



VARELA
Engineering & Management

City of Pateros

WASTEWATER FACILITY PLAN & GENERAL SEWER PLAN

FUNDED BY:

State of Washington Department of Ecology

Agreement No. WQC-2021-PateCo-00027



January 2023



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January 2023

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KELLY HOOK

CITY ADMINISTRATOR
JORD WILSON

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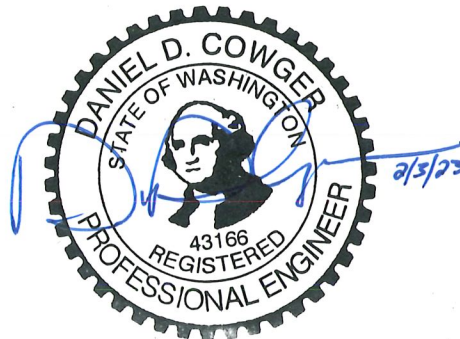


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Abbreviations

AC	asbestos cement sewer main material	LID	local improvement district
ADF	average daily flow	max.	maximum
ac-ft/yr	acre-feet per year (measure of water volume)	MCL	maximum contaminant level
add'l.	additional	MDF	max day flow
ave.	average	MG	million gallons
BSF	Base Sewage Flow	mgd	million gallons per day
CCS	cross connection control specialist	mg/L	milligrams/liter
CDBG	Community Development Block Grant	MHI	median household income
cfs	cubic feet per second	mi.	mile
CIP	capital improvements plan	min.	minimum
CY	cubic yards	NRCS	Natural Resources Conservation Service
DI	ductile iron sewer main material	NEPA	National Environmental Protection Act
dia.	diameter	NPDES	National Pollutant Discharge Elimination System
DFW	Wash. State Department of Fish and Wildlife	O&M	operation and maintenance
DOH	Wash. State Department of Health	PHF	peak hour flow
elev.	elevation	prv	pressure reducing valve
Ecology Or ECY	Wash. State Department of Ecology	PVC	polyvinyl chloride (plastic) water main material
ERU	equivalent residential unit	PWTF	Public Works Trust Fund
FF	fire flow	RCW	Revised Code of Washington
FmHA	Farmer's Home Administration, now known as Rural Development	RD	Rural Development (formerly FmHA)
gal	gallons	ROW	right of way
gpcd	gallons per capita per day	RDII	Rainfall-derived Infiltration and Inflow
gpd	gallons per day	SCADA	supervisory control and data acquisition (i.e., computerized control system)
gpm	gallons per minute	SEPA	State Environmental Protection Act
GMA	Growth Management Act	UGA	urban growth area
GO	general obligation bond	ULID	utility local improvement district
		VOC	volatile organic chemicals

GSP	General Sewer Plan	WAC	Washington Administrative Code
GW	Ground Water Infiltration	WSDM	Water System Design Manual (published by DOH)
HP	horsepower	WSP	water system plan
IOC	inorganic chemicals	WTP	water treatment plant
LF or L.F.	lineal feet	WWFP	wastewater facility plan
		WWTP	Wastewater treatment plant
		WWTF	Wastewater treatment facility

1.0 Introduction

Varela Engineering and Management (Varela) entered into an agreement for engineering services with the City of Pateros in August 2021 to prepare a Wastewater Facility Engineering Report and General Sewer Plan (WWFP) that evaluates the existing sanitary sewer collection and treatment system, identifies the need for collection and treatment system upgrades, evaluates inflow and infiltration (I/I), and describes potential improvements to the sanitary sewer collection system and treatment system that will provide adequate services for current and future flows through the planning period.

This work is being financed in part by funding from the Washington State Department of Ecology (ECY), Agreement No WQC-2021-PateCo-00027.

1.1 Purpose and Scope

This engineering report is a Wastewater Facility Engineering Report and General Sewer Plan (WWFP) for the City of Pateros prepared in general conformance with WAC 173-240-050 and WAC 173-240-060.

The City of Pateros's existing wastewater facility plan is over 20 years old and does not reflect the City's current wastewater facilities, flows and loadings, or current national pollutant discharge elimination system (NPDES) waste discharge permit requirements. The City's existing wastewater facility plan was completed in 1999 and recommended capital improvements for the City's treatment plant which included: 1) Headworks improvements, 2) New aeration basin/clarifier, 3) New UV disinfection, 4) New sludge dewatering works, and, 5) A new headworks building. In 2001, the City completed upgrades to the wastewater treatment facility (WWTF) that followed the recommendations made in the 1999 WWFP.

Preparation of this WWFP has not been required by the Department of Ecology (ECY). However, since an extensive sewer system evaluation and associated planning has not been prepared since 1999, the City requested Varela prepare this WWFP for the following reasons:

- The 1999 WWFP is not current and does not reflect current facilities
- Pateros is experiencing growth within their service area and the City wants to determine the sewer system's ability to meet future demands
- Some components in the 20-year-old treatment plant are likely nearing the end of their useful service life and need replacement
- The City would like to modernize the WWTP's controls
- The City has miscellaneous deficiencies in the wastewater system that need to be addressed

1.2 Regulatory Requirements

The following federal and state regulatory guidelines and requirements are used in this report.

1.2.1 *National Pollutant Discharge Elimination System (NPDES) Permit*

The City's NPDES Permit (No. WA0020559) expired on March 31, 2020. Pateros submitted an NPDES permit renewal application and received correspondence from ECY stating that the application was reviewed and accepted as completed on April 1, 2019. A copy of the permit is included in **Appendix A**.

The City submitted a funding application to ECY in October 2021 for updates to the Wastewater Facility Engineering Report and General Sewer Plan (WWFP). Pateros was awarded funding in 2022.

1.3 Approvals Required

The Wastewater Facility Engineering Report and General Sewer Plan (WWFP) and future plans/specifications must be submitted to the Washington State Department of Ecology (ECY) for review and approval prior to any changes to the wastewater system.

2.0 Planning Considerations

2.1 Introduction

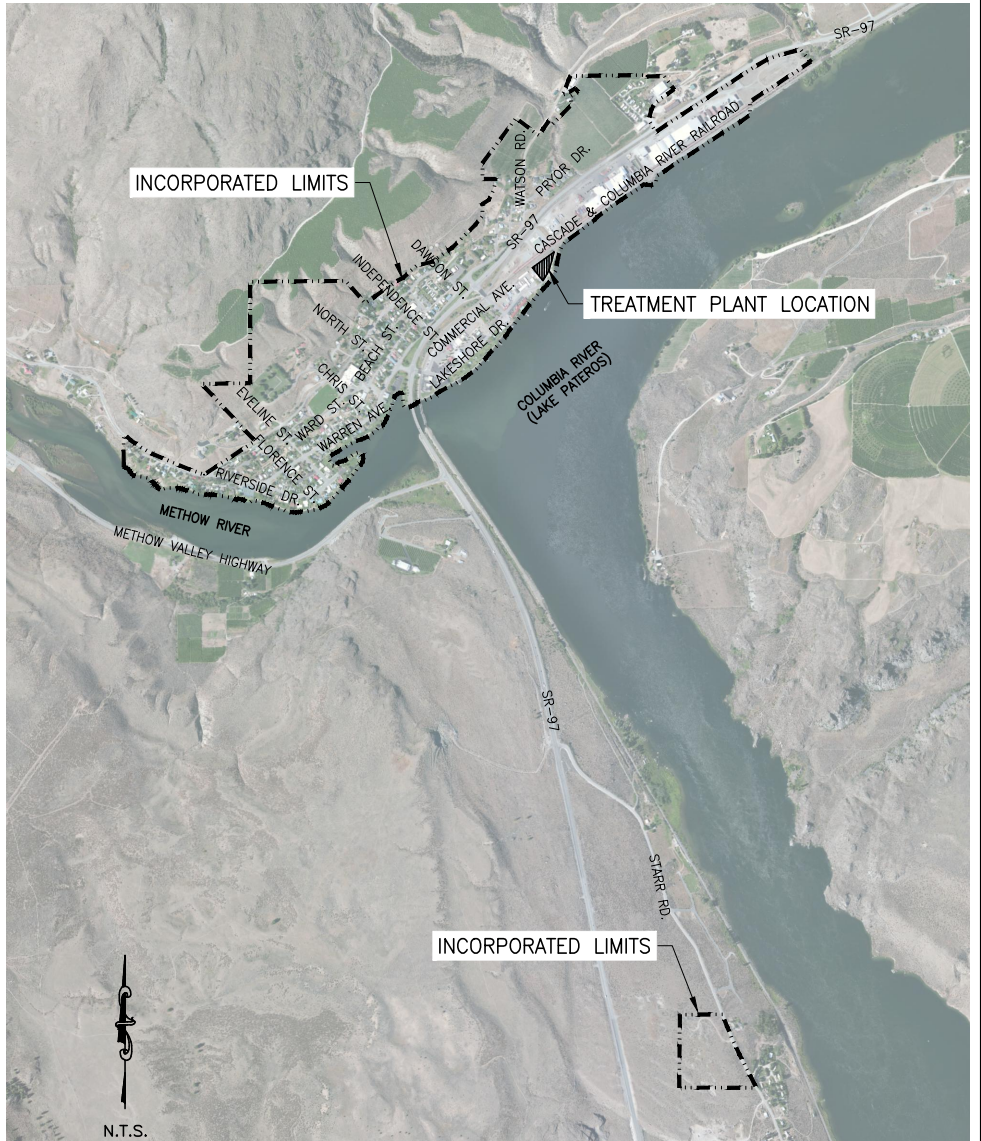
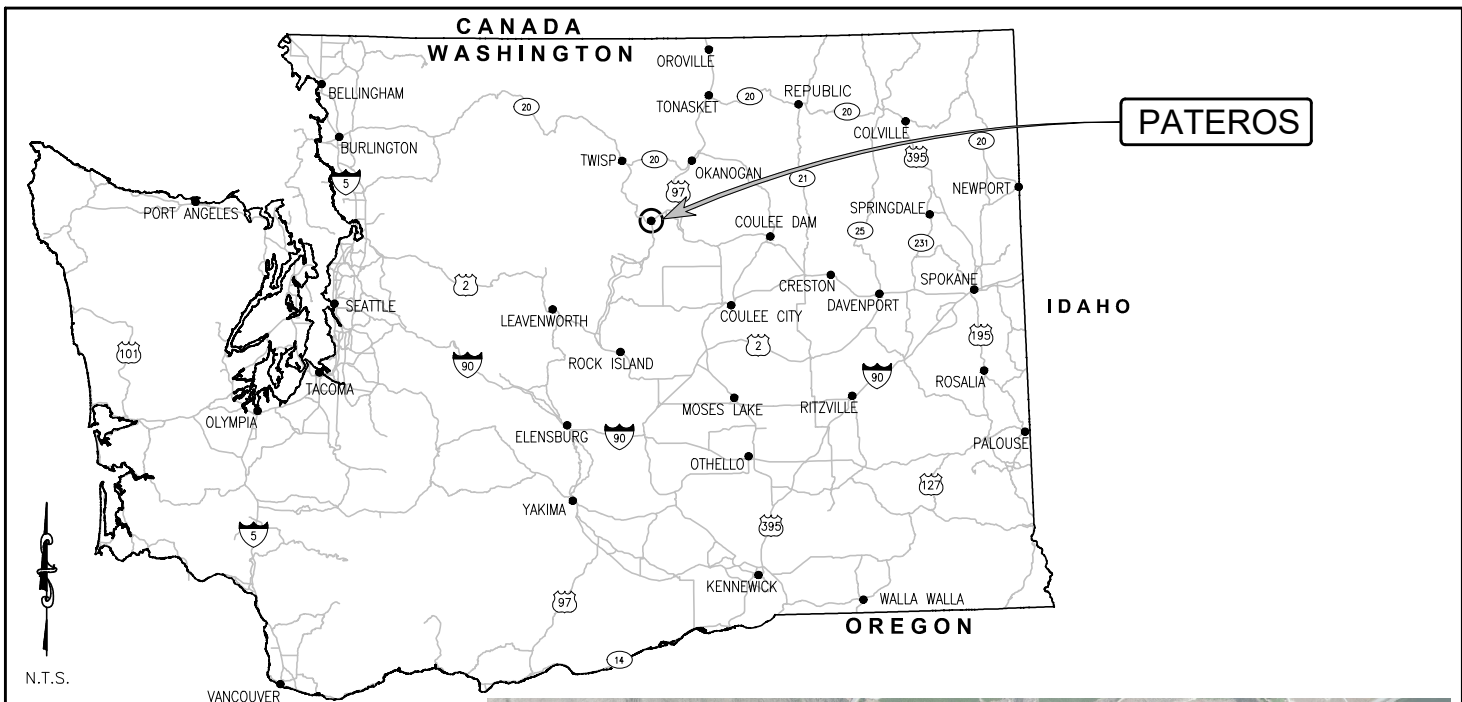
This section provides general planning information that affects Pateros’s wastewater management system including general planning information, background on Pateros’s climate and environment, land use planning, and design standards and organization rules/regulations that govern the wastewater system.

2.2 Location and Service Area

The City of Pateros is located in southern Okanogan County at the confluence of the Columbia River and Methow River, in between the Okanogan and Methow Valleys. The City is situated on US 97, 42 miles south of Omak, Okanogan County’s largest city. The terrain surrounding the City is hilly with apple orchards and mountainous areas. Refer to **Figure 2-1**. Pateros’ existing sewer service area is approximately 450 acres and shown on **Figure 3-1**.

Contact information for the City of Pateros

NPDES No.	WA0020559
Address	City of Pateros 113 Lakeshore Dr, Pateros, WA 98846
Phone	509-923-2571
Mayor	Kelly Hook
Clerk Treasurer	Kerri Wilson
Public Works Director	Jord Wilson



572808 Fig 2-1 (Vicinity Map)

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CITY OF PATEROS, WASHINGTON
 VICINITY MAP

FIGURE
2-1

2.3 System Background

2.3.1 History of Pateros

The City of Pateros, situated at the confluence of the Columbia and Methow Rivers, was originally settled by Lee Ives and his family in the late 1880s. The community established as a result of this settlement was known as Ives Landing. In circa 1900 Lt. Charles Nosler purchased the townsite and renamed it Pateros.

Pateros became known as the “Gateway to the Methow Valley” due to its strategic location along the highway leading up from Wenatchee and its status as a railroad shipping point. The landing also became a stop for riverboats plying the Columbia River between Wenatchee and Riverside. The area around Pateros would become an important apple growing region, and thousands of boxes were shipped from there. In 1913, Pateros was formally incorporated.

In the mid-1960s, the construction of the Wells Dam south of town forced the relocation of the City to higher ground. The lake behind the dam has completely covered the old townsite. Presently, the city is still a center of apple orchards, fruit processing, and warehousing. Recreation, in the form of fishing and boating is now a seasonal industry which brings people and revenue to the area.

In the summer of 2014, the Carlton Complex fire burned through portions of the City of Pateros. The fire damaged components of the City’s water system infrastructure including the telemetry system and burned the exterior of the City reservoirs. Between 2018 and 2020, the City completed extensive water system improvements including construction of a new reservoir and two new wells.

2.3.2 Wastewater System Background

The City of Pateros owns and operates a wastewater collection and treatment system serving the City’s 593 residents. Portions of the collection system were constructed in 1954 and the remainder in 1966, as part of the City relocation, made necessary by the construction of the Wells Dam on the Columbia River; and consists of approximately 26,600 LF of collection system piping that discharges to the City’s wastewater treatment plant (WWTP).

The original treatment plant was constructed in 1966. In 2000 the plant was replaced with a new WWTP that consists of a plant lift station, headworks, activated sludge aeration basin/clarifiers, UV disinfection, and sludge drying beds. Existing wastewater flows average approximately 125,000 gpd.

2.4 Natural Environment

Summers in Pateros generally last 4 months with temperatures of over 72°F from late-May to late-September. The winter season lasts generally from mid-October to mid-March¹. Temperatures are rarely above 95°F or below 14°F.

Pateros has clear skies for a majority of the year with under 40% cloud coverage from March to November with July and August being the clearest months. Pateros has over 50% cloud coverage in only December and January.

¹ Pateros, WA – Detailed climate information and monthly weather forecast, Weather Atlas.

Average monthly precipitation is 0.8 inches with the peak in January of 1.9 inches and low in July of 0.12 inches. The summer months of July and August average as low as 0.13 inches of precipitation per month. It rains an average of 101 days each year with a total of 9.6 inches of rainfall annually. Precipitation from late-October to late-March is in the form of snowfall with peak snowfall of 4.7 inches in December. Pateros has snowfall an average of 30 days with a total of 13.5 inches annually.

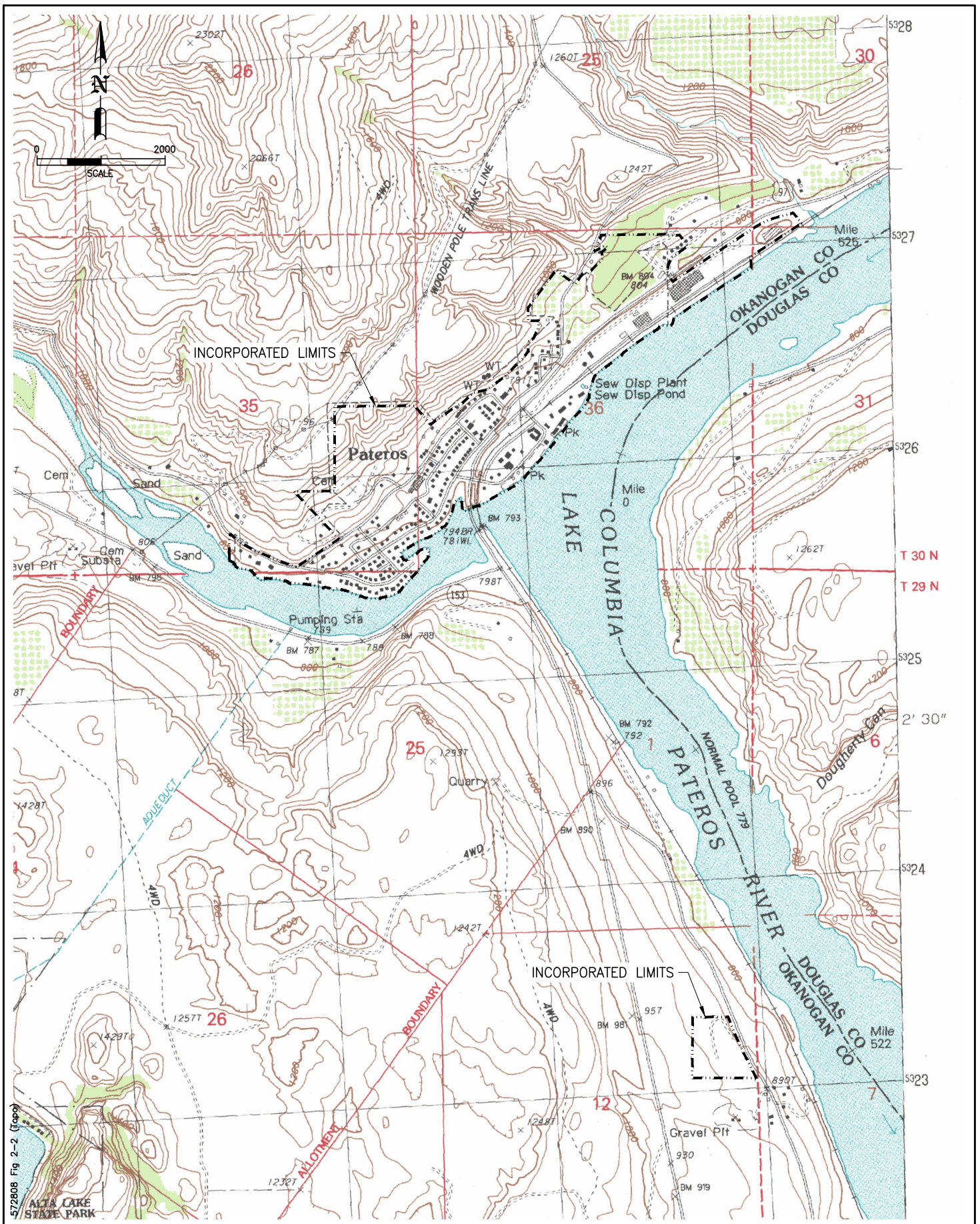
Estimated annual evapotranspiration is 81 inches (6.75 in/month)². Maximum penetration of frost is variable, depending on vegetation, soil type, soil moisture, temperature, and snow cover. Maximum penetration of frost is variable, depending on vegetation, soil type, soil moisture, temperature, and snow cover. In an average winter, frost reaches depths of 15 to 20 inches. In severe winter's, with light snow cover, the depth may extend to 30 inches or more³.

2.4.1 *Topography and Surface Drainage*

The area around Pateros is characterized by hilly to mountainous topography and is shown in **Figure 2-2**. The City is built on a river bench that ranges in elevation from 790 feet above msl to about 1,000 feet. The City is located at the confluence of the Methow River with the Columbia River. Surface runoff from the City drains to both rivers.

² <https://www.epa.gov/watersense/water-budget-data-finder>

³ Washington State – Frost <https://worldpopulationreview.com/state-rankings/frost-lines-by-state>



572808 Fig 2-2 (top)
 ALTA LAKE STATE PARK

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CITY OF PATEROS, WASHINGTON
 TOPOGRAPHIC

FIGURE
2-2

2.4.2 Soils and Geology

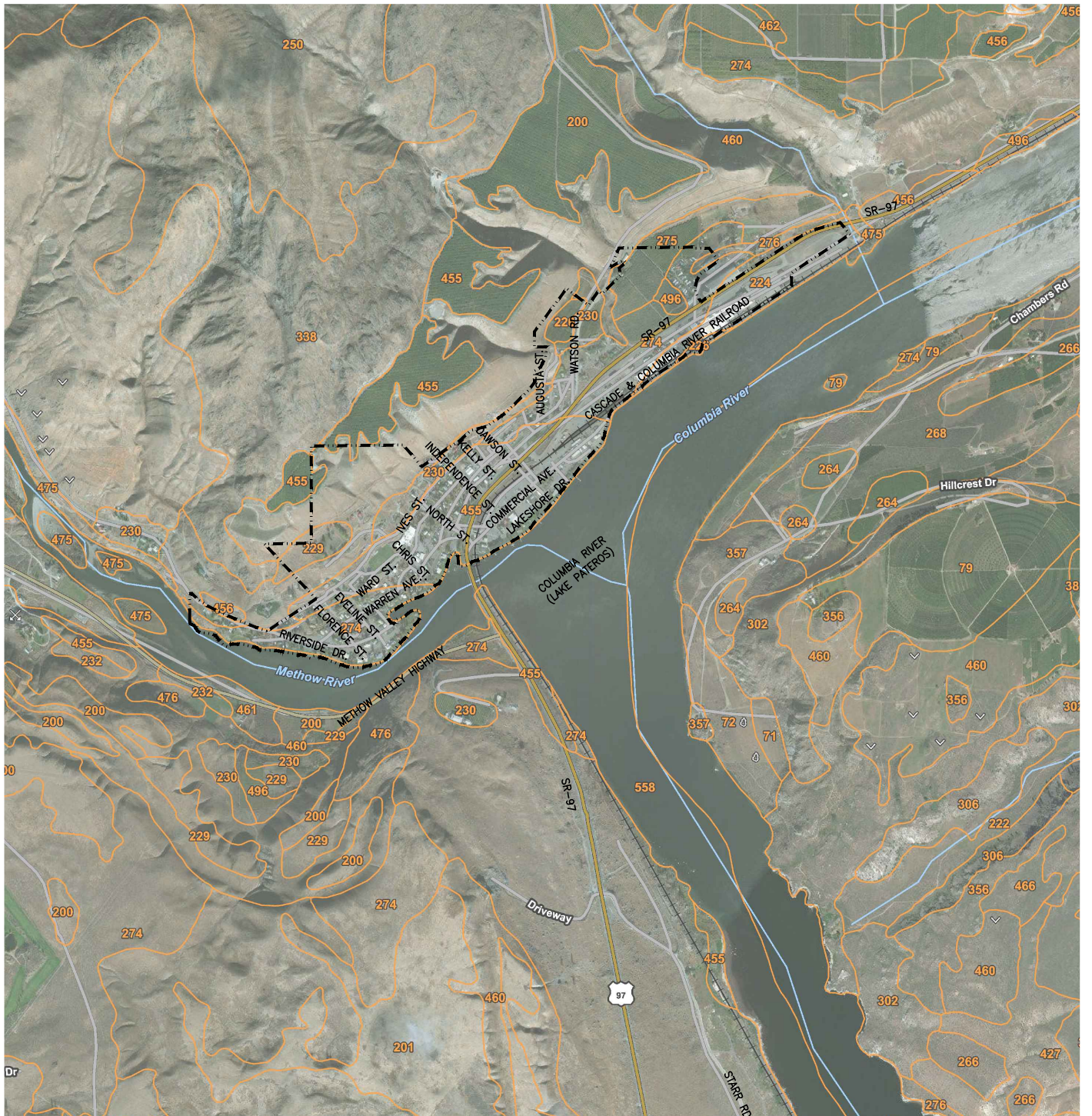
Soils data obtained from the Washington State Department of Natural Resources Conservation Service (NRCS)⁴ is shown on **Figure 2-3**. Soils in the Pateros area consists primarily of Pleistocene continental glacial drift with a component of metamorphic and igneous rock and Quaternary alluvium. The City is built on very deep, well drained soils formed from volcanic ash and colluvium from granite.

The majority of the City is constructed on Pogue fine sandy loam with 0 – 5% slopes. The soils are excessively drained with slow to rapid runoff. These soils are usually dry between a depth of 8 and 24 inches. The sections of the collection system constructed in these soils range from 3 – 10 feet deep. In a representative profile the top 6 inches is fine sandy loam over 24 inches of yellowish brown gravelly fine sandy loam. Below this is multicolored very gravelly sand to a depth of 60 inches.

The southwest part of the City that borders the Methow River is constructed of Ewall loamy fine sand with 0 – 15% slopes. The soils are usually moist, but are dry between depths of 12 to 35 inches for 90 to 105 days of the year. Ewall soils are excessively drained with slow runoff and very rapid permeability. Parts of the collection system that contribute significantly to infiltration and inflow are located near the river's edge and constructed at depth ranging between 4 – 10 feet deep. In representative profile, the upper most 15 inches is loamy fine sand, below this is a 9-inch layer of yellowish-brown sand over pale brown sand to a depth of 60 inches.

Both Pogue and Ewall soils are suitable for irrigated orchards, irrigated hay and pasture, and livestock grazing. The native vegetation includes: bitterbrush, needleandthread, wheatgrass, ponderosa pine, sagebrush, common yarrow, buckwheat, arrowleaf balsamroot, and silky lupine.

⁴ NRCS soils



LEGEND

- INCORPORATED LIMITS
- 200 AENEAS FINE SANDY LOAM, 0 TO 5 PERCENT SLOPES
- 224 CASHMERE FINE SANDY LOAM, 0 TO 3 PERCENT SLOPES
- 226 CASHMERE FINE SANDY LOAM, 8 TO 15 PERCENT SLOPES
- 229 CASHMONT SANDY LOAM, 3 TO 8 PERCENT SLOPES
- 230 CASHMONT SANDY LOAM, 8 TO 15 PERCENT SLOPES
- 233 CASHMONT SANDY LOAM, 0 TO 25 PERCENT SLOPES, EXTREMELY STONY
- 274 EWALL LOAMY FINE SAND, 0 TO 15 PERCENT SLOPES
- 275 EWALL LOAMY FINE SAND, 15 TO 25 PERCENT SLOPES
- 276 EWALL LOAMY FINE SAND, 25 TO 45 PERCENT SLOPES
- 338 LITHIC HAPLOXEREPTS-CASHMONT COMPLEX, 15 TO 45 PERCENT SLOPES
- 455 POGUE FINE SANDY LOAM, 0 TO 5 PERCENT SLOPES
- 456 POGUE FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES
- 460 POGUE GRAVELLY FINE SANDY LOAM, 25 TO 65 PERCENT SLOPES, EXTREMELY STONY
- 475 RIVERWASH
- 496 SKAHA GRAVELLY LOAMY SAND, 0 TO 8 PERCENT SLOPES

572808 Fig 2-3 (Soils Map)

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CITY OF PATEROS, WASHINGTON

SOILS MAP (NRCS)

FIGURE

2-3

2.4.3 Groundwater

The water system is currently supplied from two active wells: Well #3 (1,000 gpm) and Well #4 (1,000 gpm) which were drilled and put online in 2019 and 2020. Well #3 currently complies with current water quality standards, however Well #4 has developed manganese levels that exceed the current maximum contaminant level (MCL). Pateros primarily operates Well #3 while the City investigates Well #4 and potential treatment alternatives. The City's wells withdraw water from Columbia Plateau basaltic rock aquifers which are primarily an igneous and metamorphic rock and are relatively free-draining. The glaciofluvial aquifer is generally unconfined in the Pateros area and is recharged by the Columbia River. Due to the prolific nature of the aquifer it does not appear that the City's present and future use of groundwater wells will likely affect the quantity or quality of water available in the aquifer. The City's water rights constrain the instantaneous and annual water available for withdrawal.

In 2015, prior to drilling Wells #3 and #4, the City conducted a groundwater investigation documented in Groundwater Investigation Technical Memorandum Report dated May 1, 2015. A hydrogeologic evaluation for the groundwater investigation was conducted by GeoEngineers Inc. in a report titled Hydrogeologic Evaluation, City of Pateros Water System, dated April 2, 2015.

Groundwater underneath the City is perched at an elevation approximately equal to the Lake Pateros surface elevation. Additional discussion regarding groundwater elevations can be found in the inflow and infiltration sections in **Section 4** of this report.

2.4.4 Surface Water, Wetlands and 100-year Floodplain

The Methow River is a tributary of the Columbia River (Lake Pateros) located on the south edge of Pateros' service area. It flows generally from north to southeast and is the main drainage for the Methow Valley of which Pateros sits at the mouth. The Methow River is a fifth order stream and has two major tributaries, the Twisp River and Chewuch River. See **Figure 2-4** for surface water near Pateros.

All portions of the City are located out of the Federal Emergency Management Agencies (FEMA) 100-year flood plain.

2.4.5 Lake Pateros/Methow River

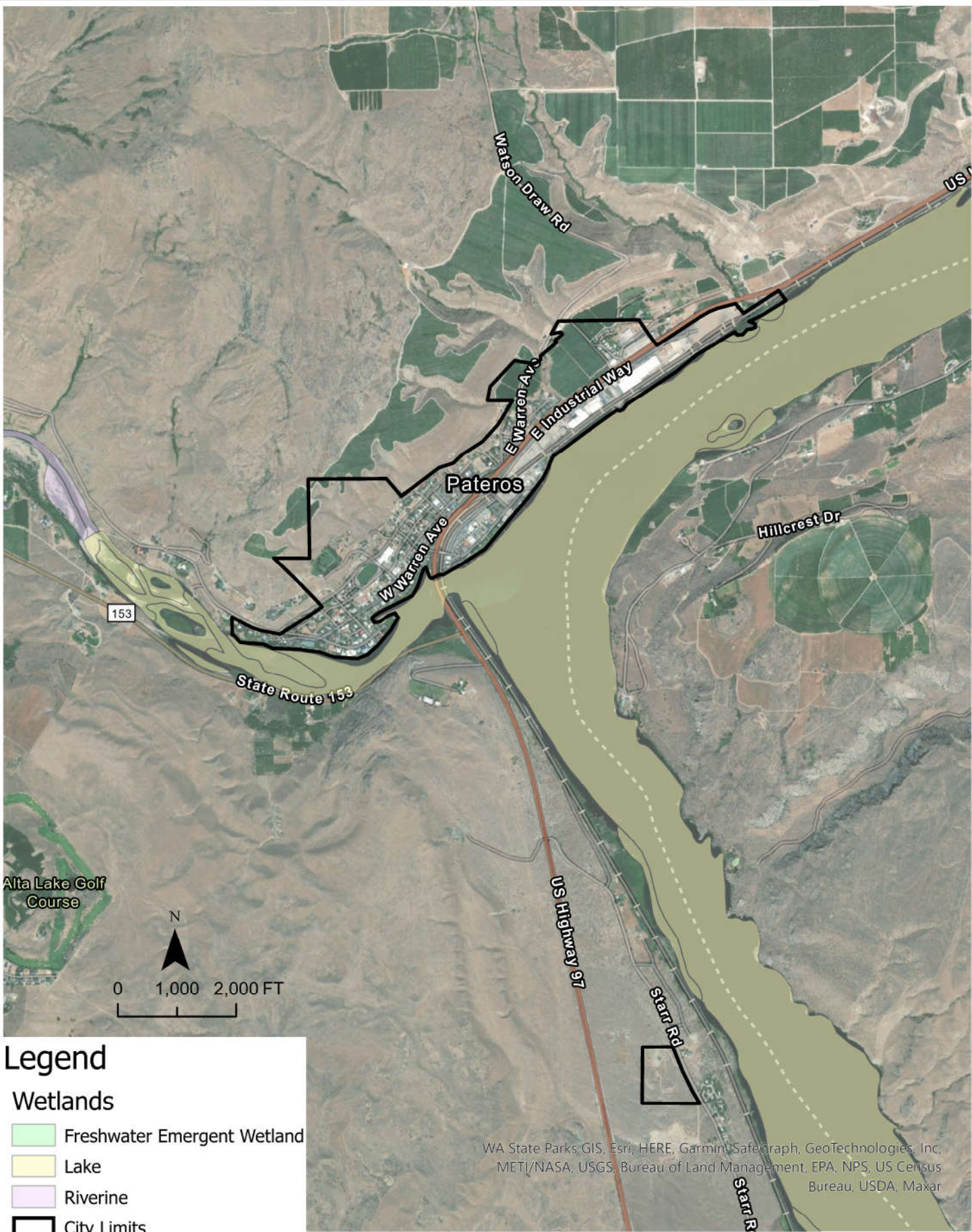
The Methow River Basin, located in North Central Washington in Okanogan County, is well known for its natural beauty, wildlife, outdoor recreation, and rural lifestyle. The Methow River and its tributaries are home to spring Chinook salmon, which are listed as endangered under the Endangered Species Act (ESA), and upper Columbia summer steelhead and bull trout which are listed as threatened. These fish species are important to Washington, both culturally and economically, and their survival depends on the quality and quantity of fish habitat.

The Methow River Basin also is currently one of many watersheds in Washington whose local citizens and governments have elected to coordinate with Tribes and State agencies to develop a watershed management plan, according to the guidelines outlined in the Watershed Management Act of 1998 (Washington State Engrossed Substitute House Bill 2514.)

Lake Pateros is a 20-mile-long reservoir on the Columbia River that was created with the construction of Wells Dam in 1967. The lake spans from Wells Dam, located 8 miles south of Pateros, to the confluence of the Columbia River and Okanogan River located 10 miles east of Pateros. The water surface level of Lake Pateros is controlled by Wells Dam and seasonally oscillates between about 776 feet above sea level

in the winter to 781 feet in the summer. Lake Pateros is home to a variety of fish species, but is noted for steelhead, chinook salmon, and sockeye salmon.

The City of Pateros's wastewater treatment plant discharges to the Columbia River at river mile 524.



Legend

Wetlands

- Freshwater Emergent Wetland
- Lake
- Riverine
- City Limits

WA State Parks, GIS, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA, Maxar

CITY OF PATEROS, WASHINGTON

STREAMS, LAKES, AND OTHER BODIES OF WATER

FIGURE

2-4

2.5 Sewer System Organization

2.5.1 Governing Authority

The City of Pateros owns and operates the wastewater collection system and treatment facility

2.5.2 City Ordinances and Policies

Title 13 of the City's municipal code includes rules and regulations pertaining to the public sewer service system. Sewer service rate adjustments are made each year based on the Consumer Price Index as laid out in Ord. 00-598 and Ord. 99-585. Relevant sections of the code state that "All owners of property within the incorporated limits of the city, whose properties are capable of being served by the municipal sewer system, are required to connect their properties and their private septic systems to the city sewer system."

2.5.3 Design Standards

The State of Washington Department of Ecology Orange Manual requirements for Sewage Works Design states that sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow (I/I).

The City completed updates to their municipal design standards in 2022. The City uses the design standards to enforce all sewer system work within the service area whether by the City or private developers. Sewer system design standards are included in **Appendix B**.

The City adopts and adheres to the State Environmental Policy Act (SEPA), RCW 43.21C.120.

2.6 Land Use

The city covers about 450 acres and has a population of 593 persons according to the 2020 Washington State Census. Pateros is not within a Growth Management (GMA) county but generally follows GMA planning and land use guidelines.

The City of Pateros's current Urban Growth Area (UGA) has approximately 165 acres available for development to support population growth.

2.6.1 Pateros' 2018 Draft Comprehensive Plan

The City is in the process of updating their 2018 Draft Comprehensive Plan and has indicated that the planning assumptions prepared in this WWFP will be used to inform the new plan. **Section 3** summarizes the City's future growth projections.

The following residential use goals are excerpted from the City of Pateros' 2018 Draft Comprehensive Plan:

- *Residential Goal 1: Provide for a variety of housing types and densities in order to accommodate the needs of all citizens.*
- *Residential Goal 2: Protect residential neighborhoods by preventing encroachment of incompatible uses.*
- *Residential Goal 3: Provide for safe, healthy and aesthetically pleasing residential areas.*

2.6.2 Okanogan County Land Use Regulations

Okanogan County is not a Growth Management (GMA) county but generally follows GMA planning and land use guidelines as does the City of Pateros. The UGA has been defined to allow the City to coordinate county development adjacent to the City limits.

2.7 Existing Water System

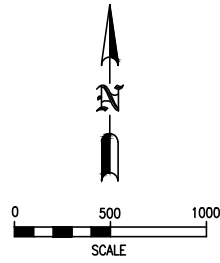
The Pateros water system was built in stages from 1915 to 1976 and included two reservoirs constructed in 1929 and 1947 and two wells (Well 1 and Well 2) that were drilled in 1964 and 1965. During the relocation of the township in the 1960's, improvements to the water system were constructed in conjunction with the Wells Dam project. The area of the City which lies south of Highway 97, the industrial areas, and portions of the old townsite north of Highway 97 had new water lines put in. In 1994, the City replaced a large portion (approximately 13,000 LF) of the distribution system that was old, corroded, and undersized.

As documented in the City's 2014 Water System Plan, Well 1 and Well 2 had just enough capacity to meet current peak demands. The wells had manganese (Mn) concentrations that far exceeded the maximum contaminate level (MCL). In addition, the existing reservoirs were at too low an elevation to provide minimum required pressure and fire flow, and overall storage capacity was below the required minimum.

In the summer of 2014, the Carlton Complex fire burned though portions of the City of Pateros. The fire damaged the City's telemetry system and burned the exterior of the City reservoirs. Water supply could not keep up with demand during the fire and there was no emergency backup power supply for the existing wells.

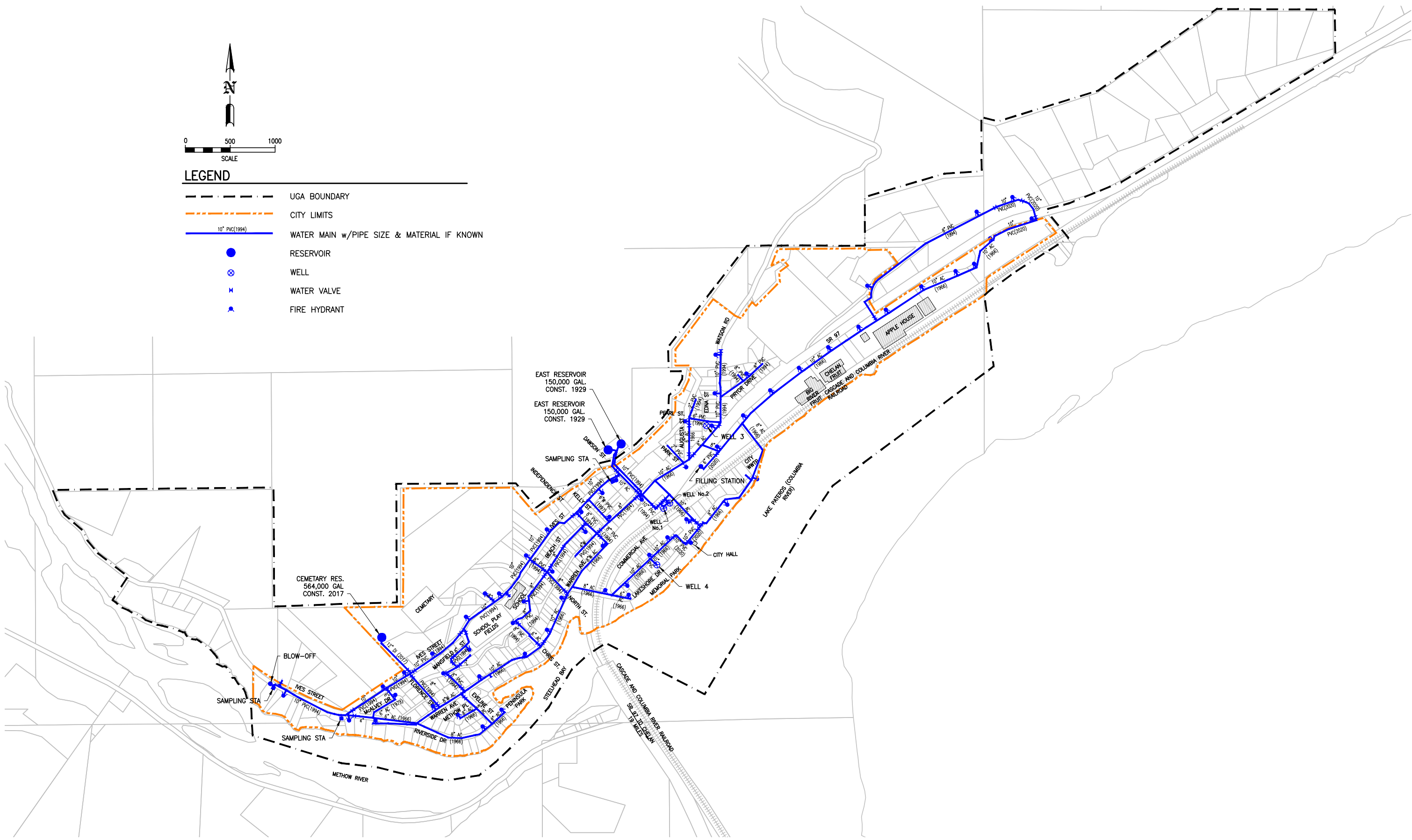
Following the fire, the City applied for and received funding to construct a new reservoir (Cemetery Reservoir), drill two new wells (Well 3 and Well 4) and construct a small amount of distribution system improvements. The new reservoir was constructed at a higher elevation near the City cemetery and was completed in 2018. Well 3 was drilled near Pearl St. and Watson Rd. and was completed in 2019. Both the new reservoir and Well 3 were put online in 2019 when the City disconnected the old reservoirs and old wells (Well 1 and Well 2) from the system. Well 4 was drilled across the street from Memorial Park on Lakeshore Dr. in the old grocery store parking lot. Well 4 was completed and put online in early 2020. The City has since capped and abandoned Well 1 and Well 2.

The existing water system is served by a single pressure zone supplied by Well 3 and Well 4. Both wells have a pumping capacity of 1,000 gpm that serve the distribution system and pump to the Cemetery Reservoir which has a capacity of approximately 564,000 gallons. The distribution system consists of approximately 35,000 LF of AC and PVC mains. The 2022 DOH Water Facility Inventory (WFI) indicates the City's water system currently serves 350 connections and has 413 total approved connections. Refer to **Figure 2-5** for a map of the City's existing water system.



LEGEND

- UGA BOUNDARY
- CITY LIMITS
- WATER MAIN w/PIPE SIZE & MATERIAL IF KNOWN
- RESERVOIR
- ⊗ WELL
- ✕ WATER VALVE
- ⋈ FIRE HYDRANT



572808 Fig 2-5 (EWS)

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 APPROVED:
 PROJ. NO.: 57-28-08
 DATE: 12/06/22



CITY OF PATEROS, WASHINGTON
 EXISTING WATER SYSTEM

FIGURE
2-5

2.8 Nearby Wastewater Treatment Facilities

The immediate area surrounding the City utilizes septic systems as the main method of wastewater disposal. Other systems in the area include Brewster's Publicly Owned Treatment Works (POTW) located 6 miles northeast of Pateros.

2.9 Related Plans

The Wastewater Facility Engineering Report and General Sewer Plan (WWFP) utilizes information from the:

- 1999 Pateros Wastewater Facilities Plan;
- 2003 Pateros Sanitary Sewer Collection System Investigation;
- 2014 Pateros Water System Plan;
- 2018 Pateros Draft Comprehensive Plan;
- 2022 Pateros Wastewater Facility Engineering Report and General Sewer Plan Technical Memorandums. Refer to **Appendix C** for copies of the Technical Memorandums.

2.10 Planning Period

The planning period used in this document for the WWFP is 20 years. This is a typical period used for planning of public utilities.

3.0 Wastewater Management Planning Data

3.1 History and Planning Documents

Varela met with City staff in February, 2022 to discuss City population projections and growth distribution within and beyond the City's Urban Growth Area. Planning information provided in this Wastewater Facility Plan (WFP) is based on City input and projections, 2020 US Census Bureau data, and Washington State Office of Financial Management (OFM) data.

The City indicated that planning estimates provided in this WFP will be used to inform the updated Comprehensive Plan currently being prepared.

3.2 Service Area and Population Projections

3.2.1 *Service Area*





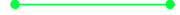
The City's incorporated limits and current sewer service area and collection and treatment system are shown on **Figure 3-1**. The existing sewer service area generally corresponds with the City's incorporated limits.

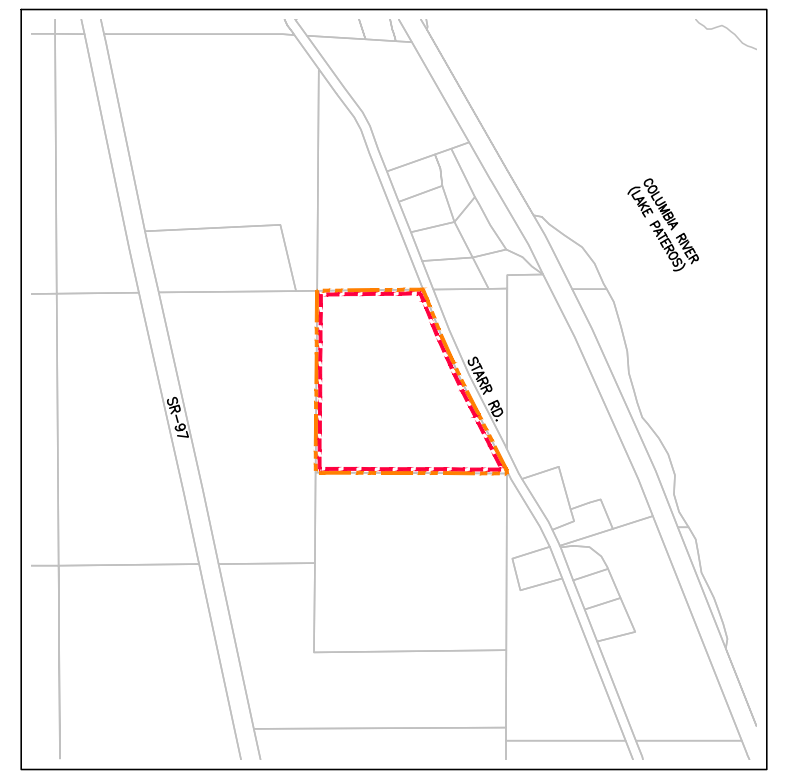
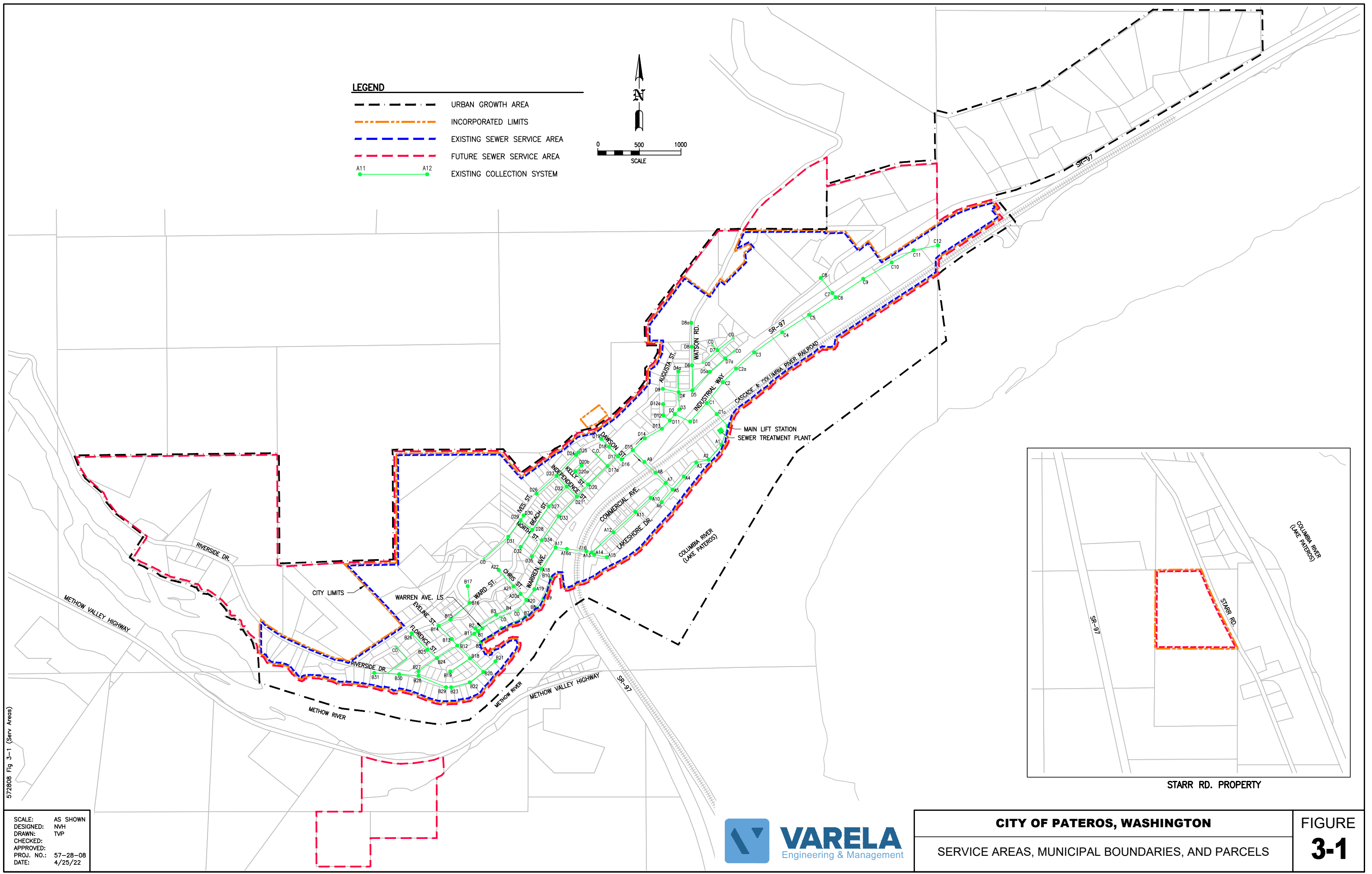
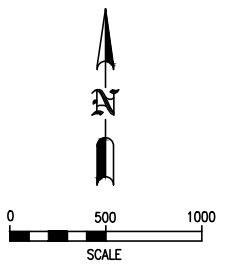
The City's urban growth area (UGA) and future sewer service area are shown on **Figure 3-1**. Future growth areas are shown on **Figure 3-2** is based on discussions with City staff regarding where development is likely to occur within the planning period. The City anticipates expansion of the existing sewer service area within the 20-yr planning period.

3.2.2 *Planning Data and Future Population*

The Washington State Office of Financial Management, (OFM) provides projections on growth for counties. Larger cities often have planning department which make these projections, while smaller systems may adopt their own projections based on one or more of the following: projections published by the OFM, historical population trends, known development plans, comprehensive plans, etc.

For the purposes of infrastructure planning, a population at the end of the 20-year planning period is projected. Available data sources for Pateros include the Washington State Office of Financial Management (OFM), historical population trends, known development plans and City staff input, and the City of Pateros' 2018 Draft Comprehensive Plan. There is no known state or federal agency which makes predictions for smaller cities such as Pateros. Therefore, based on the available data, the following sections develop population projections for Pateros.

- LEGEND**
-  URBAN GROWTH AREA
 -  INCORPORATED LIMITS
 -  EXISTING SEWER SERVICE AREA
 -  FUTURE SEWER SERVICE AREA
 -  EXISTING COLLECTION SYSTEM



572808 Fig 3-1 (Serv Areas)

SCALE: AS SHOWN
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 APPROVED:
 PROJ. NO.: 57-28-08
 DATE: 4/25/22



CITY OF PATEROS, WASHINGTON
 SERVICE AREAS, MUNICIPAL BOUNDARIES, AND PARCELS

FIGURE 3-1

3.2.3 Historical Population Trends

The historical population of Pateros is shown in the table below.

Table 3-1 Population History

Year	Population	Annual Growth Rate	Source
1960	673		Census
1970 ⁽¹⁾	472	-3.49%	Census
1980	555	1.63%	Census
1990	570	0.27%	Census
2000	643	1.21%	Census
2010	667	0.37%	Census
2020 ⁽²⁾⁽³⁾	593	-1.17%	Census

1. Construction of Wells Dam begins (1963); City submerged and relocated
2. Carlton Complex Fire
3. City staff indicated that the City is adding population; not subtracting as shown in the table

The following is excerpted from the City’s 2018 Draft Comprehensive Plan:

Before the construction of Wells Dam, Pateros enjoyed a high population in 1960 of 673 people. By 1970, the population had declined to 472 [and] population rose to 555 by 1980. Growth was slow during the 1980’s; in fact, it was under 1% for the entire decade. However, the 1990’s saw steady growth, averaging 1.2% per year, for a total of just over 11% for the whole decade. The 2000 Census put Pateros’ population at 643, and by the 2010, census at 667, just shy of the high in 1960 but showing growth had slowed to approximately 4% for the decade. The Washington State Office of Financial Management data estimated the April, 2013 population at 665, revealing a slight decline in population. However, the catastrophic fires of 2014 resulted in a loss of 140 residents by the April 1, 2015 OFM population estimate. 2016 and 2017 saw the population recovering with the addition of 55 people to the City’s population.

In general, Pateros’ population has fluctuated over the years but has stayed relatively constant.

3.2.4 Comprehensive Plan Projections

The City’s 2018 Draft Comprehensive Plan generally follows OFM projections but does not include any specific projections related to future growth.

The City is in the process of updating their Comprehensive Plan and has indicated that the planning assumptions prepared in this WWFP will be used to inform the new plan.

3.2.5 Population per Household

The City currently serves roughly 220 single-family sewer connections. Based on a 2020 population of 593 residents and 220 single family connections, it is estimated that Pateros’ population per single-family residence is approximately 2.7 capita/connection.

3.2.6 Washington State OFM Projections

The Office of Financial Management makes three population projects for each county, a low, medium, and high series. OFM does not make projections for towns and cities. For Okanogan County, OFM projected average growth rates for 2022 to 2042 are as follows:

High Series:	0.95% per year
Intermediate Series:	0.26% per year
Low Series:	-0.05% per year

Applying the Okanogan County OFM projected growth rates result in the following projected 2042 populations for Pateros:

High Series:	730 residents (+137 residents)
Intermediate Series:	628 residents (+35 residents)
Low Series:	587 residents (-6 residents)

Growth projections consistent with the OFM projections for Okanogan County are shown on **Exhibit 3-1**.

The City has reviewed the OFM projections, and given the anticipated growth identified in the following sections, believes growth in Pateros will outpace the OFM projections during the 20-year planning period.

3.2.7 Growth Areas Identified by City

The City has identified various areas where anticipated growth will likely occur. These areas are based on City knowledge and direction.

This section documents the anticipated growth areas, provides estimated additional equivalent residences for each area, and provides population estimates for the 20-year planning period for each growth area.

Following are the growth areas identified. These areas are also shown on **Figure 3-2**.

- **Area 1** is the area generally along and north of Pedersen Rd east of town within the UGA and the area generally along and south of Watson Rd east of town outside the UGA. Current land use includes single-family residential, light industrial, and orchards. Several parcels that are currently being used as orchards within the Incorporated Limits are zoned R2. Other parcels are located outside the Incorporated Limits and are generally being used as single-family residential. The City has an easement along Pedersen Rd that could be utilized to provide sewer service to properties outside the Incorporated Limits. The City also maintains a sleeve under SR 97 at Industrial Way for future water service to the Pedersen Rd area. The City has been approached by the orchard owner to provide sewer and water service to a planned multi-family seasonal worker building.

At build-out, growth in Area 1 is projected to include the following:

- 264 ERUs (made up of residential); estimated population of 710 persons
- **Area 2** is the area generally along Ives St and Bill Shaw Rd west of town outside the Incorporated Limits and within the UGA. Current land use includes single-family residential and vacant land. The City reports this area could be subdivided and connected to the City sewer

system via an extension along Riverside Dr/Bill Shaw Rd. Additional sewer flows resulting from serving Area 2 would flow to the Warren Ave Lift Station.

At build-out, growth in Area 2 is projected to include the following:

- 459 ERUs (made up of residential); estimated population of 1,237 persons
- **Area 3** is the area generally along Methow Valley Highway south of town along the south side of the Methow River. Current land use includes single-family residential and orchards. This area is outside the City's current UGA. City staff have indicated there is growing interest in this area which, if annexed into the City, could include up to 70 new single-family residential homes and a restaurant or brewery. This area could be served by forcemain over the Methow River. Service feasibility to Area 3 is evaluated in later chapters.

At build-out, growth in Area 3 is projected to include the following:

- 96 ERUs (made up of residential and commercial); estimated population of 188 persons
- Possible brewery
- **Area 4** includes City owned property within the Incorporated Limits along Starr Rd south of town currently zoned MU. The City could also provide services to the private mobile home park that is within the vicinity of the City property. The City has been approached by various industries requesting undeveloped land, sewer and water service. The City could provide sewer service to Area 4 by forcemain north along Starr Rd and SR 97 over the Methow River. Service feasibility to Area 4 is evaluated in later chapters.

At build-out, growth in Area 4 is projected to include the following:

- Possible industry
- **Infill** is expected throughout City limits due to development of unused/vacant properties and changes in zoning to allow for higher densities.

At build-out, infill development within the current incorporated limits is projected to include the following:

- 119 ERUs (made up of residential and commercial); estimated population of 303 persons
- Possible brewery
- Possible industry

3.2.8 Estimate of Future Population Based on Growth Areas

Based on growth areas identified by the City, the following table provides: 1) estimated buildout ERUs for each growth area; 2) and assumed percentage of growth the City believes will occur within the 20-year planning period; and 3) resulting population projection.

Table 3-2 20-year Population Estimate for Growth Areas

Growth Area	Type of Development	Acreage	ERU Assumptions	Estimated Additional ERUs at Build-Out	20-yr Planning Period		
					Percent of Build-Out ⁽¹⁾	Estimated Additional ERUs	Estimated Population Growth ⁽²⁾
1	Residential - R2	35.1	1 ERU per dwelling unit = 7.5 ERU / ac ⁽⁴⁾	264	25%	66	178
2	Residential - R2	61.2	1 ERU per dwelling unit = 7.5 ERU / ac ⁽⁴⁾	459	15%	69	186
3	Residential - R1	23.3	1 ERU per dwelling unit = 3.0 ERU / ac ⁽³⁾	70	25%	17	47
	Commercial	4.3	6.0 ERU / ac	26	25%	6	17
	Brewery	1.0	(6)	(6)		(6)	
4	Industrial	15.2	(6)	(6)		(6)	
City Infill	Residential - R2	1.8	1 ERU per dwelling unit = 7.5 ERU / ac ⁽⁴⁾	13	50%	7	18
	Residential - R3	11.0	1 ERU per dwelling unit = 9.0 ERU / ac ⁽⁵⁾	99	15%	15	40
	Commercial	0.5	6.0 ERU / ac	3	100%	3	7
	Brewery	0.9	(6)	(6)		(6)	
	Industrial	4.2	(6)	(6)		(6)	
	Public Utility	7.0	0.5 ERU / ac	4	100%	4	9
Total		165.3	Total	937	20%	186	502
2042 Population Estimated using Growth Areas							1,095 ⁽⁷⁾
OFM Population Growth Projection for 20-yr Planning Period ⁽⁸⁾							137
2042 Population Estimated using OFM Projections							730 ⁽⁷⁾

1. Percentages based on discussions with City staff including Public Works Director, City Planner, and Council Members.

2. Based on 2.7 residents per dwelling unit

3. Average residential density of between 1 and 5 dwelling units per acre per City of Pateros Municipal Code Chapter 17.12.020 for single-family residential (R-1)

4. Average residential density of between 1 and 15 dwelling units per acre per City of Pateros Municipal Code Chapter 17.12.040 for mixed-family residential (R-2)






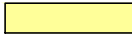

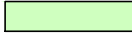

5. Average residential density of between 1 and 18 dwelling units per acre per City of Pateros Municipal Code Chapter 17.12.050 for multifamily residential (R-3)

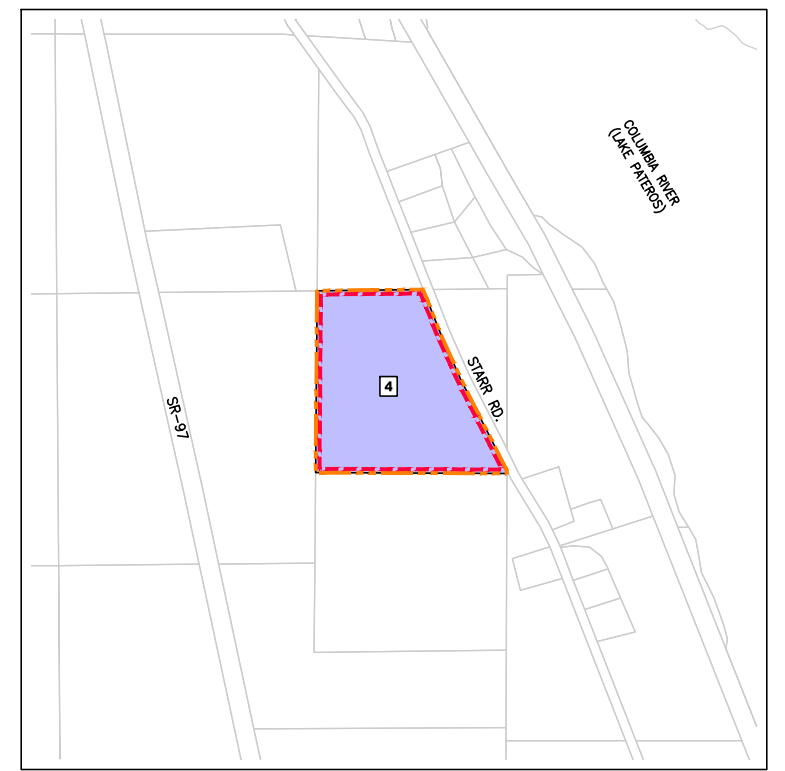
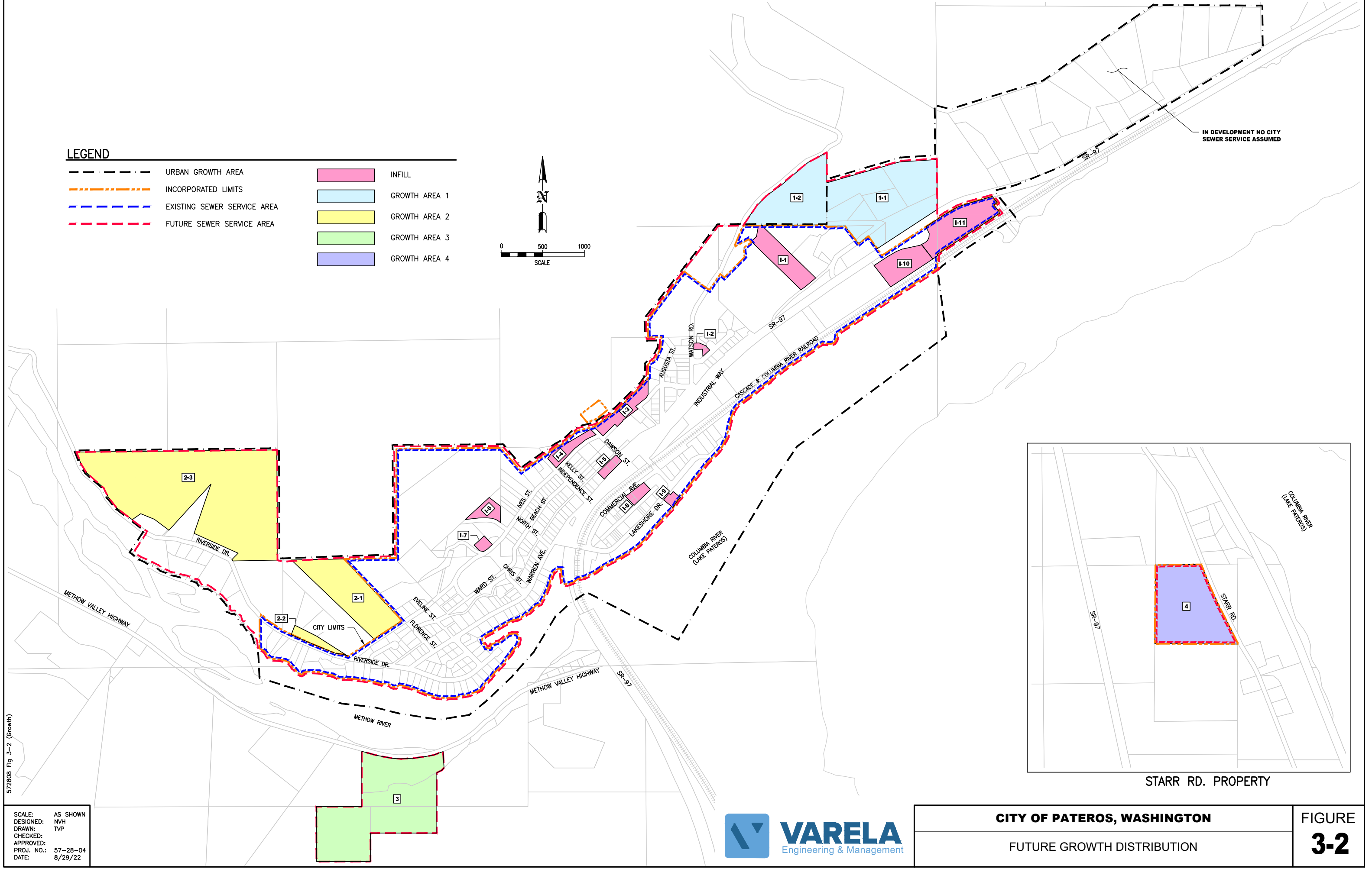
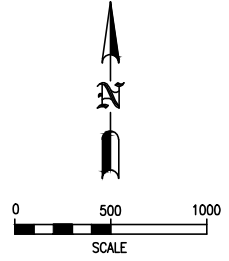
6. ERU estimate not provided. ERU estimates/considerations discussed elsewhere in the Wastewater Facility Plan

7. 593 residents per 2020 Census

8. Based on Okanogan County OFM projections for high series (0.95% annual growth rate)

LEGEND

- | | | | |
|---|-----------------------------|---|---------------|
|  | URBAN GROWTH AREA |  | INFILL |
|  | INCORPORATED LIMITS |  | GROWTH AREA 1 |
|  | EXISTING SEWER SERVICE AREA |  | GROWTH AREA 2 |
|  | FUTURE SEWER SERVICE AREA |  | GROWTH AREA 3 |
| | |  | GROWTH AREA 4 |



572808 Fig 3-2 (Growth)

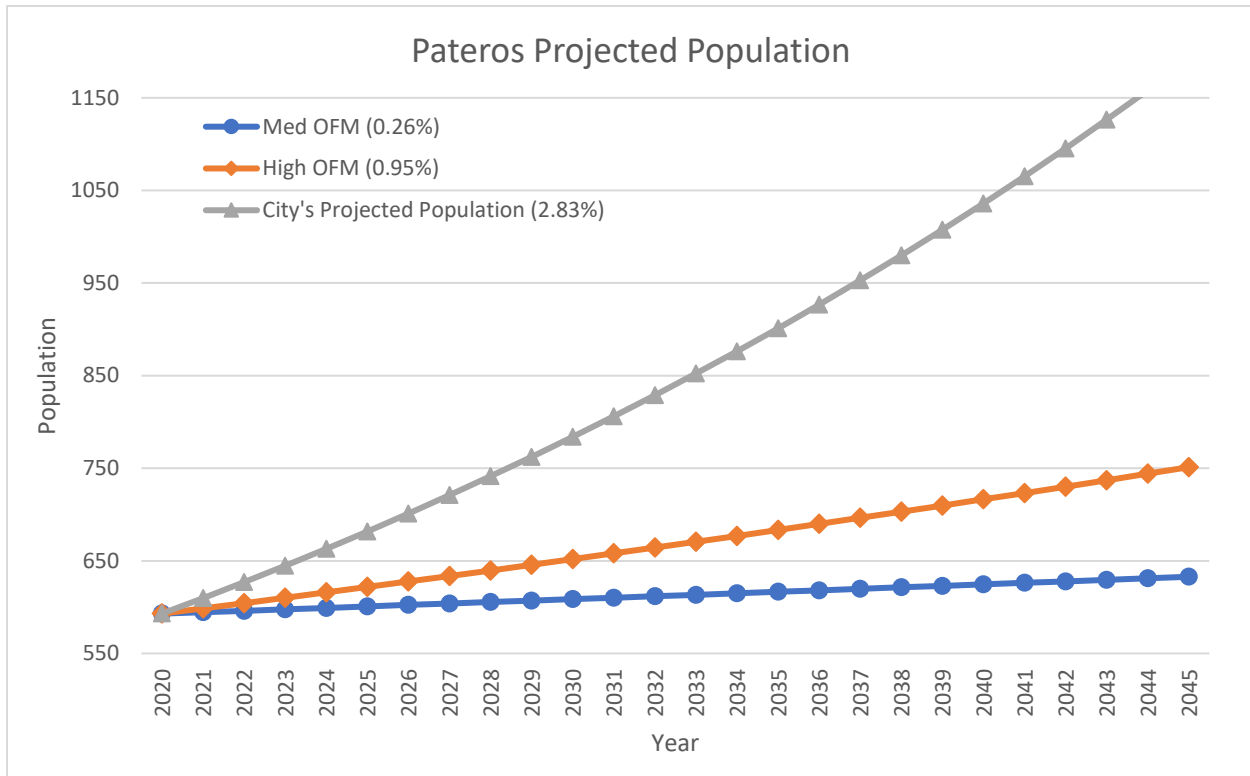
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 DATE: 8/29/22



The following exhibit shows:

- 1) Pateros’ population growth using OFM projections (med/high) and,
- 2) City anticipated growth estimates per **Table 3-2**.

Exhibit 3-1 Pateros Projected Population



3.2.9 Selected Design Population

Planning assumptions and growth areas were initially discussed with Jord Wilson, the City’s Public Works Director on February 23, 2022. At the meeting, Jord indicated that the County OFM projections are likely low and that the City expects growth within the 20-yr planning period to exceed OFM estimates. A follow up meeting with the Pateros Sewer Committee was held on April 18, 2022 to discuss TM-01 “Planning Areas and Population” population projections estimated using the City’s provided growth areas. The planning estimates provided in TM-01 were finalized on April 25, 2022 after final discussion with the City’s Public Works Director.

The City has elected to use a 20-yr projected population of 1,095 residents (2.83% annual growth rate) which is consistent with the City’s anticipated growth estimates provided in **Table 3-2**.

3.3 Wastewater Flows and Loadings

3.3.1 Introduction

This section provides an estimate of future flows and loadings to be treated at Pateros' wastewater treatment plant. The estimate is based on projected population growth within the sewer service area and flows and loadings currently entering the treatment plant.

Sanitary sewer flows that enter the treatment plant include the following components:

- Residential and commercial flows from the city sewer service area
- Industrial (food processing) flows from the Chelan Fruit Coop (Apple House)
- Infiltration and inflow (I/I) from the sewer collection system

This section evaluates current flows and loadings using Daily Monitoring Reports (DMR's) between January 2016 and December 2021. Historical and current flows and loadings are used to develop per capita ratios for influent flow, biochemical oxygen demand (BOD) and total suspended solids (TSS). The calculated per capita ratios are used with population projections to estimate future flows and loadings to the treatment plant. Future industrial flows and collection system I/I are estimated separately and added to the projected City flows.

3.3.2 Treatment Plant Influent Flows and Loadings

Influent flows include sewer flows provided from City daily monitoring reports (DMR's) and from the Apple House fruit processing and storage plant discharge reports provided by the City. Influent also includes infiltration that enters the collection system.

Wastewater flows are measured at the treatment plant's effluent V-Notch weir located downstream of all treatment processes. Effluent samples are taken from a sample tap on the 10" effluent line downstream of the UV disinfection system.

The current 2015 NPDES permit (WA0020559) requires the City to report influent flow daily, influent BOD₅ and TSS once per week and influent pH five times a week. Effluent pH and temperature are measured five times a week while effluent dissolved oxygen (DO), BOD, and TSS are measured weekly.

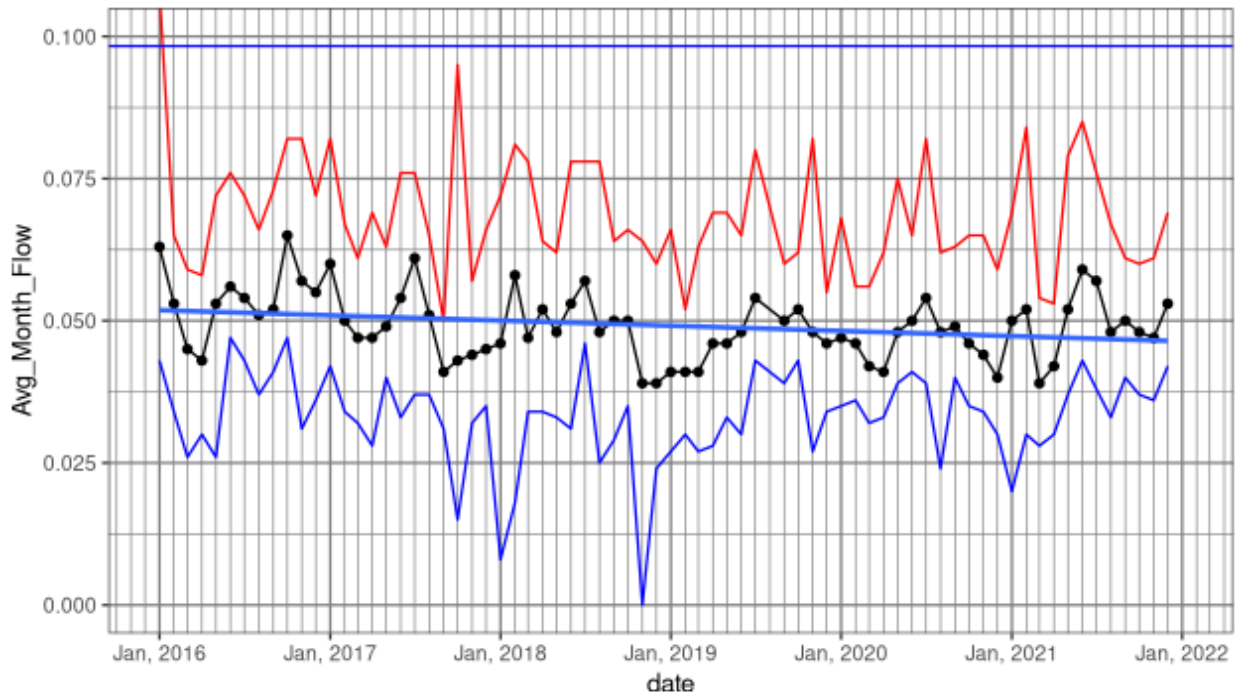
Influent flows and loadings from January 2016 through December 2021 are used to determine seasonal trends and develop per capita ratios for influent flows and loadings. **Exhibit 3-2** graphs monthly influent flows for this time period and **Table 3-3** summarizes this information. The DMR data indicates that influent flows have decreased slightly over the study period.

Table 3-3 Wastewater Influent Flow

Year	AAF (MGD) ⁽¹⁾	Maximum Month		Maximum Daily	
		MMF (MGD) ⁽²⁾	Peaking Factor	MDF (MGD) ⁽³⁾	Peaking Factor
2016	0.054	0.065	1.20	0.108	2.00
2017	0.049	0.061	1.24	0.095	1.94
2018	0.049	0.058	1.18	0.081	1.65
2019	0.047	0.054	1.15	0.082	1.74
2020	0.046	0.054	1.17	0.082	1.78
2021	0.050	0.059	1.18	0.085	1.70
Average	0.049	0.059	1.189	0.089	1.80
Maximum	0.054	0.065	1.245	0.108	2.00

1. AAF = Average Annual Flow
2. MMF = Maximum Month Flow
3. MDF = Maximum Daily Flow

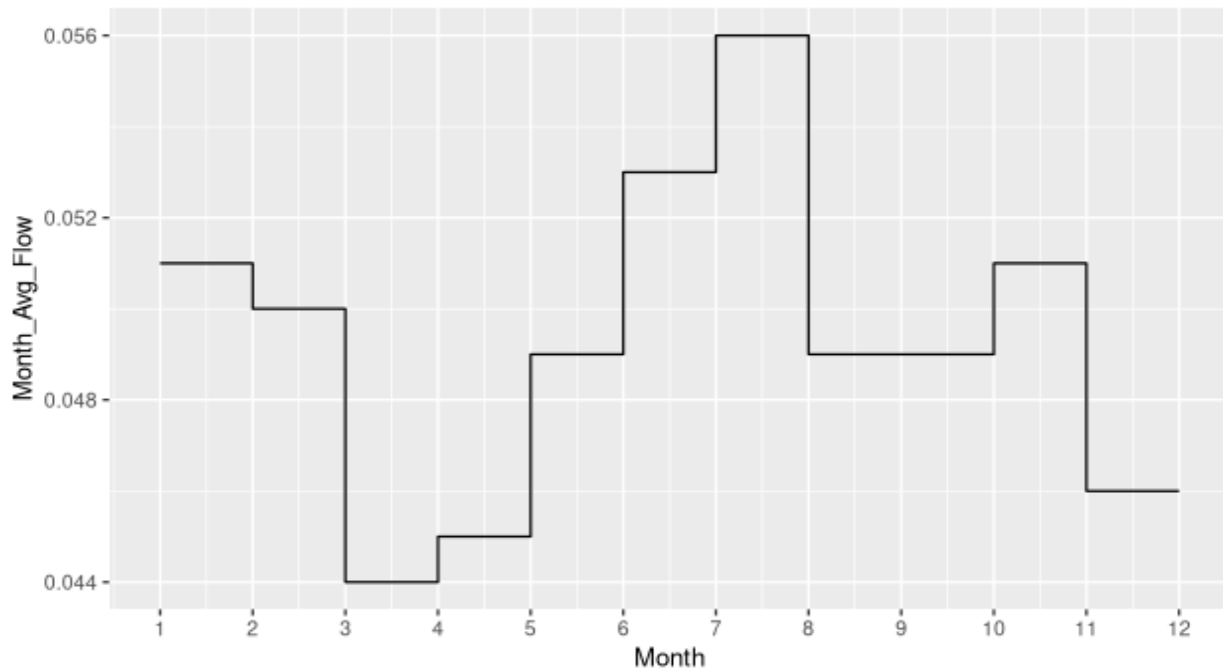
Exhibit 3-2 Pateros Monthly Influent Flows from 2016 to 2021



1. Red – Monthly Peak Flow MGD
2. Black – Average Monthly Flow (MGD)
3. Blue – Trend line for Average Monthly Flow (MGD)

Exhibit 3-3 shows the seasonal variation in monthly average influent flow for each month between 2016 and 2021. As shown on the figure, average peak influent flows occur in July with low influent flows occurring in March and April. This is an unusual flow pattern; indicating that influent flow is potentially responding to infiltration from high groundwater levels due to the water surface elevation of Lake Pateros associated with Wells Dam. Seasonal variation is not very large with the average monthly low flow about 80% of the average winter peak month flow.

Exhibit 3-3 Pateros Seasonal Flows (MGD)



Influent BOD and TSS concentrations are measured weekly. **Table 3-4** and **Exhibit 3-4** show BOD and TSS loadings for January 2016 through September 2021. Annual influent BOD has shown a slight decrease during the study period as did influent flow.

Table 3-4 Influent BOD and TSS Loading

Year	Avg. Annual BOD ₅ (lbs/d)	Max Month BOD ₅ (lbs/d)	Avg. Ann. TSS (lbs/d)	Max Mo. TSS (lbs/d)
2016	116	169	93	122
2017	101	135	93	125
2018	99	112	89	113
2019	97	127	75	95
2020	96	114	83	114
2021	97	131	91	138
Average	101	131	87	118
Maximum	116	169	93	138

Exhibit 3-4 Average Month BOD Loading (lbs/d)

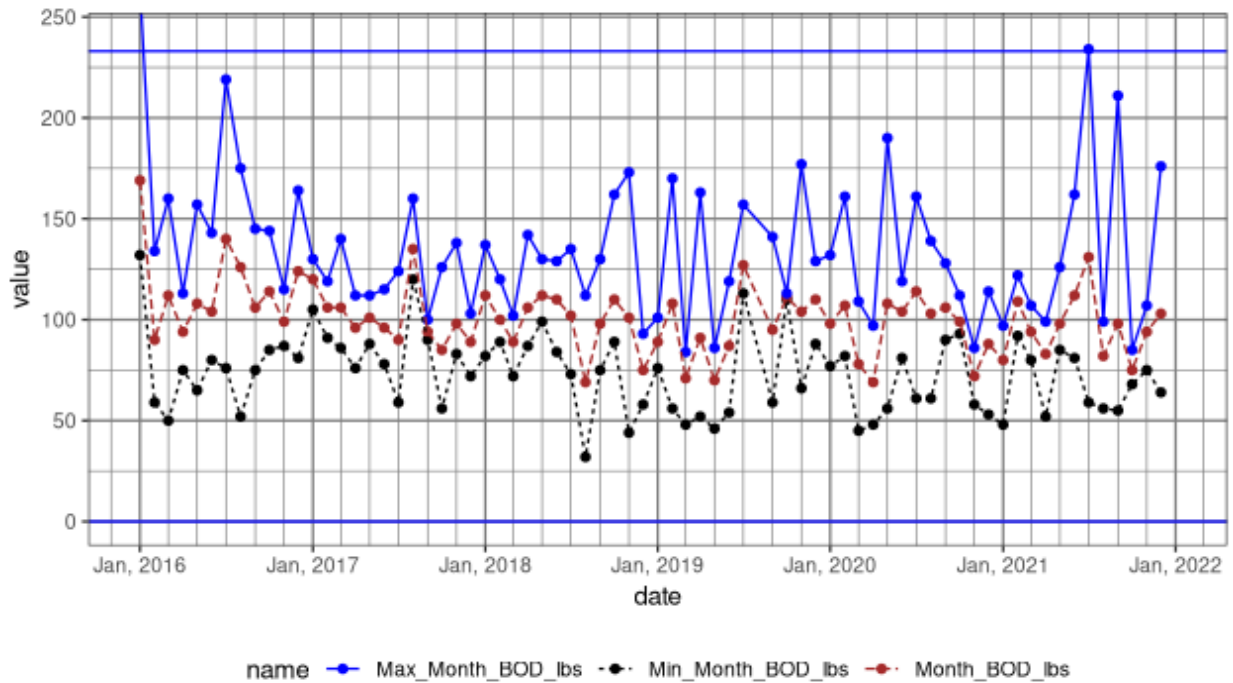


Table 3-5 provides a summary of influent flows and loadings and calculates a per capita ratio for influent flow, BOD, and TSS. These ratios are used to estimate future influent characteristics.

The per capita flows and loadings shown in **Tables 3-5 through 3-7** are based on influent measurements. The impact of industrial sewage from Apple House and on future flows and loadings are discussed in the next sections. 2020 flow characteristics are shown because the 2020 census provides an accurate city population.

- Population (2020) = 593
- Average Daily Flow = 78 gpcd
- Max Month Flow = 91 gpcd
- Average Daily BOD = 0.16 lbs per capita/d
- Max Month BOD = 0.19 lbs per capita/d
- Average Daily TSS = 0.14 lbs per capita/d
- Max Month TSS = 0.19 lbs per capita/d

Table 3-5 Influent Flow per Capita

Year	Pop	Minimum Month		Average Month		Maximum Month		Peak Day	
		Flow (MGD)	Per Capita	Flow (MGD)	Per Capita	Flow (MGD)	Per Capita	Flow (MGD)	Per Capita
2016	560	0.043	77	0.054	96	0.065	116	0.108	193
2017	580	0.041	71	0.049	84	0.061	105	0.095	164
2018	583	0.039	67	0.049	84	0.058	99	0.081	139
2019	585	0.041	70	0.047	80	0.054	92	0.082	140
2020	593	0.04	67	0.046	78	0.054	91	0.082	138
2021	590	0.039	66	0.05	85	0.059	100	0.085	144
Average		0.041	70	0.05	85	0.06	101	0.09	153
Peak		0.043	77	0.05	96	0.07	116	0.11	193

Table 3-6 Influent BOD per Capita

Year	Pop	Minimum Month		Average Month		Maximum Month	
		BOD (lbs/d)	Per Capita	BOD (lbs/d)	Per Capita	BOD (lbs/d)	Per Capita
2016	560	90	0.16	116	0.21	169	0.30
2017	580	85	0.15	101	0.17	135	0.23
2018	583	69	0.12	99	0.17	112	0.19
2019	585	70	0.12	97	0.17	127	0.22
2020	593	69	0.12	96	0.16	114	0.19
2021	590	75	0.13	97	0.16	131	0.22
Average		76	0.13	101	0.17	131	0.23
Peak		90	0.16	116	0.21	169	0.30

Table 3-7 Influent TSS per Capita

Year	Pop	Minimum Month		Average Month		Maximum Month	
		TSS (lbs/d)	Per Capita	TSS (lbs/d)	Per Capita	TSS (lbs/d)	Per Capita
2016	560	60	0.11	93	0.17	122	0.22
2017	580	66	0.11	93	0.16	125	0.22
2018	583	61	0.10	89	0.15	113	0.19
2019	585	49	0.08	75	0.13	95	0.16
2020	593	54	0.09	83	0.14	114	0.19
2021	590	66	0.11	91	0.15	138	0.23
Average		59	0.10	87	0.15	118	0.20
Peak		66	0.11	93	0.17	138	0.23

3.3.3 Industrial Flows and Loadings

Process wastewater from the Apple House Warehouse and Storage Inc., Pateros North Plant discharges to the City treatment plant. The Apple House discharges under the Fresh Fruit Packing General Permit WAG 435152 and a 2020 City contract (refer to **Appendix D**).

The City contract includes a base rate equivalent to 20 ERU's (1 ERU = 175 gpd) with a base wastewater strength of 2,000 mg/l BOD and 2,000 mg/l TSS. The contract with the City increases discharge costs for additional flow and strength if they occur. Apple House added pretreatment in order to reduce effluent suspended solids in early 2020. Pretreatment reduced peak loads that had been experienced before the system was installed. When discharging to the City, Apple House provides weekly flows and concentrations of BOD and TSS. Flow and concentration information is used to estimate flows and loadings in MGD, and pounds on a weekly basis in order to compare to measured City influent flows. **Exhibits 3-5 through 3-7** show the Apple House flows and loads entering the City treatment plant. **Table 3-8** summarizes the annual loading from Apple House.

Exhibit 3-5 Apple House Flows to the Treatment Plant

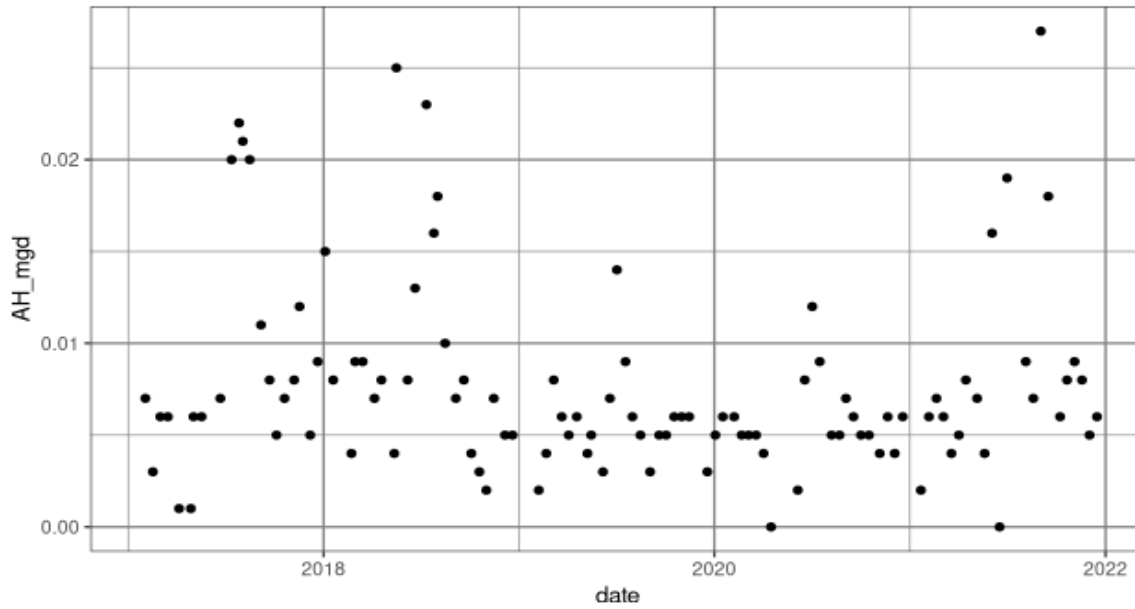


Exhibit 3-6 Apple House BOD to the Treatment Plant

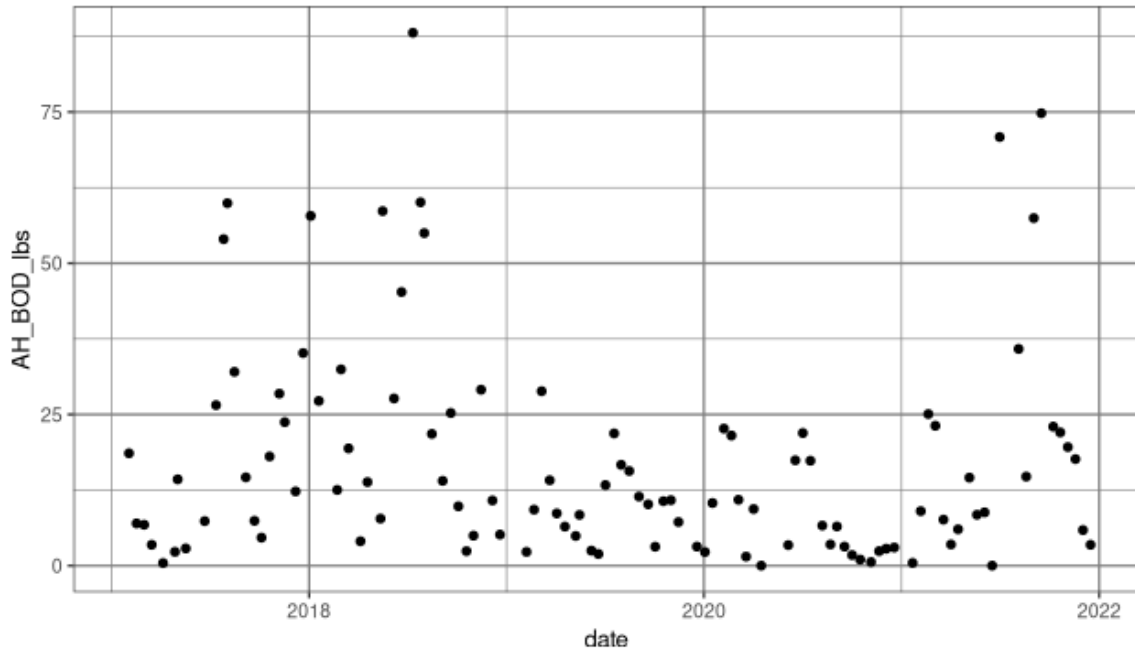


Exhibit 3-7 Apple House TSS to the Treatment Plant

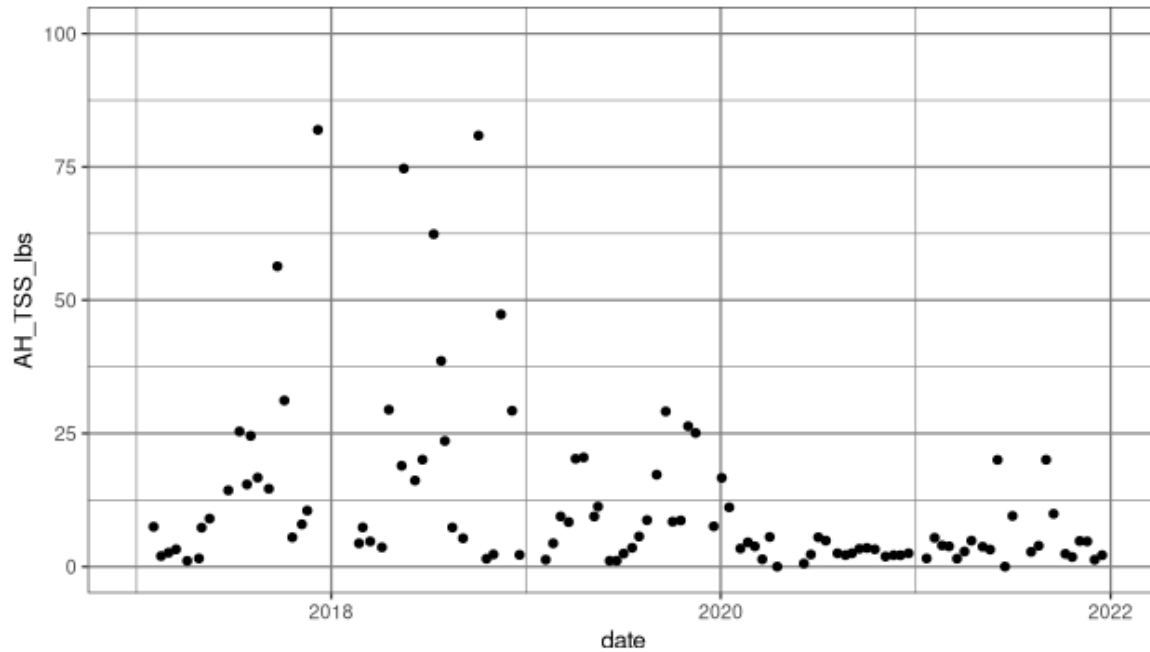


Table 3-8 Apple House Wastewater Contribution

Year	Flow (MGD)			BOD (lbs/d)			TSS (lbs/d)		
	Plant Influent	Apple House	% Apple House	Plant Influent	Apple House	% Apple House	Plant Influent	Apple House	% Apple House
2017	0.049	0.009	18.4%	101	18	17.8%	93	31	33.3%
2018	0.049	0.009	18.4%	99	28	28.3%	89	59	66.3%
2019	0.047	0.006	12.8%	97	9	9.3%	75	11	14.7%
2020	0.046	0.005	10.9%	96	8	8.3%	83	4	4.8%
2021	0.05	0.009	18.0%	97	21	21.6%	91	5	5.5%
Average	0.048	0.008	15.7%	98.0	16.8	17.1%	86.2	22.0	24.9%

During the study period, Apple House contributed about 16% of the flow, 17% of the BOD load, and 25% of the TSS load to the City treatment plant. As shown in **Table 3-8**, the TSS load from Apple House has decreased substantially after installing the pretreatment system in early 2020.

Per capita flows and loads to the treatment plant, as shown in **Table 3-5**, would be reduced by about 15% if Apple House did not discharge to the City treatment plant. However, the per capita flows and loadings shown in **Table 3-5** appear to be reasonable factors to estimate future plant loads.

3.3.4 Inflow and Infiltration

The City’s collection system was originally installed in 1954 and expanded in 1966. There are about 2.5 miles of AC pipe, 1.3 miles of concrete pipe, and 0.4 miles of PVC pipe in the collection system. I/I was reported at about 19% of influent flow in the 2015 NPDES Fact Sheet.

Seasonal peak flows occur in June and July as shown on **Exhibit 3-3**. This is possibly caused by Wells Dam backwater that is reportedly at an elevation higher than portions of the sewer collection system.

A check of I/I between 2016 and 2021 was made by calculating the difference between the highest and lowest month average influent flows as outlined in the ECY “Information Manual for Treatment Plant Operators”. This method is used for the Annual I/I Report prepared by treatment plants as part of their annual wastewater report used to track potential I/I issues. **Table 3-9** summarizes these calculations. Based on this information, excess flows from I/I contribute between 30 and 40 percent of annual influent flow. The ADF per capita is lower than the EPA guideline of 120 gpcd for excessive infiltration. A separate TM has been prepared to evaluate I/I in more detail.

Table 3-9 Estimated I/I Flows

Variable	Year					
	2016	2017	2018	2019	2020	2021
Min Month (MGD)	0.043	0.041	0.039	0.041	0.04	0.039
Avg Month (MGD)	0.054	0.049	0.049	0.047	0.046	0.05
Max Month (MGD)	0.065	0.061	0.058	0.054	0.054	0.059
Peak Day (MGD)	0.108	0.095	0.081	0.082	0.082	0.085
Population	560	580	583	585	593	590
Precip (in)	13.05	11.24	10.26	7.78	6.77	7.72
<u>Total (MG)</u>	<u>19.7</u>	<u>17.9</u>	<u>17.9</u>	<u>17.2</u>	<u>16.8</u>	<u>18.3</u>
I/I (MGD)	0.022	0.02	0.019	0.013	0.014	0.02
ADF/Cap (gal)	96	84	84	80	78	85
MMF/Cap (gal)	116	105	99	92	91	100
I/I/cap (gal)	39.3	34.5	32.6	22.2	23.6	33.9
% I/I/ADF	41%	41%	39%	28%	30%	40%

3.3.5 Potential Brew Pubs

The City has indicated that they are planning for up to two brew pubs. Assumptions are made based on planning information for a recent brewery located in Twisp. The initial data indicates that the Twisp brewery is planning on producing up to 400 barrels (12,000 gallons) per month. The preliminary data from the brewery’s engineer indicated a waste flow of about 2,200 gpd with an average BOD load of 50 lbs/d and TSS load of 15 lbs/d.

This appears to be pretty high production rate for a dedicated brew pub so let's assume that each brew pub will produce a conservative 100 barrels/day or a total of 200 barrels. This adds a projected 1,100 gpd, 25 lbs of BOD and 8 lbs of TSS to the projected flows and loadings shown below.

3.3.6 Projected Flows and Loadings

Projected flows and loadings are estimated using projected future populations and flow and loading parameters from the current influent monitoring. In Pateros, treatment plant influent flows include municipal flows (residential and commercial), industrial flows (Apple House is the only large industrial flow), and seasonal inflow and infiltration (I/I). Future projections are shown based on the per capita flows and loadings summarized in **Tables 3-5 through 3-7**.

Table 3-10 summarizes the criteria used to estimate future flows and loadings. Typical flow values for new residential developments are approximately 100 gpcd. Pateros' historical usage would indicate that residential usage is less than 100 gpcd. To be conservative a value of 100 gpcd is used to estimate future flows.

Table 3-10 Annual Projected Flows and Loadings from Future Sewer Service Area

Flow or Loading	Historic	Criteria	Type	Projected (2042)	Apple House ⁽¹⁾	Brewpub ⁽¹⁾	Combined	Design
Service Area Population	593			1,095 ⁽²⁾				
Avg Annual Flow (mgd)	0.050	100	gpcd	0.110	0.008	0.0011	0.119	0.125 ⁽³⁾
Max. Month Flow (mgd)	0.060	1.2	PF	0.131	0.020	0.0011	0.153	0.098 ⁽⁴⁾
Max. Day Flow (mgd)	0.090	1.8	PF	0.197	0.020	0.0011	0.218	0.180 ⁽³⁾
Peak Hour Flow (mgd)	---	4.2	PF	0.460	---	0.0011	0.461	0.580 ⁽³⁾
Annual Avg BOD Load (lbs/d)	101	0.17	lbs/d/cap	185	17	25	227	260 ⁽³⁾
Max. Month BOD Load (lbs/d)	131	0.22	lbs/d/cap	242	70	25	337	233 ⁽⁴⁾
Annual Avg TSS Load (lbs/d)	87	0.15	lbs/d/cap	166	8	10	184	300 ⁽³⁾
Max Month TSS Load (lbs/d)	118	0.20	lbs/d/cap	222	15	10	247	288 ⁽⁴⁾

1. Apple House flows and loadings are incorporated in the residential per capita factors providing conservative per capita factors. Industrial flows and loadings that include Apple House and potential brewpubs are also added as sperate flows. Max month for Apple House is based on 2021 data; there were two months where Apple House discharged high BOD. Peaking was ignored for the potential brewpubs.

2. See **Table 3-2**

3. Per 2000 WWTP Record Drawings

4. Per 2015 NPDES permit (WA0020559)

4.0 Wastewater Collection System

This section reports existing data and information on the City of Pateros' wastewater collection system and provides an evaluation of the collection system, an infiltration / inflow analysis, and improvements needed.

4.1 Existing Collection System Description

The City's wastewater collection system was primarily installed in 1954 and 1966.

Pipe installed in 1954 is reported to be concrete pipe in 3-foot lengths. The pipe remaining in service from the 1954 project serves the areas of the City thought to be above the average pool elevation of Wells Dam.

Sewer main installed during the 1966 project is reported to be asbestos concrete pipe with rubber gasket joints. The majority of this pipe serves the lower area of the City and approximately 50% of the AC pipe is below the average pool elevation of Wells Dam. Refer to **Figure 4-1**.

Approximately 90 services on the south west side of the City drain to the Warren Ave Lift Station which pumps wastewater through a 6-in force main to the intersection of Warren Ave and Chris St. All portions of the City gravity drain to the wastewater treatment plant (WWTP) lift station located on the east side of the WWTP site.

4.1.1 Collection System Mains

The following table contains a summary of the City's wastewater collection system sewer mains.

Table 4-1 Summary of Collection System Sewer Mains

Main	Length of Sewer Main of Diameter Shown (LF)		
	6"	8"	10"
Asbestos Cement (AC) - Gravity	100	8,790	6,350
Concrete - Gravity	270	7,340	0
PVC - Gravity	400	2,220	0
Force Main	640	0	0
Unknown Material & Size	490		
Total Sewer Length	26,600		




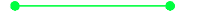
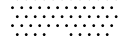
4.1.2 Manholes

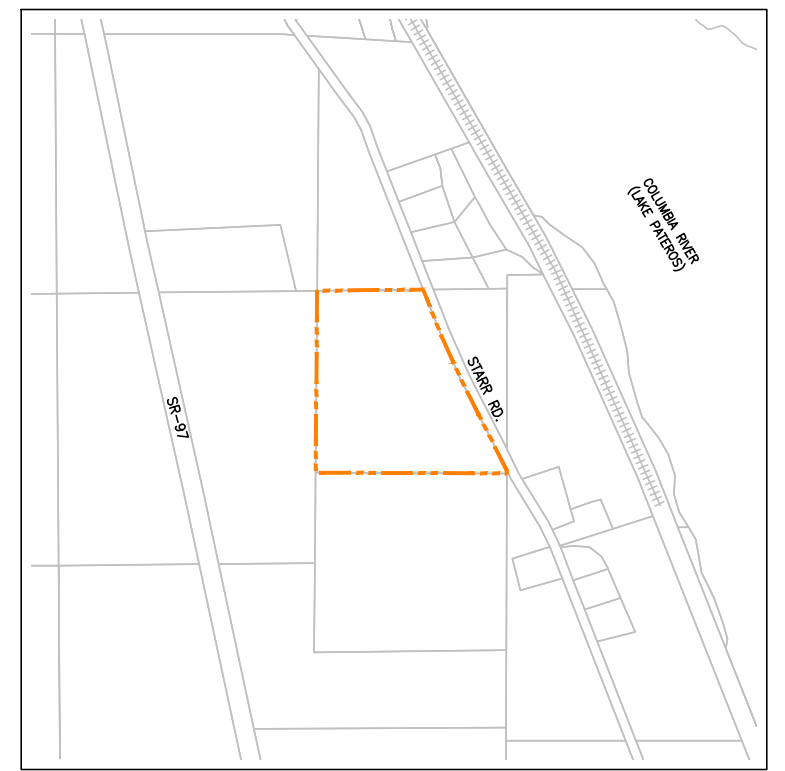
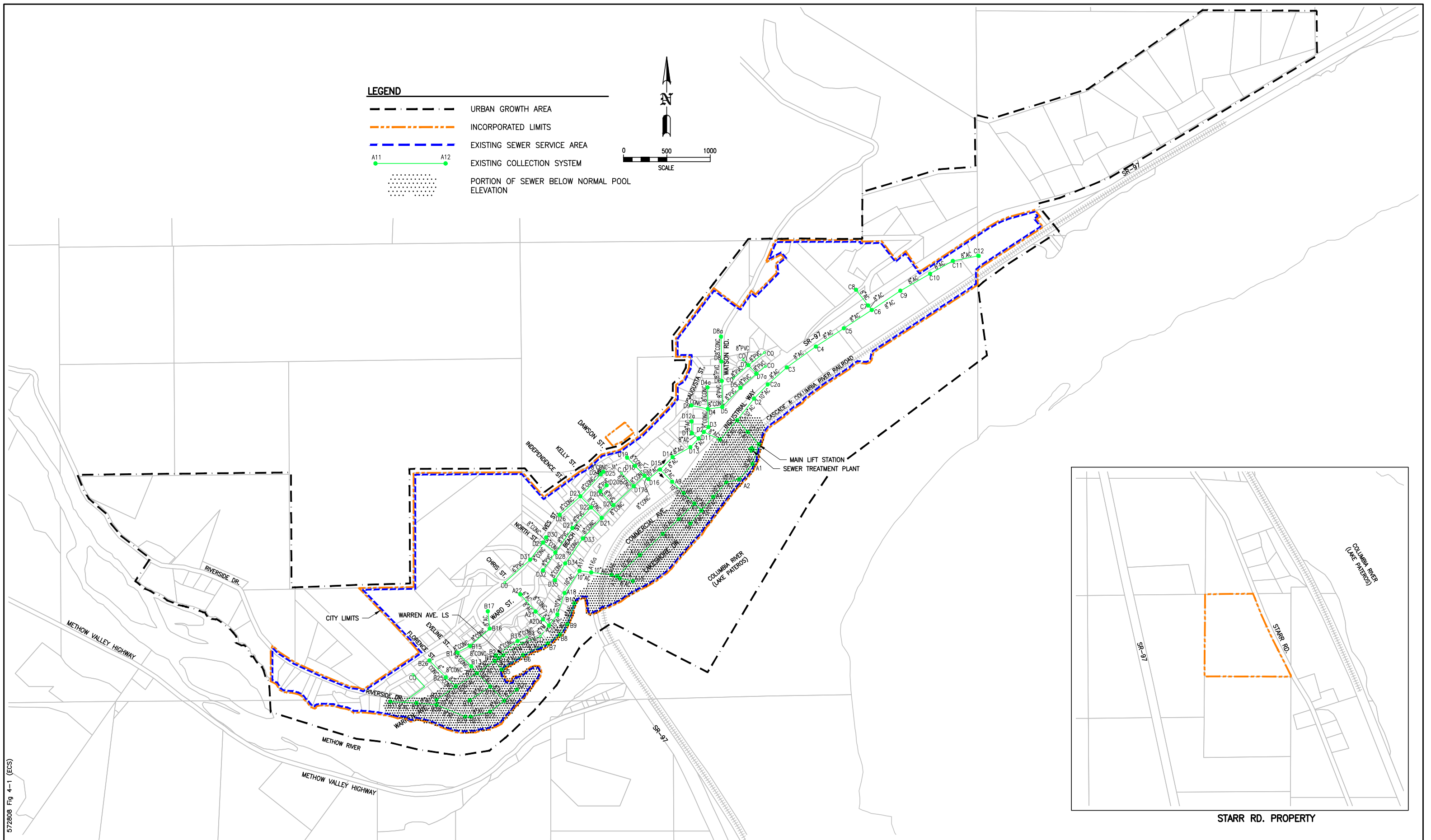
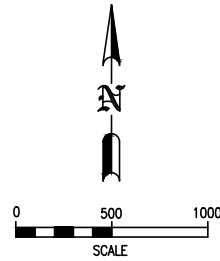
The City maintains approximately 113 manholes throughout the collection system. Manholes installed during the 1954 sewer project are primarily brick. Manholes installed during and/or after the 1967 sewer project are primarily precast concrete. Invert depths throughout the system range from 3 ft in depth to 14.5 ft in depth. Locations of manholes are shown on **Figure 4-1**. The City's Manhole Inventory is included in **Appendix E**.

4.1.3 *Lift Stations*

The City maintains and operates two lift stations: 1) Warren Avenue Lift Station; and 2) Influent Lift Station.

Locations of lift stations are shown on **Figure 4-1**. The Warren Ave Lift Station is discussed in **Section 4.3**. Refer to **Chapter 5** for an evaluation of the WWTP Influent Lift Station.

- LEGEND**
-  URBAN GROWTH AREA
 -  INCORPORATED LIMITS
 -  EXISTING SEWER SERVICE AREA
 -  EXISTING COLLECTION SYSTEM
 -  PORTION OF SEWER BELOW NORMAL POOL ELEVATION



572808 Fig 4-1 (ECS)

SCALE: AS SHOWN
 DESIGNED: NVH
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 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-02
 DATE: 8/30/22



4.2 Capacity Analysis

The City's collection system divides into four sewer basins, which are shown on **Figure 4-2** and labeled Basins A, B, C and D. The four basins are served by various sized gravity trunk mains that eventually drain to the City's Main Lift Station at the Wastewater Treatment Plant.

The collection system capacity herein was modeled using Autodesk Storm and Sanitary Analysis SWMM.

4.2.1 Reported Capacity Issues

Collection system capacity was discussed with City staff. The City reports no known capacity issues and/or surcharging in the system except for the specific cases discussed in **Section 4.3**.

4.2.2 Basin Description and Trunk Mains

The system is served by 10-inch and 8-inch trunk mains that collect sewage from all four of Pateros' sewer basins. Sewage is conveyed to the WWTP Influent Lift Station located immediately east of the City's wastewater treatment plant near the Ives Landing Park and Boat Launch.

Individual sewer basins and trunk mains are shown on **Figure 4-2**. Following is a description of each basin:

Basin A

Basin A is bordered by Basin B to the west, Basin D to the North, Basin C to the east and the Columbia River to the south. Basin A is served by a 10-inch asbestos-cement (AC) sewer trunk main that generally follows Warrant Ave, Commercial Ave, and Lakeshore Dr before discharging to the City's Main Lift Station. The trunk main serves Basins A, B and D. Basin A is comprised of mostly commercial services along Commercial Ave and Lakeshore Dr with some residential services served at the west end of the basin along Chris St and Warren Ave.

Basin B

Basin B is bordered by Basin A to the east, Basin D to the north, the Columbia River to the south, and City Limits to the west. Basin B is served by a 10-inch AC trunk main. Basin B includes all flows collected by the Warren Ave Lift Station located along Warren Ave between Eveline St and Chris St. The Warren Ave lift station pumps Basin B flows to Basin A at manhole A20. Basin B is comprised of mostly residential service along the west side of town.

1997 as-built drawings for the Warren Ave lift station show two 4" SS gravity mains discharging to the wet well, which creates a constriction upstream of the wet well. City staff have noted that the 4-inch mains have instances of clogging which can cause upstream mains to back-up.

Basin C

Basin C is bordered by Basin D and Basin A to the west, City limits to the north and east, and the Columbia River to the south. Basin C is served by an 8-inch AC trunk main. Basin C collects primarily industrial flows (including Apple House) along Industrial Way in the east end of town.

Basin D

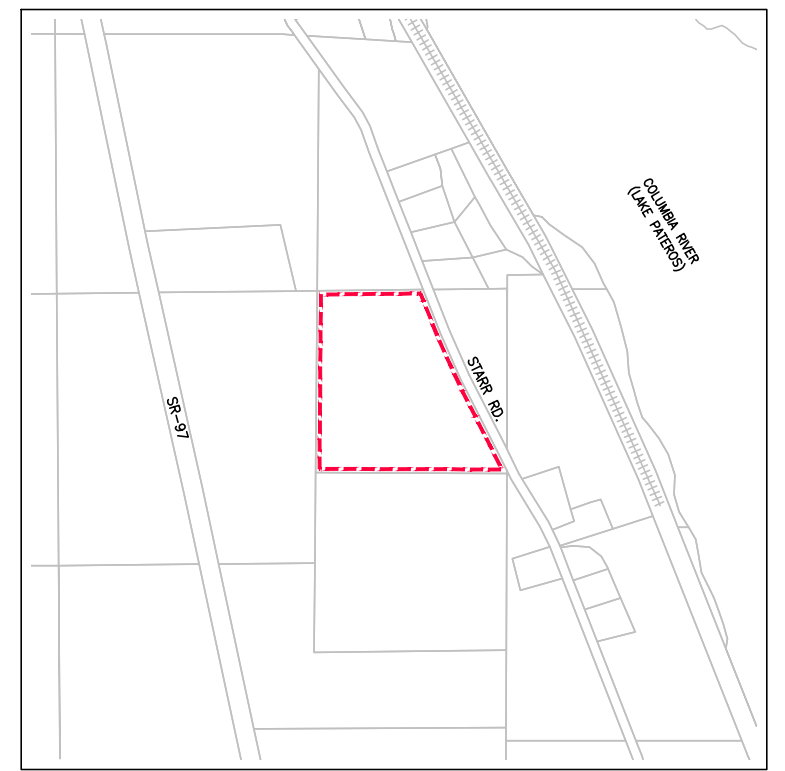
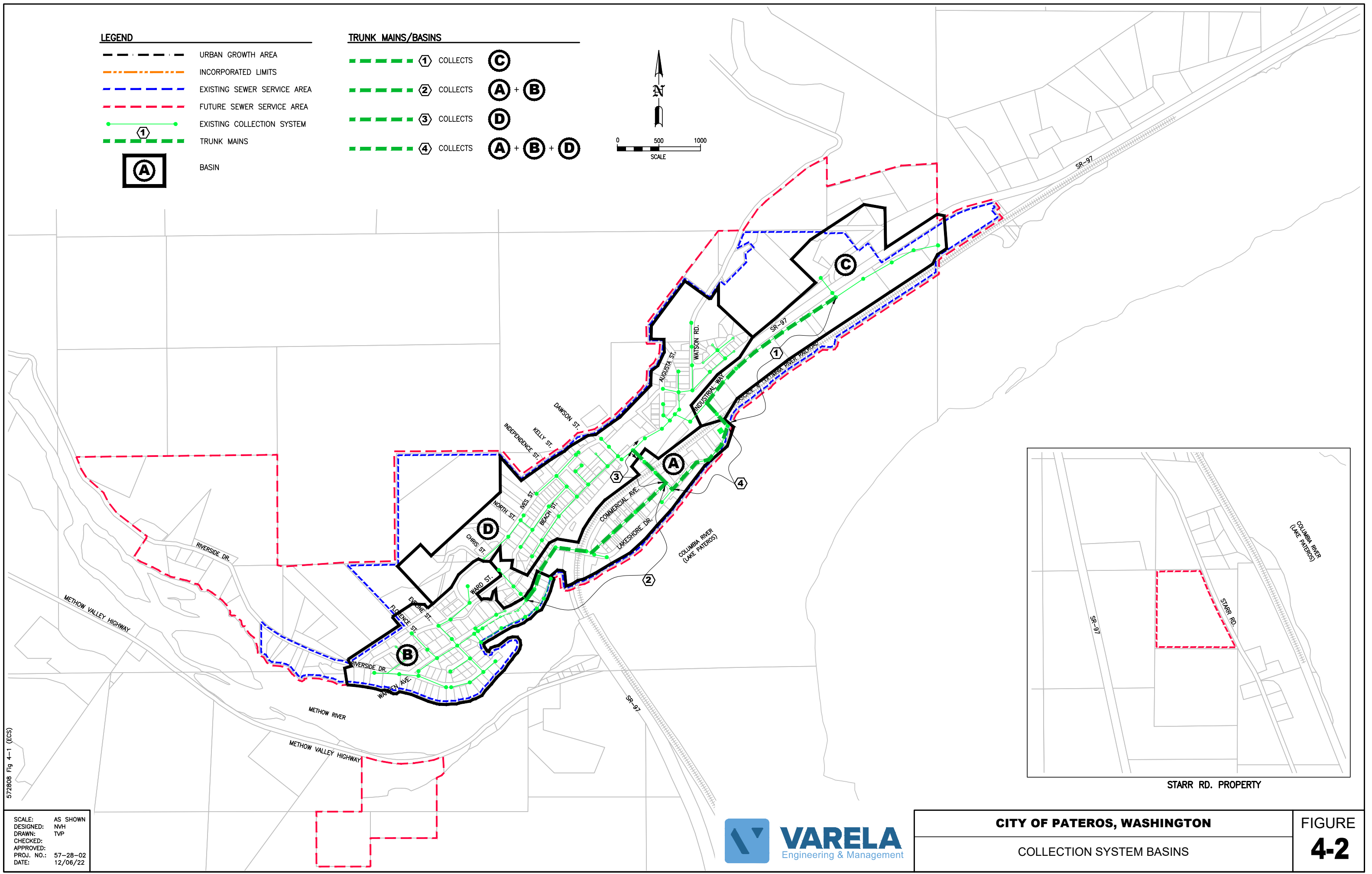
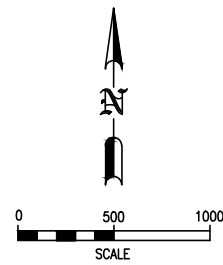
Basin D is bordered by the City limits to the north, east, and west and by Basins A, B, and C to the south. Basin D collects sewer flows north of SR-97. Basin D is served by a 10-inch AC trunk main. Flow is diverted at the intersection of Warren St and Dawson St in manhole D15; flows traveling east flow to Basin C while flows traveling south flow to Basin A. It is assumed that flows from MH D15 primarily flow to the south and into Basin A. Basin D generally consists of the older main installed during the 1954 project. Basin D is comprised of mostly residential services.

LEGEND

- URBAN GROWTH AREA
- INCORPORATED LIMITS
- EXISTING SEWER SERVICE AREA
- FUTURE SEWER SERVICE AREA
- EXISTING COLLECTION SYSTEM
- TRUNK MAINS
- 1 BASIN

TRUNK MAINS/BASINS

- ① COLLECTS C
- ② COLLECTS A + B
- ③ COLLECTS D
- ④ COLLECTS A + B + D



572808 Fig 4-1 (ECS)

SCALE: AS SHOWN
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4.2.3 *Potential Growth Areas*

During the 20-year growth period, OFM projects a population increase of 137 persons, however the City anticipates growth exceeding OFM projections. Within the 20-year planning period the City expects a population increase of 502 persons resulting in a total population of 1,095 by 2042 (see **Chapter 3**).

Growth areas for the 20-year planning period have been identified through conversations with City staff and account for 428 of the 502 persons anticipated during the 20-year planning period (See **Table 3-2** and **Figure 3-2**).

In addition to the growth areas, there are some empty lots scattered throughout the City service area that will likely be developed as well. An additional 74 persons not accounted for in the identified growth areas are assumed to be single lot in-fill developments.

The following table shows the anticipated growth areas, number of anticipated population growth ERUs, and improvements needed to serve each area.

Table 4-2 Summary of Potential Growth and Improvements Needed to Serve

Growth Area	Area Size (acres)	Zoning	Projected ERUs (20-yr)	Buildout ERUs	Improvements Needed to Serve
<u>Growth Area 1</u>					
1-1	23.0	R2	43.2	172.8	900ft of 8" sewer from the 8" main on Pederson Rd to the development area. Sewer main within this development should be minimum 8". Proposed main size considers extension to Growth Area 1-2.
1-2	12.1	R2	22.7	90.8	600ft of 8" sewer from Growth Area 1-1 to the development area along Stives Rd. This main is in addition to the main needed to serve Growth Area 1-1. Sewer main within this development should be minimum 8".
<u>Growth Area 2</u>					
2-1	11.6	R2	13.1	87.2	150ft of 8" sewer from the 6" main on Florence St to the development area. Sewer main within this development should be 8". 6" main between manholes B25 and B26 should be upsized to 8" to eliminate the 6" constriction.
2-2	1.4	R2	1.5	10.2	350ft of 8" sewer from the 8" main on Riverside Dr to the development area. Sewer main within this development should be 8". Proposed main size considers extension to Growth Area 2-2.
2-3	48.2	R2	54.2	361.5	1,950ft of 8" sewer from Growth Area 2-2 to the development area along Riverside Dr. This main is in addition to the main needed to serve Growth Area 2-2. Sewer main within this development should be 8".

Growth Area	Area Size (acres)	Zoning	Projected ERUs (20-yr)	Buildout ERUs	Improvements Needed to Serve
<u>Growth Area 3</u>					
3-1	23.3	R2	17.5	70	2,500ft of 6" forcemain along Methow Valley Hwy and 1,500ft of 8" gravity sewer main along SR-97 to the development area. Sewer main within this development should be 8". A new lift station (wet well and valve vault) is needed to pump wastewater to a new manhole at the intersection of Methow Valley Hwy and SR-97. Proposed gravity main size considers extension to Growth Area 4.
3-1	4.3	C	6.5	25.8	
3-1	1.0	C-Brewery	1.5	6	
<u>Growth Area 4</u>					
4-1	15.2	LI	(1)	(1)	2,900ft of 8" gravity main along Starr Rd, and 1,600ft of 6" forcemain along Starr Rd, and 3,800ft of gravity main to the development area. Sewer main within this development should be 8". A new lift station (wet well and valve vault) is needed to pump wastewater to a new manhole at the intersection of Starr Rd and SR-97. This main is in addition to the gravity main needed to serve Growth Area 3.

Growth Area	Area Size (acres)	Zoning	Projected ERUs (20-yr)	Buildout ERUs	Improvements Needed to Serve
<u>Infill</u>					
I-1	4.5	R3	6.08	40.5	N/A – Existing sewer system available for connection
I-2	0.3	R2	1.24	2.5	
I-3	2.7	R3	3.59	24.0	
I-4	1.7	R3	2.35	15.6	
I-5	0.8	R3	1.02	6.8	
I-6	1.4	R2	5.42	10.8	
I-7	0.5	R3	0.69	4.6	
I-8	0.9	R3	1.15	7.7	
I-8	0.9	C-Brewery	5.11	5.1	
I-9	0.5	CBD	2.71	2.7	
I-10	4.2	LI	0.00	0.0	

1. Assumed new industrial ERUs in Growth Area 4 equivalent to Apple House.

4.2.4 Analysis and Methodology

An analysis was completed to determine the capacity of the existing collection system trunk mains. The hydraulic analysis was modeled using Autodesk Storm and Sanitary Analysis⁵. The model was developed using existing sewer system information provided in the 1999 Facility Plan and from updated information provided by City Staff.

The system model assumes the following:

- Manhole rim and invert elevations per City manhole inventory.
- Pipe slope for trunk mains is based on manhole invert elevations provided by City staff. Future trunk mains were assumed to be minimum slope per ECY standards⁶.
- Existing flows are based on criteria documented in **Chapter 3**.
- Projected flows are based on peak hour flows calculated for individual growth areas using ECY ratios for peak hourly flow. Note that this approach results in flows exceeding peak flows provided in **Chapter 3**.

The hydraulic analysis models the existing sewer network under both current conditions at peak flow and under future conditions at peak flow. Future flows are modeled with the current collection system and improvements needed to serve growth areas as discussed in **Table 4-2**.

Current flows were modeled by distributing existing flows throughout the collection system based on ERU distribution. 20-year flows modified the model by adding the growth areas including City infill (refer to **Table 4-2**). Ultimate flows at buildout utilized the 20-year model assuming growth areas at 100% buildout.

Under current conditions the peak hour flow is estimated at 117 gpm. Projected 2042 peak hour flows are estimated at 296 gpm. Projected ultimate buildout peak hour flows are estimated at 431 gpm. The analysis was performed to determine the following:

- Trunk main capacity under the various conditions
- Collection system capacity deficiencies (if any)
- Trunk main capacities under future conditions based on the identified growth areas
- Recommend improvements to accommodate projected growth

⁵ Autodesk Storm and Sanitary Analysis 2022

⁶ Ecology – Criteria for Sewage Works Design, Water Quality Program August, 2008

4.2.5 Collection System Results

The following table summarizes the results of the hydraulic analysis (see **Appendix F** for selected model output):

Table 4-3 Capacity Analysis Summary

Description	Current (2022)	Projected (Yr. 2042)	Ultimate Design
Flows			
Average Day (gpd)	64,632	--	--
Average Day Max Month (gpd)	155,116	--	--
Maximum Day (gpd)	180,969	--	--
Peak Hour (gpm)	117	296	431
Capacity			
Trunk Main 1	13%	32%	80%
Trunk Main 2	10%	30%	35%
Trunk Main 3	3%	5%	7%
Trunk Main 4	16%	43%	54%

1. Trunk mains are shown on **Figure 4-2**

Based on the results of the hydraulic analysis, it appears that the City’s existing sewer collection system is adequately sized for future flows and no upsizing is needed.

4.3 Collection System Condition

4.3.1 System Issues and Recommendations

The majority of Pateros’ wastewater collection system is between 60 and 70 years old. The City’s 2003 Collection System Investigation (discussed below) found that the City’s collection system exhibits multiple structural defects which are at a risk of causing ongoing operations and maintenance problems. The City has addressed some of the highest priority issues identified in the 2003 Investigation, but many of the noted defects in the system have not yet been addressed.

4.3.1.1 2003 Collection System Investigation

In 2003 the City completed a comprehensive collection system investigation during which 24,400 lineal feet of sewer pipe was cleaned and TV inspected, 94 manholes were inspected, and 12,600 lineal feet of sewer pipe was smoke tested. During the investigation multiple types of defects were observed including structural defects, roots, sags, deterioration, and infiltration. The severity of defects were rated and ranked as follows:

- 1st Priority: Pipelines exhibiting the most serious defects. Examples include severe pipe sags and heavy root intrusion. These defects do not necessarily indicate pipe failure, but are considered to be at the highest risk of O&M problems.
- 2nd Priority: Pipelines exhibiting serious defects but are considered at lower risk of failure or increased O&M problems than 1st Priority pipelines.
- 3rd Priority: Pipelines exhibiting defects but are considered to have a low risk of pipe failure or increased O&M problems. Examples include infiltration in pipes below the average pool elevation of Wells Dam.

Costs

The 2003 Investigation estimated costs based on three possible improvement alternatives: 1) ongoing maintenance; 2) combination repair / replacement of mains; and 3) full replacement of mains. In 2010 the City completed relining of Beach St from North St to Independence St. **Figure 4-4** shows remaining collection system projects identified in the 2003 Investigation.

The results of the 2003 investigation are still valid and are the most up-to-date information the City has on the collection system condition and improvements needed. The results are used herein to identify improvements needed for the collection system.

The following table updates cost estimates for the improvements identified in the 2003 Investigation that have not yet been completed. The following costs are for full replacement of the 2003 Investigation improvements that have not yet been completed.

Table 4-4 Estimated Cost of Mains Identified in 2003 Investigation

Mains	Quantity (LF)	Amount
1st Priority Pipelines	2,200	\$550,000
2nd Priority Pipelines	900	\$220,000
3rd Priority Pipelines	200	\$50,000
Subtotal		\$740,000
Contractor mob/admin/overhead/profit (15% of Subtotal)		\$111,000
Subtotal Construction		\$851,000
Sales Tax (8.6%)		\$73,000
Contingency (25%)		\$231,000
Construction Cost		\$1,155,000
Eng, admin, const mgt, insp (30%)		\$347,000
Admin/environmental/funding		\$30,000
Estimated Improvements Cost Total		\$1,532,000

1. Includes full replacement of identified mains above the Well's Dam Pool elevation and lining of identified mains below the Well's Dam Pool elevation.

4.3.1.2 Additional Issues and Recommendations

Following are additional comments by City staff regarding condition of the existing collection system:

- The Warren Ave Lift Station was constructed in 1965 and rehabilitated in 1997. During Varela’s 2021 site visit, the City reported existing issues with the lift station which are documented in the following section. This report recommends comprehensive upgrades to the lift station be performed to ensure reliable operation through the planning period.
- The City is working toward securing funding for redevelopment of the Mall area including aboveground pedestrian improvements and utility replacements. The City intends to complete the Mall redevelopment project as a “complete streets” project including replacement of all utilities below the Mall area so that future maintenance may be kept to a minimum. As such, this project includes replacement or lining of the approx. 1,000 LF of 50+ year-old 10” trunk main and/or sewer services below the Mall. The 10” main is below the Wells Dam pool elevation. It is recommended that the 10” trunk main below the Mall be cleaned and TV inspected to determine repair/replacement options prior to redevelopment of the above hardscaping. Replacement of the main is estimated at \$540K.
- The City has noted the 10” trunk main between MHs A7 and A10 is located below a privately owned apartment complex. Access to the main would be difficult in the event of failure. It is recommended that a new 10” main be installed between MHs A10 and A16 and that the existing 8” AC main between MHs A6 and A7 be upsized to 10”. Installation of the new main is estimated at \$230K. Note that this main is likely below the Wells Dam pool water elevation.
- Warren Ave sewer sags immediately upstream of the Warren Ave Lift Station and is below the average pool elevation of Wells Dam. Replacement of the Warren Ave sewer main was identified as a 2nd priority improvement in the 2003 Collection System Investigation. Design for this section of main was completed in 2018 but was not constructed due to the prohibitive cost of replacement of the main below groundwater levels. If feasible, it is recommended that the City coordinate replacement of submerged pipelines during time when the dam pool is lowered. Otherwise, consideration should be given to slip lining these sections of main.
- The City receives frequent calls regarding backups in Auto Alley. Auto Alley is located between Chris St and North St along Warren Ave. The 2003 Investigation noted the Auto Alley as a 1st priority pipeline.
- A manhole is needed at A22 (see **Figure 4-4**) for City access near Beach St. MH A22 cannot be located and likely does not exist. Budgetary estimates for manhole replacement / addition is \$8,000 per manhole.
- Backups in North St manholes occasionally occur
- Ives St sewer main joints are offset east of Independence Ave. The 2003 Investigation noted the Ives St offset joints as a 3rd priority pipeline.
- Beach St used to be a problem area until the City cleaned and completed CIPP in the main. No issues have been reported since.
- The City’s Manhole Inventory is included in **Appendix E**. The inventory includes a condition assessment for most of the City’s manholes and is current as of 2022. Each manholes is assessed based on overall rating/condition, probability of failure, and consequence of failure. Critical manholes (highest consequence of failure / highest probability of failure) are identified by the

City on a scale of 1 to 25 (25 being most critical). The City has identified 7 manholes ranked moderately critical (criticality rating of 15).

- The City completed design of the Warren Ave Sagging Sewer Replacement Project in 2020. It is recommended that this project be constructed under separate schedule during the Warren Ave Lift Station Improvements Project to leverage potential funding.

Refer to **Table 4-12** for a summary of additional issues, recommendations and cost estimates.

4.3.1.3 Warren Ave Lift Station

Description:

The Warren Ave Lift Station is located along Warren Ave between Eveline St and Chris St. The wet well and valve vault are located along the SE side of Warren Ave in City ROW and the electrical and control panels as well as the backup power generator are located along the NW side of Warren Ave in City ROW.

The lift station was constructed in 1965. Upgrades to the lift station were completed in 1997 including installation of a new 48" dia fiberglass liner within the original 60" dia steel wet well, new 72" dia valve vault, new submersible duplex pumping system, electrical and controls.

Currently the lift station consists of a 4-ft diameter steel wet well (17.75 ft deep; working volume = 400 gallons) with separate 6-ft diameter concrete valve vault that houses the valving. The lift station is fed via two (2) 4-in gravity sewer mains which together convey the entirety of the City's Basin B flows.

Existing pumps consist of 2 submersible centrifugal 5HP pumps (215 gpm, 38.5 TDH). Pumps were replaced in 1997. Pumps are lifted from the wet well via a rail system.

The lift station pumps into a manhole at the intersection of Warren Ave and Chris St, approximately 640 feet east of the lift station via 6-in forcemain .

New soft starters and control equipment were installed in 2015/2017. Additional controls and telemetry modifications were completed by ControlFreek, Inc. in 2021. Improvements included a new banner radio, antenna, coax cable, power supply, heater, back panel wiring and lift station common alarms for callout via radio.

Observations and Issues / Recommendations:

Following are comments and observations on the Warren Ave Lift Station noted from the 2/2022 site visit.

- Current peak hour flow into the wet well is estimated to be approximately 70 gpm. Ultimate buildout peak hour flow into the wet well is estimated to be approximately 95 gpm. Existing pumps appear to be sufficient for pumping the ultimate buildout flows. Due to the age of the existing pumps (25+ years old) it is recommended that the pumps be replaced.
- Access to the wet well, valve vault, control panels, and backup power generator is via the street shoulder.

- The wet well top extends above the ground surface approximately 18 inches and is secured with lock and chain. Heavy corrosion of the wet well interior, lid, pump rails, etc. was noted during the February, 2022 site visit. It is recommended the wet well be cleaned and lid replaced.
- The City reports clogging along the 4" influent mains feeding the wet well. Replacement of the two 4" mains with a single 10" gravity sewer main is recommended to reduce instances of clogging. Mains are noted to be below groundwater.
- The City reports issues associated with low voltage at the lift station. It is recommended that the electrical control panels be replaced.
- The backup power generator automatic transfer switch (ATS) is over 20 years old. It is recommended that the ATS be replaced.
- The valve vault was observed to be full of water during the February, 2022 site visit. City staff indicated that water has been present in the valve vault for 20 years and that no evidence of hydraulic connectivity between the valve vault and wet well exists. It is recommended that the valve vault be replaced with a new water-tight valve vault sized to accommodate new valves, piping, and meter.
- Condition of the lift station controls and generator is generally good. It is recommended that yearly maintenance and load testing be completed.

Costs:

Recommended capital improvements and estimated costs for the Warren Ave Lift Station Improvements are as follows:

Table 4-5 Estimated Cost of Warren Ave Lift Station Improvements

Description	Amount
Lift Station Improvements	
New 300 gpm duplex submersible pump system ⁽¹⁾	\$60,000
Electrical and control panel upgrades	\$70,000
Valve vault replacement	\$40,000
Piping, plumbing, valves	\$30,000
Pump installation	\$10,000
Instrumentation upgrades	\$15,000
Bypass pumping	\$40,000
Wet well inspection/repair budget	\$20,000
New wet well lid replacement or refurbishment	\$15,000
Warren Ave Collection System Improvements	
Replace 4" gravity mains with 10" gravity main incl. surface replacement	\$25,000
Manhole replacement	\$20,000
Subtotal:	\$345,000
Contractor mob/admin/overhead/profit (15% of Subtotal)	\$52,000
Subtotal Construction	\$397,000
Sales Tax (8.6%)	\$34,000
Contingency (25%)	\$108,000
Construction Cost	\$539,000
Eng, admin, const mgt, insp (30%)	\$162,000
Admin/environmental/funding	\$30,000
Estimated Improvements Cost Total	\$731,000

1. Based on estimated 20-year peak flows to Warren Ave Lift Station. ECY requires ability to pump peak flows with one pump out of service.

4.4 Infiltration and Inflow

This section summarizes the methods and results used to identify the individual components of wastewater flow entering the wastewater treatment facility (WWTF) as discussed in **Section 3.3.4**. Areas of known infiltration are identified using past investigations and sanitary surveys which are compared to the results of this evaluation to develop recommendations for reducing infiltration/inflow (I/I) entering the system.

Individual flow components include:

- Sanitary Base Flow: flow from the private and public facilities such as residences, commercial facilities, and schools.

- Infiltration: groundwater entering the sewer through poor service connections, cracked or broken pipes and manhole walls.
- Inflow: water introduced into the system through area drains, roof drains, foundation drains, sump pumps, storm drains or direct flow through manhole lids. Inflow is directly related to storm (precipitation) events. Snowmelt can also contribute to inflow as well as infiltration. Inflow can be separated into direct and rainfall induced inflow (RDI/I). RDI/I is related to short term increased groundwater elevations due to precipitation.

The results determine if the collection system has excess I/I that can impact influent flows and operation of the WWTF.

4.4.1 *Previous Investigations*

Pateros previously completed the following I/I investigations:

- 1999 Pateros Wastewater Facilities Plan & I/I Investigation
- 2003 Pateros Sanitary Sewer Collection System Investigation

Figure 4-3 summarizes the results provided in the 1999 and 2003 I/I and sanitary sewer condition investigations.

4.4.2 *Data and Methods*

Effluent flows from the WWTF were obtained from daily monitoring reports (DMR's) acquired from ECY's PARIS site. DMR's used for this I/I evaluation were from January 2016 through December 2021.

Weather records for the same period (1/2016 – 12/2021) are from the WSU AGNET Azwell site (<https://weather.wsu.edu>). The Azwell site is located at Wells Dam, approximately 7.5 miles south of Pateros.

Water use records for 2018 through 2021 were provided by the City. Winter (non-irrigation season) water use was estimated as the difference between the last monthly meter reading (typically read in October) and the following years first meter reading (typically read in March).

The residential population for the sewer service area was estimated in TM-01 "Planning Areas and Population".

The following methods were used to estimate I/I. Explanations for each method can be found in TM-03:

- Method 1: Annual I/I Report – ECY Information Manual for Treatment Plant Operators
- Method 2: EPA Guide for Estimating Infiltration and Inflow, Region 1

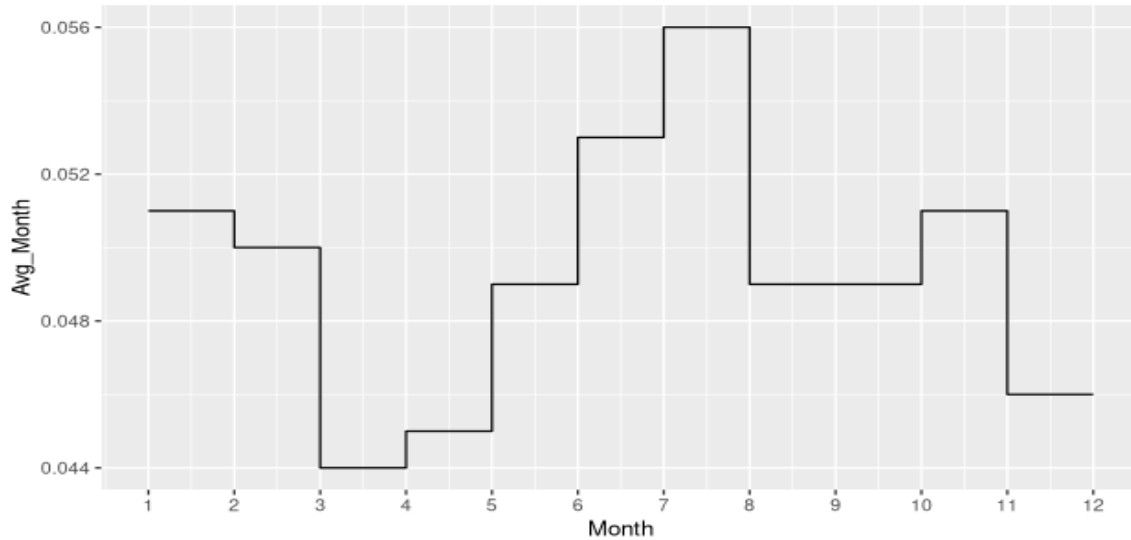
4.4.3 *Background and Information*

4.4.3.1 *Influent Wastewater Flow*

Effluent wastewater flow in million gallons per day (MGD) is measured at the WWTF. **Exhibit 4-1** shows monthly seasonal average flows. Effluent flows out of the WWTF are assumed to be the same as influent

flows into the WWTF. As can be seen on the figure, minimum influent flows occur in March and April with peak monthly flows occurring in June and July.

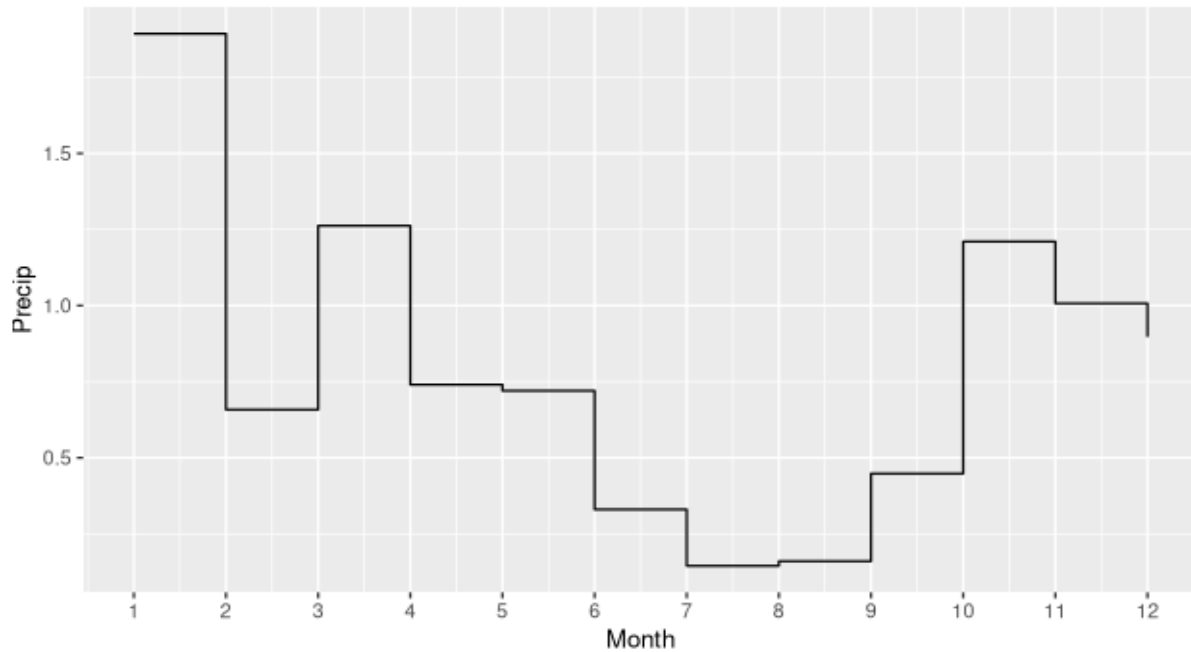
Exhibit 4-1 City of Pateros Seasonal Influent Flows



4.4.3.2 Precipitation

The months of July, August and September have periods of low to no precipitation as can be seen on **Exhibit 4-2**.

Exhibit 4-2 City of Pateros Precipitation Pattern (WSU Agnet – Azwell Site)



4.4.3.3 Lake Pateros/Wells Dam Water Surface Elevations

Wells Dam controls the elevation of Lake Pateros. Lake Pateros water surface elevation is about 10 to 12 feet below the ground surface at Lake Shore Drive. This area of the City includes the AC trunk sanitary sewers installed in 1966 after the construction of Wells Dam. The City has indicated that infiltration may be occurring in this area associated with the lake elevation.

Average Lake Pateros elevations vary about 1.5 feet throughout the year as shown on **Exhibit 4-3**. Elevations are highest in June, July, and August. Maximum month flows into the WWTF occur in June and July as shown on **Exhibit 4-1**. The correlation between both daily and monthly average Lake Pateros elevations and WWTF influent flows are poor ($r = 0.2$).

Exhibit 4-3 Lake Pateros Water Surface Elevations

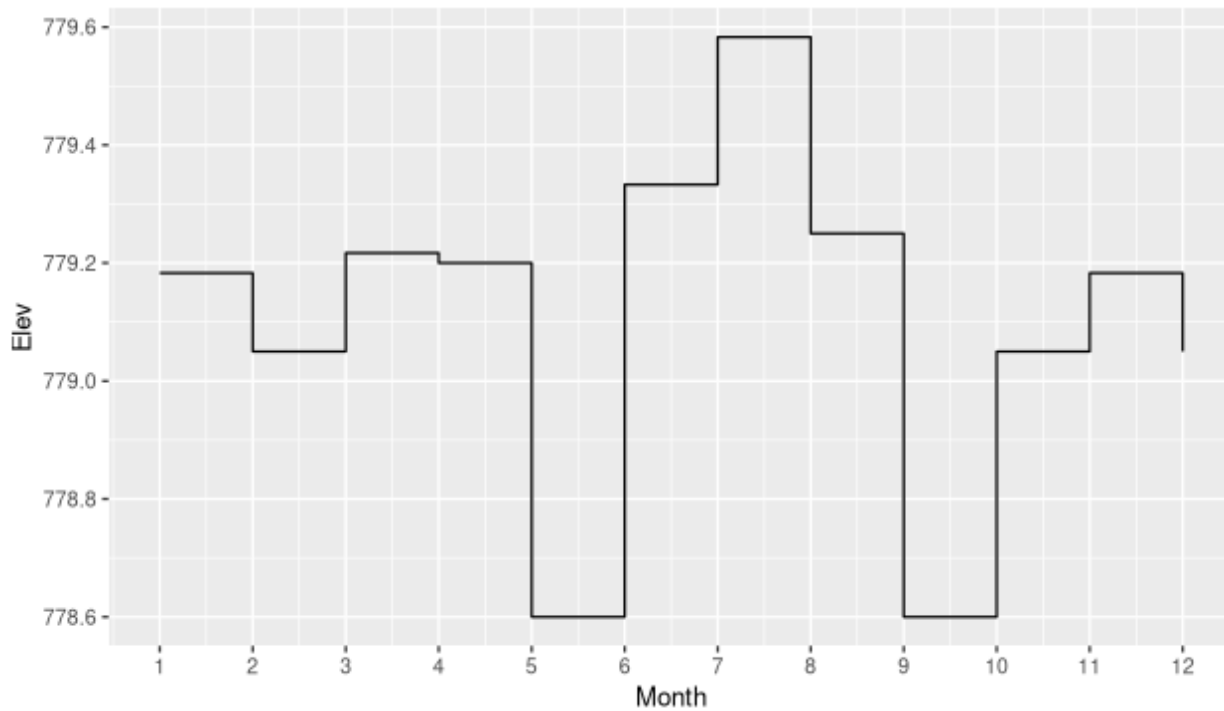


Figure 4-3 shows areas where mains are believed to be below the Lake Pateros water surface elevation and where infiltration is known to be occurring per the 2003 Sanitary Sewer Collection System Investigation.

4.4.3.4 Background Discussion

Influent flows entering the WWTF exhibit seasonal changes with high monthly flows occurring during the summer and low flows occurring during the spring. This is an uncommon pattern for the northwest and may indicate GWI impacts from the elevation of Lake Pateros.

4.4.4 I/I Calculations

4.4.4.1 Annual I/I WWTF Report Method

This section provides the calculations used to determine total I/I as described in Method 1, above. This method is typically used for screening and to easily estimate if I/I is significant. WWTF influent flows from January 2016 through December 2021 are used. **Table 4-6** shows the results of the calculations.

Table 4-6 Estimated I/I Flows

Variable	Year					
	2016	2017	2018	2019	2020	2021
Min Month (MGD)	0.043	0.041	0.039	0.041	0.04	0.039
Avg Month (MGD)	0.054	0.049	0.049	0.047	0.046	0.050
Max Month (MGD)	0.065	0.061	0.058	0.054	0.054	0.059
Peak Day (MGD)	0.108	0.095	0.081	0.082	0.082	0.085
Population	560	580	583	585	593	590
Precip (in)	13.05	11.24	10.26	7.78	6.77	7.72
Total (MG)	<u>19.7</u>	<u>17.9</u>	<u>17.9</u>	<u>17.2</u>	<u>16.8</u>	<u>18.3</u>
I/I (MGD)	0.022	0.02	0.019	0.013	0.014	0.02
ADF/Cap (gal)	96	84	84	80	78	85
MMF/Cap (gal)	116	105	99	92	91	100
I/I/cap (gal)	39.3	34.5	32.6	22.2	23.6	33.9
% I/I/ADF	41%	41%	39%	28%	30%	40%

Based on the information provided in **Table 4-2** excess flows from I/I contribute between 30 and 40 percent of annual influent flow. The ADF per capita is approximately 85 gal which is lower than the EPA guideline of 120 gpcd for excessive infiltration. These calculations show that the total annual influent flow into the WWTF has been consistent over the past five years. There is a good correlation ($r = 0.8$) between annual rainfall and total annual I/I.

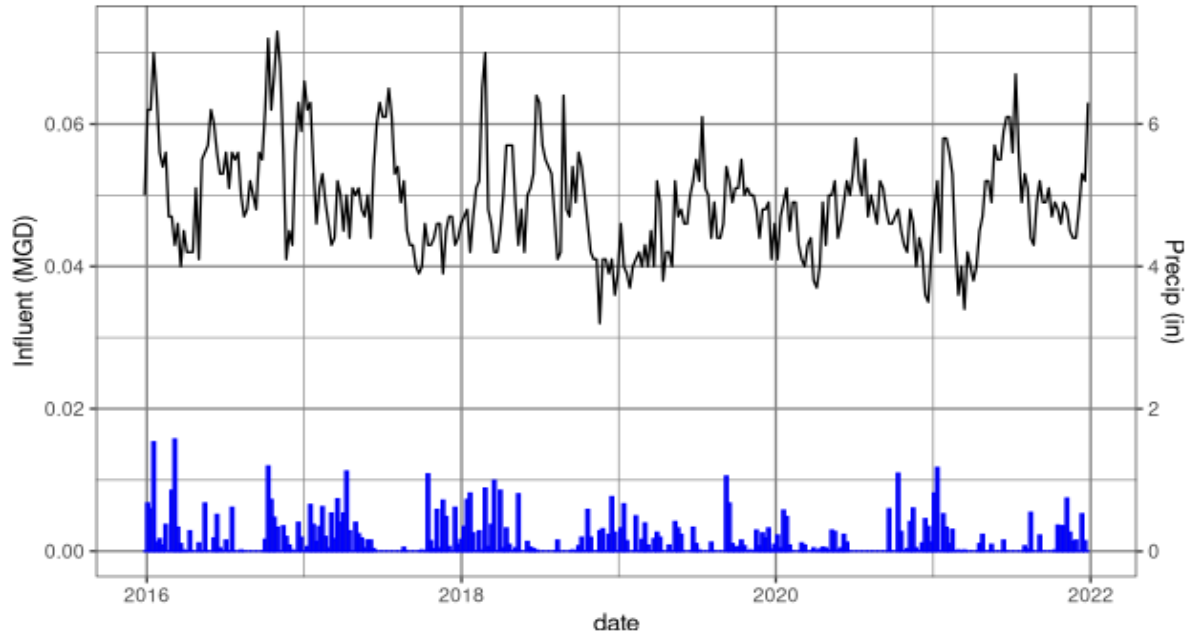
4.4.5 EPA Guide for Estimating I/I

4.4.5.1 Estimated Sanitary Baseflow and Infiltration

Wastewater influent flows provide an estimate of base sanitary flow (BSF) and groundwater infiltration (GWI). Average weekly influent flows and precipitation are calculated for the study period. Flow data was divided into weeks when there was no precipitation and weeks when precipitation occurred. For the weeks of no precipitation, weekly influent flows for the average and minimum year, month, and week

were calculated to estimate BSF and GWI flows. The data used the entire years data, the data was not divided into wet and dry seasons. **Exhibit 4-4** shows the weekly average influent flow and precipitation.

Exhibit 4-4 Weekly Average Influent Flow and Precipitation



Dry weather flow information was evaluated. The minimum week flow for each year was used to approximate BSF while the difference between the maximum and minimum week flows were used to approximate GWI as shown in **Table 4-7**.

Table 4-7 Estimated Sanitary Base Flow and Groundwater Infiltration

Date	Max. Week (MGD)	Min. Week (MGD)	Population	BSF/Cap (gal/d)	GWI/Cap (gal/d)	ADF/Cap (gal/d)
2016	0.068	0.042	560	75	46	121
2017	0.066	0.039	580	67	47	114
2018	0.064	0.039	583	67	43	110
2019	0.061	0.037	585	63	41	104
2020	0.058	0.037	593	62	35	98
2021	0.067	0.038	590	64	49	113
Average	0.06	0.039	582	67	44	110

These calculations indicate that sanitary base flow is at the low end of the range of typical textbook values of 60 to 90 gpcd for small communities (including the commercial component but not including I/I). A typical average is 75 gpcd.

Combining estimated sanitary base flow and GWI results in an average daily influent flow per capita of 110 gallons. This is below the EPA guideline of 120 gpcd for excessive infiltration. This dry weather evaluation indicates that GWI is high but not excessive in Pateros as defined by ECY.

4.4.5.2 Estimated Base Sanitary Flow with Winter Water Use

A second method to estimate base sanitary flow is from winter water use records. The City has provided water use records between 2018 and 2021. Typically, the last water reading before winter occurs in October of each year and meters are read again in March of the following year. Winter water use is estimated by subtracting the March reading from the previous October's meter reading. The City provided the total amount invoiced for each invoice period. The total water meter readings are divided by the number of days (in practice number of months times 30 days) between the meter readings. This data is converted to gallons per day and gallons per day per capita.

Pateros has a number of water use classifications. To estimate BSF only the residential, rental, and multi-family classifications were used. **Table 4-8** shows the winter water use for these classifications from the City.

Table 4-8 Estimated BSF Based on Winter Water Use

Date	Multi-family (gal)	Rental (gal)	Residential (gal)	Total		Population	BSF (gpcd)
				(gal)	(gpd)		
2018	1,009,249	453,070	3,566,028	5,028,347	33,522	583	57
2019	1,924,654	967,490	4,643,530	7,535,674	41,865	585	72
2020	1,752,394	694,620	4,637,631	7,084,645	47,231	593	80
2021 ⁽¹⁾	0	2,595,851	10,614,578	13,210,429	88,070	590	149

1. City staff indicate that 2021 water use data contains accounting errors.

The winter water use records show an increase in residential water use from 2018 to 2021. The 2021 winter water use numbers are almost double any of the other years. City staff indicate that 2021 water use numbers contain numerous accounting errors.

Using the 2019 and 2020 water use data, BSF is in the 70 to 80 gpcd range. This is a bit higher than calculated by the DMR data that had an average of 67 gpcd but the two methods of estimating BSF are considered close.

4.4.5.3 Estimated Inflow

Inflow is estimated using both daily and weekly precipitation and flow data. For both the weekly and daily data, days and weeks with no precipitation were removed. The table was sorted to include only precipitation events with a daily rainfall greater than 0.25 inches to approximate larger, more sustained rainfall events during the entire year.

A first pass compared average weekly influent flows to average weekly precipitation. The relationship between precipitation and influent flows is poor (r value of 0.2).

A second pass using daily data was made to determine that relationship. Daily precipitation does not have a close relationship to influent flows ($r = 0.1$). Tables are shown for both cases with a total flow per capita during wet weather.

This evaluation to determine inflow shows that inflow is not a significant issue in Pateros and can be considered non-existent.

Table 4-9 Estimated Inflow Based on Weekly Influent Averages

Date	Population	Max. Week (mgd)	Max Week/Cap (gal)	ADF /Cap (gal)	Inflow/Cap (gal)
2016	560	0.073	130	121	9
2017	580	0.063	109	114	-5
2018	583	0.07	120	110	10
2019	585	0.054	92	104	-12
2020	593	0.052	88	98	-10
2021	590	0.058	98	113	-15

Table 4-10 Estimated Inflow Based on Daily Influent Flows

Date	Population	Wet Weather Daily Max (mgd)	Max Week/Cap (gal)	ADF /Cap (gal)	Inflow/Cap (gal)
2016	560	0.082	146	121	25
2017	580	0.064	110	114	-4
2018	583	0.081	139	110	29
2019	585	0.06	103	104	-1
2020	593	0.065	110	98	12
2021	590	0.069	117	113	4

4.4.6 Previous Investigations Discussion

4.4.6.1 1999 Wastewater Facilities Plan

The City prepared a Facility Plan in 1999 which included an I/I investigation. Two late night flow investigations were performed to quantify infiltration in the collection system. The collection system service area was divided into six (6) subareas to measure flow from each subarea. Total average infiltration in 1999 was estimated at 32,300 gpd and 56 gpcd. **Figure 4-3** provides a summary of the infiltration results including subarea contributions from the 1999 Facility Plan.

Based on the results of the 1999 I/I analysis, the highest concentration of the City's infiltration occurs along the rubber gasketed asbestos concrete pipe installed in 1966 after the construction of Wells Dam. It is estimated that approximately 50% of this pipe is below the average elevation of Wells Dam Pool.

The 1999 Facilities Plan concluded that infiltration removal is not cost effective and that the most cost effective solution for addressing I/I is to continue to treat at the wastewater treatment facility.

4.4.6.2 2003 Sanitary Sewer Collection System Investigation

In 2003 the City completed extensive CCTV inspection and smoke testing of the sewer collection system, the results of which are summarized below:

- Some pipelines were observed with no apparent defects while others were observed with multiple kinds of defects. A prioritization schedule was developed which separated replacements into 3 priorities; with the 1st priority pipelines identified as having the potential to cause problems in the future which will likely increase in frequency over time.
- The smoke testing revealed a few abandoned service connections and sanitary sewer services that had missing cleanout caps
- Infiltration was largely observed along pipe stretches and in manholes known to be below the Lake Pateros dam pool elevation. Manholes and sewer mains reported as infiltration sources were determined to not be in bad enough shape to replace due solely to their physical condition and were therefore not added to the prioritization schedule.

4.4.7 Summary Discussion and Recommendations

Pateros' combined sanitary base flows, groundwater infiltration, and inflow are high but below the EPA's guidelines for excessive infiltration. They are similar to the 1999 findings. Inflow is not a significant issue and essentially non-existent. Infiltration from groundwater is the primary cause of excess flows in the Pateros collection system.

Previous I/I studies and collection system assessments show the highest concentration of infiltration occurs in Subareas 1 and 3. These areas include older AC sewer mains near the Columbia River which are buried below the surface elevation of Lake Pateros. **Figure 4-3** includes a table that shows that over 60% of the measured infiltration occurs in Subareas 1 & 3.

Previous studies noted that the capacity of the treatment plant was sufficient to treat the excess flows and that replacement of the AC sewer mains in Subareas 1 and 3 was not cost effective. The CCTV sewer inspection was performed about 20 years ago. It is likely that sewer condition has deteriorated since the 2003 condition assessment. The City has not completed repairs identified in the 2003 priority sewer plan.

LEGEND

- 2003 NOTED OCCURRENCE OF INFILTRATION MH
- 2003 NOTED OCCURRENCE OF INFILTRATION SEWER MAIN
- PORTION OF SEWER BELOW NORMAL POOL ELEVATION
- SEWER MANHOLE WITH LITTLE OR NO FLOW
- URBAN GROWTH AREA
- INCORPORATED LIMITS
- EXISTING COLLECTION SYSTEM

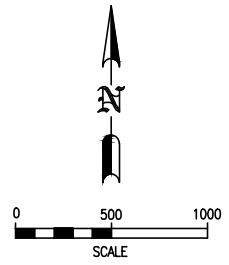
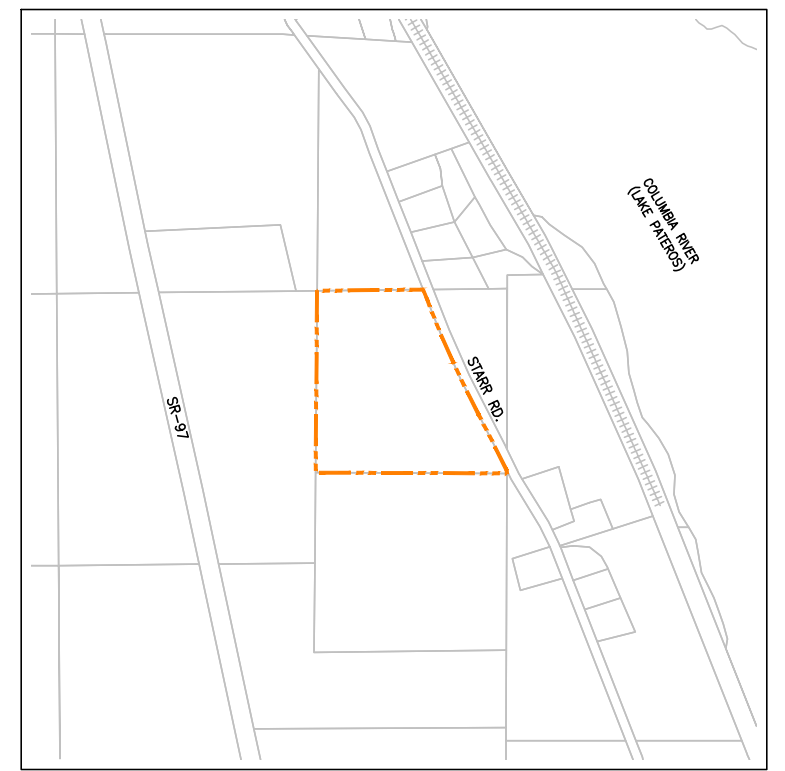
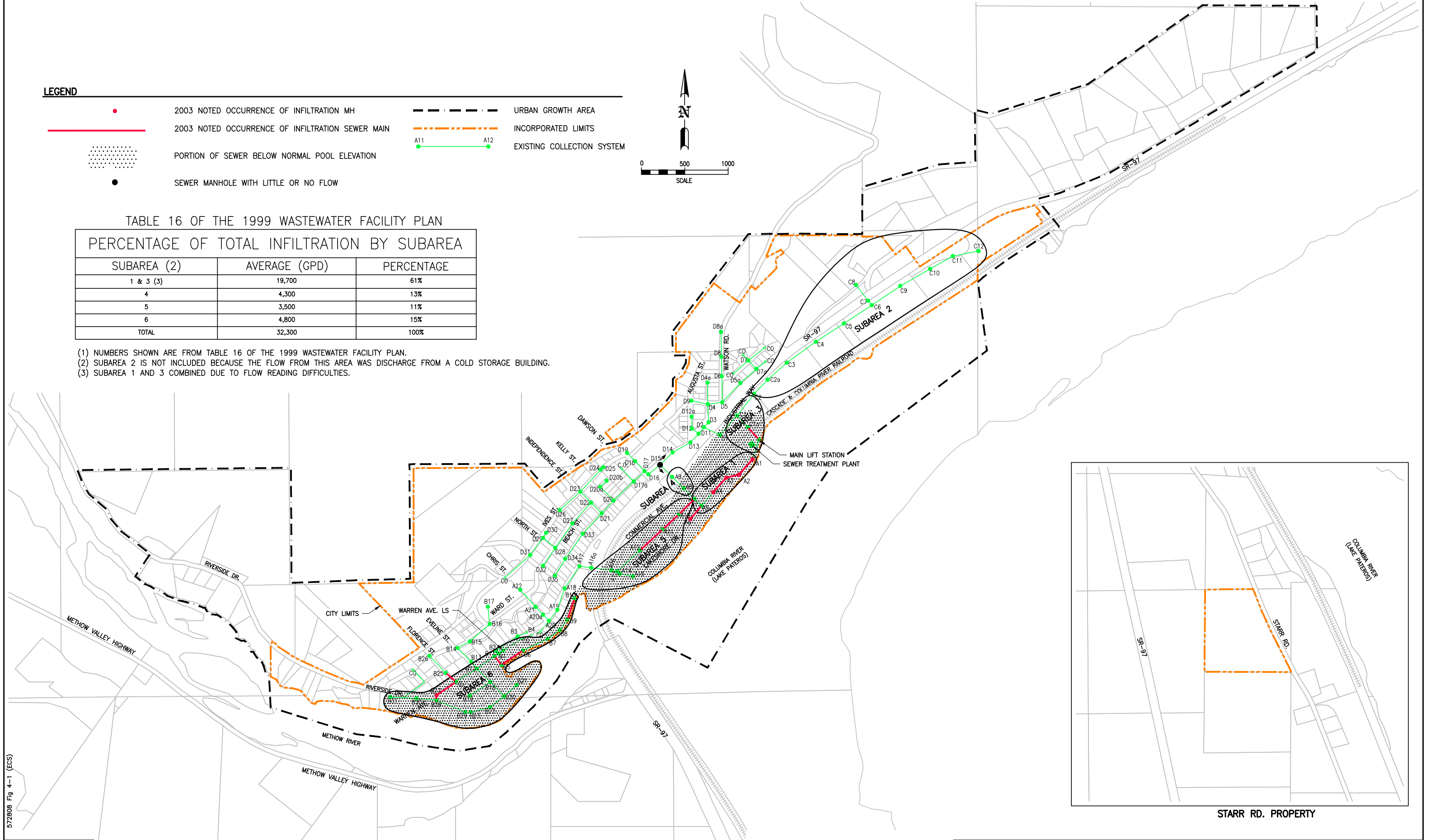


TABLE 16 OF THE 1999 WASTEWATER FACILITY PLAN
 PERCENTAGE OF TOTAL INFILTRATION BY SUBAREA

SUBAREA (2)	AVERAGE (GPD)	PERCENTAGE
1 & 3 (3)	19,700	61%
4	4,300	13%
5	3,500	11%
6	4,800	15%
TOTAL	32,300	100%

(1) NUMBERS SHOWN ARE FROM TABLE 16 OF THE 1999 WASTEWATER FACILITY PLAN.
 (2) SUBAREA 2 IS NOT INCLUDED BECAUSE THE FLOW FROM THIS AREA WAS DISCHARGE FROM A COLD STORAGE BUILDING.
 (3) SUBAREA 1 AND 3 COMBINED DUE TO FLOW READING DIFFICULTIES.



572808 Fig 4-1 (ECS)

SCALE: AS SHOWN
 DESIGNED: NVH
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-02
 DATE: 8/30/22



4.4.7.1 Recommendation

Influent flows to the treatment plant are projected to increase over the 20-year planning period. The projected flows are slightly below the hydraulic capacity of the treatment plant (0.125 mgd). The older AC sewers located in Subarea 1 and 3 contribute about 60% of the City’s infiltration (about 20,000 gpd) per the 2003 study. It is difficult to predict the effectiveness that replacing/lining these mains/manholes would have on reducing I/I, but it can be assumed that a reduction of infiltration of 50% (10,000 gpd) might be achievable. It is recommended that that City plan to line the sewer mains and repair leaky manholes in Subareas 1 & 3 which were previously identified in the 2003 evaluation and shown on **Figure 4-3. Table 4-11** is the cost estimate for lining and repair of the mains/manholes in Subarea 1 and 3.

Table 4-11 Estimated Improvements Cost for Lining Subarea 1 and 3

Description	Estimated Quantity	Units	Unit Price	Amount
Internal CCTV Inspection	2,400	LF	\$5	\$12,000
Root Removal	200	HR	\$625	\$125,000
Reopen Existing Sewer Service Connection	20	EA	\$450	\$9,000
CIPP Liner Installation, 8" Dia. ⁽¹⁾	500	LF	\$160	\$80,000
CIPP Liner Installation, 10" Dia. ⁽¹⁾	1,900	LF	\$175	\$330,000
CIPM Liner Installation ⁽²⁾	12	EA	\$3,000	\$36,000
Subtotal:				\$455,000
Contractor mob/admin/overhead/profit (15% of Subtotal)				\$68,000
Subtotal Construction				\$523,000
Sales Tax (8.6%)				\$45,000
Contingency (2%)				\$114,000
Construction Cost				\$682,000
Eng, admin, const mgt, insp (25%)				\$171,000
Admin/environmental/funding				\$30,000
Estimated Improvements Cost Total				\$883,000

1. CIPP – Cast-in-place pipe
2. CIPM – Cast-in-place manhole

4.5 Summary of Improvements and Costs

Table 4-12 Summary of Collection System Improvements and Estimated Costs

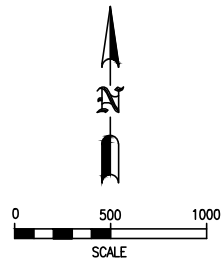
Description		Estimated Costs	
4.2 -	Capacity Improvements	None	None
4.3.1.1 -	Remaining Main Improvements Identified in 2003 Investigation	Cost:	\$1.5M
4.3.1.2 -	Additional Issues	Cost:	\$100,000 (replace 8 MHs)
		Cost:	\$540,000 (Mall T-main replacement)
		Cost:	\$230,000 (Re-route T-main away from apartments)
4.3.1.3 -	Warren Avenue Lift Station Improvements	Cost:	\$730,000
4.4 -	Improvements Needed to Serve Growth Areas	The cost associated falls on the developer	
4.5.7.1 -	Improvements for Lining Subarea 1 and 3	Cost:	\$880,000
Total Collection System Improvements		Cost:	\$3.98M

No.	RECOMMENDED COLLECTION SYSTEM IMPROVEMENTS TO REDUCE I/I
①	LINE MAINS & MANHOLES

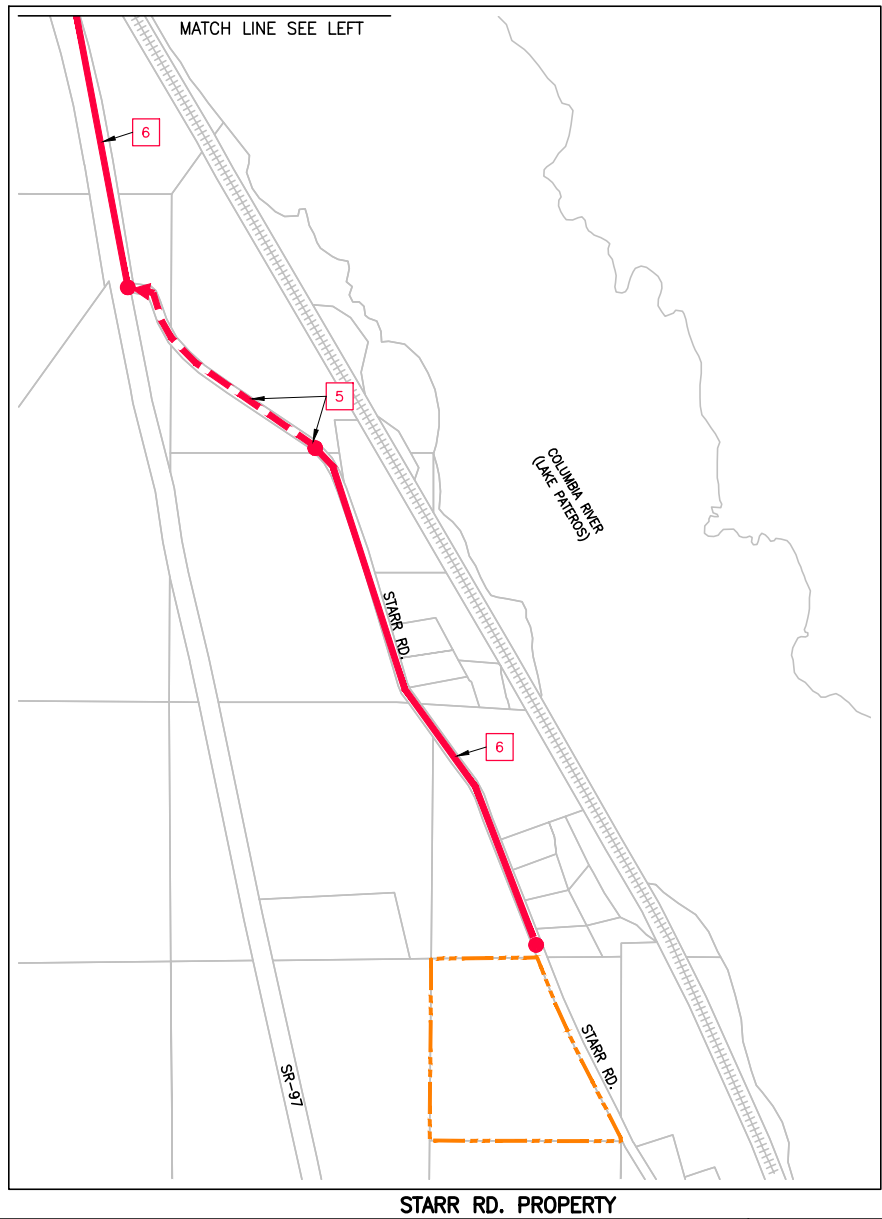
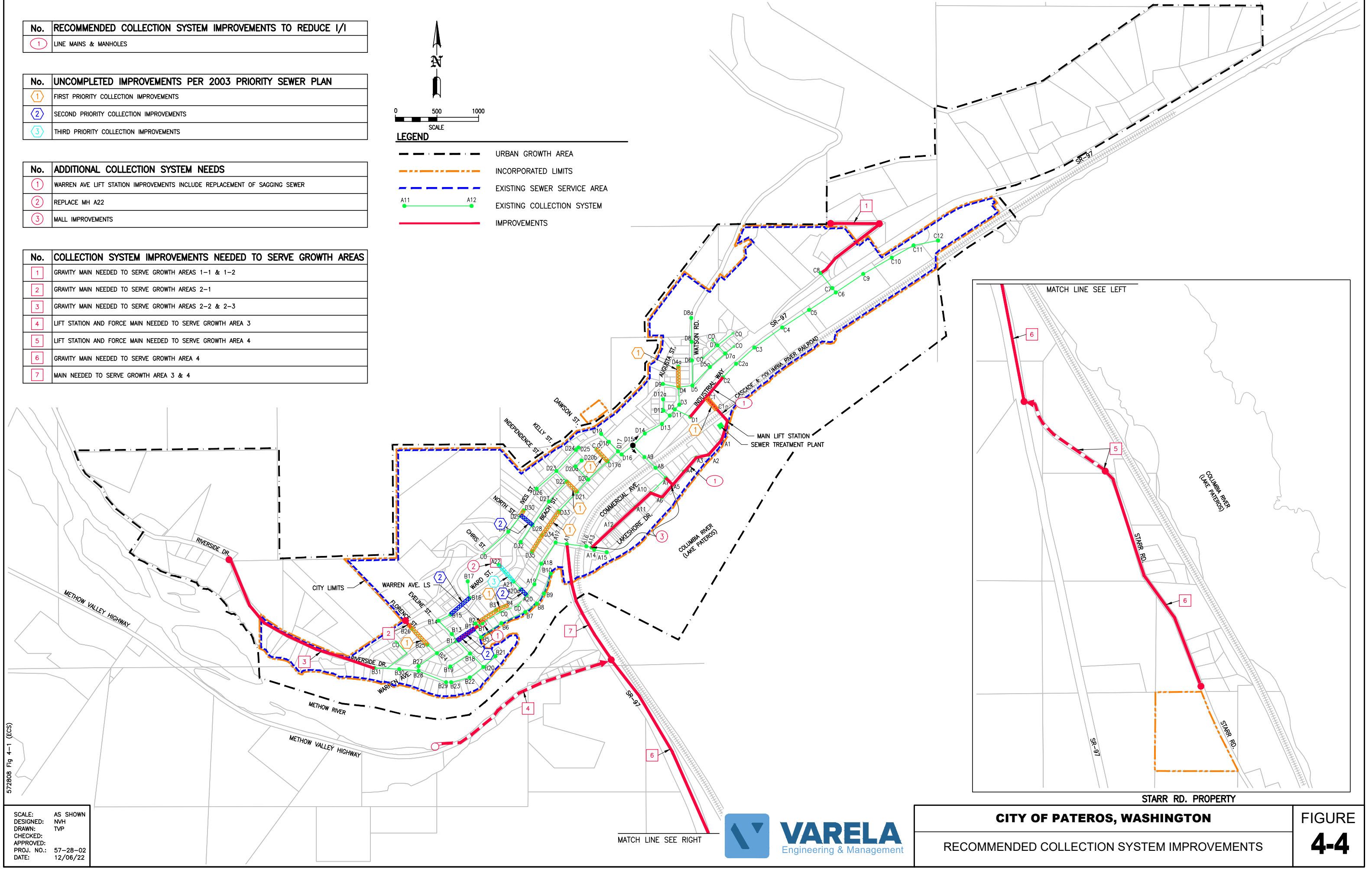
No.	UNCOMPLETED IMPROVEMENTS PER 2003 PRIORITY SEWER PLAN
①	FIRST PRIORITY COLLECTION IMPROVEMENTS
②	SECOND PRIORITY COLLECTION IMPROVEMENTS
③	THIRD PRIORITY COLLECTION IMPROVEMENTS

No.	ADDITIONAL COLLECTION SYSTEM NEEDS
①	WARREN AVE LIFT STATION IMPROVEMENTS INCLUDE REPLACEMENT OF SAGGING SEWER
②	REPLACE MH A22
③	MALL IMPROVEMENTS

No.	COLLECTION SYSTEM IMPROVEMENTS NEEDED TO SERVE GROWTH AREAS
①	GRAVITY MAIN NEEDED TO SERVE GROWTH AREAS 1-1 & 1-2
②	GRAVITY MAIN NEEDED TO SERVE GROWTH AREAS 2-1
③	GRAVITY MAIN NEEDED TO SERVE GROWTH AREAS 2-2 & 2-3
④	LIFT STATION AND FORCE MAIN NEEDED TO SERVE GROWTH AREA 3
⑤	LIFT STATION AND FORCE MAIN NEEDED TO SERVE GROWTH AREA 4
⑥	GRAVITY MAIN NEEDED TO SERVE GROWTH AREA 4
⑦	MAIN NEEDED TO SERVE GROWTH AREA 3 & 4



LEGEND	
	URBAN GROWTH AREA
	INCORPORATED LIMITS
	EXISTING SEWER SERVICE AREA
	EXISTING COLLECTION SYSTEM
	IMPROVEMENTS



572808 Fig 4-1 (ECS)

SCALE: AS SHOWN
 DESIGNED: NVH
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-02
 DATE: 12/06/22



5.0 Treatment System Evaluation

5.1 Description of Existing Treatment System

5.1.1 Physical Layout / Components

The City of Pateros' Publicly-Owned Treatment Works (POTW) was originally constructed and placed into operation in 1967. The construction was necessitated by the increased pool elevation (Lake Pateros) caused by the construction of the Wells Dam hydroelectric project. The facility was extensively upgraded in 1985 and in 2001 underwent a complete and thorough upgrade which essentially abandoned the majority of the older plant.

The upgraded facility went online in March of 2001. The upgrades included: 1) Grit removal at the headworks; 2) A mechanically cleaned fine bar screen; 3) New activated sludge aeration basin/clarifiers; 4) New UV disinfection facilities; 5) New sludge dewatering facilities; 6) A new fence around the site; and 7) Various new buildings to house the new equipment. A certified Class II operator is required.

Figure 2-1 provides treatment plant location. **Figure 5-1 and 5-2** shows the existing treatment plant facilities, process schematic, and hydraulic profile.

5.1.2 Design Parameters

Table 5-1 shows design information from the 2001 Wastewater Treatment Plant Upgrade design plans.

Table 5-1 Design Parameters

Wastewater Flow / Loading	Flow (MGD)	BOD (lb/day)	TSS (lb/day)
Average Daily (AD)	0.125	260	300
Maximum Daily (MD)	0.180	395	540
Peak Hourly (PH)	0.58	-	-



SCALE: AS SHOWN
 DESIGNED: NVH
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-08
 DATE: 6/29/22



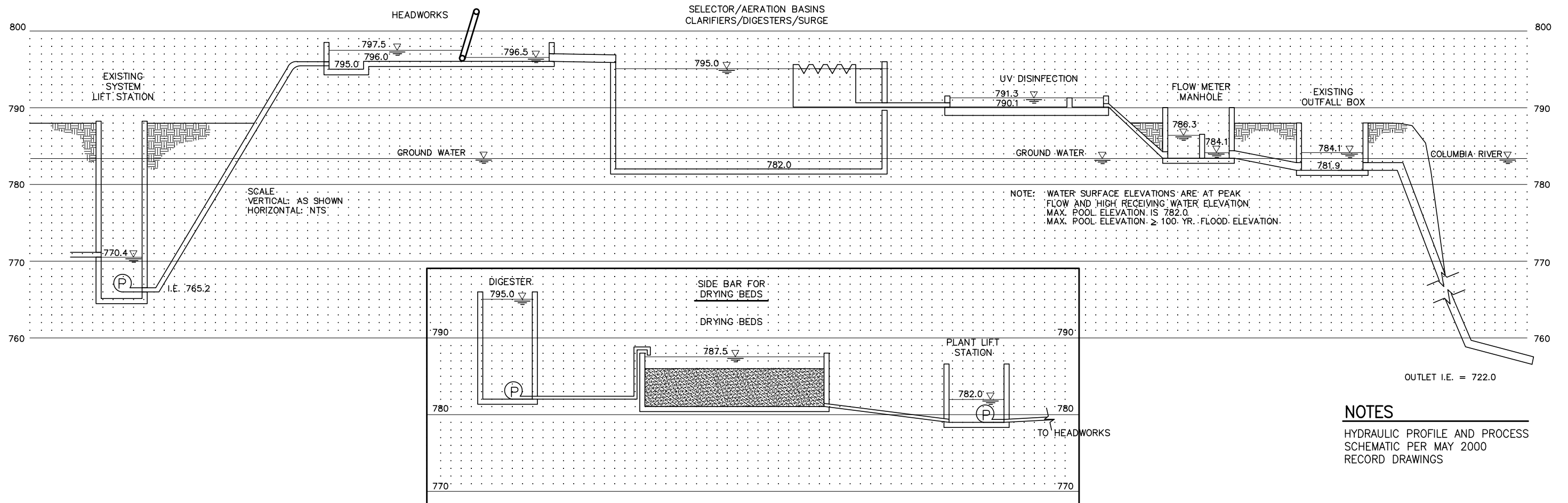
CITY OF PATEROS, WASHINGTON
 WASTEWATER TREATMENT PLANT EVALUATION

EXISTING WASTEWATER TREATMENT FACILITY

FIGURE

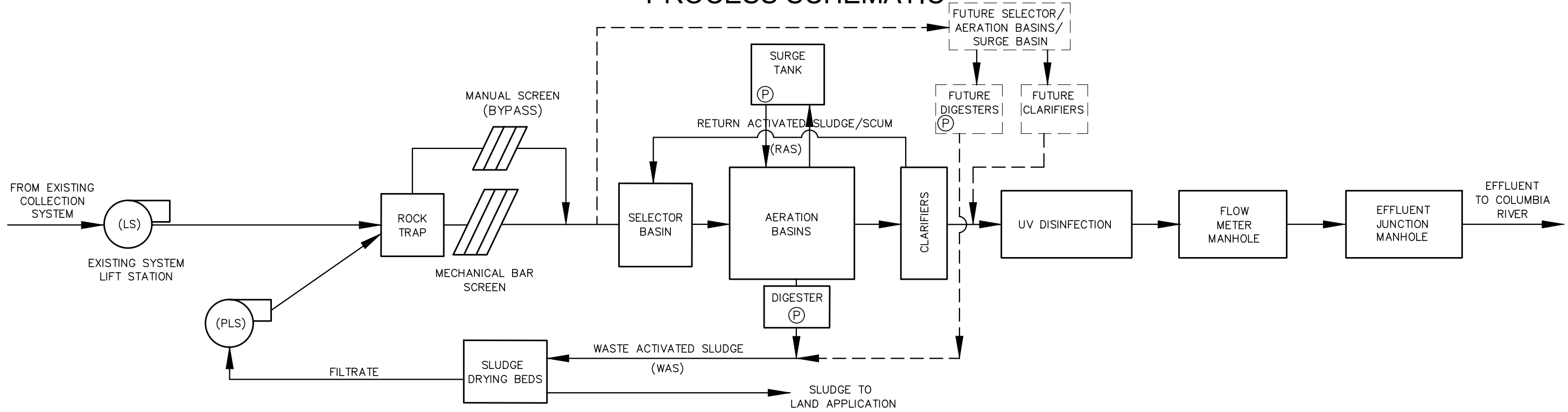
5-1

HYDRAULIC PROFILE



NOTES
HYDRAULIC PROFILE AND PROCESS SCHEMATIC PER MAY 2000 RECORD DRAWINGS

PROCESS SCHEMATIC



572808 Fig 5-2 (Hyd Prof)

SCALE: AS SHOWN
DESIGNED: NVH
DRAWN: TVP
CHECKED:
APPROVED:
PROJ. NO.: 57-28-02
DATE: 12/06/22



CITY OF PATEROS, WASHINGTON

HYDRAULIC PROFILE
PROCESS SCHEMATIC

FIGURE 5-2

5.2 Regulatory History

5.2.1 NPDES Permit Discharge Limits

Discharge of treated wastewater from the facility to the Columbia River occurs under NPDES Permit WA-0020559. The most recent NPDES permit was received by the City in February 2015. The NPDES permit was administratively extended in March 4, 2020. Current effluent limits are shown in **Table 5-2**.

Table 5-2 NPDES Permit Effluent Limits

Parameter	Average Monthly	Average Weekly
Biochemical Oxygen Demand (5-day / BOD5)	30 milligrams/liter (mg/L) 24.6 (lbs/day) 85% BOD5 removal	45 mg/L 36.9 lbs/day
Total Suspended Solids (TSS)	30 milligrams/liter (mg/L) 24.6 (lbs/day) 85% BOD5 removal	45 mg/L 36.9 lbs/day
Parameter	Monthly Geometric Mean	Weekly Geometric Mean
Fecal Coliform Bacteria (final limit)	100/100 milliliter (mL)	200/100 mL
pH	Daily Minimum is equal to or greater than 6.0 and the Daily Maximum is less than or equal to 9.0	

5.3 Evaluation of Existing Treatment

5.3.1 Influent Flows and Loadings

The treatment system was upgraded in 2000 to its current configuration. The treatment system is designed to treat wastewater from a population of 725 persons with an average annual flow of 0.125 MGD and a BOD load of 260 lbs/d lbs/d. The design peak hour flow is 0.58 MGD.

The annual average and maximum month flows and BOD loads are shown in **Table 5-3** and **Exhibits 5-1 and 5-2** provide a graph of the monthly averages. The DMR data from 2016 through December 2021 shows that influent flow and BOD₅ loading has not exceeded the original design parameters.

Table 5-3 Annual Average Influent Flow Characteristics

Year	Avg Month Flow (MGD)	Max Month Flow (MGD)	Peak Day Flow (MGD)	Avg Month BOD (lbs/d)	Max Month BOD (lbs/d)
2016	0.054	0.065	0.108	116	169
2017	0.049	0.061	0.095	101	135
2018	0.049	0.058	0.081	99	112
2019	0.047	0.054	0.082	97	127
2020	0.046	0.054	0.082	96	114
2021	0.050	0.059	0.085	97	131
Average	0.049	0.059	0.089	101	131
Maximum	0.054	0.065	0.108	116	169
Design	0.125	-	0.18	260	-

Exhibit 5-1 Monthly Influent Flows (MGD)

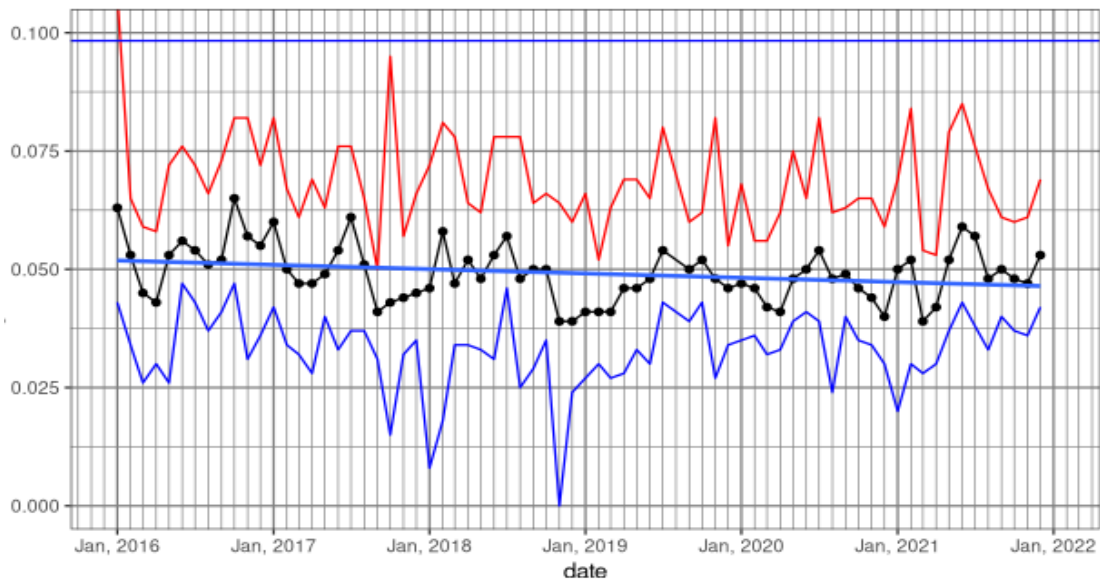
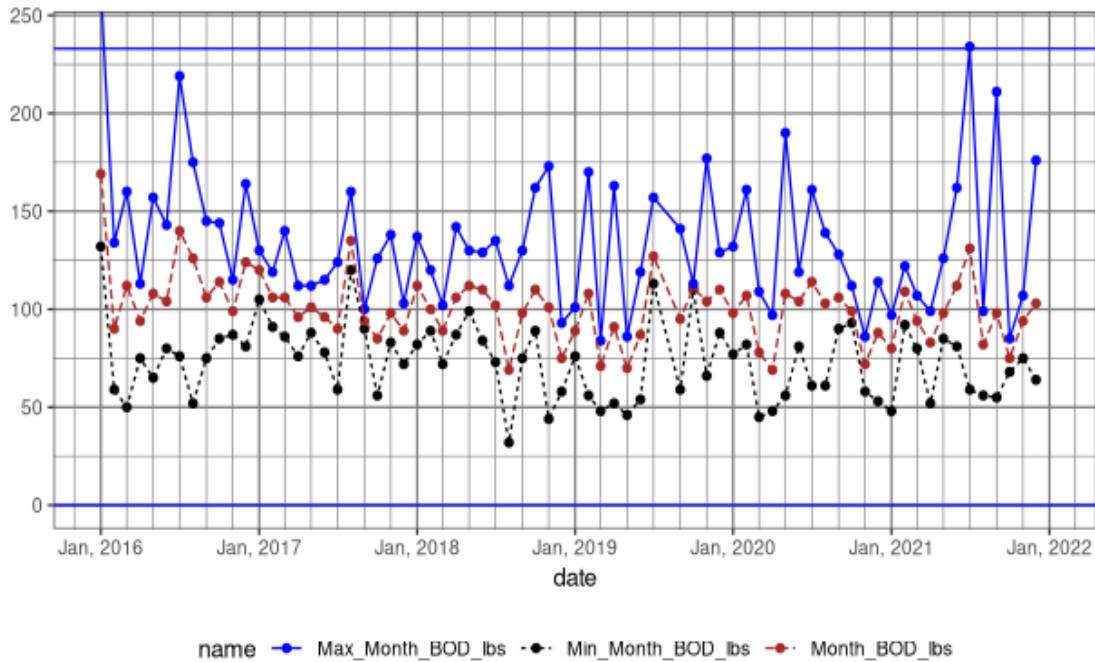


Exhibit 5-2 Monthly Influent BOD (lbs/day)



5.3.2 Effluent Characteristics

Effluent discharged from the treatment plant is regulated by NPDES permit limits. Most effluent parameters have both monthly and weekly effluent limits. The current 2015 NPDES permit (WA0020559) requires the City to report influent flow daily, influent BOD₅, and TSS once per week and influent pH five times a week. Effluent pH and temperature are measured five times a week while effluent dissolved oxygen (DO), BOD, and TSS are measured weekly. The following section summarizes effluent characteristics between 2016 and 2021 and provides graphs of monthly and weekly averages regulated by the permit.

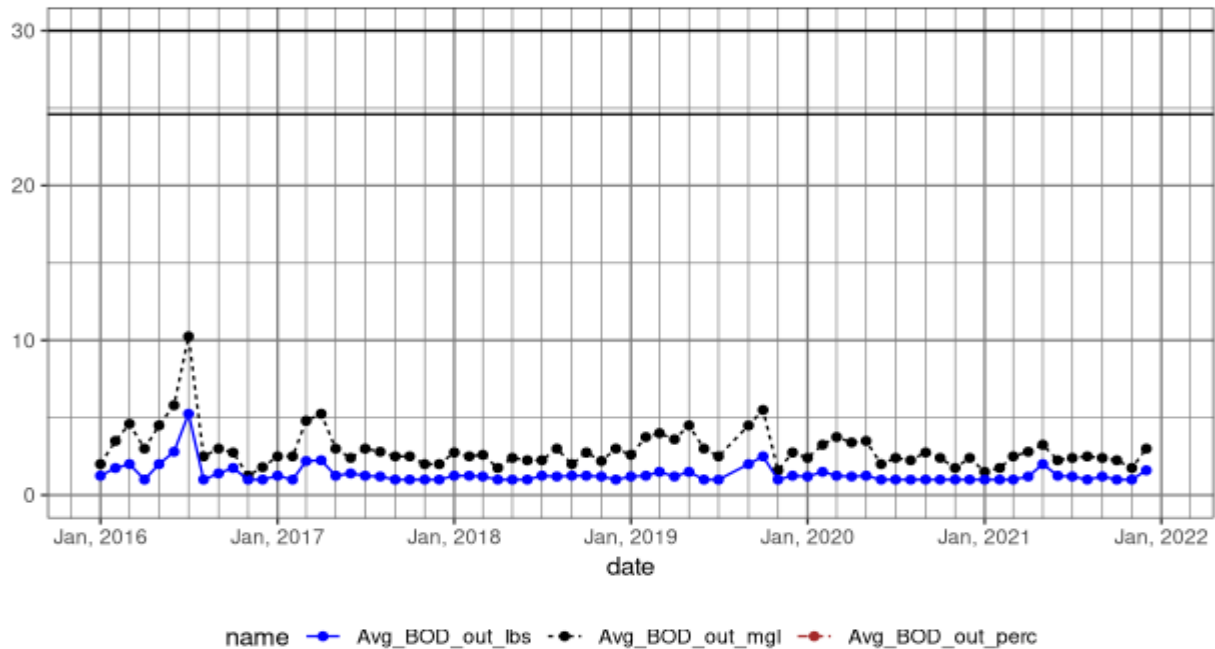
5.3.2.1 Effluent BOD

Table 5-4 and **Exhibit 5-3** shows effluent BOD characteristics.

Table 5-4 Monthly Average BOD Effluent Characteristics

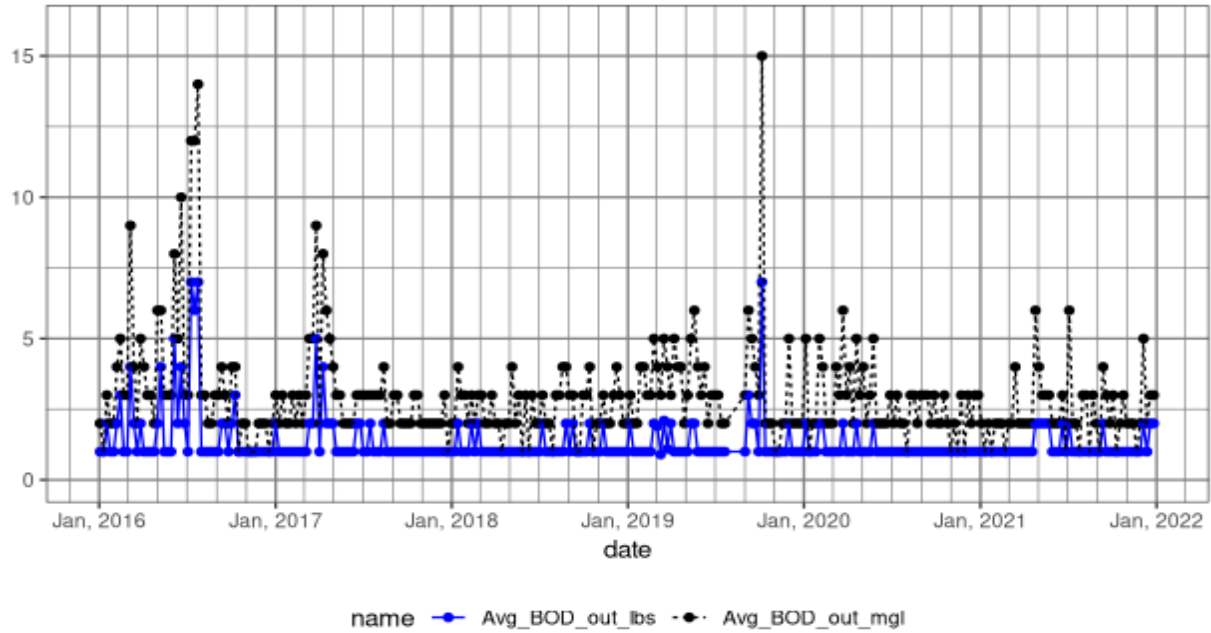
Year	Avg Month BOD (mg/l)	Max Month BOD (mg/l)	Avg Month BOD (lbs/d)	Max Month BOD (lbs/d)	Avg Month BOD (% removal)	Max Month BOD (% removal)
2016	4	10	2	5	98	99
2017	3	5	1	2	99	99
2018	2	3	1	1	99	99
2019	3	6	1	2	98	99
2020	3	4	1	2	99	99
2021	2	3	1	2	99	99
Permit Limit	30	---	24.6	---	85	---

Exhibit 5-3 Effluent Monthly Average BOD (mg/L and lbs/day)



The weekly effluent characteristics related to permitted BOD effluent limits are shown in **Exhibit 5-4**.

Exhibit 5-4 Effluent Weekly BOD (mg/L and lbs/day)



5.3.2.2 Effluent TSS

Table 5-5 and **Exhibits 5-5 and 5-6** show the annual effluent TSS characteristics.

Table 5-5 Monthly Average TSS Effluent Characteristics

Year	Avg_Month TSS (mg/l)	Max_Month TSS (mg/l)	Avg_Month TSS (lbs/d)	Max_Month TSS (lbs/d)	Avg_Month TSS (% removal)	Max_Month TSS (% removal)
2016	9	14	4	6	95	97
2017	8	12	3	5	96	97
2018	9	14	4	5	95	97
2019	9	12	4	6	95	97
2020	9	15	4	5	95	97
2021	10	14	4	6	95	97
Permit Limit	30	---	24.6	---	85	---

Exhibit 5-5 Effluent Monthly TSS (mg/L and lbs/day)

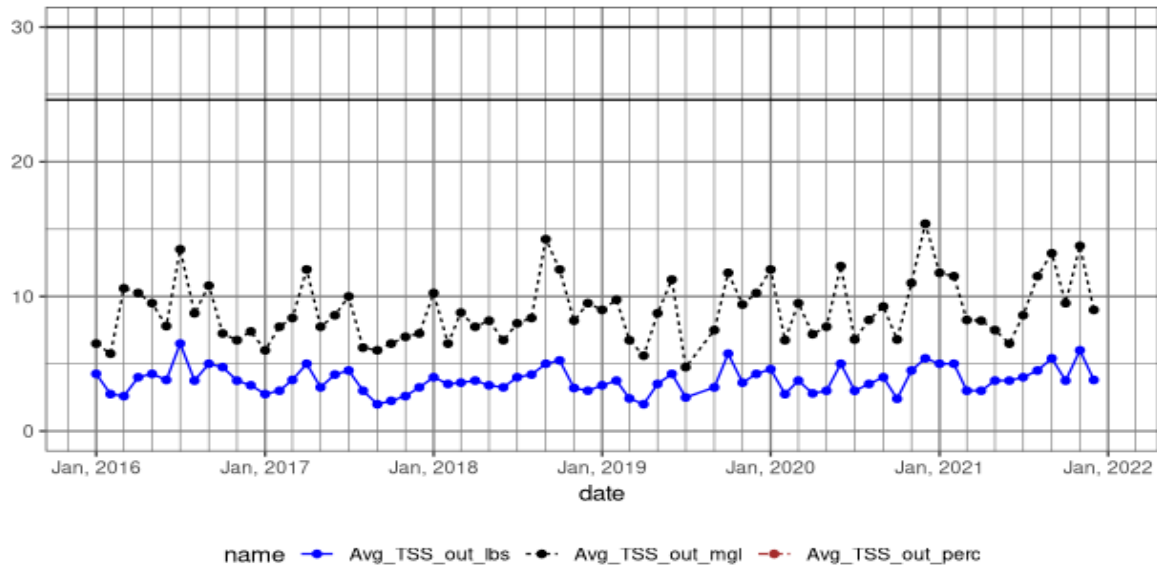
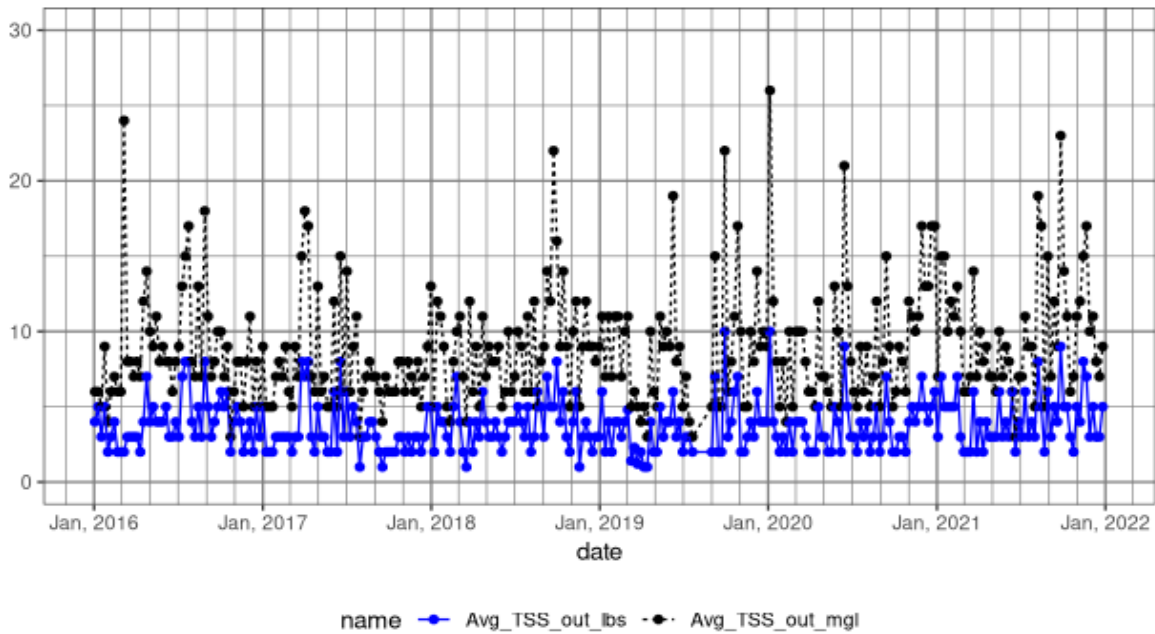


Exhibit 5-6 Effluent Weekly TSS (mg/L and lbs/day)



5.3.2.3 Effluent pH and Fecal Coliforms

In addition to the BOD and TSS effluent limits shown above, the NPDES permit includes limits for effluent pH and fecal coliforms. Daily pH limits are between 6.0 and 9.0 s.u. and effluent fecal coliform limits are 100 colonies/100/ml for a monthly average and 200 colonies/ 100 ml for weekly average.

Exhibit 5-7 Effluent Daily pH

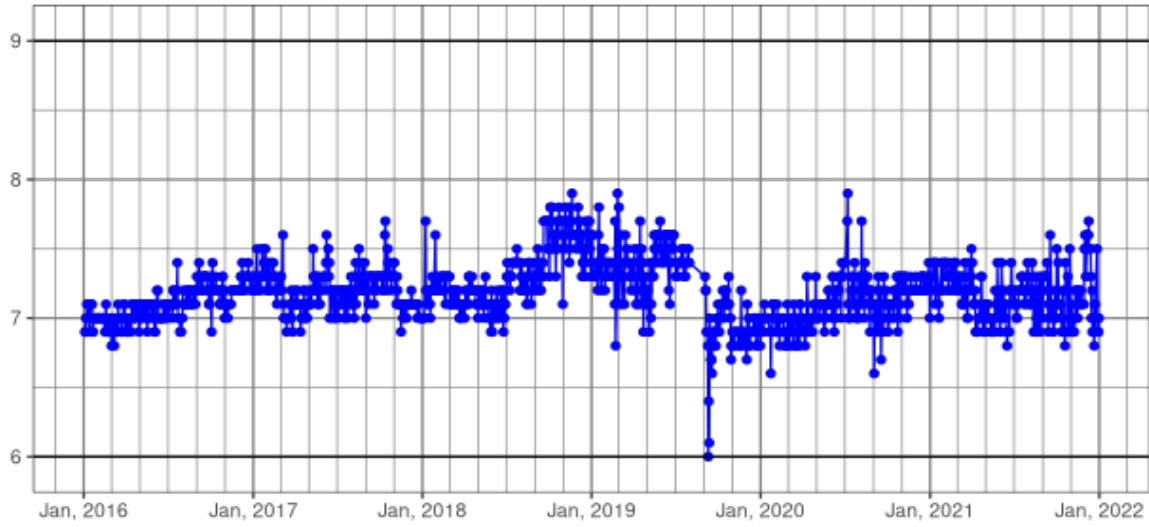


Exhibit 5-8 Effluent Fecal Coliforms – Monthly (no/100mL)

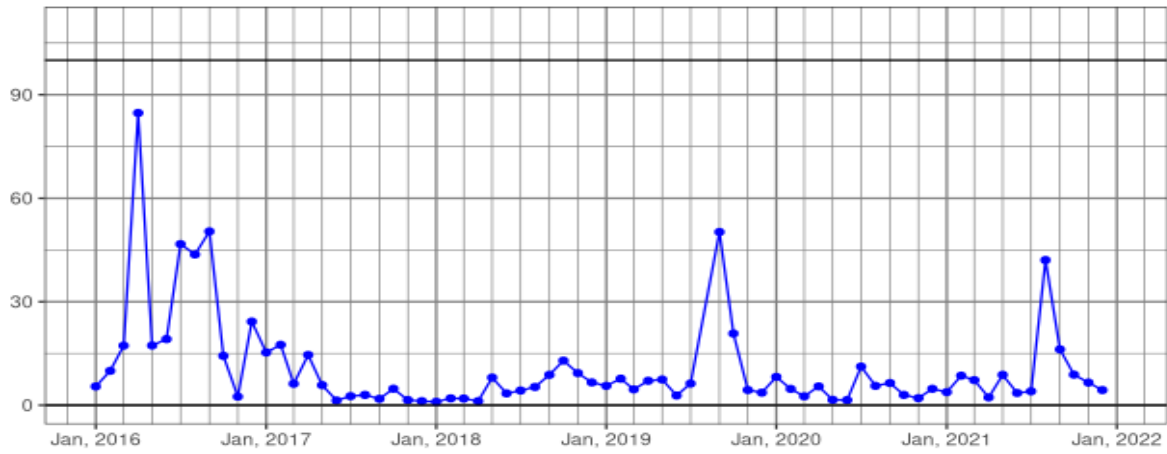
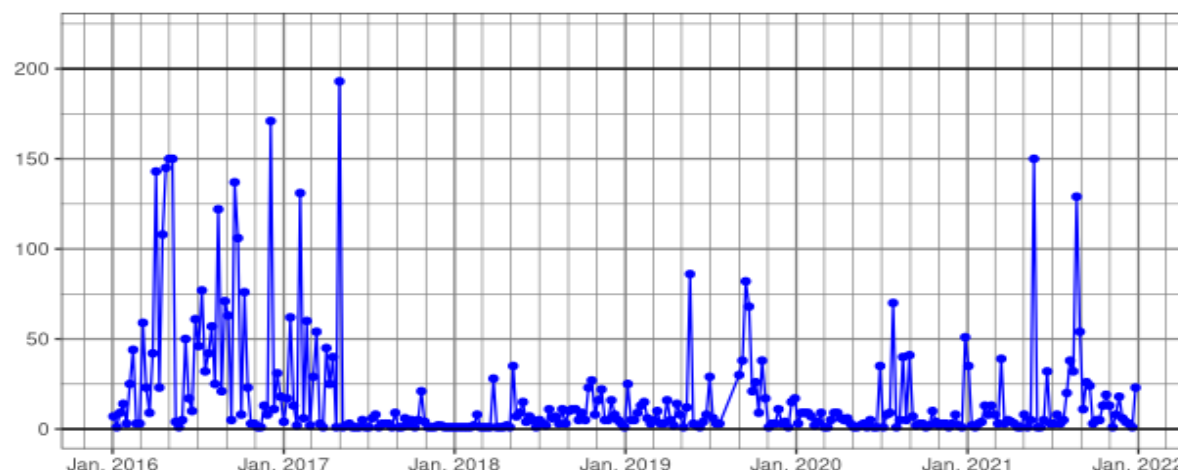


Exhibit 5-9 Effluent Fecal Coliforms – Weekly (no/100mL)



5.4 Treatment Observations

Using the 2016 through 2021 DMR data presented above the following observations are made regarding the City’s treatment facility.

5.4.1 Influent Flows

2021 average annual influent flows (0.50 MGD) are 40% of the plant’s design flow rate of 0.125 MGD. The 2021 average annual BOD loading of 97 lbs/d is 37% of the plant’s design capacity of 260 lbs/d. Annual TSS loading 90 lbs/d or 30% of the design capacity. The NPDES permit, Section S4.A “Design Criteria” contains lower influent criteria saying that the facility must not exceed the following design criteria:

Table 5-6 Excerpt from Section S4.A of Pateros NPDES Permit – “Design Criteria”

Parameter	Design Quantity
Monthly average flow (max month):	0.0983 MGD
BOD5 influent loading:	233 lbs/day
TSS influent loading:	288 lbs/day

The treatment plant is operating at about 40% of its design influent criteria and a bit over 50% of the permitted influent criteria. The NPDES Fact Sheet does not describe the reason why the permitted influent criteria is lower than the design criteria. However, it appears the criteria Ecology used in the City’s NPDES permit is the same criteria outlined in the 1999 Facility Plan; and may not have been updated to reflect the actual WWTP design criteria. It is recommended the City request Ecology revise the permitted design criteria to reflect the actual design capacity shown on the 2001 design plans.

Infiltration into the collection system is estimated at 80 to 85 gpcd well below the EPA guidelines of 120 gpcd. Annual I/I is estimated at about 0.02 MGD or about 30% of influent flow. Based on this I/I screening method, collection system I/I is not a major issue. A separate, more detailed I/I evaluation is discussed in **Section 4**.

Seasonal variability for influent flows is low with the peak month flow in June and July at about 1.3 times the lowest month flow in March.

5.4.2 Effluent Characteristics

The performance of the treatment lagoons are regulated on a number of effluent parameters. The parameters of interest include:

- BOD
- TSS
- Fecal Coliform
- pH

5.4.2.1 BOD Removal

Organic removal, measured as BOD is a primary function of the treatment system. The discharge permit regulates effluent BOD as a mass discharge, measured in lbs/day; a concentration, measured in mg/l, and as a percent removal. Both the mass discharge and the concentration are regulated as monthly and weekly averages. The percent removal is an average monthly value.

Average monthly BOD discharged from the treatment system remains very low (2-3 mg/l and 1-2 lbs/d) and very stable. Percent BOD removal is 99%. Weekly measurements are slightly higher with typically weekly effluent BOD at about 2 lbs/d with concentrations under 5 mg/l. This is well under the permitted effluent limits indicating that that treatment system is functioning well.

5.4.2.2 TSS Removal

Removal of Total Suspended Solids (TSS) is a primary function of wastewater treatment. The discharge permit regulates effluent TSS as a mass discharge, measured in lbs/day; a concentration, measured in mg/l, and as a percent removal. Both the mass discharge and the concentration are regulated as monthly and weekly averages. The percent removal is an average monthly value.

Average monthly TSS discharged from the treatment system remains low (10 mg/l and 4 lbs/d) and is very stable. Percent TSS removal is 95%. Weekly measurements are slightly higher with typically weekly effluent TSS at below 10 lbs/d with concentrations under 20 mg/l. This is well under the permitted effluent limits indicating that that treatment system is functioning well.

5.4.2.3 Effluent pH and Fecal Coliforms

Fecal Coliforms

UV disinfection is used to disinfect treated effluent. Fecal coliforms are the measurement used for disinfection efficiency. Both monthly (typical value under 10 org/100 ml) and weekly (typical range of 150 org/100 ml to 0) fecal coliform concentrations are well below the permitted limits.

Effluent pH

Annually effluent pH averages above 6.5 standard units (s.u.) and below 8 s.u. during the study period. This is within the permitted limits.

5.5 Existing Design Plant Capacity and Projected Flows/Loadings

The following table compares existing plant capacity (permitted capacity and actual) to future flows (2042).

Table 5-7 Existing vs Projected Flows/Loadings

Desc.		Existing (2022)	Plant Design Capacity		Future (2042)
			NPDES Permit	Per Design Plans	
Flow (MGD)	ADF	0.049	0.0983	0.125	0.119
	MDF	0.108	-	0.180	0.218
	PHF	n/a	-	0.580	0.461
BOD (lbs/day)	Ave. Day	101	233	260	227
	Max Day	169	-	395	337
TSS (lbs/day)	Ave. Day	87	288	300	184
	Max Day	138	-	540	247

5.6 Summary Discussion

This evaluation (based on the Daily Monitoring Reports [DMR's] between January 2016 and December 2021) shows that the treatment plant is operating well. DMR data shows that influent loading is about 40% of the original design criteria and between 50 and 60% of the NPDES permitted influent loads.

As discussed in **Section 5.4.1**, the WWTP's actual design capacity is higher than the permitted capacity. It appears the criteria Ecology used in the City's NPDES permit is the same criteria outlined in the 1999 Facility Plan; and may not have been updated to reflect the actual WWTP design criteria. The City should request Ecology revise the permitted design criteria to reflect actual design capacity (shown on the 2001 design plans).

Future flows exceed the WWTP's hydraulic capacity.

- The projected max daily flow exceeds hydraulic capacity by 21%; and only marginally meets projected ADF (95% hydraulic capacity).
- Existing hydraulic capacity is limited by the clarifiers which are currently sized for 400 gpd/sf at 0.125 MGD. Increasing hydraulic capacity of the plant would require expansion of the clarifiers.
- Projected flows are included in **Section 3** and include projected residential, commercial, and new industrial flows. It may be possible to require flow equalization from industry and/or commercial to accommodate peak flows that occur during max day. However, given the growth the City anticipates, and given the projected ADF only marginally meets plant capacity, it is likely more appropriate for the City to plan to expand the hydraulic capacity of the plant. This could be done in conjunction with other needed improvements and/or as growth necessitates the additional hydraulic capacity. See discussion in Chapter 6.

- Expansion to the existing sludge digestors is recommended. Expansion includes constructing new sludge digestors on the north side of the treatment basin. If this improvement is completed, the old digester basins could be utilized for expanding the clarifiers. This would include removing the dividing wall between the existing clarifiers and the digestors, and expanding the clarifiers into the existing digester basins. With this expansion, plant hydraulic capacity will be sufficient to meet future flows.

Future BOD is within the plant design capacity but exceeds the 85% limit.

- The projected future BOD load consumes 87% of the WWTP biological capacity—leaving only 13% reserve capacity.
- Given the potential for breweries and/or fruit packing industry in the area, some additional BOD capacity is desirable. Typically, plants plan for expansion when they reach 85% capacity. Adding additional BOD capacity could be accomplished when other recommended maintenance upgrades are completed by adding additional aeration capacity (higher capacity blowers, additional diffusers, etc.).
- Due to increased BOD loads and the City's interest in replacing the current drying beds with a screw press dewatering system, increasing the size of the aerobic digestors is recommended.

Various plant maintenance upgrades are also recommended given the age of the existing treatment plant (22 years). We conducted a plant inspection with City staff on February 9, 2022; and have had follow up discussions with various equipment manufacturers. Given the age and condition of the existing treatment plant, we recommend the City plan for various maintenance replacements / upgrades to reliably provide treatment for the next planning period. Recommended upgrades include:

- Minor upgrades to the influent lift station
- Replace influent screen
- Misc. upgrades/replacements to the secondary treatment system (AeroMod); including replacing aeration equipment and increasing blower capacity
- Replace/upgrade treatment system controls with new modernized AeroMod PLC that includes DO monitoring/control and remote access
- Replace UV modules and intensity probe
- Add additional digester volume; convert existing digestors to clarifiers
- Replace drying beds with new screw press dewatering system and associated facility
- Other misc. improvements

6.0 Treatment System Improvements

6.1 Introduction

This section provides recommendations and costs for improvements to the City's wastewater treatment plant (WWTP). Recommendations herein are based on a document review, interviews with City staff, and site visits conducted on February 9, 2022 and May 25, 2022. This section supplements evaluation documented in **Chapter 5** and the technical memorandum in **Appendix C**.

6.2 Project North

As shown on the existing treatment plant design drawings, existing facilities are aligned to "Project North" which is 37-degrees east of true north. For ease of description herein facilities will be described using "Project North". Both "Project North" and true north are shown on the attached figures.

6.3 Treatment Facility Improvements

The treatment facility history is discussed in Chapter 5. In general, the facility has operated well since it's construction in 2000; and is in satisfactory condition. However, the treatment plant has been in service for 22 years and needs maintenance upgrades to provide reliable service through the planning period. Additionally, some capacity improvements are needed to meet future flows/loadings outlined in Chapter 3.

This section provides evaluation and recommendations for treatment plant improvements needed to extend the life of the wastewater treatment plant through the next 20-year planning period. The major components of the treatment plant are briefly described followed by observations/issues, recommended improvements, and estimated costs. A summary of cost estimates for each component is provided in **Section 6.4**.

6.3.1 Influent Lift Station

Description:

- The treatment plant influent lift station is located in the grass landscape area on the east side of the WWTP—east of the headworks building and paved access/parking area. The influent lift station receives raw sewage from the collection system via two (2) 10-inch diameter mains; and pumps it to the treatment plant headworks via a single 8" diameter force main.
- The lift station was originally constructed in 1966 and consists of a Smith and Loveless 23.5' wet well/drywell duplex pump system with 3HP vertical pumps rated for approximately 250 gpm.
- The station includes a 4-foot diameter concrete wet well with separate dry pit that houses the pumps, valving, electrical and influent metering. The wet well also includes a 10-in diameter emergency overflow that discharges to a manhole upstream of the outfall
- Minor upgrades to the lift station were made during the 2000 plant upgrade. The pumps were replaced in 2011 along with some lift station electrical components.

Observations and Issues / Recommendations:

- Overall, the treatment plant influent lift station appears to be in satisfactory condition. The dry pit interior appears in satisfactory condition with conduit and access ladder in working order. Pumps and electrical components were replaced/upgraded in 2011 and are reportedly in good condition. The wet well was not observed during our site visits but the City reports no problems.
- The maximum single pump capacity of the existing pumps is 250 gpm+/- which meets current peak flows estimated at approximately 130 gpm +/- . However, duplex pump stations should be designed to meet future peak hour flow (PHF) with only a single pump operating. TM-02 projects future peak hour flow at 320 gpm (0.461 MGD). This exceeds the capacity of a single pump and thus pumping capacity needs to be increased to meet projected future flows. It is recommended VFD's be considered to allow pump capacity flexibility.
- The lift station is located outside the WWTP fence and can be accessed by the public. Also, the existing fiberglass lid is aged and secured only by chain and padlock. The City feels the dry pit is a vandalism risk due to its proximity to Ive's Landing Park and boat launch. It is recommended the lift station site be fenced; and given the age/condition of the dry pit lid, it is recommended the existing dry pit lid be replaced.
- The City reports the lift station ventilation system is old and no longer functioning. Given the confined space of the dry pit, a new ventilation system should be installed.
- In 2023, pursuant to a recent flooding event at the influent lift station the City refurbished their pumps and is planning to do the following upgrades to the lift station with City resources:
 - Add quick disconnects to the vertical pumps
 - Add a pressure transducer to operate the pumps (currently utilizing mercury switches)
 - Add backup floats in the wet well
 - Replace sump pump in dry pit
 - Add fan to vent dry pit
 - Add LED light in dry pit

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Table 6-1 Estimated Cost of Main Lift Station Upgrade

Description	Amount
New 320gpm pumps	\$45,000
Electrical and control panel upgrades to accommodate larger pumps	\$35,000
Piping, plumbing, valves	\$15,000
Pump installation	\$10,000
Instrumentation upgrades	\$5,000
Bypass pumping	\$30,000
Wet well inspection/repair budget	\$10,000
New dry pit lid replacement or refurbishment	\$5,000
Ventilation system	15,000
Fencing	\$10,000
Total ⁽¹⁾	\$180,000

1. Does not include additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering.
2. Several of the above improvements may be completed prior to overall project completion, see last bullet point in observations above regarding recent flooding event.

6.3.2 Headworks

Description:

- The treatment plant headworks room is located on the far east side of the treatment building which is immediately south of the treatment basins. The headworks receives raw sewage from the influent lift station and consists of dual concrete channels, 1' 6" in width and approximately 2' 6" in depth. A mechanical fine screen is installed in the west channel; the east channel includes a manual bar screen w/ 1" openings. The channels also include a small rock trap located at the outlet of the force main.
- The headworks room is elevated to allow gravity flow through the WWTP. The finished floor elevation of the headworks room sits approximately 10' above ground elevation and requires stair access. The room is accessed via a set of stairs located outside on the east side of the building. The room is equipped with a ventilation system, heater, and hose (for spraying down the screen).
- The mechanical fine screen is an Envirex Series 1000 chain and rack mechanical bar screen manufactured by WSG and installed during the 2000 plant upgrade. The screen opening size is 3/8" and has a peak hydraulic capacity of approximately 1 MGD.
- The screen removes inorganic solids (i.e. manufactured inerts, plastics, etc.) from the wastewater before the biological process. Wastewater passes through the screen and solids (screenings) are captured on the outside of the screen. The screen is cleaned with a wiper lifted by a chain. The screenings discharge to a garbage can for disposal.
- The bar screen opening size meets the current state screening requirements for beneficial reuse of the biosolids (per WAC 173-308-205).

Observations and Issues / Recommendations:

- The City reports the mechanical screen has operated satisfactorily without significant issue since installation in 2000. However, typical service life for mechanical screening equipment is in the 20 to 30-year range. Pateros's screen is 22 years old and thus at, or near, the end of its service life. Given the screen's age and expected service life, we recommend Pateros plan to replace the existing screen. It is likely the most economical replacement will be with the same/make model; however, there may be other models/configurations worth considering.
- The most notable complaint the City has with the headworks system is the cumbersome and tedious job of removing and disposing of screenings. Currently screenings are wasted to a garbage can adjacent to the screen. The garbage can is then hauled out of the headworks room and either carried down a flight of stairs or dropped over the railing and disposed of in a waste dumpster located outside beneath the stairway.
- Options were considered to improve the wasting disposal method. One option includes installing a wash press compactor system after the influent screen to wash, compact, and convey the screenings to the waste bin located outside. This option would include replacing the screen with a screen compatible with a wash press system, installing a new wash press, and routing the discharge chute through the north side of the building down underneath the existing stairs above the treatment basin wall. See **Figure 6-1**. This option is labeled "Option 2" in the following cost section.

- In addition to replacing the mechanical screen (and possibly improving the screenings disposal method), it is also recommended the existing ventilation and electrical equipment in the screenings room be replaced during the upgrade. Headworks are filled with caustic gasses from raw sewage which decrease the service life of equipment housed in that environment. It is unlikely the existing equipment will last the full planning period and we recommend it be replaced when the screen is replaced.

Costs:

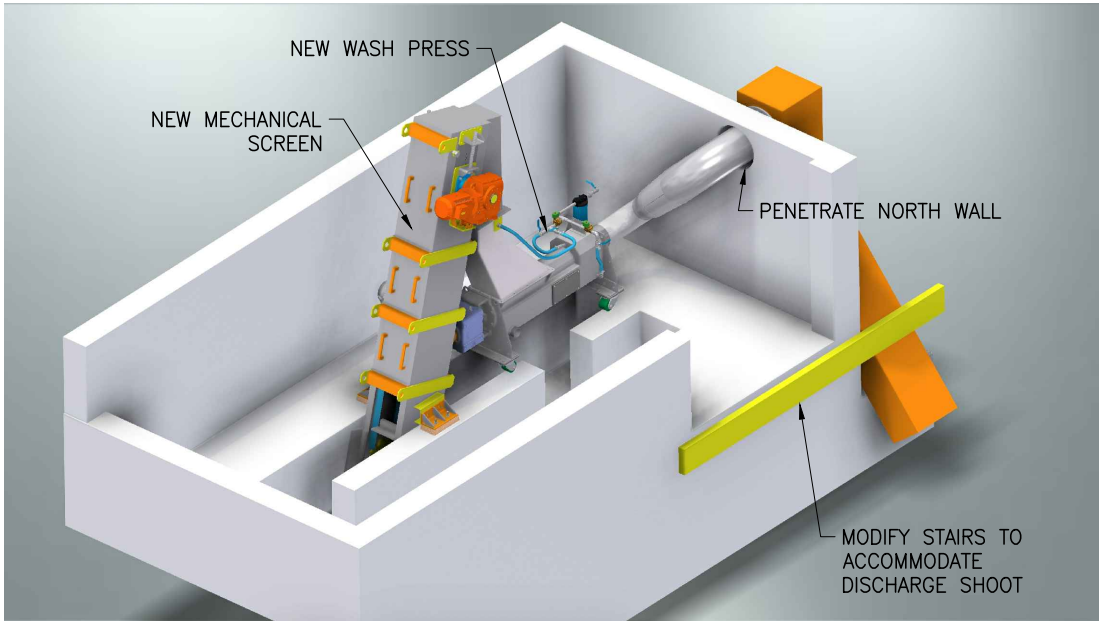
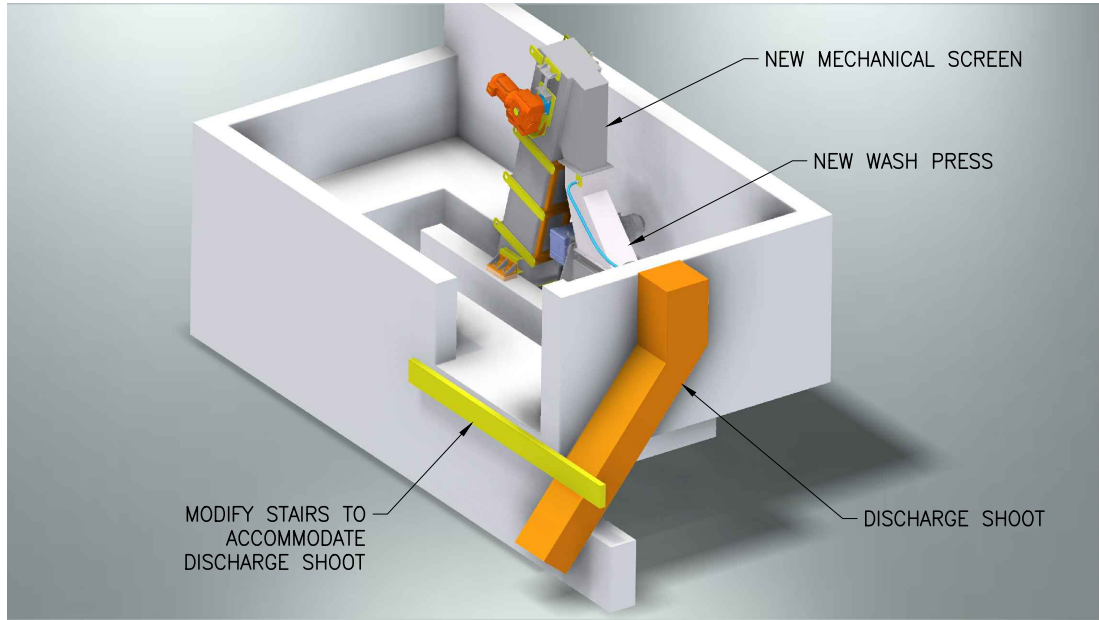
Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Table 6-2 Estimated Cost of Headworks Upgrade

Description	Amount
Option 1: Replace screen (same make/model as existing)	\$45,000
Replace existing mechanical fine screen with like equipment	\$140,000
Delivery and installation	\$30,000
Replace existing ventilation and electrical equipment	\$25,000
Instrumentation/controls to tie into new plant SCADA system	\$10,000
Misc. building improvements	\$15,000
Option 1 Total ⁽¹⁾	\$220,000
Option 2: Replace screen and add wash press system	
New mechanical fine screen ⁽²⁾	\$200,000
New wash press system ⁽²⁾	\$140,000
Building and stair system modifications to accommodate new screen and wash press system	40,000
Delivery and installation	40,000
Replace existing ventilation and electrical equipment	\$25,000
Instrumentation/controls to tie into new plant SCADA system	\$10,000
Misc. building improvements	\$15,000
Option 2 Total ⁽²⁾	\$180,000

1. Does not include additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering.

2. Cost based on 18MR Raptor Multi-Rack bar screen and 35WP Raptor Wash Press system. Pre-design to confirm actual screen and wash press system to be used as well as associated requirements and needed improvements.



572808 Fig 6-1 (Hwks Imp)

SCALE: AS SHOWN
 DESIGNED: DDC
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-08
 DATE: 12/06/22



CITY OF PATEROS, WASHINGTON

**WASTEWATER TREATMENT PLANT IMPROVEMENT
 HEADWORKS: REPLACE SCREEN AND ADD WASH PRESS OPTION**

FIGURE

6-1

6.3.3 Secondary Treatment System (Aero-Mod)

Description:

- Secondary treatment is provided by an Aero-Mod proprietary treatment system that includes selector tank, aeration basins, clarifiers, and aerated digesters constructed in concrete common wall basins. Associated aeration equipment and controls are located in the treatment building south of the treatment basins. The Aero-Mod equipment was installed as part of the 2000 wastewater treatment plant upgrade project.
- The following table shows sizing characteristics/capacity for each of the secondary treatment system components.

Table 6-3 Secondary Treatment System – Component Characteristics and Capacity

Component	Description
Selector Basin	Number of basins: 1 Volume: 4,700 gal Ave retention time: 0.4 Hours Diffused air mixing (anoxic)
Aeration Basins	Number of basins: 2 (1 per train - single stage aeration) Total volume: 125,000 gal Ave retention time: 24 hours
Clarifiers	Number of clarifiers: 2 (1 per train) Ave surface overflow rate: 390 gpd/sf Max flow through clarifier: 800 gpd/sf Ave solids loading rate: 23 lbs/d/sf Max solids loading rate: 41 lbs/d/sf
WAS/RAS	Aero-Mod solids wasting/recycle airlift system
Aerobic Digestors	Number of basins: 2 (1 per train) Total volume: 22,000 gal Ave sludge retention time: 23 days Digester wasting pump: 5 HP (1 per tank)
Flow surge handling	Number of basins: 1 Volume: 8,000 +/- gals Flow surge capacity: 0.58 MGD for 1 hr Surge handled via basin storage and surge tank Surge return pump: 3/4 HP
Aeration	Numbers of blowers: 2 Horsepower (ea): 20 Capacity: 500 (sfcfm)

Observations and Issues / Recommendations:

In general, the secondary treatment system has operated satisfactorily over its service life and met desired effluent limits. City staff does not report any significant known issues with the system.

During this evaluation both the existing condition and capacity of the Aero-Mod system and equipment were evaluated and discussed with the manufacturer. Given the age of the system (22 years) various maintenance replacements / upgrades are recommended to reliably provide treatment through the next

planning period. Additionally, **Chapter 5** evaluates the capacity of the treatment plant and identified capacity improvements needed to meet future flows/loadings. See **Section 5.6**.

The following table provides observations/issues and recommended maintenance and capacity improvements needed for each individual component of the secondary treatment system. Note, this table is followed by additional comments/recommendations.

Table 6-4 Secondary Treatment System – Observations and Recommendations

Component	Observation	Recommendation for 20-yr planning period
Concrete basins / structures	<ul style="list-style-type: none"> Satisfactory condition. No observed or reported structural concerns 	<ul style="list-style-type: none"> None
Selector basin	<ul style="list-style-type: none"> Satisfactory condition. 	<ul style="list-style-type: none"> None
Aeration basins / aeration equipment	<ul style="list-style-type: none"> Satisfactory condition considering age. City reports aeration/DO adjustments are manual, and automation is desired Adding DO/aeration automation will reduce energy costs 	<ul style="list-style-type: none"> Replace/upgrade aeration system including blowers, control valves (butterfly and pneumatically actuated valves), aeration assembly, compressor, etc. Add DO sensors and aeration automation/ control system upgrade
Clarifiers / RAS system	<ul style="list-style-type: none"> Satisfactory condition considering age. No reported problems Clarifier is limiting component for plant capacity 	<ul style="list-style-type: none"> Replace/upgrade inlet screens, fiberglass suction hoods, and concrete form brackets Replace RAS airlift pump system Additional clarifier volume is needed to increase plant capacity
WAS / Digestors	<ul style="list-style-type: none"> Satisfactory condition considering age. No reported problems Digester volume is low—approx. 15 days of storage More volume is typical (in the 30-day range) for flexibility; and is likely needed if the biosolids dewatering method is changed 	<ul style="list-style-type: none"> Replace/upgrade digester pumps Add additional digester volume if biosolids dewatering method is changed
Piping / Valving / Pneumatic actuator valves	<ul style="list-style-type: none"> Satisfactory condition City reports some freezing issues with existing valves 	<ul style="list-style-type: none"> Replace/upgrade misc. piping/valves throughout Add freeze protection to sensitive valves
Walkways / Handrails	<ul style="list-style-type: none"> Satisfactory condition. No additional walkways needed for existing basins/equipment 	<ul style="list-style-type: none"> None If digester volume is increased, add additional walkway to provide access to new basins
System Controls / Monitoring	<ul style="list-style-type: none"> System controls are both outdated and at end of service life No plant SCADA system Monitoring and adjustments do not use current technologies 	<ul style="list-style-type: none"> Upgrade control system with current Aero-Mod control panel and system automation Add plant SCADA system for control and data logging

Comments/Recommendations:

- The existing aeration basin configuration is not Aero-Mod’s current standard which utilizes 2 stage aeration to allow for denitrification and higher efficiency aeration. Converting the existing system to a two-stage aeration system could be accomplished by installing an internal wall in the aeration basin with internal piping/appurtenances. However, since Pateros will not likely be required to denitrify, the efficiency savings alone will likely not be cost effective enough to justify the improvement. In the event future nutrient removal becomes a permit consideration, this will be revisited.
- The system currently manually adjusts aeration dose. We recommend the system be upgraded/retrofitted with Aero-Mod’s current control system and DO sensors and automation. This will reduce O&M time and increase blower efficiency reducing energy costs.
- Capacity of the existing treatment plant is less than the projected 20-year flows/loadings (see TM-04). To safely meet projected flows/loading, plant capacity should be increased. This can be accomplished by: 1) adding clarifier capacity, and 2) increasing aeration capacity.
- Existing hydraulic capacity is limited by the clarifiers which are currently sized for 400 gpd/sf at 0.125 MGD. Increasing hydraulic capacity of the plant requires expansion of the clarifiers.
- The existing digestors are located adjacent to the clarifiers and are minimally sized and do not provide typical storage volumes. Given the projected higher organic loadings, and the changes the City is considering to the biosolids dewatering system (from drying beds to screw press), it is recommended additional digester volume be added. See following sections regarding recommended improvements to the existing dewatering system.
- Expansion to the existing sludge digestors could be accomplished by constructing new digestors on the north side of the treatment basin. If this improvement is completed, the old digester basins could be utilized for expanding the clarifiers. This would include removing the dividing wall between the existing clarifiers and the digestors, and expanding the clarifiers into the existing digester basins. With this expansion, plant hydraulic capacity will be sufficient to meet future flows.
- If digester and clarifier upgrades are made, it may also make sense to convert the surge tank into additional sludge storage, and adding telescoping valves, etc. to allow for sludge thickening and increasing the maximum sludge storage time.
- Future capacity increases (beyond what can be accomplished in the existing basins) will be accomplished by adding additional treatment basin volume to the west of the existing basin.
- It is recommended the treatment plant influent/effluent samplers be replaced.
- Given the age/condition of the buildings and site, it is recommended the City budget for some miscellaneous repairs/replacement etc.
- See **Figure 6-2**.

Costs:

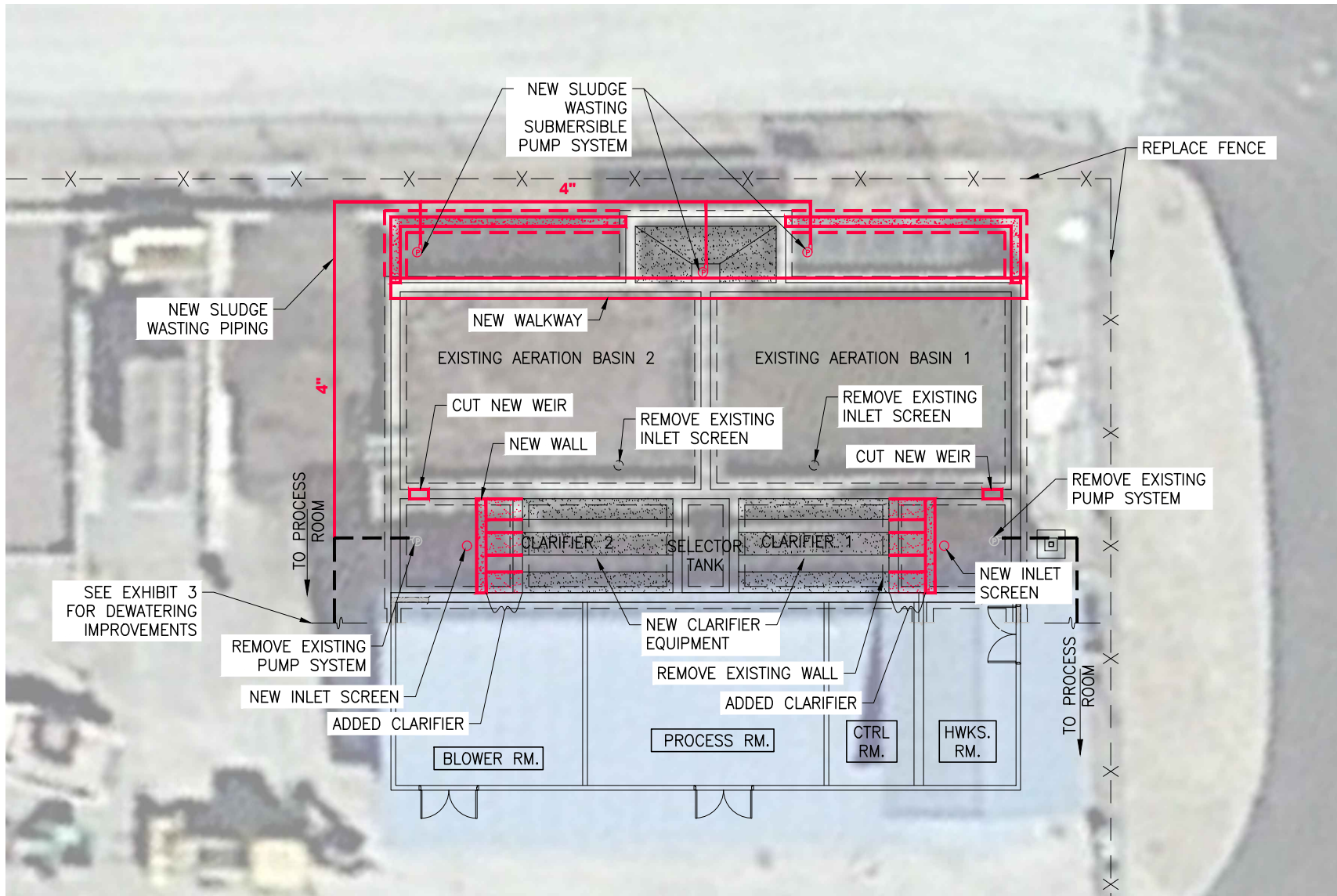
Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Table 6-5 Estimated Cost of Secondary Treatment System Upgrades

Description	Amount
Aeration Basin - Replace aeration equip and expand capacity	
Remove / dispose of existing equipment	\$10,000
Replace diffusers, piping, valving, etc	\$260,000
Digestors – Add digester capacity; new basins	
New basins (conc. walls, floor)	\$100,000
Aeration equipment (diffusers, piping, etc.)	\$65,000
Sludge pump system (Non-clog submersible)	\$60,000
Sludge piping, valves, appurtenances	\$15,000
New access walkway	\$10,000
Overflow Chamber – convert to sludge storage / multi-use	
Aeration equipment	\$60,000
Piping, valves, appurtenances (coring, etc.)	\$15,000
Retrofit existing weirs with slide gates	\$8,000
Sludge pump system (Non-clog submersible)	\$30,000
Clarifiers – add clarifier capacity, replace equipment	
Demo wall between digestors and clarifiers	\$10,000
Remove/dispose of existing clarifier equipment	\$10,000
Concrete work for clarifier mech install	\$25,000
New clarifier equipment and install	\$170,000
Piping and appurtenances	\$5,000
Electrical and Controls Upgrade and Misc. Equipment	
New plant control system (PLC)	\$250,000
DO monitors and controls upgrades	\$60,000
Misc. equipment (air comp, regenerative desiccant)	\$30,000
Misc. other improvements	
Bypass pumping and temporary facilities during construction	\$70,000
Site piping	\$50,000
Minor building updates / improvements	\$30,000
Samplers	\$10,000
Site fencing	\$30,000
Total ⁽¹⁾:	\$1,383,000

1. Does not include additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering.

572808 Fig 6-2 (Secondary Treatment Imp)



GENERAL NOTES:

1. REPLACE ALL ELECTRICAL AND CONTROLS EQUIPMENT

SCALE: 1/16"=1'-0"

SCALE: AS SHOWN
 DESIGNED: NVH
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-08
 DATE: 12/06/22



CITY OF PATEROS, WASHINGTON

SECONDARY TREATMENT SYSTEM IMPROVEMENTS

FIGURE

6-2

6.3.4 UV Disinfection System

Description:

- The UV disinfection system is manufactured by Trojan Technologies, Model UV3500 PTP. The system is located in the treatment building and was installed during the 2000 upgrade.
- The UV system consists of prefabricated stainless-steel channel, 5 UV lamp racks with 4 lamps per rack, level control weir, UV dose monitor, cleaning rack, and appurtenances. Lamp racks are situated such that lamps are horizontal and parallel to flow.
- The reactor channel was not constructed with additional length to add lamp banks in the future, rather a separate parallel channel to the existing UV channel was considered when sizing the building. An additional bank can be added in the future if increased capacity is needed.

Observations and Issues / Recommendations:

- The UV disinfection system appears to be in good working order.
- The maximum capacity of the UV system is 0.5 MGD. This meets the projected future peak flow of 0.461 MGD.
- Given the age of the system, the manufacturer recommends the following replacements be made for reliable service for the next 20 years:
 - Replace all 5 UV modules
 - Upgrade control panel
 - Replace intensity sensor/monitor

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Table 6-6 Estimated Cost of UV System Upgrades

Description	Amount
Replace UV modules (\$5,000 @ 5 each)	\$25,000
Upgrade control panel	\$10,000
Replace intensity sensor	\$3,000
Delivery/markup and installation	\$15,000
Total ⁽¹⁾:	\$53,000

1. Does not include additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering.

6.3.5 Biosolids Processing and Dewatering

Description:

- Waste activated sludge (WAS) is pumped from two (2) aerobic digester tanks located in the treatment basin to one of five (5) sludge drying beds. Each drying bed is approximately 1,225 sq-ft with an allowable maximum depth of 18". WAS is discharged to the drying beds through a 4" DI pipe system, and 2 ½" manual quarter turn ball valves are used to distribute the WAS into each drying bed. Sumps are located at the center of each drying bed which collect the drying bed filtrate. The drying bed filtrate flows from the drying bed sumps to the plant lift station via 4" PVC pipe. The drying beds are uncovered.
- Dried biosolids are removed and stockpiled onsite before being hauled to the Boulder Park (BPI) beneficial use facility as Class B biosolids.
- In 2019 (25) dry tons of biosolids were produced according to the City's Biosolids annual report.

Observations and Issues:

- The drying beds are in satisfactory condition; and based on the bed design capacity has sufficient capacity to dry the projected future WAS volumes.
- The City reports that during winter months biosolids do not dry and accumulate in the drying beds. Drying beds are uncovered and are ineffective during winter and periods with high precipitation amounts leading to storage issues on-site. This leads to lack of drying during the winter and spring with related storage issues until the biosolids can be dried and hauled away. Covering the beds would likely improve WAS drying.
- Maintaining the drying beds is a time consuming and tedious job for the City requiring significant manual labor. The existing distribution equipment does not work properly and/or is problematic and the beds must be raked and leveled by hand.
- There is no room on-site to store biosolids. Capacity within the drying beds will likely become an issue in the future due to the increase in projected flows leading to increases in biosolids.

Recommendations:

- There are a variety of dewatering methods to replace the drying beds that were discussed with the City (screw press, centrifuge, belt filter press, etc.). A screw press dewatering system is recommended. Screw presses are reliable, require little maintenance, achieve a high percent dry solids, and are a commonly used cost-effective choice for smaller treatment plants.
- A screw press system requires a new dewatering room to contain the screw press, controls, and chemical feed. This could be located as an extension to the treatment building (see **Figure 6-3**). The new room can be configured to allow for direct discharge of dewatered biosolids to a truck or container that can be used for haul to the Boulder Park (BPI) facility. Another option would be to locate a new dewatering building at the southwest corner of the site. However, for planning purposes, costs herein are based on extension of the existing treatment building.
- The existing sludge digestors have minimal storage volume—approximately 15 days of storage at design. More typical values are in the 30-day range. The treatment system manufacturer recommends increasing the volume of the aerobic digestors (see recommendations in the secondary treatment system section). It may also be beneficial to convert the surge tank into a

sludge thickening tank which will also provide additional storage volume. Projected solids wasted from the sludge holding tank is 680 gallons per day of 2.5% solids, or 142 lbs/d of dried sludge (average of 6 lbs/hr).

Screw presses used locally are manufactured by FKC, Huber, and PWT. This TM is based on evaluation of the smaller FKC screw press capable of processing 1.5 tons per day (60 lbs/hr). With chemical addition of a polymer, the screw press provides a discharge of 15% to 20% biosolids that are conveyed to a dried solids container and pressate pumped to the headworks. Biosolids would be stored onsite for transportation to BPI for incorporation into the soil.

New Solids Processing Building – includes construction of a new one room treatment building addition approximately 30 feet by 25 feet. Solids Processing Building to house the screw press. Adjacent to the new building will be a covered dewatered biosolids storage area. The screw press requires footprint for both the screw press and space for controls, chemicals addition equipment, polymer storage, etc. The room will be lighted and heated. New building elements to include:

- Concrete footings/concrete floor/floor drainage system
 - Metal sidewalls and roof, insulated (match existing building)
 - Electrical lighting, fixtures and outlets (110, 220, 480-volt services)
 - HVAC system to allow 4-5 air changes per hour, with dehumidifier
 - Heating
 - Domestic water supply
 - WAS piping from aerated digester / sludge storage to screw press
 - Chemical Storage Area (polymer storage)
 - Fire detection system
- New Covered Storage Area for the dewatered biosolids should be constructed adjacent to the biosolids processing building. Based on a projected dried biosolids amount of 142 lbs/day at 15% solids. This equates to 450 cubic foot (cf) per month) of dried solids. At a five-foot depth 90 square feet of storage per month is required for storage. Converting two of the existing 1250 sf drying beds for storage can provide about 6 months of storage. The new storage area requirements include:
 - Floor drainage system (existing)
 - Concrete sidewalls at five feet high—utilize ecology blocks
 - Metal roof over storage area
 - Electrical lighting, fixtures
 - Yard plumbing for wash down water
 - Electrical & Controls - The screw press is a skid mounted device, equipped with a NEMA 4 control panel to operate the polymer injection system, screw press, and conveyor. The press requires a 480-volt, 3 phase power supply.
 - Odor Mitigation - Odor is not anticipated to be an issue during typical wasting and dewatering of biosolids; aerobic digestion produces a low odor sludge. In the event odor does create problems, screw press screen scrubbing is available to assist in odor mitigation inside the building. An HVAC system will be designed to perform 4-5 air changes per hour, minimizing odor buildup. Another condition odors may occur is during moving of piles of stored dewatered biosolids, which may have anaerobic conditions within the pile. This could produce temporary severe odors. If this occurs the operator should schedule moving/hauling of biosolids to minimize effects. If needed the new covered storage area can be closed in and equipped with odor mitigation.

- Beneficial Use of Biosolids - The proposed biosolids system is intended to provide treatment and operation flexibility for meeting Class B requirements for disposal of treated biosolids. Treated biosolids will be disposed at the Boulder Park Incorporated (BPI) facility near Mansfield, Washington as is currently done. BPI requires biosolids be dewatered to a minimum of 10% solids and to meet the pathogen reduction requirements of WAC 173-308-170 and vector reduction requirements of WAC 173-308-180.
- Conformance with pathogen reduction requirements will be met via fecal coliform testing (WAC 173-308-170 (5) Alternative 1). This is consistent with similar systems in the area meeting Class B requirements with similar facilities. If compliance is not met via fecal coliform testing, BPI will still receive the non-Class B biosolids for an additional fee; and will provide the additional treatment and/or immediate incorporation as needed to meet WAC 173-308 requirements for Class B.
- Compliance to meet vector attraction reduction requirements will be met via soil incorporation at BPI or SOUR test.

Costs:

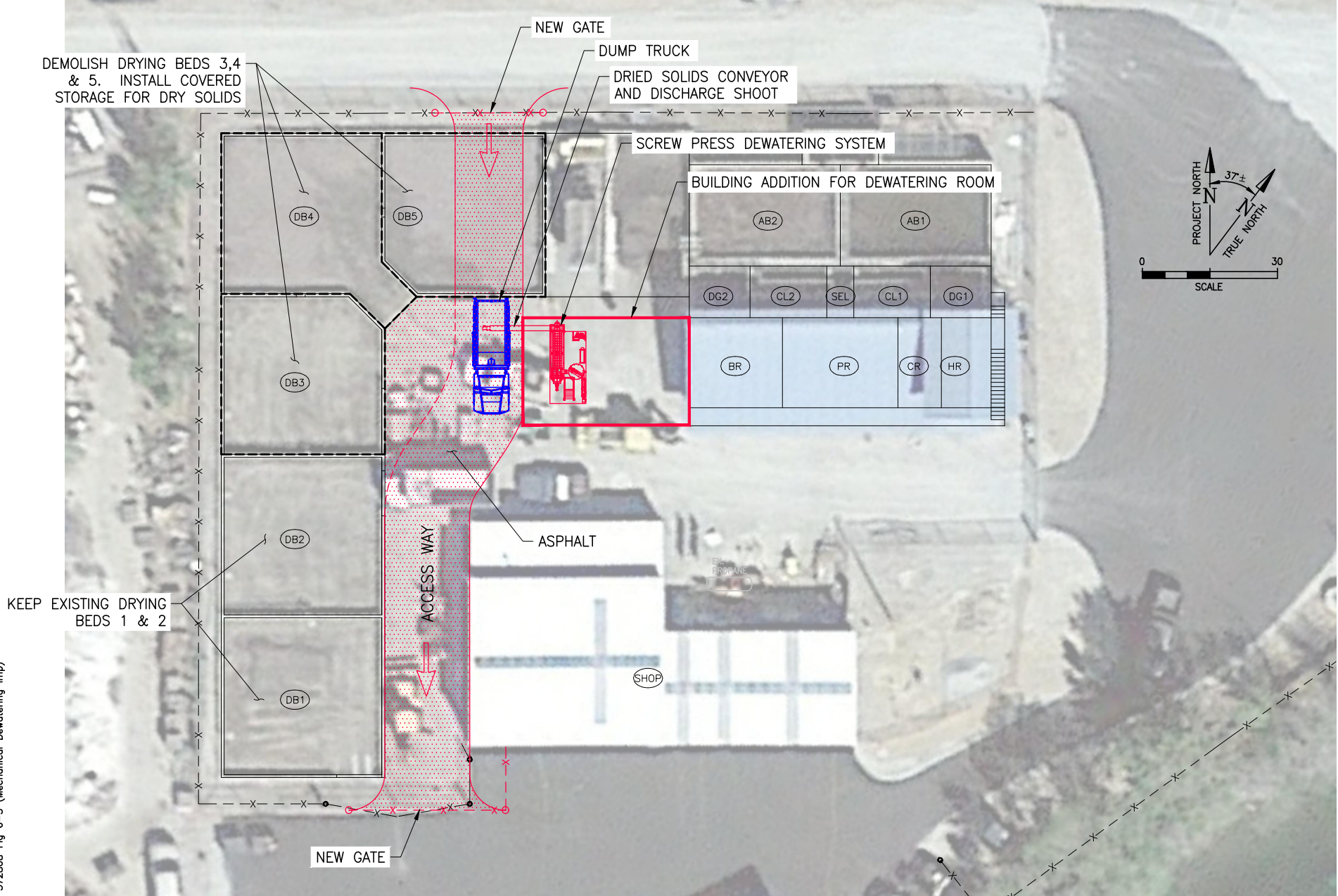
Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Table 6-7 Estimated Cost of Dewatering System (New Screw Press) Upgrades

Description	Amount
Demolish/remove 3 drying beds; modifications to keep 2 beds; covered biosolids storage area	\$300,000
Building extension	\$250,000
Screw press	\$400,000
Delivery and installation	\$30,000
Piping/plumbing/valves	\$60,000
Electrical/controls	\$100,000
Site piping revisions around building extension	\$15,000
Access driveway	\$40,000
New gates and fencing	\$10,000
Total ⁽¹⁾:	\$1,205,000

1. Does not include additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering.

572808 Fig 6-3 (Mechanical Dewatering Imp)



SCALE: AS SHOWN
 DESIGNED: NVH
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-06
 DATE: 6/29/22



CITY OF PATEROS, WASHINGTON

DEWATERING SYSTEM IMPROVEMENTS

FIGURE

6-3

6.3.6 *Outfall*

Description:

- Secondary treated and disinfected effluent is discharged from the facility via an outfall that extends approximately 550 feet offshore and terminates as an open-ended pipe. The outfall lies approximately 50-59 ft below the surface of the Columbia River at River Mile 524.1. According to the 2000 Wastewater Treatment Plant Upgrade design plans, the outfall consists of a 12-in concrete pipe.

Observations/Issues a Recommendations:

- The outfall is submerged below Lake Pateros and was not observed. City staff are unaware of the exact location or condition of the outfall.
- It is recommended the outfall be video inspected and the exact location end of the outfall discharge be located.

Costs:

- Estimated budget for video inspection of the outfall is \$10,000
- Additional improvements and/or repairs unknown.

6.3.7 *Electrical/Lab Building/Site/Misc.*

Descriptions/Recommendations:

- The City does not report any known electrical issues with the existing treatment plant electrical system. No electrical system evaluation was completed as part of this evaluation. However, given the age of the plant, it is likely the electrical system is in satisfactory condition and adequate service life remains for the next planning period. Some controls components are known to be obsolete and/or problematic and need upgrading. Those items are covered in other improvements.
- The original lab/operations building was located on the east side of the site. That building was demolished and replaced with a building addition located on the north side of the City shop. The new lab provides adequate space for plant operations and testing. The City did not report any equipment needed at this time.
- The wastewater treatment plant site is located adjacent to the Columbia River. The site consists of 3 separate parcels that total approximately 1.7 acres. All parcels are owned by the City (parcel numbers: 2180010000, 2180020300, 2180020200). The treatment plant site is surfaced with gravel with little to no landscaping. The perimeter of the plant is fenced with a 6' chain link fence. Access to treatment components and structures appears adequate. In general, site conditions are satisfactory. The treatment plant site is also being used to store a variety of old mechanical equipment and various items. During future treatment plant upgrades the City should consider removing any items that are no longer needed or useful.
- Cross connection for Pateros's WWTP is currently accomplished by use of individual backflow assemblies at various locations throughout the treatment plant. Premise isolation for the site is not provided. Department of Health (DOH) provides guidance on requirements for cross connection control for wastewater treatment plants. DOH guidance considers wastewater

treatment plants “high severity” and requires premise isolation. This means typically treatment plants are required to provide complete hydraulic separation from the City’s potable water supply; this is typically done using a reduced pressure backflow preventer with an additional air gap and repump system for process isolation. This requirement for Pateros’s WWTP should be confirmed with the City’s cross connection control specialist.

- An air gap repump system should be installed during the treatment plant improvements. The air gap system should be sized to accommodate anticipated current and future water demands and should include duplex pumps with flow pacing via VFD / pressure tank combination. Controls for the system should be integrated into the treatment plant SCADA system. It is assumed the air gap system will be housed in the biosolids dewatering building addition. Costs herein do not include construction of a new structure to house the CCC system.

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Table 6-8 Estimated Cost of Cross Connection Control Upgrades

Description	Amount
Reduced pressure backflow assembly for premise isolation	\$25,000
Building/expansion	Use dewatering imp. addition
Skid mount cross connection control repump system	\$180,000
CCC system installation	\$30,000
Site piping revisions to accommodate new CCC system	\$20,000
Electrical/controls/SCADA for CCC system	\$70,000
Total ⁽¹⁾:	\$325,000

1. Does not include additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering.

6.4 Summary of Costs

Table 6-9 Summary of Costs

Description	Amount
Influent Lift Station Upgrade	\$180,000
Headworks Upgrade ⁽²⁾	\$470,000
Secondary Treatment Upgrade	\$1,383,000
UV System Upgrade	\$53,000
Dewatering System Upgrade	\$1,205,000
Outfall Video Inspection	\$10,000
Cross Connection Control System	\$325,000
Site and Misc.	\$50,000
Modify NPDES Permit to reflect WWTF design parameters	-
Subtotal:	\$3,676,000
Contractor mob/admin/overhead/profit (15% of Subtotal)	\$551,000
Sales tax (8.6%)	\$364,000
Contingency (25%)	\$1,148,000
Construction Cost:	\$5,739,000
Eng, admin, const mgt, insp (30%)	\$1,722,000
Admin/environmental/funding	\$80,000
Estimated Improvements Cost Total:	\$7,541,000

1. Costs rounded to the nearest thousand

2. Assumes Option 2. See **Section 6.3.2**.

6.5 Reclaimed Water

As required by RCW 90.48.112, the engineering report must address the feasibility of using reclaimed water as defined in RCW 90.46.010.

Producing reclaimed water is not an option for the City of Pateros. The wastewater treatment facility will need upgrades well beyond their current NPDES permitted water quality parameters to meet beneficial reuse standards. In addition, Eastern Region ECY has indicated that reclaimed water is not a feasible alternative for small community wastewater systems due to the need to hire a Class 3 treatment plant operator.

7.0 Implementation and Financing

7.1 Summary of Projects

Costs are estimated in the preceding sections for project elements. **Table 7-1** provides a summary of costs used to develop funding scenarios in this section.

Table 7-1 Capital Improvements Plan and Estimated Project Costs

Description	Estimated Costs
Collection System Improvements (Table 4-12 - PHs I-III & Misc. Impr.)	\$2,370,000
Warren Avenue Lift Station Improvements (Table 4-12)	\$730,000
Improvements for Lining Subarea 1 & 3 (Table 4-12)	\$880,000
Wastewater Treatment Plant Improvements (Table 6-9)	\$7,540,000
Sewer Fund Rate Study ⁽¹⁾	\$40,000
Total	\$11,560,000

1. Refer to discussion in **Section 7.3**

The estimated improvements costs are based on 2022 dollars. **Table 7-2** estimates the project costs at the time of the anticipated construction (i.e. 2024) and is used for funding budgeting and planning purposes.

Table 7-2 Estimated Project Budget for Funding

Description	Estimated Costs
Estimated Capital Cost ⁽¹⁾	\$11,560,000
Estimated Rate of Annual Inflation	3.0%
Years of Inflation ⁽²⁾	4
Total Inflation Contingency	12.6%
Total Estimated Cost For Funding Purposes ⁽²⁾	\$13,010,000

1. Estimated in 2022 dollars per earlier sections of report

2. Assumed 2025

It may be possible to incorporate Transportation Improvement Board (TIB) funding to pay for some road/ROW resurfacing for the collection system improvements. Funding for the collection system and treatment facility improvements is likely to be financed through ECY and/or Rural Development funding and CDBG funding.

Table 7-3 Implementation Timeline Scenarios

Task/Description	Estimated Timeline
Submit WWFP/GSP to ECY	Jan 2023
GSP Review, Revisions, and ECY approval	Jan – July 2023
Potential Timeline with ECY Funding:	
ECY funding applications for design and construction	Oct 2023 ⁽¹⁾
TIB Application	June 2024
CDBG application	June 2024
Design Phase	
ECY Funding available / ECY & City contract / proceed	Oct 2024
CDBG grant available	Fall 2024
Design phase / ECY approval	Nov 2024 – June 2025
Construction Phase	2025 / 2026
Potential Timeline with RD Funding (ECY for design phase only):	
Design Phase (same as above scenarios with ECY funding)	
Construction Funding Procurement	
Initiate RD funding application process	Oct – Dec 2024
RD funding approved (“Obligation of Funding”)	Mar 2025
Construction Phase (same as above scenarios with ECY funding)	

1. Some communities may qualify for ECY contract extensions for open agreements. Refer to following discussion.

Table 7-2 estimates the project costs at an anticipated future construction (i.e. 2025/2026) and is used for funding discussions and planning purposes. For project funding and estimated inflation purposes, an estimated timeline is shown in **Table 7-3**.

7.2 Funding Sources

There are several funding sources available to municipalities for financing public works projects (some specifically directed at wastewater improvements) through grants and low interest loans (and forgivable loans – equivalent to grant). The favorability of each program varies from community to community, and project to project depending on several factors (e.g. \$ size of project; need; potential health and safety threat; impacts to water quality; anticipated sewer rate impacts to customers; and other funding criteria).

Three potential funding agencies likely with the most favorable funding packages for Pateros are:

- WA Department of Ecology
 - Centennial Clean Water Program (CCWP), and
 - Clean Water State Revolving Fund Loan Program (CWSRF)
- US Department of Agriculture – Rural Development (RD)
 - Water and Waste Disposal Loan and Grant Program
- WA Department of Commerce
 - Community Development Block Grant (CDBG)

7.2.1 *WA Department Of Ecology*

Funding programs under WA Department of Ecology include:

- Centennial Clean Water Program (CCWP) (grants)
- Clean water Revolving Fund Loan Program (CSWRF) (loans and forgivable loans)

Both programs are administered by the WA State Department of Ecology. The programs fund planning, design, and construction costs associated with wastewater facilities and the implementation of non-point activities. To be eligible, projects must be water quality projects that prevent and control pollution of ground and surface waters.

Although the two programs are listed separately and have specific criteria unique to each, they are accessible through a single application process through ECY. Following application submission, ECY reviews and determines the most applicable funding source and amount to be applied from each program, depending on eligibility and other criteria specific to the project.

Interest rates for loans are based on a percent of tax-exempt municipal bonds. For hardship communities, interest rates are lower, depending on the degree of hardship. Forgivable loan (I.e. equivalent to grant) may also be offered to applicants depending on funds available and depending on financial hardship criteria of the community.

Limited grant subsidy is available to applicants that can demonstrate financial hardship. Hardship interest rates and grant subsidy eligibility are shown in **Table 7-4**. ECY requires user rates include an annual 20% reserve to be collected during the first five years, equivalent to at least one annual debt service on the loan.

Table 7-4 Hardship Interest Rates and Grant Subsidy Eligibility ⁽¹⁾

Sewer Rate ⁽²⁾ ÷ MHI ⁽³⁾	< 2%	≥ 2% but < 3%	≥ 3% but < 5%	≥ 5%
Hardship Designation	Non-hardship	Moderate Hardship	Elevated Hardship	Severe Hardship
5-year Loan Rates	0.6%	0.4%	0.2%	0.0%
20-year Loan Rates	1.2 %	0.7%	0.4%	0.0%
30-year Loan Rates	1.4%	1.1%	0.7%	0.4%
Grant Eligibility	Not eligible	50% up to \$5M	75% up to \$5M	100% up to \$5M

1. Based on MHI information per Appendix M of ECY funding guidelines.
2. "Sewer Rate" for this calculation is the potential future sewer that would result if no grant funding was provided.
3. MHI – Median Household Income for the community (Pateros MHI = \$57,400 per the ECY SY24 Funding Guidelines).

Starting in the 2022 application cycle, ECY will allow communities who meet certain threshold criteria under ECY’s hardship guidelines. Under ECY’s new guidelines, applicants may request amendments to existing open ECY contracts at any time so long as the requested funding is used for continuation of the original project scope (e.g. a Step 1 – Planning contract may be amended to include Step 2 – Design). Also, as of the writing of this plan (Fall 2022), ECY has indicated that they will be moving toward a rolling deadline format for Step 1 – Planning applications.

7.2.2 US Department of Agriculture – Rural Development (RD)

Funding programs under US Department of Agriculture – Rural Development (RD) include:

- Water and Waste Disposal Loan and Grant Program

The USDA Rural Development (RD) – Water and Waste Disposal loan and Grant Program funds projects for small (less than 10,000 people) financially distressed communities to extend and improve water and waste treatment facilities. The program is primarily a loan program however grants are also offered on projects where sewer rates become excessive as compared to sewer rates being paid in other similar communities in the region.

Applicants must demonstrate effort and subsequent inability to finance the project through their own resources or commercial credit, and demonstrate the financial feasibility of the project, including ability to repay the loan. Loan security is normally a revenue bond ordinance, with loan repayment from utility rates, although repayment from taxes can also be used for RD loans.

- Applications for funding are accepted year around with award typically within 3 to 6 months of application submittal.
- Interest rates vary – Up until recently, RD’s rates had been at an all-time low at 1.5%, for the intermediate rate; and lower rates (1.125%) that can apply if “poverty level” can be shown and there is a “health and safety threat” due to the need for the project. Rates have begun to increase, and RD should be contacted during preparation of an application. Assumed rates have been used for funding scenarios in this section.
- 30 to 40-year loan terms. To obtain grant funding, applicant must accept 40-year term. No prepayment penalty for early repayment.
- Application requirements:

- Approved environmental review
- Preliminary engineering report
- Financial feasibility and cost analysis

7.2.3 Community Development Block Grant (CDBG)

The WA Department of Commerce administers the CDBG program. These Federal Department of Housing and urban Development (HUD) funds are available for water and sewer projects for areas with at least 51% low to moderate income (LMI) residents, which have public health and safety or economic development issues.

The Maximum grant amount is \$1,000,000. Applications are typically due early June (1st week) each year. Recipients are usually announced in September and, funding contracts executed within three to six months following that.

The CDBG program is highly competitive and funds projects which primarily serve at least 51% LMI residents. Pateros is eligible for this funding due to meeting or exceeding the 51% LMI threshold. Cities can conduct independent income surveys in an effort to demonstrate at least 51% LMI. Pateros has been successful utilizing CDBG funding in the past.

7.2.4 Other Funding Programs

There are other funding programs and mechanisms available that were not considered in depth at this time, but that may have future applicability depending on available funding, aggressiveness of Pateros in pursuing funding, or other factors that may emerge as planning moves forward. The following list is not exhaustive but represents the more common funding programs that can be pursued.

7.2.4.1 Public Works Board – PWB (formerly public works trust fund)

This state program, administered by the WA department of Commerce, has provided low interest loans for the repair, rehabilitation, and reconstruction of municipal infrastructure. The PWB has historically been a sought-after source of low interest loans due to the simplicity and flexibility of the program. The program is loan only and does not offer grant funding. Loan maximum is \$10 million for construction; no matching funds required; very low interest rates, with up to 20-year loan term and no loan fee. Interest rates vary, depending on loan term and degree of financially distress of the communities as measured by the affordability index.

Currently the application cycle is closed and the PWB has not announced when their next application cycle will be.

7.2.4.2 Line Item – State Budget

A small number of communities have sought assistance from their state representative and/or state senator to obtain funding for their public works project directly from the legislature. Pateros recently used this approach successfully and was able to demonstrate the severe impact of the Carlton Complex fire in the area in 2014 to the local economy and infrastructure. The City of Tonasket has also recently obtained funding for their downtown redevelopment project using direct appropriation funding.

This approach generally requires significant time and involvement and connections with the area's State Senator and/or Representatives. Usually, a person either part of city government or influential resident

that can devote time and effort is needed. A strong case needs to be made by the community and buy-in by the Senator and/or Representatives such that the project request makes it onto the State budget, and through the budget process successfully.

7.2.4.3 Revenue Bonds / General Obligation Bonds

Revenue bonds and general obligation bonds have historically been a means of funding public works projects by some communities. These funding mechanisms will likely not be needed due to the high likelihood Pateros will qualify favorably for the other loan/grant programs previously discussed. These funding mechanisms can be considered further if other more advantageous sources cannot be obtained.

7.2.4.4 City / Utility Reserve Funds

Accumulated local reserve funds are usually insufficient to fund large scale capital improvements without considerable supplemental funding. Communities are encouraged to budget sufficiently to be able to save and accumulate local reserves for responsible operation, future improvements, and emergency reserves for the utility. In the case where large capital projects are anticipated, local reserves are generally used as seed money to match or leverage funding sources to obtain more favorable funding consideration and funding offers. Communities are encouraged to begin accumulating reserves well ahead of project implementation and set utility rates accordingly.

7.3 ERU’s, Revenue, O&M Costs, and Cost of Service

A summary of Pateros’ customer connections is shown in **Table 7-5**. A summary of Pateros’ 2020 and 2021 actual and 2022 budgeted revenue and expenditures are included in **Table 7-6**. Also shown is the calculated cost of service for all three years and the estimated rate for use in the funding scenarios included in this section.

Table 7-5 Customer Connections

Sewer Customer Class	Connections ⁽¹⁾
Multiple	3
Commercial ⁽²⁾	32
Church	2
Parks	4
School	4
Residential Inside	220
Total Sewer Connections ⁽³⁾	265

1. From City records
2. Includes industrial users (e.g. Apple House)
3. Includes 7 inactive connections

Pateros’ wastewater rate charges are based on connection classes. Each customer class is billed per the City’s rate structure. The City’s 2022 sewer utility rate structure is included **Appendix G**.

For the purposes of evaluating funding scenarios in a subsequent section, “rate” ERUs are calculated. The significance of a “rate” ERU count is it represents the invoicing weight of each customer and therefore

translates to revenue charged to customers and received by the City. For rate estimating purposes, 390 "rate" ERU's has been used to be conservative and account for year-to-year fluctuations in ERUs.

Table 7-6 Budgeted Revenue and Expenditures

Descriptions	2018 (actual)	2019 (actual)	2020 (budget amt)	Pro Forma (4)
SEWER RATES:				
Residential Monthly Sewer Rate During Period ⁽¹⁾	\$50.84	\$51.65	\$54.34	
Utility Tax % - on base rate only	6.5%	6.5%	6.5%	
Utility Tax (per month)	\$3.30	\$3.36	\$3.53	
Total	\$54.14	\$55.01	\$57.87	
SEWER REVENUE:				
Sewer Rate Revenue	\$226,114	\$246,335	\$260,000	
Misc: connect/disconnect, labor, interest revenue	\$83	\$30	\$100	
Total Revenue ⁽²⁾	\$226,197	\$246,365	\$260,100	
CALCULATION OF RATE ERUs:				
Revenue From Sewer Base Rate Only (see above)	\$226,114	\$246,335	\$260,000	
Residential Monthly Sewer Rate During Period ⁽¹⁾	\$50.84	\$51.65	\$54.34	
Calculated Number of Rate ERUs	371	397	399	
ERUs Estimate Used In Funding Scenarios				390
SEWER EXPENSES:				
Sewer Operation and Maintenance ⁽³⁾⁽⁴⁾	\$154,920	\$175,562	\$189,000	\$198,450
Biosolids Haul Charges ⁽⁴⁾⁽⁵⁾	\$60,016	\$73,123	\$71,990	\$75,590
Existing Debt Service ⁽⁶⁾	\$33,706	\$20,000	\$20,000	\$20,000
Total Sewer Expenses	\$248,643	\$268,685	\$280,990	\$294,040

Descriptions	2018 (actual)	2019 (actual)	2020 (budget amt)	Pro Forma (⁴)
CALCULATION OF COST OF SERVICE:				
Total Cost of Service (from above)	\$248,643	\$268,685	\$280,990	\$294,040
Est. Equiv. Cost of Service per ERU per month ⁽⁷⁾	\$55.91	\$56.34	\$58.73	\$62.83
Utility Tax Estimate	6.5%	6.5%	6.5%	6.5%
Total Equiv. Cost of Service per ERU/Month	\$59.54	\$60.00	\$62.54	\$66.91

1. Rates based on single family residential (basic) rate.
2. Includes utility tax revenue.
3. Sewer O&M expenditures for 2020 & 2021 actual, and 2022 budgeted, per City financial report. Includes: salaries, benefits, office & operating, etc.
4. Pro Forma estimate based on 2022 amounts + 5% per year inflation
5. Biosolids haul charges for 2020 & 2021 actual, and 2022 budgeted, per City financial report. Includes: professional services, communications, insurance, utilities, etc.
6. Includes: transfers to the Sewer Capital Reserve Fund and transfers to the Debt Fund
7. Estimated cost of service per ERU, not including additional debt costs resulting from anticipated system upgrade project costs.

The City operated their sewer fund as a deficit in 2020 and 2021. The City’s 2022 budget also shows that the City expects to run the sewer fund in a deficit. The City is aware that the sewer fund has been run as a deficit and plans on completing a rate study to evaluate sewer rate structure options based on actual O&M costs and actual current number of ERUs that meet the City’s revenue requirements.

7.4 Funding Scenarios & Estimated Sewer Rate Impacts

As indicated in the preceding sections, there are several funding sources available to municipalities for financing public works projects through grants and low interest loans. Three potential funding agencies that will likely result in the most favorable funding packages for Pateros are:

- WA Department of Ecology
 - Centennial Clean Water Program (CCWP), and
 - Clean Water State Revolving Fund Loan Program (CWSRF)
- US Department of Agriculture – Rural Development (RD)
 - Water and Waste Disposal Loan and Grant Program
- WA Department of Commerce
 - Clean Water State Revolving Fund Loan Program (CSWRF)

Table 7-7 provides a summary showing the estimated rate impact ranges that may be expected for the three programs for loan and grant scenarios.

Table 7-7 Rate Impact Ranges

Description / Assumptions:	Ecology (ECY) Funding		Rural Development (RD) Funding		Combined Funding	Reduced Project Scope
	Scenario #1	Scenario #2	Scenario #3	Scenario #4	Scenario #5	Scenario #5
	ECY Loan Only	ECY Loan + Hardship Grant	RD Loan Only	RD Loan + RD Grant	ECY Hardship + CDBG Grant + RD Loan / Grant	ECY Hardship + CDBG Grant + RD Loan / Grant
Total Estimated Project Cost	\$13,010,000					\$7,500,000
Approx. loan / grant ratio	100% / 0%	62% / 38%	100% / 0%	55% / 45%	30% / 70%	20% / 80%
Loan Terms ⁽¹⁾	30 years, 20% payment reserve		40 years, 10% payment reserve			
Approx. Sewer Rate Req'd (\$/mo/ERU) ⁽¹⁾	\$204	\$150	\$175	\$124	\$96	\$76
Current (2022) Sewer Rate (\$/mo/ERU)	\$54	\$54	\$54	\$54	\$54	\$54

1. Rate impact does not include additional rates associated with utility tax. Pateros's current utility tax rate 10%. Loan terms have begun to increase, and ECY/RD should be contacted during preparation of an application. Assumed rates have been used for funding scenarios in this. Refer to **Table 7-8** for a detailed breakdown of the funding scenarios.

Funding through Ecology (ECY) and/or the USDA – Rural Development (RD) both have the potential for funding offers for Pateros with loan and grant funding. Adding CDBG grant funding may further increase chances of favorable funding and reduced rate impacts. One of the challenges (or disadvantages) of ECY grant funding (i.e. hardship grant) is that the program is very competitive with many more applications submitted than there is hardship grant available. Therefore, a very strong water quality “benefit” is necessary to be well documented and well presented in the application to have the best chance of receiving hardship funding. In contrast, an advantage of USDA-RD funding is the greater City involvement in the funding procurement process and application process, and the resulting assurance of knowing the loan/grant combined funding that will likely be offered by USDA-RD ahead of time.

Regarding augmenting the funding package with potential CDBG grant funding, CDBG is also a very competitive funding program and one that Pateros has been successful with in the past. Approximately three times the dollar amount of applications are submitted each year than can be funded by CDBG. Strong CDBG applications that document health and safety benefits of the project and the benefit to the low and moderate income (LMI) population in the community are essential to securing CDBG funds.

Historically, Ecology’s funding applications are received once per year in October and funding is then awarded the following spring and summer. However, applicants that have an open contract with ECY may have their contract amended to include additional funding so long as the requested funding is used for completion of the project (e.g. a Step 1 – Planning contract may be amended to include Step 2 – Design). RD’s funding program receives applications on a continuous year-round basis. The most favorable funding windows for RD are at the first of the year in January (i.e. following the previous October start of their fiscal year), and before late summer (August during their national pooling of funding) of each year. CDBG’s funding applications are received once per year in early June and funding results are generally announced the following September.

Generally, the most successful funding strategy is to inquire and pursue funding from the primary funding agencies that are likely to result in favorable funding packages (or partial funding package) for the community’s project. In the case of Pateros, the likely primary funders included ECY, USDA-RD, and CDBG. Then, after receiving results on the applications and/or following discussions with the agencies, make a decision on the most advantageous funding offer or funding plan approach. The final most advantageous plan may include funding from a single agency or could include partial funding from all the agencies.

Table 7-8 Funding and Rate Impacts (Expanded)

Description / Assumptions:	Ecology (ECY) Funding		Rural Development (RD) Funding		Combined Funding	Reduced Project Scope
	Scenario #1	Scenario #2	Scenario #3	Scenario #4	Scenario #5	Scenario #5
	ECY Loan Only	ECY Loan + Hardship Grant	RD Loan Only	RD Loan + RD Grant	ECY Hardship + CDBG Grant + RD Loan / Grant	ECY Hardship + CDBG Grant + RD Loan / Grant
Total Estimated Project Cost	\$13,010,000					\$7,500,000
Assumed Funding Source:						
RD Loan			\$13,010,000	\$7,155,500	\$3,855,500	\$1,512,500
SRF/CCW Loan	\$13,010,000	\$8,010,000				
RD Grant				\$5,854,500	\$3,154,500	\$1,237,500
CCW Hardship Grant or Forgivable Loan		\$5,000,000 ⁽³⁾			\$5,000,000 ⁽³⁾	\$3,750,000 ⁽⁴⁾
CDBG Grant					\$1,000,000	\$1,000,000
Legislative Appropriation	⁽⁵⁾	⁽⁵⁾	⁽⁵⁾	⁽⁵⁾	⁽⁵⁾	⁽⁵⁾
Local Contribution	TBD	TBD	TBD	TBD	TBD	TBD
Estimated Loan Portion of Project	\$13,010,000	\$8,010,000	\$13,010,000	\$7,155,500	\$3,855,500	\$1,512,500
% Loan	100%	62%	100%	55%	30%	20%
% Grant (+Local)	0%	38%	0%	45%	70%	80%

Description / Assumptions:	Ecology (ECY) Funding		Rural Development (RD) Funding		Combined Funding	Reduced Project Scope
	Scenario #1	Scenario #2	Scenario #3	Scenario #4	Scenario #5	Scenario #5
	ECY Loan Only	ECY Loan + Hardship Grant	RD Loan Only	RD Loan + RD Grant	ECY Hardship + CDBG Grant + RD Loan / Grant	ECY Hardship + CDBG Grant + RD Loan / Grant
Estimated Annual Costs (\$/yr):						
New Debt Cost	\$659,300	\$405,900	\$523,100	\$287,700	\$155,000	\$60,800
Existing O&M Costs ⁽³⁾	\$198,450	\$198,450	\$198,450	\$198,450	\$198,450	\$198,450
Existing Biosolids Haul Costs ⁽³⁾	\$75,590	\$75,590	\$75,590	\$75,590	\$75,590	\$75,590
Existing Debt Costs ⁽³⁾	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
Total Annual Costs	\$953,340	\$699,940	\$817,140	\$581,740	\$449,040	\$354,840
Approx Req'd Rate per ERU (\$/mo/ERU) ⁽⁶⁾						
Estimated Number of ERUs ⁽⁷⁾	390	390	390	390	390	390
New Debt Cost	\$140.88	\$86.73	\$111.77	\$61.47	\$33.12	\$12.99
Existing O&M Costs	\$42.40	\$42.40	\$42.40	\$42.40	\$42.40	\$42.40
Existing Biosolids Haul Costs	\$16.15	\$16.15	\$16.15	\$16.15	\$16.15	\$16.15
Existing Debt Costs	\$4.27	\$4.27	\$4.27	\$4.27	\$4.27	\$4.27

Description / Assumptions:	Ecology (ECY) Funding		Rural Development (RD) Funding		Combined Funding	Reduced Project Scope
	Scenario #1	Scenario #2	Scenario #3	Scenario #4	Scenario #5	Scenario #5
	ECY Loan Only	ECY Loan + Hardship Grant	RD Loan Only	RD Loan + RD Grant	ECY Hardship + CDBG Grant + RD Loan / Grant	ECY Hardship + CDBG Grant + RD Loan / Grant
Approx. Sewer Rate Req'd (\$/mo/ERU) ⁽⁸⁾	\$203.71	\$149.56	\$174.60	\$124.30	\$95.95	\$75.82
Current (2022) Sewer Rate (\$/mo/ERU) ⁽⁹⁾	\$54.34	\$54.34	\$54.34	\$54.34	\$54.34	\$54.34

1. *ECY loan terms used for this table: Interest Rate = 1.6%; Loan Term = 30 yrs; and Debt Payment Reserve = 20%*
2. *RD loan terms used for this table: Interest Rate = 2.0%; Loan Term = 40 yrs; and Debt Payment Reserve = 10%*
3. *Estimated Pateros ECY financial hardship index, with completed project, approximately 3.5%. Thus, potential eligibility is for up to maximum 75% financial hardship grant, up to \$5 million max.*
4. *Estimated Pateros ECY financial hardship index, with reduced scope project, approximately 2.4%. Thus, potential eligibility is for up to maximum 50% financial hardship grant, up to \$5 million max.*
5. *Direct legislative appropriation not considered herein*
6. *See Table 7-6 for estimates for existing and Pro Forma costs.*
7. *See ERU discussion / determination in Section 7.3 and Table 7-6.*
8. *Rate impact does not include additional rates associated with utility tax. Pateros has a utility tax rate of 6.5%.*
9. *2022 residential rate. Does not include utility tax rate of 6.5%.*

7.5 Recommended Funding Steps and Timeline

Implementation and steps forward for the Pateros wastewater improvements represent a significant challenge for the City due to the cost magnitude of the proposed project improvements. Typically, the most efficient and lowest overall project cost results when project improvements can be integrated into a single funding package and a coherent overall project implementation scheme with all funding for the project in place. Funding scenarios in the preceding section were based on a single project including all recommended wastewater treatment plant and collection system improvements. However, this cannot always be accomplished, and multiple phases and multiple funding acquisition efforts may be needed. These challenges are expected to exist for the Pateros project due to its magnitude, cost, and there is no requirement order from ECY to complete the recommended projects.

The challenges with obtaining sufficient funding are immediately apparent. Per **Table 7-8**, the scenario shown requires a project funding package with approximately 73% grant. This would include maximum grant funding consideration from both ECY (\$5 million hardship grant), USDA-RD (2,691,000 million grant) and CDBG (1,000,000 grant). Even with these maximum grant amounts, the City would see their basic sewer rate increase by approximately 67%. With funding at these levels, the anticipated sewer rates would wind up well below the 2% MHI level (i.e. about \$95.67/month/ERU).

There are a number of implementation combinations of elements which could be considered (e.g. reducing the project scope as shown in the far right column in **Table 7-8**). It is recommended that a funding Tech Team meeting be conducted in Pateros with elected officials and with representatives from ECY, USDA-RD, and CDBG funding agencies. Discussions need to breakdown the overall project and it may be necessary to look at a number of variations due to the significant high costs of this project and the anticipated complications and impediments associated with a project of this magnitude for a small community.

The following actions are recommended:

- Complete final facility plan and general sewer plan submission, ECY review and approval.
- Set up / conduct funding tech team with City of Pateros officials, ECY staff, USDA-RD staff, and CDBG staff (estimated early 2023)
- Formulate specific funding approach, phasing and/or options, as needed, applications to be submitted, amounts and next steps.
- Submit ECY design funding application as an amendment to the open ECY contract for preparation of the facility plan and general sewer plan (depending on funding tech team meeting results).
- Determine next steps and adjust accordingly.

8.0 Public Involvement

Following is a summary of the public involvement process.

8.1 SEPA

The Determination of Non-significance (DNS) was published in the Quad City Herald on January 5, 2023. No comments were received on the DNS or Non-project SEPA Checklist. Refer to **Appendix H** for a copy of the signed DNS, SEPA Checklist, and Affidavit of Publication.

8.2 SERP

The SERP Coversheet was submitted to the Department of Ecology on February X, 2023. Notice was provided to the public for the public forum via the following methods: 1) Publish in the Quad City Herald for two consecutive weeks; and, 2) Publish on the City's website. The public forum was held on January 17, 2023 at City Hall. Refer to **Appendix H** for a copy of the Meeting Minutes and Affidavit of Publication.

APPENDIX A

NPDES Permit (2015)

Issuance Date: February 26, 2015
Effective Date: April 1, 2015
Expiration Date: March 31, 2020

**National Pollutant Discharge Elimination System
Waste Discharge Permit No. WA0020559**

State of Washington
DEPARTMENT OF ECOLOGY
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1342 et seq.

**CITY OF PATEROS
PUBLICLY OWNED TREATMENT WORKS
PO BOX 8
PATEROS, WA 98846**

is authorized to discharge in accordance with the Special and General Conditions that follow.

<u>Plant Location:</u> 190 Lakeshore Drive Pateros, Washington 98846	<u>Receiving Water:</u> Columbia River (River Mile 524.1)
Treatment Type: Class II, activated sludge	

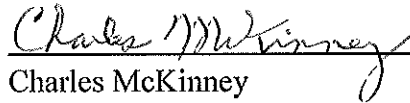

Charles McKinney
Section Manager
Water Quality Program
Central Regional Office
Washington State Department of Ecology

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Summary of Permit Report Submittals

Refer to the Special and General Conditions of this permit for additional submittal requirements. The following table is for quick reference only. Enforceable submittal requirements are contained in the permit narrative.

Permit Section	Submittal	Frequency	First Submittal Date
S3.A	Discharge Monitoring Report (DMR)	Monthly	May 15, 2015
S3.F	Reporting Permit Violations	As necessary	
S4.B	Plans for Maintaining Adequate Capacity	As necessary	
S4.D	Notification of New or Altered Sources	As necessary	
S4.E	Wasteload Assessment	1/permit cycle	September 15, 2018
S4.F	Infiltration and Inflow Evaluation	1/permit cycle	September 15, 2018
S5.F	Bypass Notification	As necessary	
S5.G	Operations and Maintenance Manual Review	Annually	
S5.G	Operations and Maintenance Manual Update	As necessary	
S8	Application for Permit Renewal	1/permit cycle	March 31, 2019
G1	Notice of Change in Authorization	As necessary	
G4	Reporting Planned Changes	As necessary	
G5	Engineering Report for Construction or Modification Activities	As necessary	
G7	Notice of Permit Transfer	As necessary	
G10	Duty to Provide Information	As necessary	
G20	Compliance Schedules	As necessary	
G21	Contract Submittal	As necessary	

Special Conditions

S1. Discharge limits

S1.A. Effluent limits

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit violates the terms and conditions of this permit.

Beginning on **April 1, 2015**, the Permittee may discharge treated domestic wastewater to the Columbia River at the permitted location subject to compliance with the following limits:

Effluent Limits: Outfall 001 Latitude 48.054846 Longitude -119.894240		
TECHNOLOGY- BASED EFFLUENT LIMITATIONS : OUTFALL # 001		
Parameter	Average Monthly ^a	Average Weekly ^b
Biochemical Oxygen Demand (5-day) (BOD ₅)	30 mg/L, 24.6 lbs/day 85% removal of influent BOD	45 mg/L, 36.9 lbs/day
Total Suspended Solids (TSS)	30 mg/L, 24.6 lbs/day 85% removal of influent BOD	45 mg/L, 36.9 lbs/day
pH	Daily Minimum is equal to or greater than 6.0 and the Daily Maximum is less than or equal to 9.0. ^c	
WATER QUALITY-BASED EFFLUENT LIMITATIONS : OUTFALL # 001		
Fecal Coliform Bacteria ^d	100 colony forming units (CFUs)/100 mL	200 CFUs/100 mL
^a Average monthly effluent limit means the highest allowable average of daily discharges over a calendar month. To calculate the discharge value to compare to the limit, you add the value of each daily discharge measured during a calendar month and divide this sum by the total number of daily discharges measured. See footnote d for fecal coliform calculations.		
^b Average weekly discharge limitation means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of daily discharges measured during that week.		
^c Indicates the range of permitted values. The permittee must report a Daily Minimum pH, a Daily Maximum pH, as well as Monthly Minimum and Monthly Maximum values. Do not average pH values.		
^d To calculate the average monthly and average weekly values for fecal coliforms you must use the geometric mean. Ecology gives directions to calculate this value in publication No. 04-10-020, <i>Information Manual for Treatment Plant Operators</i> available at: http://www.ecy.wa.gov/pubs/0410020.pdf		

S1.B. Mixing zone authorization for Outfall 001

Available Dilution (dilution factor)	
Acute Aquatic Life Criteria	708 : 1
Chronic Aquatic Life Criteria	38 : 1

The maximum boundaries of the mixing zones are defined as follows:

The length of the chronic mixing zone must extend downstream no greater than **300** feet and upstream no greater than **30** feet. The chronic mixing zone width must be no more than **40.3** feet.

The length of the acute mixing zone must extend downstream no greater than **35** feet and upstream no greater than **3.5** feet. The acute mixing zone width must be no more than **3.5** feet.

S2. Monitoring requirements

S2.A. Monitoring schedule

The Permittee must monitor in accordance with the following schedule and the requirements specified in Appendix A.

DL, and QL on the discharge monitoring report or in the required report. If the Permittee is unable to obtain the required DL and QL in its effluent due to matrix effects, the Permittee must submit a matrix-specific detection limit (MDL) and a quantitation limit (QL) to Ecology with appropriate laboratory documentation.

Parameter	Units	Laboratory Method	Minimum Sampling Frequency	Sample Type
(1) Wastewater influent: Influent means the raw sewage from the collection system which enters the first treatment process of the POTW.				
Wastewater Influent means the raw sewage flow from the collection system into the treatment facility. Sample the wastewater entering the headworks of the treatment plant excluding any side-stream returns from inside the plant.				
Biochemical Oxygen Demand (BOD ₅)	mg/L	SM 5210 B	1/week ^a	24-hr. composite ^b
BOD ₅	lbs/day	Not applicable (NA)	"	Calculated ^c
Total Suspended Solids (TSS)	mg/L	SM 2540 D	"	24-hr. composite
TSS	lbs/day	NA	"	Calculated
Dissolved Oxygen	mg/L	4500-OC/OG	1/week	Grab ^d
pH	Standard Units	SM4500-H ⁺ B	5/week ^f	Grab
Parameter	Units	Laboratory Method	Minimum Sampling Frequency	Sample Type
(2) Final wastewater effluent: Effluent means wastewater which is exiting, or has exited, the last POTW treatment operation.				
Final Wastewater Effluent means wastewater which is exiting, or has exited, the last treatment process or operation. Typically, this is after or at the exit from the chlorine contact chamber or other disinfection process. The Permittee may take effluent samples for the BOD ₅ analysis before or after the disinfection process. If taken after, dechlorinate and reseed the sample.				
Flow	MGD	--	continuous	meter
Total Ammonia	mg/L	SM4500-NH3- GH	1/month ^g	Grab
BOD ₅	mg/L	SM 5210 B	1/week	24-hr.composite
BOD ₅	lbs/day	NA	1/week	Calculated
BOD ₅	% removal	NA	1/month	Calculated ^h
TSS	mg/L	SM 2540 D	1/week	24-hr.composite
TSS	lbs/day	NA	1/week	Calculated
TSS	% removal	NA	1/month	Calculated ^h

Parameter	Units	Laboratory Method	Minimum Sampling Frequency	Sample Type
Dissolved Oxygen	mg/L	4500-OC/OG	1/week	Grab
Fecal Coliform ⁱ	#CFUs/100 ml	SM 9222 D (MF)	1/week	Grab
pH, daily minimum	Standard Units	SM 4500-H ⁺ B	5/week	Grab^j
pH, daily maximum	Standard Units	SM 4500-H ⁺ B	5/week	Grab^j
Temperature ^k	°C	Thermometer, Analog recorder, or Use micro-recording devices known as thermistors	5/week	Grab
(3) Permit renewal application requirements – final wastewater effluent				
Total Kjeldahl Nitrogen	mg/L as N	SM 4500-N Org B/C	1/year ^l	24-hr.composite
Nitrate plus Nitrite Nitrogen	mg/L as N	4500-NO3- E/F/H	1/year	24-hr.composite
Oil and Grease	mg/L	1664A	1/year	24-hr.composite
Phosphorus (Total)	mg/L as P	SM 4500 PB followed by SM4500-PE/PF	1/year	24-hr.composite
Total Dissolved Solids	mg/L	SM2540 C	1/year	24-hr.composite
a	1/week means once (1) time during each calendar week and on a rotational basis throughout the days of the week, except weekends and holidays.			
b	24-hour composite means a series of individual samples collected over a 24-hour period into a single container, and analyzed as one sample.			
c	Calculation means figured concurrently with the respective sample, using the following formula: Concentration (in mg/L) X Flow (in MGD) X Conversion Factor (8.34) = lbs/day			
d	Grab means an individual sample collected over a fifteen (15) minute, or less, period.			
e	Daily means once (1) time per 24-hr period throughout the days of the week, except weekends and holidays.			
f	5/week means five (5) times during each calendar week and on a rotational basis throughout the days of the week, except weekends and holidays.			
g	1/Month means once every calendar month during alternate weeks.			
h	$\% \text{ removal} = \frac{\text{Influent concentration (mg/L)} - \text{Effluent concentration (mg/L)}}{\text{Influent Concentration (mg/L)}} \times 100$ <p>Calculate the percent (%) removal of BOD₅ and TSS using the above equation</p>			
i	Report a numerical value for fecal coliforms following the procedures in Ecology's <i>Information Manual for Wastewater Treatment Plant Operators</i> , Publication Number 04-10-020 available at: http://www.ecy.wa.gov/programs/wg/permits/guidance.html . Do not report a result as too numerous to count (TNTC).			
j	pH grab samples to be taken twice daily, at least 6 hours apart			
k	Temperature grab sampling must occur when the influent is at or near its daily maximum temperature, which usually occurs in the late afternoon. If the Permittee measures temperature continuously, it must determine and report a daily maximum from half-hour measurements in a 24-hour period. Continuous monitoring instruments must achieve an accuracy of 0.2 degrees C and the Permittee must verify accuracy annually.			
l	1/year means once (1) per calendar year rotated on a quarterly basis.			

S2.B. Sampling and analytical procedures

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters. The Permittee must conduct representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions that may affect effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 (or as applicable in 40 CFR subchapters N [Parts 400–471] or O [Parts 501-503]) unless otherwise specified in this permit. Ecology may only specify alternative methods for parameters without permit limits and for those parameters without an EPA approved test method in 40 CFR Part 136.

S2.C. Flow measurement, field measurement, and continuous monitoring devices

The Permittee must:

1. Select and use appropriate flow measurement, field measurement, and continuous monitoring devices and methods consistent with accepted scientific practices.
2. Install, calibrate, and maintain these devices to ensure the accuracy of the measurements is consistent with the accepted industry standard, the manufacturer's recommendation, and approved O&M manual procedures for the device and the wastestream.
3. Calibrate continuous monitoring instruments weekly unless it can demonstrate a longer period is sufficient based on monitoring records. The Permittee:
 - a. May calibrate apparatus for continuous monitoring of dissolved oxygen by air calibration.
 - b. Must calibrate continuous pH measurement instruments using a grab sample analyzed in the lab with a pH meter calibrated with standard buffers and analyzed within 15 minutes of sampling.
 - c. Must calibrate continuous chlorine measurement instruments using a grab sample analyzed in the laboratory within 15 minutes of sampling.
4. Calibrate micro-recording temperature devices, known as thermistors, using protocols from Ecology's Quality Assurance Project Plan Development Tool (*Standard Operating Procedures for Continuous Temperature Monitoring of Fresh Water Rivers and Streams Version 1.0 10/26/2011*). This document is available online at:

http://www.ecy.wa.gov/programs/eap/ga/docs/ECY_EAP_SOP_Cont_Temp_Mon_Ambient_v1_OEAP080.pdf

Calibration as specified in this document is not required if the Permittee uses recording devices certified by the manufacturer.

5. Use field measurement devices as directed by the manufacturer and do not use reagents beyond their expiration dates.
6. Calibrate flow-monitoring devices at a minimum frequency of at least one calibration per year.
7. Maintain calibration records for at least three years.

S2.D. Laboratory accreditation

The Permittee must ensure that all monitoring data required by Ecology for permit specified parameters is prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. Flow, temperature, settleable solids, conductivity, pH, and internal process control parameters are exempt from this requirement. The Permittee must obtain accreditation for conductivity and pH if it must receive accreditation or registration for other parameters.

S2.E. Request for reduction in monitoring

The Permittee may request a reduction of the sampling frequency after twelve (12) months of monitoring. Ecology will review each request and at its discretion grant the request when it reissues the permit or by a permit modification.

The Permittee must:

1. Provide a written request.
2. Clearly state the parameters for which it is requesting reduced monitoring.
3. Clearly state the justification for the reduction.

S3. Reporting and recording requirements

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

3.A. Discharge monitoring reports

The first monitoring period begins on **April 1, 2015** (unless otherwise specified).
The Permittee must:

1. Summarize, report, and submit monitoring data obtained during each monitoring period on the electronic discharge monitoring report (DMR) form provided by Ecology within the Water Quality Permitting Portal. Include data for each of the parameters tabulated in Special Condition S2 and as required by the form. Report a value for each day sampling occurred (unless specifically exempted in the permit) and for the summary values (when applicable) included on the electronic form.

To find out more information and to sign up for the Water Quality Permitting Portal go to: <http://www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html>

2. Enter the “No Discharge” reporting code for an entire DMR, for a specific monitoring point, or for a specific parameter as appropriate, if the Permittee did not discharge wastewater or a specific pollutant during a given monitoring period.
3. Report single analytical values below detection as “less than the detection level (DL)” by entering < followed by the numeric value of the detection level (e.g. < 2.0) on the DMR. If the method used did not meet the minimum DL and quantitation level (QL) identified in the permit, report the actual QL and DL in the comments or in the location provided.
4. **Not** report zero for bacteria monitoring. Report as required by the laboratory method.
5. Calculate and report an arithmetic average value for each day for bacteria if multiple samples were taken in one day.
6. Calculate the geometric mean values for bacteria (unless otherwise specified in the permit) using:
 - a. The reported numeric value for all bacteria samples measured above the detection value except when it took multiple samples in one day. If the Permittee takes multiple samples in one day it must use the arithmetic average for the day in the geometric mean calculation.
 - b. The detection value for those samples measured below detection.
7. Report the test method used for analysis in the comments if the laboratory used an alternative method not specified in the permit and as allowed in S2.

8. Calculate average values and calculated total values (unless otherwise specified in the permit) using:
 - a. The reported numeric value for all parameters measured between the agency-required detection value and the agency-required quantitation value.
 - b. One-half the detection value (for values reported below detection) if the lab detected the parameter in another sample from the same monitoring point for the reporting period.
 - c. Zero (for values reported below detection) if the lab did not detect the parameter in another sample for the reporting period.
9. Ensure that DMRs are electronically submitted no later than the dates specified below, unless otherwise specified in this permit.
10. Submit DMRs for parameters with the monitoring frequencies specified in S2 (monthly, quarterly, annual, etc.) at the reporting schedule identified below.

The Permittee must:

- a. Submit **monthly** DMRs by the 15th day of the following month.
- b. Submit **annual DMRs**, unless otherwise specified in the permit, by January 15 for the previous calendar year. The annual sampling period is the calendar year.

S3.B. Permit Submittals and Schedules

The Permittee must use the Water Quality Permitting Portal – Permit Submittals application (unless otherwise specified in the permit) to submit all other written permit-required reports by the date specified in the permit.

When another permit condition requires submittal of a paper (hard-copy) report, the Permittee must ensure that it is postmarked or received by Ecology no later than the dates specified by this permit. Send these paper reports to Ecology at:

Water Quality Permit Coordinator
Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

S3.C. Records retention

The Permittee must retain records of all monitoring information for a minimum of three (3) years. Such information must include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

S3.D. Recording of results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, method, and time of sampling or measurement.
2. The individual who performed the sampling or measurement.
3. The dates the analyses were performed.
4. The individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

S3.E. Additional monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Special Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR unless otherwise specified by Special Condition S2.

S3.F. Reporting permit violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

1. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance and correct the problem.
2. If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within thirty (30) days of sampling.

a. Immediate reporting

The Permittee must immediately report to Ecology, the Department of Health, Drinking Water Program, and the Local Health Jurisdiction (at the numbers listed below), all:

- Failures of the disinfection system.
- Collection system overflows discharging to a water body that may be used for drinking water.
- Plant bypasses discharging to a water body used as a source of drinking water.
- Any other failures of the sewage system (pipe breaks, etc)

Central Regional Office	509-575-2490
Department of Health, Drinking Water Program	800-521-0323 (business hours) 877-481-4901 (after business hours)
Okanogan Public Health District	509-422-7140

b. Twenty-four-hour reporting

The Permittee must report the following occurrences of noncompliance by telephone, to Ecology at 509-575-2490, within 24 hours from the time the Permittee becomes aware of any of the following circumstances:

1. Any noncompliance that may endanger health or the environment, unless previously reported under immediate reporting requirements.
2. Any unanticipated bypass that causes an exceedance of an effluent limit in the permit (See Part S5.F, “Bypass Procedures”).
3. Any upset that causes an exceedance of an effluent limit in the permit (See G.15, “Upset”).
4. Any violation of a maximum daily or instantaneous maximum discharge limit for any of the pollutants in Section S1.A of this permit.
5. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limit in the permit.

c. Report within five days

The Permittee must also submit a written report within five days of the time that the Permittee becomes aware of any reportable event under subparts a or b, above. The report must contain:

1. A description of the noncompliance and its cause.

2. The period of noncompliance, including exact dates and times.
3. The estimated time the Permittee expects the noncompliance to continue if not yet corrected.
4. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
5. If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

d. Waiver of written reports

Ecology may waive the written report required in subpart c, above, on a case-by-case basis upon request if the Permittee has submitted a timely oral report.

e. All other permit violation reporting

The Permittee must report all permit violations, which do not require immediate or within 24 hours reporting, when it submits monitoring reports for S3.A ("Reporting"). The reports must contain the information listed in subpart c, above. Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

S3.G. Other reporting

a. Spills of Oil or Hazardous Materials

The Permittee must report a spill of oil or hazardous materials in accordance with the requirements of RCW 90.56.280 and chapter 173-303-145. You can obtain further instructions at the following website:
<http://www.ecy.wa.gov/programs/spills/other/reportaspill.htm> .

b. Failure to submit relevant or correct facts

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it must submit such facts or information promptly.

S3.H. Maintaining a copy of this permit

The Permittee must keep a copy of this permit at the facility and make it available upon request to Ecology inspectors.

S4. Facility loading

S4.A. Design criteria

The flows or waste loads for the permitted facility must not exceed the following design criteria:

Parameter	Design Quantity
Monthly average flow (max. month):	0.0983 MGD
BOD ₅ influent loading:	233 lbs/day
TSS influent loading:	288 lbs/day

S4.B. Plans for maintaining adequate capacity

a. Conditions triggering plan submittal

The Permittee must submit a plan and a schedule for continuing to maintain capacity to Ecology when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months.
2. The projected plant flow or loading would reach design capacity within five years.

b. Plan and schedule content

The plan and schedule must identify the actions necessary to maintain adequate capacity for the expected population growth and to meet the limits and requirements of the permit. The Permittee must consider the following topics and actions in its plan.

1. Analysis of the present design and proposed process modifications
2. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system
3. Limits on future sewer extensions or connections or additional waste loads
4. Modification or expansion of facilities
5. Reduction of industrial or commercial flows or waste loads

Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by Ecology prior to any construction.

S4.C. Duty to mitigate

The Permittee must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

S4.D. Notification of new or altered sources

1. The Permittee must submit written notice to Ecology whenever any new discharge or a substantial change in volume or character of an existing discharge into the wastewater treatment plant is proposed which:
 - a. Would interfere with the operation of, or exceed the design capacity of, any portion of the wastewater treatment plant.
 - b. Is not part of an approved general sewer plan or approved plans and specifications.
 - c. Is subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act.
2. This notice must include an evaluation of the wastewater treatment plant's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the treatment plant, and the anticipated impact on the Permittee's effluent [40 CFR 122.42(b)].

S4.E. Wasteload assessment

The Permittee must conduct an assessment of its influent flow and waste load and submit a **report to Ecology by September 15, 2018**, and annually thereafter. The report must contain:

1. A description of compliance or noncompliance with the permit effluent limits.
2. A comparison between the existing and design:
 - a. Monthly average dry weather and wet weather flows.
 - b. Peak flows.
 - c. BOD₅ loading.
 - d. Total suspended solids loadings.

3. The percent change in the above parameters since the previous report (except for the first report).
4. The present and design population or population equivalent.
5. The projected population growth rate.
6. The estimated date upon which the Permittee expects the wastewater treatment plant to reach design capacity, according to the most restrictive of the parameters above.

Ecology may modify the interval for review and reporting if it determines that a different frequency is sufficient.

S4.F. Infiltration and Inflow

1. The Permittee must conduct an infiltration and inflow evaluation. Refer to the U.S. EPA publication, *I/I Analysis and Project Certification*, available as Publication No. 97-03 at:

Publications Office
Department of Ecology
P.O. Box 47600
Olympia, WA, 98504-7600
or at

<http://www.ecy.wa.gov/programs/wq/permits/guidance.html>

The Permittee may use plant monitoring records to assess measurable infiltration and inflow.

2. The Permittee must prepare a report which summarizes any measurable infiltration and inflow. If infiltration and inflow have increased by more than 15 percent from that found in the previous report based on equivalent rainfall, the report must contain a plan and a schedule for:
 - a. Locating the sources of infiltration and inflow; and
 - b. Correcting the problem.
3. The Permittee must submit a report summarizing the results of the evaluation and any recommendations for corrective actions by **September 15, 2018**.

S5. Operation and maintenance

The Permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances), which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and

maintenance also includes keeping a daily operation logbook (paper or electronic), adequate laboratory controls, and appropriate quality assurance procedures. This provision of the permit requires the Permittee to operate backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

S5.A. Certified operator

This permitted facility must be operated by an operator certified by the state of Washington for at least a Class II plant. This operator must be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class I plant must be in charge during all regularly scheduled shifts.

S5.B. Operation and maintenance program

The Permittee must:

1. Institute an adequate operation and maintenance program for the entire sewage system.
2. Keep maintenance records on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records must clearly specify the frequency and type of maintenance recommended by the manufacturer and must show the frequency and type of maintenance performed.
3. Make maintenance records available for inspection at all times.

S5.C. Short-term reduction

The Permittee must schedule any facility maintenance, which might require interruption of wastewater treatment and degrade effluent quality, during non-critical water quality periods and carry this maintenance out according to the approved O&M manual or as otherwise approved by Ecology.

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limits on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee must:

1. Give written notification to Ecology, if possible, thirty (30) days prior to such activities.
2. Detail the reasons for, length of time of, and the potential effects of the reduced level of treatment.

This notification does not relieve the Permittee of its obligations under this permit.

S5.D. Electrical power failure

The Permittee must ensure that adequate safeguards prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations. Adequate safeguards include, but are not limited to, alternate power sources, standby generator(s), or retention of inadequately treated wastes.

The Permittee must maintain Reliability Class II (EPA 430-99-74-001) at the wastewater treatment plant. Reliability Class II requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions. Vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but must be sufficient to maintain the biota.

S5.E. Prevent connection of inflow

The Permittee must strictly enforce its sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system.

S5.F. Bypass procedures

This permit prohibits a bypass, which is the intentional diversion of waste streams from any portion of a treatment facility. Ecology may take enforcement action against a Permittee for a bypass unless one of the following circumstances (1, 2, or 3) applies.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

This permit authorizes a bypass if it allows for essential maintenance and does not have the potential to cause violations of limits or other conditions of this permit, or adversely impact public health as determined by Ecology prior to the bypass. The Permittee must submit prior notice, if possible, at least ten (10) days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated, and results in noncompliance of this permit.

This permit authorizes such a bypass only if:

- a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.
 - b. No feasible alternatives to the bypass exist, such as:
 - The use of auxiliary treatment facilities.
 - Retention of untreated wastes.
 - Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass.
 - Transport of untreated wastes to another treatment facility.
 - c. Ecology is properly notified of the bypass as required in Special Condition S3.F of this permit.
3. If bypass is anticipated and has the potential to result in noncompliance of this permit.
- a. The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:
 - A description of the bypass and its cause.
 - An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.
 - A cost-effectiveness analysis of alternatives including comparative resource damage assessment.
 - The minimum and maximum duration of bypass under each alternative.
 - A recommendation as to the preferred alternative for conducting the bypass.
 - The projected date of bypass initiation.
 - A statement of compliance with SEPA.
 - A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.

- Details of the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.
- b. For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during the project planning and design process. The project-specific engineering report or facilities plan as well as the plans and specifications must include details of probable construction bypasses to the extent practical. In cases where the Permittee determines the probable need to bypass early, the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.
- c. Ecology will consider the following prior to issuing an administrative order for this type of bypass:
- If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.
 - If feasible alternatives to bypass exist, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.
 - If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve or deny the request. Ecology will give the public an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Ecology will approve a request to bypass by issuing a permit modification.

S5.G. Operations and maintenance (O&M) manual

a. O&M manual submittal and requirements

The Permittee must:

1. Review the O&M Manual at least annually.
2. Submit to Ecology for review and approval substantial changes or updates to the O&M Manual whenever it incorporates them into the manual.
3. Keep the approved O&M Manual at the permitted facility.

4. Follow the instructions and procedures of this manual.

b. O&M manual components

In addition to the requirements of WAC 173-240-080(1) through (5), the O&M Manual must be consistent with the guidance in Table G1-3 in the *Criteria for Sewage Works Design* (Orange Book), 2008. The O&M Manual must include:

1. Emergency procedures for cleanup in the event of wastewater system upset or failure.
2. A review of system components which if failed could pollute surface water or could impact human health. Provide a procedure for a routine schedule of checking the function of these components.
3. Wastewater system maintenance procedures that contribute to the generation of process wastewater.
4. Reporting protocols for submitting reports to Ecology to comply with the reporting requirements in the discharge permit.
5. Any directions to maintenance staff when cleaning or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine).
6. The treatment plant process control monitoring schedule.
7. Minimum staffing adequate to operate and maintain the treatment processes and carry out compliance monitoring required by the permit.
8. Specify other items on case-by-case basis such as O&M for collection systems pump stations, lagoon liners, etc.

S6. Pretreatment

S6.A. General Requirements

The Permittee must work with Ecology to ensure that all commercial and industrial users of the publicly owned treatment works (POTW) comply with the pretreatment regulations in 40 CFR Part 403 and any additional regulations that the Environmental Protection Agency (U.S. EPA) may promulgate under Section 307(b) (pretreatment) and 308 (reporting) of the Federal Clean Water Act.

S6.B. Duty to enforce discharge prohibitions

1. Under federal regulations (40 CFR 403.5(a) and (b)), the Permittee must not authorize or knowingly allow the discharge of any pollutants into its POTW

which may be reasonably expected to cause pass through or interference, or which otherwise violate general or specific discharge prohibitions contained in 40 CFR Part 403.5 or WAC 173-216-060.

2. The Permittee must not authorize or knowingly allow the introduction of any of the following into their treatment works:
 - a. Pollutants which create a fire or explosion hazard in the POTW (including, but not limited to waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21).
 - b. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, or greater than 11.0 standard units, unless the works are specifically designed to accommodate such discharges.
 - c. Solid or viscous pollutants in amounts that could cause obstruction to the flow in sewers or otherwise interfere with the operation of the POTW.
 - d. Any pollutant, including oxygen-demanding pollutants, (BOD₅, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW.
 - e. Petroleum oil, non-biodegradable cutting oil, or products of mineral origin in amounts that will cause interference or pass through.
 - f. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity which may cause acute worker health and safety problems.
 - g. Heat in amounts that will inhibit biological activity in the POTW resulting in interference but in no case heat in such quantities such that the temperature at the POTW headworks exceeds 40 degrees Centigrade (104 degrees Fahrenheit) unless Ecology, upon request of the Permittee, approves, in writing, alternate temperature limits.
 - h. Any trucked or hauled pollutants, except at discharge points designated by the Permittee.
 - i. Wastewaters prohibited to be discharged to the POTW by the Dangerous Waste Regulations (chapter 173-303 WAC), unless authorized under the Domestic Sewage Exclusion (WAC 173-303-071).

3. The Permittee must also not allow the following discharges to the POTW unless approved in writing by Ecology:
 - a. Noncontact cooling water in significant volumes.
 - b. Stormwater and other direct inflow sources.
 - c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment, or would not be afforded a significant degree of

treatment by the system.

4. The Permittee must notify Ecology if any industrial user violates the prohibitions listed in this section (S6.B), and initiate enforcement action to promptly curtail any such discharge.

S6.C. Wastewater discharge permit required

The Permittee must:

1. Establish a process for authorizing non-domestic wastewater discharges that ensures all SIUs in all tributary areas meet the applicable state waste discharge permit (SWDP) requirements in accordance with chapter 90.48 RCW and chapter 173-216 WAC.
2. Immediately notify Ecology of any proposed discharge of wastewater from a source, which may be a significant industrial user (SIU) [see fact sheet definitions or refer to 40 CFR 403.3(v)(i)(ii)].
3. Require all SIUs to obtain a SWDP from Ecology prior to accepting their non-domestic wastewater, or require proof that Ecology has determined they do not require a permit.
4. Require the documentation as described in S6.C.3 at the earliest practicable date as a condition of continuing to accept non-domestic wastewater discharges from a previously undiscovered, currently discharging and unpermitted SIU.
5. Require sources of non-domestic wastewater, which do not qualify as SIUs but merit a degree of oversight, to apply for a SWDP and provide it a copy of the application and any Ecology responses.
6. Keep all records documenting that its users have met the requirements of S6.C.

S6.D. Identification and reporting of existing, new, and proposed industrial users

1. The Permittee must take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging or proposing to discharge to the Permittee's sewer system (see **Appendix C** of the fact sheet for definitions).
2. Within 30 days of becoming aware of an unpermitted existing, new, or proposed industrial user who may be a significant industrial user (SIU), the Permittee must notify such user by registered mail that, if classified as an SIU, they must apply to Ecology and obtain a State Waste Discharge Permit. The Permittee must send a copy of this notification letter to Ecology within this same 30-day period.

3. The Permittee must also notify all Potential SIUs (PSIUs), as they are identified, that if their classification should change to an SIU, they must apply to Ecology for a State Waste Discharge Permit within 30 days of such change.

S7. Solid wastes

S7.A. Solid waste handling

The Permittee must handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

S7.B. Leachate

The Permittee must not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment, nor allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality Standards, Chapter 173-200 WAC. The Permittee must apply for a permit or permit modification as may be required for such discharges to state ground or surface waters.

S8. Application for permit renewal or modification for facility changes

The Permittee must submit an application for renewal of this permit by **March 31, 2019**.

The Permittee must also submit a new application or supplement at least 6 months (180 days) prior to commencement of discharges, resulting from the activities listed below, which may result in permit violations. These activities include any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility.

General Conditions

G1. Signatory requirements

1. All applications, reports, or information submitted to Ecology must be signed and certified.

- a. In the case of corporations, by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
 - A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or
 - The manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- b. In the case of a partnership, by a general partner.
- c. In the case of sole proprietorship, by the proprietor.
- d. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

Applications for permits for domestic wastewater facilities that are either owned or operated by, or under contract to, a public entity shall be submitted by the public entity.

2. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
 - a. The authorization is made in writing by a person described above and submitted to Ecology.
 - b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)
3. Changes to authorization. If an authorization under paragraph G1.2, above, is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of

paragraph G1.2, above, must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section must make the following certification:

“I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

G2. Right of inspection and entry

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

1. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.
2. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.
3. To inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.
4. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. Permit actions

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the Permittee) or upon Ecology’s initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 40 CFR 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

1. The following are causes for terminating this permit during its term, or for denying a permit renewal application:

- a. Violation of any permit term or condition.
 - b. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.
 - c. A material change in quantity or type of waste disposal.
 - d. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination.
 - e. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or sludge use or disposal practice controlled by the permit.
 - f. Nonpayment of fees assessed pursuant to RCW 90.48.465.
 - g. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.
2. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:
- a. A material change in the condition of the waters of the state.
 - b. New information not available at the time of permit issuance that would have justified the application of different permit conditions.
 - c. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.
 - d. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.
 - e. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.
 - f. Ecology has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.
 - g. Incorporation of an approved local pretreatment program into a municipality's permit.
3. The following are causes for modification or alternatively revocation and reissuance:
- a. When cause exists for termination for reasons listed in 1.a through 1,g of this section, and Ecology determines that modification or revocation and reissuance is appropriate.
 - b. When Ecology has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G7) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. Reporting planned changes

The Permittee must, as soon as possible, but no later than one hundred eighty (180) days prior to the proposed changes, give notice to Ecology of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in:

1. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b).
2. A significant change in the nature or an increase in quantity of pollutants discharged.
3. A significant change in the Permittee's sludge use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G5. Plan review required

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications must be submitted to Ecology for approval in accordance with chapter 173-240 WAC. Engineering reports, plans, and specifications must be submitted at least one hundred eighty (180) days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities must be constructed and operated in accordance with the approved plans.

G6. Compliance with other laws and statutes

Nothing in this permit excuses the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. Transfer of this permit

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee must notify the succeeding owner or controller of the existence of this permit by letter, a copy of which must be forwarded to Ecology.

1. Transfers by Modification

Except as provided in paragraph (2) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked

and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

2. Automatic Transfers

This permit may be automatically transferred to a new Permittee if:

- a. The Permittee notifies Ecology at least thirty (30) days in advance of the proposed transfer date.
- b. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.
- c. Ecology does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G8. Reduced production for compliance

The Permittee, in order to maintain compliance with its permit, must control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G9. Removed substances

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G10. Duty to provide information

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology upon request, copies of records required to be kept by this permit.

G11. Other requirements of 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. Additional monitoring

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. Payment of fees

The Permittee must submit payment of fees associated with this permit as assessed by Ecology.

G14. Penalties for violating permit conditions

Any person who is found guilty of willfully violating the terms and conditions of this permit is deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars (\$10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit may incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars (\$10,000) for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is deemed to be a separate and distinct violation.

G15. Upset

Definition – “Upset” means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limits if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the Permittee can identify the cause(s) of the upset.
2. The permitted facility was being properly operated at the time of the upset.
3. The Permittee submitted notice of the upset as required in Special Condition S3.E.
4. The Permittee complied with any remedial measures required under S3.E of this permit.

In any enforcement action the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. Property rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. Duty to comply

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. Toxic pollutants

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. Penalties for tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both.

If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment shall be a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than four (4) years, or by both.

G20. Compliance schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than fourteen (14) days following each schedule date.

G21. Service agreement review

The Permittee must submit to Ecology any proposed service agreements and proposed revisions or updates to existing agreements for the operation of any wastewater treatment facility covered by this permit. The review is to ensure consistency with chapters 90.46 and 90.48 RCW as required by RCW 70.150.040(9). In the event that Ecology does not comment within a thirty-day (30) period, the Permittee may assume consistency and proceed with the service agreement or the revised/updated service agreement.

APPENDIX B

City of Pateros Sanitary Sewer Design Standards

2.0 Sanitary Sewer Design Standards

The standards established by this section are intended to represent the minimum standards for the design and construction of sanitary sewer facilities. Other requirements may be mandated by the City due to localized conditions and/or project specifics.

In some cases, in order to provide capacity for other existing and/or future development the City will determine size or capacity requirements of facilities to be designed by the Developer's Engineer and constructed by the Developer. Technical Specifications addressing material conformance, execution and testing are included in the Technical Specification section.

2.1 Design Standards

The design of sanitary sewer systems shall be dependent on local site conditions. The design elements of sanitary sewer systems, including pump stations shall conform to the latest edition of the Department of Ecology "Criteria for Sewage Works Design", and the minimum Standards set forth herein.

The Developer's Engineer shall submit all supporting documentation, in report form, including all relevant design information needed for the City to review for adequacy of the proposed design.

2.1.1 Sanitary Sewers

- a. If future extensions of the system are deemed probable by the City, the proposed system shall be designed and sized to service tributary areas and also be extended to farthest property line(s) so as to provide access to future development. Easements shall be provided if necessary to facilitate the same. Sewer mains shall be extended to the farthest boundaries of the property being served providing access for future service of adjacent properties.
- b. If the City approves sewer mains located outside public streets, the right-of-way or easement shall be of sufficient width to allow for future replacement of the facility without damage to permanent adjacent improvements. In general, if the sewer line is located in the center of the right-of-way or easement, such ROW or easement minimum width shall be 20 feet. Special circumstances may require additional width such as for deep sewer lines.
- c. Detailed plans shall be submitted for the City's review, which provide the location, size, type, and direction of flow of the proposed sewers and the connection with existing sewers. All elevation information shall be based on the North American Vertical Datum of 1988 (NAVD 88).
- d. Construction of new sewer systems or extension of existing systems will be allowed only if the existing and downstream receiving systems are capable of supporting the added hydraulic load. Sewer facilities shall be designed and installed to service tributary areas.
- e. Collection and interceptor sewers shall be designed and constructed for the ultimate development of the tributary areas and as may be further established in the City's Sewer Collection System Master Plan. The location and size of oversized sewer lines shall be designated by the Public Works Superintendent. When required by the Public Works Superintendent, the City will conduct a hydraulic analysis to determine the required sewer system improvements. The cost for such analysis shall be reimbursed by the Developer.

- f. Sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow. Sewers installed below groundwater levels shall require special design and inspection.
- g. Design criteria, site information, computations and other data used for design of sewer system shall be submitted to the City for approval, generally in the form of a Preliminary Engineering Report. In some cases, a geotechnical investigation shall be prepared and submitted, as determined by the Design Engineer, or as required by the City.
- h. The sewage facilities shall be constructed in conformance with these Specification and other applicable standards as allowed by the City.
- i. After all other work is completed and before final acceptance, the entire roadway, including final surfacing, roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades, and cross sections for a new roadway consistent with the original section.

2.1.2 Sanitary Sewer Design Elements

- a. Sewer pipelines shall be installed only in dedicated rights of way, unless otherwise specifically approved by the City.
- b. The sewer pipelines shall be located in the center of right of ways unless otherwise approved by the City. The sewer main shall maintain a minimum of 10-foot horizontal separation from proposed or existing water mains.
- c. The maximum distance between manholes shall be 300 feet unless specifically approved otherwise by the City.
- d. The City reserves the right to require a minimum of eight feet of cover unless topography, existing facilities or other future improvements prohibit this minimum cover for installation, as determined by the Public Works Superintendent.
- e. Sewer lines shall be designed such that the invert elevations of the sewer service stubs at property lines is a minimum of four feet below the lowest expected floor elevation of the structure to be served and a minimum of eight feet below finished grade within the right-of-way. See the Standard Details. The invert elevation of the sewer service stub shall be calculated based on the invert elevation of the lateral sewer at the sewer service connection (including the tee) plus the rise of the sewer service to the property line based on its length and a minimum slope of 0.02 foot/foot plus 1.0 foot. The design elevation of the sewer service stub shall be shown on the Plans. The Public Works Superintendent may deviate depth as deemed necessary.
- f. Minimum slope on all sewer pipe shall comply with Department of Ecology standards with the following exceptions:
 - 4" and 6" sewer service laterals shall be 2.0%
 - 8" gravity mains shall be 0.5%
 - 10" gravity mains shall be 0.4%
 - 12" gravity mains shall be 0.3%

Minimum slope shall be maintained unless specifically waived by the Public Works Superintendent. All mains shall be designed to have a minimum scouring velocity of two feet per second. Increasing gravity main size for the purpose of achieving a shallower slope will not be allowed.

- g. Sanitary sewer service pipe from the main to the building served shall be a minimum 4-inch diameter for single family and duplex residential. Service pipe for triplex and larger multi-family and commercial structures shall be sized by the design engineer based on fixture unit calculations, but in no case shall be less than 6-inch diameter.
- h. Each single-family residence and each multifamily and non-residential structure shall be provided with an individual sanitary sewer service. The number of individual service connections shall be as approved by the Public Works Superintendent.
- i. All sewer services shall be extended horizontally a minimum of five feet past the street right-of-way line (or property line), or back of existing curb or sidewalks, and vertically to six feet below finished grade.
- j. All private sewer systems connecting to the public system must meet all City Standards and testing requirements.
 - i. All public and private sanitary sewer mains and services shall be installed with detectable continuous marking tape installed 24 inches above the pipe, and not less than 12 inches below finished grade. The marker shall be detectable metallic tape labeled "SEWER" and shall be furnished by the contractor.
 - ii. Testing of all public and private sanitary sewer manholes and piping shall be conducted after backfilling operations have been completed, and prior to any permanent paving. All tests shall be coordinated with the Public Works Superintendent and shall be witnessed by a City representative. In all cases, the Contractor shall furnish all labor, materials, and equipment to make the required tests and shall bear the full cost of the required test. In the event that test results do not conform to the accepted standards, the Contractor, at the Contractor's expense, shall correct all deficiencies and retest until they conform to the testing requirements. Notify the City 48 hours in advance of the testing.
 - iii. All new sanitary sewer mains, service lines and manholes shall be tested in accordance with the City's Construction Standards.
 - iv. Deflection testing for PVC pipe may be required at the discretion of the City Engineer.
 - v. Television inspection for 6" pipe may also be required by the Public Works Superintendent.
 - vi. Television inspection for all gravity sewer mains will be required. All television inspections shall be completed prior to any permanent paving and be provided to the Public Works Superintendent for review.
 - vii. The Contractor shall not proceed with permanent paving until the Public Works Superintendent approves in writing, installation and testing.
- k. Minimum size of all gravity sewer main pipe shall be 8-inches. Pipe size shall be based typical residential design flows estimated to be 370 gallons per day per ERU.
- l. All sewer pipe invert elevations at manholes shall be computed to the center of the manhole.
- m. All sewers shall be laid with uniform slope between manholes. Pipe crown shall be matched when upsizing.
- n. Where the slope of the sewer line entering or exiting a manhole is less than 0.05 feet per foot, a drop of 0.1 foot shall be provided between the invert of the entering and exiting sewer pipes.

- o. All sewer manholes shall be located at street centerline or 6-foot left or right of street centerline or as approved by the Public Works Superintendent to avoid placing a manhole cover in a wheel lane.
- p. All sewer mains shall be terminated in a manhole. Should design considerations indicate a future manhole be located beyond the current sewer termination, a temporary clean out may be approved by the City to terminate the sewer provided the distance to the downstream manhole is 150 feet or less.
- q. Where new sanitary sewer mains are to be connected to an existing manhole, the existing manhole shall be core drilled. A sand collar is to be placed on the sewer line and the connection is to be sealed with non-shrink grout inside and outside of the manhole. A representative of the City must be on-site during a connection to an existing sewer. City must be notified 48 hours in advance of the connection.
- r. Sewer services shall be constructed with a prefabricated wye at the main.
- s. Extended sewer services on easements shall be avoided.
- t. Connection of sewer services to manholes shall be avoided. If sewer services must be connected to a terminating manhole such as in a cul-de-sac, no more than two (2) sewer service connections will be allowed and shall enter into the channel with matching pipe crowns.
- u. All manholes shall be completely clean prior to request for final inspection. Cleaning shall include, but not be limited to: debris removal; removal of mortar, dirt, and asphalt from steps; and removal of asphalt from the manhole frame and cover.

2.1.3 Sanitary Pump Stations

- a. Private Sanitary Pump Stations shall not serve more than one property. Private sanitary lift stations are only allowed where gravity sewer exists adjacent to a property but is not deep enough to serve all the property. Private sanitary pump stations require an engineering design report, specifications, and detailed site plans for approval by the City.
- b. Public Sanitary Pump Stations shall be designed to operate on 480-volt 3 phase power supply whenever possible.
- c. Provisions shall be provided to accommodate station inflow in the event of a power outage via the installation of a diesel or propane power generation equipment. Fuel storage is required to supply a minimum of 12 hours of operation at maximum design load. No buried tanks will be allowed.
- d. Sanitary Pump Stations shall be installed only in dedicated rights of way, unless otherwise specifically approved by the City.
- e. Sanitary Pump Station Site shall:
 - f. be selected to serve the entire basin, considering ultimate build-out of the basin.
 - g. include readily accessible by maintenance vehicles, with minimum gate width of 12 feet
 - h. be enclosed by a security fence at least 6 feet in height. All slabs, equipment, and utilities shall be located within the fenced area at least 3 feet from the fence
 - i. Generally, sewage pump stations should only be used when gravity flow is not possible.
 - j. Pump type and manufacturer shall be approved by the Public Works Superintendent.

- k. Installation shall include suitable devices for measuring sewage flow should be provided at all pumping stations
- l. Pump Station controls and logic shall be fully compatible with the current City system and fully integrated prior to use.
- m. All equipment, electrical and controls submittals shall be submitted to the Public Works Superintendent and/or City Engineer, for review and approval prior to installation.
- n. All startup and testing shall be completed in the presence of the design engineer, and City engineer. The Developer shall notify the Public Works Superintendent 48 hours prior to any equipment or controls training.
- o. All equipment and controls training shall be videotaped by the Developer.
- p. Pump Station design shall include a gantry or other means of removing the pumps. The Public Works Superintendent may allow installation of a davit to fit one of the City's exiting hoists.
- q. When the station is expected to operate at a flow rate less than 0.5 times the average design flow for an extended period of time, the design shall address measures taken to prevent septicity due to long holding times in the wet well.
- r. Each Sanitary Pump Station design shall be submitted with a design report and shall demonstrate its conformance with the standards as outlined herein. The report is to be stamped by an engineer as required. At a minimum the following shall be included in the design report:
- s. The pump station design must have a minimum of two pumps
- t. Design flow analysis (break down of phases if applicable) including peak sewage flow calculations,
- u. All relevant elevations, such as; pump(s) off, discharge elevation, pumps(s) on, alarm elevation, max allowable storage elevation, etc.
- v. Maximum static head
- w. Force main size and length
- x. Pump station capacity (gpm) per each pump and multiple pumps
- y. Velocity within force main
- z. System head and pump curves (including compound pump curves when applicable)
- aa. "n" values of force main
- bb. Friction head loss (calculations)
- cc. Velocity head
- dd. Total dynamic head
- ee. Pump time/cycle and number of cycles per day
- ff. Storage available and storage required during a power outage scenario
- gg. Discussion of odor control
- hh. Water hammer calculations.

- ii. The force mains shall be ductile iron or high-density polyethylene (HDPE) with a minimum diameter of 4 inches. Minimum bury for force mains shall be 3.5 feet, installations shall include detectable warning tape and 10-gauge single strand copper locating wire attached to the pipe.

2.2 Construction Drawing Format

The City desires to maintain a consistent format to its construction drawings and, therefore, requires that all construction drawings conform to the following format unless exceptions are approved in advance by the Public Works Superintendent. The City also requires that AutoCAD files be provided for review and record keeping.

The following format and requirements are a minimum for normal type system extensions. Unusual or special facilities or site-specific requirements may dictate additional drawings and/or drawing requirements.

1. Sheet size: full-sized 24" x 36"

2. Plan

The full-sized plan shall be at a scale of 1" = 20' and show all existing or proposed utilities, existing or proposed street surfacing and improvements, street centerline and stationing, street right-of-way margins, street names, legal identifications of properties such as lot number or tax lot number, section subdivision lines, all property lines and all water and sewer easements and rights-of-way.

Show the following:

- a. Locations of streets, right-of-ways, existing utilities, driveways, and sewers.
- b. All associated right-of-way, adjacent property lines, easements and/or proposed property lines.
- c. All utility easements, including County recording numbers.
- d. Site topography at a minimum of two (2') foot intervals, to include a minimum of ten (10') foot within adjacent areas.
- e. Vicinity and site location map.
- f. All known existing structures and utilities, both above and below ground, which might interfere with or be affected by the proposed construction, particularly water mains, gas mains, storm drains, overhead and underground power lines, telephone lines, and television cables.
- g. Station and offset to each manhole. Number each manhole consecutively in the new sewer system preceded by the initials of the development. Begin at the connection to existing system and proceed upstream. Branch lines shall use the sub-number of the manhole from which they branch. A line branching from manhole SR4 would have the first manhole on the line numbered SR4-1. All manholes shall be numbered on the plans and correspondingly numbered on the profile.
- h. Show the size, material, length, slope, capacity (Q_c at full flow) and design flow (Q_d) of each sewer line between manholes.
- i. Show the location of all sewer service stubs and the invert elevation at the end of the stub. Building and basement floor elevations shall be shown in the profile.
- j. Show details as necessary to direct the contractor in making connections to the existing system and to protect existing facilities during construction of the new sewers. Details to be to scale and clearly show special sewer joints, connections, and cross-sections, and sewer appurtenances such

as manholes and related items and all other items as required by the City to clearly identify construction items, materials, and/or methods.

- k. Other items as may be required by the Public Works Superintendent.

3. Profile

The vertical profile of the proposed sewer is required to be shown on each sheet below the plan view. The scale of these drawings shall be 1" = 20' horizontal and 1" = 4' vertical with horizontal grid of 20' and vertical grid of 4'.

Show the following:

- a. For each manhole, show rim elevation, invert elevation of all sewers entering or leaving the manhole, the depth of the manhole, and the manhole number and location (street station and offset).
- b. Show the sewer line in profile and the existing and proposed ground lines. Identify the size, type of pipe, slope and horizontal length of the sewer line on the profile. Include the Q_c (pipe capacity using full pipe, in cfs) and Q_d (design flow in cfs)
- c. Show all crossing utilities and designate special materials or construction procedures that may be required.
- d. Provide a legend to clearly illustrate the composition of the profile.

2.3 General Construction Requirements

Nothing in these general construction requirements or other components of the City's Development Standards, nor City policies or ordinances, shall be construed as creating a contractual relationship between the City and the Developer's Contractor or creating any City obligation to the Contractor. The Developer shall be solely responsible for the Contractor's work, actions and for the Contractor's compliance with City requirements for the project.

1. Work shall be performed only by Washington State licensed and bonded contractors with demonstrated experience in constructing public sewer systems of the type being proposed for construction.
2. All underground work shall be inspected full time by the Design Engineer or his/her qualified representative. The qualifications of the proposed inspector shall be provided to the City a minimum of 14 days prior to construction for City review and concurrence.
3. The City reserves the right to observe and/or inspect the work as it may deem appropriate. The City shall be notified 48 hours in advance of start of construction.
4. The City shall be present for all testing. The City shall be notified a minimum 24 hours in advance of all testing.
5. Literature for all products and materials shall be submitted to the City for review prior to delivery to the project site. Such literature may also be required for City review during City reviews of designs and plans/specifications.
6. Each side sewer lateral shall have an approved water-tight cap at the termination of the stub, it shall be adequately "blocked" to satisfactorily resist the air pressure testing.
7. Front lot corners and side sewer stub locations shall be staked prior to installation of side sewer tee.
8. Each sewer service lateral shall have a treated 2-by-4-inch wood "marker" at the termination of the stub. The "marker" shall extend from the bottom of the trench to 24 inches above finished grade. Above the

ground surface, it shall be painted “white” with “S/S” and the depth, in feet, stenciled in black letters 2 inches high.

9. Sewer service connections if allowed directly into manholes shall be constructed to match the sewer main crown (outlet) and the manhole channeled accordingly.
10. Manholes, where sewer extension may occur, shall be provided with min. 1-foot stubs of same pipe material and diameter, capped watertight, and channeled accordingly.
11. Locking lids shall be provided for all manholes located outside pavement areas and all manhole lids shall have the word “sewer” cast integrally onto its surface.
12. Concrete collars shall be placed around all manhole frames. Manhole rims shall be set 2 inches above the finish grade in areas outside streets or alley ways.
13. Unless directed otherwise by the City, pipe trenches shall not be backfilled until pipe and bedding installation has been inspected and approved by the City’s Inspector.
14. All testing shall be completed and approved prior to asphalt surfacing and after all other underground utilities have been installed, and the lines have been satisfactorily flushed, cleaned, deflection tested, and television inspected.
15. Manhole rim and invert elevations shall be field verified after construction by the Design Engineer and the Record Drawings individually stamped by a Washington State licensed professional engineer which shall attest to the fact that the information is correct. Record Drawings shall be to City datum and must be submitted in a format as set forth herein, and approved by the City prior to project acceptance along with all equipment O&M literature and manuals if applicable.
16. Upon completion of project construction, the Developer’s Engineer shall provide the City a written and stamped certification that the facilities to be accepted by the City have been designed, constructed, and tested in accordance with these Standards, the project plans and specifications approved by the City, and all other City requirements; this written certification shall bear the stamp of the same engineer responsible for the design of said facilities.

APPENDIX C

Technical Memorandums

Technical Memorandum TM-01
CITY OF PATEROS
WASTEWATER GENERAL SEWER PLAN AND FACILITIES PLAN
Planning Areas and Population
April 26, 2022

1.1 Introduction and Background

This Technical Memorandum (TM) provides planning area and population projections. The projections are used to estimate wastewater flows and loadings for wastewater treatment facilities planning and capacity.

Varela met with City staff in February, 2022 to discuss City population projections and growth distribution within and beyond the City's Urban Growth Area. Planning information provided in this TM is based on City input and projections, 2020 US Census Bureau data, and Office of Financial Management (OFM) data.

The City indicated that planning estimates provided in the Wastewater Facility Plan (WFP) and this TM will be used to inform the updated Comprehensive Plan in the future.

1.2 Sewer Service Area

The City's incorporated limits and current sewer service area and collection and treatment system are shown on **Exhibit 1**. The existing sewer service area generally corresponds with the City's incorporated limits.

The City's 2018 urban growth area (UGA) and future sewer service area are shown on **Exhibit 1** and **Exhibit 2** and are based on discussions with City staff regarding where development is likely to occur within the planning period. The City anticipates expansion of the existing sewer service area within the 20-yr planning period.

1.3 Planning Data and Future Population

The Washington State Office of Financial Management, (OFM) provides the most current information and projections on growth for counties. Larger cities often have planning department which make these projections, while smaller systems may adopt their own projections based on one or more of the following: projections published by the OFM, historical population trends, known development plans, comprehensive plans, etc.

For the purposes of infrastructure planning, a population at the end of the 20-year planning period is projected. Available data sources for Pateros include the Washington State Office of Financial Management (OFM), historical population trends, known development plans and City staff input, and the City of Pateros' 2018 Draft Comprehensive Plan. There is no known state or federal agency which makes predictions for smaller cities such as Pateros. Therefore, based on the available data, the following sections develop population projections for Pateros.

1.3.1 Historical Population Trends

The historical population of Pateros is shown in **Table 1**.

Table 1 City of Pateros Historical Population

Year	Population	Annual Growth Rate	Source
1960	673		Census
1970 ⁽¹⁾	472	-3.49%	Census
1980	555	1.63%	Census
1990	570	0.27%	Census
2000	643	1.21%	Census
2010	667	0.37%	Census
2020 ⁽²⁾⁽³⁾	593	-1.17%	Census

1. Construction of Wells Dam begins (1963); City submerged and relocated

2. Carlton Complex fire

3. City staff indicate that City is adding population; not subtracting as shown in the table

The follow is excerpted from the City's 2018 Draft Comprehensive Plan:

Before the construction of Wells Dam, Pateros enjoyed a high population in 1960 of 673 people. By 1970, the population had declined to 472 [and] population rose to 555 by 1980. Growth was slow during the 1980's; in fact, it was under 1% for the entire decade. However, the 1990's saw steady growth, averaging 1.2% per year, for a total of just over 11% for the whole decade. The 2000 Census put Pateros' population at 643, and by the 2010, census at 667, just shy of the high in 1960 but showing growth had slowed to approximately 4% for the decade. The Washington State Office of Financial Management data estimated the April, 2013 population at 665, revealing a slight decline in population. However, the catastrophic fires of 2014 resulted in a loss of 140 residents by the April 1, 2015 OFM population estimate. 2016 and 2017 saw the population recovering with the addition of 55 people to the City's population.

In general, Pateros' population has fluctuated over the years but has stayed relatively constant.

1.3.2 Comprehensive Plan Projections

The City's 2018 Draft Comprehensive Plan generally follows OFM projections but does not include any specific projections related to future growth.

The City is in the process of updating their Comprehensive Plan and has indicated that the planning assumptions prepared in this TM will be used to inform the new plan.

1.3.3 Population per Household

The City currently serves roughly 220 single-family sewer connections. Based on a 2020 population of 593 residents and 220 single family connections, it is estimated that Pateros' population per single-family residence is approximately 2.7 capita/connection.

1.3.4 *Washington State OFM Projections*

The Office of Financial Management makes three population projects for each county, a low, medium, and high series. OFM does not make projections for towns and cities. For Okanogan County, OFM projected average growth rates for 2022 to 2042 are as follows:

High Series:	0.95% per year
Intermediate Series:	0.26% per year
Low Series:	-0.05% per year

Applying the Okanogan County OFM projected growth rates result in the following projected 2042 populations for Pateros:

High Series:	730 residents (+137 residents)
Intermediate Series:	628 residents (+35 residents)
Low Series:	587 residents (-6 residents)

Growth projections consistent with the OFM projections for Okanogan County are shown on **Figure 1**.

The City has reviewed the OFM projections, and given the anticipated growth identified in the following sections, believes growth in Pateros will outpace the OFM projections given the anticipated growth identified in the following sections.

1.3.5 *Growth Areas Identified by City*

The City has identified various areas where anticipated growth will likely occur. These areas are based on City knowledge and direction.

This section documents the anticipated growth areas, provides estimated additional equivalent residences for each area, and provides population estimates for the 20-year planning period for each growth area.

Following are the growth areas identified. These areas are also shown on **Exhibit 2**.

- **Area 1** is the area generally along and north of Pedersen Rd east of town within the UGA and the area generally along and south of Watson Rd east of town outside the UGA. Current land use includes single-family residential, light industrial, and orchards. Several parcels that are currently being used as orchards within the Incorporated Limits are zoned R2. Other parcels are located outside the Incorporated Limits and are generally being used as single-family residential. The City has an easement along Pedersen Rd that could be utilized to provide sewer service to properties outside the Incorporated Limits. The City also maintains a sleeve under SR 97 at Industrial Way for future water service to the Pedersen Rd area. The City has been approached by the orchard owner to provide sewer and water service to a planned multi-family seasonal worker building.

At build-out, growth in Area 1 is projected to include the following:

- 264 ERUs (made up of residential); estimated population of 710 persons
- **Area 2** is the area generally along Ives St and Bill Shaw Rd west of town outside the Incorporated Limits and within the UGA. Current land use includes single-family residential and vacant land. The City reports this area could be subdivided and connected to the City sewer

system via an extension along Riverside Dr/Bill Shaw Rd. Additional sewer flows resulting from serving Area 2 would flow to the Warren Ave Lift Station.

At build-out, growth in Area 2 is projected to include the following:

- 459 ERUs (made up of residential); estimated population of 1,237 persons
- **Area 3** is the area generally along Methow Valley Highway south of town along the south side of the Methow River. Current land use includes single-family residential and orchards. This area is outside the City's current UGA. City staff have indicated there is growing interest in this area which, if annexed into the City, could include up to 70 new single-family residential homes and a restaurant or brewery. This area could be served by forcemain over the Methow River. Service feasibility to Area 3 is evaluated in later chapters.

At build-out, growth in Area 3 is projected to include the following:

- 96 ERUs (made up of residential and commercial); estimated population of 188 persons
- Possible brewery
- **Area 4** includes City owned property within the Incorporated Limits along Starr Rd south of Town currently zoned MU. The City could also provide services to the private mobile home park that is within the vicinity of the City property. The City has been approached by various industries requesting undeveloped land, sewer and water service. The City could provide sewer service to Area 4 by forcemain north along Starr Rd and SR 97 over the Methow River. Service feasibility to Area 4 is evaluated in later chapters.

At build-out, growth in Area 4 is projected to include the following:

- Possible industry
- **Infill** is expected throughout City limits due to development of unused/vacant properties and changes in zoning to allow for higher densities.

At build-out, infill development within the current incorporated limits is projected to include the following:

- 119 ERUs (made up of residential and commercial); estimated population of 303 persons
- Possible brewery
- Possible industry

1.3.6 *Estimate of Future Population based on Growth Areas*

Based on growth areas identified by the City, the following table provides: 1) estimated buildout ERUs for each growth area; 2) and assumed percentage of growth the City believes will occur within the 20-year planning period; and 3) resulting population projection.

Table 2 20-year Population Estimate for Growth Areas

Growth Area	Type of Development	Acreage	ERU Assumptions	Estimated Additional ERUs at Build-Out	20-yr Planning Period		
					Percent of Build-Out ⁽¹⁾	Estimated Additional ERUs	Estimated Population Growth ⁽²⁾
1	Residential - R2	35.1	1 ERU per dwelling unit = 7.5 ERU / ac ⁽⁴⁾	264	25%	66	178
2	Residential - R2	61.2	1 ERU per dwelling unit = 7.5 ERU / ac ⁽⁴⁾	459	15%	69	186
3	Residential - R1	23.3	1 ERU per dwelling unit = 3.0 ERU / ac ⁽³⁾	70	25%	17	47
	Commercial	4.3	6.0 ERU / ac	26	25%	6	17
	Brewery	1.0	(6)	(6)	(6)		
4	Industrial	15.2	(6)	(6)	(6)		
City Infill	Residential - R2	1.8	1 ERU per dwelling unit = 7.5 ERU / ac ⁽⁴⁾	13	50%	7	18
	Residential - R3	11.0	1 ERU per dwelling unit = 9.0 ERU / ac ⁽⁵⁾	99	15%	15	40
	Commercial	0.5	6.0 ERU / ac	3	100%	3	7
	Brewery	0.9	(6)	(6)	(6)		
	Industrial	4.2	(6)	(6)	(6)		
	Public Utility	7.0	0.5 ERU / ac	4	100%	4	9
Total		165.3	Total	937	20%	186	502
2042 Population Estimated using Growth Areas							1,095 ⁽⁷⁾
OFM Population Growth Projection for 20-yr Planning Period ⁽⁸⁾							137
2042 Population Estimated using OFM Projections							730 ⁽⁷⁾

1. Percentages based on discussions with City staff including Public Works Director, City Planner, and Council Members.

2. Based on 2.7 residents per dwelling unit

3. Average residential density of between 1 and 5 dwelling units per acre per City of Pateros Municipal Code Chapter 17.12.020 for single-family residential (R-1)

4. Average residential density of between 1 and 15 dwelling units per acre per City of Pateros Municipal Code Chapter 17.12.040 for mixed-family residential (R-2)

5. Average residential density of between 1 and 18 dwelling units per acre per City of Pateros Municipal Code Chapter 17.12.050 for multifamily residential (R-3)

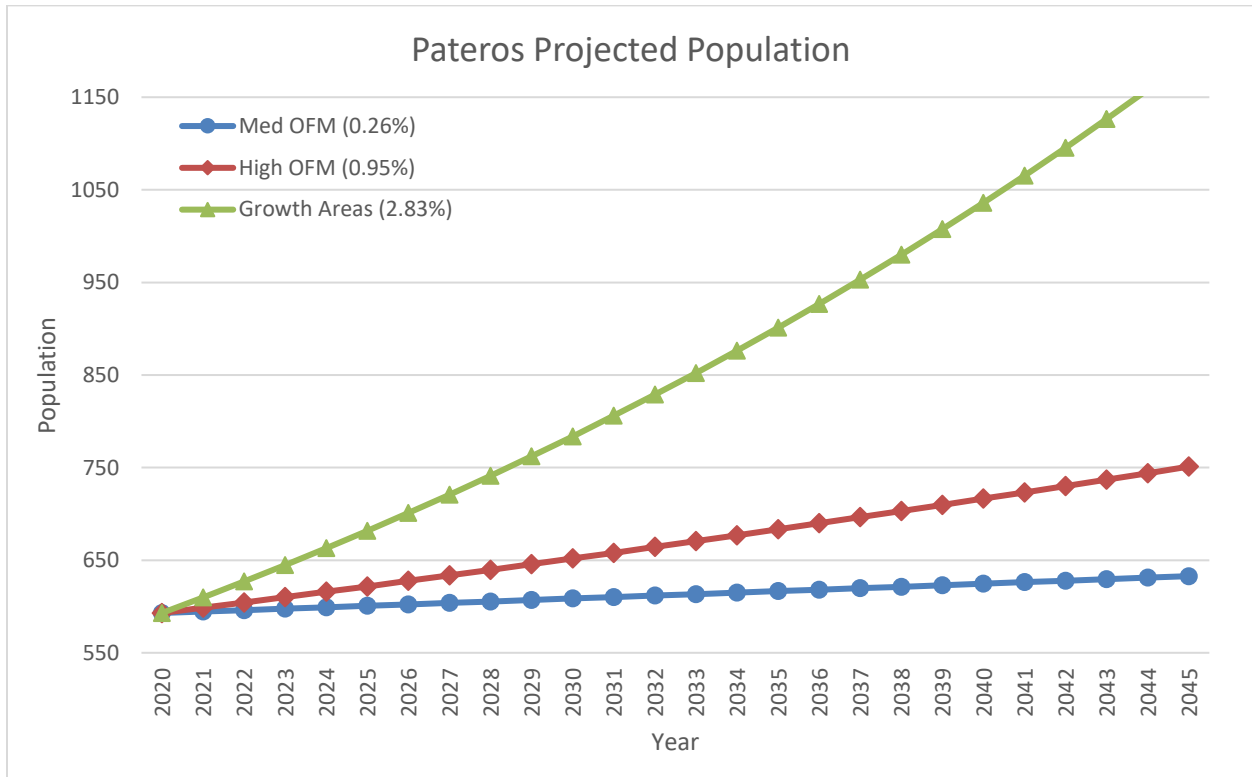
6. ERU estimate not provided. ERU estimates/considerations discussed elsewhere in the Wastewater Facility Plan

7. 593 residents per 2020 Census

8. Based on Okanogan County OFM projections for high series (0.95% annual growth rate)

The following figure shows: 1) Pateros’ population growth using OFM projections (med/high) and, 2) City anticipated growth estimates per **Table 2**.

Figure 1 Pateros Projected Population



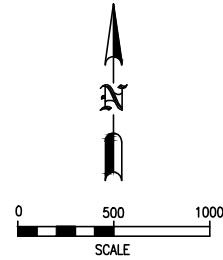
1.3.7 Selected Design Population

Planning assumptions and growth areas were initially discussed with Jord Wilson, the City’s Public Works Director on February 23, 2022. At the meeting, Jord indicated that the County OFM projections are likely low and that the City expects growth within the 20-yr planning period to exceed OFM estimates. A followup meeting with the Pateros Sewer Committee was held on April 18, 2022 to discuss TM-01 population projections estimated using the City’s provided growth areas. The planning estimates provided in this TM were finalized on April 25, 2022 after final discussion with the City’s Public Works Director.

The City has elected to use a 20-yr projected population of 1,095 residents (2.83% annual growth rate) which is consistent with the City’s anticipated growth estimates provided in **Table 2**.

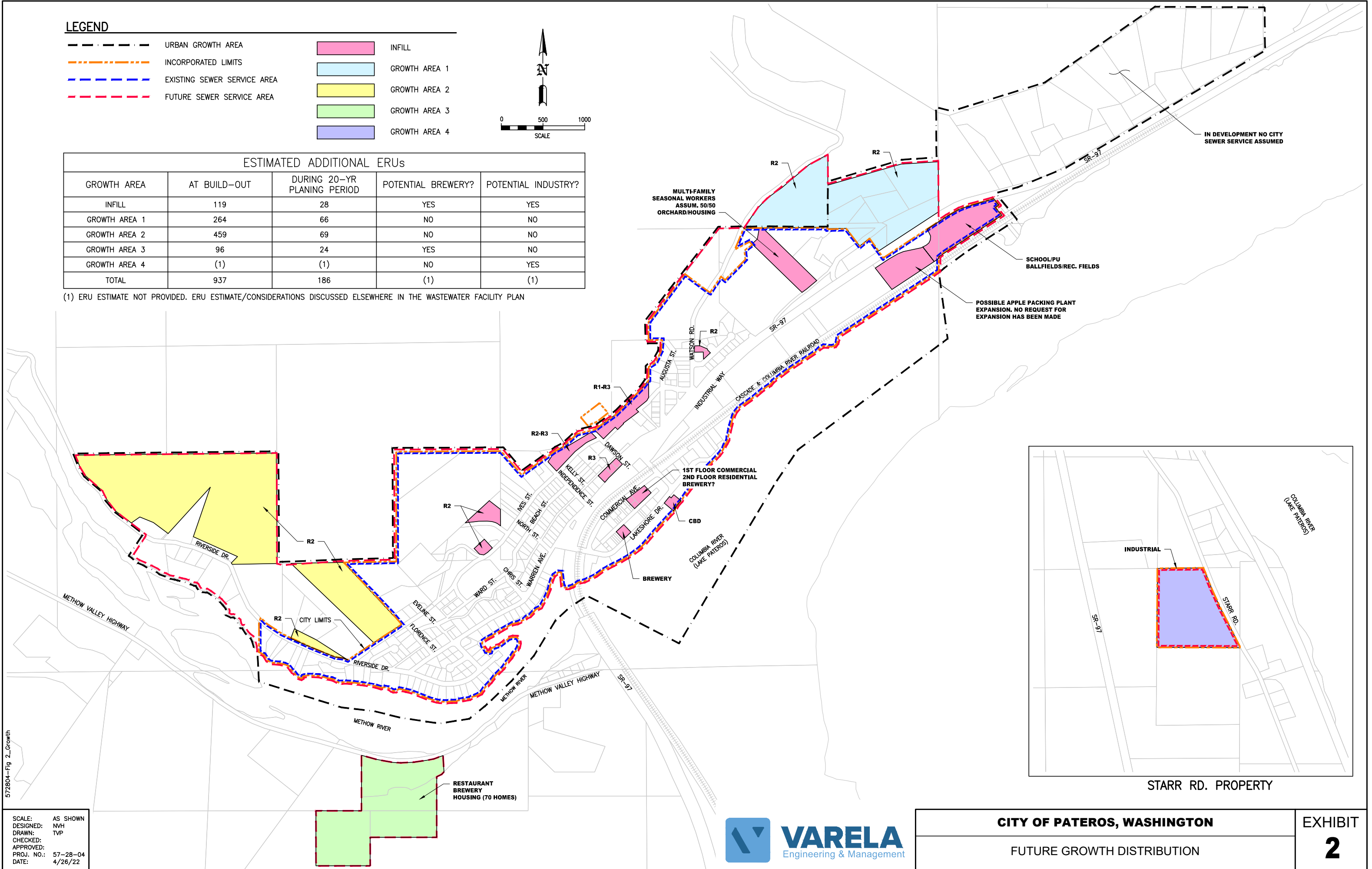
LEGEND

	URBAN GROWTH AREA		INFILL
	INCORPORATED LIMITS		GROWTH AREA 1
	EXISTING SEWER SERVICE AREA		GROWTH AREA 2
	FUTURE SEWER SERVICE AREA		GROWTH AREA 3
			GROWTH AREA 4



ESTIMATED ADDITIONAL ERUs				
GROWTH AREA	AT BUILD-OUT	DURING 20-YR PLANING PERIOD	POTENTIAL BREWERY?	POTENTIAL INDUSTRY?
INFILL	119	28	YES	YES
GROWTH AREA 1	264	66	NO	NO
GROWTH AREA 2	459	69	NO	NO
GROWTH AREA 3	96	24	YES	NO
GROWTH AREA 4	(1)	(1)	NO	YES
TOTAL	937	186	(1)	(1)

(1) ERU ESTIMATE NOT PROVIDED. ERU ESTIMATE/CONSIDERATIONS DISCUSSED ELSEWHERE IN THE WASTEWATER FACILITY PLAN



572804-Fig 2_Growth

SCALE: AS SHOWN
 DESIGNED: NVH
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-04
 DATE: 4/26/22



CITY OF PATEROS, WASHINGTON

FUTURE GROWTH DISTRIBUTION

EXHIBIT

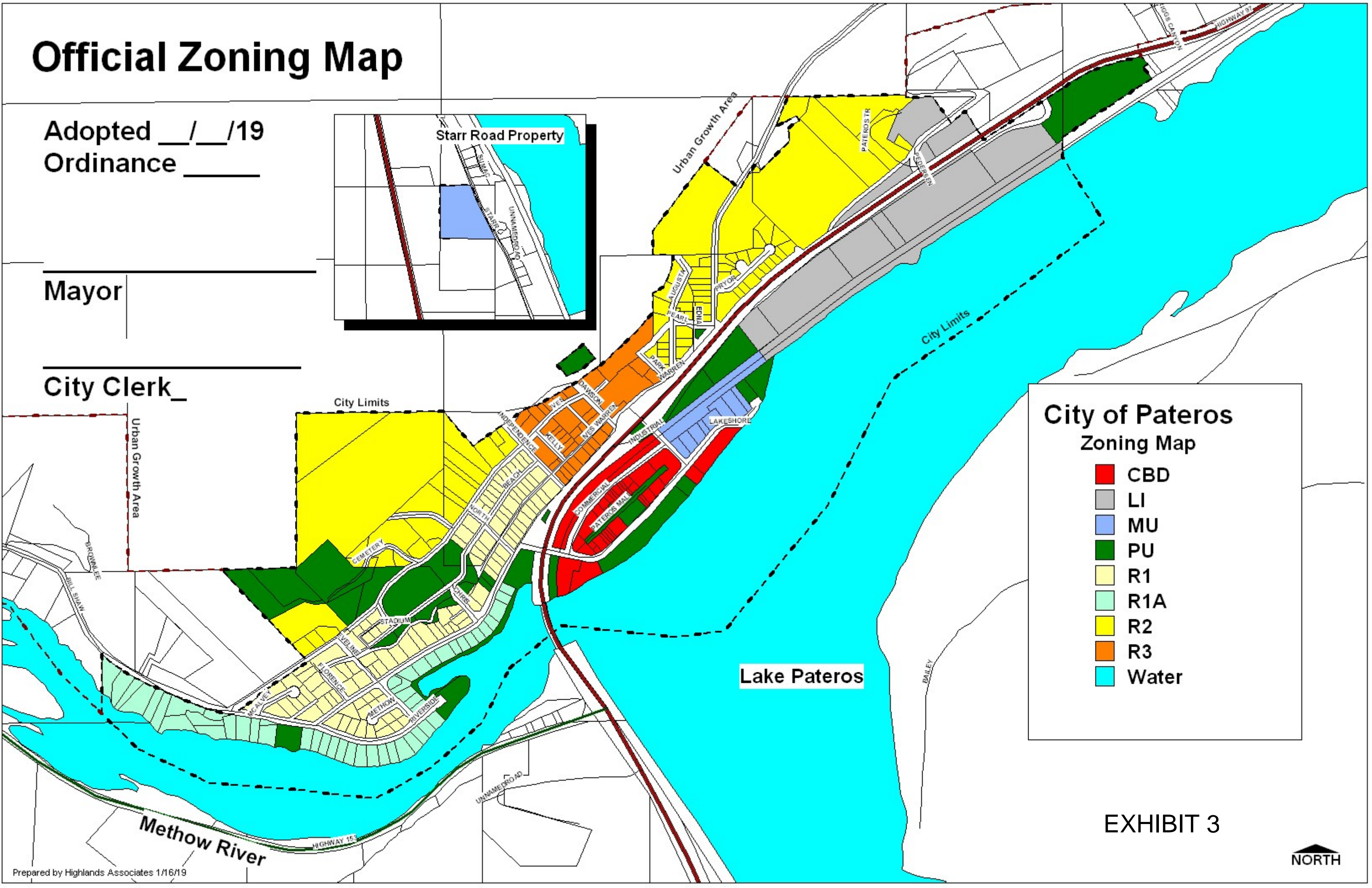
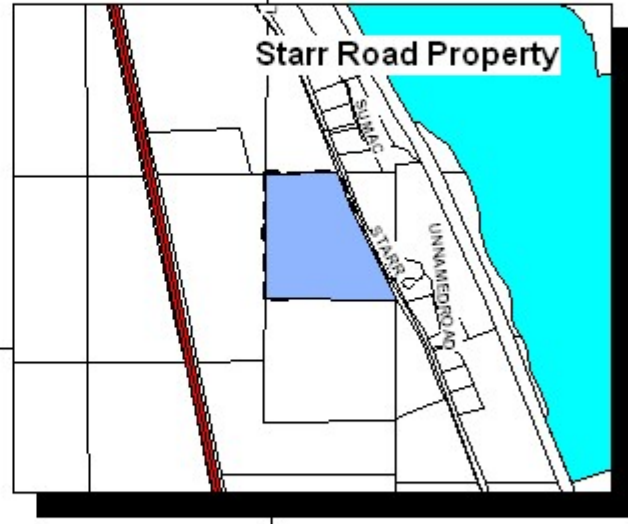
2

Official Zoning Map

Adopted __/__/19
Ordinance _____

Mayor _____

City Clerk _____



**City of Pateros
Zoning Map**

- CBD
- LI
- MU
- PU
- R1
- R1A
- R2
- R3
- Water

EXHIBIT 3



Technical Memorandum TM-02
CITY OF PATEROS
WASTEWATER GENERAL SEWER PLAN AND FACILITIES PLAN
Flow and Loading Projections
April 26, 2022

1.1 Introduction

This Technical Memorandum (TM) provides an estimate of future flows and loadings to be treated at Pateros' wastewater treatment plant. The estimate is based on projected population growth within the sewer service area and flows and loadings currently entering the treatment plant.

Sanitary sewer flows that enter the treatment plant include the following components:

- Residential and commercial flows from the city sewer service area
- Industrial (food processing) flows from the Chelan Fruit Coop (Apple House)
- Infiltration and inflow (I/I) from the sewer collection system

Varela met with City staff in February of 2022 to discuss population growth and distribution within and beyond the City's Urban Growth Boundary. Population and growth information provided in this TM was gathered based on 2020 US Census Bureau data, Office of Financial Management (OFM) data, and discussions with City staff. Refer to TM-01 "Planning Areas and Population" for further discussion regarding the City's selected population growth projections.

This TM evaluates current flows and loadings to the City's treatment plant using Daily Monitoring Reports (DMR's) between January 2016 and December 2021. Historical and current flows and loadings are used to develop per capita ratios for influent flow, biochemical oxygen demand (BOD) and total suspended solids (TSS). The calculated per capita ratios are used with population projections to estimate future flows and loadings to the treatment plant. Future industrial flows and collection system I/I are estimated separately and added to the projected City flows.

Population projections and the sewer service area are developed in TM-01 Planning Areas and Population. That technical memo is under review by the City. For the

Population projections for Pateros are developed in TM-01 *Planning Areas and Population*. That technical memo provides projected population based on: 1) OFM projections, and 2) City identified growth areas. For wastewater planning purposes and representing plant capacity OFM projections are used herein and are shown below.

Existing population (City Limits):	593
Projected 2042 population:	1,095
Annual Growth Rate:	2.83%

1.2 Treatment Plant Influent Flows and Loadings

Influent flows include sewer flows provided from City daily monitoring reports (DMR's) and from the Apple House fruit processing and storage plant discharge reports provided by the City. Influent also includes infiltration that enters the collection system.

Wastewater flows are measured at the treatment plant's effluent V-Notch weir located downstream of all treatment processes. Effluent samples are taken from a sample tap on the 10" effluent line downstream of the UV disinfection system.

The current 2015 NPDES permit (WA0020559) requires the City to report influent flow daily, influent BOD₅ and TSS once per week and influent pH five times a week. Effluent pH and temperature are measured five times a week while effluent dissolved oxygen (DO), BOD, and TSS are measured weekly.

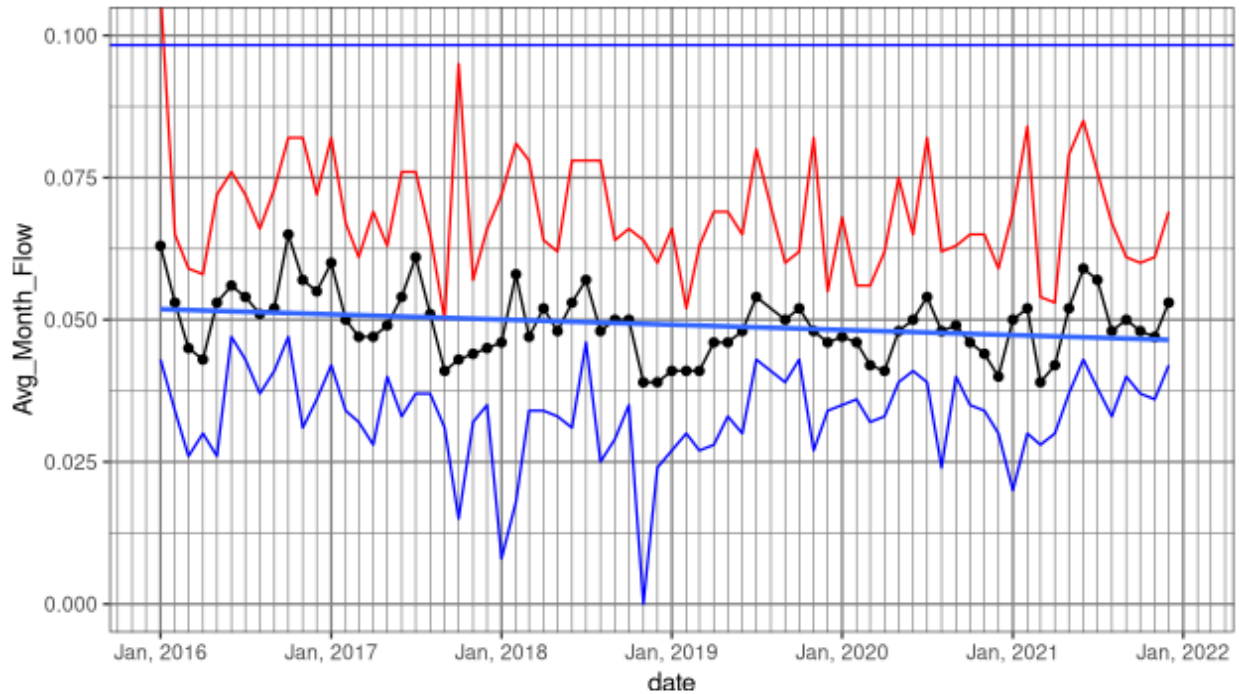
Influent flows and loadings from January 2016 through December 2021 are used to determine seasonal trends and develop per capita ratios for influent flows and loadings. **Figure 1** graphs monthly influent flows for this time period and **Table 1** summarizes this information. The DMR data indicates that influent flows have decreased slightly over the study period.

Table 1 Wastewater Influent Flow

Year	AAF (MGD) ⁽¹⁾	Maximum Month		Maximum Daily	
		MMF (MGD) ⁽²⁾	Peaking Factor	MDF (MGD) ⁽³⁾	Peaking Factor
2016	0.054	0.065	1.20	0.108	2.00
2017	0.049	0.061	1.24	0.095	1.94
2018	0.049	0.058	1.18	0.081	1.65
2019	0.047	0.054	1.15	0.082	1.74
2020	0.046	0.054	1.17	0.082	1.78
2021	0.050	0.059	1.18	0.085	1.70
Average	0.049	0.059	1.189	0.089	1.80
Maximum	0.054	0.065	1.245	0.108	2.00

1. AAF = Average Annual Flow
2. MMF = Maximum Month Flow
3. MDF = Maximum Daily Flow

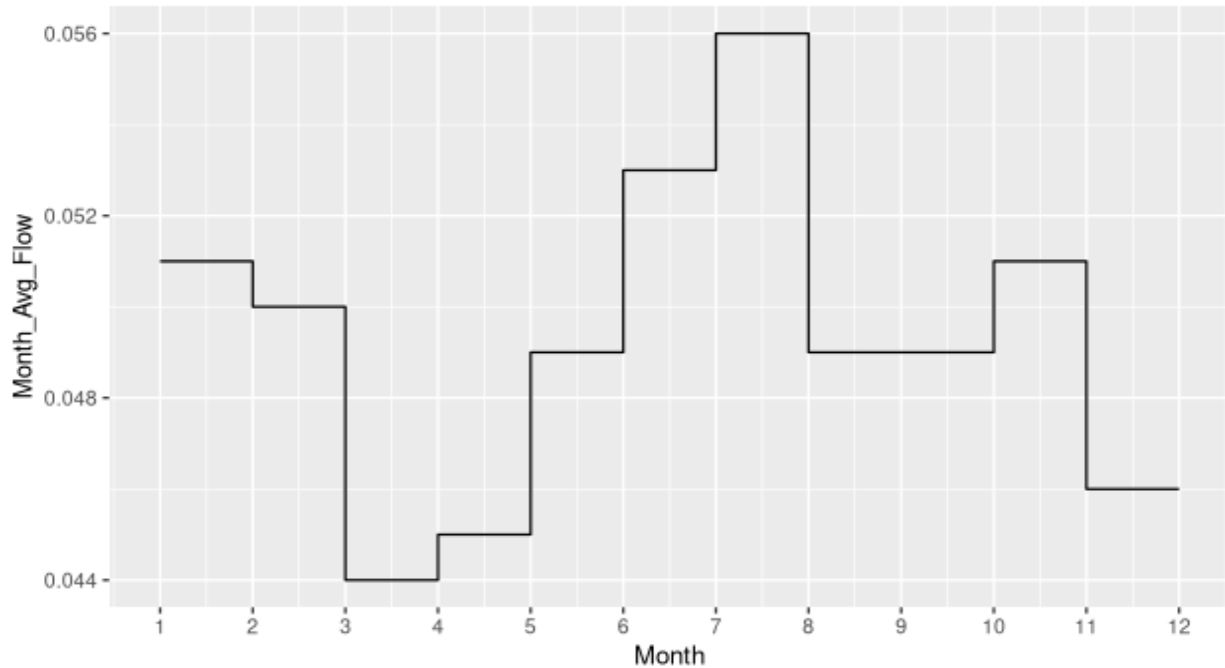
Figure 1 Pateros Monthly Influent Flows from 2016 to 2021



1. Red – Monthly Peak Flow MGD
2. Black – Average Monthly Flow (MGD)
3. Blue – Trend line for Average Monthly Flow (MGD)

Figure 2 shows the seasonal variation in monthly average influent flow for each month between 2016 and 2021. As shown on the figure, average peak influent flows occur in July with low influent flows occurring in March and April. This is an unusual flow pattern; indicating that influent flow is potentially responding to infiltration from high groundwater levels due to the water surface elevation of Lake Pateros associated with Wells Dam. Seasonal variation is not very large with the average monthly low flow about 80% of the average winter peak month flow.

Figure 2 Pateros Seasonal Flows (MGD)



Influent BOD and TSS concentrations are measured weekly. **Table 2** and **Figure 3** show BOD and TSS loadings for January 2016 through September 2021. Annual influent BOD has shown a slight decrease during the study period as did influent flow.

Table 2 Influent BOD and TSS Loading

Year	Avg. Annual BOD ₅ (lbs/d)	Max Month BOD ₅ (lbs/d)	Avg. Ann. TSS (lbs/d)	Max Mo. TSS (lbs/d)
2016	116	169	93	122
2017	101	135	93	125
2018	99	112	89	113
2019	97	127	75	95
2020	96	114	83	114
2021	97	131	91	138
Average	101	131	87	118
Maximum	116	169	93	138

Figure 3 Average Month BOD Loading (lbs/d)

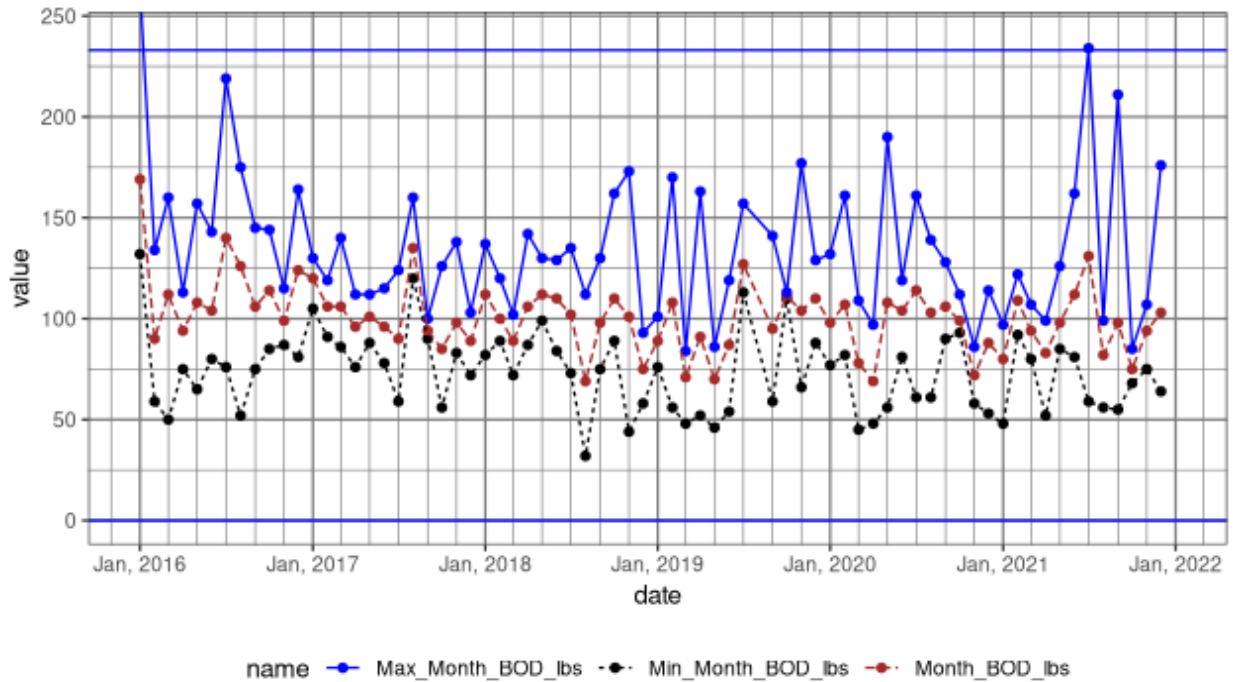


Table 3 provides a summary of influent flows and loadings and calculates a per capita ratio for influent flow, BOD, and TSS. These ratios are used to estimate future influent characteristics.

The per capita flows and loadings shown in **Tables 3** to **5** are based on influent measurements. The impact of industrial sewage from Apple House and on future flows and loadings are discussed in the next sections. 2020 flow characteristics are shown because the 2020 census population is available.

- Population (2020) = 593
- Average Daily Flow = 78 gpcd
- Max Month Flow = 91 gpcd
- Average Daily BOD = 0.16 lbs per capita/d
- Max Month BOD = 0.19 lbs per capita/d
- Average Daily TSS = 0.14 lbs per capita/d
- Max Month TSS = 0.19 lbs per capita/d

Table 3 Influent Flow per Capita

Year	Pop	Minimum Month		Average Month		Maximum Month		Peak Day	
		Flow (MGD)	Per Capita	Flow (MGD)	Per Capita	Flow (MGD)	Per Capita	Flow (MGD)	Per Capita
2016	560	0.043	77	0.054	96	0.065	116	0.108	193
2017	580	0.041	71	0.049	84	0.061	105	0.095	164
2018	583	0.039	67	0.049	84	0.058	99	0.081	139
2019	585	0.041	70	0.047	80	0.054	92	0.082	140
2020	593	0.04	67	0.046	78	0.054	91	0.082	138
2021	590	0.039	66	0.05	85	0.059	100	0.085	144
Average		0.041	70	0.05	85	0.06	101	0.09	153
Peak		0.043	77	0.05	96	0.07	116	0.11	193

Table 4 Influent BOD per Capita

Year	Pop	Minimum Month		Average Month		Maximum Month	
		BOD (lbs/d)	Per Capita	BOD (lbs/d)	Per Capita	BOD (lbs/d)	Per Capita
2016	560	90	0.16	116	0.21	169	0.30
2017	580	85	0.15	101	0.17	135	0.23
2018	583	69	0.12	99	0.17	112	0.19
2019	585	70	0.12	97	0.17	127	0.22
2020	593	69	0.12	96	0.16	114	0.19
2021	590	75	0.13	97	0.16	131	0.22
Average		76	0.13	101	0.17	131	0.23
Peak		90	0.16	116	0.21	169	0.30

Table 5 Influent TSS per Capita

Year	Pop	Minimum Month		Average Month		Maximum Month	
		TSS (lbs/d)	Per Capita	TSS (lbs/d)	Per Capita	TSS (lbs/d)	Per Capita
2016	560	60	0.11	93	0.17	122	0.22
2017	580	66	0.11	93	0.16	125	0.22
2018	583	61	0.10	89	0.15	113	0.19
2019	585	49	0.08	75	0.13	95	0.16
2020	593	54	0.09	83	0.14	114	0.19
2021	590	66	0.11	91	0.15	138	0.23
Average		59	0.10	87	0.15	118	0.20
Peak		66	0.11	93	0.17	138	0.23

1.3 Industrial Flows and Loadings

Process wastewater from the Apple House Warehouse and Storage Inc., Pateros North Plant discharges to the City treatment plant. The Apple House discharges under the Fresh Fruit Packing General Permit WAG 435152 and a 2020 City contract.

The city contract includes a base rate equivalent to 20 ERU's (1 ERU = 175 gpd) with a base wastewater strength of 2,000 mg/l BOD and 2,000 mg/l TSS. The contract with the City increases discharge costs for additional flow and strength if they occur. Apple House added pretreatment in order to reduce effluent suspended solids in early 2020. Pretreatment reduced peak loads that had been experienced before the system was installed. When discharging to the City, Apple House provides weekly flows and concentrations of BOD and TSS. Flow and concentration information is used to estimate flows and loadings in MGD, and pounds on a weekly basis in order to compare to measured City influent flows. **Figures 4 to 6** shows the Apple House flows and loads entering the City treatment plant. **Table 6** summarizes the annual loading from Apple House.

Figure 4 Apple House Flows to the Treatment Plant

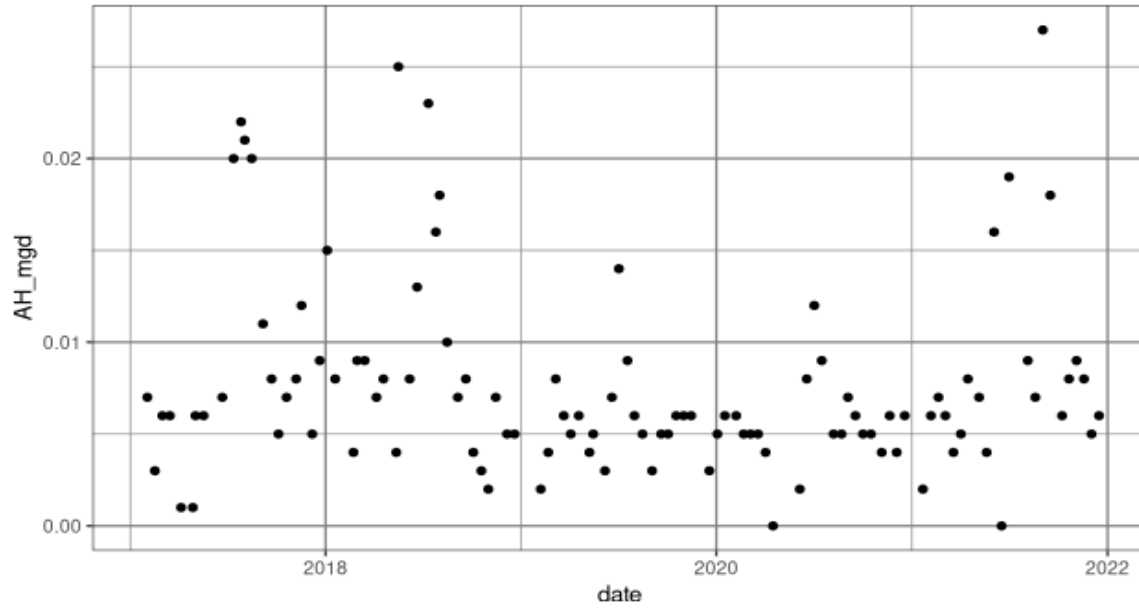


Figure 5 Apple House BOD to the Treatment Plant

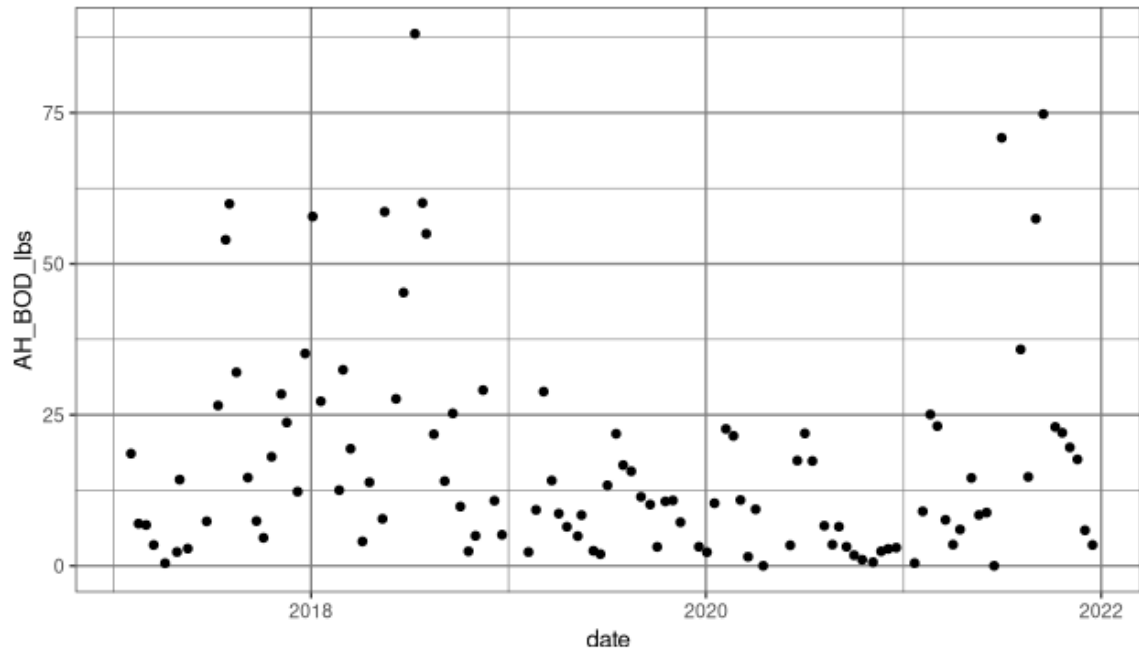


Figure 6 Apple House TSS to the Treatment Plant

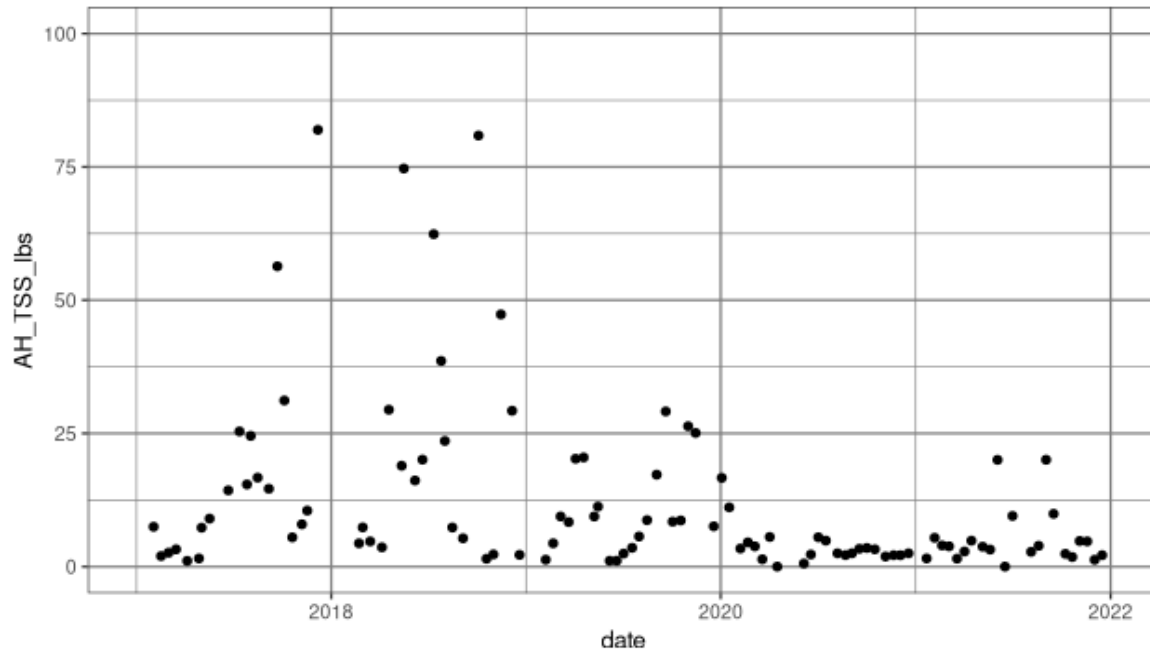


Table 6 Apple House Wastewater Contribution

Year	Flow (MGD)			BOD (lbs/d)			TSS (lbs/d)		
	Plant Influent	Apple House	% Apple House	Plant Influent	Apple House	% Apple House	Plant Influent	Apple House	% Apple House
2017	0.049	0.009	18.4%	101	18	17.8%	93	31	33.3%
2018	0.049	0.009	18.4%	99	28	28.3%	89	59	66.3%
2019	0.047	0.006	12.8%	97	9	9.3%	75	11	14.7%
2020	0.046	0.005	10.9%	96	8	8.3%	83	4	4.8%
2021	0.05	0.009	18.0%	97	21	21.6%	91	5	5.5%
Average	0.048	0.008	15.7%	98.0	16.8	17.1%	86.2	22.0	24.9%

During the study period, Apple House contributed about 16% of the flow, 17% of the BOD load, and 25% of the TSS load to the city treatment plant. As shown in **Table 6**, the TSS load from Apple House has decreased substantially after installing the pretreatment system in early 2020.

Per capita flows and loads to the treatment plant, as shown in **Table 3**, would be reduced by about 15% if Apple House did not discharge to the City treatment plant. However, the per capita flows and loadings shown in **Table 3** appear to be reasonable factors to estimate future plant loads.

1.4 Inflow and Infiltration

The City’s collection system was originally installed in 1954 and expanded in 1966. There are about 2.5 miles of AC pipe, 1.3 miles of concrete pipe, and 0.4 miles of PVC pipe in the collection system. I/I was reported at about 19% of influent flow in the 2015 NPDES Fact Sheet.

Seasonal peak flows occur in June and July as shown on **Figure 2**. This is possibly caused by Wells Dam backwater that is reportedly at an elevation higher than portions of the sewer collection system.

A check of I/I between 2016 and 2021 was made by calculating the difference between the highest and lowest month average influent flows as outlined in the ECY “Information Manual for Treatment Plant Operators”. This method is used for the Annual I/I Report prepared by treatment plants as part of their annual wastewater report used to track potential I/I issues. **Table 7** summarizes these calculations. Based on this information, excess flows from I/I contribute between 30 and 40 percent of annual influent flow. The ADF per capita is lower than the EPA guideline of 120 gpcd for excessive infiltration. A separate TM has been prepared to evaluate I/I in more detail.

Table 7 Estimated I/I Flows

Variable	Year					
	2016	2017	2018	2019	2020	2021
Min Month (MGD)	0.043	0.041	0.039	0.041	0.04	0.039
Avg Month (MGD)	0.054	0.049	0.049	0.047	0.046	0.05
Max Month (MGD)	0.065	0.061	0.058	0.054	0.054	0.059
Peak Day (MGD)	0.108	0.095	0.081	0.082	0.082	0.085
Population	560	580	583	585	593	590
Precip (in)	13.05	11.24	10.26	7.78	6.77	7.72
<u>Total (MG)</u>	<u>19.7</u>	<u>17.9</u>	<u>17.9</u>	<u>17.2</u>	<u>16.8</u>	<u>18.3</u>
I/I (MGD)	0.022	0.02	0.019	0.013	0.014	0.02
ADF/Cap (gal)	96	84	84	80	78	85
MMF/Cap (gal)	116	105	99	92	91	100
I/I/cap (gal)	39.3	34.5	32.6	22.2	23.6	33.9
% I/I/ADF	41%	41%	39%	28%	30%	40%

1.5 Potential Brew Pubs

The City has indicated that they are planning for up to two brew pubs. We have some planning information for a recent brewery located in Twisp. The initial data indicates that the Twisp brewery is planning on producing up to 400 barrels (12,000 gallons) per month. The preliminary data from the brewery’s engineer indicated a waste flow of about 2,200 gpd with an average BOD load of 50 lbs/d and TSS load of 15 lbs/d.

This appears to be pretty high production rate for a dedicated brew pub so let’s assume that each brew pub will produce a conservative 100 barrels/day or a total of 200 barrels. This adds a projected 1,100 gpd, 25 lbs of BOD and 8 lbs of TSS to the projected flows and loadings shown below.

1.6 Projected Flows and Loadings

Projected flows and loadings are estimated using projected future populations and flow and loading parameters from the current influent monitoring. In Pateros, treatment plant influent flows include municipal flows (residential and commercial), industrial flows (Apple House is the only large industrial flow), and seasonal inflow and infiltration (I/I). Future projections are shown based on the per capita flows and loadings summarized in **Tables 3 to 5**.

Table 8 summarizes the criteria used to estimate future flows and loadings. Typical flow values for new residential developments are approximately 100 gpcd. Pateros' historical usage would indicate that residential usage is less than 100 gpcd. To be conservative a value of 100 gpcd is used to estimate future flows.

Table 8 Annual Projected Flows and Loadings from Future Sewer Service Area

Flow or Loading	Historic	Criteria	Type	Projected (2042)	Apple House ⁽¹⁾	Brewpub ⁽¹⁾	Combined	Design
Service Area Population	593			1,095 ⁽²⁾				
Avg Annual Flow (mgd)	0.050	100	gpcd	0.110	0.008	0.0011	0.119	0.125 ⁽³⁾
Max. Month Flow (mgd)	0.060	1.2	PF	0.131	0.020	0.0011	0.153	0.098 ⁽⁴⁾
Max. Day Flow (mgd)	0.090	1.8	PF	0.197	0.020	0.0011	0.218	0.180 ⁽³⁾
Peak Hour Flow (mgd)	---	4.2	PF	0.460	---	0.0011	0.461	0.580 ⁽³⁾
Annual Avg BOD Load (lbs/d)	101	0.17	lbs/d/cap	185	17	25	227	260 ⁽³⁾
Max. Month BOD Load (lbs/d)	131	0.22	lbs/d/cap	242	70	25	337	233 ⁽⁴⁾
Annual Avg TSS Load (lbs/d)	87	0.15	lbs/d/cap	166	8	10	184	300 ⁽³⁾
Max Month TSS Load (lbs/d)	118	0.20	lbs/d/cap	222	15	10	247	288 ⁽⁴⁾

1. Apple House flows and loadings are incorporated in the residential per capita factors providing conservative per capita factors. Industrial flows and loadings that include Apple House and potential brewpubs are also added as sperate flows. Max month for Apple House is based on 2021 data; there were two months where Apple House discharged high BOD. Peaking was ignored for the potential brewpubs.

2. See **Section 1.1**.

3. Per 2000 WWTP Record Drawings

4. Per 2015 NPDES permit (WA0020559)

Technical Memorandum TM-03
CITY OF PATEROS
WASTEWATER GENERAL SEWER PLAN AND FACILITIES PLAN
Inflow and Infiltration Evaluation
July 7, 2022

1.1 Introduction

This memorandum summarizes the methods and results used to identify the individual components of wastewater flow entering the wastewater treatment facility (WWTF). Areas of known infiltration are identified using past investigations and sanitary surveys which are compared to the results of this evaluation to develop recommendations for reducing infiltration/inflow (I/I) entering the system.

Individual flow components include:

- Sanitary Base Flow: flow from the private and public facilities such as residences, commercial facilities, and schools.
- Infiltration: groundwater entering the sewer through poor service connections, cracked or broken pipes and manhole walls.
- Inflow: water introduced into the system through area drains, roof drains, foundation drains, sump pumps, storm drains or direct flow through manhole lids. Inflow is directly related to storm (precipitation) events. Snowmelt can also contribute to inflow as well as infiltration. Inflow can be separated into direct and rainfall induced inflow (RDI/I). RDI/I is related to short term increased groundwater elevations due to precipitation.

The results determine if the collection system has excess I/I that can impact influent flows and operation of the WWTF.

1.2 Previous I/I Investigations

Pateros previously completed the following I/I investigations:

- 1999 Pateros Wastewater Facilities Plan & I/I Investigation
- 2003 Pateros Sanitary Sewer Collection System Investigation

Exhibit 1 summarizes the results provided in the 1999 and 2003 I/I and sanitary sewer condition investigations.

1.3 Data and Methods

Effluent flows from the WWTF were obtained from daily monitoring reports (DMR's) acquired from ECY's PARIS site. DMR's used for this I/I evaluation were from January 2016 through December 2021.

Weather records for the same period (1/2016 – 12/2021) are from the WSU AGNET Azwell site (<https://weather.wsu.edu>). The Azwell site is located at Wells Dam, approximately 7.5 miles south of Pateros.

Water use records for 2018 through 2021 were provided by the City. Winter (non-irrigation season) water use was estimated as the difference between the last monthly meter reading (typically read in October) and the following years first meter reading (typically read in March).

The residential population for the sewer service area was estimated in TM-01 "Planning Areas and Population".

The following methods were used to estimate I/I:

1.3.1 *Method 1: Annual I/I Report – ECY Information Manual for Treatment Plant Operators*

The Annual I/I Report is prepared by treatment plant operators as part of their annual wastewater report. The purpose of the Annual I/I Report is to track potential I/I issues. If large increases in I/I are noted, ECY requires an explanation and a plan for corrective action.

This I/I method assumes that the difference between the highest and lowest month average influent flow provides a reasonable estimate of I/I.

1.3.2 *Method 2: EPA Guide for Estimating Infiltration and Inflow, Region 1*

The 2014 EPA Guide provides guidance for estimating I/I. The guidance is based on EPA's 1991 Sewer System Infrastructure Analysis and Rehabilitation and the 1985 Infiltration/Inflow – I/I Analysis and Project Certification documents. Following is a description of steps used for estimating I/I:

Step 1: Estimate Base Sanitary Flow (BSF)

The sanitary portion of the wastewater flow can be estimated through two methods, which can be used to 'check' each other – influent flow data and winter domestic water consumption.

The first method analyzes influent wastewater flow at the WWTF during a dry weather period of 7 to 14 days. Influent flow data is used to calculate the average daily flow for the dry weather periods. Base sanitary flow (BSF) is estimated by subtracting groundwater infiltration (GWI) flow from the average daily dry weather wastewater (ADW) flow.

The second method uses winter (non-irrigation) water usage records to estimate base sanitary flow. During winter, wastewater from residential areas is assumed to be the same as the billed water use. Groundwater infiltration is estimated as the difference between the monitored wastewater flow and the billed water use.

Step 2: Estimate Infiltration (GWI)

Groundwater infiltration (GWI) can be estimated from influent flow data collected during dry weather when groundwater is high. Dry weather is defined as when there has been at least three days without a rain event. During dry weather, inflow is expected to be zero. In most cases, the GWI rate will approximate the maximum weekly infiltration.

The infiltration rate can also be estimated by averaging nighttime flows (midnight to 6 am) over several days, during dry weather conditions. The nighttime flows can be assumed to be mostly groundwater (after subtracting significant industrial or commercial nighttime flows). Note that nighttime flows were not evaluated during the preparation of this TM.

Step 3: Estimate Inflow

Inflow is calculated by subtracting sanitary and infiltration flows when the system has been influenced by rain. Flows during a significant storm event can be compared to the dry weather flows immediately preceding the storm when groundwater conditions are similar.

The calculations in this memo use "R: A language and environment for statistical computing" and various analytical packages. The workflow includes:

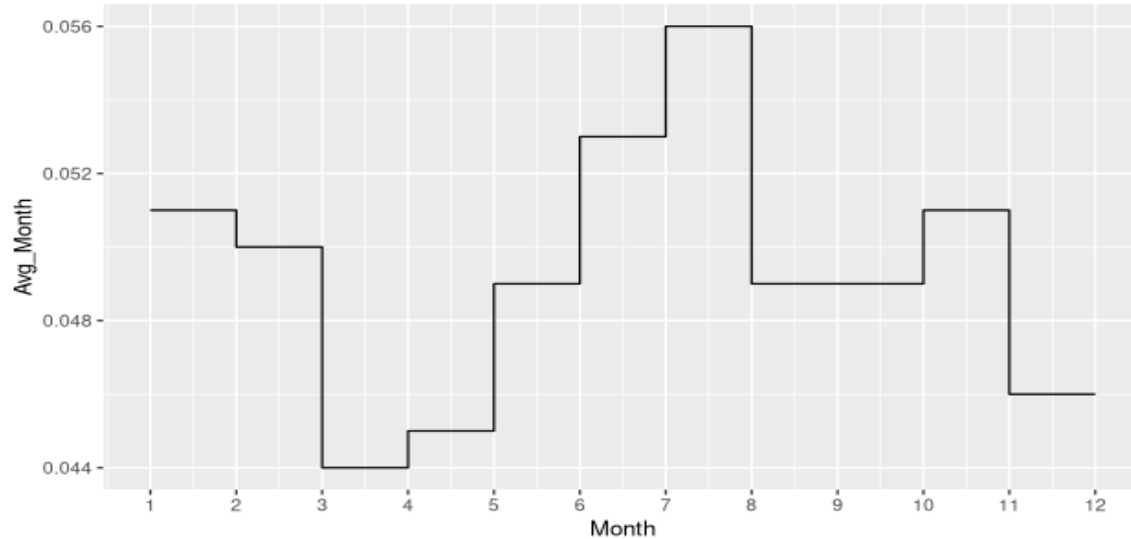
1. Gather Data
 - Download DMR data from the ECY PARIS website
 - Download weather data from the WSUAGNET site
 - Estimate sewer service area populations for the study period
2. Plot, review and clean data to remove outliers
3. Calculate ECY annual I/I (Method 1)
 - Calculate influent monthly average flows. Determine/select the annual maximum and minimum month influent flows.
 - GWI is estimated as the difference between maximum and minimum month flows. Add annual precipitation and population to the table.
 - Divide the annual flows and the GWI estimate by population to estimate flow per capita.
 - Compare flows to EPA and ECY guidelines for excess I/I (120 gpcd).
4. Estimate EPA dry weather BSF and GWI flow.
 - Calculate weekly, monthly, and annual flows. Evaluate for outliers and for seasonal trends.
 - Calculate weekly, monthly, and annual precipitation. Evaluate for outliers and for seasonal trends.
 - Merge weekly influent flows and precipitation into a table and do the same for the daily data.
 - Estimate BSF and GWI by filtering weekly average flows to include only non-precipitation weeks. High influent weeks during the dry periods are assumed to equal base flow plus infiltration from high groundwater. Low influent weeks are assumed to equal base wastewater flow. Note that even during low influent months a portion of the flow can be GWI and commercial flows.
 - Data can be further filtered for low precipitation months (see graphs made for seasonal trends) to refine the evaluation.
 - In practice, identifying the annual low and high weekly flows during non precipitation periods provides a reasonable estimate of BSF and GWI. BSF is then checked with water use records.
5. Estimate EPA Inflow.
 - Inflow is estimated using weekly and daily precipitation and flow records filtered for precipitation days. The data was further filtered by using a minimum rainfall to approximate more sustained rainfall events. The annual maximum week and maximum day influent are assumed to provide a reasonable approximation of potential inflow.
 - The correlation between precipitation and influent flow is checked to determine if there is a noticeable relationship.

1.4 Background and Information

1.4.1 Influent Wastewater Flow

Effluent wastewater flow in million gallons per day (MGD) is measured at the WWTF. **Figure 1** shows monthly seasonal average flows. Effluent flows out of the WWTF are assumed to be the same as influent flows into the WWTF. As can be seen on the figure, minimum influent flows occur in March and April with peak monthly flows occurring in June and July.

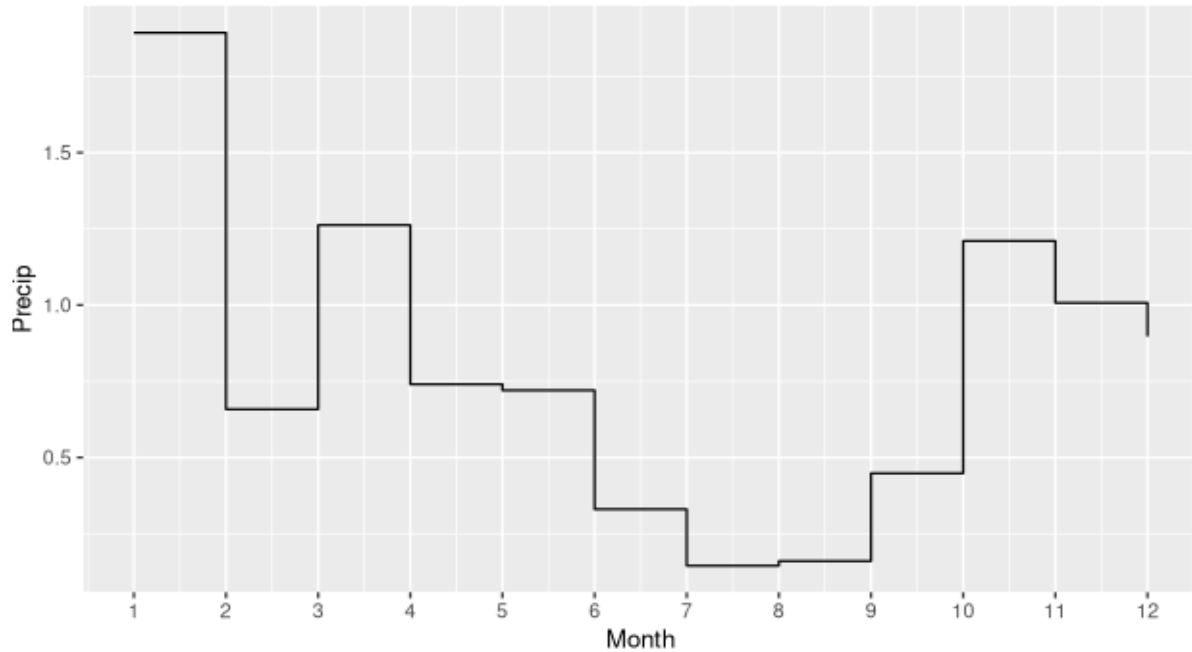
Figure 1 City of Pateros Seasonal Influent Flows



1.4.2 Precipitation

The months of July, August and September have periods of low to no precipitation as can be seen on **Figure 2**.

Figure 2 City of Pateros Precipitation Pattern (WSU Agnet – Azwell Site)



1.4.3 Lake Pateros/Wells Dam Water Surface Elevations

Wells Dam controls the elevation of Lake Pateros. Lake Pateros water surface elevation is about 10 to 12 feet below the ground surface at Lake Shore Drive. This area of the City includes the AC trunk sanitary sewers installed in 1966 after the construction of Wells Dam. The City has indicated that infiltration may be occurring in this area associated with the lake elevation.

Average Lake Pateros elevations vary about 1.5 feet throughout the year as shown on **Figure 3**. Elevations are highest in June, July, and August. Maximum month flows into the WWTF occur in June and July as shown on **Figure 1**. The correlation between both daily and monthly average Lake Pateros elevations and WWTF influent flows are poor ($r = 0.2$).

Figure 3 Lake Pateros Water Surface Elevations

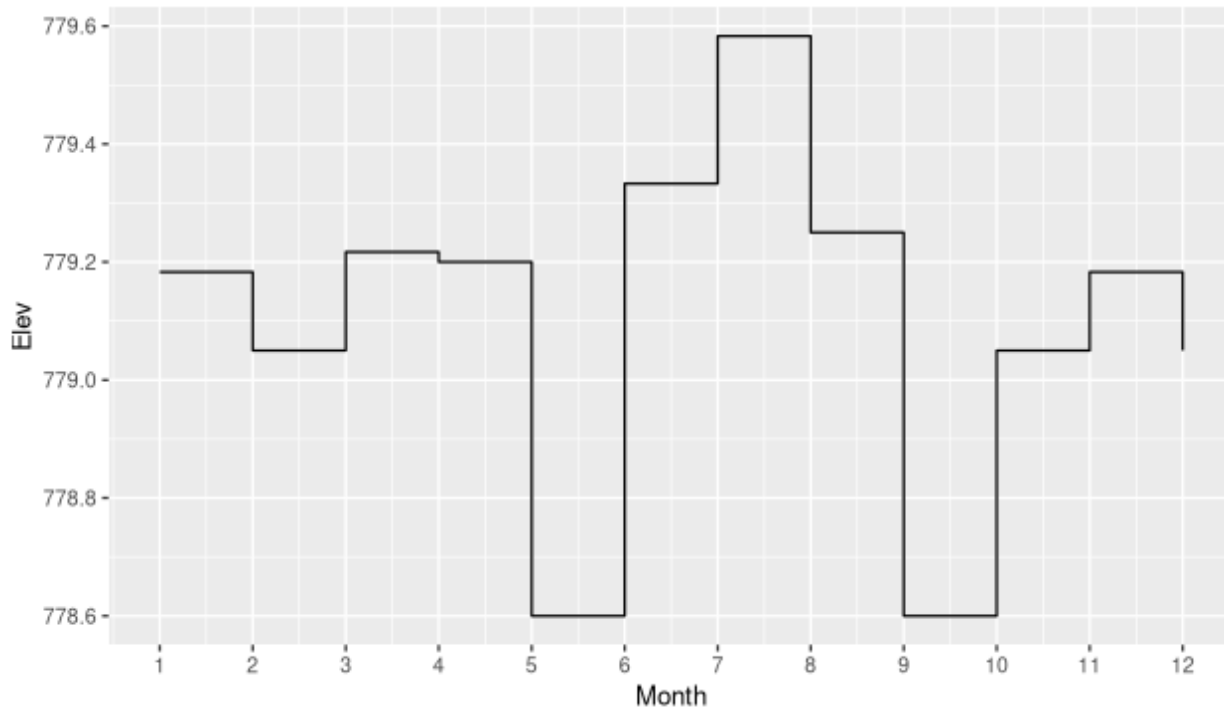


Exhibit 1 shows areas where mains are believed to be below the Lake Pateros water surface elevation and where infiltration is known to be occurring per the 2003 Sanitary Sewer Collection System Investigation.

1.4.4 Background Discussion

Influent flows entering the WWTF exhibit seasonal changes with high monthly flows occurring during the summer and low flows occurring during the spring. This is an uncommon pattern for the northwest and may indicate GWI impacts from the elevation of Lake Pateros.

1.5 I/I Calculations

1.5.1 Annual I/I WWTF Report Method

This section provides the calculations used to determine total I/I as described in Method 1, above. This method is typically used for screening and to easily estimate if I/I is significant. WWTF influent flows from January 2016 through December 2021 are used. **Table 1** shows the results of the calculations.

Table 1 Estimated I/I Flows

Variable	Year					
	2016	2017	2018	2019	2020	2021
Min Month (MGD)	0.043	0.041	0.039	0.041	0.04	0.039
Avg Month (MGD)	0.054	0.049	0.049	0.047	0.046	0.050
Max Month (MGD)	0.065	0.061	0.058	0.054	0.054	0.059
Peak Day (MGD)	0.108	0.095	0.081	0.082	0.082	0.085
Population	560	580	583	585	593	590
Precip (in)	13.05	11.24	10.26	7.78	6.77	7.72
<u>Total (MG)</u>	<u>19.7</u>	<u>17.9</u>	<u>17.9</u>	<u>17.2</u>	<u>16.8</u>	<u>18.3</u>
I/I (MGD)	0.022	0.02	0.019	0.013	0.014	0.02
ADF/Cap (gal)	96	84	84	80	78	85
MMF/Cap (gal)	116	105	99	92	91	100
I/I/cap (gal)	39.3	34.5	32.6	22.2	23.6	33.9
% I/I/ADF	41%	41%	39%	28%	30%	40%

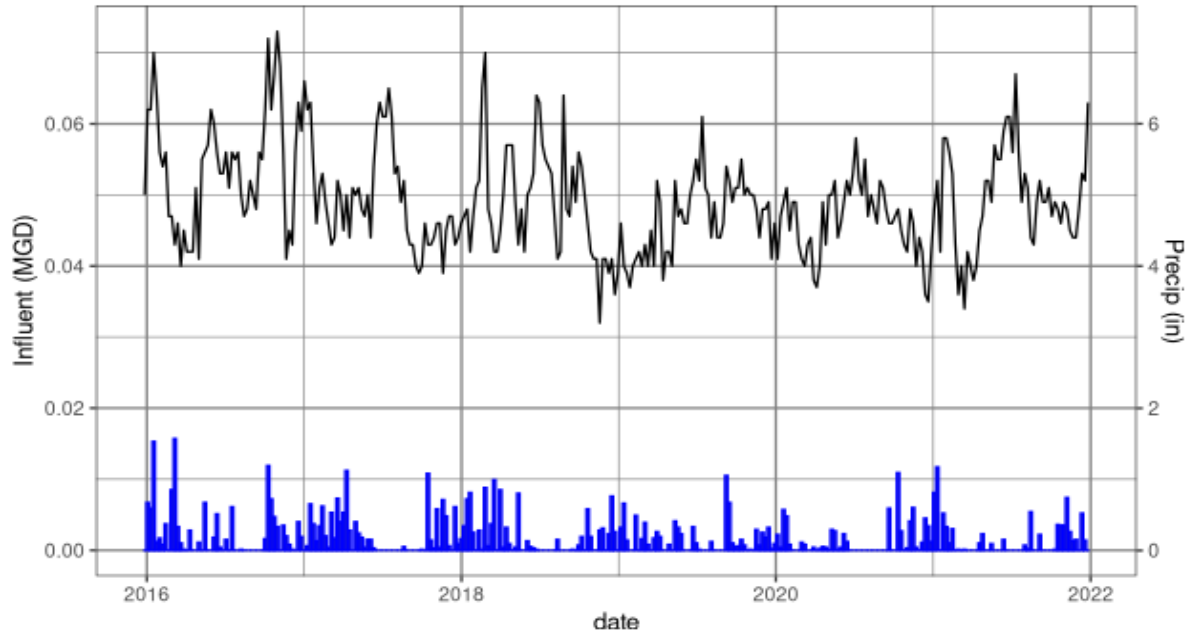
Based on the information provided in **Table 1** excess flows from I/I contribute between 30 and 40 percent of annual influent flow. The ADF per capita is approximately 85 gal which is lower than the EPA guideline of 120 gpcd for excessive infiltration. These calculations show that the total annual influent flow into the WWTF has been consistent over the past five years. There is a good correlation ($r = 0.8$) between annual rainfall and total annual I/I.

1.6 EPA Guide for Estimating I/I

1.6.1 *Estimated Sanitary Baseflow and Infiltration*

Wastewater influent flows provide an estimate of base sanitary flow (BSF) and groundwater infiltration (GWI). Average weekly influent flows and precipitation are calculated for the study period. Flow data was divided into weeks when there was no precipitation and weeks when precipitation occurred. For the weeks of no precipitation, weekly influent flows for the average and minimum year, month, and week were calculated to estimate BSF and GWI flows. The data used the entire years data, the data was not divided into wet and dry seasons. **Figure 4** shows the weekly average influent flow and precipitation.

Figure 4 Weekly Average Influent Flow and Precipitation



Dry weather flow information was evaluated. The minimum week flow for each year was used to approximate BSF while the difference between the maximum and minimum week flows were used to approximate GWI as shown in **Table 2**.

Table 2 Estimated Sanitary Base Flow and Groundwater Infiltration

Date	Max. Week (MGD)	Min. Week (MGD)	Population	BSF/Cap (gal/d)	GWI/Cap (gal/d)	ADF/Cap (gal/d)
2016	0.068	0.042	560	75	46	121
2017	0.066	0.039	580	67	47	114
2018	0.064	0.039	583	67	43	110
2019	0.061	0.037	585	63	41	104
2020	0.058	0.037	593	62	35	98
2021	0.067	0.038	590	64	49	113
Average	0.06	0.039	582	67	44	110

These calculations indicate that sanitary base flow is at the low end of the range of typical textbook values of 60 to 90 gpcd for small communities (including the commercial component but not including I/I). A typical average is 75 gpcd.

Combining estimated sanitary base flow and GWI results in an average daily influent flow per capita of 110 gallons. This is below the EPA guideline of 120 gpcd for excessive infiltration. This dry weather evaluation indicates that GWI is high but not excessive in Pateros as defined by ECY.

1.6.2 Estimated Base Sanitary Flow with Winter Water Use

A second method to estimate base sanitary flow is from winter water use records. The City has provided water use records between 2018 and 2021. Typically, the last water reading before winter occurs in October of each year and meters are read again in March of the following year. Winter water use is estimated by subtracting the March reading from the previous October's meter reading. The City provided the total amount invoiced for each invoice period. The total water meter readings are divided by the number of days (in practice number of months times 30 days) between the meter readings. This data is converted to gallons per day and gallons per day per capita.

Pateros has a number of water use classifications. To estimate BSF only the residential, rental, and multi-family classifications were used. **Table 3** shows the winter water use for these classifications from the City.

Table 3 Estimated BSF Based on Winter Water Use

Date	Multi-family (gal)	Rental (gal)	Residential (gal)	Total		Population	BSF (gpcd)
				(gal)	(gpd)		
2018	1,009,249	453,070	3,566,028	5,028,347	33,522	583	57
2019	1,924,654	967,490	4,643,530	7,535,674	41,865	585	72
2020	1,752,394	694,620	4,637,631	7,084,645	47,231	593	80
2021 ⁽¹⁾	0	2,595,851	10,614,578	13,210,429	88,070	590	149

1. City staff indicate that 2021 water use data contains accounting errors.

The winter water use records show an increase in residential water use from 2018 to 2021. The 2021 winter water use numbers are almost double any of the other years. City staff indicate that 2021 water use numbers contain numerous accounting errors.

Using the 2019 and 2020 water use data, BSF is in the 70 to 80 gpcd range. This is a bit higher than calculated by the DMR data that had an average of 67 gpcd but the two methods of estimating BSF are considered close.

1.6.3 Estimated Inflow

Inflow is estimated using both daily and weekly precipitation and flow data. For both the weekly and daily data, days and weeks with no precipitation were removed. The table was sorted to include only precipitation events with a daily rainfall greater than 0.25 inches to approximate larger, more sustained rainfall events during the entire year.

A first pass compared average weekly influent flows to average weekly precipitation. The relationship between precipitation and influent flows is poor (r value of 0.2).

A second pass using daily data was made to determine that relationship. Daily precipitation does not have a close relationship to influent flows (r = 0.1). Tables are shown for both cases with a total flow per capita during wet weather.

This evaluation to determine inflow shows that inflow is not a significant issue in Pateros and can be considered non-existent.

Table 4 Estimated Inflow Based on Weekly Influent Averages

Date	Population	Max. Week (mgd)	ADF Inflow/Cap (gal)	Inflow/Cap (gal)	Inflow/Cap (gal)
2016	560	0.073	121	130	-9
2017	580	0.063	114	109	5.2
2018	583	0.07	110	120	-10.3
2019	585	0.054	104	92	11.9
2020	593	0.052	98	88	10.1
2021	590	0.058	113	98	14.7

Table 5 Estimated Inflow Based on Daily Influent Flows

Date	Population	Wet Weather Daily Max (mgd)	ADF Inflow/Cap (gal)	Inflow/Cap (gal)	Inflow/Cap (gal)
2016	560	0.082	121	146	-25.0
2017	580	0.064	114	110	3.5
2018	583	0.081	110	139	-29.1
2019	585	0.06	104	103	1.6
2020	593	0.065	98	110	-11.8
2021	590	0.069	113	117	-3.9

1.7 Previous Investigations Discussion

1.7.1 1999 Wastewater Facilities Plan

The City prepared a Facility Plan in 1999 which included an I/I investigation. Two late night flow investigations were performed to quantify infiltration in the collection system. The collection system service area was divided into six (6) subareas to measure flow from each subarea. Total average infiltration in 1999 was estimated at 32,300 gpd and 56 gpcd. **Exhibit 1** provides a summary of the infiltration results including subarea contributions from the 1999 Facility Plan.

Based on the results of the 1999 I/I analysis, the highest concentration of the City’s infiltration occurs along the rubber gasketed asbestos concrete pipe installed in 1966 after the construction of Wells Dam. It is estimated that approximately 50% of this pipe is below the average elevation of Wells Dam Pool.

The 1999 Facilities Plan concluded that infiltration removal is not cost effective and that the most cost effective solution for addressing I/I is to continue to treat at the wastewater treatment facility.

1.7.2 2003 Sanitary Sewer Collection System Investigation

In 2003 the City completed extensive CCTV inspection and smoke testing of the sewer collection system, the results of which are summarized below:

- Some pipelines were observed with no apparent defects while others were observed with multiple kinds of defects. A prioritization schedule was developed which separated replacements into 3 priorities; with the 1st priority pipelines identified as having the potential to cause problems in the future which will likely increase in frequency over time.
- The smoke testing revealed a few abandoned service connections and sanitary sewer services that had missing cleanout caps
- Infiltration was largely observed along pipe stretches and in manholes known to be below the Lake Pateros dam pool elevation. Manholes and sewer mains reported as infiltration sources were determined to not be in bad enough shape to replace due solely to their physical condition and were therefore not added to the prioritization schedule.

1.8 Summary Discussion and Recommendations

Pateros' combined sanitary base flows, groundwater infiltration, and inflow are high but below the EPA's guidelines for excessive infiltration. They are similar to the 1999 findings. Inflow is not a significant issue and essentially non-existent. Infiltration from groundwater is the primary cause of excess flows in the Pateros collection system.

Previous I/I studies and collection system assessments show the highest concentration of infiltration occurs in Subareas 1 and 3. These areas include older AC sewer mains near the Columbia River which are buried below the surface elevation of Lake Pateros. **Exhibit 1** includes a table that shows that over 60% of the measured infiltration occurs in Subareas 1 & 3.

Previous studies noted that the capacity of the treatment plant was sufficient to treat the excess flows and that replacement of the AC sewer mains in Subareas 1 and 3 was not cost effective. The CCTV sewer inspection was performed about 20 years ago. It is likely that sewer condition has deteriorated since the 2003 condition assessment. The City has not completed repairs identified in the 2003 priority sewer plan.

1.8.1 Recommendation

Influent flows to the treatment plant are projected to increase over the 20 year planning period. The projected flows are slightly below the hydraulic capacity of the treatment plant (0.125 mgd). The older AC sewers located in Subarea 1 and 3 contribute about 60% of the City's infiltration (about 20,000 gpd) per the 2003 study. It is difficult to predict the effectiveness that replacing/lining these mains/manholes would have on reducing I/I, but it can be assumed that a reduction of infiltration of 50% (10,000 gpd) might be achievable. It is recommended that that City plan to line the sewer mains and repair leaky manholes in Subareas 1 & 3 which were previously identified in the 2003 evaluation and shown on **Exhibit 1. Table 6** is the cost estimate for lining and repair of the mains/manholes in Subarea 1 and 3.

Table 6 Estimated Improvements Cost for Lining Subarea 1 and 3

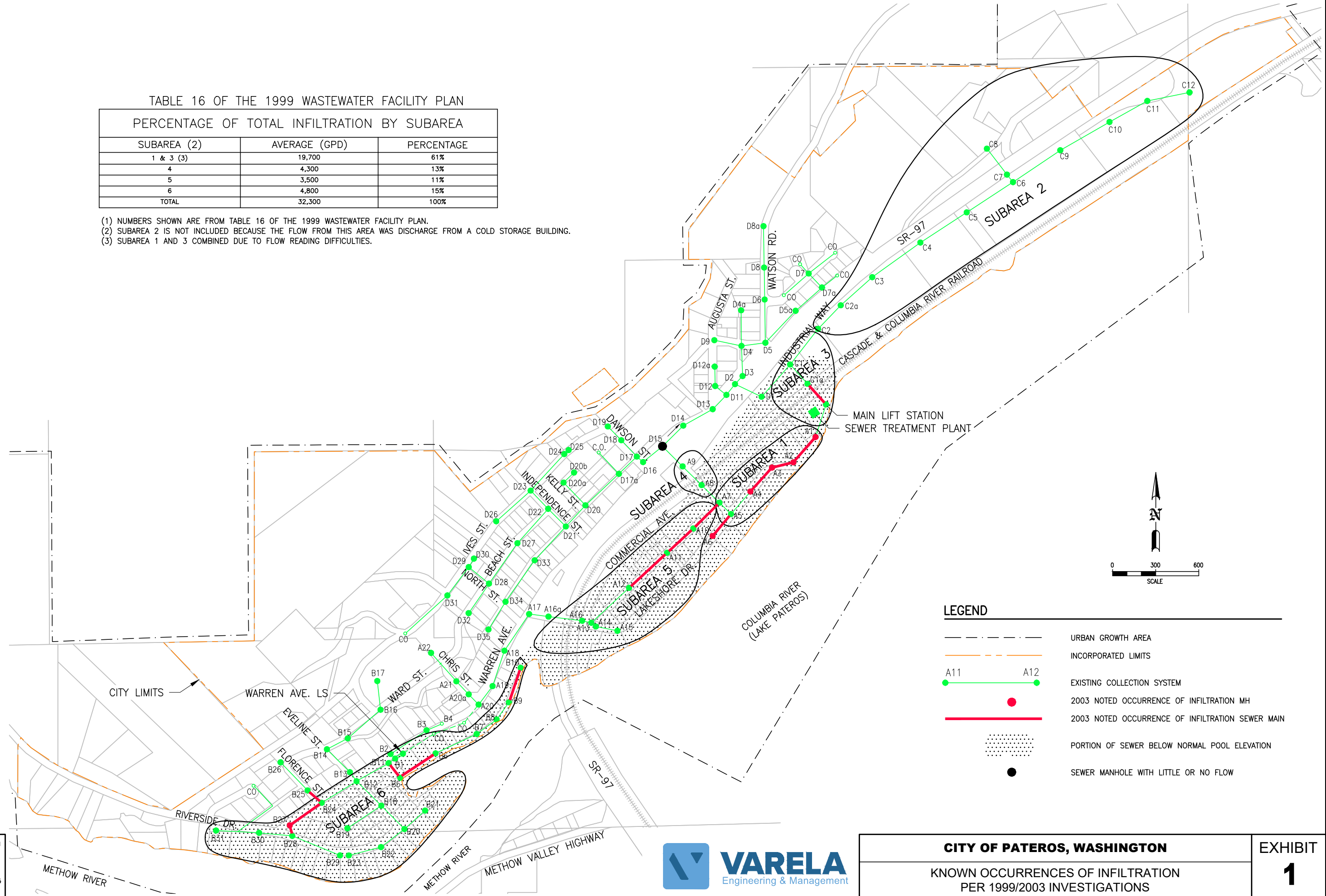
Description	Estimated Quantity	Units	Unit Price	Amount
Internal CCTV Inspection	2,400	LF	\$5	\$12,000
Root Removal	200	HR	\$625	\$125,000
Reopen Existing Sewer Service Connection	20	EA	\$450	\$9,000
CIPP Liner Installation, 8" Dia. ⁽¹⁾	500	LF	\$160	\$80,000
CIPP Liner Installation, 10" Dia. ⁽¹⁾	1,900	LF	\$175	\$332,500
CIPM Liner Installation ⁽²⁾	12	EA	\$3,000	\$36,000
Subtotal				\$457,500
Contractor Mobilization/ Admin. (10% of Subtotal)				\$45,800
Sales Tax (8%)				\$40,300
Contingency (25%)				\$125,800
Estimated Construction Cost				\$669,400
Eng, Const Mgmt, Inspection (25%)				\$167,400
Environmental Permitting				\$5,000
Estimated Improvements Cost Total				\$841,800

2. CIPP – Cast-in-place pipe
3. CIPM – Cast-in-place manhole

TABLE 16 OF THE 1999 WASTEWATER FACILITY PLAN
 PERCENTAGE OF TOTAL INFILTRATION BY SUBAREA

SUBAREA (2)	AVERAGE (GPD)	PERCENTAGE
1 & 3 (3)	19,700	61%
4	4,300	13%
5	3,500	11%
6	4,800	15%
TOTAL	32,300	100%

(1) NUMBERS SHOWN ARE FROM TABLE 16 OF THE 1999 WASTEWATER FACILITY PLAN.
 (2) SUBAREA 2 IS NOT INCLUDED BECAUSE THE FLOW FROM THIS AREA WAS DISCHARGE FROM A COLD STORAGE BUILDING.
 (3) SUBAREA 1 AND 3 COMBINED DUE TO FLOW READING DIFFICULTIES.



LEGEND

- URBAN GROWTH AREA
- INCORPORATED LIMITS
- A11 A12 EXISTING COLLECTION SYSTEM
- 2003 NOTED OCCURRENCE OF INFILTRATION MH
- 2003 NOTED OCCURRENCE OF INFILTRATION SEWER MAIN
- PORTION OF SEWER BELOW NORMAL POOL ELEVATION
- SEWER MANHOLE WITH LITTLE OR NO FLOW

572805 Exh A
 SCALE: AS SHOWN
 DESIGNED: NVH
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-05
 DATE: 7/07/22



Technical Memorandum TM-04
CITY OF PATEROS
WASTEWATER GENERAL SEWER PLAN AND FACILITIES PLAN
Treatment Facility Evaluation
July 8, 2022

1.1 Introduction

This Technical Memorandum (TM) provides evaluation of Pateros's existing wastewater treatment system and includes the following:

1. Description and design parameters of the existing treatment system
2. NPDES permit discharge requirements
3. An evaluation of wastewater treatment between 2016 and 2021 that includes:
 - a) influent flows and loadings
 - b) effluent discharge parameters
 - c) treatment performance
4. Discussion of the ability to meet current and projected flows and loadings

This evaluation is based on the planning projections and projected design flows outlined in TM-01 and TM-02.

1.2 Description of Existing Treatment System

1.2.1 Physical Layout / Components

The City of Pateros' Publicly-Owned Treatment Works (POTW) was originally constructed and placed into operation in 1967. The construction was necessitated by the increased pool elevation (Lake Pateros) caused by the construction of the Wells Dam hydroelectric project. The facility was extensively upgraded in 1985 and in 2001 underwent a complete and thorough upgrade which essentially abandoned the majority of the older plant.

The upgraded facility went online in March of 2001. The upgrades included: 1) Grit removal at the headworks; 2) A mechanically cleaned fine bar screen; 3) New activated sludge aeration basin/clarifiers; 4) New UV disinfection facilities; 5) New sludge dewatering facilities; 6) A new fence around the site; and 7) Various new buildings to house the new equipment. With completion of the POTW upgrades, the principal treatment plant operator must be certified by the State as, at least, a Class II operator.

Figure 1 (below) provides treatment plant location. **Exhibit 1** and **2** (attached) show the existing treatment plant facilities, process schematic, and hydraulic profile.

Figure 1 City of Pateros Treatment Facilities



1.2.2 Design Parameters

Table 1 shows design information from the 2001 Wastewater Treatment Plant Upgrade design plans.

Table 1 Design Parameters

Wastewater Flow / Loading	Flow (MGD)	BOD (lb/day)	TSS (lb/day)
Average Daily (AD)	0.125	260	300
Maximum Daily (MD)	0.180	395	540
Peak Hourly (PH)	0.58	-	-

1.3 Regulatory History

1.3.1 NPDES Permit Discharge Limits

Discharge of treated wastewater from the facility to the Columbia River occurs under NPDES Permit WA-0020559. The most recent NPDES permit was received by the City in February 2015. The NPDES permit was administratively extended in March 4, 2020. Current effluent limits are shown in **Table 2**.

Table 2 NPDES Permit Effluent Limits

Parameter	Average Monthly	Average Weekly
Biochemical Oxygen Demand (5-day / BOD5)	30 milligrams/liter (mg/L) 24.6 (lbs/day) 85% BOD5 removal	45 mg/L 36.9 lbs/day
Total Suspended Solids (TSS)	30 milligrams/liter (mg/L) 24.6 (lbs/day) 85% BOD5 removal	45 mg/L 36.9 lbs/day
Parameter	Monthly Geometric Mean	Weekly Geometric Mean
Fecal Coliform Bacteria (final limit)	100/100 milliliter (mL)	200/100 mL
pH	Daily Minimum is equal to or greater than 6.0 and the Daily Maximum is less than or equal to 9.0	

1.4 Evaluation of Existing Treatment

1.4.1 Influent Flows and Loadings

The treatment system was upgraded in 2000 to its current configuration. The treatment system is designed to treat wastewater from a population of 725 persons with an average annual flow of 0.125 MGD and a BOD load of 260 lbs/d lbs/d. The design peak hour flow is 0.58 MGD.

The annual average and maximum month flows and BOD loads are shown in **Table 3** and **Figures 2 and 3** provide a graph of the monthly averages. The DMR data from 2016 through December 2021 shows that influent flow and BOD5 loading has not exceeded the original design parameters.

Table 3 Annual Average Influent Flow Characteristics

Year	Avg Month Flow (MGD)	Max Month Flow (MGD)	Peak Day Flow (MGD)	Avg Month BOD (lbs/d)	Max Month BOD (lbs/d)
2016	0.054	0.065	0.108	116	169
2017	0.049	0.061	0.095	101	135
2018	0.049	0.058	0.081	99	112
2019	0.047	0.054	0.082	97	127
2020	0.046	0.054	0.082	96	114
2021	0.050	0.059	0.085	97	131
Average	0.049	0.059	0.089	101	131
Maximum	0.054	0.065	0.108	116	169
Design	0.125	-	0.18	260	-

Figure 2 Monthly Influent Flows (MGD)

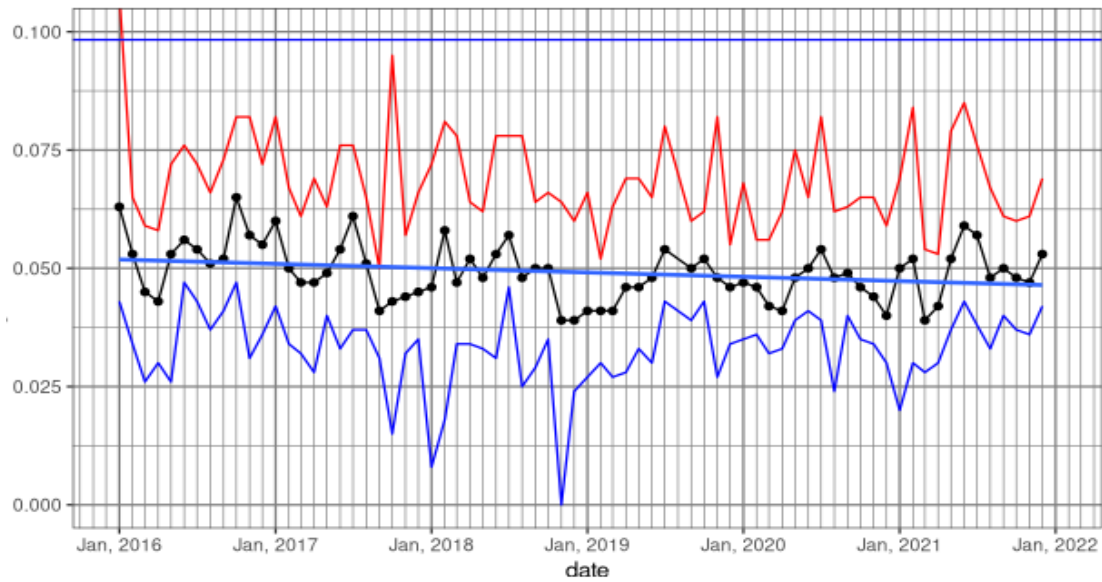
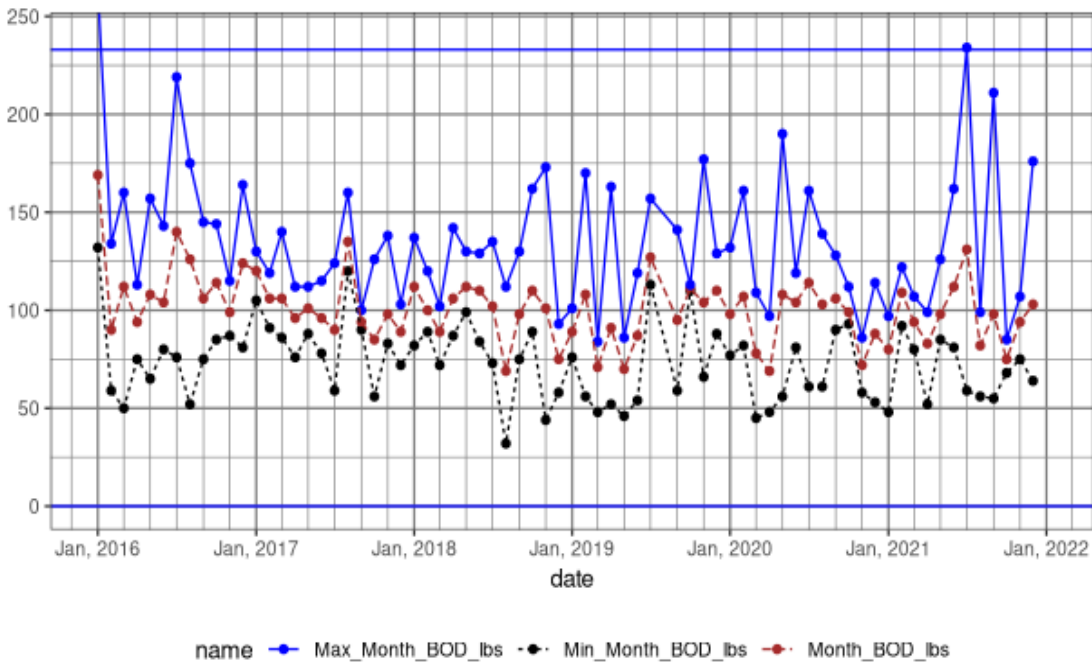


Figure 3 Monthly Influent BOD (lbs/day)



1.4.2 Effluent Characteristics

Effluent discharged from the treatment plant is regulated by NPDES permit limits. Most effluent parameters have both monthly and weekly effluent limits. The current 2015 NPDES permit (WA0020559) requires the City to report influent flow daily, influent BOD₅, and TSS once per week and influent pH five times a week. Effluent pH and temperature are measured five times a week while effluent dissolved oxygen (DO), BOD, and TSS are measured weekly. The following section summarizes effluent characteristics between 2016 and 2021 and provides graphs of monthly and weekly averages regulated by the permit.

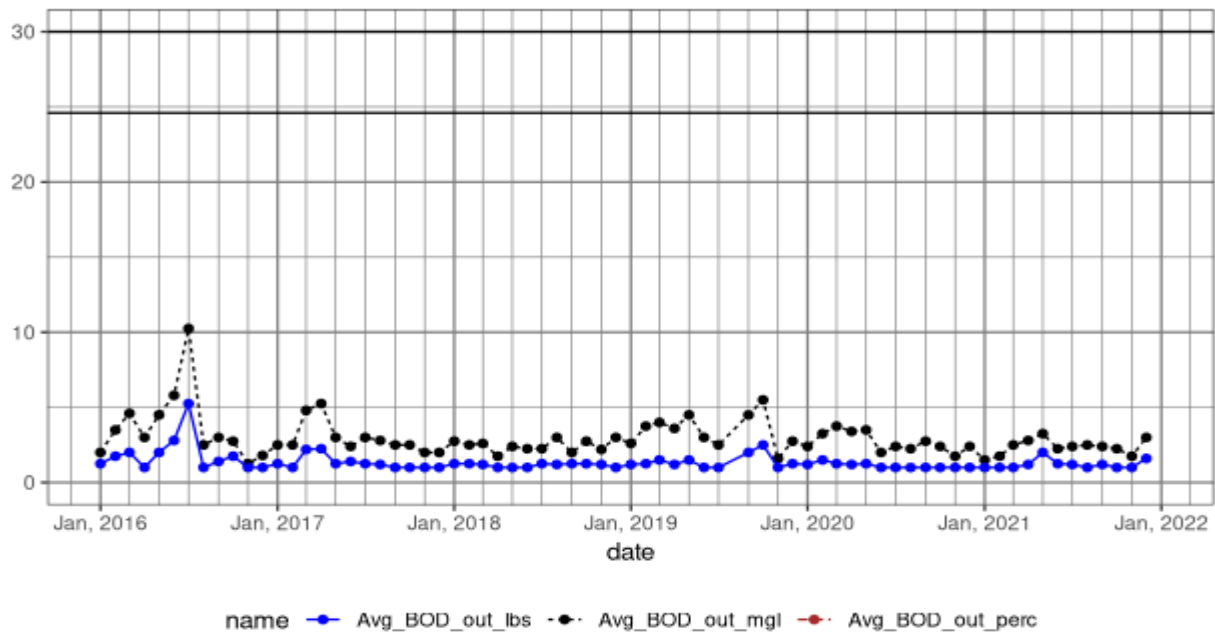
1.4.2.1 Effluent BOD

Table 4 and **Figures 4** shows effluent BOD characteristics.

Table 1 Monthly Average BOD Effluent Characteristics

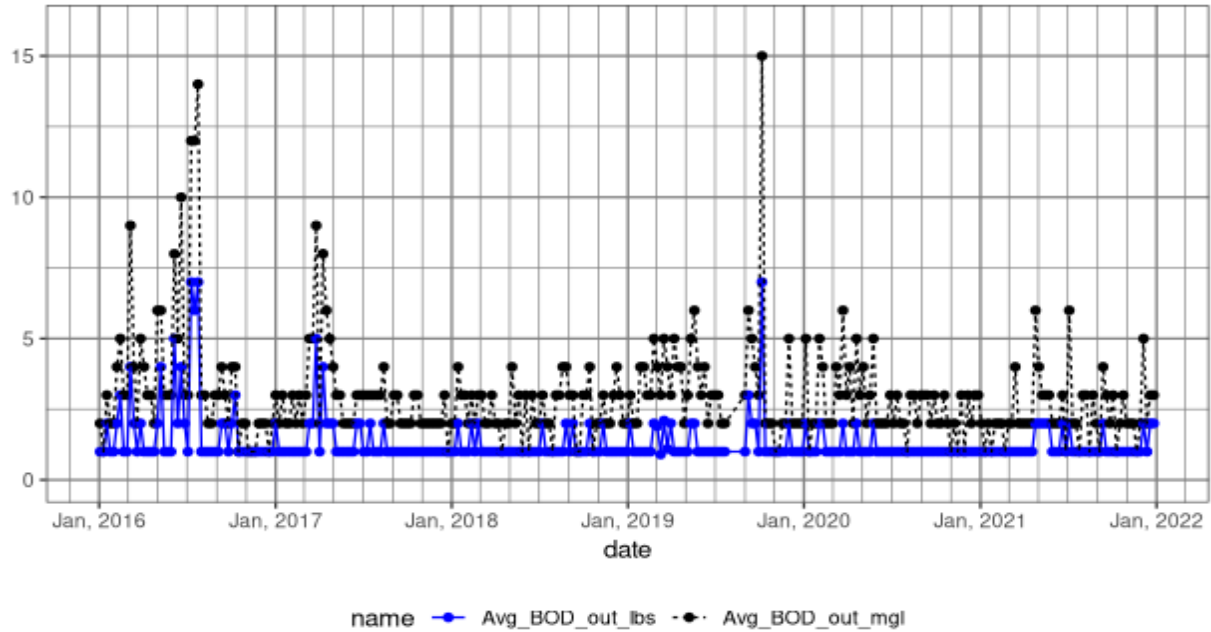
Year	Avg Month BOD (mg/l)	Max Month BOD (mg/l)	Avg Month BOD (lbs/d)	Max Month BOD (lbs/d)	Avg Month BOD (% removal)	Max Month BOD (% removal)
2016	4	10	2	5	98	99
2017	3	5	1	2	99	99
2018	2	3	1	1	99	99
2019	3	6	1	2	98	99
2020	3	4	1	2	99	99
2021	2	3	1	2	99	99
Permit Limit	30	---	24.6	---	85	---

Figure 4 Effluent Monthly Average BOD (mg/L and lbs/day)



The weekly effluent characteristics related to permitted BOD effluent limits are shown in **Figure 5**.

Figure 5 Effluent Weekly BOD (mg/L and lbs/day)



1.4.2.2 Effluent TSS

Table 5 and Figures 6 and 7 show the annual effluent TSS characteristics.

Table 2 Monthly Average TSS Effluent Characteristics

Year	Avg_Month TSS (mg/l)	Max_Month TSS (mg/l)	Avg_Month TSS (lbs/d)	Max_Month TSS (lbs/d)	Avg_Month TSS (% removal)	Max_Month TSS (% removal)
2016	9	14	4	6	95	97
2017	8	12	3	5	96	97
2018	9	14	4	5	95	97
2019	9	12	4	6	95	97
2020	9	15	4	5	95	97
2021	10	14	4	6	95	97
Permit Limit	30	---	24.6	---	85	---

Figure 6 Effluent Monthly TSS (mg/L and lbs/day)

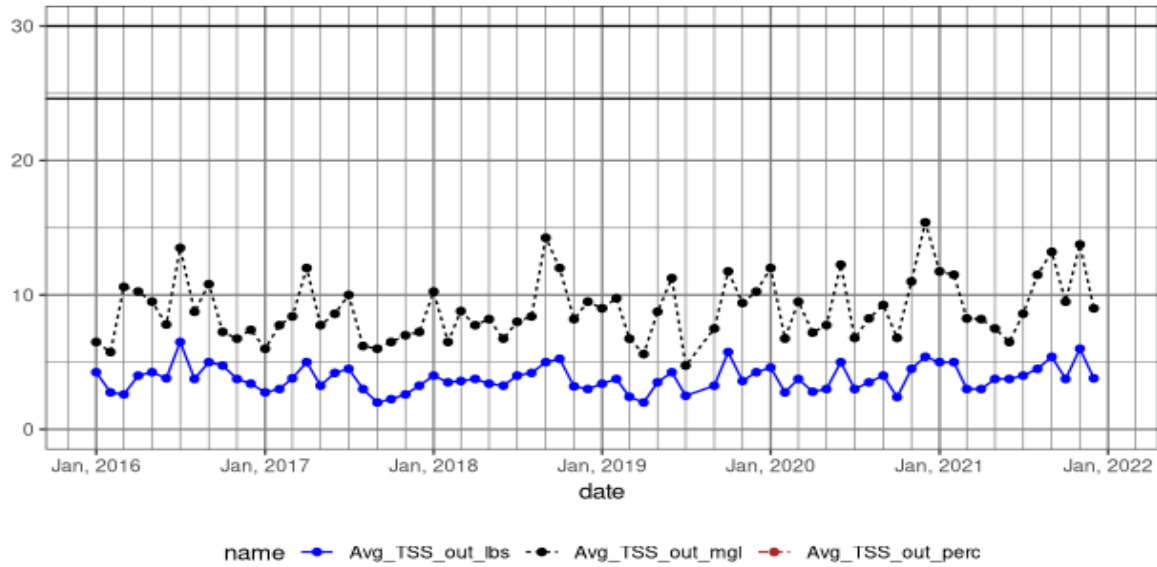
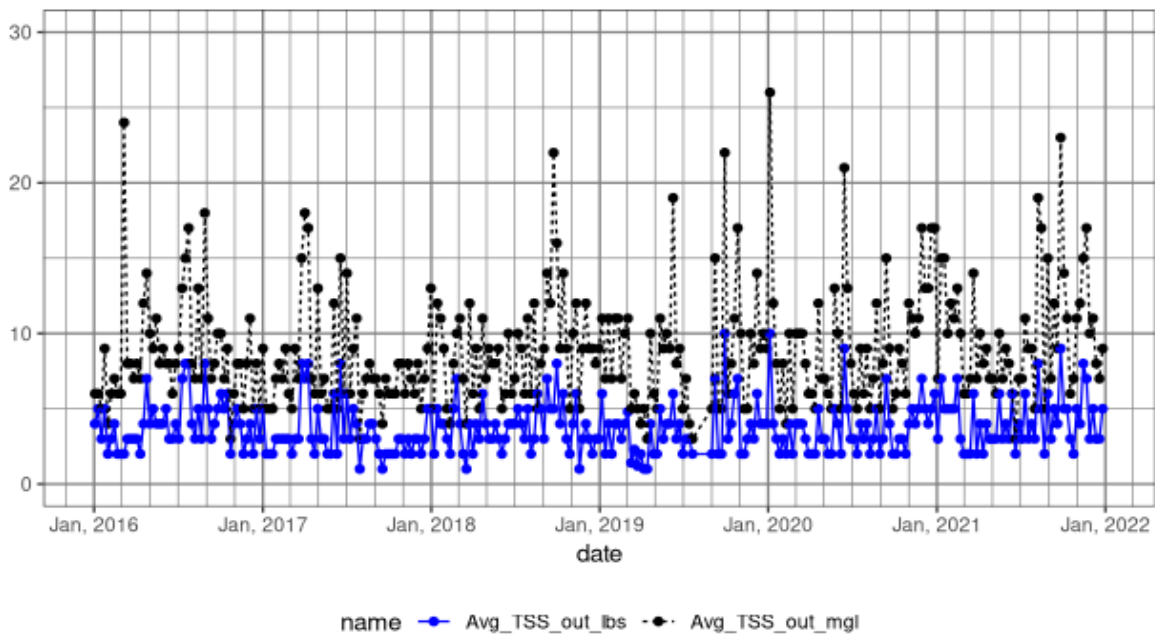


Figure 7 Effluent Weekly TSS (mg/L and lbs/day)



1.4.2.3 Effluent pH and Fecal Coliforms

In addition to the BOD and TSS effluent limits shown above, the NPDES permit includes limits for effluent pH and fecal coliforms. Daily pH limits are between 6.0 and 9.0 s.u. and effluent fecal coliform limits are 100 colonies/100/ml for a monthly average and 200 colonies/ 100 ml for weekly average.

Figure 8 Effluent Daily pH

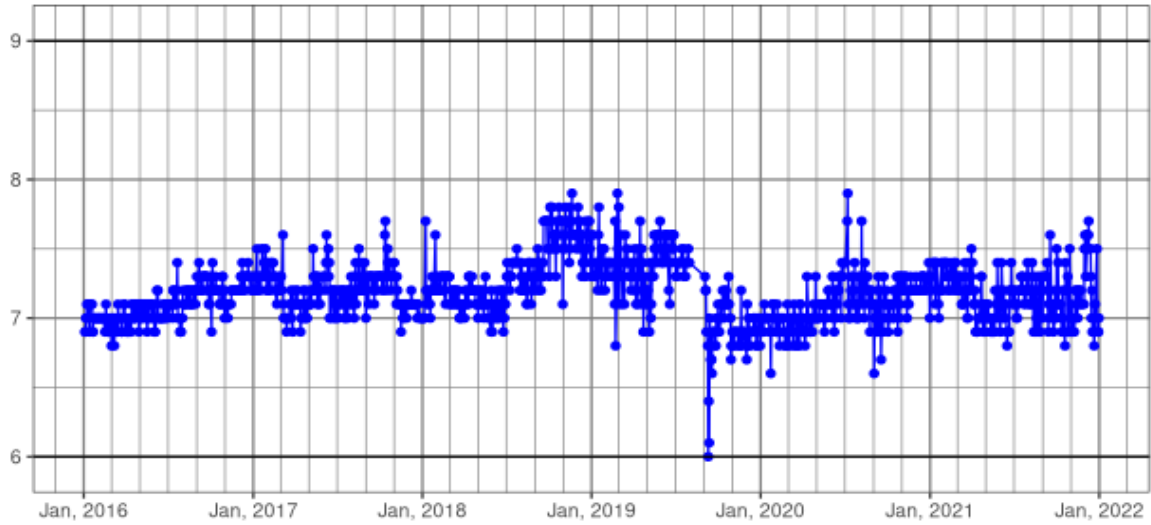


Figure 9 Effluent Fecal Coliforms – Monthly (no/100mL)

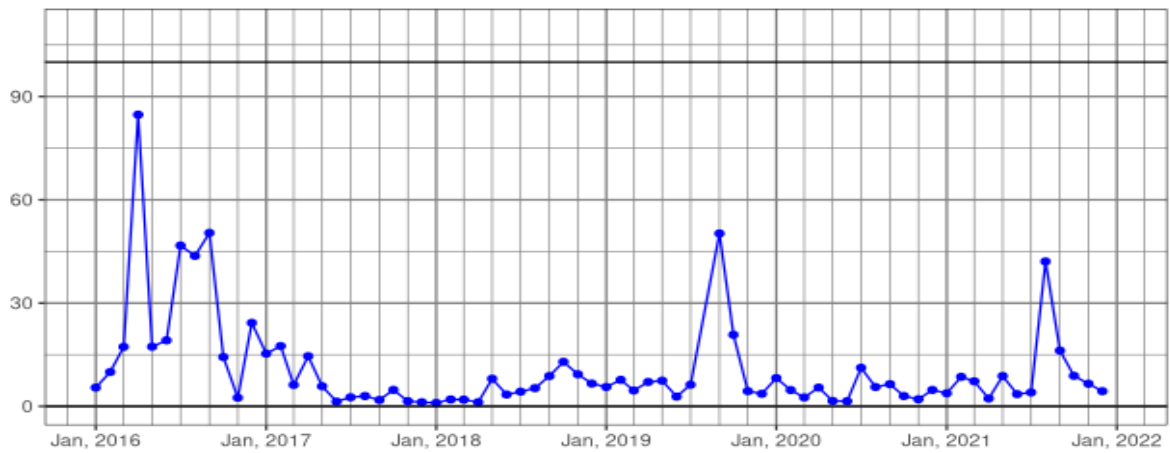
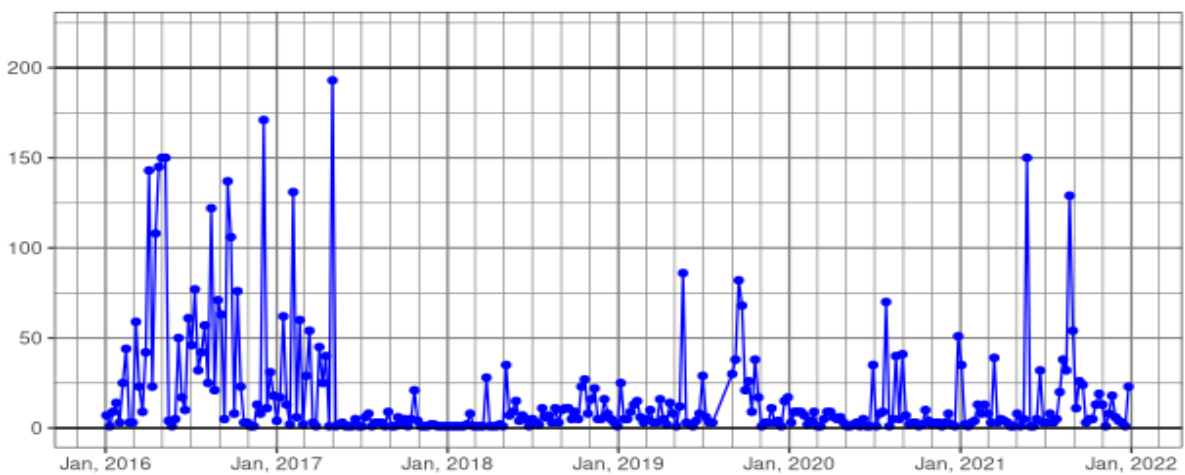


Figure 10 Effluent Fecal Coliforms – Weekly (no/100mL)



1.5 Treatment Observations

Using the 2016 through 2021 DMR data presented above the following observations are made regarding the City's treatment facility.

1.5.1 Influent Flows

2021 average annual influent flows (0.50 MGD) are 40% of the plant's design flow rate of 0.125 MGD. The 2021 average annual BOD loading of 97 lbs/d is 37% of the plant's design capacity of 260 lbs/d. Annual TSS loading 90 lbs/d or 30% of the design capacity. The NPDES permit, Section S4.A "Design Criteria" contains lower influent criteria saying that the facility must not exceed the following design criteria:

Table 6 Excerpt from Section S4.A of Pateros NPDES Permit – "Design Criteria"

Parameter	Design Quantity
Monthly average flow (max month):	0.0983 MGD
BOD5 influent loading:	233 lbs/day
TSS influent loading:	288 lbs/day

The treatment plant is operating at about 40% of its design influent criteria and a bit over 50% of the permitted influent criteria. The NPDES Fact Sheet does not describe the reason why the permitted influent criteria is lower than the design criteria. However, it appears the criteria Ecology used in the City's NPDES permit is the same criteria outlined in the 1999 Facility Plan; and may not have been updated to reflect the actual WWTP design criteria. It is recommended the City request Ecology revise the permitted design criteria to reflect the actual design capacity shown on the 2001 design plans.

Infiltration into the collection system is estimated at 80 to 85 gpcd well below the EPA guidelines of 120 gpcd. Annual I/I is estimated at about 0.02 MGD or about 30% of influent flow. Based on this I/I screening method, collection system I/I is not a major issues. A separate, more detailed I/I evaluation is discussed in TM-03.

Seasonal variability for influent flows is low with the peak month flow in June and July at about 1.3 times the lowest month flow in March.

1.5.2 Effluent Characteristics

The performance of the treatment lagoons are regulated on a number of effluent parameters. The parameters of interest include:

- BOD
- TSS
- Fecal Coliform
- pH

1.5.2.1 BOD Removal

Organic removal, measured as BOD is a primary function of the treatment system. The discharge permit regulates effluent BOD as a mass discharge, measured in lbs/day; a concentration, measured in mg/l, and as a percent removal. Both the mass discharge and the concentration are regulated as monthly and weekly averages. The percent removal is an average monthly value.

Average monthly BOD discharged from the treatment system remains very low (2-3 mg/l and 1-2 lbs/d) and very stable. Percent BOD removal is 99%. Weekly measurements are slightly higher with typically weekly effluent BOD at about 2 lbs/d with concentrations under 5 mg/l. This is well under the permitted effluent limits indicating that that treatment system is functioning well.

1.5.2.2 TSS Removal

Removal of Total Suspended Solids (TSS) is a primary function of wastewater treatment. The discharge permit regulates effluent TSS as a mass discharge, measured in lbs/day; a concentration, measured in mg/l, and as a percent removal. Both the mass discharge and the concentration are regulated as monthly and weekly averages. The percent removal is an average monthly value.

Average monthly TSS discharged from the treatment system remains low (10 mg/l and 4 lbs/d) and is very stable. Percent TSS removal is 95%. Weekly measurements are slightly higher with typically weekly effluent TSS at below 10 lbs/d with concentrations under 20 mg/l. This is well under the permitted effluent limits indicating that that treatment system is functioning well.

1.5.2.3 Effluent pH and Fecal Coliforms

Fecal Coliforms

UV disinfection is used to disinfect treated effluent. Fecal coliforms are the measurement used for disinfection efficiency. Both monthly (typical value under 10 org/100 ml) and weekly (typical range of 150 org/100 ml to 0) fecal coliform concentrations are well below the permitted limits.

Effluent pH

Annually effluent pH averages above 6.5 standard units (s.u.) and below 8 s.u. during the study period. This is within the permitted limits.

1.6 Existing Design Plant Capacity and Projected Flows/Loadings

The following table compares existing plant capacity (permitted capacity and actual—see discussion in Section 1.5.1) to future flows (2042).

Table 7 Existing vs Projected Flows/Loadings

Desc.		Existing (2022)	Plant Design Capacity		Future (2042)
			NPDES Permit	Per Design Plans	
Flow (MGD)	ADF	0.049	0.0983	0.125	0.119
	MDF	0.108	-	0.180	0.218
	PHF	n/a	-	0.580	0.461
BOD (lbs/day)	Ave. Day	101	233	260	227
	Max Day	169	-	395	337
TSS (lbs/day)	Ave. Day	87	288	300	184
	Max Day	138	-	540	247

1.7 Summary Discussion

This evaluation (based on the Daily Monitoring Reports [DMR's] between January 2016 and December 2021) shows that the treatment plant is operating well. DMR data shows that influent loading is about 40% of the original design criteria and between 50 and 60% of the NPDES permitted influent loads.

As discussed in Section 1.5.1, the WWTP's actual design capacity is higher than the permitted capacity. It appears the criteria Ecology used in the City's NPDES permit is the same criteria outlined in the 1999 Facility Plan; and may not have been updated to reflect the actual WWTP design criteria. The City should request Ecology revise the permitted design criteria to reflect actual design capacity (shown on the 2001 design plans).

Future flows exceed the WWTP's hydraulic capacity.

- The projected max daily flow exceeds hydraulic capacity by 21%; and only marginally meets projected ADF (95% hydraulic capacity).
- Existing hydraulic capacity is limited by the clarifiers which are currently sized for 400 gpd/sf at 0.125 MGD. Increasing hydraulic capacity of the plant would require expansion of the clarifiers.
- Projected flows are included in TM-02 (Flow and Loading Projects) and include projected residential, commercial, and new industrial flows. It may be possible to require flow equalization from industry and/or commercial to accommodate peak flows that occur during max day. However, given the growth the City anticipates, and given the projected ADF only marginally meets plant capacity, it is likely more appropriate for the City to plan to expand the hydraulic capacity of the plant. This could be done in conjunction with other needed improvements and/or as growth necessitates the additional hydraulic capacity. This will be discussed in a subsequent TM.
- Expansion to the existing sludge digestors is recommended (and will be discussed in a subsequent TM). Expansion includes constructing new sludge digesters on the north side of the treatment basin. If this improvement is completed, the old digester basins could be utilized for expanding the clarifiers. This would include removing the dividing wall between the existing clarifiers and the digestors, and expanding the clarifiers into the existing digester basins. With this expansion, plant hydraulic capacity will be sufficient to meet future flows.

Future BOD is within the plant design capacity but exceeds the 85% limit.

- The projected future BOD load consumes 87% of the WWTP biological capacity—leaving only 13% reserve capacity.
- Given the potential for breweries and/or fruit packing industry in the area, some additional BOD capacity is desirable. Typically, plants plan for expansion when they reach 85% capacity. Adding additional BOD capacity could be accomplished when other recommended maintenance upgrades are completed by adding additional aeration capacity (higher capacity blowers, additional diffusers, etc.).
- Due to increased BOD loads and the City's interest in replacing the current drying beds with a screw press dewatering system, increasing the size of the aerobic digestors is recommended.

Various plant maintenance upgrades are also recommended given the age of the existing treatment plant (22 years). We conducted a plant inspection with City staff on February 9, 2022; and have had follow up discussions with various equipment manufacturers. Given the age and condition of the existing treatment

plant, we recommend the City plan for various maintenance replacements / upgrades to reliably provide treatment for the next planning period. Recommended upgrades include:

- Minor upgrades to the influent lift station
- Replace influent screen
- Misc. upgrades/replacements to the secondary treatment system (AeroMod); including replacing aeration equipment and increasing blower capacity
- Replace/upgrade treatment system controls with new modernized AeroMod PLC that includes DO monitoring/control and remote access
- Replace UV modules and intensity probe
- Add additional digester volume; convert existing digestors to clarifiers
- Replace drying beds with new screw press dewatering system and associated facility
- Other misc. improvements

Recommendations and costs for these improvements will be included in a subsequent technical memorandum.



- AB Aeration Basin (Single Stage)
- BR Blower Room
- CL Clarifier
- CLB Existing Clarifier Building
- CR Control Room
- DG Digester
- DB Drying Bed
- EJM Effluent Junction Manhole
- EH Existing Headworks
- EOX Existing Oxidation Ditch
- FMM Flow Metering Manhole
- HR Headworks Room
- LAB Lab
- LS Existing Lift Station
- PLS Plant Lift Station
- PR Process Room
- SEL Selector Basin
- SHOP Shop
- SUR Surge Basin

572806-Site

LAKESHORE DR.

SCALE: AS SHOWN
 DESIGNED: NVH
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-06
 DATE: 6/29/22



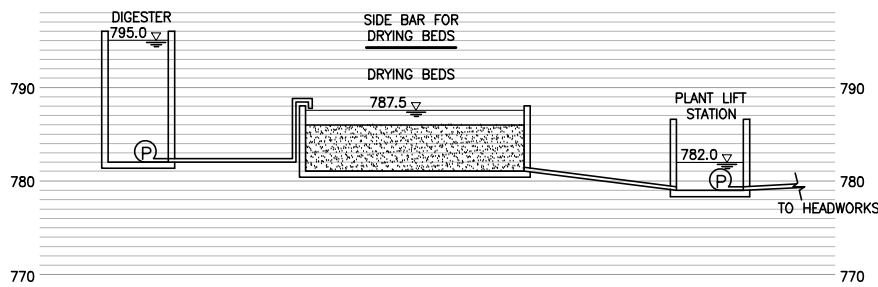
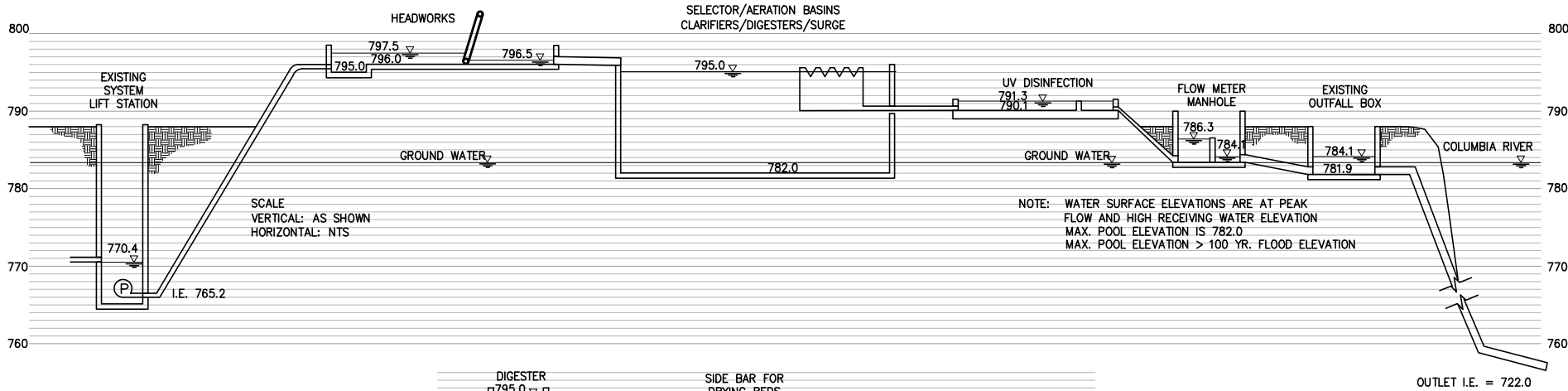
CITY OF PATEROS, WASHINGTON
WASTEWATER TREATMENT PLANT EVALUATION

EXISTING TREATMENT PLANT

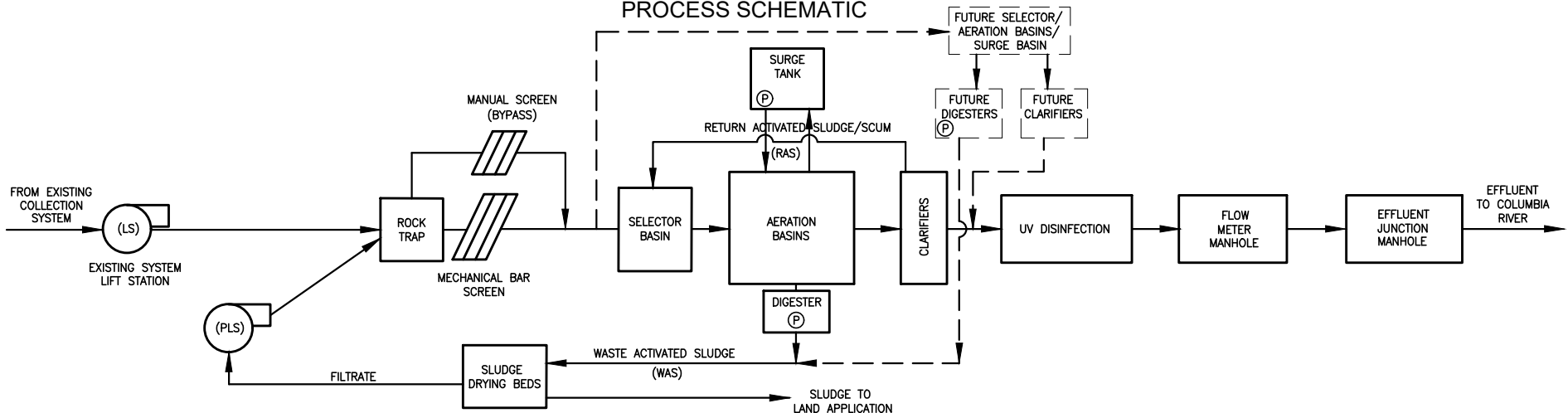
EXHIBIT

1

HYDRAULIC PROFILE



PROCESS SCHEMATIC



572806-Proc Sche&Hydr Prof

SCALE: AS SHOWN
DESIGNED: NVH
DRAWN: TVP
CHECKED:
APPROVED:
PROJ. NO.: 57-28-06
DATE: 6/29/22



CITY OF PATEROS, WASHINGTON
WASTEWATER TREATMENT PLANT EVALUATION

PROCESS SCHEMATIC & HYDRAULIC PROFILE

EXHIBIT

2

Technical Memorandum TM-05
CITY OF PATEROS
WASTEWATER GENERAL SEWER PLAN AND FACILITIES PLAN
Treatment Facility Improvements
August 19, 2022

1.1 Introduction

This Technical Memorandum (TM) provides recommendations and costs for improvements to the City's wastewater treatment plant (WWTP).

Recommendations are based on a document review, interviews with City staff, and site visits conducted on February 9, 2022 and May 25, 2022. This technical memorandum (TM) supplements evaluation documented in TM-04 Treatment Facility Evaluation, and previous TM's.

1.2 Project North

As shown on the existing treatment plant design drawings, existing facilities are aligned to "Project North" which is 37-degrees east of true north. For ease of description herein facilities will be described using "Project North". Both "Project North" and true north are shown on the attached figures.

1.3 Treatment Facility Improvements

The treatment facility history is discussed in TM-04. In general, the facility has operated well since it's construction in 2000; and is in satisfactory condition. However, the treatment plant has been in service for 22 years and needs maintenance upgrades to provide reliable service through the planning period. Additionally, some capacity improvements are needed to meet future flows/loadings outlined in TM-02.

This section provides evaluation and recommendations for treatment plant improvements needed to extend the life of the wastewater treatment plant through the next 20-year planning period. The major components of the treatment plant are briefly described followed by observations/issues, recommended improvements, and estimated costs. A summary of cost estimates for each component is provided in **Section 1.4.**

1.3.1 *Influent Lift Station*

Description:

- The treatment plant influent lift station is located in the grass landscape area on the east side of the WWTP—east of the headworks building and paved access/parking area. The influent lift station receives raw sewage from the collection system via two (2) 10-inch diameter mains; and pumps it to the treatment plant headworks via a single 8" diameter force main.
- The lift station was originally constructed in 1966 and consists of a Smith and Loveless 23.5' wet well/drywell duplex pump system with 3HP vertical pumps rated for approximately 250 gpm.

- The station includes a 4-foot diameter concrete wet well with separate dry pit that houses the pumps, valving, electrical and influent metering. The wet well also includes a 10-in diameter emergency overflow that discharges to a manhole upstream of the outfall
- Minor upgrades to the lift station were made during the 2000 plant upgrade. The pumps were replaced in 2011 along with some lift station electrical components.

Observations and Issues / Recommendations:

- Overall, the influent lift station appears to be in satisfactory condition. The dry pit interior appears in satisfactory condition with conduit and access ladder in working order. Pumps and electrical components were replaced/updated in 2011 and are reportedly in good condition. The wet well was not observed during our site visits but the City reports no problems.
- The maximum single pump capacity of the existing pumps is 250 gpm+/- which meets current peak flows estimated at approximately 130 gpm +/- . However, duplex pump stations should be designed to meet future peak hour flow (PHF) with only a single pump operating. TM-02 projects future peak hour flow at 320 gpm (0.461 MGD). This exceeds the capacity of a single pump and thus pumping capacity needs to be increased to meet projected future flows. It is recommended VFD's be considered to allow pump capacity flexibility.
- The lift station is located outside the WWTP fence and can be accessed by the public. Also, the existing fiberglass lid is aged and secured only by chain and padlock. The City feels the dry pit is a vandalism risk due to its proximity to Ive's Landing Park and boat launch. It is recommended the lift station site be fenced; and given the age/condition of the dry pit lid, it is recommended the existing dry pit lid be replaced.
- The City reports the lift station ventilation system is old and no longer functioning. Given the confined space of the dry pit, a new ventilation system should be installed.

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

<u>Influent Lift Station Upgrade Description:</u>	<u>Est. Cost</u>
New 320gpm pumps	\$45,000
Electrical and control panel upgrades to accommodate larger pumps	\$35,000
Piping, plumbing, valves	\$15,000
Pump installation	\$10,000
Instrumentation upgrades	\$5,000
Bypass pumping	\$30,000
Wet well inspection/repair budget	\$10,000
New dry pit lid replacement or refurbishment	\$5,000
Ventilation system	15,000
Fencing	\$10,000
Total:	\$180,000

1.3.2 *Headworks*

Description:

- The treatment plant headworks room is located on the far east side of the treatment building which is immediately south of the treatment basins. The headworks receives raw sewage from the influent lift station and consists of dual concrete channels, 1' 6" in width and approximately 2' 6" in depth. A mechanical fine screen is installed in the west channel; the east channel includes a manual bar screen w/ 1" openings. The channels also include a small rock trap located at the outlet of the force main.
- The headworks room is elevated to allow gravity flow through the WWTP. The finished floor elevation of the headworks room sits approximately 10' above ground elevation and requires stair access. The room is accessed via a set of stairs located outside on the east side of the building. The room is equipped with a ventilation system, heater, and hose (for spraying down the screen).
- The mechanical fine screen is an Envirex Series 1000 chain and rack mechanical bar screen manufactured by WSG and installed during the 2000 plant upgrade. The screen opening size is 3/8" and has a peak hydraulic capacity of approximately 1 MGD.
- The screen removes inorganic solids (i.e. manufactured inerts, plastics, etc.) from the wastewater before the biological process. Wastewater passes through the screen and solids (screenings) are captured on the outside of the screen. The screen is cleaned with a wiper lifted by a chain. The screenings discharge to a garbage can for disposal.
- The bar screen opening size meets the current state screening requirements for beneficial reuse of the biosolids (per WAC 173-308-205).

Observations and Issues / Recommendations:

- The City reports the mechanical screen has operated satisfactorily without significant issue since installation in 2000. However, typical service life for mechanical screening equipment is in the 20 to 30-year range. Pateros's screen is 22 years old and thus at, or near, the end of its service life. Given the screen's age and expected service life, we recommend Pateros plan to replace the existing screen. It is likely the most economical replacement will be with the same/make model; however, there may be other models/configurations worth considering.
- The most notable complaint the City has with the headworks system is the cumbersome and tedious job of removing and disposing of screenings. Currently screenings are wasted to a garbage can adjacent to the screen. The garbage can is then hauled out of the headworks room and either carried down a flight of stairs or dropped over the railing and disposed of in a waste dumpster located outside beneath the stairway.
- Options were considered to improve the wasting disposal method. One option includes installing a wash press compactor system after the influent screen to wash, compact, and convey the screenings to the waste bin located outside. This option would include replacing the screen with a screen compatible with a wash press system, installing a new wash press, and routing the discharge chute through the north side of the building down underneath the existing stairs above the treatment basin wall. See attached **Exhibit 1**. This option is labeled "Option 2" in the following cost section.
- In addition to replacing the mechanical screen (and possibly improving the screenings disposal method), it is also recommended the existing ventilation and electrical equipment in the

screenings room be replaced during the upgrade. Headworks are filled with caustic gasses from raw sewage which decrease the service life of equipment housed in that environment. It is unlikely the existing equipment will last the full planning period and we recommend it be replaced when the screen is replaced.

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

<u>Headworks Upgrade Description:</u>	<u>Est. Cost</u>
Option 1: Replace screen (same make/model as existing)	
Replace existing mechanical fine screen with like equipment	\$140,000
Delivery and installation	\$30,000
Replace existing ventilation and electrical equipment	\$25,000
Instrumentation/controls to tie into new plant SCADA system	\$10,000
Misc. building improvements	\$15,000
Option 1 Total:	\$220,000
Option 2: Replace screen and add wash press system	
New mechanical fine screen ⁽¹⁾	\$200,000
New wash press system ⁽¹⁾	\$140,000
Building and stair system modifications to accommodate new screen and wash press system	40,000
Delivery and installation	40,000
Replace existing ventilation and electrical equipment	\$25,000
Instrumentation/controls to tie into new plant SCADA system	\$10,000
Misc. building improvements	\$15,000
Option 2 Total:	\$470,000

1. Cost based on 18MR Raptor Multi-Rack bar screen and 35RWP Raptor Wash Press system. Pre-design to confirm actual screen and wash press system to be used as well as associated requirements and needed improvements.

1.3.3 Secondary Treatment System (Aero-Mod)

Description:

- Secondary treatment is provided by an Aero-Mod proprietary treatment system that includes selector tank, aeration basins, clarifiers, and aerated digesters constructed in concrete common wall basins. Associated aeration equipment and controls are located in the treatment building south of the treatment basins. The Aero-Mod equipment was installed as part of the 2000 wastewater treatment plant upgrade project.

- The following table shows sizing characteristics/capacity for each of the secondary treatment system components.

<u>Secondary Treatment System - Component Characteristics and Capacity:</u>	
Selector Basin	Number of basins: 1 Volume: 4,700 gal Ave retention time: 0.4 Hours Diffused air mixing (anoxic)
Aeration Basins	Number of basins: 2 (1 per train - single stage aeration) Total volume: 125,000 gal Ave retention time: 24 hours
Clarifiers	Number of clarifiers: 2 (1 per train) Ave surface overflow rate: 390 gpd/sf Max flow through clarifier: 800 gpd/sf Ave solids loading rate: 23 lbs/d/sf Max solids loading rate: 41 lbs/d/sf
WAS/RAS	Aero-Mod solids wasting/recycle airlift system
Aerobic Digestors	Number of basins: 2 (1 per train) Total volume: 22,000 gal Ave sludge retention time: 23 days Digester wasting pump: 5 HP (1 per tank)
Flow surge handling	Number of basins: 1 Volume: 8,000 +/- gals Flow surge capacity: 0.58 MGD for 1 hr Surge handled via basin storage and surge tank Surge return pump: 3/4 HP
Aeration	Numbers of blowers: 2 Horsepower (ea): 20 Capacity: 500 (sfcf)

Observations and Issues / Recommendations:

In general, the secondary treatment system has operated satisfactorily over its service life and met desired effluent limits. City staff does not report any significant known issues with the system.

During this evaluation both the existing condition and capacity of the Aero-Mod system and equipment were evaluated and discussed with the manufacturer. Given the age of the system (22 years) various maintenance replacements / upgrades are recommended to reliably provide treatment through the next planning period. Additionally, TM-04 evaluated the capacity of the treatment plant and identified capacity improvements needed to meet future flows/loadings. See TM-04 Section 1.7.

The following table provides observations/issues and recommended maintenance and capacity improvements needed for each individual component of the secondary treatment system. Note, this table is followed by additional comments/recommendations.

Component	Observations	Recommendations for 20-yr planning period
Concrete basins / structures	<ul style="list-style-type: none"> Satisfactory condition. No observed or reported structural concerns 	None
Selector basin	<ul style="list-style-type: none"> Satisfactory condition. 	None
Aeration basins / aeration equipment	<ul style="list-style-type: none"> Satisfactory condition considering age. City reports aeration/DO adjustments are manual, and automation is desired Adding DO/aeration automation will reduce energy costs 	<ul style="list-style-type: none"> Replace/upgrade aeration system including blowers, control valves (butterfly and pneumatically actuated valves), aeration assembly, compressor, etc. Add DO sensors and aeration automation/control system upgrade
Clarifiers / RAS system	<ul style="list-style-type: none"> Satisfactory condition considering age. No reported problems Clarifier is limiting component for plant capacity 	<ul style="list-style-type: none"> Replace/upgrade inlet screens, fiberglass suction hoods, and concrete form brackets Replace RAS airlift pump system Additional clarifier volume is needed to increase plant capacity
WAS / Digestors	<ul style="list-style-type: none"> Satisfactory condition considering age. No reported problems Digester volume is low—approx.15 days of storage More volume is typical (in the 30-day range) for flexibility; and is likely needed if the biosolids dewatering method is changed 	<ul style="list-style-type: none"> Replace/upgrade digester pumps Add additional digester volume if biosolids dewatering method is changed
Piping / Valving / Pneumatic actuator valves	<ul style="list-style-type: none"> Satisfactory condition City reports some freezing issues with existing valves 	<ul style="list-style-type: none"> Replace/upgrade misc. piping/valves throughout Add freeze protection to sensitive valves
Walkways / Handrails	<ul style="list-style-type: none"> Satisfactory condition. No additional walkways needed for existing basins/equipment 	<ul style="list-style-type: none"> None If digester volume is increased, add additional walkway to provide access to new basins
System Controls / Monitoring	<ul style="list-style-type: none"> System controls are both outdated and at end of service life No plant SCADA system Monitoring and adjustments do not use current technologies 	<ul style="list-style-type: none"> Upgrade control system with current Aero-Mod control panel and system automation Add plant SCADA system for control and data logging

Comments/Recommendations:

- The existing aeration basin configuration is not Aero-Mod's current standard which utilizes 2 stage aeration to allow for denitrification and higher efficiency aeration. Converting the existing system to a two-stage aeration system could be accomplished by installing an internal wall in the aeration basin with internal piping/appurtenances. However, since Pateros will not likely be required to denitrify, the efficiency savings alone will likely not be cost effective enough to justify the improvement. In the event future nutrient removal becomes a permit consideration, this will be revisited.
- The system currently manually adjusts aeration dose. We recommend the system be upgraded/retrofitted with Aero-Mod's current control system and DO sensors and automation. This will reduce O&M time and increase blower efficiency reducing energy costs.
- Capacity of the existing treatment plant is less than the projected 20-year flows/loadings (see TM-04). To safely meet projected flows/loading, plant capacity should be increased. This can be accomplished by: 1) adding clarifier capacity, and 2) increasing aeration capacity.
- Existing hydraulic capacity is limited by the clarifiers which are currently sized for 400 gpd/sf at 0.125 MGD. Increasing hydraulic capacity of the plant requires expansion of the clarifiers.
- The existing digestors are located adjacent to the clarifiers and are minimally sized and do not provide typical storage volumes. Given the projected higher organic loadings, and the changes the City is considering to the biosolids dewatering system (from drying beds to screw press), it is recommended additional digester volume be added. See following sections regarding recommended improvements to the existing dewatering system.
- Expansion to the existing sludge digestors could be accomplished by constructing new digestors on the north side of the treatment basin. If this improvement is completed, the old digester basins could be utilized for expanding the clarifiers. This would include removing the dividing wall between the existing clarifiers and the digestors, and expanding the clarifiers into the existing digester basins. With this expansion, plant hydraulic capacity will be sufficient to meet future flows.
- If digester and clarifier upgrades are made, it may also make sense to convert the surge tank into additional sludge storage, and adding telescoping valves, etc. to allow for sludge thickening and increasing the maximum sludge storage time.
- Future capacity increases (beyond what can be accomplished in the existing basins) will be accomplished by adding additional treatment basin volume to the west of the existing basin.
- It is recommended the treatment plant influent/effluent samplers be replaced.
- Given the age/condition of the buildings and site, it is recommended the City budget for some miscellaneous repairs/replacement etc.
- See attached **Exhibit 2**.

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Secondary Treatment System (Aero-Mod) Upgrade Description:	Est. Cost
Aeration Basin - Replace aeration equip and expand capacity	
Remove / dispose of existing equipment	\$10,000
Replace diffusers, piping, valving, etc	\$260,000
Digestors – Add digester capacity; new basins	
New basins (conc. walls, floor)	\$100,000
Aeration equipment (diffusers, piping, etc.)	\$65,000
Sludge pump system (Non-clog submersible)	\$60,000
Sludge piping, valves, appurtenances	\$15,000
New access walkway	\$10,000
Overflow Chamber – convert to sludge storage / multi-use	
Aeration equipment	\$60,000
Piping, valves, appurtenances (coring, etc.)	\$15,000
Retrofit existing weirs with slide gates	\$8,000
Sludge pump system (Non-clog submersible)	\$30,000
Clarifiers – add clarifier capacity, replace equipment	
Demo wall between digestors and clarifiers	\$10,000
Remove/dispose of existing clarifier equipment	\$10,000
Concrete work for clarifier mech install	\$25,000
New clarifier equipment and install	\$170,000
Piping and appurtenances	\$5,000
Electrical and Controls Upgrade and Misc. Equipment	
New plant control system (PLC)	\$250,000
DO monitors and controls upgrades	\$60,000
Misc. equipment (air comp, regenerative desiccant)	\$30,000
Misc. other improvements	
Bypass pumping and temporary facilities during construction	\$70,000
Site piping	\$50,000
Minor building updates / improvements	\$30,000
Samplers	\$10,000
Site fencing	\$30,000
Total:	\$1,383,000

1.3.4 *UV Disinfection System*

Description:

- The UV disinfection system is manufactured by Trojan Technologies, Model UV3500 PTP. The system is located in the treatment building and was installed during the 2000 upgrade.
- The UV system consists of prefabricated stainless-steel channel, 5 UV lamp racks with 4 lamps per rack, level control weir, UV dose monitor, cleaning rack, and appurtenances. Lamp racks are situated such that lamps are horizontal and parallel to flow.

- The reactor channel was not constructed with additional length to add lamp banks in the future, rather a separate parallel channel to the existing UV channel was considered when sizing the building. An additional bank can be added in the future if increased capacity is needed.

Observations and Issues / Recommendations:

- The UV disinfection system appears to be in good working order.
- The maximum capacity of the UV system is 0.5 MGD. This meets the projected future peak flow of 0.461 MGD.
- Given the age of the system, the manufacturer recommends the following replacements be made for reliable service for the next 20 years:
 - Replace all 5 UV modules
 - Upgrade control panel
 - Replace intensity sensor/monitor

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

<u>UV System Upgrade Description:</u>	<u>Est. Cost</u>
Replace UV modules (\$5,000 @ 5 each)	\$25,000
Upgrade control panel	\$10,000
Replace intensity sensor	\$3,000
Delivery/markup and installation	\$15,000
Total:	\$53,000

1.3.5 *Biosolids Processing and Dewatering*

Description:

- Waste activated sludge (WAS) is pumped from two (2) aerobic digester tanks located in the treatment basin to one of five (5) sludge drying beds. Each drying bed is approximately 1,225 sq-ft with an allowable maximum depth of 18". WAS is discharged to the drying beds through a 4" DI pipe system, and 2 1/2" manual quarter turn ball valves are used to distribute the WAS into each drying bed. Sumps are located at the center of each drying bed which collect the drying bed filtrate. The drying bed filtrate flows from the drying bed sumps to the plant lift station via 4" PVC pipe. The drying beds are uncovered.
- Dried biosolids are removed and stockpiled onsite before being hauled to the Boulder Park (BPI) beneficial use facility as Class B biosolids.
- In 2019 (25) dry tons of biosolids were produced according to the City's Biosolids annual report.

Observations and Issues:

- The drying beds are in satisfactory condition; and based on the bed design capacity has sufficient capacity to dry the projected future WAS volumes.
- The City reports that during winter months biosolids do not dry and accumulate in the drying beds. Drying beds are uncovered and are ineffective during winter and periods with high precipitation amounts leading to storage issues on-site. This leads to lack of drying during the winter and spring with related storage issues until the biosolids can be dried and hauled away. Covering the beds would likely improve WAS drying.
- Maintaining the drying beds is a time consuming and tedious job for the City requiring significant manual labor. The existing distribution equipment does not work properly and/or is problematic and the beds must be raked and leveled by hand.
- There is no room on-site to store biosolids. Capacity within the drying beds will likely become an issue in the future due to the increase in projected flows leading to increases in biosolids.

Recommendations:

- There are a variety of dewatering methods to replace the drying beds that were discussed with the City (screw press, centrifuge, belt filter press, etc.). A screw press dewatering system is recommended. Screw presses are reliable, require little maintenance, achieve a high percent dry solids, and are a commonly used cost effective choice for smaller treatment plants.
- A screw press system requires a new dewatering room to contain the screw press, controls, and chemical feed. This could be located as an extension to the treatment building (see **Exhibit 3**). The new room can be configured to allow for direct discharge of dewatered biosolids to a truck or container that can be used for haul to the Boulder Park (BPI) facility. Another option would be to locate a new dewatering building at the southwest corner of the site. However, for planning purposes, costs herein are based on extension of the existing treatment building.
- The existing sludge digestors have minimal storage volume—approximately 15 days of storage at design. More typical values are in the 30 day range. The treatment system manufacturer recommends increasing the volume of the aerobic digesters (see recommendations in the secondary treatment system section). It may also be beneficial to convert the surge tank into a sludge thickening tank which will also provide additional storage volume. Projected solids wasted from the sludge holding tank is 680 gallons per day of 2.5% solids, or 142 lbs/d of dried sludge (average of 6 lbs/hr).
- Screw presses used locally are manufactured by FKC, Huber, and PWT. This TM is based on evaluation of the smaller FKC screw press capable of processing 1.5 tons per day (60 lbs/hr). With chemical addition of a polymer, the screw press provides a discharge of 15% to 20% biosolids that are conveyed to a dried solids container and pressate pumped to the headworks. Biosolids would be stored onsite for transportation to BPI for incorporation into the soil.
- New Solids Processing Building – includes construction of a new one room treatment building addition approximately 30 foot by 25 foot. Solids Processing Building to house the screw press. Adjacent to the new building will be a covered dewatered biosolids storage area. The screw press requires footprint for both the screw press and space for controls, chemicals addition equipment, polymer storage, etc. The room will be lighted and heated. New building elements to include:

- Concrete footings/concrete floor/floor drainage system
 - Metal sidewalls and roof, insulated (match existing building)
 - Electrical lighting, fixtures and outlets (110, 220, 480-volt services)
 - HVAC system to allow 4-5 air changes per hour, with dehumidifier
 - Heating
 - Domestic water supply
 - WAS piping from aerated digester / sludge storage to screw press
 - Chemical Storage Area (polymer storage)
 - Fire detection system
- New Covered Storage Area for the dewatered biosolids should be constructed adjacent to the biosolids processing building. Based on a projected dried biosolids amount of 142 lbs/day at 15% solids. This equates to 450 cubic foot (cf) per month) of dried solids. At a five-foot depth 90 square feet of storage per month is required for storage. Converting two of the existing 1250 sf drying beds for storage can provide about 6 months of storage. The new storage area requirements include:
 - Floor drainage system (existing)
 - Concrete sidewalls at five feet high—utilize ecology blocks
 - Metal roof over storage area
 - Electrical lighting, fixtures
 - Yard plumbing for wash down water
- Electrical & Controls - The screw press is a skid mounted device, equipped with a NEMA 4 control panel to operate the polymer injection system, screw press, and conveyor. The press requires a 480-volt, 3 phase power supply.
 - Odor Mitigation - Odor is not anticipated to be an issue during typical wasting and dewatering of biosolids; aerobic digestion produces a low odor sludge. In the event odor does create problems, screw press screen scrubbing is available to assist in odor mitigation inside the building. An HVAC system will be designed to perform 4-5 air changes per hour, minimizing odor buildup. Another condition odors may occur is during moving of piles of stored dewatered biosolids, which may have anaerobic conditions within the pile. This could produce temporary severe odors. If this occurs the operator should schedule moving/hauling of biosolids to minimize effects. If needed the new covered storage area can be closed in and equipped with odor mitigation.
 - Beneficial Use of Biosolids - The proposed biosolids system is intended to provide treatment and operation flexibility for meeting Class B requirements for disposal of treated biosolids. Treated biosolids will be disposed at the Boulder Park Incorporated (BPI) facility near Mansfield, Washington as is currently done. BPI requires biosolids be dewatered to a minimum of 10% solids and to meet the pathogen reduction requirements of WAC 173-308-170 and vector reduction requirements of WAC 173-308-180.
 - Conformance with pathogen reduction requirements will be met via fecal coliform testing (WAC 173-308-170 (5) Alternative 1). This is consistent with similar systems in the area meeting Class B requirements with similar facilities. If compliance is not met via fecal coliform testing, BPI will still receive the non-Class B biosolids for an additional fee; and will provide the additional treatment and/or immediate incorporation as needed to meet WAC 173-308 requirements for Class B.
 - Compliance to meet vector attraction reduction requirements will be met via soil incorporation at BPI or SOUR test.

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

<u>Dewatering System Upgrade (New Screw Press) Description:</u>	<u>Est. Cost</u>
Demolish/remove 3 drying beds; modifications to keep 2 beds; covered biosolids storage area	\$300,000
Building extension	\$250,000
Screw press	\$400,000
Delivery and installation	\$30,000
Piping/plumbing/valves	\$60,000
Electrical/controls	\$100,000
Site piping revisions around building extension	\$15,000
Access driveway	\$40,000
New gates and fencing	\$10,000
Total:	\$1,205,000

1. Cost does not include submersible pump system from digesters. Refer to Secondary Treatment System Upgrade Description.

1.3.6 *Outfall*

Description:

- Secondary treated and disinfected effluent is discharged from the facility via an outfall that extends approximately 550 feet offshore and terminates as an open-ended pipe. The outfall lies approximately 50-59 ft below the surface of the Columbia River at River Mile 524.1. According to the 2000 Wastewater Treatment Plant Upgrade design plans, the outfall consists of a 12-in concrete pipe.

Observations/Issues an Recommendations:

- The outfall is submerged below Lake Pateros and was not observed. City staff are unaware of the exact location or condition of the outfall.
- It is recommended the outfall be video inspected and the exact location end of the outfall discharge be located.

Costs:

- Estimated budget for video inspection of the outfall is \$10,000
- Additional improvements and/or repairs unknown.

1.3.7 *Electrical/Lab Building/Site/Misc.*

Descriptions/Recommendations:

- The City does not report any known electrical issues with the existing treatment plant electrical system. No electrical system evaluation was completed as part of this evaluation. However, given the age of the plant, it is likely the electrical system is in satisfactory condition and adequate service life remains for the next planning period. Some controls components are known to be

obsolete and/or problematic and need upgrading. Those items are covered in other improvements.

- The original lab/operations building was located on the east side of the site. That building was demolished and replaced with a building addition located on the north side of the City shop. The new lab provides adequate space for plant operations and testing. The City did not report any equipment needed at this time.
- The wastewater treatment plant site is located adjacent to the Columbia River. The site consists of 3 separate parcels that total approximately 1.7 acres. All parcels are owned by the City (parcel numbers: 2180010000, 2180020300, 2180020200). The treatment plant site is surfaced with gravel with little to no landscaping. The perimeter of the plant is fenced with a 6' chain link fence. Access to treatment components and structures appears adequate. In general, site conditions are satisfactory. The treatment plant site is also being used to store a variety of old mechanical equipment and various items. During future treatment plant upgrades the City should consider removing any items that are no longer needed or useful.
- Cross connection for Pateros's WWTP is currently accomplished by use of individual backflow assemblies at various locations throughout the treatment plant. Premise isolation for the site is not provided. Department of Health (DOH) provides guidance on requirements for cross connection control for wastewater treatment plants. DOH guidance considers wastewater treatment plants "high severity" and requires premise isolation. This means typically treatment plants are required to provide complete hydraulic separation from the City's potable water supply; this is typically done using a reduced pressure backflow preventer with an additional air gap and repump system for process isolation. This requirement for Pateros's WWTP should be confirmed with the City's cross connection control specialist.
- An air gap repump system should be installed during the treatment plant improvements. The air gap system should be sized to accommodate anticipated current and future water demands and should include duplex pumps with flow pacing via VFD / pressure tank combination. Controls for the system should be integrated into the treatment plant SCADA system. It is assumed the air gap system will be housed in the biosolids dewatering building addition. Costs herein do not include construction of a new structure to house the CCC system.

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

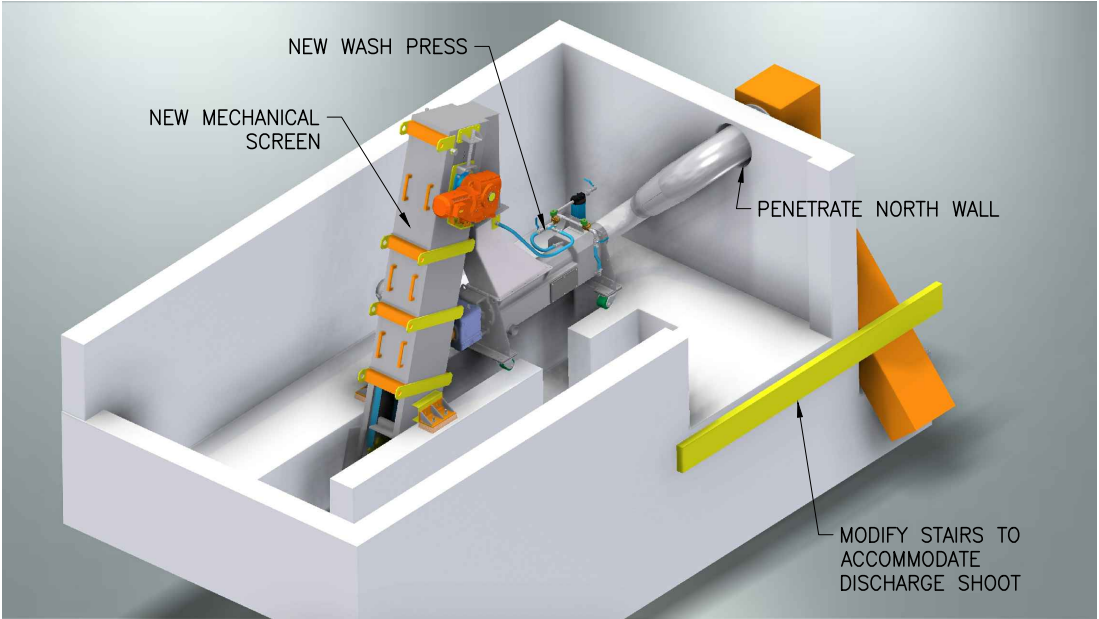
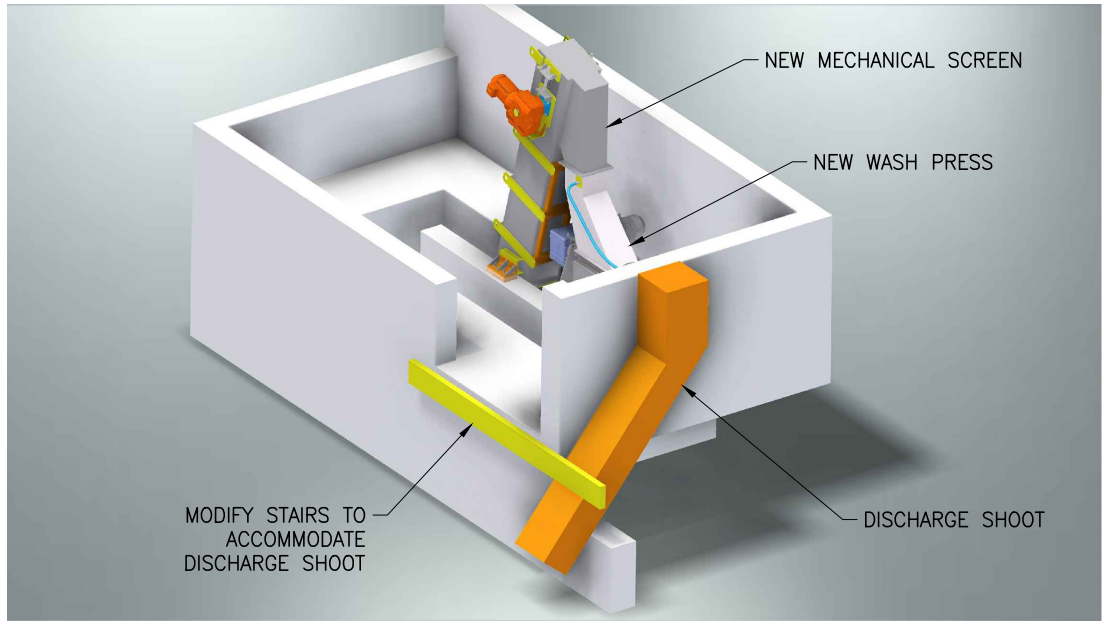
<u>Cross Connection Control System Description:</u>	<u>Est. Cost</u>
Reduced pressure backflow assembly for premise isolation	\$25,000
Building/expansion	Use dewatering imp. addition
Skid mount cross connection control repump system	\$180,000
CCC system installation	\$30,000
Site piping revisions to accommodate new CCC system	\$20,000
Electrical/controls/SCADA for CCC system	\$70,000
Total:	\$325,000

1.4 Summary of Costs

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Improvement Description (per TM-05)	Est. Cost ⁽¹⁾
Influent Lift Station Upgrade	\$180,000
Headworks Upgrade ⁽²⁾	\$470,000
Secondary Treatment Upgrade	\$1,383,000
UV System Upgrade	\$53,000
Dewatering System Upgrade	\$1,205,000
Outfall Video Inspection	\$10,000
Cross Connection Control System	\$325,000
Site and Misc.	\$50,000
Subtotal:	\$3,676,000
Contractor mob/admin/overhead/profit (15% of Subtotal)	\$551,000
Subtotal Construction:	\$4,227,000
Sales tax (8.6%)	\$364,000
Contingency (25%)	\$1,148,000
Construction Cost:	\$5,739,000
Eng, admin, const mgt, insp (30%)	\$1,722,000
Admin/environmental/funding	\$80,000
Estimated Improvements Cost Total:	\$7,541,000

1. Costs rounded to the nearest thousand.
2. Assumes Option 2. See Section 1.3.2.



572806-Headworks

SCALE: AS SHOWN
 DESIGNED: DDC
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-06
 DATE: 6/29/22

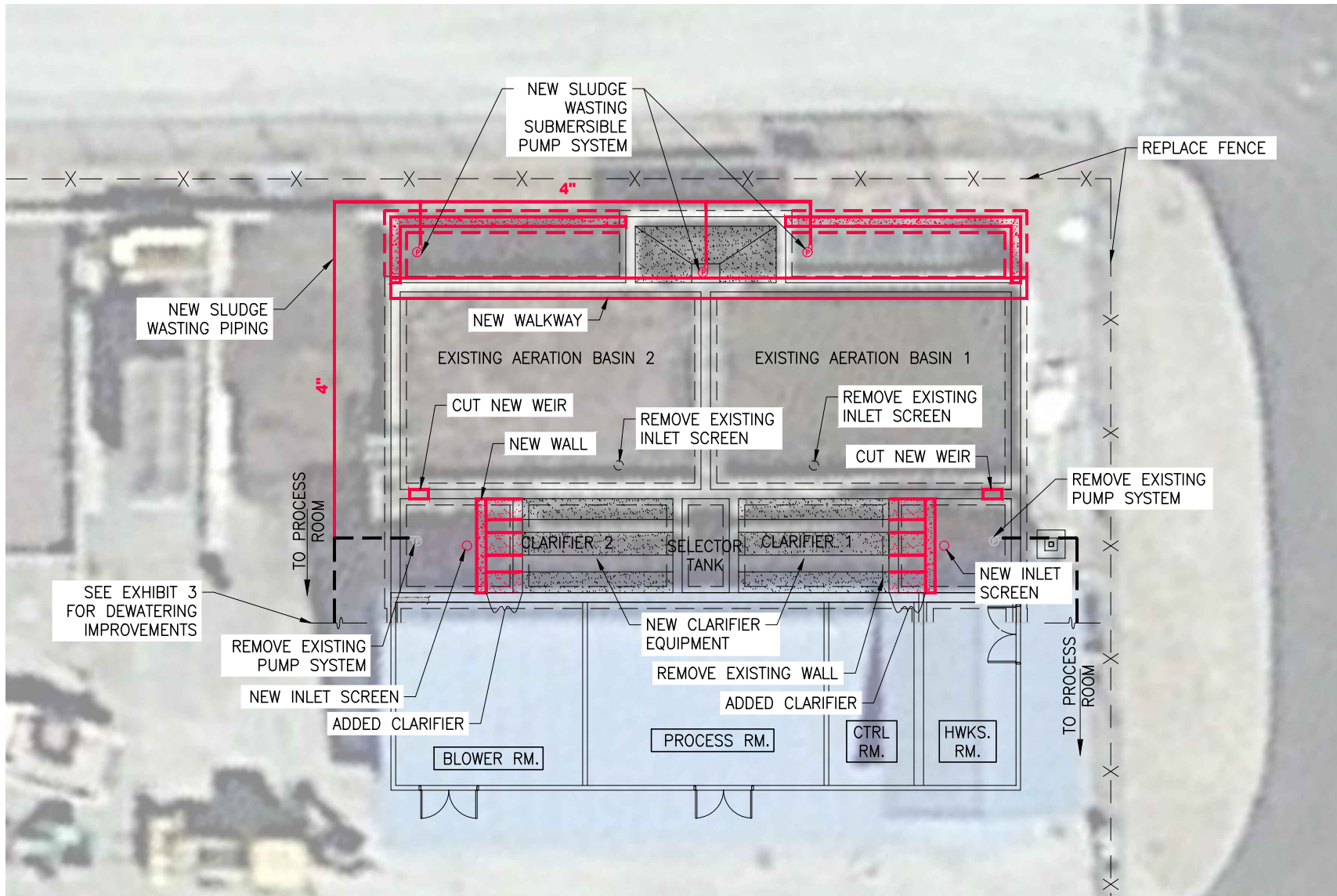


CITY OF PATEROS, WASHINGTON
 WASTEWATER TREATMENT PLANT EVALUATION

WASTEWATER TREATMENT PLANT IMPROVEMENT
HEADWORKS: REPLACE SCREEN AND ADD WASH PRESS OPTION

EXHIBIT

1



GENERAL NOTES:

1. REPLACE ALL ELECTRICAL AND CONTROLS EQUIPMENT

SCALE: 1/16"=1'-0"

572806-AeroMod Basins

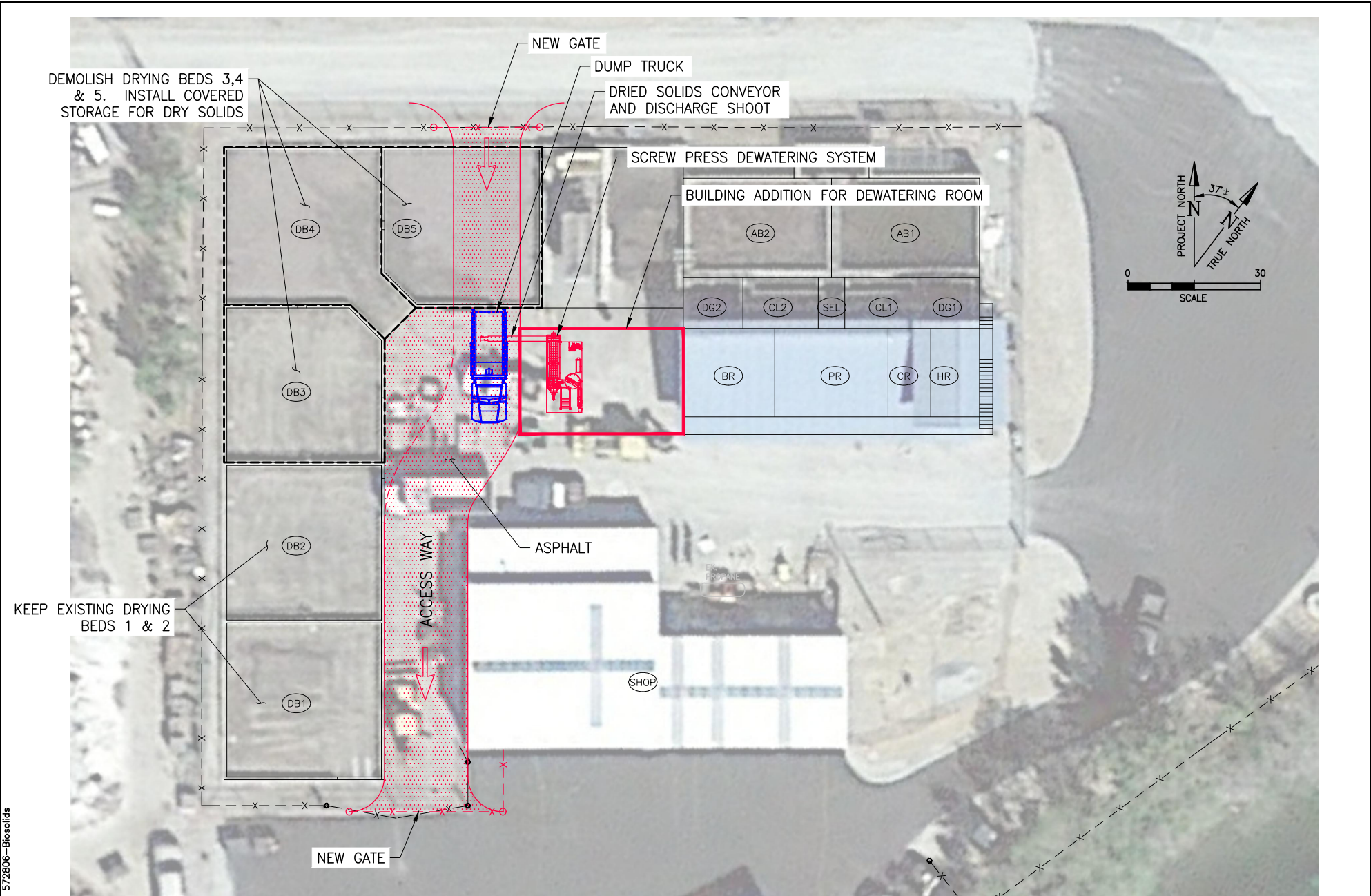
SCALE: AS SHOWN
 DESIGNED: NVH
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-06
 DATE: 6/29/22



CITY OF PATEROS, WASHINGTON
WASTEWATER TREATMENT PLANT EVALUATION

SECONDARY TREATMENT SYSTEM IMPROVEMENTS

EXHIBIT
2



572806-Biosolids

SCALE: AS SHOWN
 DESIGNED: NVH
 DRAWN: TVP
 CHECKED:
 APPROVED:
 PROJ. NO.: 57-28-06
 DATE: 6/29/22



CITY OF PATEROS, WASHINGTON
WASTEWATER TREATMENT PLANT EVALUATION

DEWATERING SYSTEM IMPROVEMENTS

EXHIBIT

3

APPENDIX D

Apple House Contract

113 Lakeshore Drive
PO Box 8
Pateros, WA 98846



Phone: 509.923.2571
Fax: 509.923.2971
E-mail: pateros@swift-stream.com

2020-2022- Apple House Contract

Apple House Sewer – The Pit Account

This account is for the wash water process coming out of the building (PIT). Water from their well and/or city water (Apple House Sewer Account) is used in this process. The amount is calculated on 20 ERU's per month.

Commercial Sewer and no water on this account – There is a meter on the outflow of wastewater. (*Meter is in 100's – add two zeros to amount*)

Typical Monthly Billing Costs as referenced in Contract 4.F, 5.A, 5.B, 5.D

4.F Testing Cost: Actual testing costs plus **\$280.00** (based on 8 hours @ \$35 hour 2022 Hourly Rate of City Employee) per month for city employees added each month. Hourly rate based on the City Fee Schedule for hourly rate of City Employee.

5.A Base Rate: 20 ERU's X ~~55.00~~ 58.79 (monthly rate) = ~~\$1,100.00~~ \$1,175.80 is the ~~2020~~ 2022 Base Rate - This amount will automatically calculate as well as the amount for the additional use. Base Rate is the Industrial Rate per the City's Fee Schedule.

5.B Surcharge rate for additional flow:

~~\$55.00~~ 58.79 per ERU ÷ (175 gallons per day X 22 days per month ÷ 1000 gallons = 3.85)

~~\$55.00~~ 58.79 ÷ 3.85 = ~~\$14.29~~ 15.27 per thousand gallons extra.

Sample (using 2020 rate): 85,000 – 77,000 (77,000 allowed) = 8,000 extra X ~~\$14.29~~ 15.27 (surcharge rate per 1,000) = \$114.32. extra. An ERU is the Base Rate for one business per the City's Fee Schedule.

5.D Additional Strength Charge – After satisfactory completion of the additional settling tank for TSS, the City will use the average of the monthly TSS samples and the average of the monthly BOD samples to determine the Additional Strength Charge. When there are two consecutive months of a single sample of BOD or TSS above 2000 mg/l of BOD or TSS the City will return to using the single highest sample until there are consecutive months of BOD and TSS sample levels below 2000 mg/l.

The City will provide reports for all samples taken that say "APPLE HOUSE TESTING WORKSHEET" on the top. This is for calculating the BOD/TSS amount.

As per 5.D of the contract, the Monthly Rate will be adjusted according to Additional Strength Charges. The monthly rate is the Monthly Base Charge plus the Additional Flow Charge multiplied times the additional strength multiplier. The Additional Flow Charge will not be added to the Monthly Base Charge when BOD/TSS is above level 6. The additional strength multiplier is found in the following chart:

	Additional Strength Multiplier	BOD/TSS Limits
Level 1	1 (MBC + AFC x ASC)	BOD/TSS not to exceed 300 mg/l
Level 2	1.5 (MBC + AFC x ASC)	BOD/TSS of 301 mg/l not to exceed more than 400 mg/l
Level 3	2 (MBC + AFC x ASC)	BOD/TSS of 401 mg/l not to exceed more than 500 mg/l
Level 4	3 (MBC + AFC x ASC)	BOD/TSS of 501 mg/l not to exceed more than 1000 mg/l
Level 5	4 (MBC + AFC x ASC)	BOD/TSS of 1001 mg/l not to exceed more than 2000 mg/l
Level 6	5 (MBC + AFC x ASC)	BOD/TSS of 2001 mg/l not to exceed more than 3000 mg/l
Level 7	6 (MBC + AFC x ASC)	BOD/TSS of 3001 mg/l not to exceed more than 4000 mg/l
Level 8	7 (MBC x ASC)	BOD/TSS of 4001 mg/l not to exceed more than 5000 mg/l
Level 9	8 (MBC x ASC)	BOD/TSS of 5001 mg/l not to exceed more than 6000 mg/l
Level 10	9.5 (MBC x ASC)	BOD/TSS of 6001 mg/l not to exceed more than 7000 mg/l
Level 11	11 (MBC x ASC)	BOD/TSS of 7001 mg/l not to exceed more than 8000 mg/l
Level 12	12.5 (MBC x ASC)	BOD/TSS of 8001 mg/l not to exceed more than 9000 mg/l
Above 12	12.5 plus 2 (MBC x ASC) for each 1000 mg/l of BOD/TSS above 9001	

Note: *Monthly Base Charge (MBC); Additional Flow Charge (AFC); Additional Strength Charge (ASC)*
Adding Additional Flow Charge is capped at Level 6

Testing examples using 2020 Rates:

Testing Cost \$280 per month & Monthly Base Charge \$1100

Total Monthly Bill = (Testing Cost) + (Monthly Rate)

Monthly Rate = ((Monthly Base Charge) + (Additional Flow Charge))(Additional Strength Charge Multiplier)

Example 1

Level 1 BOD/TSS (Additional Strength Multiplier of 1)

With an Additional Flow Charge of \$195.00

Testing Cost = \$280.00

Monthly Rate = (\$1100.00 + \$195.00) x (1) = \$1295.00

Monthly Rate = ((Monthly Base Charge) + (Additional Flow Charge)) x (Additional Strength Charge Multiplier)

Total Bill for Month = \$1575.00

Example 2

Level 3 BOD/TSS (Additional Strength Multiplier of 2)

With an Additional Flow Charge of \$195.00

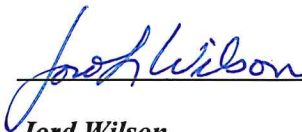
Testing Cost = \$280.00

Monthly Rate = (\$1100.00 + \$195.00) x (2) = \$2590.00

Monthly Rate = ((Monthly Base Charge) + (Additional Flow Charge)) x (Additional Strength Charge Multiplier)

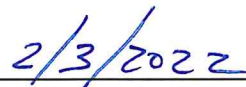
Total Bill for Month = \$2870.00

Annual rate adjustment based on changes to the City Fee Schedule



Jord Wilson

City Administrator



Date

APPENDIX E

Manhole Inventory

OBJECTID	Asset_ID	Depth	Material	Outlet_Siz	Inlets	Drops	Invert_Ele	Installati	MH Cover Size	Expected_U	Value	Proba_of_F	Conse_of_F	Failure_Co	Failure_Mo	Cond_Asses	Criticalit	Mitigation	Evidence of Infiltration	Comments
43	A1	14'6	Concrete	10"	1	1	771.1	1967	24	2042		1	5			1	5		0	
75	A10	9'0	Precast	10"	1	0	775.4	1967	24	2042		1	5			2	5		0	Ring/frame displaced
76	A11	8'0	Precast	10"	1	0	776.6	1967	24	2042		1	5			1	5		0	
77	A12	7'0	Precast	10"	1	1	777.6	1967	24	2042		2	5			2	10		0	Ring needs regROUTED
80	A13	11'6	Precast	10"	2	0	778.6	1967	24	2042		1	5			1	5		0	
78	A14	10'0	Precast	10"	1	0	780.6	1967	24	2042		3	5			1	15		0	Channel obstruction/paper build up in trough/Needs biannual flush
79	A15	3'6	Precast	10"	0	0	781.6	1967	24	2042		2	5			1	10		0	Channel obstructed needs cleaned out.
81	A16	11'0	Precast	10"	1	0	780.0	1967	24	2042		1	5			1	5		0	
82	A16a	6'6	Precast	10"	1	0	790.0	1967	20	2042		1	5			1	5		0	
83	A17	9'0	Precast	10"	1	0	799.4	1967	24	2042		2	5			2	10		0	Missing Grout. Bench needs cleand, as channel has paper build up.
84	A18	6'0	Precast	10"	1	0	801.4	1967	24	2042		1	5			2	5		0	Offset ring/frame
85	A19	6'0	Precast	10"	1	0	803.4	1967	24	2042		2	5			1	10		0	Obstructed channel needs flushed.
42	A2	13'0	Precast	10"	1	0	772.0	1967	24	2042		1	5			2	5		0	cone/riser cracked or broken
86	A20	3'9	Precast	10"	2	0	804.8	1967	24	2042		1	5			1	5		0	
87	A20a	3'4	Precast	10"	1	0	805.0	1967	24	2042		1	4			2	4		0	Ring/frame displaced
88	A21	6'6	Precast	10"	2	0	806.8	1967	24	2042		1	4			1	4		0	
89	A22												4							
41	A3	12'9	Precast	10"	1	0	772.6	1967	24	2042		1	5			2	5		0	Ring/frame missing grout
40	A4	12'6	Precast	10"	1	0	773.4	1967	24	2042		1	5			1	5		2	Infiltration in barrel at rung #5
39	A5	11'9	Precast	10"	2	0	774.0	1967	24	2042		1	5			1	5		1	Infiltration at joint - minor
74	A6	10'6	Precast	10"	0	1	775.0	1967	24	2042		1	5			2	5		0	Ring/frame displaced
38	A7	10'6	Precast	10"	2	0	774.5	1967	24	2042		1	5			1	5		0	
37	A8	9'0	Precast	10"	1	0	779.0	1967	24	2042		1	5			1	5		0	
36	A9	6'0	Precast	10"	1	0	782.9	1967		2042		1	5			1	5		0	
91	B1		Precast	4"	2	0	774.2	1967		2042		1	4			1	4		0	
92	B10	4'0	Precast	8"	1	1	780.8	1967	24	2042		1	1			2	1		0	Ring offset
14	B11	10'0	Precast	10"	2	1	774.7	1967		2042			4							
10	B12	10'0	Precast	10"	3	0	776.0	1967	24	2042		1	4			1	4		0	
98	B13	6'0	Brick	10"	1	0	786.0	1954	24	2029		2	2			1	4		0	Needs flushed
99	B14		Brick	8"	2	0	817.8	1954	24	2029		1	1			1	1		0	Needs more rungs
100	B15	7'0	Brick	10"	1	0	826.1	1954	24	2029		1	1			2	1		0	Missing some grout
101	B16	8'10	Brick	10"	1	0	832.6	1954	24	2029		2	1			2	2		0	Needs dugout, channel has some obstruction, low priority
102	B17		Brick	8"	0	0		1954		2029			1							
12	B18	9'0	Precast	10"	2	0	777.1	1967	24	2042		1	1			1	1		0	
13	B19	7'10	Precast	8"	1	0	778.3	1967		2042			1							
15	B2	8'0	Precast/Cemen	10"	1	0			24			1	1			2	1		0	Rungs unsafe, Need to be lowered in manhole to do proper inspection.
2	B20	7'2	Precast	10"	2	0	777.9	1967	24	2042		1	1			1	1		0	
1	B21	6'8	Precast	8"	0	1	778.5	1967	24	2042		1	1			1	1		0	
3	B22	6'6	Precast	8"	1	0	778.8	1967	24	2042		1	1			1	1		0	
4	B23	5'3	Precast	8"	0	0	779.9	1967	24	2042		1	1			1	1		0	
11	B24	6'6	Precast	10"	2	0	777.1	1967	24	2042		2	3			1	6		0	bench has large rocks on it. Needs cleaned.
103	B25	7'0	Precast	10"	1	0	780.3	1954	24	2029		1	1			1	1		0	
104	B26	4'2	Precast	8"	1	0	836.3	1954	24	2029		3	1			1	3		0	Channel full of gravel, no services beyond MH
6	B27	7'0	Precast	10"	1	0	778.1	1967	24	2042		1	2			2	2		0	Missing some grout, shimmed with 2x4
7	B28	6'6	Precast	10"	2	0	778.5	1967	24	2042		2	1			1	2		0	Channel needs flushed
5	B29	5'3	Precast	8"	0	0	780.1	1967	24	2042		1	1			1	1		0	
90	B3	6'6	Precast	10"	1	0		24				1	1			1	1		0	
8	B30	6'0	Precast	10"	1	0	779.8	1967	24	2042		1	1			1	1		0	
9	B31	10'0	Precast	10"	0	1	781.0	1967	24	2042		1	1			2	1		0	Ring/frame offset
108	B4												1							
97	B5	8'6	Precast	8"	1	0	775.4	1967		2042			2							
96	B6	8'6	Precast	8"	1	0	776.8	1967		2042			2							
95	B7	6'10	Precast	8"	1	0	778.2	1967	24	2042		1	2			1	2		0	
94	B8		Precast	8"	1	0	779.0	1967		2042			1							
93	B9		Precast	8"	1	0	779.8	1967		2042			1							
116	C.O.												1							
62	C1	8'0	Precast	10"	2	0	779.9	1967	24	2042		2	5			1	10		0	
70	C10	3'10	Precast	8"	1	0	789.3	1967		2042			1							
71	C11	4'7	Precast	10"	1	0	790.4	1967		2042			1							
72	C12		Precast	10"	0	0	790.7	1967		2042			1							
73	C1a	9'9	Precast	10"	1	0	779.1	1967	24	2042		1	5			1	5		0	
63	C2	12'0	Precast	10"	1	0	780.7	1967		2042			5							
64	C2a	11'8	Precast	10"	1	0	782.1	1967		2042			5							
65	C3	11'6	Precast	10"	1	1	782.6	1967		2042			5							
66	C4	9'6	Precast	10"	1	0	784.0	1967		2042			5							
67	C5	7'10	Precast	10"	1	0	785.2	1967		2042			5							
68	C6	7'6	Precast	10"	2	0	787.2	1967		2042			5							

OBJECTID	Asset_ID	Depth	Material	Outlet_Siz	Inlets	Drops	Invert_Ele	Installati	MH Cover Size	Expected_U	Value	Proba_of_F	Conse_of_F	Failure_Co	Failure_Mo	Cond_Asses	Criticalit	Mitigation	Evidence of Infiltration	Comments
106	C7	6'0	Precast	10"	1	0	792.4	1967	24	2042		2	3			2	6		0	
107	C8	6'0	Precast	10"	2	0	810.0	1967	24	2042		2	3			2	6		0	debris
69	C9	3'6	Precast	8"	1	0	787.8	1967		2042			4							
109	CO1												5							
110	CO2												5							
61	D1	8'0	Precast	10"	1	0	781.1	1967	24	2042		3	5			2	15		0	Misaligned lid; debris
46	D11	8'0	Precast	10"	2	0	782.5	1967	20	2042		3	5			2	15		0	
50	D12	5'0	Precast	10"	2	0	783.0	1967		2042			2							
49	D12a				0		783.9	1967		2042			1							
45	D13	3'0	Precast	10"	2	0	783.1	1967	20	2042			5						0	
44	D14	3'0	Precast	10"	1	0	784.2	1967	20	2042		2	5			2	10		0	Needs flushed; minor signs of surcharge
35	D15	5'0	Precast	10"	1	0	785.6	1967	20	2042		2	5			2	10		0	Gravel in inlet/needs regouted
33	D16	7'6	Precast	10"	2	0	786.4	1967	20	2042		2	5			2	10		0	debris
32	D17	4'6	Brick	10"	2	0	795.7	1954	20	2029		2	5			2	10		0	Unsafe rungs
31	D17a	5'6	Brick	10"	2	1	801.1	1954	24	2029		3	5			2	15		0	Rungs corroded and unsafe; needs flushed
34	D18	6'0	Brick	10"	1	0	801.0	1954	24	2029		1	1			2	1		0	Rungs unsafe
115	D19												1							
47	D2	7'8	Precast	10"	2	0	782.1	1967	20	2042		3	5			2	15		0	Minor signs of surcharge; debris
30	D20	6'0	Precast	10"	2	0	800.3	1996	24	2071		3	5			1	15		0	Needs flushed regularly
29	D20a		Precast	10"	1	1	804.9	1996	24	2071		2	1			1	2		0	Minor signs of surcharge
28	D20b												1							
20	D21	5'9	Brick	10"	1	0	802.5	1954	24	2029		3	5			2	15		0	Rungs unsafe; Needs flushed
22	D22	4'9	Brick	10"	2	0	803.2	1954	24	2029		2	4			2	8		0	Rungs unsafe
24	D23	6'8	Brick	10"	2	1	814.8	1954	24	2029		4	3			2	12		0	Rungs unsafe; Needs flushed; sings of surcharge
27	D24	5'0	Brick	10"	1	1	816.2	1954	24	2029		3	1			2	3		0	Possible crack in channel; no rungs; needs flushed; minor signs of surcharge
117	D25												1							
26	D26												1							
23	D27	4'8	Brick	10"	1	0	806.4	1954		2029			4							
18	D28	5'0	Brick	10"	2	0	811.8	1954	24	2029		1	4			2	4			Rungs unsafe; cracked broken
19	D29	8'0	Brick	10"	2	0	828.5	1954	24	2029		5	1			3	5		0	Minor indication of surcharge; needs flushed; rungs unsafe; cone & riser misaligned. Channel blocked with debris
48	D3	4'6	Precast	10"	1	0	789.6	1967	24	2042		3	4			2	12		0	minor indication of surcharge; debris; needs flushed
25	D30	3'10	Concrete	8"	0	1	828.8	1954		2029			1							
16	D31	5'0	Brick	10"	1	1	835.8	1954	24	2029		1	1			2	1		0	Rungs Unsafe
17	D32	3'4	Brick	10"	0	0	815.8	1954		2029			4							
21	D33	4'8	Brick	10"	1	0	805.4	1954	24	2029		4	2			2	8		0	Rungs corroded and unsafe; Indication of surcharge; heavy debris needs flushed
118	D34	4'10	Brick	10"	1	0	806.8	1954		2029			2							
105	D35	4'10	Brick	10"	1	0	808.7	1954	24	2029		2	1			1	2		0	Unsafe rungs; needs flushed
52	D4	9'6	Brick	10"	2	0	805.1	1954	24	2029		3	4			2	12		0	Unsafe rungs; debris
57	D4a				0								1							
51	D5	6'0	Brick	10"	2	0	806.6	1994	24	2069		2	3			2	6		0	
58	D5a	8'1	Precast	10"	1	0	811.9	1994		2069			2							
56	D6	7'0	Precast	10"	1	0	838.0	1954	24	2029		2	2			1	4		0	
60	D7	7'0	Precast	10"	3	0	818.0	1994	24	2029		4	2			1	8		0	Heavy debris; silt; minor indication of surcharge
59	D7a	4'2	Precast	10"	2	0	816.9	1994		2029			2							
55	D8	5'10	Brick	10"	1	0	858.9	1954	24	2029		1	2			2	2		0	debris; no flow; doesn't appear to be in use.
54	D8a				0								1							
53	D9	4'0	Brick	10"	0	2	816.9	1954		2029			1							
112	E.CO												1							
114	E.CO1												2							
111	N.CO												1							
113	W.CO												1							

APPENDIX F

Hydraulic Capacity Analysis

Current Peak Hour Flow Main Analysis

SN	Element ID	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (inches)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Peak Flow (cfs)	Max Flow Velocity (ft/sec)	Travel Time (min)	Design Flow Capacity (cfs)	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Surcharged Ratio	Total Time (min)	Max Flow Depth (ft)	Reported Condition
1	Link-01	C1a	MainLS	193.00	779.10	770.00	9.10	4.7200	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.09	2.99	1.08	4.12	0.02	0.10	0.00	0.08	Calculated
2	Link-02	A1	MainLS	238.00	771.10	770.00	1.10	0.4600	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.17	1.64	2.42	1.29	0.13	0.24	0.00	0.20	Calculated
4	Link-04	C1	C1a	181.00	779.90	779.10	0.80	0.4400	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.09	1.34	2.25	1.26	0.07	0.18	0.00	0.15	Calculated
5	Link-05	64	A1	235.00	771.60	771.10	0.50	0.2100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.17	1.24	3.16	0.88	0.19	0.30	0.00	0.25	Calculated
30	Link-12	C6	C5	385.00	787.20	785.20	2.00	0.5200	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.05	1.25	5.13	0.75	0.07	0.18	0.00	0.12	Calculated
33	Link-13	C5	C4	385.00	785.20	784.00	1.20	0.3100	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.05	1.04	6.17	0.58	0.09	0.20	0.00	0.14	Calculated
34	Link-14	C4	C3	413.00	784.00	782.60	1.40	0.3400	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.05	1.07	6.43	0.61	0.09	0.20	0.00	0.13	Calculated
35	Link-15	C3	C2a	294.00	782.60	782.10	0.50	0.1700	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.05	0.85	5.76	0.43	0.13	0.24	0.00	0.16	Calculated
36	Link-16	C2a	C2	228.00	782.10	780.70	1.40	0.6100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.05	1.29	2.95	1.49	0.04	0.13	0.00	0.11	Calculated
37	Link-17	C2	C1	315.00	780.70	779.90	0.80	0.2500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.05	0.95	5.53	0.96	0.06	0.16	0.00	0.13	Calculated
60	Link-41	D15	A9	198.00	785.60	782.90	2.70	1.3600	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.06	1.77	1.86	2.22	0.03	0.11	0.00	0.09	Calculated
61	Link-42	A9	A8	185.00	782.90	779.00	3.90	2.1100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.06	2.01	1.53	2.76	0.02	0.10	0.00	0.09	Calculated
62	Link-43	A8	A7	175.00	779.00	774.50	4.50	2.5700	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.06	2.18	1.34	3.04	0.02	0.10	0.00	0.08	Calculated
63	Link-44	A7	A5	113.00	774.50	774.00	0.50	0.4400	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.17	1.61	1.17	1.26	0.13	0.25	0.00	0.20	Calculated
64	Link-45	A5	A4	207.00	774.00	773.40	0.60	0.2900	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.17	1.38	2.50	1.02	0.16	0.27	0.00	0.23	Calculated
65	Link-46	A4	A3	225.00	773.40	772.60	0.80	0.3600	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.17	1.49	2.52	1.13	0.15	0.26	0.00	0.22	Calculated
66	Link-47	A3	64	153.00	772.60	771.60	1.00	0.6500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.17	1.85	1.38	1.54	0.11	0.22	0.00	0.19	Calculated
67	Link-48	A6	A5	199.00	775.00	774.00	1.00	0.5000	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.00	0.44	7.54	0.74	0.00	0.04	0.00	0.02	Calculated
68	Link-49	A10	A7	256.00	775.40	774.50	0.90	0.3500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.11	1.30	3.28	1.13	0.09	0.21	0.00	0.17	Calculated
69	Link-50	A13	A12	358.00	778.60	777.60	1.00	0.2800	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.09	1.16	5.14	1.00	0.09	0.21	0.00	0.17	Calculated
70	Link-51	A12	A11	360.00	777.60	776.60	1.00	0.2800	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.10	1.17	5.13	1.00	0.10	0.21	0.00	0.18	Calculated
71	Link-52	A11	A10	249.00	776.60	775.40	1.20	0.4800	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.10	1.44	2.88	1.32	0.08	0.19	0.00	0.16	Calculated
74	Link-55	A16	A13	65.00	780.00	778.60	1.40	2.1500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.09	2.35	0.46	2.79	0.03	0.12	0.00	0.10	Calculated
98	Link-79	A20	A19	161.00	804.80	803.40	1.40	0.8700	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.09	1.69	1.59	1.77	0.05	0.15	0.00	0.13	Calculated
99	Link-80	A19	A18	260.00	803.40	801.40	2.00	0.7700	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.09	1.63	2.66	1.67	0.05	0.16	0.00	0.13	Calculated
100	Link-81	A18	A17	308.00	801.40	799.40	2.00	0.6500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.09	1.53	3.36	1.53	0.06	0.16	0.00	0.14	Calculated
101	Link-82	A17	A16a	136.00	799.40	790.00	9.40	6.9100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.09	3.48	0.65	4.99	0.02	0.09	0.00	0.08	Calculated
102	Link-83	A16a	A16	236.00	790.00	780.00	10.00	4.2400	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.09	2.87	1.37	3.91	0.02	0.11	0.00	0.09	Calculated

2042 Peak Hour Flow Trunk Main Analysis

SN	Element ID	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Peak Flow	Max Flow Velocity	Travel Time	Design Flow Capacity	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Ratio	Total Time	Max Flow Depth	Reported Condition
				(ft)	(ft)	(ft)	(ft)	(%)		(inches)					(cfs)	(ft/sec)	(min)	(cfs)			(min)	(ft)	
1	Link-01	C1a	MainLS	193.00	779.10	770.00	9.10	4.7200	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.20	3.89	0.83	4.12	0.05	0.15	0.00	0.12	Calculated
2	Link-02	A1	MainLS	238.00	771.10	770.00	1.10	0.4600	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.44	2.14	1.85	1.29	0.34	0.40	0.00	0.34	Calculated
4	Link-04	C1	C1a	181.00	779.90	779.10	0.80	0.4400	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.20	1.68	1.80	1.26	0.16	0.27	0.00	0.22	Calculated
5	Link-05	64	A1	235.00	771.60	771.10	0.50	0.2100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.44	1.61	2.43	0.88	0.50	0.50	0.00	0.42	Calculated
30	Link-12	C6	C5	385.00	787.20	785.20	2.00	0.5200	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.14	1.63	3.94	0.75	0.18	0.29	0.00	0.19	Calculated
39	Link-13	C5	C4	385.00	785.20	784.00	1.20	0.3100	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.14	1.36	4.72	0.58	0.23	0.33	0.00	0.22	Calculated
42	Link-14	C4	C3	413.00	784.00	782.60	1.40	0.3400	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.14	1.41	4.88	0.61	0.22	0.32	0.00	0.21	Calculated
43	Link-15	C3	C2a	294.00	782.60	782.10	0.50	0.1700	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.14	1.10	4.45	0.43	0.32	0.39	0.00	0.26	Calculated
44	Link-16	C2a	C2	228.00	782.10	780.70	1.40	0.6100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.14	1.71	2.22	1.49	0.09	0.21	0.00	0.17	Calculated
45	Link-17	C2	C1	315.00	780.70	779.90	0.80	0.2500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.14	1.25	4.20	0.96	0.14	0.26	0.00	0.21	Calculated
68	Link-41	D15	A9	198.00	785.60	782.90	2.70	1.3600	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.12	2.15	1.53	2.22	0.05	0.16	0.00	0.13	Calculated
69	Link-42	A9	A8	185.00	782.90	779.00	3.90	2.1100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.12	2.52	1.22	2.76	0.04	0.14	0.00	0.12	Calculated
70	Link-43	A8	A7	175.00	779.00	774.50	4.50	2.5700	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.12	2.68	1.09	3.04	0.04	0.13	0.00	0.11	Calculated
71	Link-44	A7	A5	113.00	774.50	774.00	0.50	0.4400	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.43	2.10	0.90	1.26	0.34	0.40	0.00	0.34	Calculated
72	Link-45	A5	A4	207.00	774.00	773.40	0.60	0.2900	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.44	1.80	1.92	1.02	0.43	0.46	0.00	0.38	Calculated
73	Link-46	A4	A3	225.00	773.40	772.60	0.80	0.3600	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.44	1.94	1.93	1.13	0.39	0.43	0.00	0.36	Calculated
74	Link-47	A3	64	153.00	772.60	771.60	1.00	0.6500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.44	2.43	1.05	1.54	0.29	0.37	0.00	0.31	Calculated
75	Link-48	A6	A5	199.00	775.00	774.00	1.00	0.5000	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.00	0.54	6.14	0.74	0.00	0.05	0.00	0.03	Calculated
76	Link-49	A10	A7	256.00	775.40	774.50	0.90	0.3500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.31	1.76	2.42	1.13	0.28	0.36	0.00	0.30	Calculated
77	Link-50	A13	A12	358.00	778.60	777.60	1.00	0.2800	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.29	1.59	3.75	1.00	0.29	0.37	0.00	0.31	Calculated
78	Link-51	A12	A11	360.00	777.60	776.60	1.00	0.2800	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.30	1.60	3.75	1.00	0.30	0.37	0.00	0.31	Calculated
79	Link-52	A11	A10	249.00	776.60	775.40	1.20	0.4800	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.30	1.96	2.12	1.32	0.23	0.33	0.00	0.27	Calculated
82	Link-55	A16	A13	65.00	780.00	778.60	1.40	2.1500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.28	3.28	0.33	2.79	0.10	0.21	0.00	0.18	Calculated
106	Link-79	A20	A19	161.00	804.80	803.40	1.40	0.8700	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.19	2.14	1.25	1.77	0.11	0.22	0.00	0.18	Calculated
107	Link-80	A19	A18	260.00	803.40	801.40	2.00	0.7700	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.19	2.07	2.09	1.67	0.12	0.23	0.00	0.19	Calculated
108	Link-81	A18	A17	308.00	801.40	799.40	2.00	0.6500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.20	1.95	2.63	1.53	0.13	0.24	0.00	0.20	Calculated
109	Link-82	A17	A16a	136.00	799.40	790.00	9.40	6.9100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.19	4.44	0.51	4.99	0.04	0.13	0.00	0.11	Calculated
110	Link-83	A16a	A16	236.00	790.00	780.00	10.00	4.2400	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.28	4.17	0.94	3.91	0.07	0.18	0.00	0.15	Calculated

Ultimate Peak Hour Flow Main Analysis

SN	Element ID	From (Inlet Node)	To (Outlet Node)	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (inches)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Peak Flow (cfs)	Max Flow Velocity (ft/sec)	Travel Time (min)	Design Flow Capacity (cfs)	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Ratio	Total Time Surcharged (min)	Max Flow Depth (ft)	Reported Condition
1	Link-01	C1a	MainLS	193.00	779.10	770.00	9.10	4.7200	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.41	4.82	0.67	4.12	0.10	0.21	0.00	0.18	Calculated
2	Link-02	A1	MainLS	238.00	771.10	770.00	1.10	0.4600	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.55	2.27	1.75	1.29	0.43	0.46	0.00	0.38	Calculated
4	Link-04	C1	C1a	181.00	779.90	779.10	0.80	0.4400	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.41	2.06	1.46	1.26	0.32	0.39	0.00	0.33	Calculated
5	Link-05	64	A1	235.00	771.60	771.10	0.50	0.2100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.55	1.69	2.32	0.88	0.63	0.57	0.00	0.48	Calculated
30	Link-12	C6	C5	385.00	787.20	785.20	2.00	0.5200	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.34	2.11	3.04	0.75	0.46	0.47	0.00	0.32	Calculated
39	Link-13	C5	C4	385.00	785.20	784.00	1.20	0.3100	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.34	1.74	3.69	0.58	0.59	0.55	0.00	0.37	Calculated
42	Link-14	C4	C3	413.00	784.00	782.60	1.40	0.3400	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.34	1.80	3.82	0.61	0.57	0.54	0.00	0.36	Calculated
43	Link-15	C3	C2a	294.00	782.60	782.10	0.50	0.1700	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.35	1.37	3.58	0.43	0.80	0.68	0.00	0.45	Calculated
44	Link-16	C2a	C2	228.00	782.10	780.70	1.40	0.6100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.35	2.22	1.71	1.49	0.23	0.33	0.00	0.27	Calculated
45	Link-17	C2	C1	315.00	780.70	779.90	0.80	0.2500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.35	1.61	3.26	0.96	0.36	0.42	0.00	0.35	Calculated
68	Link-41	D15	A9	198.00	785.60	782.90	2.70	1.3600	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.16	2.38	1.39	2.22	0.07	0.18	0.00	0.15	Calculated
69	Link-42	A9	A8	185.00	782.90	779.00	3.90	2.1100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.16	2.77	1.11	2.76	0.06	0.17	0.00	0.14	Calculated
70	Link-43	A8	A7	175.00	779.00	774.50	4.50	2.5700	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.16	2.97	0.98	3.04	0.05	0.16	0.00	0.13	Calculated
71	Link-44	A7	A5	113.00	774.50	774.00	0.50	0.4400	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.54	2.23	0.84	1.26	0.43	0.46	0.00	0.38	Calculated
72	Link-45	A5	A4	207.00	774.00	773.40	0.60	0.2900	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.55	1.91	1.81	1.02	0.54	0.52	0.00	0.43	Calculated
73	Link-46	A4	A3	225.00	773.40	772.60	0.80	0.3600	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.55	2.06	1.82	1.13	0.48	0.49	0.00	0.41	Calculated
74	Link-47	A3	64	153.00	772.60	771.60	1.00	0.6500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.55	2.58	0.99	1.54	0.36	0.41	0.00	0.34	Calculated
75	Link-48	A6	A5	199.00	775.00	774.00	1.00	0.5000	CIRCULAR	8.040	0.0150	0.5000	0.5000	0.0000	0.00	0.54	6.14	0.74	0.00	0.05	0.00	0.03	Calculated
76	Link-49	A10	A7	256.00	775.40	774.50	0.90	0.3500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.37	1.85	2.31	1.13	0.33	0.40	0.00	0.33	Calculated
77	Link-50	A13	A12	358.00	778.60	777.60	1.00	0.2800	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.34	1.67	3.57	1.00	0.34	0.40	0.00	0.34	Calculated
78	Link-51	A12	A11	360.00	777.60	776.60	1.00	0.2800	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.35	1.67	3.59	1.00	0.35	0.41	0.00	0.34	Calculated
79	Link-52	A11	A10	249.00	776.60	775.40	1.20	0.4800	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.36	2.06	2.01	1.32	0.27	0.36	0.00	0.30	Calculated
82	Link-55	A16	A13	65.00	780.00	778.60	1.40	2.1500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.34	3.44	0.31	2.79	0.12	0.24	0.00	0.20	Calculated
106	Link-79	A20	A19	161.00	804.80	803.40	1.40	0.8700	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.20	2.17	1.24	1.77	0.11	0.23	0.00	0.18	Calculated
107	Link-80	A19	A18	260.00	803.40	801.40	2.00	0.7700	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.20	2.06	2.10	1.67	0.12	0.23	0.00	0.19	Calculated
108	Link-81	A18	A17	308.00	801.40	799.40	2.00	0.6500	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.19	1.93	2.66	1.53	0.13	0.24	0.00	0.20	Calculated
109	Link-82	A17	A16a	136.00	799.40	790.00	9.40	6.9100	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.19	4.42	0.51	4.99	0.04	0.13	0.00	0.11	Calculated
110	Link-83	A16a	A16	236.00	790.00	780.00	10.00	4.2400	CIRCULAR	9.960	0.0150	0.5000	0.5000	0.0000	0.34	4.39	0.90	3.91	0.09	0.20	0.00	0.17	Calculated

APPENDIX G

Pateros Sewer Rates (2022)

Sewer Rates

2022 SECTION 3 – SEWER RATES in RED

Rates for sewer service may be adjusted annually in accordance with Ordinance No. 598 dated November 15, 2000.

Fee for Sewer Service Connection

Application Fee for Service: \$100.00

The Capital improvement (System Development Fee) fee shall be based on the size of the water meter.

Each new sewer service established shall pay the actual costs of city labor and materials, including inspection, to establish the connection, plus a fee for capital improvements to the sewer system. The capital improvements fee shall be based on the number of units as follows:

First unit	\$1241.33	1305.88
Two through four units	\$1038.80	1092.82
Five through eight units	\$1028.86	1082.36
Nine through twelve units	\$838.88	882.50
Thirteen or more units	\$790.54	831.65

Inspection Fee: An inspection fee shall also be charged whenever any work for which a permit is required as described in Chapter 13.08.040 of PMC has been commenced without first obtaining a permit. \$100.00

Sewer main extensions or new development that requires the city engineer review shall be charged actual cost

Sewer User Charges

Minimum monthly charge \$51.65 54.34

The minimum monthly charge will be assessed for all single family dwelling units, churches, and grange halls. For apartments, duplexes, and mobile home courts, each unit or space shall be assessed the minimum monthly charge.

Sewer User Charge – Commercial & Industrial

Each business shall pay the minimum monthly charge of \$58.79 for the first four thousand gallons, plus \$1.05 per thousand (\$4.00 for 4,000 gallons), for each 1,000 gallon increments of water used in excess of the 4,000 gallons

Inactive Sewer Rate

\$28.88 30.38

Stand-by rate is established for those residences that have their sewer service terminated for 45 days or more, but not for more than one year from the date of disconnect. (Resolution 2001-10 dtd.10/08/01)

Multiple Businesses

When more than one commercial business shares a water meter/building, each entity shall be assessed the minimum charge of \$49.79 and overages at the commercial user's rate.

Senior Citizen/Disabled Charges

To qualify:

- 1. You are at least 62 years of age or permanently disabled.
- 2. You own and occupy a residence in the city of Pateros.
- 3. The combined disposable income of the house is \$36,000 or less.

Water	\$60.49	63.64
Sewer	\$46.49	48.91

APPENDIX H

SEPA, SERP, & DNS



State Environmental Review Process Information Packet Coversheet

***To be completed by Clean Water State Revolving Fund (CWSRF)
Applicants and Recipients and sent to Ecology's Project
Manager and Environmental Review Coordinator***

Applicant/Recipient and Project Information	
Applicant/Recipient (Organization): City of Pateros	
Loan number (if known): WQC-2021-PateCo-00027	
Project Title: City of Pateros Wastewater Facility Plan and General Sewer Plan	
Project Contact Person: Jord Wilson	Telephone: 509-923-2571
Address: 113 Lakeshore Dr, Pateros, WA 98846	
Email: paterosparks@outlook.com	
Brief Project Description: <p>The Wastewater Facility Plan and General Sewer Plan (WWFP) is a non-project action; it is a planning document that identifies the City's wastewater treatment facility and wastewater collection system deficiencies and corresponding improvement alternatives. The WWFP is in compliance with ECY requirements and has been prepared in general accordance with WAC Chapter 173-240.</p>	

Please submit all documentation listed below with this form to Ecology's Project Manager and Environmental Review Coordinator for review and approval.

ECY Environmental Review Coordinator: _____ Liz Ellis <lzell461@ecy.wa.gov>

ECY Project Manager: _____ Stephanie Giesin <stephanie.giesin@ecy.wa.gov>

Check the boxes below to indicate that the SERP packet includes documentation for the items listed. Provide comments for additional information when needed.

1. State Environmental Policy Act (SEPA), National Environmental Policy Act (NEPA) review or Tribal Environmental Policy Act¹ (TEPA) documentation included:

a. Project description includes the entire area of effect. **See below**

The WWFP is a non-project action; it is a planning document that identifies the City's wastewater treatment facility and wastewater collection system deficiencies and corresponding improvement alternatives. This WWFP is in compliance with ECY requirements and has been prepared in general accordance with WAC Chapter 173-240.

Project description includes all phases, stages, and elements of the project.

b. Resource impacts accurately described.

c. SEPA checklist or TEPA/NEPA document.

Refer to SEPA Non-project Checklist

d. The signed SEPA determination or TEPA/NEPA finding.

Refer to Signed SEPA Determination of Non-significance

e. Documentation that the lead agency solicited public comments during SEPA, NEPA or the TEPA process (affidavit of publication or similar).

Refer to Affidavit of Publication – Threshold Determination

¹ Tribes are not subject to SEPA. Please submit a NEPA document or Tribal equivalent (TEPA). For assistance, see NEPA/TEPA Guide for American Indian and Alaska Native Communities, 2000. Mittelstaedt, G. Suagee, D. and L. H. Nelson.

If you need this document in a format for the visually impaired, call the Water Quality Program at 360-407-6600. Persons with hearing loss, call 711 for Washington Relay Service. Persons with a speech disability, call 877-833-6341.

- f. Attach comments received during the SEPA/NEPA/TEPA process

No comments received

- g. If you are applying for a SEPA exemption, contact your Ecology Environmental Review Coordinator and request the SEPA certification form.
- h. If you are applying for a NEPA categorical exclusion, contact your Ecology Environmental Review Coordinator and request the NEPA Record of Environmental Consideration form. Tribes may also apply for NEPA categorical exclusions.

Additional Information for Ecology: **The WWFP is a non-project action**

2. The Clean Water Act State Revolving Fund requires *additional* public outreach and community engagement beyond SEPA/NEPA/TEPA - even if for exempt projects. Provide documentation on how you met the following requirements. **Tip:** Start outreach during the project *Planning Phase* when reviewing alternatives.

- a. Provide your public/legal advertisement of the meeting.

**Public Hearing was published in the local newspaper for two consecutive weeks.
Refer to Affidavit of Publication**

- b. Provide information on ways you advertised public meetings or opportunities to provide input to the community.

- **Public Hearing was published in the local newspaper for two consecutive weeks. Refer to Affidavit of Publication – Public Hearing**
- **Public Hearing was advertised on the City website. Refer to Advertisement from City Website**
- **A copy of the Draft WWFP was made available at City Hall prior to the Public Hearing**

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- **Public comments were solicited at the Public Hearing on 1/17/2023. Refer to Council Meeting Minutes – 1/17/2023.**
- c. For any in-person or virtual meetings, provide Ecology with a documented history of what occurred at the meeting (record, transcripts, agenda, minutes).
- Copy of any presentation **See Council Meeting Packet – 1/17/2023**
 - Documentation on how you discussed the reasonable alternatives to the audience. **See Council Meeting Minutes – 1/17/2023**
 - Documentation on how you explained the potential environmental, social and economic impacts of reasonable alternatives, and why the preferred alternative was chosen. **See Council Meeting Minutes – 1/17/2023**
- d. Documentation that the public meeting covered the rate payer (when applicable) impacts of the project. **See Council Meeting Minutes – 1/17/2023**
- e. Documentation that the public had an opportunity to comment on the proposal.
- Document, address and submit any comments received during or after the public meeting. Include the Ecology Environmental Review Coordinator on this correspondence. **See Council Meeting Minutes – 1/17/2023**
 - If you did not receive any comments, submit a statement stating so in the “Additional Information for Ecology” section below.

Additional Information for Ecology:

3. Ensure this project complies with current SERP Public Engagement and Environmental Justice requirements. For more information, see the current Funding Guidelines.
- a. Describe the population demographics and background of the community potentially affected by the project.

All values from US Census Bureau data

- **Population: 593**
- **MHI: \$58,846**

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- **Types of Language Spoken at Home: 44.0% English only, 56.0% Spanish**
- **High School or equivalent degree: 30.2%**
- **Employment Rate: 66.8%**

b. Describe how you ensured meaningful public engagement.

- **The Public Hearing was advertised in the local newspaper for two consecutive weeks**
- **The Public Hearing was advertised on the City website for two weeks**
- **A copy of the WWFP was provided at City Hall**

c. Describe how you engaged any identified EJ communities.

The public was provided opportunity to comment on the Plan at the Public Hearing

d. If mitigation is required, ensure the Ecology Environmental Review Coordinator is involved. For more information and guidance, see the current Funding Guidelines.

Additional Information for Ecology:

4. Provide a completed Ecology Cultural Resources Review Form or cultural resource survey and complete an Inadvertent Discovery Plan using Ecology’s template.

- Fill out an Ecology Cultural Resources Review Form and submit to your Ecology Project Manager and Environmental Review Coordinator.
- Submit an Ecology Inadvertent Discovery Plan and submit to your Ecology Project Manager and Environmental Review Coordinator.
- If not completed, advise your Ecology Project Manager and Environmental Review Coordinator on the status of your cultural resource compliance.

Additional Information for Ecology:

This is a non-project activity. Cultural Resources Review will be completed during the funding phase for various improvements proposed in the WWFP

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5. For Designated Equivalency Projects/Projects with external federal funds

a. Is this a project with federal funding from another agency?

- Yes.

Document the federal agency and contact:

- Who is the lead agency for environmental and cultural review?

- Ecology

Agency other than Ecology.

(List):

- Not sure

(Contact the Ecology Environmental Review Coordinator)

b. Is this a CWSRF Designated Equivalency Project (DEP)? Yes No

If yes, follow the instructions below:

Identify which resources required consultation, coordination and/or permitting in order to ensure protection. Include the appropriate final documentation from each consultation or permit as an upload to EAGL's environmental and cultural review form. Include any required mitigation.

- **Tip:** Ecology has delegated non-federal authority from the EPA for coordination of Section 106 of the National Historic Preservation Act and for consultation under the Section 7(a)(2) of the Endangered Species Act on CWSRF projects, where applicable. If your project triggers one or both of these laws, ***confirm the lead agency*** prior to entering into consultation. ***This may save you time.***

Consult your Ecology Funding Guidelines for a list of commonly referenced federal laws and authorities that may be triggered for a federally funded project. *Only address those laws that are triggered by resources within your project footprint.* For example, if your project is not near a coastal zone, do not reference the Coastal Zone Management Act. Provide the information

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within the context of your Packet. If a local and/or state and/or tribal law is enacted in order to protect the resource, as with the case of wetlands and floodplains, reference the appropriate authorities and authorizations. *It is more important that you explain how your project may have impacted a resource and what you did to protect it.*

- a. Identify which local, state, tribal and/or federal laws and authorities applied to this project, list them, and note which page(s).
- b. Upload any permits, consultation and required mitigation documents in EAGL.

Additional Information for Ecology:

6. For all funded projects

Whether a DEP or not, if your project triggers any environmental law, permit, required consultation, or investigation into a potential impact, you must include the outcome as part of your SERP Information Packet. Any mitigation must be reported as a condition of your loan.

If you have questions, contact the Ecology Environmental Review Coordinator, Liz Ellis at 360-628-4410 or liz.ellis@ecy.wa.gov

Resources:

For [SEPA Exemptions](#), request a [SEPA Certification \(Finding of Categorical Exemption\) form](#)
For [EPA NEPA Categorical Exclusions](#) (40 CFR 6.204), request a [Record of Environmental Consideration form](#)
[Combined Funding Guidance](#)
[Inadvertent Discovery Plan](#)
[Ecology Executive Order Cultural Resources Review](#) form
[Elements of Environmental Review by Phase and Loan](#)
[Ecology's Environmental Justice Webpage](#)
EJ Tools: [EJSCREEN https://ejscreen.epa.gov/mapper/](https://ejscreen.epa.gov/mapper/),
[Washington Tracking Network](#)
Ecology's [Water Quality Atlas](#)
Ecology's [What's in My Neighborhood](#)
[U.S. Census](#)

If you need this document in a format for the visually impaired, call the Water Quality Program at 360-407-6600. Persons with hearing loss, call 711 for Washington Relay Service. Persons with a speech disability, call 877-833-6341.

CITY OF Pateros
Wastewater Facility Plan and General Sewer Plan

Environmental Review Record (ERR)
January 2023

Funded by: Washington State Department of Ecology

SERP DOCUMENTATION

- ECY SERP Coversheet

SEPA DOCUMENTATION

- Affidavit of Publication – Threshold Determination
- Determination of Non-significance
- Environmental Checklist (SEPA)

PUBLIC OUTREACH DOCUMENTATION

- Affidavit of Publication – Public Hearing
- Advertisement from City Website
- Council Meeting Minutes – 1/17/2023
- Council Meeting Packet – 1/17/2023

**STATE ENVIRONMENTAL
POLICY ACT
Determination of
NonSignificance**

January 5, 2023

Proponent: City of Pateros
Agency Contact: Jord Wilso
paterosparks@outlook.com,
(509) 923-2571

Description of proposal: The proposed project is for the adoption of the City of Pateros Wastewater Facility Plan General Sewer Plan dated 202. The Plan is a non-project action; is a planning document that identifies the City's wastewater treatment facility and sanitary sewer collection system deficiencies and corresponding improvement alternatives. The Plan is in compliance with EC requirements.

Location of proposal: The Wastewater Facility Plan General Sewer Plan identifies several alternatives that include city-wide improvements. The City of Pateros and the potential stormwater system improvements are generally located within:

Township 30N, Range 23E
Sections 25 / 35 / 36

Township 30N, Range 24E
Section 30

Township 29N, Range 23E
Sections 01 / 02 / 12

Township 29N, Range 24E
Section 07

The City of Pateros has determined that this proposal will not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed checklist and other information on file with the lead agency. This information is available to the public on request.

This DNS is issued under WAC 197-11-340(2); the City of Pateros will not act on this proposal for 14 days from the following date:

Comments must be submitted by January 20, 2023.

Responsible Official:

Kerri Wilson

Position/title:

Clerk Treasurer

Phone: (509) 923-2571

Address: 113 Lakeshore Dr.,
Pateros, WA 98846

You may appeal this determination in writing to the City of Pateros at 113 Lakeshore Dr., Pateros, WA 98846 no later than January 20, 2023 (14 days from the date of this publication).

Published in the Quad City Herald
January 4, 2023 #5116

NCW Media, Inc.

Corporate Office

215 14th Street
P.O. Box 39
Leavenworth, WA 98826
(509)548-5286

STATE OF WASHINGTON)

) S.S.

COUNTY OF CHELAN) **Affidavit of Publication**

Laura Husa, being first duly sworn, on oath deposes and says:

That she is the Administrative Assistant of the **Quad City Herald** and that said newspaper is a legal newspaper and it now is and has been for more than six months prior to the date of publication hereafter referred to, published in the English language continually as a weekly newspaper in Bridgeport and Mansfield, Douglas County, Washington, and Brewster and Pateros, Okanogan County, Washington, and it is now and during all of said time published in an office maintained at the aforesaid place of publication of said newspaper.

That the annexed is a true copy of **City of Pateros, Wastewater & Sewer plan, Ad #5116** is published in regular form (and not in supplement form) of said newspaper(s) once a week for a period of 1 week(s) commencing the 4th of **January, 2023** and ending on the 4th of **January, 2023** and that such newspaper regularly distributed to its subscribers during all of said period.

That the full amount of the fee charges foregoing publication is the sum of **\$111.50**.

This newspaper has been approved as a legal newspaper by order of the Superior Courts of Douglas and Okanogan Counties, Washington, as provided in Chapter 213 Session of Laws of 1941.

Laura Husa

Subscribed and sworn before me this *4th* day of *January* 20 *23*



Ruthedna Keys
Notary Public in and for the State of Washington

STATE ENVIRONMENTAL POLICY ACT

Determination of NonSignificance

January 5, 2023

Proponent: City of Pateros

Agency Contact: Jord Wilson, paterosparks@outlook.com, (509) 923-2571

Description of proposal: The proposed project is for the adoption of the City of Pateros's Wastewater Facility Plan & General Sewer Plan dated 2022. The Plan is a non-project action; it is a planning document that identifies the City's wastewater treatment facility and sanitary sewer collection system deficiencies and corresponding improvement alternatives. This Plan is in compliance with ECY requirements.

Location of proposal: The Wastewater Facility Plan & General Sewer Plan identifies several alternatives that include city-wide improvements. The City of Pateros and the potential stormwater system improvements are generally located within:

Township 30N, Range 23E, Sections 25 / 35 / 36
Township 30N, Range 24E, Section 30
Township 29N, Range 23E, Sections 01 / 02 / 12
Township 29N, Range 24E, Section 07

The City of Pateros has determined that this proposal will not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed checklist and other information on file with the lead agency. This information is available to the public on request.

This DNS is issued under WAC 197-11-340(2); the City of Pateros will not act on this proposal for 14 days from the following date: Comments must be submitted by January 20, 2023.

Responsible Official: Kerri Wilson
Position/title: Clerk Treasurer
Phone: (509) 923-2571
Address: 113 Lakeshore Dr., Pateros, WA 98846

Signature *Jord Wilson* Clerk Treasurer Date *12/28/2022*

You may appeal this determination in writing to the City of Pateros at 113 Lakeshore Dr., Pateros, WA 98846 no later than January 20, 2023 (14 days from the date of this publication).

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the [SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS \(part D\)](#). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background [\[HELP\]](#)

1. Name of proposed project, if applicable:

City of Pateros Wastewater Facility Plan & General Sewer Plan

2. Name of applicant:

City of Pateros

3. Address and phone number of applicant and contact person:

Jord Wilson

(509) 923-2571

City of Pateros

113 Lakeshore Dr.

Pateros, WA 98846

4. Date checklist prepared:

12/28/2022

5. Agency requesting checklist:

Washington State Department of Ecology

6. Proposed timing or schedule (including phasing, if applicable):

Plan adoption by July, 2023. The Plan recommends capital improvements that would be proposed separately and dependent on project funding. The estimated schedule in the Plan for recommended improvements is as follows: Apply for funding October 2023, Design in 2024/2025 and Construction in 2025/2026.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

Yes, the plan covers capital improvements that the City plans to implement.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

The City will complete SERP in addition to this SEPA checklist. Environmental and archaeological reviews of the capital improvements will be conducted when each project is proposed.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No.

10. List any government approvals or permits that will be needed for your proposal, if known.

None that are known.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The Wastewater Facility Plan & General Sewer Plan is a non-project action; it is a planning document that identifies the City's wastewater treatment facility and sanitary sewer collection system deficiencies and corresponding improvement alternatives. The Wastewater Facility Plan & General Sewer Plan discusses City population projects and growth distribution within and beyond the City's Urban Growth Area. This Wastewater Facility Plan & General Sewer Plan is in compliance with ECY requirements and has been prepared in general accordance with WAC Chapter 173-240.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The Wastewater Facility Plan & General Sewer Plan identifies several alternatives that include City-wide improvements with some alternatives that are proposed beyond the City's current Urban Growth Area. Several maps showing the locations of suggested improvements are attached.

The City of Pateros and the potential wastewater facility and sanitary sewer collection system improvements are generally located within:

Township 30N, Range 23E, Sections 25 / 35 / 36
Township 30N, Range 24E, Section 30
Township 29N, Range 23E, Sections 01 / 02 / 12
Township 29N, Range 24E, Section 07

B. Environmental Elements [\[HELP\]](#)

1. Earth [\[help\]](#)

a. General description of the site:

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other _____

b. What is the steepest slope on the site (approximate percent slope)?

Approximately 25-65% (per NRCS Soils Map)

- c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

According to the USDA NRCS Soils Maps for the City of Pateros, general soil types consist of Aeneas fine sandy loam, Cashmere fine sandy loam, Cashmont sandy loam, Ewall loamy fine sand, Lithic Haploxerepts-Cashmont Complex, Pogue fine sandy loam, Pogue gravelly fine sandy loam, Riverwash, Skaha gravelly loamy sand.

- d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

Not applicable. Soil stability will be evaluated for each project during design.

- e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Not applicable. Will be evaluated for each project during design.

- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Not applicable. Will be evaluated for each project during design.

- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Not applicable. Will be evaluated for each project during design.

- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Not applicable. Will be evaluated for each project during design.

2. Air [\[help\]](#)

- a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

Not applicable. Will be evaluated for each project during design.

- b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

Not applicable. Will be evaluated for each project during design.

- c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Not applicable. Will be evaluated for each project during design.

3. Water [\[help\]](#)

- a. Surface Water: [\[help\]](#)

- 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Pateros is located at the confluence of the Methow River and the Columbia River. It is not anticipated that the improvements will occur within surface waters shown on the National Wetlands Index mapping.

- 2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Not applicable. Will be evaluated for each project during design.

- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

Not applicable. Will be evaluated for each project during design.

- 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

Not applicable to the adoption of the Plan.

- 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

Flood maps (FIRM) have not been created for Pateros. Mitigation measures will be evaluated on a case-by-case basis for each proposed improvement.

- 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

The City of Pateros manages its wastewater system in accordance with the National Pollutant Discharge Elimination System (NPDES) Permit No. WA0020559 administered by the Department of ECY effective date April 1, 2015. Pateros treats collected municipal and industrial wastewater at their wastewater treatment facility. Treated wastewater discharges to the Columbia River via an outfall.

b. Ground Water: [\[help\]](#)

- 1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

Not applicable to the adoption of the Plan.

- 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

Not applicable to the adoption of the Plan.

c. Water runoff (including stormwater):

- 1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Not applicable. Will be evaluated for each project during design.

- 2) Could waste materials enter ground or surface waters? If so, generally describe.

Not applicable. Will be evaluated for each project during design.

- 3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

Not applicable. Will be evaluated for each project during design.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

Not applicable. Will be evaluated for each project during design.

4. **Plants** [\[help\]](#)

a. Check the types of vegetation found on the site:

- ___deciduous tree: alder, maple, aspen, other
- ___evergreen tree: fir, cedar, pine, other
- ___shrubs
- ___grass
- ___pasture

- ____ crop or grain
- ____ Orchards, vineyards or other permanent crops.
- ____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- ____ water plants: water lily, eelgrass, milfoil, other
- ____ other types of vegetation

Not applicable. Will be evaluated for each project during design.

- b. What kind and amount of vegetation will be removed or altered?

Not applicable. Will be evaluated for each project during design.

- c. List threatened and endangered species known to be on or near the site.

Not applicable. Will be evaluated for each project during design.

- d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Not applicable. Will be evaluated for each project during design.

- e. List all noxious weeds and invasive species known to be on or near the site.

Not applicable. Will be evaluated for each project during design.

5. Animals [\[help\]](#)

- a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Examples include:

- birds: hawk, heron, eagle, songbirds, other:
- mammals: deer, bear, elk, beaver, other:
- fish: bass, salmon, trout, herring, shellfish, other _____

Not applicable. Will be evaluated for each project during design.

- b. List any threatened and endangered species known to be on or near the site.

Not applicable. Will be evaluated for each project during design.

- c. Is the site part of a migration route? If so, explain.

Not applicable. Will be evaluated for each project during design.

- d. Proposed measures to preserve or enhance wildlife, if any:

Not applicable. Will be evaluated for each project during design.

e. List any invasive animal species known to be on or near the site.

Not applicable. Will be evaluated for each project during design.

6. Energy and Natural Resources [\[help\]](#)

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Not applicable. Will be evaluated for each project during design.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

Not applicable. Will be evaluated for each project during design.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

Not applicable. Will be evaluated for each project during design.

7. Environmental Health [\[help\]](#)

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

1) Describe any known or possible contamination at the site from present or past uses.

Not applicable. Will be evaluated for each project during design.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

Not applicable. Will be evaluated for each project during design.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

Not applicable. Will be evaluated for each project during design.

4) Describe special emergency services that might be required.

Not applicable. Will be evaluated for each project during design.

5) Proposed measures to reduce or control environmental health hazards, if any:

Not applicable. Will be evaluated for each project during design.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Not applicable. Will be evaluated for each project during design.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Not applicable. Will be evaluated for each project during design.

3) Proposed measures to reduce or control noise impacts, if any:

Not applicable. Will be evaluated for each project during design.

8. Land and Shoreline Use [\[help\]](#)

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

Not applicable. Will be evaluated for each project during design.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

Not applicable. Will be evaluated for each project during design.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

Not applicable. Will be evaluated for each project during design.

c. Describe any structures on the site.

Not applicable. Will be evaluated for each project during design.

d. Will any structures be demolished? If so, what?

Not applicable. Will be evaluated for each project during design.

e. What is the current zoning classification of the site?

Not applicable. Will be evaluated for each project during design.

f. What is the current comprehensive plan designation of the site?

Not applicable. Will be evaluated for each project during design.

g. If applicable, what is the current shoreline master program designation of the site?

Not applicable. Will be evaluated for each project during design.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

Not applicable. Will be evaluated for each project during design.

i. Approximately how many people would reside or work in the completed project?

Not applicable. Will be evaluated for each project during design.

j. Approximately how many people would the completed project displace?

Not applicable. Will be evaluated for each project during design.

k. Proposed measures to avoid or reduce displacement impacts, if any:

Not applicable. Will be evaluated for each project during design.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Not applicable. Will be evaluated for each project during design.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

Not applicable. Will be evaluated for each project during design.

9. Housing [\[help\]](#)

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

No housing proposed.

- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

No housing expected to be eliminated

- c. Proposed measures to reduce or control housing impacts, if any:

Not applicable. Will be evaluated for each project during design.

10. Aesthetics [\[help\]](#)

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

Not applicable. Will be evaluated for each project during design.

- b. What views in the immediate vicinity would be altered or obstructed?

Not applicable. Will be evaluated for each project during design.

- b. Proposed measures to reduce or control aesthetic impacts, if any:

Not applicable. Will be evaluated for each project during design.

11. Light and Glare [\[help\]](#)

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Not applicable. Will be evaluated for each project during design.

- b. Could light or glare from the finished project be a safety hazard or interfere with views?

Not applicable. Will be evaluated for each project during design.

- c. What existing off-site sources of light or glare may affect your proposal?

Not applicable. Will be evaluated for each project during design.

- d. Proposed measures to reduce or control light and glare impacts, if any:

Not applicable. Will be evaluated for each project during design.

12. Recreation [\[help\]](#)

- a. What designated and informal recreational opportunities are in the immediate vicinity?

Not applicable. Will be evaluated for each project during design.

- b. Would the proposed project displace any existing recreational uses? If so, describe.

Not applicable. Will be evaluated for each project during design.

- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

Not applicable. Will be evaluated for each project during design.

13. Historic and cultural preservation [\[help\]](#)

- a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.

There is currently one eligible historic site within the City of Pateros (Pateros Church of Christ) that is listed on the DAHP Washington Information System for Architectural and Archaeological Records (WISAARD). The WISAARD shows several properties that are not eligible for listing in the City of Pateros.

- b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

Not applicable. Will be evaluated for each project during design.

- c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

Not applicable. Will be evaluated for each project during design.

- d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Not applicable. Will be evaluated for each project during design.

14. Transportation [\[help\]](#)

- a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

Not applicable. Will be evaluated for each project during design.

- b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

Not applicable. Will be evaluated for each project during design.

- c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

Not applicable. Will be evaluated for each project during design.

- d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

Not applicable. Will be evaluated for each project during design.

- e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

Not applicable. Will be evaluated for each project during design.

- f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

Not applicable. Will be evaluated for each project during design.

- g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

Not applicable. Will be evaluated for each project during design.

- h. Proposed measures to reduce or control transportation impacts, if any:

Not applicable. Will be evaluated for each project during design.

15. Public Services [\[help\]](#)

- a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

Not applicable. Will be evaluated for each project during design.

- b. Proposed measures to reduce or control direct impacts on public services, if any.

Not applicable. Will be evaluated for each project during design.

16. Utilities [\[help\]](#)

- a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system,
other _____

Not applicable. Will be evaluated for each project during design.

- b. Describe the utilities that are proposed for the project, the utility providing the service,
and the general construction activities on the site or in the immediate vicinity which might
be needed.

Not applicable. Will be evaluated for each project during design.

C. Signature [\[HELP\]](#)

The above answers are true and complete to the best of my knowledge. I understand that the
lead agency is relying on them to make its decision.

Signature: Debra Wilson

Name of signee Debra Wilson

Position and Agency/Organization Clerk Treasurer City of Pateras

Date Submitted: 12/28/2022

D. Supplemental sheet for nonproject actions [\[HELP\]](#)

(IT IS NOT NECESSARY to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

The proposal is to adopt the City of Pateros Wastewater Facility Plan & General Sewer Plan, dated 2022, which provides a plan for continued and improved wastewater management. It is unlikely that adoption of the Wastewater Facility Plan & General Sewer Plan will increase the production, storage, or release of toxic or hazardous substances or long-term noise production. The Wastewater Facility Plan & General Sewer Plan evaluates the City of Pateros' wastewater collection system and wastewater treatment facility by: providing an existing system analysis, evaluating improvement alternatives, developing financing options and implementation schedules. If the improvement projects suggested in the Wastewater Facility Plan & General Sewer Plan are implemented, noise and emissions to air would temporarily increase during construction.

Proposed measures to avoid or reduce such increases are:

A. Compliance with environmental review and implementation requirements applicable to wastewater improvement projects included in the Wastewater Facility Plan & General Sewer Plan (i.e., SEPA, NEPA and SERP if applicable)

B. Requiring proposals to comply with applicable environmental review and implementation regulations.

C. Obtaining permits for wastewater improvement projects in the Wastewater Facility Plan & General Sewer Plan from agencies with jurisdiction applicable to water quality, air quality, noise, and toxic or hazardous substances.

D. Requiring control measures during construction of wastewater improvement projects in the Wastewater Facility Plan & General Sewer Plan and requiring contractors to be responsible for implementing appropriate measures during construction in compliance with environmental regulations including those related to air emissions, noise and

discharge to water and production, storage, or release of toxic or hazardous substances (i.e. Dept. of Ecology, Dept. of Health, etc.).

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

The adoption of the Wastewater Facility Plan & General Sewer Plan will not affect plants, animals, fish or marine life. The wastewater improvement projects included in the Wastewater Facility Plan & General Sewer Plan could have an impact on these environmental elements.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

A. Compliance with environmental review and implementation requirements applicable to wastewater improvement projects included in the Wastewater Facility Plan & General Sewer Plan (i.e., SEPA, NEPA and SERP if applicable)

B. Requiring proposals to comply with applicable environmental review and implementation regulations.

C. Obtaining permits for wastewater improvement projects in the Wastewater Facility Plan & General Sewer Plan from agencies with jurisdiction applicable to water quality, air quality, noise, and toxic or hazardous substances.

D. Requiring control measures during construction of wastewater improvement projects in the Wastewater Facility Plan & General Sewer Plan and requiring contractors to be responsible for implementing appropriate measures during construction in compliance with environmental regulations including those related to air emissions, noise and discharge to water and production, storage, or release of toxic or hazardous substances (i.e. Dept. of Ecology, Dept. of Health, etc.).

3. How would the proposal be likely to deplete energy or natural resources?

The adoption of the Facility Plan will not affect energy or natural resources. The wastewater management projects included in the Facility Plan could have a direct impact on these environmental elements.

Proposed measures to protect or conserve energy and natural resources are:

A. Measures may include public outreach, public education and use of energy efficient materials when economically and otherwise feasible.

B. Compliance with environmental review and implementation requirements applicable to wastewater improvement projects included in the Wastewater Facility Plan & General Sewer Plan (i.e., SEPA, NEPA and SERP if applicable)

C. Requiring proposals to comply with applicable environmental review and implementation regulations.

D. Obtaining permits for wastewater improvement projects in the Wastewater Facility Plan & General Sewer Plan from agencies with jurisdiction applicable to water quality, air quality, noise, and toxic or hazardous substances.

E. Requiring control measures during construction of wastewater improvement projects in the Wastewater Facility Plan & General Sewer Plan and requiring contractors to be responsible for implementing appropriate measures during construction in compliance with environmental regulations including those related to air emissions, noise and discharge to water and production, storage, or release of toxic or hazardous substances (i.e. Dept. of Ecology, Dept. of Health, etc.).

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

All projects will be evaluated for potential impacts during the review process.

Proposed measures to protect such resources or to avoid or reduce impacts are:

A. Compliance with environmental review and implementation requirements applicable to wastewater improvement projects included in the Wastewater Facility Plan & General Sewer Plan (i.e., SEPA, NEPA and SERP if applicable)

B. Compliance with City of Pateros critical areas and shoreline management regulations.

C. Requiring proposals to comply with applicable environmental review and implementation regulations.

D. Obtaining permits for wastewater improvement projects in the Wastewater Facility Plan & General Sewer Plan from agencies with jurisdiction applicable to water quality, air quality, noise, and toxic or hazardous substances.

E. Requiring control measures during construction of wastewater improvement projects in the Wastewater Facility Plan & General Sewer Plan and requiring contractors to be

responsible for implementing appropriate measures during construction in compliance with environmental regulations including those related to air emissions, noise and discharge to water and production, storage, or release of toxic or hazardous substances (i.e. Dept. of Ecology, Dept. of Health, etc.).

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

The adoption of the Wastewater Facility Plan & General Sewer Plan will not affect land and shoreline use. The wastewater improvement projects included in the Wastewater Facility Plan & General Sewer Plan could have an impact on these environmental elements.

Proposed measures to avoid or reduce shoreline and land use impacts are:

A. Following plans, priorities, guidelines, and rules in the Comprehensive Plan and Municipal Code.

B. Required project proposals to comply with Comprehensive Plans, Municipal Code, and other applicable review and implementation regulations.

C. Compliance with environmental review and implementation requirements applicable to wastewater improvement projects included in the Wastewater Facility Plan & General Sewer Plan (i.e., SEPA, NEPA and SERP if applicable)

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

The adoption of the Wastewater Facility Plan & General Sewer Plan will not affect demands on transportation or public services and utilities. The wastewater improvement projects included in the Wastewater Facility Plan & General Sewer Plan could have an impact on these environmental elements.

Proposed measures to reduce or respond to such demand(s) are:

A. Following plans, priorities, guidelines, and rules in the Comprehensive Plan and Municipal Code.

B. Required project proposals to comply with Comprehensive Plans, Municipal Code, and other applicable review and implementation regulations.

C. Compliance with environmental review and implementation requirements applicable to wastewater improvement projects included in the Wastewater Facility Plan & General Sewer Plan (i.e., SEPA, NEPA and SERP if applicable)

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

The Washington State Department of Ecology must approve the Wastewater Facility Plan & General Sewer Plan. In addition, the City will comply with environmental review and implementation requirements applicable to wastewater system improvement projects included in the Wastewater Facility Plan & General Sewer Plan. Therefore, the proposal to adopt the City of Pateros Wastewater Facility Plan & General Sewer Plan to provide continued and improved wastewater system management is unlikely to conflict with local, state, or federal laws or requirements for the protection of the environment.

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STATE OF WASHINGTON)

) S.S.

COUNTY OF CHELAN)

Affidavit of Publication

Laura Husa, being first duly sworn, on oath deposes and says:

That she is the Administrative Assistant of the **Quad City Herald** and that said newspaper is a legal newspaper and it now is and has been for more than six months prior to the date of publication hereafter referred to, published in the English language continually as a weekly newspaper in Bridgeport and Mansfield, Douglas County, Washington, and Brewster and Pateros, Okanogan County, Washington, and it is now and during all of said time published in an office maintained at the aforesaid place of publication of said newspaper.

That the annexed is a true copy of **City of Pateros, 2022 Wastewater Facility & Sewer Plan, Ad #5117** is published in regular form (and not in supplement form) of said newspaper(s) once a week for a period of 2 week(s) commencing the 4th of **January, 2023** and ending on the 11th of **January, 2023** and that such newspaper regularly distributed to its subscribers during all of said period.

That the full amount of the fee charges foregoing publication is the sum of **\$121.76**.

This newspaper has been approved as a legal newspaper by order of the Superior Courts of Douglas and Okanogan Counties, Washington, as provided in Chapter 213 Session of Laws of 1941.

Laura Husa

Subscribed and sworn before me this 11th day of January 2023



Ruthedna Keys

Notary Public in and for the State of Washington

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Public Notices

Public Notice
City of Pateros

Public Hearing for the 2022 City of Pateros Wastewater Facility Plan & General Sewer Plan

The City of Pateros has prepared the 2022 City of Pateros Wastewater Facility Plan & General Sewer Plan using funding from the State of Washington Department of Ecology (ECY) Clean Water State Revolving Funds supplemented by the City's Sewer Utility funds. In accordance with ECY funding guidelines the City is holding a Public Hearing to give the community an opportunity to learn more about the Wastewater Facility Plan & General Sewer Plan, preferred alternatives, and any potential impacts, including impacts to existing utility rates. Opportunity will be provided to the public to ask questions and provide comment on the Wastewater Facility Plan & General Sewer Plan. A copy of the Wastewater Facility Plan & General Sewer Plan may be found at City Hall for those who wish to review the plan prior to the meeting.

See below for more details:

Date: January 17, 2023

Time: 6:00 PM

Location:

City Hall Council Chambers

113 Lakeshore Dr.

Pateros, WA 98846

Published in the Quad City Herald

January 4, 11, 2023 #5117

SEWER PLAN UPDATE PUBLIC HEARING

JANUARY 17, 2023 6PM

PATEROS CITY HALL

NOW ACCEPTING APPLICATIONS FOR A PUBLIC WORKS POSITION

This position is non exempt performing manual to journey level work in the parks, streets, buildings and utilities of the City of Pateros. This is a full time position, wage scale starting at \$3,987 to \$4,333 per month plus full benefit package. Desirable qualifications but not mandatory include a CDL, Public Pesticide License, irrigation and landscape maintenance, street repair and maintenance, water or sewer certifications and heavy equipment operation. Background check and drug test will be required before hiring. Applicant must have a valid WA State Drivers

MAKE YOUR PAYMENT ONLINE



CITY OF PATEROS

UTILITIES
RV & CAMPING FEES
ANIMAL LICENSE



BUSINESS LICENSE APPLICATION

CITY OF PATEROS

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PARK RESERVATIONS



**CITY OF PATEROS
COUNCIL MEETING MINUTES
FOR JANUARY 17, 2023**

Mayor Kelly Hook called the meeting to order at 6:00 p.m. Councilmembers present included Mike Harding, Chantel Poole, George Brady and Holly Bange attended via zoom. Councilmember Sherrard was excused. Staff present was Jord & Kerri Wilson. Community present was Angela VanEysinga and Chief Heen.

ADDITIONS AND CHANGES TO AGENDA:

CONSENT CALENDAR

Councilmember Harding moved to accept payment of checks numbers 41054 to 41143. No voided checks. Claim checks total amount of \$93,072.85 and payroll checks total amount of \$57,434.16, and approval of the minutes for the meeting held December 19, 2022, and the mayors monthly meeting plan. Seconded by Brady. Motion carried unanimously.

AUDIENCE INPUT: Chief Heen gave his report early so he could attend a training. Chief Heen stated training continues. The team did a hydrant inspection and location. Chief updated council on a non-injury accident involving one of the engines. Minor damage was incurred, and all firefighters were fine. Mayor Hook stated he inspected the engine last Thursday and could not see any damage. Chief Heen stated he had three new recruits. Brady asked if those recruits needed gear. Heen stated he thought he had enough gear, but would check after recruits were approved. City Administrator asked Chief Heen if there was a procedure to deal with a HazMat situation. Chief stated it would be a good idea to have a drill. CA Wilson thought it would be a good idea to invite Emergency Management to our next Safety Committee meeting.

COMMITTEE REPORTS:

Finance & Sewer Committee: Harding stated the Finance and Sewer Committee met and discussed future planning for improvements to the sewer plant and how much it will cost. Finance committee also discussed the needed repairs to the tennis courts and how the city doesn't have the funds for the improvements.

Parks/Street Committee: Bange stated the Parks/Streets committee met and discussed doing away with the banners and look at other scenarios for downtown. The committee discussed the informational boards for the kiosk and the needed repairs to the tennis courts.

Planning Committee: Brady stated the planning committee met and went over the preliminary plans for Rock Garden Holdings. The committee also discussed the development standards, charging stations and pursuing the RDBG grant.

CITY REPORTS

Police: Report was submitted in the council's packet. No comments.

Mayor's Report: Mayor Hook submitted his report in council packets. Mayor Hook stated he and CA Wilson would be conducting interviews starting tomorrow for the vacant public works position.

Council Report: Poole stated there would be another blood drive January 25th at the Pateros School. Brady stated that he and the mayor would be attending the AWC Legislative action days in Olympia in February.

School: no report

City Administrator: CA Wilson updated council on all the public works projects and grants for the city. Wilson stated most of the month was dedicated to repairing and monitoring the lift station. Poole asked how many applicants were received. CA Wilson stated he received five good applications.

Clerk-Treasurer, Kerri Wilson: Clerk Wilson updated council on revenues and expenditures ending December 31, 2022.

- Expenditures are at 109.5% and Revenues are at 87%
- Hotel/Motel revenues are down
- Sales/Use revenues are up by \$18,239.
- Property taxes are on track
- TBD revenues are at \$25,897.54

Clerk Wilson gave a yearly overview of the building department. In 2022, there were 10 permits issued.

PUBLIC HEARING:

- **Mayor Hook opened the public hearing on the Sewer Plan at 6:24 pm. CA Wilson gave a detailed overview of the plan to the public. No public comments. Public hearing closed at 6:30 pm.**

ORDINANCES AND RESOLUTIONS:

- **Resolution 2023-01 RFQ Engineering/Surveying:** Poole moved to adopt Resolution 2023-01, a resolution choosing Varela Engineering and Management for engineering services and Erlanden and Associates for surveying services. Seconded by Harding. Motion carried unanimously.
- **Resolution 2023-02 Akitvov Contract:** Harding moved to adopt Resolution 2023-01 a resolution amending the Aktivov contract for the next three years. Seconded by Brady. Poole asked if the program would still be useful with the changes. CA Wilson stated we looked at what we use and cancelled what we don't use. The program is still beneficial and helpful to the city. Motion carried unanimously.

OTHER BUSINESS:

- **Council Date Change:** Brady moved to have February Council meeting on Tuesday February 21, 2023 due to the normal council meeting being a holiday. Seconded by Harding. Motion carried unanimously.
- **Old Checks:** Harding moved to void the checks listed on the attached spreadsheet presented by Clerk Wilson and re-issue as needed. Seconded by Poole. Motion carried unanimously.
- **600 Funds:** Poole moved to dissolve Funds 631 and 632 in the amount of \$1308.00 and move the funds to the General Fund. Seconded by Brady. Motion carried unanimously.
- **Sewer Plan:** Brady moved to submit the sewer plan to Department of Ecology for review. Seconded by Poole. CA Wilson stated Varela would be adding some comments from the committee meeting into the plan before submission. Motion carried unanimously.
- **Kiosk:** Poole moved to approve the three informational posters to be displayed in the downtown kiosk on Commercial Avenue. Seconded by Harding. Brady asked whether we should continue the free stay for peddlers/paddlers and asked how many used the free

stay in 2022. CA Wilson estimated ten. Poole asked if the Apple Pie Jamboree poster could be edited to include “3rd weekend in July”. CA Wilson stated he could do that.

ADJOURNMENT: The next regular council meeting will be February 21, 2023, at 6:00 p.m. There being no further business before the City Council, Harding made a motion to adjourn at 6:45 pm.; seconded by Brady. Motion carried unanimously.

APPROVED:

Kelly Hook, Mayor

ATTEST:

Kerri Wilson, Clerk-Treasurer

PUBLIC HEARING INFORMATIONAL SHEET

- Purpose of the Wastewater Facility Engineering Report and General Sewer Plan (WWFP)
 - Pateros' current WWFP is not up to date and does not reflect the City's current wastewater facilities
 - Pateros anticipates growth within their service area and the City wants to confirm the sewer system's ability to meet future demands
 - Some components in the 20-year-old treatment plant are at or nearing the end of their useful service life and need replacing
 - Pateros would like to modernize some of the WWTP's components
 - Pateros reports other miscellaneous deficiencies in the system that need addressing
- Alternatives Considered
 - Recommended improvements contained in the plan are divided into two categories: 1) Sanitary Sewer Collection System Improvements; and 2) Wastewater Treatment Plant Improvements.
 - 1) Sanitary Sewer Collection System Improvements:
 - Sewer main extensions to serve identified growth areas
 - Replacement of old and failing sewer mains and manholes
 - Warren Ave Lift Station upgrades
 - Lining of identified mains to reduce inflow into sewer system
 - 2) Wastewater Treatment Plant Improvements
 - Headworks system upgrade
 - Alternative 1: Replace screen
 - Alternative 2: Replace screen and add wash press system
 - Preferred alternative is Alternative 2. The existing screen is at the end of its service life. Addition of a wash press will reduce maintenance efforts associated with disposal of screenings.
 - Secondary treatment system upgrade
 - Upgrades to the secondary treatment system are needed due to the units age, advancements in technology, and Pateros' anticipated growth projections. Identified improvements to the secondary treatment system are necessary to provide service to sewer system users through the next 20+ years.
 - Biosolids processing and dewatering upgrade
 - Pateros does not have sufficient space on-site to store biosolids during winter / spring. Maintaining the existing drying beds is labor intensive and equipment is outdated

- Dewatering of biosolids using a screw press is recommended. Screw presses are reliable, require little maintenance, achieve a high percent dry solids, and are a commonly used cost-effective choice for smaller treatment plants such as Pateros.
 - Other upgrade considerations were given to the following WWTP elements:
 - Influent lift station
 - UV system
 - Outfall
 - Cross connection control system
 - Site improvements
 - Environmental Issues
 - Adoption of the WWFP is a non-project action and will not result in environmental impacts.
 - Improvements identified in the WWFP will require environmental review upon implementation.
 - Implementation of the improvements identified in the WWFP will ensure that the City is able to continue providing wastewater services to users and meet the criteria set forth in the City's NPDES permit.
 - Financial Issues
 - Implementation of sewer system and treatment plant upgrades identified in the WWFP will result in rate impacts to sewer system users. The extent of rate impacts to sewer users is dependent on which of the recommended improvements are pursued and what funding is available.
 - Implementation of the improvements are needed for the City to be able continue to provide sewer services to users. If no improvements are implemented, then sewer services will be impacted and the City will be unable to provide reliable sewer services to users.
 - The City will work with Varela to formulate a specific funding approach, phasing and/or options for implementation of the proposed improvements with the aim of reducing the overall financial impact on sewer rate users by pursuing low interest rate loans and grants.