage of the total unaccounted-for-water. The District also has old manual read meters which may result in meter inaccuracies. System wide inaccuracies for older metering equipment could play a significant role in the unaccounted-for-water totals seen from the data.

AWWA no longer uses the term “unaccounted-for-water” in assessing water loss. The AWWA has seen an inconsistent use and interpretation of “unaccounted-for-water” because it has varied for different systems. Currently, AWWA uses “non-revenue” water to reflect the distributed volume of water that is not seen in customer billings. This terminology specifically focuses on unbilled consumption (water for firefighting, flushing, etc.), apparent losses (customer meter inaccuracies and unauthorized consumption) and real losses (system leakage and storage tank overflows) to attain a more accurate estimate of water that is not billed to customers. Regardless of the terminology, the amount of non-revenue water noted in this report does suggest that further investigation and remedial actions should be pursued to address the unquantifiable losses apparent in Perry Park including flushing losses, customer meter inaccuracies and system leaks and breaks.

The metered water usage for both residential and commercial users was 120.0 MG in 2020, 108.1 MG in 2021, 103.6 MG in 2022, 91.8 MG in 2023, and 97.5 MG from January through November of 2024. The current average daily water usage is 290,114 gallons per day (gpd). This results in a calculated per capita water use value of 80 gallons per capita per day (gpcd).

Water sales and production data is used for future water demand projections. The average per capita water sales between 2020 to November 2024 was 80 gpcd. The average unaccounted-for-water within the system was 35% and is expected to continue into the future at a similar rate. That figure is used in this study for water use projections. The maximum month water production

from the wells occurred in July 2024 with 24.1 million gallons of supply. This represents a maximum month factor of 165% of average day demand. Maximum day demand conditions occur during the summertime when conditions are dry and outdoor water usage is elevated. Based on the maximum month demand factor of 165%, the maximum day peaking factor is estimated at 250% of average day demand. The highest demand condition that stresses a system the most is that of a peak hour demand which occurs typically for a short period of time during the maximum day demand condition. Typical peak hour demand factors for a community of this size range from 3.0 to 4.0 times the average day demand. For the purpose of this evaluation, a peak hour demand of 350% of average day has been selected as being representative of this condition.

The following table is a summary of the baseline water use parameters used in this report for the PPWSD's water system in projecting future water demand conditions.

TABLE 7
PERRY PARK WATER AND SANITATION DISTRICT
BASELINE WATER USE PARAMETERS

Parameter	Value
Average daily water supply, gpd	446,218
Average daily water sales, gpd	290,114
Unaccounted-for-water, %	35.0%
Maximum monthly water usage, %	165%
Maximum daily water usage, %	250%
Peak hour water usage, %	350%
Service area population, 2024	3,641
Per capita water production, gpcd	123
Per capita water sales, gpcd	80

A. WEST PERRY PARK FUTURE DEMANDS

Using the baseline water use parameters provided in the previous table, along with population projections for the West Perry Park service area, the existing and future water demand requirements for the Glen Grove WTP can be determined. Currently West Perry Park has 884 customers. Applying the average household size of 2.34 people per household results in an estimated service population of approximately 2,069 people. A conservative annual growth rate of 1.26%, as determined in the earlier population projection section, was applied and projected out to 2045.

TABLE 8
PERRY PARK WATER AND SANITATION DISTRICT
WEST PERRY PARK POPULATION PROJECTIONS

Year	West Perry Park Water Taps	West Perry Park Water Service Area Population
2024	884	2,069
2025	895	2,095
2030	953	2,230
2035	1,015	2,374
2040	1,080	2,527
2045	1,150	2,691

To estimate water demands, the projected population values were multiplied by the baseline per capita water sales, 80 gallons per capita day (gpcd). An additional 35% was then applied to account for system water loss, resulting in the total projected water demands. Although the goal would be to reduce the water loss in the future, a conservative approach has been taken to continue to account for water loss at the current rate of 35%. These values allow the existing and future water production demands for West Perry Park to be projected and summarized. The estimated existing and future water production demands for West Perry Park are presented in the following table.

TABLE 9
PERRY PARK WATER AND SANITATION DISTRICT
EXISTING AND PROJECTED WELL PRODUCTION DEMANDS
WEST PERRY PARK

Condition	Service Population ¹⁾	Average Day Demand ²⁾ , gpd	Maximum Day Demand ³⁾ , gpd	Peak Hour Demand ⁴⁾ , gpm
Existing - 2024	2,069	222,531	556,327	541
Future - 2025	2,095	225,287	563,217	548
Future - 2030	2,230	239,842	599,605	583
Future - 2035	2,374	255,338	638,344	621
Future - 2040	2,527	271,835	679,586	661
Future - 2045	2,691	289,397	723,493	703

1) From table 8

2) Average day demand = gpcd delivered x population x (1 plus water loss).

3) Maximum day demand at 250% of average day demand.

4) Peak hour demand at 300% of average day demand, divided by 1,440.

Future average day demand and maximum day demand conditions, as shown in the table above, are compared against PPWSD's available water rights, the Glen Grove WTP treatment capacity, and the East-West pipeline capacity in the following section of this report. The analysis is performed separately for both East and West Perry Park to assess the District's needs to be able to operate West Perry Park independently from East Perry Park.

There is a discrepancy between the projected water demands presented in the previous 2022 Glen Grove WTP Technical Memorandum and those in this CIP report, as the Technical Memorandum relied on water demands from the 2014 water model update. As the 2014 water model data is dated, the projections in this report are considered more accurate because they are based on current water production and sales data.

B. EAST PERRY PARK FUTURE LOADINGS

Existing and future water production demands were estimated the same way for East Perry Park as they were for West Perry Park. Currently, East Perry Park has 672 customers, which when multiplied by the average household size of 2.34 people per household, the current service population is 1,572 people. Population growth was projected through 2045 using an annual increase of 1.26%, with the resulting values summarized in the following table.

TABLE 10
PERRY PARK WATER AND SANITATION DISTRICT
EAST PERRY PARK POPULATION PROJECTIONS

Year	East Perry Park Water Taps	East Perry Park Water Service Area Population
2024	672	1,572
2025	680	1,592
2030	724	1,695
2035	771	1,805
2040	821	1,921
2045	874	2,045

Projected water production demands were than calculated by applying the per capita water sales rate of 80 gpcd to the forecasted population. To account for distribution system deficiencies, an additional 35% demand was included for water loss, as previously explained. This approach provides both the existing and projected production demands for East Perry Park which are presented in the table below.

TABLE 11
PERRY PARK WATER AND SANITATION DISTRICT
EXISTING AND PROJECTED WELL PRODUCTION DEMANDS
EAST PERRY PARK

Condition	Service Population ¹⁾	Average Day Demand ²⁾ , gpd	Maximum Day Demand ³⁾ , gpd	Peak Hour Demand ⁴⁾ , gpm
Existing - 2024	1,572	169,076	422,690	411
Future - 2025	1,592	171,259	428,147	416
Future - 2030	1,695	182,323	455,808	443
Future - 2035	1,805	194,103	485,257	472
Future - 2040	1,921	206,643	516,609	502
Future - 2045	2,045	219,994	549,986	535

1) From table 10

2) Average day demand = gpcd delivered x population x (1 plus water loss).

3) Maximum day demand at 250% of average day demand.

4) Peak hour demand at 300% of average day demand, divided by 1,440.

In the following section of this report, the average day and maximum day demand conditions from the above table are used to evaluate PPWSD's available water rights and the Sageport WTP.

SECTION VI

EVALUATION OF EXISTING WATER FACILITIES

In evaluating the overall condition and adequacy of the existing water system, the elements described in the Existing Water System section were reviewed and assessed. PPWSD's water system is an independent system with its own water supply, treatment, storage, distribution and metering components. This section reviews the capacity and condition of these components as well as historical water quality. Recommended water system improvements to the District's facilities are then drawn from this review.

A. WELLS

The District derives its water supply from groundwater sources. PPWSD actively pumps water from three shallow alluvial wells and four deep non-tributary wells. The shallow alluvial wells are located along West Plum Creek in West Perry Park and serve as source water for the Glen Grove WTP. The three active alluvial wells are the Grant Ditch Well, Glen Grove Well, and West Plum No. 2 Well. The West Plum No. 1 Well has not been used for the last five years, at least, because it produces water with a very high concentration of iron which poses treatability issues at the Glen Grove WTP. Water rights for the District's alluvial wells have been decreed in Division 1 Water Court, Case No. 89CW225. The combined average annual amount of groundwater to be appropriated by the above-listed wells and four (4) other alluvial wells that were never constructed was decreed to not exceed 1,600 acre-feet.

The deep non-tributary wells draw from the Denver and Arapahoe aquifers in East Perry Park and serve as source water for the Sageport WTP. The four deep wells are Arapahoe No. 2, Arapahoe No. 3, Arapahoe No. 4, and Denver No. 4 wells. PPWSD is currently constructing a new well in East Perry Park, northwest of the Sageport WTP, known as the Poncho Road Well. In addition to the four active wells, PPWSD also operates two other non-tributary wells that are not currently used for potable service due to water quality issues. Water rights for the Arapahoe aquifer wells have been decreed in Division 1 Water Court, Case No. 81CW308. The decreed maximum annual withdrawal for PPWSD's Arapahoe aquifer wells is 1,118 acre-feet. Water rights for the Denver aquifer wells have been decreed

in Division 1 Water Court, Case No. 82CW181. The decreed maximum annual withdrawal for PPWSD's Denver aquifer wells is 1,844 acre-feet.

TABLE 12
PERRY PARK WATER AND SANITATION DISTRICT
EXISTING WATER SUPPLY WELLS

Well	Current Capacity (gpm)	Design Capacity (gpm)	Pumping Limits (gpm)	Annual Limits	Status	Comments
Glen Grove	100	175	400	1600 ac-ft/yr ¹⁾	Online	Large capacity available
Grant Ditch	65	175	150	1600 ac-ft/yr ¹⁾	Online	Underutilized
West Plum No. 1	0	175	400	1600 ac-ft/yr ¹⁾	Offline	Offline due to high iron concentrations
West Plum No. 2	100	125	448	1600 ac-ft/yr ¹⁾	Online	Large capacity available
Arapahoe No. 2	170	250	184	295 ac-ft/yr	Online	Near permit limit
Arapahoe No. 3	200	250	350	301 ac-ft/yr	Online	Moderate utilization
Arapahoe No. 4	195	350	197	320 ac-ft/yr	Online	Near permit limit
Denver No. 4	280	300	350	564 ac-ft/yr	Online	Near design capacity
Poncho Road Arapahoe Well	120	Unknown	350	301 ac-ft/yr	Under Construction	

1) Combined maximum annual withdrawal limit of 1600 acre-feet per year.

The system can currently draw approximately 1,230 gallons per minute (gpm), which exceeds the combined future required maximum day flow rate of 888 gpm, as listed in the projected demand tables for both East and West Perry Park in Section V. The District's water storage tanks are designed to handle peak hour demand, helping to ensure adequate supply during high-usage periods. The table above summarizes current and design capacities, as well as pumping and annual withdrawal limits, providing a basis to assess where existing capacity may be optimized and where upgrades might be needed. The following table summarizes the existing wells, their current flows to the WTP they serve, and the rated capacity of the WTPs.

TABLE 13
PERRY PARK WATER AND SANITATION DISTRICT
EXISTING WELL PRODUCTION AND WTP SERVED

Well	Current Capacity, gpm	Receiving WTP	Total Well Contribution, gpd	WTP Rated Capacity, gpd
Glen Grove	100	Glen Grove WTP	381,600	201,600
Grant Ditch	65			
West Plum No. 1	0			
West Plum No. 2	100			
Arapahoe No. 2	170	Sageport WTP	1,389,600	1,188,000
Arapahoe No. 3	200			
Arapahoe No. 4	195			
Denver No. 4	280			
Poncho Road Arapahoe Well	120			

Glen Grove, West Plum No. 2, and Arapahoe No. 3 are operating well below their permitted capacities, offering near-term opportunities to increase water production, redistribute production and reduce stress on higher-performing sources. Optimizing flow from these underutilized wells through pump adjustments or control system recalibration could help balance output more efficiently across the system. At the same time, Grant Ditch is operating at approximately 43% of its pumping limits and 37% of its design capacity. The utilization levels suggest that targeted rehabilitation or maintenance may help improve output by addressing potential declines in well efficiency or mechanical wear.

In contrast, Arapahoe No. 2 and Arapahoe No. 4 are currently operating near their permitted flow limits. While both are reliable contributors to the system, their use should continue to be carefully managed to avoid over-pumping. Flow monitoring and control enhancements recently completed as part of the Sageport WTP automation project will assist with the control and monitoring of these wells to ensure they operate within regulatory thresholds, especially during peak demand periods. At the same time, Arapahoe No. 3 is moderately utilized and may benefit from targeted rehabilitation or maintenance to improve its output, restoring capacity that may have declined due to mechanical wear or well efficiency losses. Although the gained capacity would be oriented toward peak demand periods as continual pumping above the current capacity all year could surpass the annual withdrawal limit. Denver No.

4 could be upgraded in the future to boost its capacity on a daily basis as its annual limit would allow for additional continual daily use.

West Plum No. 1, although offline due to high iron concentrations, remains a potential source of supply and could be reactivated in the future if water quality improves or appropriate treatment measures are implemented at the Glen Grove WTP. However, reactivation is not currently required, as the existing wells in operation have sufficient capacity to meet current demand. If West Perry Park were to operate independently from East Perry Park and rely solely on its shallow alluvial wells, the three active wells could be upgraded to their permitted capacities, which are expected to be adequate to meet the projected water system flows.

The District has long-term plans to construct a new water treatment plant in West Perry Park to replace the current Glen Grove WTP, which currently lacks the capacity to serve the area. The new WTP is intended to operate independently from the Sageport WTP, at which point West Perry Park will depend on the Glen Grove WTP and the production capacity of its local shallow alluvial wells. However, the existing wells in West Perry Park do not currently produce sufficient volume to meet future projected demands for the West Perry Park WTP. Presently, the shallow alluvial wells yield approximately 265 gallons per minute, while the Glen Grove WTP has a rated capacity of 142 gpm. The water demand for West Perry Park can be estimated based on the number of water taps, an average household size of 2.34 people, a per capita usage of 80 gallons per day, and a water loss of 35%. Based on these values, the average day water demand for West Perry Park is approximately 155 gpm, and the maximum day water demand is 388 gpm.

To address this, focus should be placed on maximizing output from the shallow alluvial wells that are already online: Glen Grove, Grant Ditch, and West Plum No. 2. All three have significant available capacity within their permitted limits. Upgrading pumping infrastructure and optimizing performance at these wells could enable the District to meet projected West Perry Park demands through 2045. While only two of these wells need to be upgraded to meet the project demand within the 20-year planning period, upgrading the third well would provide operational redundancy and additional reliability. Once Glen Grove WTP is fully supplying West Perry Park, the District's deep non-tributary wells are expected to be capable of supporting additional East Perry Park demands through 2045 and beyond.

As part of long-term system planning, the District should also account for the replacement of aging well equipment nearing the end of its service life. Pumps, electrical panels, and control systems at many well sites have exceeded or will approach their expected lifespans within the 20-year planning period from 2025 through 2045. Proactive replacement of these components will help maintain operational reliability.

To further extend available supply and reduce the need for new sources, the District should prioritize reducing system water loss, which is currently estimated at 35%. While a portion of this loss is attributed to backwash processes at the treatment plants, aging infrastructure and outdated metering technology likely contribute as well. The existing customer meters are older, manual read units. These meters may be inaccurate or unreliable, resulting in unaccounted-for water and reduced revenue recovery. Upgrading to automated meters would improve measurement accuracy, reduce staff time spent on meter reading, and help detect leaks in customer service lines or abnormal usage patterns. A comprehensive water loss study would be able to accurately quantify and locate losses within the system and guide targeted infrastructure improvements. Reducing any system losses will directly translate into more water available for customer use without requiring additional production.

To support the above recommendations, enhancing monitoring and control infrastructure across the system is also advised. Real-time flow tracking and integrated automation would provide greater flexibility, improve compliance with permit limits, and support informed decision-making regarding flow allocation and future infrastructure investments.

A final note on the PPWSD wells is that per- and polyfluoroalkyl substances (PFAS) are becoming more prevalent and will be a treatment issue in the future if source wells contain these constituents. PFAS are a large group of synthetic chemicals used in a wide range of consumer and industrial products. They are known for their ability to resist heat, oil, stains, grease, and water; and are found in many everyday items, including nonstick cookware, waterproof clothing, stain-resistant fabrics and carpets, food packaging, cosmetics, and firefighting foams. PFAS are often referred to as "forever chemicals" because they do not break down easily in the environment and can persist for many years. Based on recent information, PFAS are less likely in deep aquifer wells, but more often observed in shallow wells. As of the writing of this report, PFAS have not been detected in any source wells

used in PPWSD. Therefore, no capital improvements are planned to address or treat PFAS contamination. However, should PFAS be detected in any wells in the future, remedial steps will need to be taken swiftly to mitigate the issue. Should future monitoring indicate a potential issue with PFAS in any source wells, immediate planning should be taken and updates to this CIP should be made in order for the PPWSD to prepare for addressing such a situation.

B. SAGEPORT WATER TREATMENT PLANT

The Sageport WTP receives water from four active deep groundwater wells operated by PPWSD. The plant was originally constructed in the late 1960s or early 1970s with the primary goal of removing iron and manganese from the water. The treatment process currently includes chemical oxidation with chlorine and potassium permanganate to oxidize the iron and manganese, followed by clarification through an upflow contact clarifier and filtration through gravity greensand filters. After filtration, chlorine is added again for disinfection, and the treated water is stored in a below-grade clearwell before entering the distribution system.

Since its original construction, the plant has undergone several expansions. Initially, two package gravity filters with upflow clarifiers were installed with a capacity of 144,000 gpd. In 1999, two additional filters, 3 and 4, were added to increase capacity to 432,000 gpd. The treatment plant underwent a major expansion in 2002, when the building was enlarged and filters 5 and 6 were added increasing the capacity to 936,00 gpd. The most recent upgrade occurred in 2020 with the addition of filter 7, increasing the total treatment capacity to 1,188,000 gpd. In combination with production from Glen Grove WTP, both WTPs are sufficient to meet projected future demands for both East and West Perry Park beyond 2045. This upgrade project also included system rehabilitation including the inspection and replacement of older piping, media reconditioning, as well as controls and electrical upgrades. PPWSD now refers to the portion of the building built in 2002 as the “new side,” while the original section is referred to as the “old side.”

To maintain long-term reliability of the Sageport WTP, several components can be scheduled for replacement according to expected lifespans. Components such as the Greensand filter media, float switches, probe level sensors, chemical feed metering pumps,

blowers, pumps, and the epoxy coatings for the gravity filter units have exceeded or will approach their expected lifespans within the 20 year review period from 2025 through 2045. Implementing a proactive replacement schedule for these assets will help extend the life and reliability of the WTP.

It is also noted that the Sageport WTP is in the process of planning and constructing improvements to provide radium removal capabilities. Due to elevated radium levels recently detected, the facility will undergo upgrades for the new treatment process. Based on information provided by PPWSD, the upgrades are new capabilities for the WTP and will not increase the treatment capacity or output currently provided by the 7 filter units. Although this project is in progress, it will be considered in the capital improvements recommended for the Sageport WWTP.

C. GLEN GROVE WATER TREATMENT PLANT

As stated previously, the Glen Grove WTP has a rated capacity of 142 gpm, or 201,600 gpd. The water demand for West Perry Park can be estimated based on the number of water taps, an average household size of 2.34 people, a per capita usage of 80 gallons per day, and an unaccounted for water loss of 35%. Using these values, the average day water demand for West Perry Park is approximately 222,531 gpd, or 155 gpm, and the maximum day water demand is 556,327 gpd, or 388 gpm. Therefore, the Glen Grove WTP does not have sufficient treatment capacity to meet the projected water demands in the western portion of the water system on its own. As a result, supplemental potable water flows are currently provided by the eastern service area's Sageport WTP, which bridges the gap between water demand and the limited production capacity of the western service area. A goal of the PPWSD is to maximize the use of the alluvial wells feeding the Glen Grove WTP. The District also desires for the western portion of its water system to be self-sufficient and no longer reliant on supplemental flows from the Sageport WTP. A new water treatment facility with adequate treatment capacity to meet current and future water demands in the western portion of the water system is recommended.

Assuming the historical rate of service connections added to West Perry Park continues, a 0.75 MGD water treatment facility is needed to meet maximum day water demands in the year 2045. With the proposed new Glen Grove WTP in operation, the portion of Sageport

WTP capacity which would typically be allocated to West Perry Park would become available for use in East Perry Park. Under current demand projections, the combined usage of the Sageport WTP and the existing Glen Grove WTP are expected to support both East and West Perry Park through 2045 and a few years beyond. To prevent overextension of either facility and avoid the need for premature expansion, the District should plan to revisit the review of the new Glen Grove WTP in 2045. As a placeholder for that review, the cost of the Glen Grove WTP expansion has been included in the CIP Cost Summary Matrix in year 2045. It is noted that this cost was taken from the 2022 report which applied to a 1.0 MGD facility. That cost was projected to a 2025 value for use in this report as the 0.75 MGD expansion cost, knowing it is an estimate and used as a placeholder for planning purposes. The following table shows combined projected water demands for East and West Perry Park and the combined production capacity of the Glen Grove and Sageport WTPs.

TABLE 14
PERRY PARK WATER AND SANITATION DISTRICT
PROJECTED PRODUCTION DEMAND AND WTP CAPACITY
ENTIRE DISTRICT

Condition	Service Population ¹⁾	Average Day Demand ²⁾ , gpd	Maximum Day Demand ³⁾ , gpd	Combined Sageport and Glen Grove Rated Capacity, gpd ⁴⁾
Existing - 2024	3,641	393,228	983,070	1,392,480
Future - 2025	3,687	398,187	995,468	1,392,480
Future - 2030	3,925	423,913	1,059,783	1,392,480
Future - 2035	4,179	451,301	1,128,253	1,392,480
Future - 2040	4,449	480,459	1,201,147	1,392,480
Future - 2045	4,736	511,500	1,278,750	1,392,480

1) From table 8 plus table 10

2) Average day demand = gpcd delivered x population x (1 plus water loss).

3) Maximum day demand at 250% of average day demand.

4) Rated capacity in gpd = rated capacity in gpm x 1440

The proposed water treatment plant would follow a similar treatment process to the existing Glen Grove WTP. Raw water would flow from the three active alluvial wells to a below-grade raw water tank. Water would be pumped from the tank and dosed with chlorine solution and coagulant aid polymer before flowing through a static mixer for chemical blending. The coagulant and chlorine solution would act to oxidize and precipitate dissolved iron and manganese out of solution. Next, water would flow to two filtration units. Floor space will be available for a future third filter/clarifier unit. Filter effluent would be dosed with

polyphosphate for corrosion control and chlorine solution for disinfection. Water would then flow through a new contact tank and continue to the existing contact tank for additional contact time before flowing to a new clearwell and being pumped to the distribution system.

The proposed dimensions of the raw water tank are estimated at 18 feet wide, 20 feet long, and 8 feet deep. This corresponds to a volume of 21,000 gallons and should provide approximately 34 minutes of residence time at the design flow of 700 gpm. The backwash recycle tank is estimated at 21 feet in both width and length, and 8 feet in height, corresponding to a volume of 26,389 gallons. This tank would be capable of receiving the total flow volumes of two filter backwashes. The proposed contact tank and clearwell has estimated dimensions that are identical to the existing contact tank at 24 feet wide, 20 feet long, and 8 feet in height. Disinfection contact is required to achieve a 3.0-log giardia inactivation less a 2.0-log credit for direct filtration. Using a 1.0 mg/L residual chlorine concentration, the required baffled contact volume at 1.0 MGD is 98,000 gallons in the winter. Approximately 35,000 gallons of baffled contact volume is available within the existing WTP. If the existing contact volume is used, a new contact tank measuring 25 feet wide by 25 feet long by 8 feet deep is proposed. A clearwell of approximately 21,000 gallons is also needed. The new contact tank and clearwell would be plumbed in series with the existing contact tank for a total of 98 minutes of residence time at design flow.

D. PRESSURE REDUCING VAULTS

The PPWSD has several pressure reducing valve (PRV) vaults located throughout their water system as described in previous sections and summarized in the following table. The majority of the PRV vaults are located in East Perry Park, with only two located in West Perry Park. Each PRV location contains two separate PRV valves in parallel. Under normal conditions, service is provided through the smaller PRV. The larger PRV provides for additional flow during high-demand periods or fire flow events.

TABLE 15
PERRY PARK WATER AND SANITATION DISTRICT
EXISTING PRESSURE REDUCING VALVES (PRV)

Name	Low Flow (in.)	High Flow (in.)	Elevation (ft)	Pressure Setting (psi)
Independence	2.5	6	6696	130-135
Tenderfoot	1.5	6	6845	78-86
Poncha	2.5	6	6752	95-100
Silverheels	1.5	6	6806	77-82
Quartz Mountain	1.5	8	6844	65-75
East-West	3.0	8	6446	140-150
Pike Circle	2.0	8	6643	75-82

Each PRV is designed to manage both low and high flow scenarios. The low flow settings (1.5 to 3 inches) are intended for regular water demand, while the high flow settings (6 to 8 inches) are critical for handling fire flow situations or other high-demand scenarios. The pressure settings are well-calibrated to the respective elevations, ensuring that each PRV can effectively maintain system pressure across a wide range of flow demands. With these pressure and flow capacities, the PRVs are sufficient to maintain safe and efficient system operation under varying conditions.

Two of the existing pressure relief vaults are in need of rehabilitation, as the internal piping and valves are in poor condition. However, the concrete vault structures themselves are in good condition, and it may be feasible to replace the internal components without full replacement of the entire station. Additionally, PRV valves typically have a service life of 10 to 15 years and should be replaced on a routine maintenance and replacement schedule to ensure continued functionality. While these replacements should be tracked as part of the District's asset management program, they do not currently warrant inclusion in the capital improvement plan (CIP) as the maintenance replacement cost of a PRV can typically be covered under maintenance budgeting and is not large enough to warrant a separate budget line item as a capital expense.

E. FOX WAY/PIKE DRIVE BOOSTER PUMP STATION

The booster pump station located at the intersection of Fox Way and Pike Drive operates

out of an 18-foot by 18-foot building and houses two 175 GPM Goulds pumps. Only one pump is active at any given time, with the second serving as a manual backup. This configuration provides a maximum capacity of 252,000 gallons per day when running a single pump, which would take roughly 43 hours to fill the 450,000-gallon Hog John water storage tanks. This suggests the system is designed to keep up with average daily demand rather than rapid tank refill, relying on storage to buffer peak usage. It is recommended to install a standby backup generator in case of power shut downs to preserve the water supply through the booster station.

Downstream of the pumps, three parallel 4-inch lines each equipped with a pressure-reducing valve (PRV) and a micro switch appear to regulate flow, either toward the storage tanks or into a lower-pressure service zone. The PRVs are on the discharge side of the booster station feeding the tanks to protect against over-pressurization or manage pressure transitions. While each 4-inch PRV is capable of handling significant flow (typically up to 500 GPM depending on model and pressure conditions), the fact that only one pump operates at a time at 175 GPM indicates the three valves likely provide redundancy or staged operation.

Due to the expected lifespan of mechanical and electrical components, the pumps and associated controls should be scheduled for replacement within the 20-year planning period from 2025 through 2045. Incorporating this replacement into the District's asset management plan will help ensure continued reliability of the booster station.

F. WATER STORAGE TANK

The PPWSD owns and operates five potable water storage tanks at three different locations with a combined storage capacity of 2,083,000 gallons. In West Perry Park, there are two tank sites—the Echo Hills and Hog John locations—each containing two water storage tanks. This setup provides a level of redundancy, enabling one tank to be taken offline for maintenance or repairs while the other continues to supply water. East Perry Park is served by a single water storage tank, known as the School House tank. The following table lists each existing storage tank along with its construction material, dimensions, empty hydraulic grade line, and storage capacity.

TABLE 16
PERRY PARK WATER AND SANITATION DISTRICT
EXISTING TANKS

Tank Name	Material	Diameter (ft)	Height (ft)	HGL Empty	Volume (gal)
Hog John Tank No. 1	Steel	36	40	7063	300,000
Hog John Tank No. 2	Steel	26	40	7063	150,000
Echo Hills Tank No. 1	Concrete	53	28	6748	500,000
Echo Hills Tank No. 2	Steel	45	28	6748	333,000
School House Tank	Steel	63	32	7031	800,000

In evaluating the District's storage tank requirements, it is necessary to evaluate demands within the system to determine the reasonable amount of storage required. Although East and West Perry Park are currently connected by a single line supplying treated water to West Perry Park, it is still necessary to evaluate each area separately. West Perry Park has four storage tanks and East Perry Park has a single storage tank, resulting in different hydraulic conditions, storage capacities, and potential operational constraints that should be considered individually. Distribution storage serves several purposes. Total storage needs must be evaluated with consideration given to each individual storage component. The three primary purposes of water storage are:

1. Equalization storage to meet hourly variations in water system demands.
2. Fire storage to store water for firefighting.
3. Emergency storage to provide a reserve supply for emergency use.

1. East Perry Park Storage Requirements

The first of these factors is the equalization of daily flow. Instantaneous demands placed on a water system are not uniform throughout any given day. The system must be able to supply the peak demands that occur on an hourly basis throughout the day. Water storage is a means whereby the equalization of these heightened demands can be obtained without placing the demand directly on the supply source. Equalization storage typically ranges from 15% to 30% of maximum daily demand. This factor has an inverse relationship to the size of the customer base, so the fewer customers you have, the more erratic water use tends to be. So smaller systems often need closer to 30% of maximum daily demand for equalization. With larger customer bases, the peaks and valleys average out across many users. Since the review of the water storage tanks is being separated by East and West Perry Park, and each part of Perry Park has less than 1,000 customers, a conservative equalization storage factor of 30% of maximum daily demand will be used for the District.

The water demand for East Perry Park can be estimated based on the number of water taps, an average household size of 2.34 people, a per capita usage of 80 gallons per day, a water loss factor of 35%, and a maximum day factor of 250% of the average day water demand. Using these values, the projected 2045 maximum day water demand

for East Perry Park is approximately 549,986 gpd. 30% of the maximum day demand would result in an equalization storage requirement of 164,996 gallons for East Perry Park.

The second component of storage is fire flow. Fire protection within the District is provided by the Larkspur Fire Protection District. The District has historically used 1,000 gpm for its fire flow requirement, which requires a relatively small portion of the overall storage requirement. According to the Insurance Service Office (ISO) guidelines, the needed fire flow for residential areas with structures having a separation of 11-20 feet is 1,000 gpm. For structures with separation greater than 20 feet, the needed fire flow is 750 gpm. In determining the required fire storage component, the needed fire flow is increased by the projected maximum day demand and decreased by the maximum system inflow rate.

Using the same process as above, the projected 2045 maximum day water demand for East Perry Park is approximately 549,986 gpd (383 gpm). The rated capacity for the Sageport WTP, located in East Perry Park is 825 gpm. Using the historic fire flow requirement of 1,000 gpm, adding the maximum day water demand, and subtracting the system inflow rate as determined by the WTP capacities the needed fire flow for East Perry Park is 558 gpm. Needed fire storage volume is a function of the required flow rate and duration. In accordance with ISO guidelines, the available storage should provide two hours of firefighting capacity for non-residential dwellings. Therefore, the fire storage requirement for East Perry Park is 67,013 gallons.

The third factor in sizing storage is an emergency reserve. An emergency supply is that portion of the total storage that is available when the normal supply is interrupted. The quantity of supply for emergency storage depends primarily upon the source of water and method of its delivery. The primary emergency condition would be a power failure. Under this condition, the service area would be supplied directly from the distribution system storage if such storage could provide water on a gravity feed basis. The PPWSD system is dependent on the well pumps for supply, so in the case of a power failure, the wells would not be able to provide water to the system unless there is an emergency generator at the well sites and the WTPs.

The Arapahoe No. 3 well has an emergency standby generator as does the Sageport WTP. The Arapahoe No. 3 well is located in East Perry Park and provides water to the Sageport WTP. The projected 2045 average day water demand for East Perry Park is approximately 219,994 gpd. Since East Perry Park has a well and WTP with emergency generators, they would be able to provide water to East Perry Park during a power failure. The Arapahoe No. 3 well can provide up to 200 gpm (288,000 gpd) at a given time. The Arapahoe No. 3 pumping rate meets the projected 2045 average day demand for East Perry Park, but since there is only one well with a standby generator it is in the District's best interest to account for emergency reserve regardless. Therefore, the required emergency reserve for East Perry Park is 219,994 gallons.

Based on the estimated quantities from the three factors described above, the calculated total future distribution storage requirement for East Perry Park is approximately 452,003 gallons. As stated above, East Perry Park is serviced by the School House Tank, which has a total storage capacity of 800,000 gallons. Therefore, the existing storage tank has sufficient storage capacity to meet the future needs of East Perry Park.

2. West Perry Park Storage Requirements

Using the same process as the East Perry Park water storage calculations above, West Perry Park was also evaluated. The first factor analyzed is the equalization of daily flow. Since the review of the water storage tanks is being separated by East and West Perry Park, and West Perry Park has less than 1,000 customers, a conservative equalization storage factor of 30% of maximum daily demand was used.

The water demand for West Perry Park can be estimated based on the number of water taps, an average household size of 2.34 people, a per capita usage of 80 gallons per day, a water loss factor of 35%, and a maximum day factor of 250% of the average day water demand. Using these values, the projected 2045 maximum day water demand for West Perry Park is approximately 723,493 gpd. 30% of the maximum day demand would result in an equalization storage requirement of 217,048 gallons for West Perry Park.

The second component of storage is fire flow. The District has historically used 1,000 gpm for its fire flow requirement. In determining the required fire storage component, the needed fire flow is increased by the projected maximum day demand and decreased by the maximum system inflow rate.

Using the same process as above, the projected 2045 maximum day water demand for West Perry Park is approximately 723,493 gpd (505 gpm). The rated capacity for the Glen Grove WTP, located in West Perry Park, is 142 gpm. Using the historic fire flow requirement of 1,000 gpm, adding the maximum day water demand, and subtracting the system inflow rate as determined by the WTP capacity the needed fire flow for West Perry Park is 1,363 gpm. The available storage should provide two hours of firefighting capacity for non-residential dwellings. Therefore, the fire storage requirement for West Perry Park is 163,508 gallons.

The third factor in sizing storage is an emergency reserve. The primary emergency condition would be a power failure. The quantity of supply for emergency storage depends primarily upon the source of water and method of its delivery. The PPWSD system is dependent on the well pumps for supply, so in the case of a power failure, the wells would not be able to provide water to the system unless there is an emergency generator at the well sites and the WTPs.

The Glen Grove WTP has emergency standby generators, but the active wells in West Perry Park do not have emergency generators; therefore, the emergency reserve requirement for the tanks in West Perry Park is equal to the projected 2045 average day demand for West Perry Park. As previously mentioned, this can be estimated based on the number of water taps, an average household size of 2.34 people, a per capita usage of 80 gallons per day, and a water loss factor of 35%. The projected 2045 average day water demand for West Perry Park is approximately 289,397 gpd. The required emergency reserve for West Perry Park is 289,397 gallons.

Based on the estimated quantities from the three factors described above, the calculated total future distribution storage requirement for West Perry Park is approximately 669,953 gallons. As stated above, West Perry Park is serviced by the Hog John and Echo Hills tanks, which have a total storage capacity of 1,283,000 gallons. Therefore,

the existing storage tanks have sufficient storage capacity to meet the future needs of West Perry Park District.

To ensure continued reliability, the School House tank and the Hog John tanks will need to be recoated during the 20-year planning period. This will help to maintain structural integrity and protect against corrosion. As required by the Colorado Department of Public Health (CDPHE) current drinking water policies DW012, a periodic storage tank inspection must be done at least twice per year and a comprehensive storage tank inspection must be done at least every five years. The latest comprehensive inspection was conducted on the storage tank in July 2018 by Inland Potable Services, Inc., located in Centennial, Colorado. The inspection reported that the tanks are in fair condition and overall should be cleaned and inspected every three to five years.

The PPWSD SCADA system provides telemetry control between the storage tanks and wells. The District has noted that the SCADA system is beginning to age and the controls are not reading well. Thus, it is recommended the District update components of the SCADA system. As stated above, the School House Tank should be scheduled for recoating. During the field review, the School House Tank was confirmed as needing recoating in the near future.

SECTION VII

WATER SYSTEM CAPITAL IMPROVEMENT NEEDS

The PPWSD water system requires targeted improvements to ensure long-term reliability, efficiency, and regulatory compliance. This section outlines key areas where upgrades are needed and presents recommendations and preliminary costs for capital improvements that will support sustainable system performance through the 20-year planning period from 2025 through 2045. Improvements with an estimated cost of less than \$30,000 were not included in the Capital Improvement Plan (CIP), as they are anticipated to be addressed through routine maintenance. Refer to Appendix C for the Capital Improvements Plan (CIP) Cost Summary Matrix which is a tabulation of all recommended improvement costs estimated for each year in which they are planned over 20-year planning period.

A. WELLS

1. West Perry Park

To enable the new Glen Grove WTP to reliably sustain West Perry Park, the District's three shallow alluvial wells that are currently online, Glen Grove, Grant Ditch, and West Plum No. 2, will need upgrades to operate near their permitted pumping limits. It is recognized that the optimization of the alluvial wells is better suited time wise to be completed in conjunction with the Glen Grove WTP upgrades in order to provide a complete package of source and treatment that can be self-sufficient in supplying West Perry Park. The exception being the prioritization of upgrades to the West Plum No. 2 well due to the collapsed meter pit, which presents an urgent infrastructure issue. In doing so, the recommended well testing can occur prior to this improvement. Even with the Glen Grove WTP expansion able to be extended to 2045, the other two wells are in need of replacement work before then due to equipment age. Therefore, those improvements will be recommended immediately after the West Plum No. 2 work in the hopes of completing their replacements before equipment failures are experienced. While raw water piping in the area may already be adequately sized, existing GIS mapping suggests some ambiguity, as portions of the raw water pipeline appear to connect to the distribution system. Further investigation is recommended to confirm piping layout and sizing.

Well performance testing is also recommended in order to verify the potential production of each of the three alluvial wells. The testing will provide valuable information as to the direction of the upgrades and potential production capacities of each well. Although the third active well is not required to meet projected demands through 2045 if two of the three wells are optimized up to their pumping limit, it should be upgraded within the 20-year planning period. This will provide operational redundancy if the other two wells are optimized, or additional capacity if they are not able to produce at their pumping limits. The reactivation of West Plum No. 1 does not appear necessary, provided the production of the other three alluvial wells will meet the projected demands as described above.

The brief descriptions and cost of upgrading the wells is estimated as follows:

- West Perry Park Wells (2026) – Well Performance Testing - \$72,000
 - The existing West Perry Park Wells should have a step drawdown test and constant rate pump test to determine if the existing well can handle increased water production.
- West Plum No. 2 (2027) - \$282,800
 - Based on the well performance testing, the well could either require upgrades to the existing well site and equipment to increase capacity, or the well may need to be redrilled. This cost is worst case scenario, in case a new redrilled well is needed.
- Grant Ditch (2028) - \$105,000
 - The existing well has an underutilized design capacity of 175 gpm, the plan would be to increase production of the existing well by upgrading it with a new pump installed to produce higher flow rates. Estimated cost for new submersible well pump, drop pipe, valves, and electrical or control wiring updates.
- Glen Grove (2029) - \$254,800
 - Based on the well performance testing, the well could either require upgrades to the existing well site and equipment to increase capacity, or the well may need to be redrilled. This cost is worst case scenario, in case a new redrilled well is needed.

2. East Perry Park

To ensure operational reliability, well pumps and associated electrical and control systems should be replaced approximately every 15 to 20 years. Aging infrastructure can lead to reduced pumping efficiency, increased energy costs, and a higher risk of mechanical failure. As many of the District's well pumps and controls are approaching or have exceeded this typical service life within the 20-year period, replacements are recommended at multiple well sites as part of the Capital Improvement Plan. Since the recent automation upgrade project for the Sageport WTP included VFD replacements and new instrumentation and control panels for the Arapahoe No. 2, Arapahoe No. 3 and Denver No. 4 wells, those items should not require replacement as their expected life span is right at the end of the 20-year planning period. Those same items for the Arapahoe No. 4 well are relatively new; however, their expected life span will require replacement toward the end of the 20-year planning period.

The cost of replacing aging equipment at the East Perry Park wells is generally limited to the pump and motor replacements. While performing those replacements, it would be beneficial to complete a deep cleaning of the wells while the pump and piping is out of the well. As for the drop pipes, the pipe typically last longer than pump equipment so replacement of the drop piping has not been included in the cost estimates. The estimated costs are as follows:

- Arapahoe No. 2 (2034) – \$210,000
- Arapahoe No. 3 (2026) – \$210,000
- Arapahoe No. 4 (2039) – \$324,000
- Denver No. 4 (2034) – \$198,000
- East Perry Park Wells – Well Control Replacement (2045) - \$372,000

B. SAGEPORT WATER TREATMENT PLANT

Many components of the Sageport Water Treatment Plant (WTP) are nearing the end of their typical service life and should generally be replaced every 10 to 20 years depending on equipment type, operational conditions, and maintenance history. These replacements are essential to maintain treatment efficiency, prevent equipment failure, and ensure compliance

with water quality standards. Aging mechanical equipment and systems can impact the performance of the treatment facility. As can aging or obsolete instrumentation and control systems which monitor and manage operations. Over time, these can lead to reduced efficiency, operational reliability and increased maintenance needs. To extend the useful life of the facility and maintain performance, several key capital improvements are recommended over the next 20 years and are summarized below. As the recommended improvements are generally dictated by expected life spans of equipment or manufacturer's replacement intervals, they will occur at various stages over the next 20 years. Therefore, each recommended improvement has an estimated time to perform the improvements.

It is also noted that the Sageport WTP is undergoing an upgrade project to provide radium removal capabilities to the facility. Based on input from PPWSD, that project is underway and expected to be completed in the next couple of years. Estimated costs of that project and approximate timing of the expenses have been included in the CIP Cost Summary Matrix. As the project continues, the CIP can be updated as necessary to track its costs and timeframes.

The brief descriptions and cost of replacing aging equipment at the Sageport WTP is estimated as follows:

- Old Side Equipment Replacement (2029) – \$86,400
 - Improvements include replacing the existing airwash blowers 1 and 2 on the old side of the WTP and the float and probe level sensors with ultrasonic level sensors in filter units 1 through 4.
- Filter Media and Backwash Equipment Replacement (2030) – \$426,000
 - Improvements include replacing the Greensand filter media in all 7 filter units and replacing all four of the existing vertical turbine backwash pumps in the WTP.
- High Service Pump Replacement (2027) – \$150,000
 - Improvements include replacing the three vertical turbine high service pumps on the new side of the WTP.
- Filter Unit Coating (2030) – \$204,000
 - Improvements include sandblasting and epoxy coating filter units 3 through 6. This work is planned to be at the same time as the filter media replacement to save time and cost as the filter media must be removed to complete the recoating of the interior of the filter units. If the work is not performed at the same time as the filter media replacement, additional cost will be incurred to

handle the filter media during recoating.

- Chemical Feed Pump Replacement (2038) – \$46,800
 - Improvements include replacing the four chemical feed metering pumps.

C. GLEN GROVE WATER TREATMENT PLANT

The existing Glen Grove WTP does not have sufficient capacity to meet current and projected water demands for West Perry Park. As a result, water service to this area currently depends on the existing east-west transmission pipeline connecting East and West Perry Park. To improve operational flexibility and system reliability, the District aims to reduce reliance on interconnection and allow each service area to operate more independently. A new 0.75 MGD treatment plant is therefore proposed to serve West Perry Park directly, although the capacity based need for this expansion is not necessary until at least 2045.

To accommodate the new proposed 0.75 MGD water treatment plant, a new 70-foot by 45-foot treatment plant building is proposed near the site of the existing Glen Grove WTP. Two sites were evaluated for the new facility in a 2022 Technical Memo prepared by GMS, Inc. the high level evaluation identified one site located immediately south of the existing Glen Grove WTP and would require the purchase of additional land. The other site identified immediately north of the existing facility, is situated on a parcel already owned by PPWSD. At this time, the south site appears to be the optimal choice for the future WTP to provide better security, more compact operations and less yard piping to accommodate process operations. In addition to the treatment building, the project also includes a new below-grade raw water storage tank, backwash recycle tank, contact tank, and clearwell.

The following are conceptual-level preliminary cost estimates for the new Glen Grove WTP depending on site location, based on the 2022 Technical Memo prepared by GMS, Inc. and then estimating the 2025 value of a 0.75 MGD facility. :

- South Site Glen Grove WTP (used in this Capital Improvement Plan) - \$7,931,000
- North Site Glen Grove WTP - \$8,210,000

D. PRESSURE REDUCING VAULTS

Pressure reducing valve vaults play a critical role in maintaining system pressures with proper

water delivery and protecting water infrastructure. While PRV valves typically have a service life of 10 to 15 years and should be replaced as part of the District's routine maintenance and asset management program, the Tenderfoot and Silverheels PRV vaults have deteriorated to the point of requiring capital improvements. For these two PRVs, the vault structure is in acceptable condition, but the internal piping and valve components are in poor condition. The Independence PRV vault also needs rehabilitation to prevent failure due to the deterioration of the internal components.

The brief description and cost of restoring the existing PRV vaults is estimated as follows:

- Tenderfoot PRV (2027) – \$52,200
 - Improvements include removing and replacing the existing PRV vault as worst-case scenario, including the internal piping and valves.
- Silverheels PRV (2030) – \$52,200
 - Improvements include removing and replacing the existing PRV vault as worst-case scenario, including the internal piping and valves.
- Independence PRV (2032) – \$37,800
 - Improvements include targeted replacement of 2.5-inch copper pipe and both of the existing pressure reducing valves.

E. FOX WAY/PIKE DRIVE BOOSTER PUMP STATION

Some of the components of the Fox Way/Pike Drive Booster Pump Station are nearing the end of their typical service life and should be replaced approximately every 20 years. Aging infrastructure can lead to reduced pumping efficiency, increased energy costs, and a higher risk of mechanical failure. As some of the mechanical and electrical components of the booster pump station are approaching or have exceeded this typical service life within the 20-year planning period, replacements are recommended as part of the Capital Improvement Plan. In addition, the booster station does not have a backup generator to maintain operation under a loss of power. Installing a backup generator is recommended to provide continuous service.

The cost of replacing aging equipment at the booster pump station is estimated as follows:

- Booster Pump Station Controls (2028) – \$426,000
 - Improvements include replacing booster pump station electrical equipment, motor controllers, monitoring and control devices, SCADA and

communication upgrades, and the installation of a new backup generator and transfer switch gear.

- Pump Replacement (2035)– \$102,000
 - Improvements include removing and replacing the two existing 175 gpm vertical turbine pumps.

F. WATER STORAGE TANKS

Regular rehabilitation of steel water storage tanks is essential to prevent corrosion and extend service life. Depending on the coating systems and whether or not a properly functioning cathodic protection system exists, recoating of a tank can typically be expected approximately every 15 to 20 years. Based on the field review of the existing water storage tanks, the School House tank requires sandblasting and recoating of the interior and exterior of the tank. The Hog John site includes two tanks, and minor areas of peeling and surface rust were observed during inspection, indicating the need for sandblasting and recoating within the 20-year planning period of the Capital Improvement Plan. In addition, SCADA system upgrades are recommended for all District storage tanks.

The brief description and cost of restoring the water storage tanks is estimated as follows:

- School House Tank (2030)– \$910,000
 - Improvements include recoating the interior and exterior of the tank and replacing instrumentation and SCADA communication equipment
- Hog John Tanks (2039)– \$658,000
 - Improvements include recoating the interior and exterior of both tanks

G. WATER SYSTEM IMPROVEMENTS

In addition to major capital projects, the District should continue planning for system-wide improvements that support operational efficiency, regulatory compliance, and long-term asset management. One key initiative is to conduct a comprehensive water loss study to accurately quantify and locate losses within the distribution system. Results of this study should guide targeted improvements, which can then be incorporated into future updates of the Capital Improvement Plan. Water distribution system pipeline replacements should also be planned at regular intervals to continually renew older pipe segments for better assurance of

minimizing water loss, reducing pipe leaks and breaks, and maintaining water quality throughout the system. The water loss study can aid in delineating pipeline replacements, as can an asset management system combined with the GIS system to track pipeline characteristics such as age, material, frequency of breaks and number repairs completed. That information can be used to schedule regular, if not annual, pipeline replacement schedules. When that information is gathered and analyzed, pipeline replacement can be added to this CIP for planning and budgeting purposes.

Another recommended improvement is the replacement of existing water meters. The existing customer meters are older, manual read units and may be inaccurate or unreliable, resulting in unaccounted-for water and reduced revenue recovery. Upgrading to Advanced Metering Infrastructure (AMI) can improve data accuracy, streamline billing, support water conservation efforts, and enhance leak detection. The PPWSD has embarked on the initial stages of a meter replacement project. Based on information from PPWSD, the estimated costs associated with the replacement project have been included in the CIP Cost Summary Matrix in years 2026 and 2027. As that project progresses, updates can be made to this CIP.

SECTION VIII EXISTING WASTEWATER SYSTEM

A. BACKGROUND

This Section provides a summary and description of the existing wastewater system facilities. A field review of PPWSD's existing wastewater system infrastructure was undertaken within the course of this study effort. PPWSD has operated and maintained its own wastewater system since the 1970s. Collection system piping ranges in size from 8- to 15-inches in diameter and consists mainly of PVC piping. East and West Perry Park have separate wastewater systems, each with their own WWTF. West Perry Park has two (2) lift stations and wastewater is treated at the Waucondah WWTF before discharging to Bear Creek. East Perry Park has one (1) lift station and wastewater is treated at the Sageport WWTF before discharging to East Plum Creek. The figures on the following pages depict PPWSD's existing wastewater system. Figure 13A shows the West Perry Park Wastewater System and Figure 13B illustrates the East Perry Park Wastewater System. The system maps has been compiled from the District's GIS mapping data. A detailed inventory of the wastewater facilities and their observed condition is provided in Appendix B.

B. LIFT STATIONS

The PPWSD owns and operates three (3) lift stations that convey wastewater from areas where topography prevents gravity flow to the WWTFs. The lift stations generally pump the wastewater collected in there service area up to higher portions of the collection system so that it can be discharged into the collection system and continue by gravity to the respective WWTF. The Bannock and Red Rock lift stations are located in West Perry Park and provide service to the eastern portion of that service area. The Boreas lift station is located in East Perry Park and provides service to the northern ridge in that service area.

1. Bannock Lift Station

The Bannock lift station is located northwest of Kalamath Drive and Bannock Road and provides service to the southeast portion of West Perry Park. Significant improvements were made to the Bannock Lift Station wet well in 2018. The lift station contains a 12.5-

BOREAS LIFT STATION

SAGEPORT WWTF

N

SCALE : 1" = 1,500'

FIGURE 13.DWG

**FIGURE 13B
EAST PERRY PARK
EXISTING WASTEWATER SYSTEM
PPWSD**

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MAP SOURCE: PERRY PARK WATER
AND SANITATION DISTRICT'S GIS MAP

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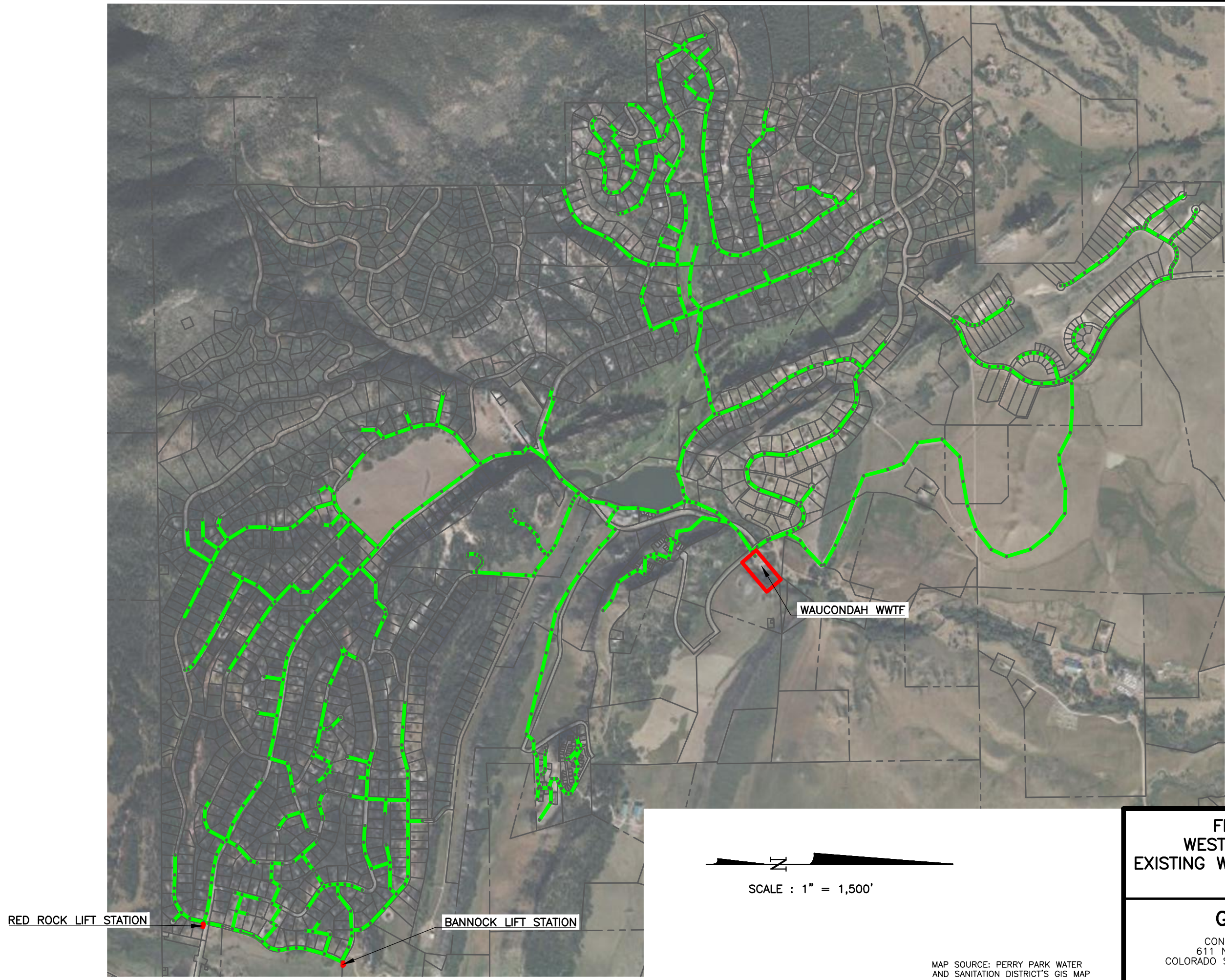


FIGURE 13.DWG

FIGURE 13A
WEST PERRY PARK
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SCALE : 1" = 1,500'

MAP SOURCE: PERRY PARK WATER
AND SANITATION DISTRICT'S GIS MAP

foot deep, 6-foot internal diameter (ID) wet well with an above ground piping enclosure. A screening basket is located on the 8-inch influent pipe. The lift station utilizes two (2) Sulzer ABS submersible sewage pumps that are controlled by float controls. Wastewater collected at the Bannock lift station is pumped south along Bannock Drive where it then gravity flows into the Red Rock lift station.

A temporary bypass structure was installed on the lift station site when improvements were made in 2018. The structure can act as an overflow structure in case of an emergency, but during the field review the structure was observed to be filled with water. The inlet pipe for the wet well has a tee that connects a line to the bypass structure. The force main outlet from the wet well also has a tee that would allow a temporary above-ground piping connection to drain the bypass structure.

An emergency generator is located northeast of the wet well. The diesel-fueled Cummins GenSet generator was installed in 1994 and is 6.5-feet by 2.75-feet and has rated capacity of 50kW. Controls for the wet well and the generator are located southeast of the wet well. Figure 14 shows the general site of the lift station and its components.

2. Red Rock Lift Station

The Red Rock lift station is located at the southeast corner of Bannock Drive and Red Rock Drive and handles wastewater from the southeast portion of West Perry Park. The Red Rock lift station also receives wastewater flow from the Bannock lift station. The wet well measures 16.9 feet deep with a 6-foot ID and is connected to a below grade pump chamber. Four (4) Smith and Loveless pumps are installed in the chamber, with float switches used for level control. Two separate hatches provide access: one above the pumps for equipment removal and one above the stairwell leading to the lower structure. Ventilation within the chamber is supplied by a Greenheck centrifugal exhaust fan.

The site includes an overflow structure that is in good condition located southwest of the wet well. A 10-inch line connects the two structures, enabling excess wastewater to bypass the wet well if water levels rise too high. The overflow structure is 17.3 feet deep with a 6-foot ID.

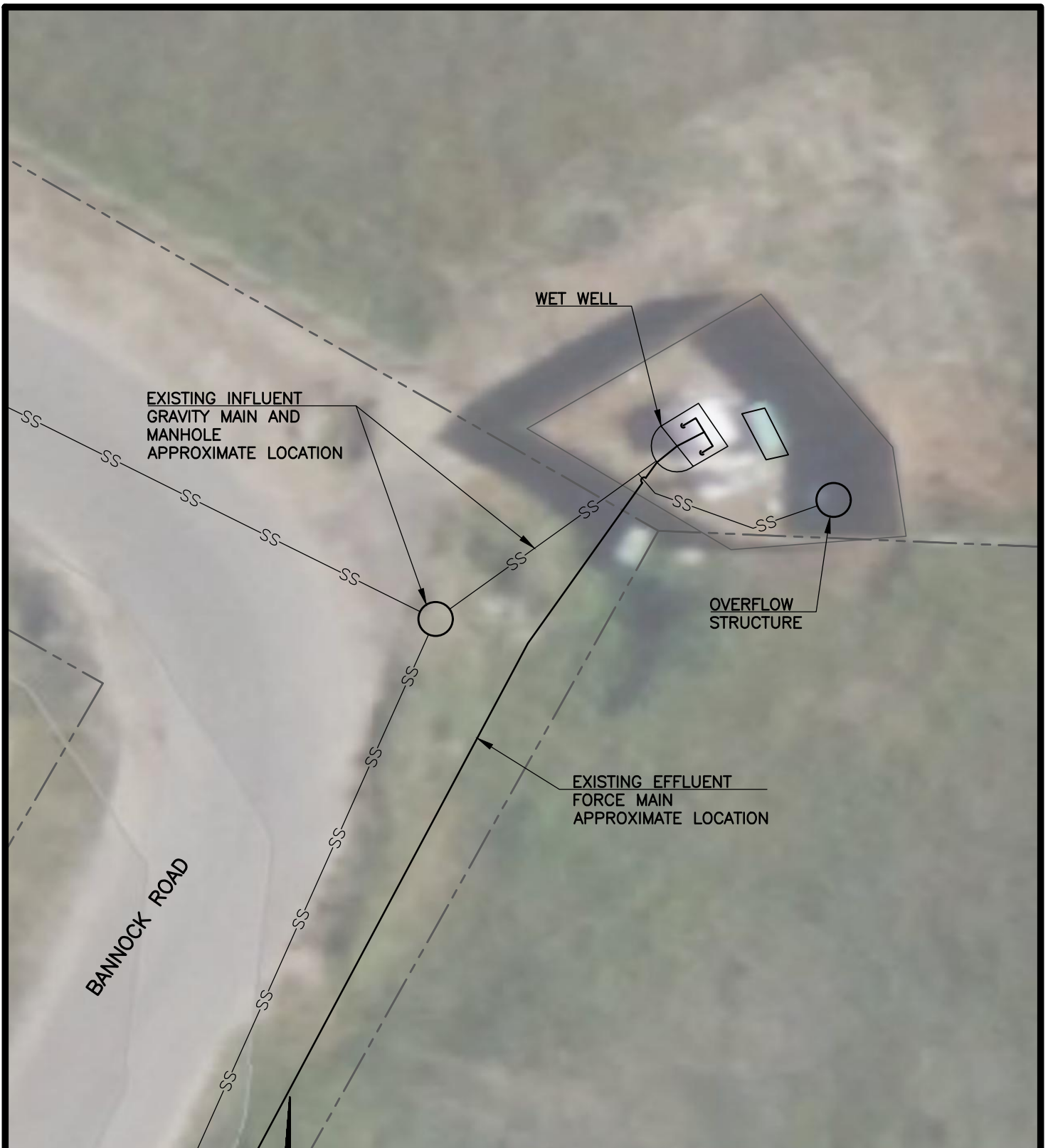


FIGURE 14.DWG

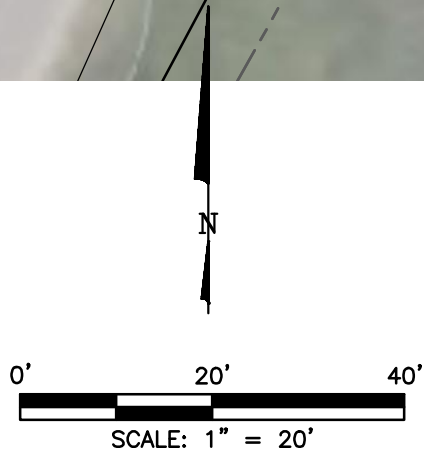


FIGURE 14
BANNOCK SITE PLAN
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Backup power is supplied by a Cummins GenSet diesel generator positioned southeast of the wet well. The generator is rated at 80kW. Controls for the wet well and the generator are located east of the wet well. Figure 15 depicts the general site of the lift station and its components.

3. Boreas Lift Station

The Boreas lift station is located at the north end of Boreas Road, northeast of its intersection with Kenosha Drive and provides service to the northern most portion of East Perry Park. The facility consists of a 17.4-foot-deep, 4-foot ID wet well paired with an above-ground pump and piping enclosure. Two (2) Smith and Loveless pumps operate based on float controls. The enclosure lid was noted to be in deteriorated condition and is in the process of being replaced. Unlike the District's other lift stations, Boreas does not include an overflow structure.

Standby power is provided by a 35kW Onan QuietSite II diesel generator located southwest of the wet well. Controls for the wet well and the generator are located east of the wet well. The lift station also has a rotary phase converter generator that was replaced in 2024. The basic site configuration of the lift station and its components is shown in Figure 16.

C. SAGEPORT WASTEWATER TREATMENT FACILITY

The Sageport WWTF was constructed in 1972 and has undergone multiple upgrades. However, the oldest portions of the facility are now 40 years old. At the Sageport WWTF, there are two rotating biological contactor (RBC) units in series to provide biological treatment downstream of the headworks. A flash mixer and flocculation basin with alum addition were added in 1993 to assist with phosphorous removal after the RBCs. The clarifier that originally operated within the WWTF was abandoned in 2008 when a new clarifier was constructed. The new clarifier now receives treated wastewater that has been



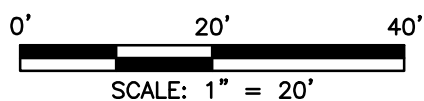
FIGURE 15.DWG

FIGURE 15
RED ROCK SITE PLAN
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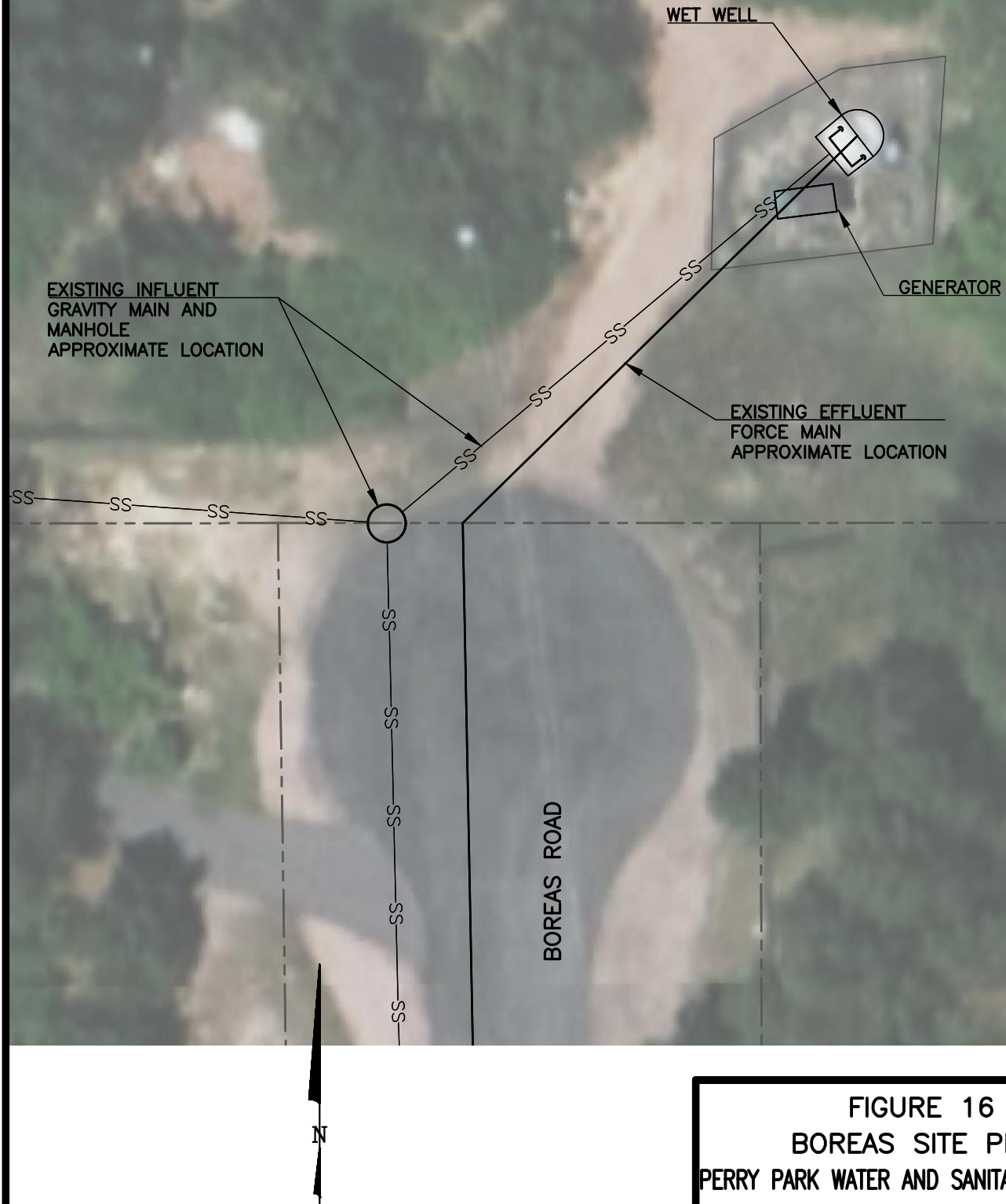


FIGURE 16.DWG

FIGURE 16
BOREAS SITE PLAN
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mixed with alum and achieves co-settling of biological and chemical sludge by gravity separation. Clarified wastewater is directed to the effluent channel for flow measurement by a Parshall flume. It is then disinfected using a UV system before it is discharged to East Plum Creek. Waste sludge from the clarifier is pumped to an aerobic digester for stabilization. Stabilized liquid sludge is pulled directly from the digester and hauled to a land application site by a contract hauler.

The most recent upgrade to the Sageport WWTF occurred in 2019 and included the construction of a new headworks building. This headworks building includes influent flow metering, screening, and grit removal processes. The 2019 upgrade also involved the modification of piping within the original RBC building to allow for easier maintenance and flow monitoring. A schematic of the Sageport WWTF is provided in the following Figure 17.

The following sections describe the main process components of the WWTF:

1. Headworks

The headworks building is where flow monitoring and preliminary treatment occur. Wastewater from the collection system enters the headworks building via a 10-inch pipe. This transitions to an 8-inch Palmer-Bowlus Flume equipped with a Teledyne ISCO ultrasonic flow meter to calculate volumetric flow rate into the plant. Influent wastewater then flows through a Duperon mechanical screen for the removal of rags and other solids. A bypass channel runs parallel to the main channel and may be used if the automatic screen is out of service. The bypass channel is equipped with two manual bar racks in series to accomplish coarse screening during bypass operations.

Grit removal is accomplished by two parallel low-velocity grit channels. The channels include grit sumps at the downstream end, with 90-degree v-notch weir plates at the downstream side of the sumps. After the weir plates, the grit removal channels converge to a single channel. Wastewater subsequently flows through a 10-inch pipe to an equalization storage (EQ) basin. The purpose of the EQ basin is to provide a consistent flow rate and loading to the RBC units. The upstream RBC unit is equipped with feed buckets which draw wastewater received from the EQ basin at a constant rate.

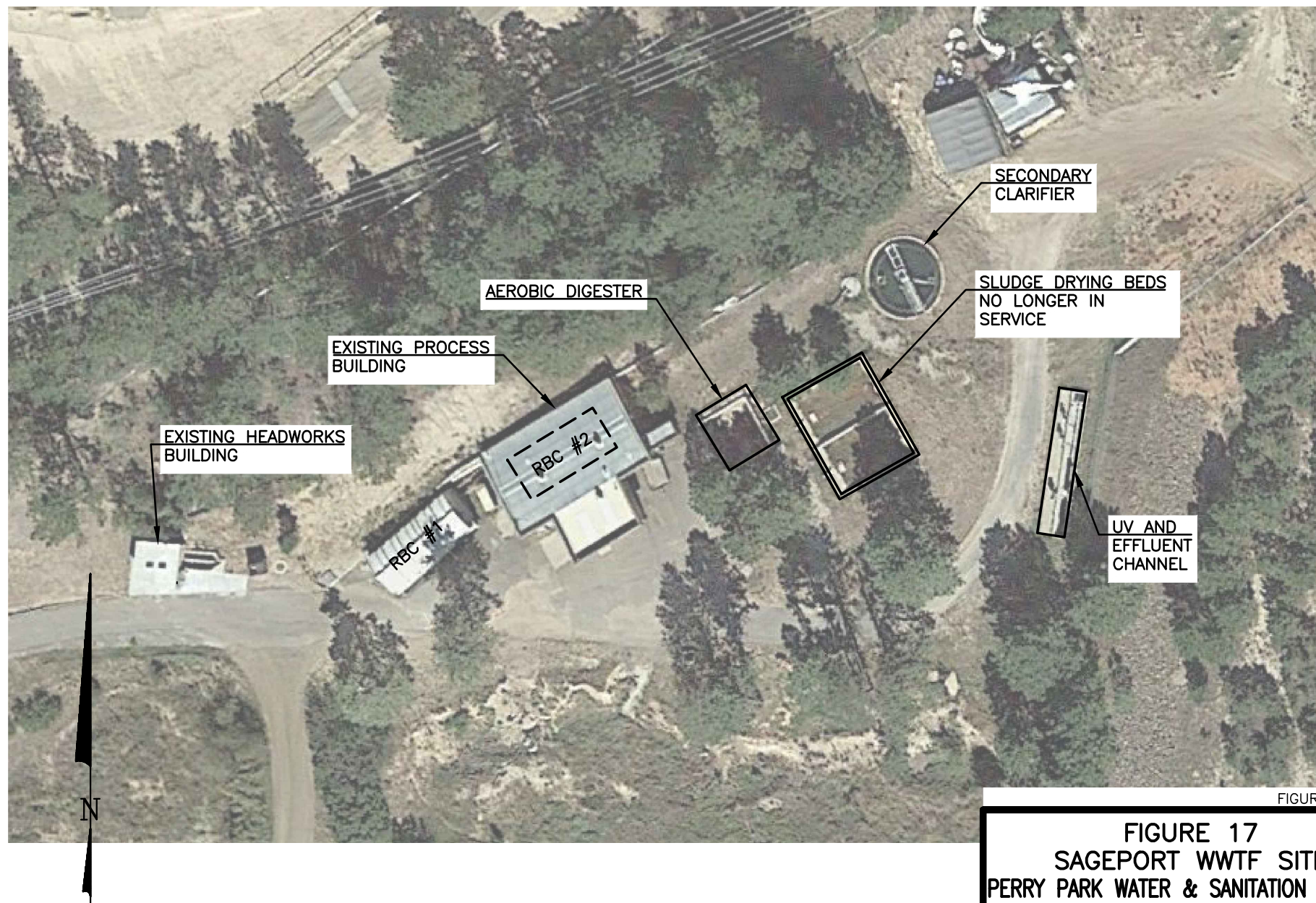


FIGURE 17.DWG

FIGURE 17
SAGEPORT WWTF SITE
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2. Rotating Biological Contactors

The Sageport WWTF treatment train includes two RBC units in series, with four stages per unit and twenty discs per stage. Each disc is 11'-10" in diameter. Wastewater is delivered to the first RBC downstream of the EQ basin. Water that flows over the weir downstream of the first RBC is transported to a separate building and flows into the second RBC. The RBC units are installed in concrete basins measuring 16'-4" wide by 6'-0" high. The concrete basins are equipped with aeration piping to assist with maintaining dissolved oxygen (DO) levels in the basins. Air is supplied to the RBC basins by six universal blowers. Each RBC has its own main drive unit to rotate the discs through the shallow basins of wastewater. RBC #1 and its basin are located separately from the main treatment building. The basin has a fiberglass enclosure encompassing the RBC unit and basin. RBC #2 is located in the main treatment building with its basin integral with other concrete channels and tanks.

3. Phosphorus Control System

A chemical coagulation, flocculation and settling system was added to the WWTF in 1993 for phosphorus removal. Water that has passed through both RBC units first enters a flash mixing tank where aluminum sulfate (alum) is added as a reactant to phosphorus and mixed with the wastewater by a ¼ hp paddle mixer. The alum is housed in the main treatment building, in a room separate from RBC #2. The alum is stored in a 2,000-gallon steel tank and utilizes a Pulsatron electronic metering pump to get the alum from the tank to the flash mixing tank. Wastewater subsequently flows by gravity to a flocculation basin. Polymer is added to the wastewater in one of the open channels of the old clarifier tank in the RBC building before leaving the building. The polymer is stored in a 55-gallon HDPE tank adjacent to the RBC #2 open channels. The polymer tank has a 6 GPD Pulsatron electronic metering pump to get the polymer from the tank to the open channels. Wastewater then flows by gravity through buried piping downstream of the RBC building to the clarifier. Both biological solids in the form of waste activated sludge (WAS) and chemical sludge in the form of phosphorus precipitate are separated in a co-settling process in the secondary clarifier, and phosphorus is removed with the waste sludge.

4. Secondary Clarifier

The original clarifier tank, which is located inside the main treatment building, was abandoned in 2008 when a new clarifier was constructed. Water from the phosphorus removal flocculation basin now flows into the new circular clarifier located outdoors, east of the main treatment building. The new clarifier has a 26-foot inside diameter and a 16-foot side water depth. The clarifier surface area is 530 square feet, and the nominal volume is 8,500 cubic feet (63,580 gallons). The clarifier is equipped with an automatic rake mechanism which directs sludge into a center well for removal and pumping to subsequent sludge treatment at the aerobic digesters. The rake mechanism also directs surface scum to a scum removal well. Clarified effluent from the clarifier flows into an effluent trough. Diversion structures and yard piping direct the treated water to the effluent channel for flow measurement and disinfection.

5. Disinfection

The clarified effluent from the secondary clarifier is received at the effluent channel. The channel contains a flume and ultra-sonic flow meter for flow measurement along with a UV system for disinfection. The disinfection system is a horizontal lamp Trojan UV3000 PTP system. The UV system includes two banks in series in a single channel. Each module contains four lamps. Water level in the UV is controlled by a serpentine weir at the downstream end of the channel. A parallel UV channel has been constructed immediately adjacent to the main channel. This parallel channel is not currently equipped with UV modules and is not currently in use. It is understood that the purpose of this parallel channel is to allow for possible future expansion of the system. A soda ash solution is injected into the treated wastewater to adjust the pH and maintain it within the required range as dictated by the CDPS discharge permit. The soda ash solution is prepared in a 160-gallon steel solution tank located within the main treatment building. The solution is mixed within the tank using a Baldor mixer and has a 12 GPD Pulsatron electronic metering pump.

An effluent flow measurement flume is installed in the channel just upstream of the UV system. It is a Parshall flume with a 3-inch throat width. Downstream of the UV system, treated and disinfected water proceeds to the outfall where it is discharged to East Plum

Creek.

6. Sludge Processing

Solids that settle out in the clarifier and scum from the clarifier are sent to an aerobic digester for processing. A diffused aeration system provide process air the digesters, with the blowers in the main process building supplying the air. After stabilization in the digester, sludge is removed in liquid form and transported to a land application site by a third-party contractor. Two (2) sludge drying beds were constructed when the facility was built in 1972, but are no longer in use. Supernatant from the aerobic digester is pumped to the EQ basin just upstream of the first RBC unit periodically. Typically, the digester aeration system is turned off and supernatant is pumped, just before a load of sludge is hauled off. Sludge is hauled off from the site biweekly.

D. WAUCONDAH WASTEWATER TREATMENT FACILITY

The Waucondah WWTF was constructed in 1970 as a packaged wastewater treatment plant and has since undergone multiple upgrades. At the Waucondah WWTF, there is a primary clarifier with a sludge pump building and then two rotating biological contactor (RBC) units in series to provide biological treatment downstream of the headworks. The flocculation basin was added in 1993 and included the construction of a building for the chemical storage tank to facilitate the phosphorus removal process. The secondary clarifier was constructed in 1980 and receives treated wastewater that has been mixed with alum and achieves co-settling of biological and chemical sludge by gravity separation. Clarified wastewater is directed to the effluent channel, disinfected using a UV system, and measured by a weir before it is discharged to Bear Creek. Waste sludge from the primary and secondary clarifiers is pumped to an aerobic digester for stabilization. Stabilized liquid sludge is pulled directly from the digester and hauled to a land application site by a contract hauler.

The most recent upgrade to the Waucondah WWTF occurred in 2022 and included the replacement of the influent flume manhole which included a new ultrasonic influent flow measurement system, installation of grating over the open channels adjacent to the headworks building, structural repairs to the primary clarifier, and improvements to the effluent channel including the installation of a new weir plate and ultrasonic effluent flow

measurement system . A schematic of the Waucondah WWTF is provided in the following Figure 18.

The following sections describe the main process components of the WWTF:

1. Exterior

Wastewater from the collection system enters a OPENCHANNELFLOW fiberglass packaged meter manhole located on the southwest end of the WWTF via a 15-inch pipe. This transitions to a 3-inch Parshall flume equipped with a TIENet ultrasonic flow meter to calculate volumetric flow rate into the plant. The previous metering assembly was originally installed in 2008, but in 2022 the influent manhole and ultrasonic level sensor was replaced. Influent wastewater then flows to the headworks building where preliminary treatment occurs. A backup generator is also on site. It was originally installed in 1999 with various component replacements being completed in 2008 and 2025.

2. Headworks

Wastewater flows into the headworks building through a concrete channel 2-feet wide, 3.5-feet deep, and approximately 20-feet long. The primary operating channel contains a Duperon mechanical screen that was installed in 2013 for the removal of rags and other incoming solids. A bypass channel runs parallel to the main channel and may be used if the automatic screen is out of service. The bypass channel was designed to utilize three separate, manually cleaned bar screens.

Grit removal is accomplished by two parallel low-velocity grit channels prior to screening. The existing Waucondah WWTF headworks channel includes a 6-inch deep, recessed channel in each of the dual inlet channels for grit removal. After the headworks building wastewater subsequently flows by gravity to the adjacent primary clarifier.



FIGURE 18.DWG

0' 50' 100'
SCALE: 1" = 50'

FIGURE 18
WAUCONDAH WWTF SITE
PERRY PARK WATER & SANITATION DISTRICT

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3. Primary Clarifier

The primary clarifier was constructed in 1980. Wastewater flows into the circular clarifier located outdoors, northeast of the headworks building, at a center ring within the primary clarifier. The clarifier has a 25-foot inside diameter and is 10-feet deep. The clarifier surface area is 490 square feet, and the nominal volume is 4,900 cubic feet. The clarifier is equipped with a sludge scraper arm and scum collection arm. Clarified effluent from the clarifier flows over a perimeter weir plate into an effluent trough and continues by gravity to the RBCs.

The primary sludge is conveyed with a pump from the sump of the clarifier to the digester building located southeast of the clarifier. The sludge pumps are located in the primary sludge pump building northeast and adjacent to the primary clarifier. The primary pump building consists of two WEMCO Screw-Flow centrifugal pumps. Pump controls are located in the primary pump building as well.

4. Rotating Biological Contactors

The Waucondah WWTF treatment train includes two RBC units in series. The upstream RBC unit, RBC #1, has four stages, but RBC #2 only has three stages. Wastewater is delivered to the first RBC downstream of the primary clarifier. Water that flows over the weir downstream of the first RBC and is transported to a separate building and flows into the second RBC. The RBC units are installed in underground concrete basins with fiberglass enclosures that encompass the RBC units and basins. The concrete basins are equipped with aeration piping to assist with maintaining dissolved oxygen (DO) levels in the basins. Air is supplied to the RBC basins by two Ametek Rotron blowers. The blowers for the RBCs are located in the blower building, southwest and adjacent to RBC #1.

5. Phosphorus Control System

A flocculation basin was added to the WWTF in 1993 along with a building to house a 5,100 gallon fiberglass chemical storage tank for alum. The flocculation basin is a 16-foot by 8-foot by 7-foot-deep reinforced concrete structure. At the Waucondah WWTF,

alum is continuously added upstream of the flocculation basin using a 17 GPD Stenner Pump Company metering pump. Once wastewater reaches the flocculation basin, it is gently mixed with two mechanical mixers. Wastewater then flows by gravity through buried piping to the secondary clarifier. Phosphorus precipitates formed by the reaction with the alum are settled in the secondary clarifier, and phosphorus is removed with the waste sludge.

6. Secondary Clarifier

The secondary clarifier was constructed in 1980 along with the primary clarifier. Water from the flocculation basin flows into the circular clarifier located outdoors, northeast of the chemical feed building. The clarifier has a 30-foot inside diameter and is 10-feet deep. The clarifier surface area is 700 square feet, and the nominal volume is 7,000 cubic feet. The influent flow from the flocculation basin enters at the center ring of the clarifier, below the water surface. The clarifier is equipped with sludge scraper arm which directs sludge into a center well for removal and pumping to subsequent sludge treatment at the aerobic digester. Both biological solids in the form of waste activated sludge (WAS) and chemical sludge in the form of phosphorus precipitate are separated in a co-settling process. A scum skimmer blade directs surface scum to a scum removal well which is also removed and pumped to sludge treatment. Clarified effluent from the clarifier flows over perimeter weirs and into an effluent trough. Diversion structures and yard piping direct the water to the effluent channel for flow measurement and disinfection.

7. Disinfection and Effluent Flow Measurement

The clarified effluent from the secondary clarifier is received at the effluent channel which has been repurposed from a serpentine chlorine contact channel. The channel contains a weir and ultra-sonic flow meter for flow measurement along with a UV system for disinfection. The disinfection system is a horizontal lamp Trojan UV3000 PTP system. The UV system was installed in 1993 and consists of a single unit with four lamps. A soda ash solution is injected into the treated wastewater to adjust the pH and maintain it within the required range as dictated by the CDPS discharge permit. The soda ash solution is prepared in a 750-gallon fiberglass solution tank located in a building

southeast of the effluent channel and mixed using a Neptune mixer. The soda ash mixture is added to the treated wastewater after the UV system using an 85 GPD Stenner Pump Company metering pump. An effluent flow measurement weir is installed in the channel downstream of the UV system. A TIENet ultrasonic flow meter is situated over the weir to calculate volumetric flow rate out of the plant. Treated and disinfected water proceeds to the outfall where it is discharged to Bear Creek.

8. Sludge Processing

Solids that settle out in the clarifiers and scum from the clarifiers are sent to an aerobic digester for processing. This includes primary sludge from the primary clarifier, as well as waste active sludge and phosphorus precipitates from the secondary clarifier. The aerobic digester building is located in the southwest part of the WWTF site, southeast of the primary clarifier. The original packaged WWTP that was installed in 1970 was repurposed as an aerobic digester around 1980. The facility is a buried steel basin that is approximately 30-feet in diameter and 14-feet deep. The basin is covered by a wooden framed roof structure. The digester consists of two aeration basins, one unaerated gravity thickener, and one aerated storage basin. The two positive displacement blowers feeding the digester tanks are located within the framed roof structure.

SECTION IX

HYDRAULIC AND ORGANIC WASTEWATER LOADINGS

The treatment capability of a wastewater treatment facility (WWTF) is typically expressed as its rated, or design, capacity. The rated capacity is typically comprised of two components, the hydraulic loading capacity, expressed in terms of million gallons per day (MGD), and organic loading capacity, expressed in terms of pounds per day (lbs/day or ppd) of BOD₅. By Water Quality Control Commission definition, rated or design capacity is intended to represent the maximum 30-day average (maximum monthly average) loading on a treatment facility. Historical hydraulic and organic wastewater loadings data were used to evaluate the Sageport WWTF and Waucondah WWTF are summarized in the following paragraphs.

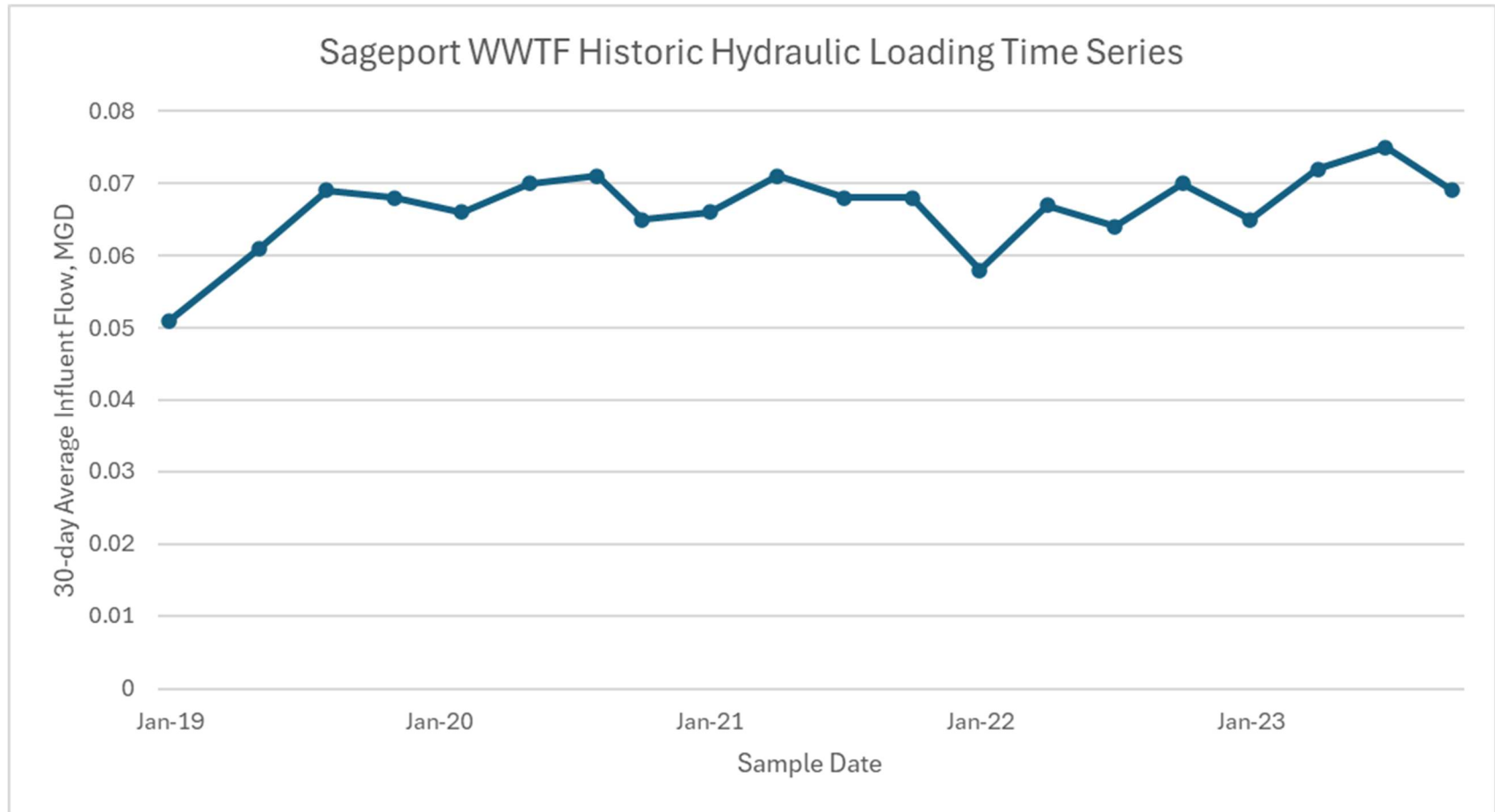
A. SAGEPORT WWTF HISTORIC HYDRAULIC LOADING

Historic treatment facility influent flow records for the six-year period of 2019 through 2024 were gathered from the EPA Discharge Monitoring Report (DMR) database to quantify the volume of wastewater generated from both East and West Perry Park. The 30-day average flow data associated with the Sageport WWTF, and therefore East Perry Park, were only available by quarter. The following table presents the 30-day average influent flows received at the Sageport WWTF during the period of record. The subsequent figure provides a time series of the database values for 30-day average influent data received at the WWTF.

TABLE 17
PERRY PARK WATER AND SANITATION DISTRICT
SAGEPORT WWTF INFLUENT FLOW, MGD

Date	2019	2020	2021	2022	2023	2024
1st Q	0.058	0.068	0.065	0.068	0.065	0.069
2nd Q	0.051	0.066	0.066	0.058	0.072	0.071
3rd Q	0.061	0.070	0.071	0.067	0.075	0.075
4th Q	0.069	0.071	0.068	0.064	0.069	0.071
Average, MGD	0.060	0.069	0.068	0.064	0.070	0.072
Maximum, MGD	0.069	0.071	0.071	0.068	0.075	0.075
Minimum, MGD	0.051	0.066	0.065	0.058	0.065	0.069
Service Area Population	929	934	948	952	964	973
Average, gpcd	64	74	71	67	73	73

FIGURE 19
PERRY PARK WATER AND SANITATION DISTRICT



The quarterly reported 30-day average values were relatively consistent within each individual year and showed a slight increase in values across the years. It was noted that the influent flow value recorded in the second quarter of 2019 (0.051 MGD) appeared low compared to the rest of the flow data recorded over the 2019-2024 period. However, the results of statistical analysis did not change with this value omitted; therefore, this low flow value of 0.051 MGD was included in statistical analysis.

The average daily flow and the maximum month design influent hydraulic loading was established based on a statistical analysis of historic treatment facility influent flow data for the period of record. The statistical analysis for the influent flow data from 2019 to 2024 indicates that the average daily flow received at the WWTF is 67,000 gpd. Based on a statistical analysis of the same influent flow data, a maximum 30-day average influent flow rate of 0.073 MGD or 73,000 gpd was selected as being a reasonably conservative estimate of the current maximum month WWTF influent flow. This value represents a non-exceedance percentage of 92%, which corresponds to a flow that would not be expected to be exceeded approximately 11 months in 12.

According to tap data received from the District, there are currently 416 customers in East Perry Park who contribute wastewater flow to the Sageport WWTF. Using the State Demographer's accepted household density of 2.34 people per house, the population within the service area of the Sageport WWTF was estimated to average 973 people. Dividing the average daily flow rate of 67,000 by a population of 973 results in an average per capita wastewater loading rate of 69 gallons per capita per day (gpcd). The same was done with the selected maximum 30-day average influent flow rate of 73,000 gpd and dividing it by a population of 973 which results in an maximum month per capita contribution of 75 gpcd.

The per capita wastewater contribution rate in rural Colorado communities typically ranges from 65 to 85 gpcd. The estimated per capita contribution rate from the Sageport WWTF service area (75 gpcd) falls within this typical range for small size communities. The WWTF does not currently serve any large commercial or industrial customers that would impact the influent wastewater contribution rate. Water Quality Control Division (WQCD) Policy WPC-DR-1 states that the maximum month average daily per capita wastewater contribution must be not less than 75 gpcd nor greater than 100 gpcd unless satisfactory justification is provided for using a lower or higher value. The calculated maximum 30-day average per capita

hydraulic contribution of 75 gpcd falls within this range as well and is deemed acceptable as it was calculated from the actual operating data of the WWTF. A summary of the estimated Sageport WWTF influent flow parameters are shown in the following table.

TABLE 18
PERRY PARK WATER AND SANITATION DISTRICT
SAGEPORT WWTF INFLUENT FLOW PARAMETERS

Parameter	Value
Wastewater Service Area Population, 2024	973
Average Day Wastewater Flow, gpd	67,000
Per Capita Average Day Wastewater Flow, gpcd	69
Max Month Wastewater Flow, gpd	73,000
Per Capita Max Month Wastewater Flow, gpcd	75

B. SAGEPORT WWTF ORGANIC LOADING

Based on the demographics of the PPWSD, the nature of the wastewater received at the Sageport WWTF is typically of residential origin. There are currently no major commercial customers in the WWTF's existing service area that could discharge higher strength wastewater to the WWTF wastewater collection system.

Organic loadings on a wastewater treatment facility are typically expressed in terms of five-day biochemical oxygen demand (BOD₅), and the parameter of total suspended solids (TSS) is another indicating parameter. Since the Sageport WWTF will discharge to a segment of the Upper South Platte River which has been assigned aquatic life and water supply beneficial use classifications, the nitrogen loading on the facility also becomes a relevant parameter. Phosphorous loading is relevant of the WWTF, as the phosphorous concentration in the segment of the Upper South Platte River to which the Sageport WWTF discharges is regulated by WQCC Regulation No. 73.

Historic treatment facility influent wastewater concentration records for each of the five parameters of concern were gathered from the EPA Discharge Monitoring Report (DMR) database. These maximum monthly average concentrations taken in conjunction with the hydraulic loading, result in the design organic mass loading (pounds per day) expected to be received from the contributing service area. For the six-year period of 2019 through 2024,

the District has tested its treatment facility's influent and effluent for BOD₅ and TSS on a quarterly basis in accordance with the facility's Colorado Discharge Permit System (CDPS) discharge permit.

1. Sageport WWTF Five-day Biochemical Oxygen Demand (BOD₅)

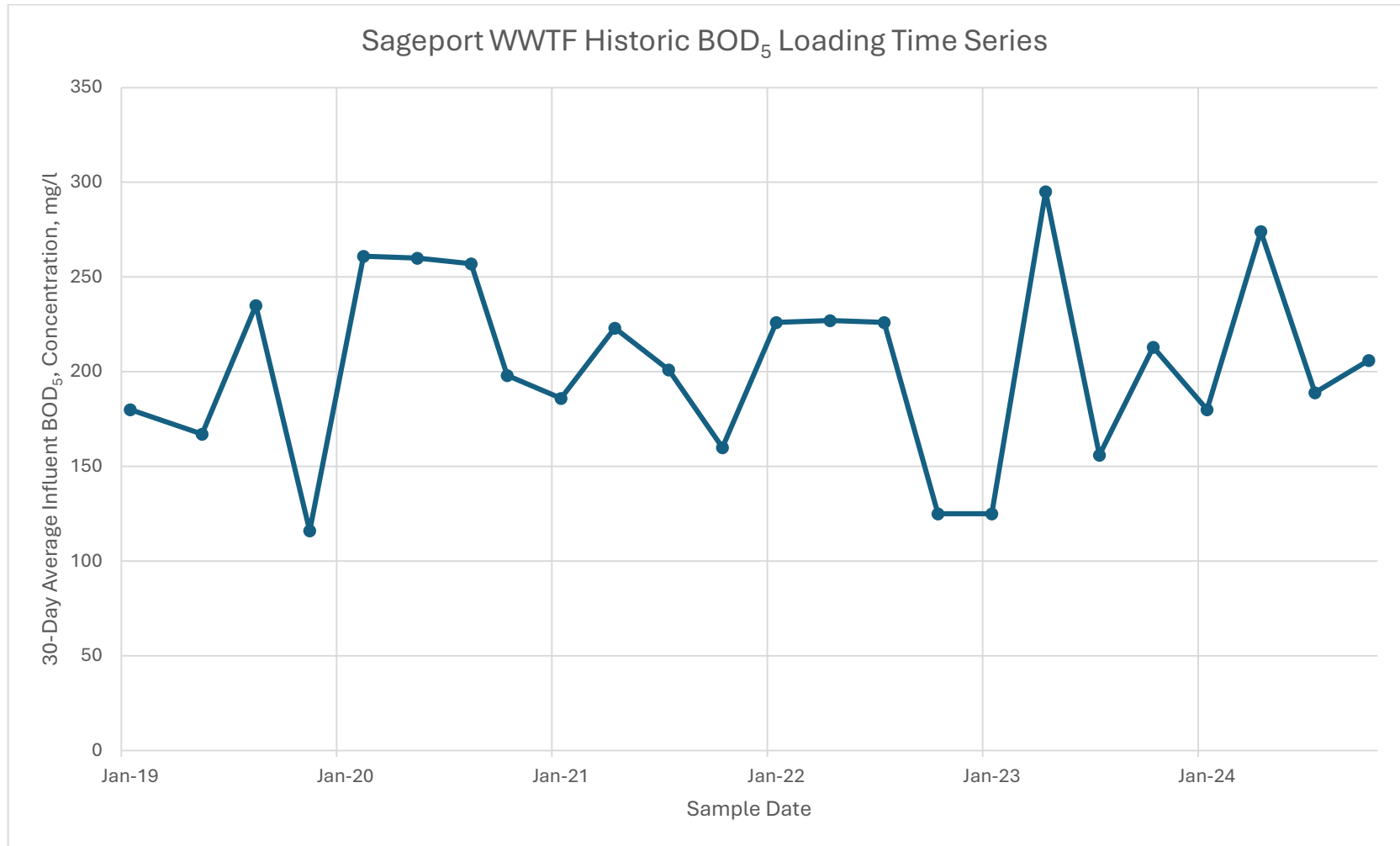
The following table presents a tabulation of influent BOD₅ data. The table presents the data in two parts with the 30-day average influent BOD₅ concentrations in milligrams per liter (mg/l) in the upper half of the table and the loading rate in pounds per day (ppd) in the lower half of the table. The figure that follows shows a time series of the 30-day average influent BOD₅ concentrations over the considered six-year period. No significant long-term increasing or decreasing trend in influent BOD₅ concentration was observed.

TABLE 19
PERRY PARK WATER AND SANITATION DISTRICT
SAGEPORT WWTF REPORTED INFLUENT BOD₅

Month	2019	2020	2021	2022	2023	2024
Influent BOD ₅ Concentration, mg/l						
1st Q	180	261	186	226	125	180
2nd Q	167	260	223	227	295	274
3rd Q	235	257	201	226	156	189
4th Q	116	198	160	125	213	206
Average, mg/l	175	244	193	201	197	212
Maximum, mg/l	235	261	223	227	295	274
Minimum, mg/l	116	198	160	125	125	180
Influent BOD ₅ Loading, ppd						
1st Q	94.6	120.0	101.0	145.0	65.0	100.0
2nd Q	73.8	99.7	123.0	117.0	159.0	162.0
3rd Q	109.8	150.0	117.0	125.0	94.0	117.0
4th Q	46.4	115.0	90.7	71.0	129.0	125.0
Average, ppd	81.2	121.2	107.9	114.5	111.8	126.0
Maximum, ppd	109.8	150.0	123.0	145.0	159.0	162.0
Minimum, ppd	46.4	99.7	90.7	71.0	65.0	100.0

- 1) 30-day average 5-day biochemical oxygen demand from monthly Discharge Monitoring Reports
- 2) mg/l = milligrams per liter
- 3) ppd = pounds per day

FIGURE 20
PERRY PARK WATER AND SANITATION DISTRICT



A review of the influent BOD₅ concentration data indicates a range from 116 milligrams per liter (mg/l) to 295 mg/l with an average value of 204 mg/l. A typical medium domestic wastewater strength would be expected to have an average BOD₅ concentration in the range of 190 mg/l to 220 mg/l.

A statistical analysis of historical influent BOD₅ concentration data was accomplished to establish a maximum monthly average concentration which would provide a rational basis for projecting BOD₅ loadings from the Sageport WWTF service area. Based on the statistical analysis of this influent data, a maximum 30-day average BOD₅ concentration of 274 mg/l was selected as being reasonably conservative estimate of the maximum monthly WWTF influent BOD₅ concentration. This value represents a non-exceedance percentage of 92%. This maximum 30-day average influent concentration is approximately 136% of the average daily concentration received at the WWTF during the period of record examined.

Based on the maximum month influent flow of 73,000 gpd and the maximum 30-day average BOD₅ concentration of 274 mg/l, the organic loading on the WWTF has averaged 167 pounds per day (ppd). This is approximately half of the rated capacity of the facility at 317 ppd. On a per capita basis, using the estimated 2024 service area population of 973 people, an average of 0.171 ppd per person is generated. This is on the low end of a typical range of 0.17 to 0.20 pounds per capita per day (ppcd). With no significant infiltration and inflow issues noted by the District, this low per capita loading rate does not appear to be significantly influenced by I&I to cause depressed levels of BOD₅ in the Sageport WWTF influent wastewater.

2. Sageport WWTF Total Suspended Solids (TSS)

The following table presents a tabulation of 30-day average influent TSS concentrations in the wastewater generated in the Sageport WWTF service area during the period of record analyzed together with a statistical analysis of this data. The subsequent figure shows a time series of the 30-day average influent TSS concentrations over the considered six-year period. No significant long-term increasing or decreasing trend in influent TSS concentration was observed. In addition, no significant outlier data points were identified which need to be discarded from the data set.

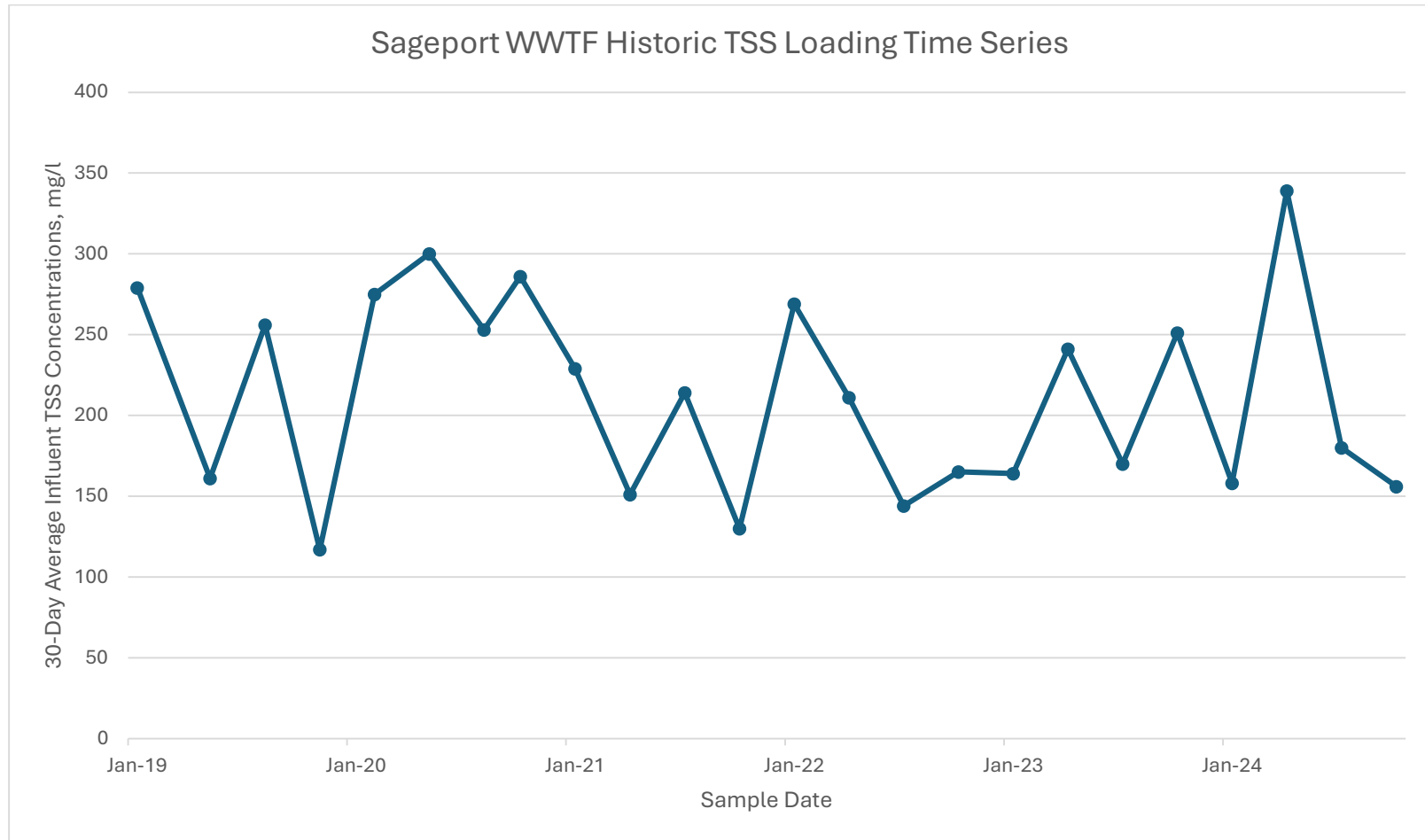
TABLE 20
PERRY PARK WATER AND SANITATION DISTRICT
SAGEPORT WWTF REPORTED INFLUENT TSS, mg/l

Month	2019	2020	2021	2022	2023	2024
1st Q	279	275	229	269	164	158
2nd Q	161	300	151	211	241	339
3rd Q	256	253	214	144	170	180
4th Q	117	286	130	165	251	156
Average, mg/l	203	279	181	197	207	208
Median, mg/l	209	281	183	188	206	169
Geomean, mg/l	192	278	176	192	203	197
Maximum, mg/l	279	300	229	269	251	339
Minimum, mg/l	117	253	130	144	164	156

A review of the influent TSS concentration data indicates a range from 117 mg/l to 339 mg/l with an average value of 212 mg/l. A typical medium domestic wastewater strength would be expected to have an average TSS concentration in the range of 210 mg/l to 240 mg/l. Also, for typical domestic wastewater, one would expect the TSS and BOD₅ concentrations to be somewhat similar. The TSS average concentration observed in the considered time period falls on the low end of the typical range and is consistent with the BOD₅ concentrations shown in the previous section.

A statistical analysis of the historic influent TSS concentration was accomplished to establish a maximum monthly average concentration which would provide a rational basis for projecting future TSS loadings from the Sageport WWTF service area. Based on the statistical analysis of the influent data, a maximum 30-day average TSS concentration of 300 mg/l was selected as being reasonably conservative estimate of a maximum monthly WWTF influent TSS concentration. This value represents a non-exceedance percentage of 92%. This maximum 30-day average influent TSS

FIGURE 21
PERRY PARK WATER AND SANITATION DISTRICT



concentration is approximately 141% of the average daily TSS concentration received at the WWTF during the period of record examined.

Based on the maximum month influent flow of 73,000 gpd and the maximum 30-day average TSS concentration of 300 mg/l, the loading on the WWTF has averaged 183 pounds per day (ppd). On a per capita basis, using the estimated 2024 service area population of 973 people, an average of 0.188 ppd per person is generated. This is on the low end of a typical range of 0.18 to 0.23 pounds per capita per day (ppcd) typically seen for smaller communities with primarily residential customers.

3. Sageport WWTF Nitrogen and Phosphorous

The District has not been required to monitor influent ammonia nitrogen concentrations, Total Kjeldahl nitrogen (TKN), nor phosphorous at the Sageport WWTF.

Three samples of influent ammonia nitrogen concentrations to the WWTF were taken in 2021 and sent to a laboratory for analysis of ammonia nitrogen. The laboratory received the three samples on March 29, May 5, and May 27 of 2021 and the samples reported values of 33.36 mg/l, 20.10 mg/l, and 17.71 mg/l respectively. Lacking comprehensive data, a maximum 30-day average ammonia nitrogen concentration of 33.3 g/l was assumed to be a reasonably conservative estimate of the influent ammonia nitrogen concentration. Total inorganic nitrogen (TIN) is a combined measurement of ammonia nitrogen, nitrate, and nitrite contained in wastewater. Nitrate and nitrite concentrations are assumed negligible for domestic wastewater influent. The ammonia nitrogen concentration of 33.3 mg/l was therefore assumed to be equal to the maximum month TIN concentration in the Sageport WWTF influent.

Total Kjeldahl nitrogen (TKN) is a measurement of the organic nitrogen and the ammonia nitrogen contained in wastewater. Bacteria present in a WWTF are capable of converting a portion of the organic nitrogen present to ammonia nitrogen, thereby increasing the total ammonia nitrogen loading on the biological treatment process. One sample of influent wastewater to the WWTF reported a TKN concentration of 30.7 mg/l in October of 2021. This is lower than the maximum month ammonia nitrogen concentration assumed in the previous section. As TKN concentration is the sum of ammonia nitrogen

concentration and total organic nitrogen concentration, TKN concentration cannot be lower than ammonia nitrogen concentration. As more samples of ammonia nitrogen were available than samples of TKN, the reported TKN concentration was assumed less representative of maximum month conditions than the assumed concentration of 33.3 mg/l ammonia nitrogen. The ratio of TKN to ammonia nitrogen in typical domestic wastewater of medium strength is 1.7:1 per *Wastewater Engineering: Treatment and Resource Recovery*, 5th ed. (Metcalf & Eddy, 2014). For the purposes of estimating a maximum 30-day average design loading, an influent TKN concentration of 57 mg/l was assumed. This value is approximately 1.7 times the maximum monthly average ammonia nitrogen concentration selected.

One sample of influent wastewater phosphorous concentration reported a total phosphorous concentration of 3.30 mg/l in October of 2021. This is characteristic of very low strength wastewater, per *Wastewater Engineering: Treatment and Resource Recovery*, 5th ed. (Metcalf & Eddy, 2014). Only one test result for total phosphorous is available, which may not be representative of typical influent phosphorous concentrations. Preliminary system sizes are based on typical phosphorous concentrations in predominantly residential domestic wastewater. Historical influent concentrations of other pollutants for the Sageport WWTF influent are in the low to medium ranges of wastewater strength when compared to typical domestic wastewater values. A maximum month value of 7 mg/l for total phosphorous concentration, which is generally considered to be in the medium strength domestic wastewater category, is therefore assumed to be reasonably conservative for the Sageport WWTF service area.

C. SAGEPORT WWTF FUTURE LOADINGS

Applying the 1.26% population increase to the population within the Sageport WWTF service area, the population is projected to increase to 1,266 people in 2045, which encompasses the 20-year planning period. Utilizing the 69 gpcd average contribution rate, the future average flows for the planning period originating from the service area are estimated to be 87,200 gpd.

In accordance with Colorado Law, C.R.S. 25-8-501 (5 d), whenever throughput reaches 80% of treatment facility design capacity, initiation of engineering and financial planning for facility expansion is required. Although maximum month loading values typically represent more of a design loading value which is greater than day-to-day facility throughput values, a comparison of maximum month loading to the 80% threshold was completed to determine if the threshold may be reached during the 20-year planning period. The existing organic rated capacity for the Sageport WWTF is 317 ppd BOD₅ per Site Approval 1752. Assuming the projected 2045 population of 1,266 people and a per capita loading rate of 0.171 ppcd BOD₅, the projected future maximum month loading to the Sageport WWTF is 216 ppd BOD₅.

Based on the estimated existing hydraulic loading rates, the following table presents the future estimated loadings on the PPWSD WWTF.

TABLE 21
PERRY PARK WATER AND SANITATION DISTRICT
SAGEPORT WWTF ESTIMATED FUTURE LOADINGS

Service Area	Condition	Wastewater Service Population	Hydraulic Loading		Organic Loading, ppd, BOD ₅
			Average Day, gpd	Max Month, gpd	
Sageport WWTF	Existing - 2024	973	66,100	75,000	171
	Future - 2045	1,266	87,200	95,000	216

Even with maximum month organic loadings, the projected future maximum month loading to the Sageport WWTF is much lower than 80% of the existing 317 ppd capacity. The 80% value is the trigger point for needing to initiate the planning and design of a facility expansion according to the facility's discharge permit. With the projected future organic loading being less than the 80% threshold, initiating planning for an expansion for organic treatment capacity would not be required across the planning period under typical growth projections.

However, the hydraulic loading projections paint a different picture. The projected 2045 average day flow of 87,200 gpd, as well as the projected 2045 maximum month daily flow of 95,000 gpd does exceed 80% of the existing rated hydraulic capacity of 0.10 MGD. The future population growth rate assumed in this report predicts that the Sageport WWTF influent flow will reach the threshold of 80% of the WWTF's hydraulic design within the 20-year planning period. In addition, the ability of the facility to meet the effluent TIN limit appears to

be marginal. Recent data shows the effluent TIN concentrations being near, and at times over, the discharge limit. From the analysis of influent ammonia and TKN values explained above, that indicates there are no anomalies evident with the incoming wastewater nor significant contributors identified. Therefore, taking a source control approach to ammonia reduction and targeting a major ammonia source is not possible as none can be identified. Therefore, treatment is the necessary solution to consistently meeting the TIN effluent limit. As such, improvements to the treatment processes are required.

The conclusion above is consistent with that found in the Preliminary Engineering Report (PER) for the Sageport WWTF prepared by GMS in 2023. That report was instigated by the new TIN limit which was enacted in the facility's discharge permit. The PER found that the existing RBCs were not capable of consistently meeting the TIN limit and they would need to be replaced with a secondary treatment system which could achieve both nitrification and denitrification to the extent necessary to meet the new TIN limit. While evaluating existing loadings and projected future loadings, the PER made the same conclusion that an expansion would be needed to accommodate future loadings. Rather than embark on a major facility upgrade project for the secondary treatment system and then need to complete a second major expansion project of the new system only years later, the PPWSD decided to pursue a single major expansion project that included the new second secondary treatment system improvements. As of the preparation of this CIP report, that expansion project is expected to be delayed due to financial needs of the District. Therefore, the capital improvement project and its costs will be deferred for approximately six years in this CIP report rather than being pursued in the near future as originally contemplated in the PER.

It is also noted that future nutrient regulations and permitting conditions are highly volatile at this time and they are impossible to predict with any certainty in the future. However, the upgraded secondary treatment process proposed for the Sageport WWTF had the future nutrient requirements in mind. Even though the future nutrient requirements are unknown, the project has been planned to have treatment capabilities beyond current effluent limits, which provides flexibility to meet potential future nutrient requirements as they become more stringent.

D. WAUCONDAH WWTF HISTORIC HYDRAULIC LOADING

Historic treatment facility influent flow records for the Waucondah WWTF were also gathered from the EPA DMR database and reviewed over the same six-year period from January 2019 through December 2024. The following table presents the 30-day average influent flows received at the Waucondah WWTF during the period of record. The following figure provides a time series of the database values for 30-day average influent data received at the Waucondah WWTF.

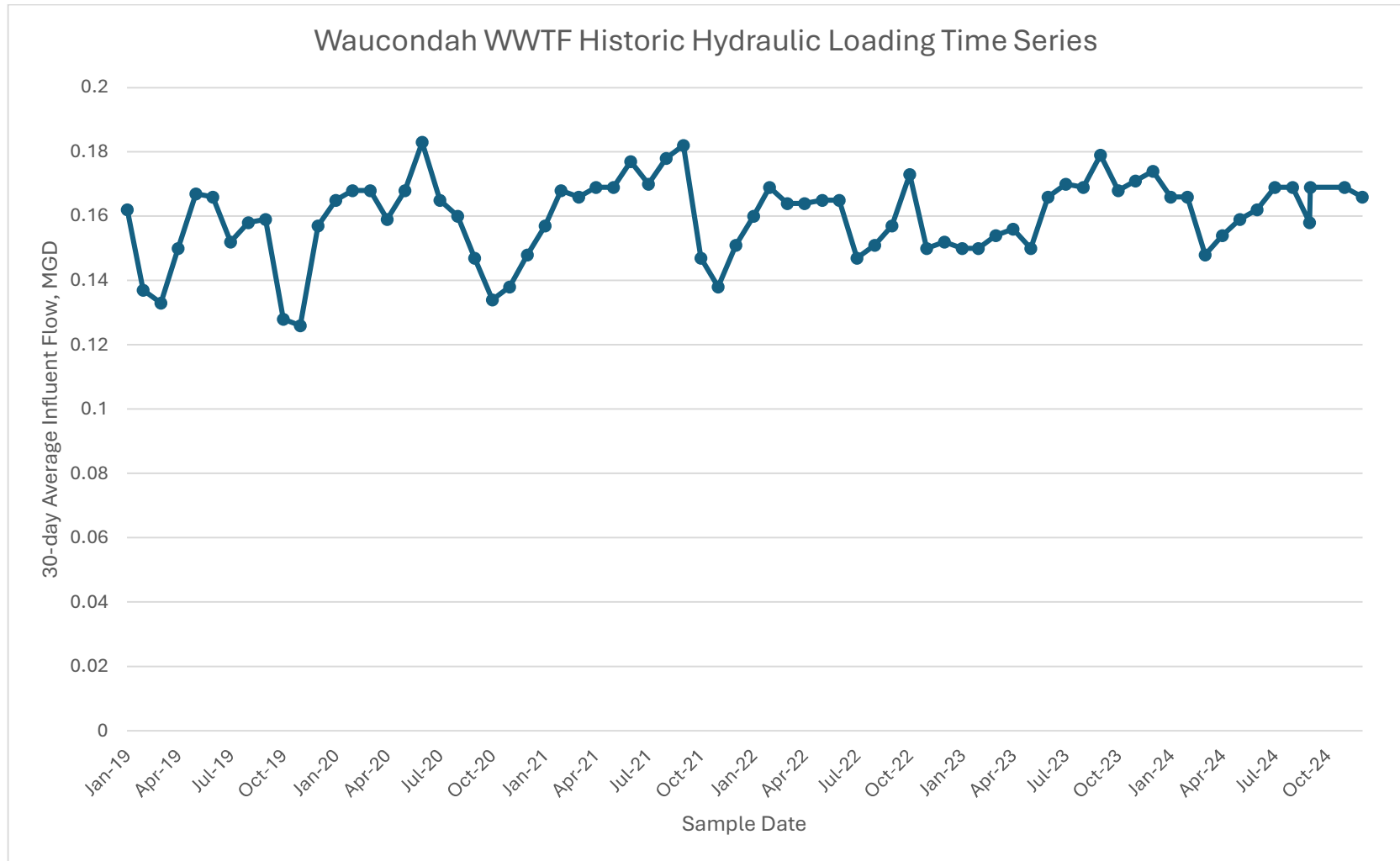
TABLE 22
PERRY PARK WATER AND SANITATION DISTRICT
WAUCONDAH WWTF INFLUENT FLOW, MGD

Month	2019	2020	2021	2022	2023	2024
January	0.162	0.165	0.157	0.160	0.150	0.166
February	0.137	0.168	0.168	0.169	0.150	0.166
March	0.133	0.168	0.166	0.164	0.154	0.148
April	0.150	0.159	0.169	0.164	0.156	0.154
May	0.167	0.168	0.169	0.165	0.150	0.159
June	0.166	0.183	0.177	0.165	0.166	0.162
July	0.152	0.165	0.170	0.147	0.170	0.169
August	0.158	0.160	0.178	0.151	0.169	0.169
September	0.159	0.147	0.182	0.157	0.179	0.158
October	0.128	0.134	0.147	0.173	0.168	0.169
November	0.126	0.138	0.138	0.150	0.171	0.169
December	0.157	0.148	0.151	0.152	0.174	0.166
Average, MGD	0.150	0.159	0.164	0.160	0.163	0.163
Maximum, MGD	0.167	0.183	0.182	0.173	0.179	0.169
Minimum, MGD	0.126	0.134	0.138	0.147	0.150	0.148
Service Area Population	1874	1891	1918	1951	1975	1976
Average gpcd	80	84	86	82	83	82

A review of 30-Day average daily record inflow data shows sporadic monthly flow rates. Influent flows for the 36 months from January 2022 to December 2024 were fairly consistent, averaging 162,000 gpd. In the previous years between January 2019 and December 2021,

flows were sporadic, dropping significantly in the months of September and October. Flows during that period ranged from 126,000 gpd to 183,000 gpd and averaged 157,000 gpd. The influent flow meter was replaced in 2022. The old influent flow meter was undersized and when flows exceeded the max capacity of the flume, performance would be unreliable and provide inaccurate flow data. It is believed the sporadic readings are a result of the influent flow meter being undersized. As a result, influent flow values observed prior to 2022 were excluded in the below estimations of Waucondah WWTF design influent hydraulic loading.

FIGURE 22
PERRY PARK WATER AND SANITATION DISTRICT



Three years of data is on the low end of the desirable amount for data analysis. The average daily flow and the maximum month design influent hydraulic loading was established based on a statistical analysis of historic treatment facility influent flow data for the years following 2021. The statistical analysis for the influent flow data from 2022 to 2024 indicates that the average daily flow received at the WWTF is 162,000 gpd. Based on a statistical analysis of the same influent flow data, a maximum 30-day average influent flow rate of 0.174 MGD or 174,000 gpd was selected as being a reasonably conservative estimate of the current maximum month WWTF influent flow. This value represents a non-exceedance percentage of 92%, which corresponds to a flow that would not be expected to be exceeded approximately 11 months in 12.

According to tap data received from the District, there are currently 852 customers in West Perry Park who contribute wastewater flow to the Sageport WWTF. Using the State Demographer's accepted household density of 2.34 people per house, the population within the service area of the Waucondah WWTF was estimated to average 1,994 people. Dividing the average daily flow rate of 162,000 by a population of 1,994 results in an average per capita wastewater loading rate of 81 gallons per capita per day (gpcd). The same was done with the selected maximum 30-day average influent flow rate of 174,000 gpd and dividing it by a population of 1,994 which results in an average month per capita contribution of 87 gpcd.

The per capita wastewater contribution rate in rural Colorado communities typically ranges from 65 to 85 gpcd. The estimated per capita contribution rate from the Waucondah WWTF service area (87 gpcd) falls outside this typical range for small size communities. The WWTF does currently serve 4 commercial customers and no industrial customers. It is believed that the commercial customers are not large enough to significantly impact the influent wastewater contribution rate. Water Quality Control Division (WQCD) Policy WPC-DR-1 states that the maximum month average daily per capita wastewater contribution must be not less than 75 gpcd nor greater than 100 gpcd unless satisfactory justification is provided for using a lower or higher value. The selected maximum 30-day average per capita hydraulic contribution of 87 gpcd falls within this range and is deemed acceptable as it was calculated from the actual operating data of the WWTF. A summary of the estimated Waucondah WWTF influent flow parameters are shown in the following table.

TABLE 23
PERRY PARK WATER AND SANITATION DISTRICT
WAUCONDAH WWTF INFLUENT FLOW PARAMETERS

Parameter	Value
Wastewater Service Area Population, 2024	1,994
Average Day Wastewater Flow, gpd	162,000
Per Capita Average Day Wastewater Flow, gpcd	81
Max Month Wastewater Flow, gpd	174,000
Per Capita Max Month Wastewater Flow, gpcd	87

E. WAUCONDAH WWTF ORGANIC LOADING

Based on the demographics of the PPWSD, the nature of the wastewater received at the Waucondah WWTF is typically of domestic origin. There are a few commercial customers in the WWTF's existing service area, but none of them would appear to discharge higher strength wastewater to the WWTF wastewater collection system. Organic loadings on a wastewater treatment facility are typically expressed in terms of five-day biochemical oxygen demand (BOD₅), with total suspended solids (TSS) being another indicative parameter.

Historic treatment facility influent wastewater concentration records for above parameters of concern were gathered from the EPA Discharge Monitoring Report (DMR) database. These maximum monthly average concentrations taken in conjunction with the hydraulic loading, result in the design organic mass loading (pounds per day) expected to be received from the contributing service area. For the six-year period of 2019 through 2024, the District has tested its treatment facility's influent and effluent for BOD₅ and TSS on a monthly basis in accordance with the facility's Colorado Discharge Permit System (CDPS) discharge permit.

1. Waucondah WWTF Five-day Biochemical Oxygen Demand (BOD₅)

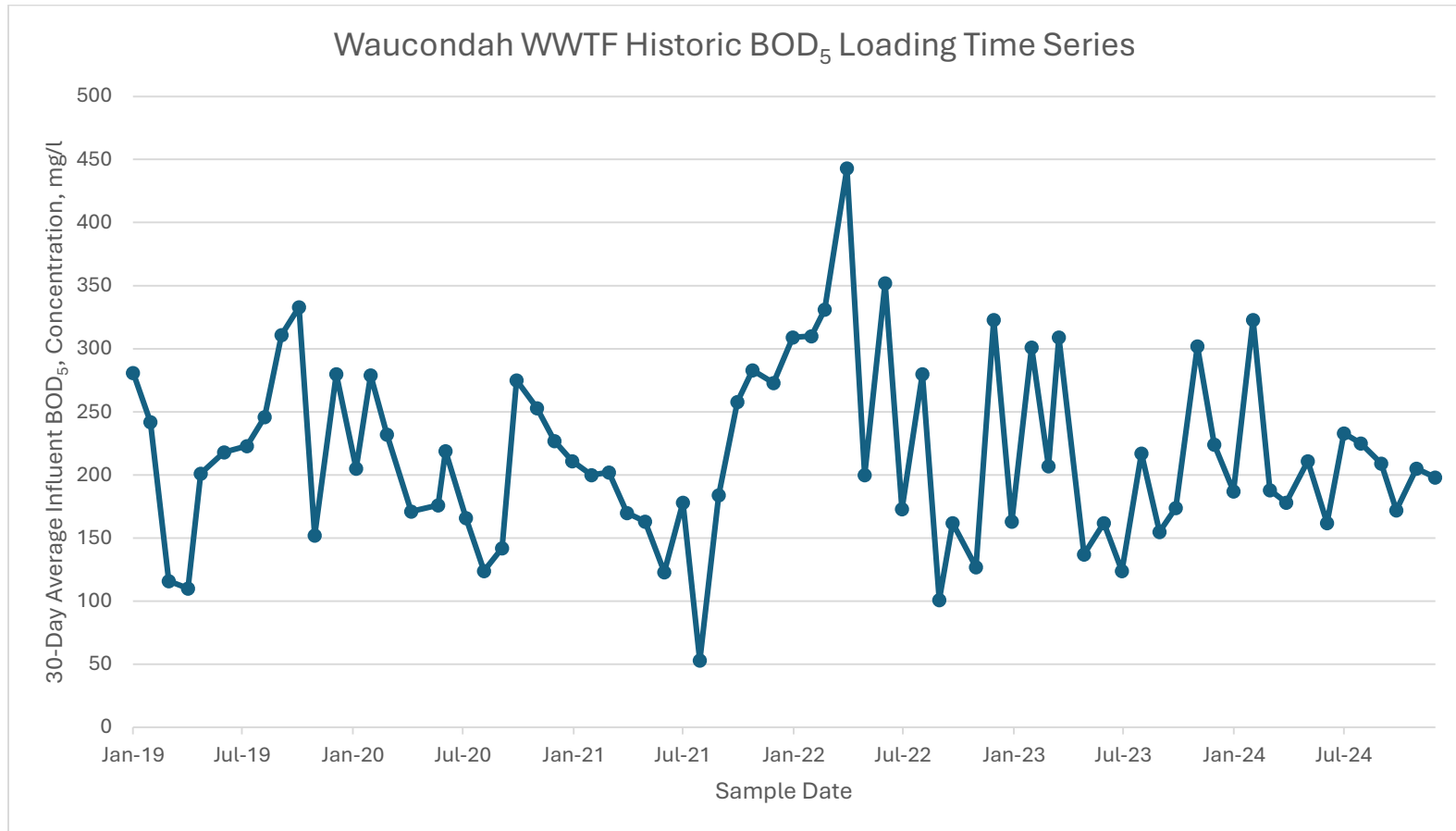
The following table presents a tabulation of the 30-day average influent BOD₅ concentrations in the wastewater received at the Waucondah WWTF during the period of record analyzed. The following figure shows a time series of the 30-day average influent BOD₅ concentrations over the considered six-year period. No significant long-term increasing or decreasing trend in influent BOD₅ concentration was observed.

The reported influent BOD₅ concentration in August of 2021, 53 milligrams per liter (mg/l), appeared to be abnormally low and the reported concentration in April of 2022, 443 mg/l, appeared to be abnormally high. In order to avoid skewing the analysis of this data, these questionable/anomalous results were culled from the data set.

TABLE 24
PERRY PARK WATER AND SANITATION DISTRICT
WAUCONDAH WWTF REPORTED INFLUENT BOD₅

Month	2019	2020	2021	2022	2023	2024
January	281	205	211	309	163	187
February	242	279	200	310	301	323
March	116	232	202	331	207	188
April	110	171	170	443	309	178
May	201	176	163	200	137	211
June	218	219	123	352	162	162
July	223	166	178	173	124	233
August	246	124	53	280	217	225
September	311	142	184	101	155	209
October	333	275	258	162	174	172
November	152	253	283	127	302	205
December	280	227	273	323	224	198
Average, mg/l	226	206	204	243	206	208
Maximum, mg/l	333	279	283	352	309	323
Minimum, mg/l	110	124	123	101	124	162

FIGURE 23
PERRY PARK WATER AND SANITATION DISTRICT



A review of the influent BOD₅ concentration data indicates a range from 101 mg/l to 352 mg/l with an average value of 215 mg/l. A typical medium domestic wastewater strength would be expected to have an average BOD₅ concentration in the range of 190 mg/l to 220 mg/l.

A statistical analysis of historical influent BOD₅ concentration data was accomplished to establish a maximum monthly average concentration which would provide a rational basis for projecting BOD₅ loadings from the Waucondah WWTF service area. Based on the statistical analysis of this influent data, a maximum 30-day average BOD₅ concentration of 315 mg/l was selected as being reasonably conservative estimate of the maximum monthly WWTF influent BOD₅ concentration. This value represents a non-exceedance percentage of 92%. This maximum 30-day average influent concentration is approximately 140% of the average daily concentration received at the WWTF during the period of record examined.

Based on the maximum month influent flow of 174,000 gpd and the maximum 30-day average BOD₅ concentration of 315 mg/l, the organic loading on the WWTF has averaged 457 pounds per day (ppd). This is approximately half of the rated capacity of the facility at 855 ppd. On a per capita basis, using the estimated 2024 service area population of 1,994 people, an average of 0.229 ppd per person is generated. On a nationwide basis, per capita BOD₅ loading contributions from typical residential service areas are reported to be in the range of 0.11 to 0.26 pounds per capita day (ppcd) and typically fall in the range of 0.17 to 0.20 ppcd. With the per capita BOD₅ loading on the higher end of the typical range, this suggests that the influent wastewater at the Waucondah WWTF is relatively strong. Possible contributing factors include efficient water use among customers, higher organic waste contributions from residential sources, or minor influences from the District's commercial users.

2. Waucondah WWTF Total Suspended Solids (TSS)

The following table presents a tabulation of 30-day average influent TSS concentrations in the wastewater generated in the Waucondah WWTF service area during the period of record analyzed together with a statistical analysis of this data. The following figure shows a time series of the 30-day average influent TSS concentrations over the

considered six-year period. No significant long-term increasing or decreasing trend in influent TSS concentration was observed.

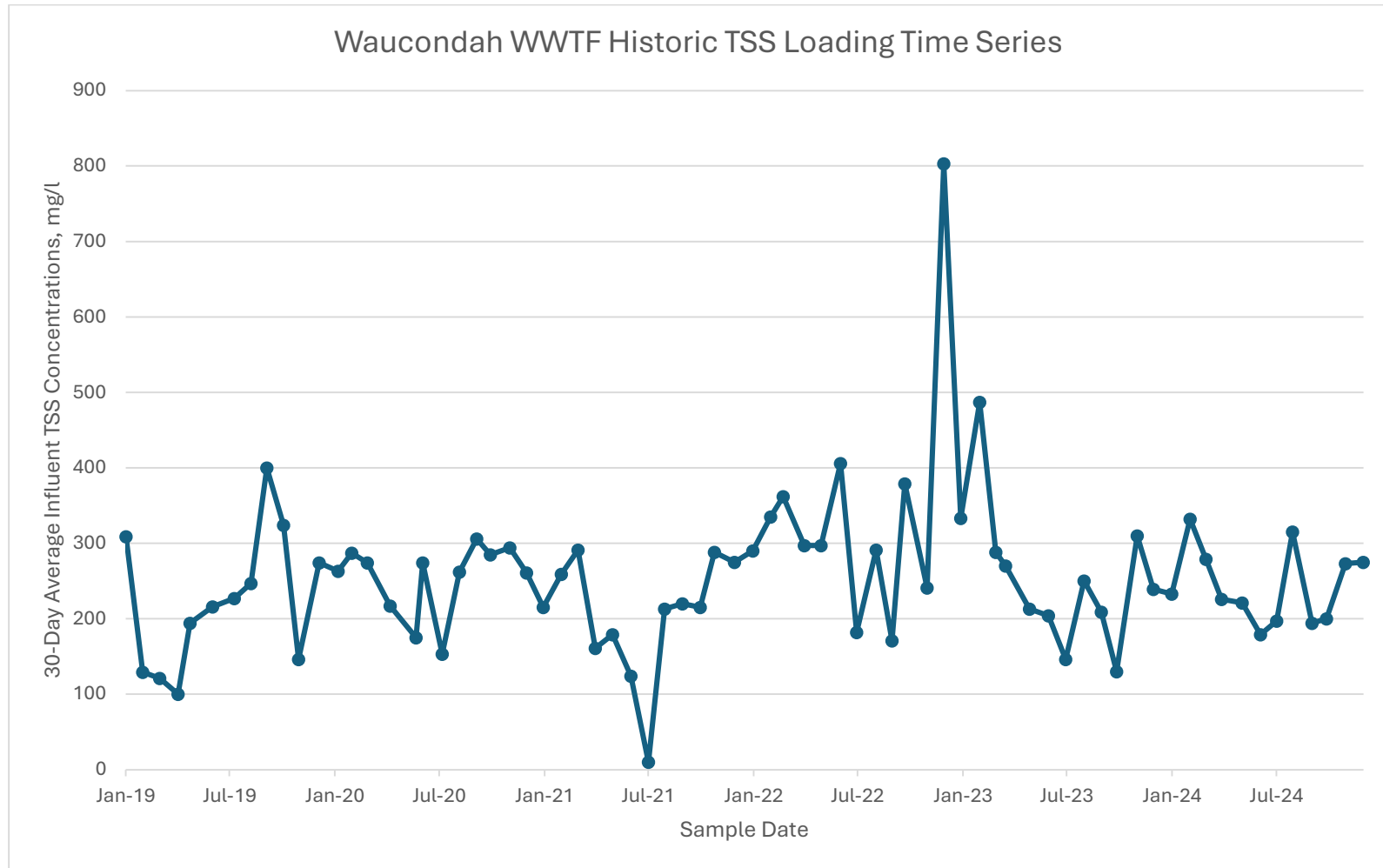
The reported influent TSS concentration in July of 2021, 10 milligrams per liter (mg/l), appeared to be abnormally low and the reported concentrations in December of 2022, 443 mg/l, and February of 2023, 487 mg/l, appeared to be abnormally high. In order to avoid skewing the analysis of this data, these questionable/anomalous results were culled from the data set.

TABLE 25
PERRY PARK WATER AND SANITATION DISTRICT
WAUCONDAH WWTF REPORTED INFLUENT TSS, mg/l

Month	2019	2020	2021	2022	2023	2024
January	309	263	215	290	333	233
February	129	287	259	335	487	332
March	121	274	291	362	288	279
April	100	217	161	297	270	226
May	194	175	179	297	213	221
June	216	274	124	406	204	179
July	227	153	10	182	146	197
August	247	262	213	291	250	315
September	400	306	220	171	209	194
October	324	285	215	379	130	200
November	146	294	288	241	310	273
December	274	261	275	803	239	275
Average, mg/l	224	254	222	296	236	244
Median, mg/l	222	269	215	297	239	230
Geomean, mg/l	206	249	215	286	227	239
Maximum, mg/l	400	306	291	406	333	332
Minimum, mg/l	100	153	124	171	130	179

A review of the influent TSS concentration data indicates a range from 100 mg/l to 406 mg/l with an average value of 246 mg/l. A typical medium domestic wastewater strength would be expected to have an average TSS concentration in the range of 210 mg/l to 240 mg/l. Also, for typical domestic wastewater, one would expect the TSS and BOD₅ concentrations to be somewhat similar. The TSS average concentration

FIGURE 24
PERRY PARK WATER AND SANITATION DISTRICT



observed in the considered time period is slightly above the typical range and is consistent with the BOD₅ concentrations shown in the previous section. This may indicate higher particulate organic loading from residential sources, contributions from food waste disposal, or solids from periodic maintenance activities at commercial facilities.

A statistical analysis of the historic influent TSS concentration was accomplished to establish a maximum monthly average concentration which would provide a rational basis for projecting future TSS loadings from the Waucondah WWTF service area. Based on the statistical analysis of the influent data, a maximum 30-day average TSS concentration of 334 mg/l was selected as being reasonably conservative estimate of a maximum monthly WWTF influent TSS concentration. This value represents a non-exceedance percentage of 92%. This maximum 30-day average influent TSS concentration is approximately 119% of the average daily TSS concentration received at the WWTF during the period of record examined.

Based on the maximum month influent flow of 174,000 gpd and the maximum 30-day average TSS concentration of 334 mg/l, the loading on the WWTF has averaged 485 pounds per day (ppd). On a per capita basis, using the estimated 2024 service area population of 973 people, an average of 0.243 ppd per person is generated. This per capita TSS loading is slightly above the typical range for medium-strength domestic wastewater, which further suggests higher particulate organic loading from residential sources as stated previously.

3. Waucondah WWTF Nitrogen and Phosphorous

The District has not been required to monitor influent ammonia nitrogen concentrations, Total Kjeldahl nitrogen (TKN), nor phosphorous at the Waucondah WWTF. Without data points to analyze, definitive conclusions on influent loading cannot be made. Only rough estimates can be made. Rather than rely on typical textbook values or arranges for these parameters, it can be assumed the loading concentrations are similar to those of the Sageport WWTF. Since the service area of the two facilities are adjacent to each and include similar demographics and customer bases, it can be inferred that the loadings can be similar. This assumption would seem better suited to this facility that applying

generalized or industry standard values. It is also noted that the facility discharge permit only has limits for the ammonia nitrogen constituent, and no other nitrogen parameters. Therefore, the Waucondah WWTF existing influent concentrations for ammonia nitrogen and phosphorus are assumed to be the same as that determined for the Sageport WWTF, which are 33.3 mg/l and 7 mg/l, respectively.

F. WAUCONDAH WWTF FUTURE LOADINGS

Applying the 1.26% population increase to the population within the Waucondah WWTF service area, the population is projected to increase to 2,593 people in 2045, which encompasses the 20-year planning period. Utilizing the 81 gpcd average hydraulic contribution rate, the future average flows for the planning period originating from the service area are estimated to be 210,665 gpd.

In accordance with Colorado Law, C.R.S. 25-8-501 (5 d), and as dictated by the facility's discharge permit, whenever throughput reaches 80% of treatment facility design capacity, initiation of engineering and financial planning for facility expansion is required. Although maximum month loading values typically represent more of a design loading value which is greater than day-to-day facility throughput values, a comparison of maximum month loading to the 80% threshold was completed to determine if the threshold may be reached during the 20-year planning period. The existing organic rated capacity for the Waucondah WWTF is 855 ppd BOD₅ per Site Approval 1752. Assuming the projected 2045 population of 2,593 people and a per capita loading rate of 0.229 ppcd BOD₅, the projected future maximum month loading to the Waucondah WWTF is 594 ppd BOD₅.

Based on the estimated existing hydraulic loading rates, the following table presents the future estimated loadings on the PPWSD WWTF.

TABLE 26
PERRY PARK WATER AND SANITATION DISTRICT
WAUCONDAH WWTF ESTIMATED FUTURE LOADINGS

Service Area	Condition	Wastewater Service Population	Hydraulic Loading		Organic Loading, ppd, BOD ₅
			Average Day, gpd	Max Month, gpd	
Waucondah WWTF	Existing - 2024	1,994	162,000	179,000	470
	Future - 2045	2,593	210,665	226,270	594

Even with maximum month organic loadings, the projected future maximum month loading to the Waucondah WWTF does not exceed 80% of the existing 855 ppd capacity. Additionally, the projected average day flow of 210,665 gpd does not exceed 80% of the existing WWTF's 0.320 MGD rated capacity, nor does the projected maximum month flow of 226,270 gpd. Therefore, under typical growth rate projections, initiating planning for an expansion of organic and hydraulic treatment capacity would not be required across the 20-year planning period under typical growth projections.

As for the ammonia and phosphorus, the existing influent concentrations were assumed to be the same as that seen at the Sageport WWTF. In reviewing the effluent data for phosphorus for the two facilities, the effluent concentrations are very similar generally ranging from 0.1 to 0.4 mg/l, which is well below the 1 mg/l limit of each facility. The effluent data for ammonia for the two facilities shows the Waucondah WWTF as having noticeably lower effluent ammonia concentrations than the Sageport WWTF. With similar influent concentrations yet lower effluent concentrations, this suggests the Waucondah WWTF is performing better than Sageport WWTF. Without actual data to suggest otherwise, it appears the Waucondah WWTF is, and will continue, performing adequately to meet the effluent limits and will not require expansion or upgrade within the 20-year planning period.

A side note to the nutrient treatment requirements for the Waucondah WWTF. The current discharge permit includes ammonia limits, but no other nitrogen parameters such as TIN. The current permit is under administrative extension and will remain unchanged and in force until a new permit is issued. Due to current CDPHE backlogs, the permit renewal timeframe is unknown at this time. Our experience with the Permits unit and CDPHE's recent stakeholder meetings regarding nutrient control regulations suggests a new permit will be several years in the future. New nutrient regulations were planned for implementation in 2027;

however, CDPHE has delayed that date for streams until 2030 the earliest with 2033 being more likely.

Once new regulations are put into effect, they do not immediately apply to the facility until the facility's discharge permit is renewed. CDPHE has stated that their backlog of permit renewals will be addressed on a priority basis. This means the first renewals will be for those facilities that discharge to a highly sensitive water feature or have been shown to have many effluent violations where pollution would be a concern. Neither of which apply to the Waucondah WWTF. Once a permit is issued with new effluent limits, it must contain a compliance schedule for the permittee to make adjustments to meet the new limit. That compliance schedule is typically five years long. Based on this information as we know it today, if the new nutrient regulations are implemented in 2033, the facility's non-priority permit may get renewed in the three to five years following the new regulations. The compliance schedule in that permit to meet new nutrient regulations will be five years long, so the new limits would not actually be in effect until possibly 2041 or 2043. It is also noted that the CDPHE has conducted stakeholder meetings on the feasibility and implementation of the new nutrient regulations, which may provide options to permittees. Although not confirmed by CDPHE, the feasibility and implementation aspects may allow permittees to request longer compliance schedules to meet the implementation of new regulations, or argue for less restrictive limits due to feasibility (largely economic) of constructing improvements to meet the new regulations.

With all that said, trying to speculate on future permit conditions is very difficult as that arena is highly volatile today. The years stated above are just one possibility and are in no way guaranteed. The nutrient regulations must be closely tracked for planning purposes on any future upgrade projects. A new discharge permit implementing new regulatory effluent limits may be issued within the 20-year planning period, but the need to act on the new limits may not be within the 20-year planning period. This is because the exact level of nutrient effluent limits and the true impact they may have on the facility cannot be predicted at this time. Therefore, as the timing and scope of any upgrade project cannot be determined at this point, no major capital improvement projects are planned for the Waucondah WWTF during the 20-year planning period. It is noted that reminders have been included in the CIP Summary Matrix in Appendix C to track nutrient regulation progress so the CIP can be regularly updated

based on new information that becomes clear in the future. Updating the CIP as years go on will be critical to timely planning.

SECTION X

EVALUATION OF EXISTING WASTEWATER FACILITIES

This section evaluates the existing lift stations and wastewater treatment facilities for the Perry Park Water and Sanitation District (PPWSD). Recommended improvements to the wastewater facilities were then determined from this review.

A. LIFT STATIONS

The PPWSD owns and operates three (3) lift stations: Bannock, Red Rock, and Boreas. Based on projected population growth in West Perry Park, the service areas for the Bannock and Red Rock lift stations are assumed to develop the remaining vacant properties within the District's boundaries over the next 20 years. The Boreas lift station, serving a small portion of East Perry Park, is already near full build-out with minimal vacant lots remaining. When looking at lift station capacity, it is important to note that lift station capacity is considered to be the firm pumping capacity provided by the pump(s) and must meet the projected peak hour flow rate received at the lift station. Typically the peak hour factor is assumed to be four times the average day flow for a small service area. That is the assumption made for the PPWSD lift stations. The following table provides a summary of each of the lift station pump capacities, along with current and future wastewater flows.

TABLE 27
PERRY PARK WATER AND SANITATION DISTRICT
LIFT STATION PUMP EVALUATION

Lift Station	Existing Pump Manufacturer	Existing Pump Model	Existing Pump Capacity, gpm	Current Influent Flow, gpm	Projected 2045 Future Average Day Influent Flow, gpm	Projected 2045 Future Peak Hour Influent Flow, gpm
Bannock	Sulzer	XFP 100E-CB1	130	22	27	108
Red Rock	Smith and Loveless	4C3	176	139	43	172
Boreas	Smith and Loveless	4B2D	80	6	7	28

1) Assuming worst-case scenario of future growth with a spike of an additional 50 taps as predicted in prior 2016 Master Plan

1. Bannock Lift Station

The Bannock lift station was reviewed using a combination of field data, available as-built drawings, and approximate surface elevations to determine if the lift station would be able to sustain population growth for the 20-year planning period. The Total Dynamic Head (TDH) was calculated and found to align with the pump performance curve provided by the District. The existing pump capacity is 130 gallons per minute (gpm) at 54 feet of head.

Pump run times and wet well fill times were also reviewed to confirm that the pumps are operating within acceptable duty cycles and are not being overused. The evaluation concluded that the existing pumps can support projected flows over the next 20 years based on population growth estimates.

This lift station underwent significant improvements in 2018, including pump replacements. According to the manufacturer, the current pumps have a lifespan of 50,000 to 100,000 operating hours. At the time of inspection, the pumps have logged only 3,692 hours. With proper maintenance, replacement based on expected life span or expansion for projected future loadings should not be necessary within the 20-year planning period.

2. Red Rock Lift Station

For the Red Rock Lift Station, field measurements and estimated ground elevations were used to assess the its ability to accommodate growth over the 20-year planning horizon. The analysis included calculating TDH, which was calculated at approximately 213 feet of head. The lift station has two sets of two (2) pumps in series, each rated at 176 gpm at 108 feet of head, therefore, the station has a current capacity of 176 gpm at 216 feet of head with one set being a standby. Current wastewater flows are approximately 35 gpm with 27 gpm coming from the Bannock Lift Station and 8 gpm from vacant properties within the Red Rock service area.

Future development, as outlined in the District's 2016 Master Plan, includes approximately 50 additional taps from the vacant properties located within the lift

station's existing service area. The wastewater flow from these additional properties increases the lift station loading to 43 gpm. The current pump capacity is sufficient to handle the increased flow from these taps.

However, the proposed Sandstone Ranch development, located southeast of West Perry Park, may exceed existing pumping capacity. The development consists of 110-single-family lots and will increase the wastewater loadings to 58 gpm. While it appears that the existing lift station can handle this additional load, Sandstone Ranch includes its own proposed lift station. The additional 110 taps from this development only account for an additional 15 gpm in this evaluation, but it's possible the proposed lift station will have a higher pumping capacity.

The Red Rock Lift Station was upgraded in 2012, at which time the pumps were also replaced. Smith and Loveless states a pump lifespan of over 25 years, projecting the next replacement around 2037. At the time of inspection, one pump had logged 4,976 hours of run time and the other 1,554 hours. Based on the expected life span of the pumps and the large potential for future lot development and connection to the lift station, the following assumptions have been made. The pumps will require replacement at the 25-year life span predicted by the manufacturer. That cost to replace the pumps and maintain current capacity will be included as a capital improvement by the District. As time goes on, the future developments that could contribute additional flow to the lift station will be responsible for upgrading the lift station to meet the additional capacity demands of their lot development. This approach ensures the PPWSD will plan for maintaining its facilities at their rated capacity in case significant development is not added to the lift station in that timeframe. At the same time, this approach ensures that development pays its own way by providing upgrades to accommodate increased capacity when it is needed from additional developed lots. If development comes sooner than the life span replacement of the pumps, then upgrades to the lift station to satisfy the additional demands can be completed by the development and the District avoids the costs of replacement pumps. Since this CIP is a living document that will be updated on a regular basis, these assumptions can be reviewed year after year to adjust the CIP according to development conditions and trends.

3. Boreas Lift Station

As with the other lift stations, the Boreas lift station was also evaluated using field inspection data and estimated surface elevations to determine whether it could continue to serve projected demands through the 20-year planning period. The calculated TDH was consistent with the pump performance curve, which indicates a pump capacity of 80 gpm at 62 feet of head. Pump run times and wet well fill times indicate operations are within acceptable duty cycles and are not being overused.

The lift station serves an area that is nearly built out, with only four (4) vacant lots remaining. The District's 2016 Master Plan includes a proposed lift station for the Meribel Village development, located northwest of East Perry Park, which is not currently planned to discharge into the Boreas service area. Therefore, no additional development flows were included in this evaluation. If future development flows are rerouted to the Boreas Lift Station, the facility will need to be reevaluated based on updated flow projections and field data. At that time, the new development that would contribute additional loading to the lift station should be responsible for any upgrades required to the lift station in order to accommodate the additional loading. The expansion expense should not be borne by the PPWSD if it is initiated by other development.

The vacuum primer component was recently replaced and at the time of inspection, the pumps had logged approximately 5,424 hours of run time. The O&M manuals date back to 1996, but based on runtime data, the pumps were likely replaced within the past 10 years. Replacement may be necessary within the 20-year planning period.

As part of long-term system planning, the District should also account for the replacement of aging lift station equipment nearing the end of its service life. Pumps, electrical panels, and control systems at each of the lift station sites have exceeded or will approach their expected lifespans within the 20-year planning period from 2025 through 2045. Proactive replacement of these components will help maintain operational reliability.

B. SAGEPORT WASTEWATER TREATMENT FACILITY

The Sageport WWTF serves only the East Perry Park area. Originally constructed in 1972, the facility has undergone multiple upgrades over the years. Based on current hydraulic loading projections, the WWTF is expected to reach 80% of its existing hydraulic capacity within the 20-year planning period. By crossing the 80% threshold of rated capacity, the facility is required to initiate planning and design of a facility expansion at this point.

The Sageport WWTF was evaluated in a 2023 Preliminary Engineering Report (PER) which analyzed various secondary treatment process alternatives which could satisfy the recently enacted total inorganic nitrogen (TIN) effluent limits in the facility's discharge permit. This evaluation considered the ability of different processes to accommodate future increases in loading and to meet the more stringent effluent discharge requirement. Currently, the facility consistently meets effluent limits for BOD, TSS, e. coli, and total phosphorous as shown in the discharge monitoring reports (DMRs). While the facility has historically met the effluent limits for TIN, concentrations are only slightly below the regulatory threshold. Sampling and testing indicate that some nitrification is occurring within the existing rotating biological contactor (RBC) units; however, little denitrification is taking place. In its current configuration, the facility is unlikely to consistently meet new TIN limits in the CDPS permit, especially as growth continues.

Several alternatives were evaluated in the PER for the District to meet the new TIN limit. Of the multiple secondary treatment processes evaluated, two processes were identified as the most viable alternatives. Those options were the sequencing batch reactor (SBR) process and the four stage Bardenpho process. Preliminary design calculations, equipment sizing, and cost estimates were prepared for these two options. Based on the systems' treatment capability, ease of expansion, ability to be integrated into the other treatment processes at the facility, and cost effectiveness, the SBR secondary treatment process is recommended to replace the existing RBC process at the Sageport WWTF.

Implementing the SBR treatment process will require its integration into the existing unit processes operating at the Sageport WWTF. Additionally, in order to ultimately serve projected future loading and accommodate previously committed sewer taps, a capacity expansion of the facility was recommended. The capacity expansion would include a new

SBR secondary treatment process. The impact on other unit processes will vary from little or no impact, to requiring those unit processes to be expanded or improved to accommodate the SBR treatment system and the capacity expansion proposed.

There are numerous facets to the proposed expansion project. Rather than repeat all of those details in this report, further details can be gathered by referring to the 2023 Sageport Wastewater Treatment Facility PER.

As mentioned earlier, the Sageport WWTF Expansion project is no longer planned for near future implementation. Due to financial strains, the PPWSD has delayed the project for an estimated six years. The components planned for decommissioning or replacement in the expansion project are not suggested for replacement in the hopes that they will continue to function properly until the project is enacted. To maintain long-term reliability of the Sageport WWTF, components that are not being replaced with the SBR capacity expansion can be scheduled for replacement according to expected lifespans. Components such as the mechanical bar screen, the clarifier drive motor, clarifier controls, flocculation basin mixers, and ultrasonic level sensors have exceeded or will approach their expected lifespans within the 20-year planning period from 2025 through 2045. While smaller items such as tank mixers, level sensors and other instruments can be covered under normal maintenance budgeting, implementing a proactive replacement schedule for the larger assets noted will help extend the life of the WWTF.

C. WAUCONDAH WASTEWATER TREATMENT FACILITY

The Waucondah WWTF, located in West Perry Park, handles wastewater solely from customers on the west side of the District. Originally constructed in 1970 as a packaged wastewater treatment plant, the facility has undergone multiple upgrades over the years. Based on current hydraulic loading projections, the WWTF is not expected to reach 80% of its existing hydraulic capacity within the 20-year planning period.

A review of several WWTF processes was conducted to assess whether their capacities would be exceeded within the planning period. The existing 3-inch Parshall influent flume and 60-degree V-notch effluent weir were evaluated under current and projected future hydraulic loadings. The analysis determined that both the flume and weir have sufficient

capacity to accommodate anticipated flows. Similarly, the primary and secondary clarifiers were assessed and found to be adequate for future flow projections.

In 1980, the original packaged WWTP building was converted into an aerobic digester. The current volume of the digester is inadequate to reliably produce acceptable biosolids at current annual average loading. Performance evaluations, particularly those based on solids retention time (SRT), indicate substandard performance. In addition, the existing aeration system is inadequate and does not provide the necessary oxygen to maintain dissolved oxygen residual. Recent biosolids testing for standard oxygen uptake rates (SOUR) have eventually passed according to CDPHE regulations, but those tests show the margin for passing is narrowing. The system experiences regular equipment failures that are increasing in frequency and customer complaints have been received for odors and noise.

To address these deficiencies, a full replacement of the digester facilities has been planned and is currently moving forward. The proposed Waucondah WWTF Phase 2 Improvements project focuses on the solid stream treatment process, with no changes to the liquid stream treatment process except for the planned replacement of the UV disinfection system. The new aerobic digestion facilities will maintain similar operations to the current system but with expanded capabilities and enhanced performance and reliability. The general scope of the project includes the following items, refer to the construction documents for the project for additional details.

- Two aerobic digester basins
- One solids holding tank
- Diffused aeration system in each of the three process tanks
- Decant mechanisms in each of the three process tanks
- Sludge transfer pumps and piping in each of the three process tanks
- Blower building with three duty aeration blowers and one standby unit
- Blower building electrical and control room for power distribution and process control
- WAS pump vault, pumps, piping and controls
- Upgraded primary sludge pumps
- UV disinfection system with redundant capabilities
- Backup generator with automatic transfer switch and controls

- Electric service upgrades to power new systems and equipment
- Replacement of access driveways and sidewalks across site

To maintain long-term reliability of the Waucondah WWTF and its systems outside the digest system, several components other than those being replaced in the Phase 2 project can be scheduled for replacement according to expected lifespans. Components such as the mechanical bar screen, the clarifier drive motors, RBC blowers, flocculation basin mixers, ultrasonic level sensors, chemical feed pumps, chemical storage tank mixers and various WWTF controls have exceeded or will approach their expected lifespans within the 20-year planning period from 2025 through 2045. It is recommended that smaller items such as instrumentation, tank mixers and feed pumps be tracked and replaced under normal maintenance budgeting. Implementing a proactive replacement schedule for the larger assets noted will help extend the life of the WWTF.

SECTION XI

WASTEWATER SYSTEM CAPITAL IMPROVEMENT NEEDS

In order to ensure long term reliability, efficiency and regulatory compliance, the PPWSD wastewater system requires focused improvements. Based on the prior discussions and details, this section identifies key areas where improvements are needed. It also presents recommendations and preliminary costs for capital improvements that will support sustainable system performance through the 20-year planning period. As with the water system evaluation, improvements with an estimated cost of less than \$30,000 were not included in the Capital Improvement Plan (CIP). That dollar value was selected as a reasonable amount that can be addressed through routine maintenance rather long term planning and budgeting that is better suited for large expenditures. Itemized cost estimates for each of the proposed CIP improvements are provided in Appendix D. Refer to Appendix C for the Capital Improvements Plan (CIP) Cost Summary Matrix which is a tabulation of all recommended improvement costs estimated for each year in which they are planned over 20-year planning period.

A. LIFT STATIONS

1. Red Rock Lift Station

As discussed in previous sections, the Red Rock lift station is in a unique situation where it may or may not see the typical slowly increasing demands of an average population increase in its service area. Potential land development within its service area could come at a high rate if the potential future developments identified come to fruition. It is for that reason that the recommended capital improvements have been based on the lift station continuing its operations with minimal loading increase. This aligns with the notion that the PPWSD is responsible for equipment replacements to maintain current capacities, while development must pay its own way and be responsible for capacity increases that must be completed to accommodate the additional loadings induced by such development. This approach provides a reasonable capital cost projection for the PPWSD in its planning and budgeting. If development does not materialize over the 20-year planning period, the PPWSD is prepared to maintain their facilities as needed. Should new development be completed, then the facility upgrades needed to handle the

additional loadings will be accomplished by the development. In addition, should the new development be completed before the planned replacement work by the PPWSD, then the PPWSD will save the cost of equipment replacement to maintain capacity if the equipment is upgraded by the development to provide additional capacity. It is also important to note that the CIP is a living document to be updated regularly as time passes. Should development conditions change in the coming years, the CIP can be adjusted to account for the flux that most certainly can occur with development.

The brief description and cost of upgrading the Red Rock Lift Station is estimated as follows:

- Red Rock Lift Station upgrades (2037) - \$490,000
 - The lift station improvements include new pumps, dry pit exhaust fan, instrumentation and SCADA upgrades and a new emergency backup generator with transfer switch gear. This cost is a worst case scenario which also includes a new wet well.

2. Bannock and Boreas Lift Stations

As the Bannock Lift Station and the Boreas Lift Station are in similar stations where their build-out or future loading projections are limited and their current capacities are sufficient to meet projected future demands. Unlike the Red Rock Lift Station, the future loading scenario for these lift stations is much more defined and limited. Therefore, they have been grouped together as their recommended improvements will be very similar. To ensure operational reliability, lift station pumps and associated electrical and control systems should be replaced approximately every 15 to 20 years. Additionally, backup generators should be replaced or overhauled approximately every 30 years. Aging infrastructure can lead to reduced pumping efficiency, increased energy costs, and a higher risk of mechanical failure. As the pumps and controls for each of these lift stations are approaching or have exceeded the typical service life within the 20-year planning period, replacements are recommended at each lift station site as part of the CIP.

The brief descriptions and costs of replacing aging equipment at the Bannock and Boreas lift station sites is estimated as follows:

- Bannock Lift Station (2038) – \$246,000
 - Improvements include the replacement of the existing submersible pumps, upgrades to the existing lift station electrical and control systems, and installation of a new emergency generator all due to aging.
- Boreas Lift Station (2040) – \$186,000
 - Improvements include the replacement of the existing vacuum prime pumps, upgrades to the existing lift station electrical and control systems, and an overhaul of the existing emergency generator all due to aging.

B. SAGEPORT WASTEWATER TREATMENT FACILITY

1. Sageport WWTF Capacity Expansion and SBR Treatment System

An evaluation of the Sageport WWTF assessed multiple secondary treatment processes for their ability to attain the new TIN limitations. The analysis also considered each process's capacity to accommodate future increases in facility loadings and the potential for more stringent effluent discharge requirements. Based on treatment performance and cost-effectiveness, a sequencing batch reactor (SBR) process is recommended to replace the existing rotating biological contactor (RBC) process at the Sageport WWTF. To serve projected future loadings and accommodate previously committed sewer taps, a facility capacity expansion is also recommended.

The proposed capacity expansion will enable the District to effectively manage and treat projected loadings through the design life of the facility, while also accounting for previously committed service connections. The new SBR system will support both nitrification and denitrification, allowing the facility to achieve compliance with new total inorganic nitrogen (TIN) effluent limits. In addition, the SBR process will provide operational flexibility and modular scalability to support future increases in loading and/or more stringent effluent limitations.

The scope of recommended improvements are provided in the 2023 PER along with cost estimates. Recent updates to the project cost estimates were completed to aid in planning and budgeting for the PPWSD. Based on the recent updates, the estimated cost of the Sageport WWTF Expansion project is as follows:

- Sageport WWTF Improvements - \$11,700,000

2. Sageport WWTF Equipment Replacement

Many components of the Sageport WWTF are nearing the end of their typical service life and should generally be replaced every 10 to 20 years depending on equipment type, operational conditions, and maintenance history. These replacements are essential to maintain treatment efficiency, and prevent equipment failure. Aging mechanical systems and sensor technologies can lead to reduced operational reliability and increased maintenance needs. To extend the useful life of the facility and maintain performance, several key capital improvements are recommended. These improvements are outside the scope of work defined for the Sageport WWTF Expansion project and will be necessary regardless of the timing of that project.

The cost of replacing aging equipment at the Sageport WWTF is estimated as follows:

- Clarifier Equipment Replacement (2028) – \$96,000
 - Improvements include replacing the existing ½ HP clarifier drive motor, gear box and associated controls due to aging.
- Headworks and Flocculation Basin Equipment Replacement (2038) – \$240,000
 - Improvements include replacing the mechanical bar screen, replacing the control system for the mechanical bar screen and mixers for the floc basin due to aging.

C. WAUCONDAH WASTEWATER TREATMENT FACILITY

1. Waucondah WWTF Phase II Improvements

As previously discussed, the improvements for the Waucondah WWTF associated with capacity issues are primarily constrained to the aerobic digester system. The Waucondah Phase 2 Improvements project is currently underway to address the aerobic digester system, the UV disinfection system and the emergency generator at the site. There has been coordination with the PPWSD on the award of the construction contract, based on the information shared in those coordination efforts, the projected costs associated with constructing the project is as follows:

- Waucondah WWTF Phase 2 Improvements (2025 – 2027) - \$9,000,000

2. Waucondah WWTF Equipment Replacement

There are mechanical and electrical components at the Waucondah WWTF that are approaching or have exceeded their typical service life that are not included in the scope of work for the Waucondah WWTF Phase 2 Improvements project. The rotating biological contactor (RBC) system is critical to the treatment processes at the facility. Both RBCs are aging and require regular maintenance. In order to plan for maintaining their operation, it is recommended to replace the drive mechanisms and main drive shafts within the 20-year planning period. Because of their age, other maintenance and repairs may be needed, but the cost and effort to replace the drive mechanisms and shafts can be large and is best planned in advance to budget properly. In addition, the logistics must be carefully coordinated, especially for the RBC shaft replacement which will require a crane to complete the work. It is also recommended to plan for the replacement of the drive motors and controls of the primary and secondary clarifiers, as well as the flocculation tank mixers. The following summarizes the costs associated with these additional equipment replacements:

- RBC replacements (2032) - \$315,000
- Clarifier Drives and Flocculation Mixers (2029) - \$234,000

SECTION XII

RECOMMENDED SCHEDULE OF IMPROVEMENTS

An estimated schedule for the recommended improvements has been developed to guide the Perry Park Water and Sanitation District (PPWSD) in prioritizing and budgeting for capital projects over the 20-year planning period from 2025 through 2045. This schedule is intended to serve as a standalone planning tool that outlines the timing, costs, and sequence of proposed improvements across the water and wastewater systems. It will enable the District to effectively plan, budget, and allocate financial resources, pursue grant or loan funding opportunities, and coordinate design and construction efforts.

Improvements have been prioritized based on a combination of urgency, asset condition, regulatory drivers, and projected system capacity constraints. The schedule is phased to balance near-term needs with long-term sustainability and to spread out capital costs in a manageable way. Budgeting efforts should consider this schedule as a framework for annual capital planning and long-range financial forecasting. By reviewing the scheduled improvements each year, the District can incorporate high-priority projects into its annual budget, identify multi-year funding needs, and align project timelines with potential grant cycles, loan applications, and reserve fund strategies. This schedule also enables staff and the Board to anticipate upcoming costs, plan for design and permitting lead times, and make informed decisions about rate adjustments or financial policies to ensure adequate funding for future infrastructure investments.

Detailed descriptions of the recommended capital improvements have been provided in the CIP report in the previous sections above, along with estimated timeframe for implementing each improvement. Each recommended capital improvement also had a detailed cost estimate prepared to itemize costs across the entire scope of work. The total costs for each recommended improvement were included in the detailed description above, and copies of each detailed cost estimate are also provided in Appendix D. In order to pull this information together into a concise tool for PPWSD to use in their planning efforts, a Capital Improvements Plan Cost Summary Matrix was compiled to show the improvement costs recommended for each component of the water and wastewater systems in each year of the 20-year planning period. This matrix is included in Appendix XX.

A. WATER SYSTEM IMPROVEMENTS

The most significant water system improvement is the construction of the new Glen Grove Water Treatment Plant (WTP) to serve West Perry Park. While the combined capacities of the Glen Grove WTP and Sageport WTP are capable of meeting the system's needs until at least 2045, increasing water demands will exceed the current treatment capacity soon after. In addition, relying solely on the Sageport WTP to supply both East and West Perry Park places strain on a single facility and a single transmission main, creating long-term risks for system redundancy and reliability. The new Glen Grove WTP is therefore recommended not only to meet projected capacity demands, but also to improve system resilience, reduce dependence on a single treatment source, and provide operational flexibility. The Glen Grove expansion project cost has been put as a placeholder in year 2045 for the PPWSD to re-evaluate the demand conditions at that time. The Sageport WTP is also ongoing upgrades to address radium treatment. Based on information provided by the PPWSD, the anticipated costs of that project are projected across 2026 and 2027.

In preparation for this project, the existing and active shallow alluvial wells in West Perry Park will need to be upgraded to ensure a sufficient raw water supply to the new plant. These well improvements are scheduled for earlier phases of the CIP to stagger costs and minimize budget strain. Well performance testing is prioritized first to determine the existing wells' production capability and the extent of the improvements required for each well. The West Plum No. 2 well is then prioritized first for rehabilitation due to the structural failure of its metering vault.

Other water system improvements over the 20-year planning period include replacement of aging mechanical and electrical components, such as WTP air wash blowers, various flow meters and instrumentation, pumps, and tank recoating, particularly at facilities with equipment exceeding typical service life. These projects are recommended to ensure continued system reliability and operational efficiency.

B. WASTEWATER SYSTEM IMPROVEMENTS

Improvements to the Waucondah Wastewater Treatment Facility (WWTF) are already underway, so associated costs are projected from 2025 to 2027. These improvements are

necessary because the current volume of the digester is inadequate to reliably produce acceptable biosolids at the existing annual average loading. the project improvements will provide improved solids treatment, stabilization, handling and quality. Recommended improvements at the Sageport WWTF are planned for initiation in 2031. Although the current RBCs are at their limitations for treating TIN, financial stressors are delaying the project for an anticipated six years. The need for capacity expansion at the Sageport WWTF is also recognized and is planned to be incorporated into the facility upgrade project. Once initiated, the project design, approval and construction is anticipated to span 4 years. Therefore, the costs have been spread across years 2031 to 2035.

Other wastewater-related projects included replacements at the three lift stations and other work at the WWTFs on items not being addressed in the described major projects, such as sludge pumps, motor controls, electrical and control system equipment and mechanical bar screens, all of which are essential to ensure long-term compliance and performance of aging infrastructure. These upgrades are generally scheduled across the first 10 years of the plan, reflecting the needs of equipment condition, spreading out costs and cost-effectiveness of early action.

Those are the major capital improvements identified in this CIP report. It is important for the PPWSD to treat this CIP report and its tools as living documents that must be reviewed and updated on a regular basis. By maintaining these tools and keeping them updated, current and accurate planning strategies can be implemented based on this information to better position the PPWSD for long-term stability, both from a functional systems standpoint and a financial position.

APPENDIX A – WATER SYSTEM FIELD INVENTORY

GMS, Inc.
Perry Park Water and Sanitation District
Capital Improvement Plan

Water System Field Inventory

Facility Description	Equipment Details	Date of Installation	Condition	Notes
Wells				
Glen Grove Well		2006	Fair	
Pump	Goulds 5-hp submersible pump	2007	-	Did not pull pump for visual inspection - no complaints mentioned
Drop Pipe	4-inch galvanized steel drop pipe	2006	-	Did not get visual look at drop pipe - no complaints mentioned
Flow Meter	Seametrics flow meter	2006	Fair	Located inside Glen Grove WTP
Controls	Eaton enclosed SVX drive		Good	
Grant Ditch		2002	Fair	
Pump	Burekely 5-hp submersible pump	2002	-	Did not pull pump for visual inspection - no complaints mentioned
Drop Pipe	3-inch galvanized steel drop pipe	2002	-	Did not get visual look at drop pipe - no complaints mentioned
Flow Meter	Water Spec flow meter	2002	Poor	Insulation appears to have deteriorated. Manhole in good condition
Controls	Eaton enclosed SVX drive		Good	
West Plum No. 1		1997	Poor	Non-use well. Well head appears to be in good condition. High concentration of iron in raw water.
Pump	Goulds 7.5-hp submersible pump	1998	-	Did not pull pump for visual inspection - no complaints mentioned
Drop Pipe	10-inch steel drop pipe	1998	-	Did not get visual look at drop pipe - no complaints mentioned
Flow Meter	Unknown		Fair	Not in use
Controls				
West Plum No. 2		2001	Fair	
Pump	Goulds 10-hp submersible pump	2003	-	Did not pull pump for visual inspection - no complaints mentioned
Drop Pipe	3-inch galvanized steel drop pipe	2001	-	Did not get visual look at drop pipe - no complaints mentioned
Flow Meter	Sensus flow meter	2001	Poor	Wood encased meter has collapsed
Controls	Eaton enclosed SVX drive		Good	
Arapahoe No. 2		2007	Fair	
Pump	Brundfos 75-hp submersible pump	2014	-	Did not pull pump for visual inspection - no complaints mentioned
Drop Pipe	4.5-inch J55 steel drop pipe	2007	-	Did not get visual look at drop pipe - no complaints mentioned
Flow Meter	Neptune flow meter	2007	Fair	
Controls	Palmer Drives Controls and System	2023	Good	
Variable Frequency Drive	Rockwell Automation VFD	2024	Good	
Arapahoe No. 3		2004	Fair	
Pump	Brundfos 75-hp submersible pump	2004	-	Did not pull pump for visual inspection - no complaints mentioned
Drop Pipe	4-inch steel drop pipe	2004	-	Did not get visual look at drop pipe - no complaints mentioned
Flow Meter	Invensys flow meter	2004	Fair	
Controls	Palmer Drives Controls and System	2023	Good	
Variable Frequency Drive	Rockwell Automation VFD	2024	Good	
Generator	Generac 2000 Series diesel generator	1999/2023	Good	
Arapahoe No. 4		2000	Fair	
Pump	Summit 120-hp submersible pump	2019	-	Did not pull pump for visual inspection - no complaints mentioned
Drop Pipe	4.5-inch J55 steel drop pipe	2000	-	Did not get visual look at drop pipe - no complaints mentioned
Flow Meter	Hersey Meter	2020	Good	
Controls				
Variable Frequency Drive		2020	Good	
Denver No. 4		1994	Fair	
Pump	PI Pumps 75-hp submersible pump	2014	-	Did not pull pump for visual inspection - no complaints mentioned
Drop Pipe	4.5-inch J55 steel drop pipe	1994	-	Did not get visual look at drop pipe - no complaints mentioned
Flow Meter	Sensus flow meter		Fair	
Controls				
Variable Frequency Drive	Rockwell Automation VFD	2024	Good	
Solar Panel			Good	

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Perry Park Water and Sanitation District
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Water System Field Inventory

Facility Description	Equipment Details	Date of Installation	Condition	Notes
Sageport Water Treatment Plant				
Generator	Cummins Power Command 2.3 Generator	2020	Good	
Sageport WTP Old Side		1960s/1970s	Fair	
Pretreatment Tank - Liquid Chlorine	200 gallon HDPE tank		Fair	
Pretreatment Mixer			Fair	
Pretreatment Chemical Feed Meter	Stenner Pump Co. chemical feed metering pump	2023	Good	
Raw Water Static Mixer			Good	
Filter Unit 1	Upflow contact clarifier and gravity greensand filter	1960s/1970s		
Raw Water Influent Meter	Magmeter		Good	Exterior epoxy painting in good condition. Rusting where filter meets concrete and interior
Filter Media	Greensand	2019/2020	Good	
Epoxy Coating		2019/2020	Good	
Float and Probe Level	Great Lakes Instruments - Model 690L	1996	Fair	
Filter Unit 2	Upflow contact clarifier and gravity greensand filter	1960s/1970s	Fair	Exterior epoxy painting in good condition. Minimal rusting where filter meets concrete. Rusting and signs of deterioration on the inside
Raw Water Influent Meter	Magmeter		Good	
Filter Media	Greensand	2019/2020	Good	
Epoxy Coating		2019/2020	Good	
Float and Probe Level	Great Lakes Instruments - Model 690L	1996		
Filter Unit 3	Upflow contact clarifier and gravity greensand filter	1999	Fair	
Raw Water Influent Meter	Manometer flow gauge		Poor	According to operators - should be replaced soon
Filter Media	Greensand	2019/2020	Good	
Epoxy Coating			Fair	Minor rusting where filter meets concrete and at the corners of the filter unit
Float and Probe Level	Great Lakes Instruments - Model 690L	1999	Fair	
Filter Unit 4	Upflow contact clarifier and gravity greensand filter	1999	Fair	Minor rusting where filter meets concrete and at the corners of the filter unit
Raw Water Influent Meter	Manometer flow gauge		Poor	According to operators - should be replaced soon
Filter Media	Greensand	2019/2020		
Epoxy Coating			Fair	The bottom, where the filter meets the concrete, appears to have been sand blasted and painted on 2 sides in 2019/2020
Float and Probe Level	Great Lakes Instruments - Model 690L	1999	Fair	
Blower 1	Ametek Rotron regenerative blower	1999	Fair	Minor rusting and exterior deterioration
Blower 2	EG&G Rotron regenerative blower	1999	Fair	Moderate oxidation and minor exterior deterioration
Backwash Pump 1	Simflo pump	1999	Fair	Moderate rusting on motor. Did not pull pumps for visual inspection
Backwash Pump 2	Simflo pump	1999	Fair	Moderate rusting on motor. Did not pull pumps for visual inspection
Backwash Water Meter	Magmeter		Good	
High Service Pump 1	Goulds Pumps	2019	Good	Did not pull pumps for visual inspection
High Service Pump 2	Gould Pumps	2019	Good	Did not pull pumps for visual inspection
High Service Pump 3	Simflo pump	2012-2015	Good	Did not pull pumps for visual inspection
Finish Water Meter	McCrometer propeller meter	2020	Good	
Electrical and Controls		1960s/1970s	Fair	Original to plant construction with minor upgrades over the course of several years. The interior of the MCC will be upgraded and replaced in 2024

GMS, Inc.
Perry Park Water and Sanitation District
Capital Improvement Plan

Water System Field Inventory

Facility Description	Equipment Details	Date of Installation	Condition	Notes
Sageport New Side		2002	Good	
Pretreatment Tank - Potassium Per	150 gallon HDPE tank		Good	
Pretreatment Mixer	Lightnin mixer		Fair	
Pretreatment Chemical Feed Meter	Stenner Pump Co. chemical feed metering pump	2023	Good	
Pretreatment Tank - Liquid Chlorine	750 gallon steel tank	1994	Fair	
Pretreatment Chemical Feed Metering Pump		2023	Good	
Filter Unit 5	Upflow contact clarifier and gravity greensand filter	2002	Fair	
Raw Water Influent Meter	Water Specialties McCrometer propeller meter		Fair	
Filter Media	Greensand	2019/2020	Good	
Epoxy Coating			Fair	Moderate rusting at the top of the filter unit
Ultrasonic Level Transmitter	Siemens SITRANS ultrasonic level transmitter	2016-2018	Good	
Blower 3	FPZ regenerative blower	2013	Good	Minor rusting and exterior deterioration
Filter Unit 6	Upflow contact clarifier and gravity greensand filter	2002	Fair	Rusting at the top and interior with some peeling
Raw Water Influent Meter	Water Specialties McCrometer propeller meter		Fair	
Filter Media	Greensand		Good	
Epoxy Coating			Fair	
Ultrasonic Level Transmitter	Siemens SITRANS ultrasonic level transmitter	2016-2018	Good	
Blower 4	FPZ regenerative blower	2014	Fair	
Filter Unit 7	Upflow contact clarifier and gravity greensand filter	2019/2020		
Raw Water Influent Meter	Endress & Hauser magmeter	2019/2020	Good	
Filter Media	Greensand	2019/2020	Good	
Epoxy Coating		2019/2020	Good	
Ultrasonic Level Transmitter	Vegapuls WL 61 ultrasonic level transmitter	2019/2020	Good	
Blower 5	Regenerative blower	2019/2020	Fair	
Blower 6	Regenerative blower	2019/2020	Fair	
Backwash Pump 1	Simflo pump	2002	Fair	Did not pull pumps for visual inspection
Backwash Pump 2	Simflo pump	2002	Fair	Did not pull pumps for visual inspection
Treatment Tank - Seaquest	275 gallon HDPE tank		Good	
Treatment Chemical Feed Metering	Stenner Pump Co. chemical feed metering pump	2023	Good	
Clearwell Level Transmitter	Miltronics The Probe ultrasonic level transmitter		Good	
High Service Pump 1	Simflo pump	2002	Fair	Did not pull pumps for visual inspection
High Service Pump 2	Simflo pump	2002	Fair	Did not pull pumps for visual inspection
High Service Pump 3	Simflo pump	2002	Fair	Did not pull pumps for visual inspection
Finish Water Meter	McCrometer propeller meter		Good	
Electrical and Controls		2019/2020	Good	

GMS, Inc.
Perry Park Water and Sanitation District
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Water System Field Inventory

Facility Description	Equipment Details	Date of Installation	Condition	Notes
Glen Grove Water Treatment Plant				
Chemical Storage Building			Good	
Pretreatment Tank - Seaquest	50 gallon HDPE tank			
Pretreatment Mixer	Brawn mixer		Fair	
Pretreatment Chemical Feed Meter	Pulsatron chemical feed metering pump	2023	Fair	
Pretreatment Tank - Polymer	60 gallon HDPE tank			
Pretreatment Mixer	Neptune Mixer		Good	
Pretreatment Chemical Feed Meter	Pulsatron chemical feed metering pump	2023	Good	
Pretreatment - Gas Chlorine Feeder	Regal Gas Chlorinator		Good	
Pretreatment - Gas Chlorine Injector	Siemens gas chlorine injector	2010	Good	
Gas Chlorine - Cylinder Scale	Wallace & Tiernan gas cylinder scale		Good	
Raw Water Static Mixer	Koflo static mixer		Good	
Raw Water Influent Meter	Sensus flow meter		Fair	
Filter Unit 1	Pressurized Greensand filter	1980	Fair	Exterior filter coating peeling and rust identified in isolated areas
Filter Unit 2	Pressurized Greensand filter	1980	Fair	Exterior filter coating peeling and rust identified in isolated areas
Backwash Water Meter	Sensus flow meter		Fair	
Airwash Blower			Fair	
Turbidimeter	Hach 1720E Turbidimeter		Good	
Treated Water Meter	Sensus Omni flow meter	2017	Good	
Clearwell Bypass PRV			Good	
High Service Pump 1	200 gpm pump		Good	
High Service Pump 2	200 gpm pump		Fair	
Chlorine Analyzer	Hach colorimeter	2023	Good	
Generator	Generac 2000 Series diesel generator	1999	Fair	
Electrical and Controls		1980	Fair	
Pressure Reducing Valves				
Independence PRV	2.5-inch copper and 8-inch ductile iron water lines with PRVs.		Fair	Concrete vault in good condition. 2.5-inch copper pipe oxidizing. Influent/effluent gauges and valves in good condition
Tenderfoot PRV	2.5-inch and 8-inch galvanized steel water lines with PRVs.		Poor	of water infiltration. 8-inch galvanized steel pipe rusting. Portions of the 2.5-inch galvanized steel pipe replaced with PVC.
Poncha PRV	2.5-inch galvanized and 8-inch ductile iron water lines with PRVs.		Fair	Concrete vault in good condition, but water has collected at the bottom. 2.5-inch galvanized steel pipe oxidizing. Influent/effluent gauges in good condition
Silverheels PRV	2.5-inch PVC and 8-inch galvanized steel water lines with PRVs.		Poor	Concrete vault in good condition, some signs of root infiltration at riser rings. 8-inch galvanized steel pipe and both PRV valves rusting. Gauges in good condition
Quartz Mountain PRV	2.5-inch galvanized and 8-inch ductile iron water lines with PRVs.		Fair	Concrete vault in good condition. 8-inch PRV valve rusting. 2.5 inch galvanized pipe rusting in some spots
East-West PRV	3-inch and 12-inch ductile iron water lines with PRVs.		Good	Pipe, PRV valves, meter, and concrete in good condition. Very minimal water draining at the bottom potentially form a leak somewhere.
Pike Circle PRV	3-inch and 8-inch ductile iron water lines with PRVs.		Good	Pipe, PRV valves, and concrete in good condition.

APPENDIX B – WASTEWATER SYSTEM FIELD INVENTORY

GMS, Inc.
Perry Park Water and Sanitation District
Capital Improvement Plan

Wastewater System Field Inventory

Facility Description	Equipment Details	Date of Installation	Condition	Notes
Lift Stations				
Bannock Lift Station			Good	
Wet Well	6' ID precast manhole		Fair	
Pumps	130 gpm Sulzer submersible pump - x2	2018	-	Did not pull pump for visual inspection - no complaints mentioned
Pipe Enclosure		2018	Good	
Temporary Bypass Manhole	Precast manhole	2018	Good	Filled with water; unable to complete full inspection of manhole
Generator	Cummins Onan Genset generator	1994	Fair	
Float Level Control	Type S roto-float	2018	Good	
Controls and Electrical	EG Controls	2018	Good	
Red Rock Lift Station			Good	
Wet Well	6' ID precast manhole w/ square aluminum hatch		Fair	Minor root infiltration in manhole; wet well hatch started rusting in limited places
Pumps	176 gpm Smith and Loveless 4C3	2012	Fair	
Pipe Enclosure		2012	Good	Some signs of water infiltration spotted on concrete walls in select places
Exhaust Fan System	Greenheck upblast centrifugal roof exhaust fans	2012	Good	
Overflow Manhole	6' ID precast manhole	2012	Good	
Float Level Control			Good	
Generator	Cummins Onan Genset generator		Fair	Panel on generator detached; upgrades made to control panel in 2012
Controls and Electrical	EG Controls	2012	Good	
Boreas Lift Station			Fair	No overflow manhole on site
Wet Well	4' ID precast manhole		Fair	
Pumps	80 gpm Smith and Loveless 4B2D	1996	Fair	
Pipe Enclosure			Poor	To be replaced in 2024
Generator	Cummins Onan QuietSite II		Fair	
Float Level Control			Fair	
Rotary Phase Converter Generator	North America Rotary Phase Converter Generator	2024	Good	
Controls and Electrical			Fair	

GMS, Inc.
Perry Park Water and Sanitation District
Capital Improvement Plan

Wastewater System Field Inventory

Facility Description	Equipment Details	Date of Installation	Condition	Notes
Wastewater Treatment Facilities (WWTF)				
Sageport WWTF				
Headworks Building			Good	
Influent Metering Assembly	8-inch Palmer-Bowlus flume		Good	
Ultrasonic Level Sensor	Teledyne ISCO ultrasonic flow meter		Good	
Headworks Bar Screen	Duperon mechanical bar screen	2018	Good	
Controls	Duperon controls	2018	Good	
Grit Channels	Cast in place concrete		Good	
Equalization Basin				
RBC #1	Lyco RBC U.S. Filter		Good	
Tankage	Cast in place concrete		Good	
Enclosure	Fiberglass		Fair	
Motor	Baldor SuperE motor; Browning drive transmission		Fair	
Main Treatment Building				
RBC #2			Good	
Tankage	Cast in place concrete		Good	
Motor			Fair	
Blower #1			Good	
Blower #2			Good	
Blower #3	Universal Blower RAI		Good	
Blower #4	Elmo Pietschie		Fair	
Blower #5	Elmo Pietschie		Fair	
Blower #6	Elmo Pietschie		Good	
Phosphorus Control System				
Alum Tank	2000 gallon steel tank	1994	Good	
Metering Pump	Pulsatron Pulsafeeder electronic metering pump	2015	Fair	
Flocculation Basin	Cast in place concrete	1993	Good	
Floc Mixers	1/4 HP mixer	2010	Fair	
Coagulation Tank	150 gallon steel tank	1993	Fair	
Mixer	Lightnin Mixer		Fair	
Polymer Tank	Snyder Industries 55 gal HDPE tank	2005	Good	
Mixer			Fair	
Metering Pump	Pulsatron Pulsafeeder electronic metering pump	2004	Fair	
Soda Ash Tank	150 gallon steel tank	1994	Fair	
Mixer	Lightnin Mixer		Fair	
Metering Pump	Pulsatron Pulsafeeder electronic metering pump	2023	Fair	
Controls	General Electric		Fair	
Secondary Clarifier	Cast in place concrete	2008	Good	
Motor and drive	SEW-Eurodrive inc. motor; Amwell clarifier drive	2008	Good	
Controls		2008	Good	
Aerobic Digester	Cast in place concrete	1972	Good	
WAS Pump	submersible pump		-	Did not pull pump for visual inspection - no complaints mentioned
Waste Sludge Pump	Sulzer ABS pump		-	Did not pull pump for visual inspection - no complaints mentioned
Effluent Channel	Cast in place concrete		Good	
UV Disinfection	Trojan UV3000 PTP System		Good	
Effluent Metering Assembly	3-inch Parshall Flume		Good	
Ultrasonic Level Sensor			Fair	
Controls			Good	
Generator	Generac 2000 Series	1999	Fair	Upgrades in 2019

GMS, Inc.
Perry Park Water and Sanitation District
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Wastewater System Field Inventory

Facility Description	Equipment Details	Date of Installation	Condition	Notes
Wastewater Treatment Facilities (WWTF) (cont'd)				
Waucondah WWTF				
Influent Metering Manhole	OPENCHANNELFLOW fiberglass packaged meter manhole	2022	Good	
Influent Metering Assembly	3-inch Parshall Flume	2022	Fair	
Ultrasonic Level Sensor	TIENet ultrasonic flow meter	2022	Good	
Grit Channels			Fair	
Headworks Building		2021	Good	
Headworks Bar Screen	Duperon mechanical bar screen	2013	Good	
Controls	Duperon controls	2013	Good	
Primary Clarifier	Buried reinforced concrete tank	1980	Fair	Structural repairs to motor support concrete in 2022
Motor and drive	Three phase AC induction 1/2 HP motor; Denver Equipment Division Joy Manufacturing Co	1980	Fair	
RBC #1	Packaged unit	1980		
Tankage	Buried concrete tank	1980	Fair	Groundwater infiltration near motor housing
Enclosure	Fiberglass with observation ports	1993	Good	
Motor			Good	
RBC #2	Packaged unit	2000		
Tankage	Buried concrete tank	2000	Good	
Enclosure	Fiberglass with observation ports	2000	Good	
Motor	Leeson TEFC 5 HP motor; Line-O-Motor enclosed gear drive	2012; 2001	Fair	
Blower Building				
Blower #1	Ametek Regenerative blower 15 HP	2020	Good	
Blower #2	Ametek Regenerative blower 15 HP	2020	Good	
Controls	Intermatic 24 hr & Square D	2020	Good	
AWT Building				
Alum Tank	5100 gallon steel tank	1994	Fair	Appears to have been some spills in the past
Metering Pump	Stenner Pump Company	2023	Fair	
Electrical & Controls			Fair	
Flocculation Basin	Cast in place concrete	1993	Fair	
Floc Mixers	1/3 HP	1993	Fair	
Secondary Clarifier	Buried reinforced concrete tank		Fair	
Motor and drive	1/2 HP motor; Denver Equipment Division Joy Manufacturing Co	1980	Fair	
Air Lift Manhole		1980	Fair	
Pump Building			Good	
Primary Sludge Pump #1	WEMCO SFD4 200 gpm	2023	Good	
Primary Sludge Pump #1 Motor	Toshiba 2 HP motor	2015	Fair	
Primary Sludge Pump #2	WEMCO SFHD4 203 gpm	2022	Good	
Primary Sludge Pump #2 Motor	NEMA Premium Industrial motor		Fair	Drive cover detached
Controls	Siemens-Allis MCC		Fair	
Digester Building	Repurposed packaged WWTP	1990	Poor	
Tankage and Clarifier	Repurposed packaged WWTP	1970		
Digester Thickener Drive Motor	1/4 HP	1970	Fair	
Digester Blower #1	Gardner Denver 5M positive displacement	1989	Poor	
Digester Blower #2	Gardner Denver 5M positive displacement	2014	Fair	
Digester Blower Motor #1	Baldor Reliance 10 HP motor	2020	Poor	
Digester Blower Motor #2	Baldor Reliance 10 HP motor	2020	Fair	
Soda Ash Tank	750 gallon steel tank	1994	Fair	
Mixer	Neptune Mixer		Poor	Appears that work is being done to the mixer
Metering Pump	Stenner Pump Company	2023	Good	
Effluent Channel		1980	Good	
UV Disinfection	Trojan UV3000 PTP System		Good	
Effluent Metering Assembly	V notch weir	2022	Good	

GMS, Inc.
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Wastewater System Field Inventory

Facility Description	Equipment Details	Date of Installation	Condition	Notes
Ultrasonic Level Sensor	TIENet ultrasonic flow meter	2022	Good	
Controls		2022	Good	
Generator	Generac 2000 Series	1999	Fair	
Electrical and Controls			Good	

APPENDIX C – CAPITAL IMPROVEMENT PLAN COST SUMMARY MATRIX

PERRY PARK WATER AND SANITATION DISTRICT
CAPITAL IMPROVEMENTS PLAN COST SUMMARY MATRIX

SYSTEM CATEGORY AND DESCRIPTION	YEAR																				
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
WATER SYSTEM																					
Well																					
Arapahoe No. 2										\$210,000											\$372,000
Arapahoe No. 3		\$210,000																			
Arapahoe No. 4															\$324,000						
Denver No. 4										\$198,000											
Glen Grove					\$254,800																
Grant Ditch				\$105,000																	
West Plum No. 1																					
West Plum No. 2		\$72,000	\$282,800																		
Water Treatment Plant (WTP)																					
Sageport WTP		\$1,500,000	\$1,650,000		\$86,400	\$630,000								\$46,800							
Glen Grove WTP																					\$7,931,000
Pressure Reducing Valve Vault (PRV)																					
Independence PRV								\$37,800													
Tenderfoot PRV			\$52,200																		
Poncha PRV																					
Silverheels PRV						\$52,200															
Quartz Mountain PRV																					
East-West PRV																					
Booster Pump Station (BPS)																					
Fox Way / Pike Drive BPS				\$426,000							\$102,000										
Water Storage Tank																					
School House Tank						\$910,000															
Echo Hills Tank No. 1																					
Echo Hills Tank No. 2																					
Hog John Tank No. 1															\$329,000						
Hog John Tank No. 2															\$329,000						
Water Meters		\$1,250,000	\$1,250,000																		
Water System Yearly Totals	\$0	\$3,032,000	\$3,235,000	\$531,000	\$341,200	\$1,592,200	\$0	\$37,800	\$0	\$408,000	\$102,000	\$0	\$0	\$46,800	\$982,000	\$0	\$0	\$0	\$0	\$0	\$8,303,000
WASTEWATER SYSTEM																					
Lift Station (LS)																					
Bannock LS														\$246,000							
Red Rock LS													\$490,000								
Boreas LS																\$186,000					
Wastewater Treatment Plant (WWTF)																					
Sageport WWTF				\$78,000			\$500,000	\$1,200,000	\$5,000,000	\$5,000,000				\$222,000							
Waucondah WWTF	\$1,000,000	\$6,000,000	\$2,000,000		\$216,000			\$308,000			1)			1)			1)			1)	
Wastewater System Yearly Totals	\$1,000,000	\$6,000,000	\$2,000,000	\$78,000	\$216,000	\$0	\$500,000	\$1,508,000	\$5,000,000	\$5,000,000	\$0	\$0	\$490,000	\$468,000	\$0	\$186,000	\$0	\$0	\$0	\$0	\$0
Combined Water + WW Systems Yearly Totals	\$1,000,000	\$9,032,000	\$5,235,000	\$609,000	\$557,200	\$1,592,200	\$500,000	\$1,545,800	\$5,000,000	\$5,408,000	\$102,000	\$0	\$490,000	\$514,800	\$982,000	\$186,000	\$0	\$0	\$0	\$0	\$8,303,000

1) Revisit nutrient regulations to track CDPHE progress on defining the regulatory requirements and timing of implementation

APPENDIX D – DETAILED COST ESTIMATES FOR RECOMMENDED IMPROVEMENTS

GMS Inc.
Perry Park Water and Sanitation District
West Wells Itemized Cost Estimate

STEP DRAWDOWN TEST AND CONSTANT RATE PUMP TEST

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$15,000	\$15,000
2.	Step Drawdown Test			
a.	Grant Ditch Well	1 EA	\$7,500	\$7,500
b.	Glen Grove Well	1 EA	\$7,500	\$7,500
c.	West Plum No. 2 Well	1 EA	\$7,500	\$7,500
3.	Constant Rate Pumping Test			
a.	Grant Ditch Well	1 EA	\$7,500	\$7,500
b.	Glen Grove Well	1 EA	\$7,500	\$7,500
c.	West Plum No. 2 Well	1 EA	\$7,500	\$7,500
Total preliminary construction cost estimate				\$60,000
Contingencies 20%				\$12,000
Total preliminary project cost estimate				\$72,000

GLEN GROVE WELL IMPROVEMENTS

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$15,000	\$15,000
2.	New submersible well pump and motor	1 EA	\$22,000	\$22,000
3.	Schedule 30 steel casing	1 LS	\$10,000	\$10,000
4.	Stainless steel wire well screen	1 LS	\$15,000	\$15,000
5.	Gravel pack, seal, and grout	1 LS	\$15,000	\$15,000
6.	Drop pipe, check valves	1 LS	\$25,000	\$25,000
7.	Well development	1 LS	\$10,000	\$10,000
8.	24-hour pumping test	1 LS	\$10,000	\$10,000
9.	Pitless unit	1 LS	\$30,000	\$30,000
10.	Electrical and SCADA Integration	1 LS	\$30,000	\$30,000
Total preliminary construction cost estimate				\$182,000
Contingencies and Soft Costs Estimated at 40%				\$72,800
Total preliminary project cost estimate				\$254,800

GRANT DITCH WELL IMPROVEMENTS

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$15,000	\$15,000
2.	New submersible well pump and motor	1 EA	\$25,000	\$25,000
3.	4 inch drop pipe, check valves	1 LS	\$25,000	\$25,000
4.	Electrical and SCADA Integration	1 LS	\$10,000	\$10,000
Total preliminary construction cost estimate				\$75,000
Contingencies and Soft Costs Estimated at 40%				\$30,000
Total preliminary project cost estimate				\$105,000

WEST PLUM NO. 2 WELL IMPROVEMENTS

Item	Description	Quantity	Unit Cost	Total Cost
1.	New submersible well pump and Motor	1 EA	\$22,000	\$22,000
2.	Schedule 30 steel casing	1 LS	\$10,000	\$10,000
3.	Stainless steel wire well screen	1 LS	\$15,000	\$15,000
4.	Gravel pack, seal, and grout	1 LS	\$15,000	\$15,000
5.	Drop pipe, check valves	1 LS	\$25,000	\$25,000
6.	Well development	1 LS	\$10,000	\$10,000
7.	24-hour pumping test	1 LS	\$10,000	\$10,000
8.	Pitless unit	1 LS	\$30,000	\$30,000
9.	Electrical and SCADA Integration	1 LS	\$30,000	\$30,000
10.	New flow meter and 5' ID manhole for housing	1 LS	\$35,000	\$35,000
Total preliminary construction cost estimate				\$202,000
Contingencies and Soft Costs Estimated at 40%				\$80,800
Total preliminary project cost estimate				\$282,800

GMS Inc.
Perry Park Water and Sanitation District
East Wells Itemized Cost Estimate

ARAPAHOE NO. 2 WELL PUMP REPLACEMENT

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$25,000	\$25,000
2.	Pump removal	1 LS	\$20,000	\$20,000
3.	75-HP Well Pump and Motor Replacement	1 EA	\$90,000	\$90,000
4.	Well Deep Clean	1 EA	\$25,000	\$25,000
5.	Testing	1 EA	\$15,000	\$15,000
Total preliminary construction cost estimate				\$175,000
Contingencies 20%				\$35,000
Total preliminary project cost estimate				\$210,000

ARAPAHOE NO. 3 WELL PUMP REPLACEMENT

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$25,000	\$25,000
2.	Pump removal	1 LS	\$20,000	\$20,000
3.	75-HP Well Pump and Motor Replacement	1 EA	\$90,000	\$90,000
4.	Well Deep Clean	1 EA	\$25,000	\$25,000
5.	Testing	1 EA	\$15,000	\$15,000
Total preliminary construction cost estimate				\$175,000
Contingencies 20%				\$35,000
Total preliminary project cost estimate				\$210,000

ARAPAHOE NO. 4 WELL PUMP REPLACEMENT

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$25,000	\$25,000
2.	Pump removal	1 LS	\$25,000	\$25,000
3.	120-HP Well Pump and Motor Replacement	1 EA	\$110,000	\$110,000
4.	Electrical and SCADA Replacements	1 EA	\$70,000	\$70,000
5.	Well Deep Clean	1 EA	\$25,000	\$25,000
6.	Testing	1 EA	\$15,000	\$15,000
Total preliminary construction cost estimate				\$270,000
Contingencies 20%				\$54,000
Total preliminary project cost estimate				\$324,000

DENVER NO. 4 WELL PUMP REPLACEMENT

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$25,000	\$25,000
2.	Pump removal	1 LS	\$15,000	\$15,000
3.	75-HP Well Pump and Motor Replacement	1 EA	\$90,000	\$90,000
4.	Well Deep Clean	1 EA	\$20,000	\$20,000
5.	Testing	1 EA	\$15,000	\$15,000
Total preliminary construction cost estimate				\$165,000
Contingencies 20%				\$33,000
Total preliminary project cost estimate				\$198,000

REPLACEMENT OF CONTROLS AT EAST PERRY PARK WELLS

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$10,000	\$10,000
2.	Electrical and SCADA Replacements	4 EA	\$25,000	\$100,000
3.	VFD Replacements	4 EA	\$50,000	\$200,000
Total preliminary construction cost estimate				\$310,000
Contingencies 20%				\$62,000
Total preliminary project cost estimate				\$372,000

GMS Inc.
Perry Park Water and Sanitation District
Sageport WTP Itemized Cost Estimate

SAGEPORT WTP - OLD SIDE UPDATES

Item	Description	Quantity	Unit Cost	Total Cost
1	Mobilization	1 LS	\$3,000	\$3,000
2	Remove and replace existing airwash blowers	2 EA	\$22,000	\$44,000
3.	Remove and replace float and probe level sensors with ultrasonic level sensors	4 EA	\$5,000	\$20,000
4.	Programming and SCADA integration	1 LS	\$5,000	\$5,000
Total preliminary construction cost estimate				\$72,000
Contingencies 20%				\$14,400
Total preliminary project cost estimate				\$86,400

SAGEPORT WTP - FILTER MEDIA AND BACKWASH PUMP REPLACEMENT

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$5,000	\$5,000
2	Remove and dispose of Greensand filter media	7 EA	\$5,000	\$35,000
3	New Greensand media	7 EA	\$15,000	\$105,000
4.	Cleaning, Disinfection and Startup	7 EA	\$10,000	\$70,000
5.	Remove and replace vertical turbine pumps	4 EA	\$35,000	\$140,000
Total preliminary construction cost estimate				\$355,000
Contingencies 20%				\$71,000
Total preliminary project cost estimate				\$426,000

SAGEPORT WTP - NEW SIDE HIGH SERVICE PUMP REPLACEMENT

Item	Description	Quantity	Unit Cost	Total Cost
1	Mobilization	1 LS	\$5,000	\$5,000
2.	Remove and replace 200 gpm vertical turbine pumps	3 EA	\$40,000	\$120,000
Total preliminary construction cost estimate				\$125,000
Contingencies 20%				\$25,000
Total preliminary project cost estimate				\$150,000

SAGEPORT WTP - FILTER UNIT COATING (FILTERS 3-6)

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$10,000	\$10,000
2	Removal, storage and reinstallation of filter media - see note	4 EA	\$0	\$0
3	Sandblast existing filter units	4 EA	\$15,000	\$60,000
4.	Apply new epoxy coating to filter units	4 EA	\$25,000	\$100,000
Total preliminary construction cost estimate				\$170,000
Contingencies 20%				\$34,000
Total preliminary project cost estimate				\$204,000

NOTE: This work is planned to be at the same time as the filter media replacement to save time and cost as the filter media must be removed to complete the recoating of the interior of the filter units. If the work is not performed at the same time as the filter media replacement, additional cost will be incurred to handle the filter media during recoating.

SAGEPORT WTP - FILTER MEDIA AND NEW CHEMICAL FEED METER PUMPS

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$5,000	\$5,000
2	Remove and replace chemical feed pumps	4 EA	\$6,000	\$24,000
3.	Programming and SCADA integration	1 LS	\$10,000	\$10,000
Total preliminary construction cost estimate				\$39,000
Contingencies 20%				\$7,800
Total preliminary project cost estimate				\$46,800

GMS Inc.
Perry Park Water and Sanitation District
Glen Grove WTP Itemized Cost Estimate

2022 ESTIMATE FOR NEW WATER TREATMENT PLANT (SOUTH SITE)

Item	Description	Quantity	Unit Cost	Total Cost
A. New 1.0 MGD Rated WTP				
1	Conventional surface water treatment equipment, pre-engineered, packaged, including two (2) 350 gpm clarifier/filter units, valves, air wash blowers, and control system	1 LS	\$1,500,000	\$1,500,000
2	Polymer feed system including feed pump	1 LS	\$45,000	\$45,000
3	Chlorine gas feed system including tanks, scale, chlorinator, & controls	1 LS	\$50,000	\$50,000
4	Slab on-grade foundation	1 LS	\$105,000	\$105,000
5	New WTP Building 70' x 45' x 12' high including heating, ventilation & lighting.	1 LS	\$1,100,000	\$1,100,000
6	Below Grade 21' x 21' x 8' high backwash storage tank	1 LS	\$350,000	\$350,000
7	Below Grade 25' x 25' x 8' contact tank and clearwell including influent weir and 3 vertical turbine pumps	1 LS	\$500,000	\$500,000
8	Below Grade 19' x 19' x 8' raw water storage tank	1 LS	\$320,000	\$320,000
9	New filter feed pumps rated at 700 gpm	1 LS	\$90,000	\$90,000
10	Piping, static mixer, and valves	1 LS	\$90,000	\$90,000
11	Site work	1 LS	\$50,000	\$50,000
12	On site gravel surfacing	1 LS	\$20,000	\$20,000
13	Electrical	1 LS	\$95,000	\$95,000
14	Additional land	1 ac	\$100,000	\$100,000
15	Generator and ATS	1 LS	\$70,000	\$70,000
	Subtotal			\$4,485,000
B. Decommission Existing WTP				
1	Decommission existing pumps, filters, piping, and other related equipment, while keeping the serpentine baffle clearwell in service	1 LS	\$75,000	\$75,000
Subtotal Preliminary Cost				\$4,560,000
Contingencies and Soft Costs Estimated at 40%				\$1,824,000
Total Preliminary Cost - 2022				\$6,384,000
Total Preliminary Cost - 2025 (0.75 MGD)				\$7,931,000

1) Soft costs include preliminary design report, funding applications, environmental assessment, permitting, engineering, CDPHE review, bidding, project administration, construction contingencies, construction inspection, and funding administration.

2022 ESTIMATE FOR NEW WATER TREATMENT PLANT (NORTH SITE)

Item	Description	Quantity	Unit Cost	Total Cost
A. New 1.0 MGD Rated WTP				
1	Conventional surface water treatment equipment, pre-engineered, packaged, including two (2) 350 gpm clarifier/filter units, valves, air wash blowers, and control system	1 LS	\$1,500,000	\$1,500,000
2	Polymer feed system including feed pump	1 LS	\$45,000	\$45,000
3	Chlorine gas feed system including tanks, scale, chlorinator, & controls	1 LS	\$50,000	\$50,000
4	Slab on-grade foundation	1 LS	\$105,000	\$105,000
5	New WTP Building 70' x 45' x 12' high including heating, ventilation & lighting.	1 LS	\$1,100,000	\$1,100,000
6	Below Grade 21' x 21' x 8' high backwash storage tank	1 LS	\$350,000	\$350,000
7	Below Grade 43' x 29' x 8' contact tank and clearwell including influent weir and 3 vertical turbine pumps	1 LS	\$700,000	\$700,000
8	Below Grade 19' x 19' x 8' raw water storage tank	1 LS	\$320,000	\$320,000
9	New filter feed pumps rated at 700 gpm	1 LS	\$90,000	\$90,000
10	Piping, static mixer, and valves	1 LS	\$90,000	\$90,000
11	Site work	1 LS	\$50,000	\$50,000
12	On site gravel surfacing	1 LS	\$20,000	\$20,000
13	Electrical	1 LS	\$95,000	\$95,000
15	Generator and ATS	1 LS	\$70,000	\$70,000
16	Extend 8" RW and FW piping to new WTP	500 LF	\$120	\$60,000
	Subtotal			\$4,645,000
B. Decommission Existing WTP				
1	Decommission existing pumps, filters, piping, and other related equipment, while keeping the serpentine baffle clearwell in service	1 LS	\$75,000	\$75,000
Subtotal Preliminary Cost				\$4,720,000
Contingencies and Soft Costs Estimated at 40%				\$1,888,000
Total Preliminary Cost - 2022				\$6,608,000
Total Preliminary Cost - 2025 (0.75 MGD)				\$8,210,000

1) Soft costs include preliminary design report, funding applications, environmental assessment, permitting, engineering, CDPHE review, bidding, project administration, construction contingencies, construction inspection, and funding administration.

GMS Inc.
Perry Park Water and Sanitation District
PRV Vaults Itemized Cost Estimate

TENDERFOOT PRV REPLACEMENT

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$7,500	\$7,500
2	Traffic Control	1 LS	\$3,000	\$3,000
3.	Remove existing PRV vault and install new PRV vault	1 EA	\$25,000	\$25,000
5.	Connections	2 EA	\$4,000	\$8,000
Total preliminary construction cost estimate				\$43,500
Contingencies 20%				\$8,700
Total preliminary project cost estimate				\$52,200

SILVERHEELS PRV REPLACEMENT

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$7,500	\$7,500
2	Traffic Control	1 LS	\$3,000	\$3,000
3.	Remove existing PRV vault and install new PRV vault	1 EA	\$25,000	\$25,000
5.	Connections	2 EA	\$4,000	\$8,000
Total preliminary construction cost estimate				\$43,500
Contingencies 20%				\$8,700
Total preliminary project cost estimate				\$52,200

INDEPENDENCE PRV REHABILITATION

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$5,000	\$5,000
2	Traffic Control	1 LS	\$3,000	\$3,000
3.	Remove and replace existing 2.5" copper pipe	1 LS	\$1,500	\$1,500
4.	Remove and replace existing 2.5" PRV valve	1 EA	\$4,500	\$4,500
5.	Remove and replace existing 8" PRV valve	1 EA	\$17,500	\$17,500
Total preliminary construction cost estimate				\$31,500
Contingencies 20%				\$6,300
Total preliminary project cost estimate				\$37,800

Appendix D
PRV-1

GMS Inc.
Perry Park Water and Sanitation District
Booster Pump Station Itemized Cost Estimate

REPLACEMENT OF CONTROLS AT BOOSTER PUMP STATION

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$5,000	\$5,000
2.	Motor Control Center (MCC) - includes replacing motor cotnrlers, circuit breakers, contactors, terminal blocks, disconnects	1 LS	\$50,000	\$50,000
3.	New emergency generator, transfer switch, wiring, terminations and SCADA intergration	1 LS	\$250,000	\$250,000
4.	SCADA upgrades	1 LS	\$50,000	\$50,000
Total preliminary construction cost estimate				\$355,000
Contingencies 20%				\$71,000
Total preliminary project cost estimate				\$426,000

REPLACEMENT OF BOOSTER STATION PUMPS

Item	Description	Quantity	Unit Cost	Total Cost
1	Mobilization	1 LS	\$5,000	\$5,000
2.	Remove and replace 175 gpm vertical turbine pumps	2 EA	\$40,000	\$80,000
Total preliminary construction cost estimate				\$85,000
Contingencies 20%				\$17,000
Total preliminary project cost estimate				\$102,000

GMS Inc.
Perry Park Water and Sanitation District
Water Storage Tank Itemized Cost Estimate

SCHOOL HOUSE WATER STORAGE TANK PAINTING AND SCADA IMPROVEMENTS

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$20,000	\$20,000
2.	Surface preparation, sand blasting and interior/exterior painting	1 LS	\$600,000	\$600,000
3.	SCADA upgrades	1 LS	\$30,000	\$30,000
Total preliminary construction cost estimate				\$650,000
Contingencies 40%				\$260,000
Total preliminary project cost estimate				\$910,000

HOG JOHN WATER STORAGE TANK PAINTING IMPROVEMENTS

Item	Description	Quantity	Unit Cost	Total Cost
1.	Mobilization	1 LS	\$20,000	\$20,000
2.	Tank No. 1 - Surface preparation, sand blasting and interior/exterior painting	1 LS	\$275,000	\$275,000
3.	Tank No. 2 - Surface preparation, sand blasting and interior/exterior painting	1 LS	\$175,000	\$175,000
Total preliminary construction cost estimate				\$470,000
Contingencies 40%				\$188,000
Total preliminary project cost estimate				\$658,000

GMS Inc.
Perry Park Water and Sanitation District
Lift Station Itemized Cost Estimate

BANNOCK LIFT STATION IMPROVEMENTS

Item	Description	Quantity	Unit Price	Total Price
1.	Mobilization	1 LS	\$ 15,000	\$ 15,000
2.	New submersible pumps, guide rails and base supports	2 EA	\$ 25,000	\$ 50,000
3.	New Emergency Generator - 50kW generator, transfer switch wiring and concrete pad	1 LS	\$ 100,000	\$ 100,000
4.	Motor Control Center (MCC) - includes replacing motor controllers, circuit breakers, contactors, terminal blocks, disconnects, and float switches	1 LS	\$ 40,000	\$ 40,000
Total preliminary construction cost estimate				\$205,000
Contingencies Estimated at 20%				\$41,000
Total preliminary project cost estimate				\$246,000

BOREAS LIFT STATION IMPROVEMENTS

Item	Description	Quantity	Unit Price	Total Price
1.	Mobilization	1 LS	\$ 15,000	\$ 15,000
2.	New submersible pumps, guide rails and base supports	2 EA	\$ 25,000	\$ 50,000
3.	Emergency Generator Overhaul	1 LS	\$ 50,000	\$ 50,000
4.	Motor Control Center (MCC) - includes replacing motor controllers, circuit breakers, contactors, terminal blocks, disconnects, and float switches	1 LS	\$ 40,000	\$ 40,000
Total preliminary construction cost estimate				\$155,000
Contingencies Estimated at 20%				\$31,000
Total preliminary project cost estimate				\$186,000

RED ROCK LIFT STATION IMPROVEMENTS

Item	Description	Quantity	Unit Price	Total Price
1.	Mobilization	1 LS	\$ 15,000	\$ 15,000
2.	New vacuum prime pumps	2 EA	\$ 50,000	\$ 100,000
3.	New upblast centrifugal roof exhaust fan	1 LS	\$ 10,000	\$ 10,000
4.	New Emergency Generator and Automatic Transfer Switch wiring and controls	1 LS	\$ 150,000	\$ 150,000
5.	8' I.D. wet well approximately 16' deep	1 EA	\$ 40,000	\$ 40,000
6.	Install float switches with control and SCADA upgrades	1 LS	\$ 35,000	\$ 35,000
Total preliminary construction cost estimate				\$350,000
Contingencies and Soft Costs Estimated at 40%				\$140,000
Total preliminary project cost estimate				\$490,000

GMS Inc.
Perry Park Water and Sanitation District
Sageport WWTF Itemized Cost Estimate

SAGEPORT EQUIPMENT REPLACEMENT - PHASE I

Item	Description	Quantity	Unit Price	Total Price
1.	Mobilization	1 LS	\$ 15,000	\$ 15,000
2.	New 1/2 HP Clarifier Drive Motor, gearbox, torque limiter, and couplings for clarifiers	1 EA	\$ 50,000	\$ 50,000
3.	Clarifier instruments and controls	1 EA	\$ 15,000	\$ 15,000
Total preliminary construction cost estimate				\$80,000
Contingencies Estimated at 20%				\$16,000
Total preliminary project cost estimate				\$96,000

SAGEPORT EQUIPMENT REPLACEMENT - PHASE II

Item	Description	Quantity	Unit Price	Total Price
1.	Mobilization	1 LS	\$ 15,000	\$ 15,000
2.	New mechanical bar screen	1 EA	\$ 150,000	\$ 150,000
3.	Bar screen controls	1 LS	\$ 20,000	\$ 20,000
4.	New 1/3 HP Mixers for flocculation basin	1 EA	\$ 15,000	\$ 15,000
Total preliminary construction cost estimate				\$200,000
Contingencies Estimated at 20%				\$40,000
Total preliminary project cost estimate				\$240,000

GMS Inc.
Perry Park Water and Sanitation District
Waucondah WWTF Itemized Cost Estimate

WAUCONDAH EQUIPMENT REPLACEMENT - PHASE I

Item	Description	Quantity		Unit Price	Total Price
1.	Mobilization	1	LS	\$ 15,000	\$ 15,000
2.	New 1/2 HP Clarifier Drive Motor, gearbox, torque limiter, and couplings for clarifiers	2	EA	\$ 50,000	\$ 100,000
3.	Clarifier instruments and controls	2	EA	\$ 15,000	\$ 30,000
4.	New 1/3 HP Mixers for flocculation basin	2	EA	\$ 25,000	\$ 50,000
Total preliminary construction cost estimate					\$195,000
Contingencies Estimated at 20%					\$39,000
Total preliminary project cost estimate					\$234,000

WAUCONDAH EQUIPMENT REPLACEMENT - PHASE II

Item	Description	Quantity		Unit Price	Total Price
1.	Mobilization	1	LS	\$ 25,000	\$ 25,000
2.	New RBC drive motor replacement	2	EA	\$ 25,000	\$ 50,000
3.	New RBC drive shaft replacement with cover removal, crane and ancillary equipment	2	EA	\$ 75,000	\$ 150,000
Total preliminary construction cost estimate					\$225,000
Contingencies Estimated at 40%					\$90,000
Total preliminary project cost estimate					\$315,000