CASCADE LOCKS

# City of Cascade Locks, Oregon

## Wastewater Facilities Plan

2017

Draft

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# CITY OF CASCADE LOCKS, OREGON

# WASTEWATER FACILITIES PLAN

# 2017

Preparation of this Wastewater Facilities Plan was funded with a financial award from the Community Development Block Grant Program administered by Business Oregon.

The City of Cascade Locks, Oregon, has reviewed this Wastewater Facilities Plan and adopted it.

_____ _____

Signature and Title Date

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# Executive Summary

## Introduction and Overview

This Wastewater Facilities Plan (WWFP) has been developed to provide the City of Cascade Locks, Oregon, with an up-to-date review of their wastewater collection system, the wastewater treatment facility (WWTF), and financial components of its wastewater system. Specifically, this WWFP evaluates the wastewater collection system and the WWTF for overall condition and performance, provides a schedule for low, medium, and high priority collection system repairs, and provides alternatives to improve the WWTF to address identified deficiencies and help comply with the conditions set forth in the National Pollutant Discharge Elimination System (NPDES) Permit. The following text summarizes existing conditions, describes the WWTF and collection system evaluation, and briefly discusses improvements. Detailed discussions are provided in the chapters specifically addressing the topic of interest.

## Existing Wastewater Collection and Treatment Systems

### *Wastewater Collection System*

The City of Cascade Locks' original wastewater treatment system was constructed and placed into service in 1968. Most of the City's wastewater collection system was constructed in 1968, along with the original wastewater treatment system. Before 1968, the City relied on septic tank systems for wastewater containment and treatment. Since the construction of the original collection system, some small residential subdivisions and sewer extensions have been added to the collection system.

To accommodate anticipated development and growth within the City, in 1998 the original WWTF located at Marina Park was demolished and replaced with a new extended aeration, activated sludge mechanical WWTF. The 1998 improvements also consisted of the installation of two new pump stations and new gravity and pressure sewer pipelines to transport wastewater from the pump stations to the WWTF.

Municipal wastewater from the western portion of the City of Cascade Locks is collected in a gravity collection system and conveyed via an 18-inch interceptor to the Main Pump Station wetwell located at the site of the old WWTF adjacent to Marina Park. The Main Pump Station pumps collected wastewater from the wetwell through an 8-inch pressure sewer to the 12-inch gravity main on Forest Lane that begins near the east end of the airport. The pumped untreated wastewater is then conveyed via gravity flow to the WWTF for processing. At the site of the Main Lift Station, an emergency overflow basin (converted old chlorine contact basin from the original WWTF) exists for the purpose of intercepting overflow from the station wetwell in the event of high flow occurrences that exceed the capacity of the pumps. Industrial wastewater from the Port of Cascade Locks Industrial Park is conveyed through a 15-inch interceptor and collects at the Industrial Pump Station wetwell. The Industrial Pump Station is located on the east side of the City near the intersection of Forest Lane and Industrial Park Way. The Industrial Pump Station pumps collected wastewater from the wetwell through an 8-inch pressure sewer to a manhole on the gravity main located at the intersection of Forest Lane and Herman Creek Lane. The pumped untreated wastewater is then conveyed via gravity flow to the WWTF for processing. The older (original)

portions of the City's wastewater collection system are mostly reinforced concrete pipe, while system extensions and new subdivisions generally use polyvinyl chloride (PVC) pipe. Concrete manholes are used throughout the City. The wastewater collection system contains approximately 39,636 feet of gravity pipe and 9,435 feet of pressure sewer pipe. The gravity portion of the wastewater collection system ranges from 8- to 18-inch diameter pipe.

### *Wastewater Treatment Facility*

The City of Cascade Locks' original wastewater treatment system was constructed and placed into service in 1968. As mentioned above, in 1998 the original WWTF located at Marina Park was demolished and replaced with a new WWTF. The existing WWTF is located about 1,000 feet west of Herman Creek on the south bank of the Columbia River.

The City's existing mechanical WWTF provides secondary treatment of the City's municipal wastewater. The WWTF generally consists of a preliminary treatment system (headworks), two sequencing batch reactor (SBR) activated sludge units, a flow equalization basin, two aerobic digestion units (waste activated sludge aerated holding tanks), an ultraviolet (UV) light disinfection system, an effluent outfall to the Columbia River, a laboratory/control building, a pump and blower building, and other miscellaneous supporting appurtenances (electrical and control systems, piping, air blowers and pumps, etc.,) to make a completely functioning system.

## Existing Wastewater System Evaluation and Recommended Improvements Summary

### *Collection System Evaluation and Recommended Improvements*

In the past, the City of Cascade Locks has not had the capacity or manpower to perform a comprehensive evaluation of the collection system. Portions of the wastewater collection system are approaching 50 years of age and are nearing the end of their expected service life. Therefore, as part of this WWFP, a thorough evaluation of the wastewater collection system was completed for the purposes of identifying source areas of infiltration and inflow (I/I) and possible illegal taps into the sewer, inspecting and documenting the condition of manholes and sewer main lines, determining preferred methodologies for manhole and sewer line repairs, and prioritizing locations and areas for rehabilitation.

The evaluation of the City's wastewater collection system included visual flow monitoring, visual manhole inspections, smoke testing, and sewer line cleaning and television (TV) inspection. The evaluation showed the portion of the collection system that was inspected is in relatively good condition; however, as expected, age and wear are beginning to show. The TV inspection showed areas of the collection system have cracks, broken lines, deterioration, and separated joints. It was possible to observe and identify many areas of infiltration resulting from the deteriorated, damaged, or broken pipes in the system. The TV inspection also showed leaks where service lines attach to the main line, some offset joints, and some sagging pipe sections.

After completion of the TV monitoring and inspection work, the TV monitoring video and reports generated were reviewed for purposes of documenting the gravity sewer lines' condition, determining problem areas and potential methodologies to repair and/or rehabilitate the identified deficiencies, and prioritizing the needed repairs and rehabilitation.

Visual inspection of 156 manholes was completed. The inspection focused primarily on those manholes in the older parts of the system and did not include the Shahala Drive development, Sheridan Street developments, or other newer developments in the City. The inspection identified some manholes have offset rings, cracks, spalling concrete, reinforcement showing, and liners separating from the inside wall of the manholes. The inspection also found some manholes that are leaking and may be contributing to I/I. Based on the visual inspection, the condition of the manholes was assessed and needed repairs were documented, after which a prioritization plan was developed for addressing the manhole issues.

## Wastewater Pump Station Evaluation

As part of this WWFP, a general evaluation of the three wastewater pump stations that serve the City was completed. Following is a summary of the results of the pump station evaluation.

### *Main Pump Station*

The Main Pump Station's pumps are functioning well but appear to be undersized. Operators report that each year, under high flow conditions, the pumps do not keep up with incoming flows, and wastewater is diverted into the old chlorine contact chamber where the surge is stored. In a duplex (two) pump system, the Oregon Department of Environmental Quality (DEQ) requires pumps to be sized to handle the anticipated peak flow conditions with just one pump operating. It is recommended the lift station be equipped with two new larger capacity pumps capable of handling peak flows.

The pump station piping is Schedule 80 PVC and is not adequately supported. It is suggested the piping be modified and supported appropriately.

Lift station components are constructed of materials such as carbon steel bolts, brackets, and cast iron fittings without an appropriate coating. These components are failing from corrosion. The corroded components need to be replaced with corrosion-resistant materials such as stainless steel, which will provide a system with a long expected life.

The electrical system does not appear to meet current electrical codes. The electrical control panels are located in a classified electrical area (Class 1, Division 1 hazardous environment) and were not designed to be installed in the classified area. There is also evidence of corrosion of the panels. It is recommended the electrical and control systems be upgraded to meet applicable codes and address the corrosion issue.

### *Industrial Pump Station*

At the time of the visual observation of the Industrial Pump Station, the pumps showed only three hours of run time. The wetwell was full of clear water. This station has not been used since its installation in 1998, as there have been no industries in operation at the industrial park to use the station.

The station appears to be operational and is in near-new condition. Even though the pumps have only three hours of run time on them, they are nearly 20 years old, which may affect

their remaining useful life. At this time, no improvements are recommended to be completed to this station.

### *Residential Pump Station*

The residential pump station appears to be functioning well. The anticipated remaining life of the components is limited, and funds should be allocated for upgrading the station when the components start to fail. Immediate improvements are not anticipated to be needed.

## *Summary*

Following is a summary of estimated project costs for the recommended Main Pump Station improvements and three improvement priority levels proposed for the City of Cascade Locks' collection system.

**TABLE ES-1**
**COLLECTION SYSTEM IMPROVEMENTS AND COST SUMMARY**

| Improvement Priority | Total Estimated Project Cost (2018 Dollars)[1] |
|---|---|
| Main Pump Station | $317,000 |
| High Priority Collection System | $467,850 |
| Medium Priority Collection System | $71,000 |
| Low Priority Collection System | $80,000 |
| **Total** | **$935,850** |

[1] *Includes the total estimated construction cost and estimated engineering fees.*

For a comprehensive discussion and evaluation of the collection system, refer to Chapter 3 of this WWFP. Chapter 3 outlines improvement priorities, provides breakdowns of the estimated costs to repair the collection system under the different identified priority levels, and includes wastewater collection system priority improvements maps.

## *Wastewater Treatment Facility Evaluation and Recommended Improvements*

An evaluation of the WWTF was undertaken to identify deficiencies and needed improvements to address the identified deficiencies, assist with development of improvement alternatives, and prioritize the needed improvements. Also, the evaluation assisted with determining the adequacy of the existing WWTF to meet the future wastewater treatment needs of the City of Cascade Locks and keep the WWTF operating in consistent compliance with the conditions of the NPDES Permit. The comprehensive evaluation of the existing WWTF is included in Chapter 4 of this WWFP. The evaluation used design criteria included in the 1998 Record Drawings from KCM, Inc., the operation and maintenance manuals prepared as part of the 1998 Wastewater Facilities Improvements project, and commonly accepted design criteria related to each unit process. The design criteria shown on Figure 2-2 in Chapter 2 were also used extensively in the evaluation. The recommended improvements to address the identified deficiencies are presented in Chapter 5 of this WWFP.

## Summary of Wastewater Treatment Facility Operational Issues and Deficiencies

Following is a summary of the existing treatment system operational issues and deficiencies identified in Chapter 4 of this WWFP.

- The WWTF is currently not being operated as intended by the original design, operational adjustments need to be made, and general maintenance items need to be completed.
- The headworks has no grit removal process unit.
- The existing SBR process units and aeration system are significantly larger than what is required to accommodate and treat the current and projected future influent flows and loadings.
- The aeration/mixing system does not appear to be functioning as originally designed.
- Due the nature of the design of the floating SBR decanter mechanism, the mechanism appears to be allowing undesirable levels of mixed liquor suspended solids (MLSS) to enter the decanter pipe during the SBR cycles.
- The SBR effluent equalization (EQ) basin outlet control valve is not functioning, which means the EQ basin is not performing as intended. This results in inefficient operation of the UV light disinfection system.
- The existing UV light disinfection system is nearly 20 years old and is reaching the end of its intended design life.
- A pH adjustment system is needed to meet upcoming anticipated pH limits.
- The aerobic digesters' decant valves freeze and become inoperable.
- The WWTF does not have an effective method to thicken the waste sludge within the digesters prior to hauling it to the City of Hood River. This results in inhibited ability to effectively manage the solids inventory within the WWTF and hauling a significantly greater volume of sludge than if a system was in place to allow thickening of the solids.

## Conceptual Wastewater Treatment Facility Improvement Alternatives

Rather than upgrading the existing WWTF, improvement alternatives could be considered to address the long-term wastewater treatment needs for the City of Cascade Locks. Possible alternatives could include the following:

### *No Action*

Under the No Action alternative, the City would continue to use the WWTF in its current condition. No work would be performed on the City's WWTF. To effectively meet the long-term wastewater treatment needs of the City, this alternative is not considered viable.

### *Modify the Wastewater Treatment Facility from the Existing Sequencing Batch Reactor Process to a Membrane Bioreactor Process*

Under this alternative, the City would modify the existing WWTF from an SBR process to a membrane bioreactor process. Although this alternative has the potential to be implemented, due to the high capital and operating costs relative to the cost of upgrading and maintaining the existing SBR process with no real tangible benefits, it is not considered cost-effective or viable.

### *Abandon the Existing Wastewater Treatment Facility and Construct a New Facultative Lagoon Treatment, Storage, and Effluent Reuse System*

This alternative consists of abandoning the existing WWTF and constructing a new pumping station and pipeline to convey the collected wastewater to a new lagoon treatment, storage, and effluent reuse (irrigation) facility. This alternative would allow the City to discontinue discharging treated effluent to the Columbia River by allowing winter storage of the wastewater and reuse of the treated effluent through summer irrigation. This alternative is not considered feasible for the City to implement for several reasons, which are discussed in detail in Chapter 5 of this WWFP.

It appears, based on the conceptual evaluation of possible improvement alternatives, the only feasible and cost-effective alternative is to continue to utilize the existing WWTF SBR process and complete improvements. Refer to Chapter 5 for detailed evaluation and discussion of recommended improvements.

Based on the process evaluation, observations, and issues identified, the steps for addressing the identified deficiencies and improving the performance of the WWTF could be considered under the following categories:

- Operational Adjustments and General Maintenance
- Headworks Improvements
- SBR Improvements
- UV Light Disinfection System Improvements
- Effluent pH Adjustment
- Sludge Management Improvements

### *Operational Adjustments and General Maintenance*

The items identified under this category are operational and general maintenance steps that can be taken to help increase the performance of the WWTF and reduce the risk of future violations of the NPDES Permit. Operational adjustments that can be taken include reducing the operating depths and MLSS concentrations maintained in the SBRs and reducing the overall decant rate to help minimize solids discharge from the decant mechanisms. These are considered high priority items recommended to be completed in the short term.

### *Headworks Improvements*

Headworks improvements should be considered a high priority item. To improve the headworks, a new grit removal system would need to be installed. Grit removal units function to provide protection of downstream mechanical equipment, such as pumps, from abrasion and accompanying abnormal premature wear, and to reduce the formation of heavy grit deposits in pipelines, channels, and aerator and digester tanks.

### *Sequencing Batch Reactor Improvements*

Improvements to the SBRs need to be completed to provide a long-term, reliable, energy-efficient system capable of achieving high level, reliable wastewater treatment that will allow consistent compliance with the conditions of the NPDES Permit. The recommended improvements include replacing the old aerator/mixing system with a new efficient aerator/mixing system, replacing the old decanting mechanism with new decanters, upgrading the WWTF control system, and removing the accumulated grit from the SBR basins. It is critical that vital components are well maintained and each functions as reliably and efficiently as possible. To address the identified deficiencies, the SBR improvements should be considered a high priority and need to be completed as soon as the budget and funding allow.

### *Ultraviolet Light Disinfection Improvements*

It is recommended that improvements to the existing UV light disinfection system be completed by replacing the old equipment with a new system. The UV light disinfection equipment is nearly 19 years old and is reaching the end of its intended design life. The equipment is showing its age and is requiring more and more maintenance. This is a critical component of the WWTF and must be reliable and work efficiently to disinfect properly and ensure continued consistent NPDES Permit compliance. The UV light disinfection system improvements should be considered a high priority and need to be completed as soon as budget and funding allow.

### *Effluent pH Adjustment*

The DEQ's 303(d) list for the Columbia River at the City's outfall specifies that treated wastewater effluent should be discharged with a pH in the range of 7.0 to 8.5. A new pH permit limit of 7.0 to 8.5 is anticipated to be stipulated in the next NPDES Permit renewal cycle. Historical operating data indicate that, more often than not, the pH of the effluent is below the 7.0 threshold. To address this concern, and consistently comply with the pH limits, adjustments to the effluent pH will need to be made prior to discharge into the Columbia River. To make the required pH adjustments, a chemical will need to be injected into the effluent stream at a controlled rate. To ensure consistent compliance with the anticipated permit limits, implementation of a pH adjustment system should be considered a high priority.

### *Sludge Management Improvements*

Incorporation of a mechanical sludge thickening system would result in significant reduction in the volume of sludge that would need to be hauled to the City of Hood River's WWTF and would provide enhanced control and management of the sludge. Enhanced control capabilities afforded by a sludge thickening system would allow the process to be operated more easily as intended by the original design and, thereby, increase the treatment efficiency and help with consistent NPDES Permit compliance. Sludge thickening improvements should be completed as the budget and funding allow.

A summary of the estimated costs for these recommended improvements to the WWTF is presented on Figure ES-1.

## Selected Improvements

Selected improvements will be included after City Council action.

## Current Financial Status and Loan Capacity

The annual cost of operating and maintaining the wastewater system is summarized on Figure 6-1 in Chapter 6. This includes all costs for the wastewater system, such as personnel services, materials and services, capital outlay, and inter-fund transfers to debt service and the capital reserve fund. A graphical plot of the City of Cascade Locks' wastewater system budget, showing revenue and expenditures, is presented on Figure 6-2 in Chapter 6. The trend for the City of Cascade Locks' operation and maintenance expenditures suggests expenditures should be in the range of $375,000 in the budget year 2018-19, based on historical data provided by the City and the fiscal year 2016-17 adopted budget.

The City has a U.S. Department of Agriculture Rural Development (RD) bond serviced by wastewater system revenues. The bond was created in 1998 with a total principal amount of $954,000, a 40-year repayment period, and an annual percentage rate of 4.75 percent compounded annually. The current annual loan payment amount is $57,311, with approximately $723,244 in principal remaining.

To determine the City's ability to fund a wastewater system improvements project, Figures 6-3 and 6-4 in Chapter 6 were prepared. It appears more than one funding source is available to the City, potentially including the Business Oregon Water/Wastewater program, RD, and the DEQ's Clean Water State Revolving Fund (CWSRF). These programs appear to be sources that can provide the funds needed to potentially make the proposed improvements financially feasible for the City.

The data on Figure 6-3 indicate the City could afford to service a CWSRF 30-year bond purchase (approximately 1.48 percent annual interest rate) in the amount of approximately $5,274,500 with an average monthly sewer cost of approximately $91 per equivalent residential unit (ERU). Further, the data indicate the City could afford to service an RD 40-year design/construction loan (approximately 2.625 percent annual interest rate) for the same loan amount with the same average sewer cost of approximately $94 per ERU. The City could service similar bond debts using taxes only, which would result in annual property taxes increasing in the range of approximately $264 to $326 per $100,000 of tax assessed value.

To complete all recommended improvements, grant funds coupled with low interest loan funds will most likely need to be acquired. It is recommended the City thoroughly investigate potential funding sources to ensure the best funding package is obtained for the project. Other potential funding measures may be available to the City to reduce the potential rate increase impact on City customers. It will be important for the City to work directly with the Business Oregon Regional Development Officer, the RD Area Specialist, and the DEQ Finance Administrators to evaluate these options.

## Prioritized Funding Options

Based on the funding available and established priorities, there may be an option to separate and/or bundle the recommended improvements to be affordable based on the City's prioritized needs and available funding. The City may want to discuss the options based on the City's most pressing needs. Refer to Figure ES-2 for various options potentially available under this concept.

## Project implementation

### *Action items*

The City of Cascade Locks needs to perform the following general action items to implement the proposed wastewater system improvements project.

1. The City needs to contact Business Oregon to schedule a One Stop meeting to initiate funding discussions.
2. Chapters IX and X of the City of Cascade Locks' Charter regulate financing of the sewage disposal system and limits indebtedness, respectively. To successfully fund a wastewater system improvements project, the City will need to maintain good communications with City residents. A bond election may also be necessary if RD funding is sought. Once a debt mechanism has been selected (revenue bond or general obligation bond), a bonding attorney should be consulted and the appropriate resolution paperwork should be prepared and considered for implementation.
3. The City will need to hold public information meetings to inform its citizens of the needs and scope of the project, to answer questions, and to generate support for the required sewer rate increase.

## Conclusion

The key to implementing the recommended collection system and WWTF improvements is the ability of the City of Cascade Locks to acquire the necessary funding that will allow sewer rates to remain as low as possible. It is likely not possible for the City to complete the identified improvements without seeking funding assistance from both state and federal funding sources. Depending on timing, available funding, and affordability, all or a portion of the recommended WWTF improvement items could be included as part of an overall wastewater system improvements project that may include the high priority collection system improvements recommended in this WWFP.

The City of Cascade Locks' WWTF is now approximately 19 years old. The typical design life of facility improvements is 20 years. The City has had issues in the past and continues to have problems with maintaining consistent compliance with the NPDES Permit. Without making identified operational

changes and improvements to the WWTF, the City will likely continue to violate the conditions of the NPDES Permit and may be subject to penalties and fines by the DEQ. The identified and recommended improvements, if operated properly and as intended by the design, are anticipated to provide the City with an efficient treatment system that will allow consistent compliance with the NPDES Permit. Overall, the recommended improvements will provide an upgraded and more reliable wastewater treatment system that should serve the City of Cascade Locks for many years.

## CITY OF CASCADE LOCKS, OREGON
## WASTEWATER FACILITIES PLAN
## RECOMMENDED WASTEWATER TREATMENT FACILITY IMPROVEMENTS
## SUMMARY OF PRELIMINARY COSTS
## July 2017

| | | |
|---|---|---|
| **Estimated Improvements Cost[1]** | | |
| Headworks Improvements | $ | 961,000 |
| Equalization Basin Automatic Flow Control Valve Repair | | 10,000 |
| SBR Improvements | | 1,722,500 |
| UV Light Disinfection System Improvements | | 363,000 |
| pH Adjustment System | | 458,000 |
| Sludge Management Improvements | | 791,000 |
| **Total Estimated Improvements Cost (2018 Dollars)** | **$** | **4,305,500** |
| | | |
| **Other Estimated Project Costs** | | |
| Funding Acquisition | $ | 30,000 |
| Legal and Administration | | 35,000 |
| Labor Standards | | 15,000 |
| Environmental Review Report | | 35,000 |
| Archaeological Report | | 20,000 |
| Cultural Resource Monitoring[2] | | 35,000 |
| Regulatory Agency Permitting, Reporting, and Review Fees | | 15,000 |
| **Total Other Estimated Project Costs (2018 Dollars)** | **$** | **185,000** |
| | | |
| **TOTAL ESTIMATED PROJECT COSTS (2018 DOLLARS)** | **$** | **4,490,500** |

[1] Includes total estimated construction costs and engineering fees.
[2] Assumes a 12-month construction period with one part-time monitor on site.

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
RECOMMENDED WASTEWATER TREATMENT FACILITY IMPROVEMENTS SUMMARY OF PRELIMINARY COSTS

**FIGURE**
**ES-1**

## CITY OF CASCADE LOCKS, OREGON
## WASTEWATER FACILITIES PLAN
## IMPROVEMENTS PRIORITIZATION SCENARIOS FUNDING COMPARISON

| Improvements Prioritization Included Elements | Estimated Improvements Cost | Estimated Other Costs | Estimated Total Improvements Costs | Funding Scenarios[1,2] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Business Oregon Water/ Wastewater Program 25-Yr Loan | Estimated Monthly Rate | DEQ CWSRF 20-Yr Loan | Estimated Monthly Rate | DEQ CWSRF 30-Yr Bond/Loan | Estimated Monthly Rate | RD 40-Yr Loan | Estimated Monthly Rate | Business Oregon SPWF | Business Oregon CDBG |
| pH Adjustment System (PA) | $458,000 | $185,000 | $643,000 | $643,000 | $67 | $643,000 | $67 | $643,000 | $65 | $643,000 | $66 | TBD | None |
| PA and High Priority Collection System Improvements (CSI) | $1,242,000 | $185,000 | $1,427,000 | $1,427,000 | $74 | $1,427,000 | $73 | $1,427,000 | $70 | $1,427,000 | $70 | TBD | None |
| PA, CSI, and Headworks (HW) | $2,203,000 | $185,000 | $2,388,000 | $2,388,000 | $81 | $2,388,000 | $81 | $2,388,000 | $76 | $2,388,000 | $76 | TBD | None |
| PA, CSI, HW, and Flow Control Valve Repair (FCV) | $2,213,000 | $185,000 | $2,398,000 | $2,398,000 | $81 | $2,398,000 | $81 | $2,398,000 | $75 | $2,398,000 | $76 | TBD | None |
| PA, CSI, and Sequencing Batch Reactor (SBR) | $2,964,500 | $185,000 | $3,149,500 | $3,149,500 | $88 | $3,149,500 | $86 | $3,149,500 | $79 | $3,149,500 | $81 | TBD | None |
| PA, CSI, HW, FCV, and SBR | $3,935,000 | $185,000 | $4,120,000 | $4,120,000 | $96 | $4,120,000 | $94 | $4,120,000 | $85 | $4,120,000 | $87 | TBD | None |
| PA, CSI, HW, FCV, SBR, and Ultraviolet (UV) Light Disinfection | $4,298,500 | $185,000 | $4,483,500 | $4,483,500 | $98 | $4,483,500 | $97 | $4,483,500 | $87 | $4,483,500 | $89 | TBD | None |
| PA, CSI, HW, FCV, SBR, UV, and Sludge Management | $5,089,500 | $185,000 | $5,274,500 | $5,274,500 | $105 | $5,274,500 | $103 | $5,274,500 | $91 | $5,274,500 | $94 | TBD | None |

[1] Depending on the selected funding package, monthly rates may increase as shown above and on Figure 6-3, or annual taxes may increase as shown on Figure 6-4, or a combination of monthly rates and taxes may also be used.

[2] For the purpose of this financial analysis, it is assumed the City would acquire funding only from loans.

CDBG = Community Development Block Grant
CSWRF = Clean Water State Revolving Fund
DEQ = Oregon Department of Environmental Quality
SPWF = Special Public Works Fund
TBD = To be determined

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
IMPROVEMENTS PRIORITIZATION
SCENARIOS FUNDING COMPARISON

FIGURE
ES-2

# Chapter 1 - Background Information

## Introduction and Project Purpose

This chapter of the Wastewater Facilities Plan (WWFP) provides background information on the City of Cascade Locks, Oregon, and its municipal wastewater system. This information will be helpful to understand the scope and need for the WWFP by providing the data necessary to evaluate the existing system and develop subsequent improvement alternatives. This chapter discusses the project authorization, funding, and scope of the WWFP and briefly describes the community. It also provides a system overview and historic municipal wastewater flow and loading data.

The City owns and operates a mechanical secondary wastewater treatment facility (WWTF) for processing municipal wastewater. Waste sludge is hauled to the City of Hood River's WWTF for further treatment prior to disposal on land at Oregon Department of Environmental Quality (DEQ)-approved sites. Treated and disinfected effluent is discharged to the Columbia River.

On December 9, 2009, the City entered into a Mutual Agreement and Order (MAO) with the DEQ to address ongoing permit violations for total suspended solids (TSS) in wastewater effluent. Although the MAO was amended a year later to allow credit for actions taken by the City to resolve the TSS exceedances, the City opted to keep the MAO open and comply with the original requirements, which included submitting an engineering study of the WWTF. To comply with this requirement, the City completed a technical memorandum that outlined recommended short-, intermediate, and long-term operational adjustments and improvements. Submittal of this memorandum met the requirements of the MAO and, consequently, the DEQ terminated the MAO on May 20, 2013.

Although the 2009 MAO was terminated, the City realized it needed to complete a more comprehensive analysis of the existing WWTF than what was provided in the aforementioned memorandum. As a result, the City completed a Wastewater Facilities Engineering Evaluation Report (Report) in November 2013. The Report identified deficiencies as well as the improvements required within the City's existing WWTF to correct problems and address ongoing National Pollutant Discharge Elimination System (NPDES) Permit compliance issues. The Report also concluded that significant infiltration/inflow (I/I) is occurring within the existing wastewater collection system and identified key elements of a detailed collection system evaluation required to determine and prioritize improvements needed in the collection system.

On June 27, 2013, the DEQ issued the City a renewed NPDES Permit. The NPDES Permit authorizes the City to construct, install, modify, and operate wastewater treatment and disposal facilities and discharge adequately treated wastewater into the Columbia River in conformance with the requirements, limitations, and conditions set forth in the NPDES Permit. The NPDES Permit expires on December 31, 2017. A copy of the City's NPDES Permit is included in Appendix A.

Since issuance of the NPDES Permit, the City has had numerous violations. As a result of the ongoing NPDES Permit violations, the DEQ issued the City another MAO on January 21, 2014. A copy of the 2014 MAO and amendments are included in Appendix B. One of the conditions of this MAO requires the City to prepare a WWFP and submit it to the DEQ for review and approval. The WWFP must expand upon the scope of the 2013 Report and fully evaluate the existing wastewater collection and treatment

systems; outline identified deficiencies, improvements needed, and estimated project costs to complete the required WWTF improvements; determine the most appropriate action and prioritization for long-term collection system rehabilitation; and include a complete financial analysis of the selected improvements package. Agencies that fund wastewater system improvements projects also require the City to have a WWFP; this document will satisfy that requirement.

For these reasons, the City of Cascade Locks has initiated this WWFP. The intent of this WWFP is to provide the City with the data and information needed to better assess the alternatives and provide the guidance required to select the best long-term solution for the City's wastewater system needs. The information, data, and analysis from the 2013 Report were incorporated into this WWFP, along with other elements necessary to make a completed WWFP to meet the planning guidelines. This WWFP will allow the City to seek state and federal funding for the design and construction of identified and selected improvements.

## Project Authorization and Funding

An Agreement for Engineering Services authorized Anderson Perry & Associates, Inc., to prepare this WWFP. This WWFP was funded in its entirety by a Community Development Block Grant administered by Business Oregon - Infrastructure Finance Authority.

## Scope of Wastewater Facilities Plan

This WWFP is intended to provide the City with a planning document that presents alternatives related to municipal wastewater treatment and provides guidance for the decision-making process. The primary focus of this WWFP includes the following:

1. Provide wastewater treatment system operational and capacity analysis.
2. Develop improvement alternatives for the WWTF to address identified deficiencies.
3. Evaluate the collection system.
4. Recommend an improvements project for both the WWTF and the collection system to address identified deficiencies.
5. Provide a full financial analysis of the recommended improvements package.

To meet the intentions and goals of the WWFP, the following scope was identified in the Agreement for Engineering Services referenced above:

1. Develop a statement of purpose, background, and need for the WWFP and demonstrate consistency with the City's Comprehensive Land Use Plan.
2. Review and update the current wastewater flows and loads as well as the 20-year projection of future population, wastewater flows, and waste loads. Develop updated design criteria for use in evaluating the system and developing needed improvements.
3. Prepare a technical description and review of the evaluation of the existing WWTF included in the 2013 Report and an update of identified deficiencies based on the review.

4. Evaluate the collection system based on the results of influent flow records, television monitoring, and manhole inspection, including identifying and prioritizing needed improvements. Develop estimated collection system improvements costs.
5. Discuss the applicable regulatory requirements, including those concerning surface water, recycled water, groundwater, and sludge management and whether these requirements are permitted or limited by the City's Comprehensive Land Use Plan.
6. Develop various feasible improvements alternatives based on the outcome of the existing system evaluation and identified deficiencies. Prepare estimated project costs of the feasible improvements alternatives, annual operation and maintenance cost, and present worth analysis.
7. Prepare an evaluation and detailed description of the City's preferred improvements alternatives. Identify treatment and regulatory standards and outline estimated costs.
8. Analyze financing options and prepare a financing plan for design and construction of improvements, if needed, and long-term operation of the facilities, including projection of sewer use impacts and fees.
9. Prepare a preliminary environmental analysis.
10. Note: This scope of work does not include the preparation of environmental reports for design and construction funding applications, biological assessments, wetland delineations, cultural resource evaluations, mitigation plans, or other related environmental documents.

## Description of Community and System Overview

The City of Cascade Locks is an Oregon municipal corporation incorporated in 1935. The City is governed by a mayor/City Council government with a city administrator handling the day-to-day operations. The City is located in northwest Hood River County on the south shore of the Columbia River just upstream from the Bonneville Dam along Interstate 84 (I-84), approximately 40 miles east of the City of Portland, Oregon, and 20 miles west of the City of Hood River, Oregon. Figure 1-1 shows location and vicinity maps for the City, and Figure 1-2 is an aerial photograph of the City.

### *Population*

Generally, the City has experienced slow growth over the last 20 years. A short decline was experienced in 2007 and 2008 that has leveled off since then. Refer to Chapter 2 for a more comprehensive discussion of population and its applicability and importance to this planning effort.

### *Transportation*

U.S. Highway 30 runs through the City and can be accessed by Exit 44 from I-84, which is the City's major transportation route. Washington State Highway 14, located just across the Columbia River, is accessible via the Bridge of the Gods. Through the Columbia River Gorge, the Union Pacific Railroad maintains a main line that is routed through the City.

### *Study Area*

The study area for this WWFP encompasses the entire area within the city limits and urban growth boundary (UGB) of the City (see Figure 1-1).

### *Land Use*

The current zoning in the City is shown on the Land Use Map, Figure 1-3. Four Comprehensive Plan land use designations have been identified within the city limits: residential, commercial, industrial, and public. The majority of the City is designated for residential use. Areas along the Columbia River are primarily designated as public. Industrial areas are located in the east part of the City between I-84 and the Columbia River.

## Physical Environment

### *Topography*

The City is located in the Columbia River Gorge, bounded on the north by the Columbia River and on the south by the steep walls of the Gorge. The average elevation within the City is approximately 150 feet above mean sea level.

### *Regional Geology*

The Columbia River Gorge was formed approximately 2 million years ago by erupting volcanoes. During this period, the Cascade Mountain Range began to uplift and the Columbia River carved out the Gorge. The City of Cascade Locks is located on a portion of the Columbia River famous for a natural dam known as the Bridge of the Gods. The dam was a result of a major landslide. The river eventually breached the natural dam, creating the Cascades Rapids. The rapids were submerged after construction of the Bonneville Dam in 1938.

### *Threatened and Endangered Species*

Thirteen species of salmon and steelhead in the Columbia River Basin are listed as threatened or endangered under the Endangered Species Act. The spotted owl is also considered threatened in this area.

### *Climate*

The City of Cascade Locks has a warm summer Mediterranean-like climate with a marked seasonal distribution in precipitation. Most of the precipitation occurs from November through January. The normal amount of annual precipitation for the City is approximately 76 inches. Temperatures are stabilized by coastal weather patterns. The City experiences chilly and rainy winters.

### *Soils*

A comprehensive soil survey by the Natural Resources Conservation Service is not currently available for the City of Cascade Locks. This could be due to limited natural space available for agriculture and highly complex soil development due to historic geologic events.

### *Air Quality*

The City of Cascade Locks is an attainment area for all criteria pollutants, which means the area has not otherwise been designated by the U.S. Environmental Protection Agency as a nonattainment area with ambient air quality standards for a particular regulated pollutant. A criteria pollutant refers to any of the following regulated pollutants: nitrogen oxides, volatile organic compounds, particulate matter, PM10, PM2.5, sulfur dioxide, carbon monoxide, and lead. The City is not located within 10 kilometers (approximately 6.2 miles) of a Class I Air Quality Protection Area. For more information on attainment areas, criteria pollutants, and Air Quality Protection Areas, reference Oregon Administrative Rule 340-200-0020.

### *Fish and Wildlife*

The City is home to Oxbow Hatchery, part of the Columbia River Fisheries Development Program, which exists to enhance declining fish runs in the Columbia River Basin and provide additional rearing facilities for the Bonneville Hatchery. Oxbow Hatchery raises spring Chinook, coho salmon, and winter steelhead. Fish are not released at the location of the hatchery. Fish present in the Columbia River include various salmon species, steelhead, and sturgeon. The Gorge is also host to a variety of plant and animal life. Over 800 species of wildflowers and shrubs exist along the Gorge. Varied landscapes create many habitats for wildlife.

## Water Resources

### *Hydrology*

The main hydrologic features within the City's UGB include the Columbia River, Herman Creek, Dry Creek, and Moody Creek, as well as several large ponds at the base of the steep Gorge walls south of I-84. Alluvial gravels along the Columbia River contain a body of groundwater connected hydraulically to the river. This groundwater resource provides municipal water for the City. The City is located in the Middle Columbia-Hood watershed.

### *Wetlands*

According to the Local Wetlands Inventory Report for the City written by Pacific Habitat Services, Inc., wetland areas are generally transitional between unplanned and truly aquatic areas, which have permanent open water. Many of the wetlands in the area are permanently saturated or inundated with water. The largest areas of wetlands within the area are south of the frontage road, where the Palustrine Aquatic Beds wetlands exist, as well as wetland bottomlands produced by water level fluctuations of the Columbia River. The National Wetlands Inventory Map is shown on Figure 1-4.

### *Flood Hazards*

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map Panels 410086 0025 B and 410087 0005 B provide a comprehensive overview of areas within the city limits and the UGB. The majority of the City is designated Zone C, which is described as areas with minimal flooding. The FEMA floodplain is shown on Figures 1-5A and 1-5B.

## Wastewater System Overview

The City's original WWTF was placed into service in 1968. Thirty years later, in June 1998, a sequencing batch reactor (SBR) facility was constructed and placed into service. The SBR facility was sized to accommodate future growth and has a dry weather design flow capacity of 0.493 million gallons per day (MGD). When the 1998 facilities were constructed, the original WWTF was demolished and a lift station, the Main Pump Station, was constructed in its place. The original WWTF chlorine contact basin was converted to an emergency containment tank for wetwell overflows from the lift station. The wastewater system also includes a lift station on Forest Lane near Industrial Way, referred to as the Industrial Pump Station, and a lift station located in a restricted area south of City Hall.

Wastewater is pumped from the lift stations to the gravity main on Forest Lane, then flows by gravity to the new WWTF. The WWTF consists of the headworks, two SBR basins, a flow equalization basin, an ultraviolet (UV) light disinfection unit, and two aerobic digesters. Wastewater enters the WWTF from the collection system through a 24-inch pipe to the headworks, where a fine screen removes non-treatable objects. The headworks does not provide grit removal. From the headworks, wastewater flows to the SBRs, where organics are converted to bacteria solids and the solids are removed to produce clarified effluent. The wastewater is then separated into a liquid stream and a solids stream. Liquid stream effluent flow is discharged to the flow equalization basin, then to the UV light disinfection unit, where it is subjected to ultraviolet radiation. After disinfection, effluent is discharged to the Columbia River. The solids stream, or waste activated sludge, is pumped to the aerobic digester cells where the volatile solids and pathogens are aerobically reduced. The digested sludge is then trucked to the City of Hood River's WWTF for further treatment and disposal. Refer to Chapters 3 and 4 for more comprehensive discussions and evaluations of the City's collection and treatment systems, respectively.

## Historical Municipal Wastewater Data

This section provides a summary of the historical municipal wastewater quality data for the City's WWTF. Information provided in this section was taken from the City's Discharge Monitoring Reports (DMRs).

Figure 1-6 shows a summary of historical (January 2010 through July 2016) total monthly municipal effluent flows from the City as measured by the effluent flowmeter and recorded on the DMRs. As indicated on Figure 1-6, the maximum total monthly flow occurred in December 2015 and was 8.12 million gallons (MG). The minimum total monthly flow occurred in September 2014 and was 1.71 MG. The average total monthly flow over the approximately 6-year period is 3.93 MG.

A summary of the historical daily maximum, minimum, and average effluent flows, as measured by the effluent flowmeter and recorded on the DMRs for the period between January 2010 and July 2016, is shown on Figure 1-7. According to the data, the maximum daily flow occurred in November 2015 and was 0.920 MGD. The minimum daily flow occurred in October 2014 and was 0.028 MGD. The average daily flow was 0.129 MGD over the approximately 6-year period. Wastewater analysis was completed using the recorded effluent flows since the City does not have an influent flowmeter or a method to determine influent flows. For the purposes of this WWFP, the influent flows were assumed to be equal to the effluent flows, although it is likely the influent flows are greater. The influent flows would be approximately equal to the effluent flows plus the volume lost due to evaporation and the volume of sludge removed and hauled to the City of Hood River's WWTF. These losses were assumed to be minor

enough not to change the overall analysis or the recommendations given in this WWFP and, therefore, were not estimated.

Figure 1-8 summarizes historical municipal influent and effluent five-day carbonaceous biochemical oxygen demand ($CBOD_5$) concentrations as recorded on the DMRs during the period between January 2010 and July 2016. As indicated on Figure 1-8, the maximum, minimum, and average influent $CBOD_5$ were 823 milligrams per liter (mg/L), 61 mg/L, and 239 mg/L, respectively. The maximum, minimum, and average effluent $CBOD_5$ were 6 mg/L, 1 mg/L, and 2 mg/L, respectively. The WWTF's average $CBOD_5$ mass loading was approximately 257 pounds per day (lbs/day). The City's secondary WWTF, according to the data, achieved an average $CBOD_5$ removal of 99 percent.

The historical municipal influent and effluent TSS concentrations, as reported on the DMRs during the period previously described, are shown on Figure 1-9. As illustrated on Figure 1-9, the maximum, minimum, and average influent TSS were 1,144 mg/L, 120 mg/L, and 364 mg/L, respectively. The maximum, minimum, and average effluent TSS were 62 mg/L, 2 mg/L, and 14 mg/L, respectively. The WWTF's average TSS mass loading was approximately 392 lbs/day. The City's secondary WWTF, according to the data, achieved an average TSS removal of 95 percent.

Figure 1-10 provides a summary of the historical flow and loading data presented above. These historical flow and loading data have been analyzed for the purpose of establishing the future design criteria used in evaluation of the existing WWTF and development of improvement alternatives. Included in the summary are maximum, minimum, and average monthly effluent flows. Additionally, Figure 1-10 presents the historical wastewater data including flow, influent and effluent $CBOD_5$ and TSS concentration, and mass loading.

Figure 1-11 shows a summary of the municipal effluent flow analysis for specific flow components of interest. The flow components have been separated into dry weather flow and wet weather flow categories.

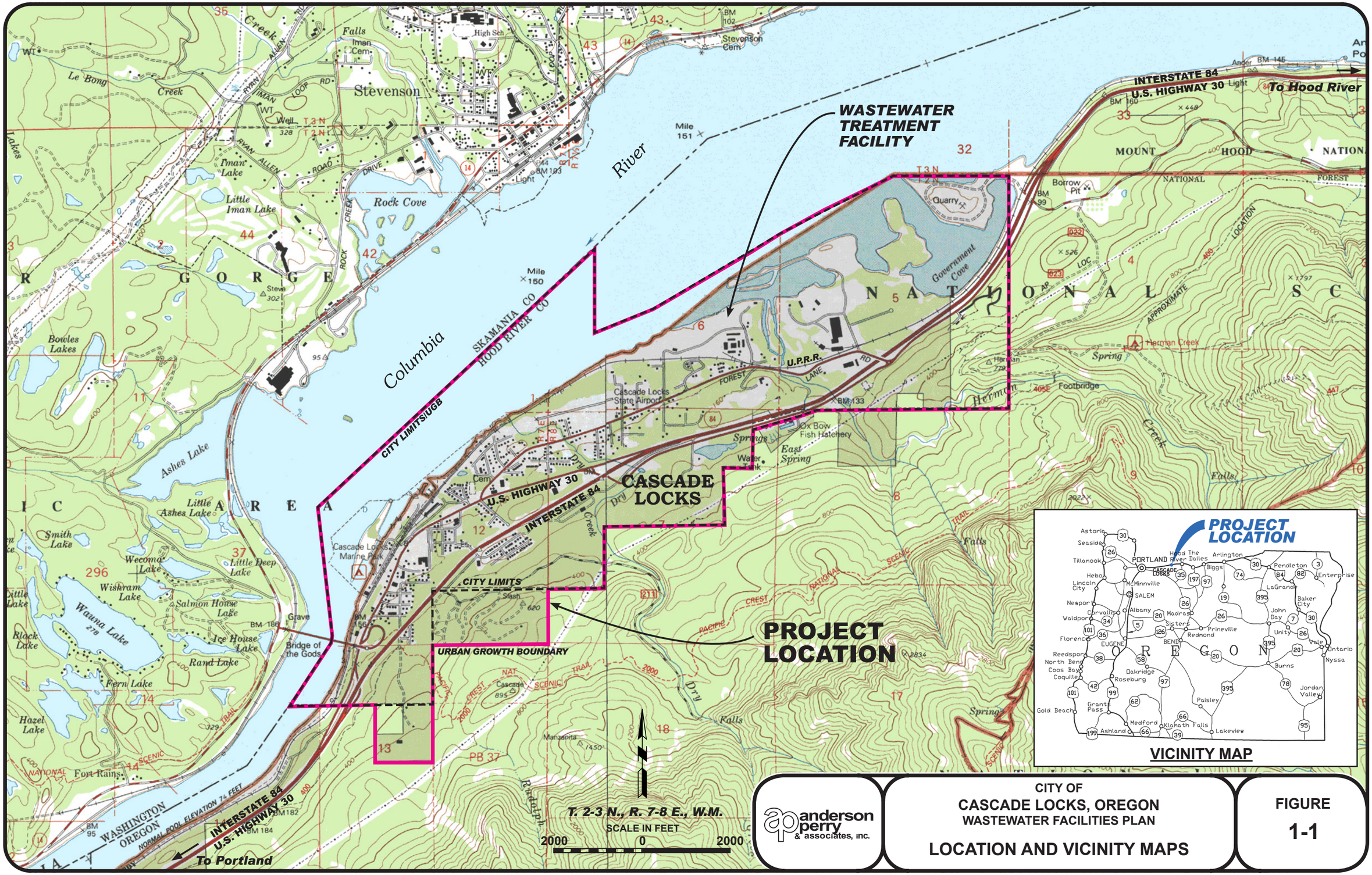
Figure 1-12 is a summary of the City's DMR data. Included in the summary are total, maximum, minimum, and average monthly effluent flows. Additionally, Figure 1-12 presents historical influent and effluent $CBOD_5$ and TSS concentrations and mass loading data.

These historical flows are slightly higher than the ranges expected. Data collected from many municipal wastewater systems similar to the City's indicate that average annual flows usually range between 64 to 127 gallons per capita per day (gpcd). The City's average annual flow is 132 gpcd.

The historical monthly flow, as seen on Figure 1-6, indicates there is typically a period of time when the wastewater flows become much greater than those at other times. These periods generally occur from November to April of each year and can be up to twice as much flow. High sustained influent flows during these months are usually indicative of groundwater infiltration into the collection system as a result of seasonal rainfall causing a rise in the area's shallow groundwater. Refer to Chapter 3 for further discussion regarding I/I into the system.

$CBOD_5$ and TSS mass loadings are within the ranges that normally would be expected; however, the concentrations are higher than normal. $CBOD_5$ and TSS per capita contributions typically range from 0.11 to 0.33 pounds per capita per day (lbs/cap/day), with a normal contribution of approximately 0.20 lbs/cap/day. The City's average annual mass loadings are approximately 0.21 pound of $CBOD_5$ per

capita per day and 0.32 pound of TSS per capita per day. For municipal wastewater with minor industrial contributions and low I/I, $CBOD_5$ and TSS concentrations normally range from 190 to 220 mg/L. The City of Cascade Locks' average annual historical concentrations are 237 mg/L and 363 mg/L for $CBOD_5$ and TSS, respectively. Normally in a system experiencing high I/I, wastewater would be diluted and $CBOD_5$ and TSS would be at lower-than-normal concentrations. Even though the City's wastewater appears to have normal mass loadings, the concentrations appear to be high, especially for a system experiencing high I/I.

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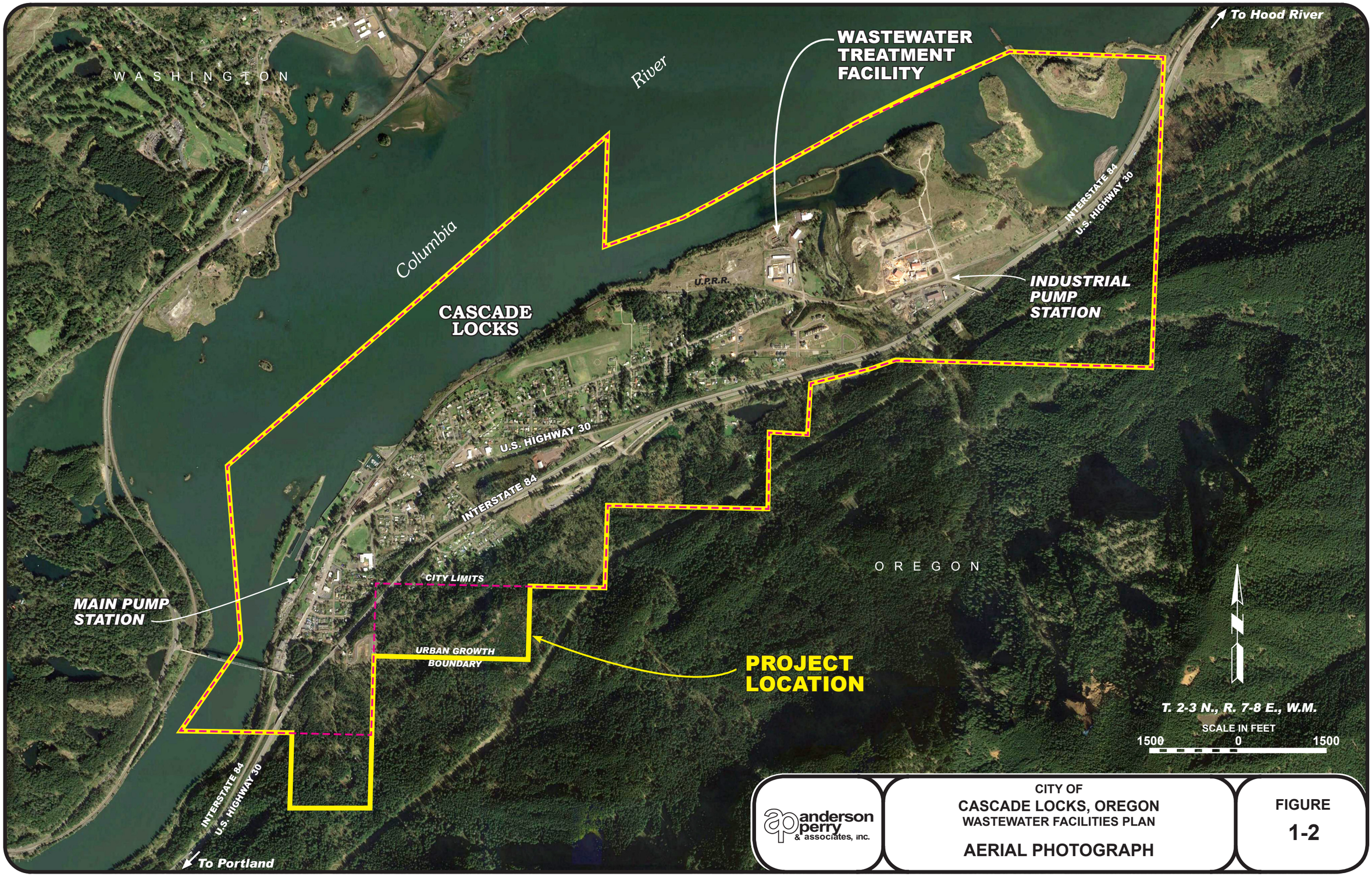
CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

LOCATION AND VICINITY MAPS

FIGURE
1-1

Job# 208-02-020 Sep. 29, 2016 lbauer

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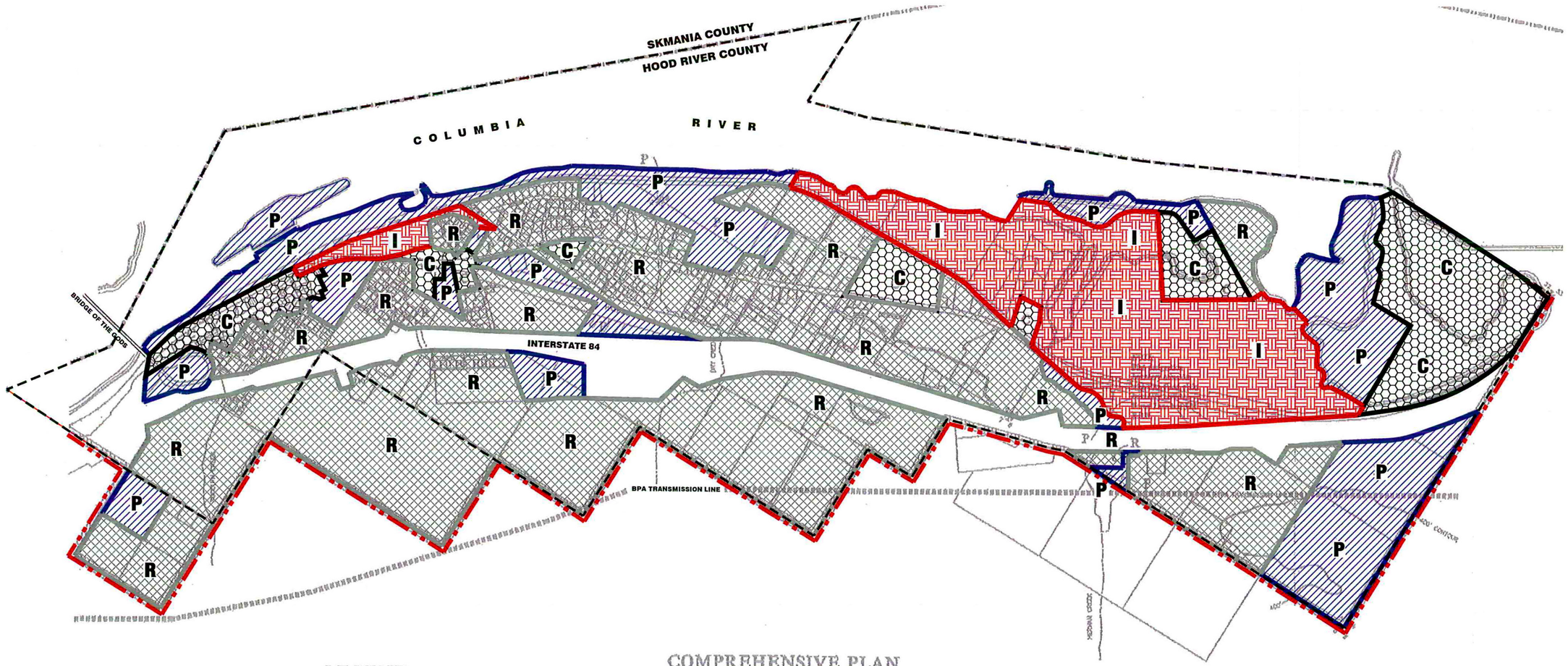
CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

AERIAL PHOTOGRAPH

FIGURE
1-2

Job# 208-02-020 Sep. 29, 2016 lbauer




*** MAP DATA OBTAINED FROM CITY OF CASCADE LOCKS COMPREHENSIVE PLAN - 2001**

## LEGEND

- City Limits
- State & County Line
- BPA Transmission Line
- Urban Growth Boundary
- Zoning Boundary

## COMPREHENSIVE PLAN LAND USE DESIGNATIONS

- R — Residential (RR, LDR, MDR, HDR & MHR Zones)
- C — Commercial (C, CR & RC Zones)
- I — Industrial (LI, HI Zones)
- P — Public (P & OS Zones)

600' North

0 300' 600' 1200'

***NOTE:***
***LAND USE MAP OBTAINED FROM 2014 WSMP BY TENNESON ENGINEERING CORP.***

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CITY OF
**CASCADE LOCKS, OREGON**
**WASTEWATER FACILITIES PLAN**

**LAND USE MAP**

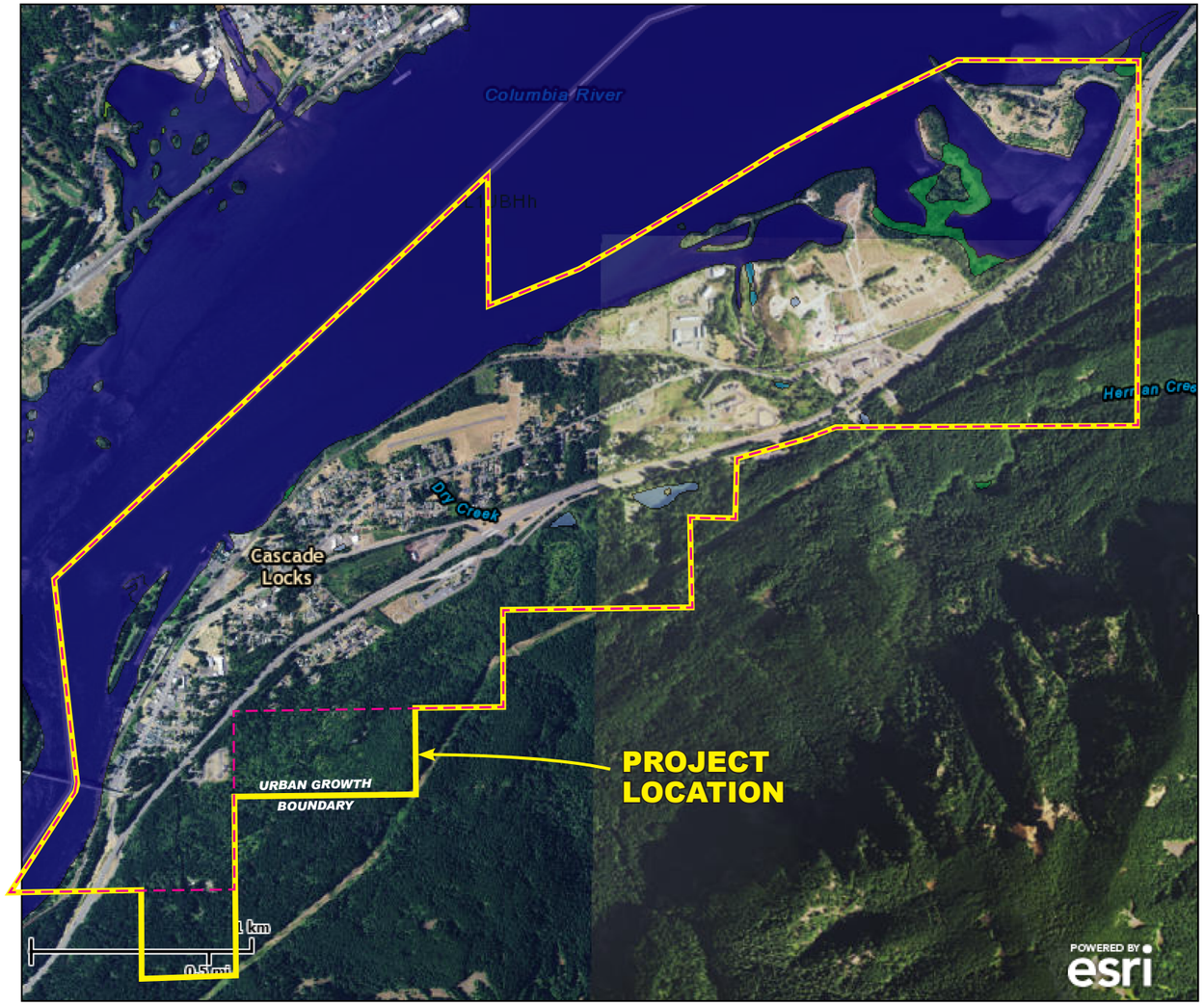
**FIGURE**
**1-3**

Job# 208-02-020 Sep. 29, 2016 lbauer

U.S. Fish and Wildlife Service

# National Wetlands Inventory

Sep. 29, 2016




## Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

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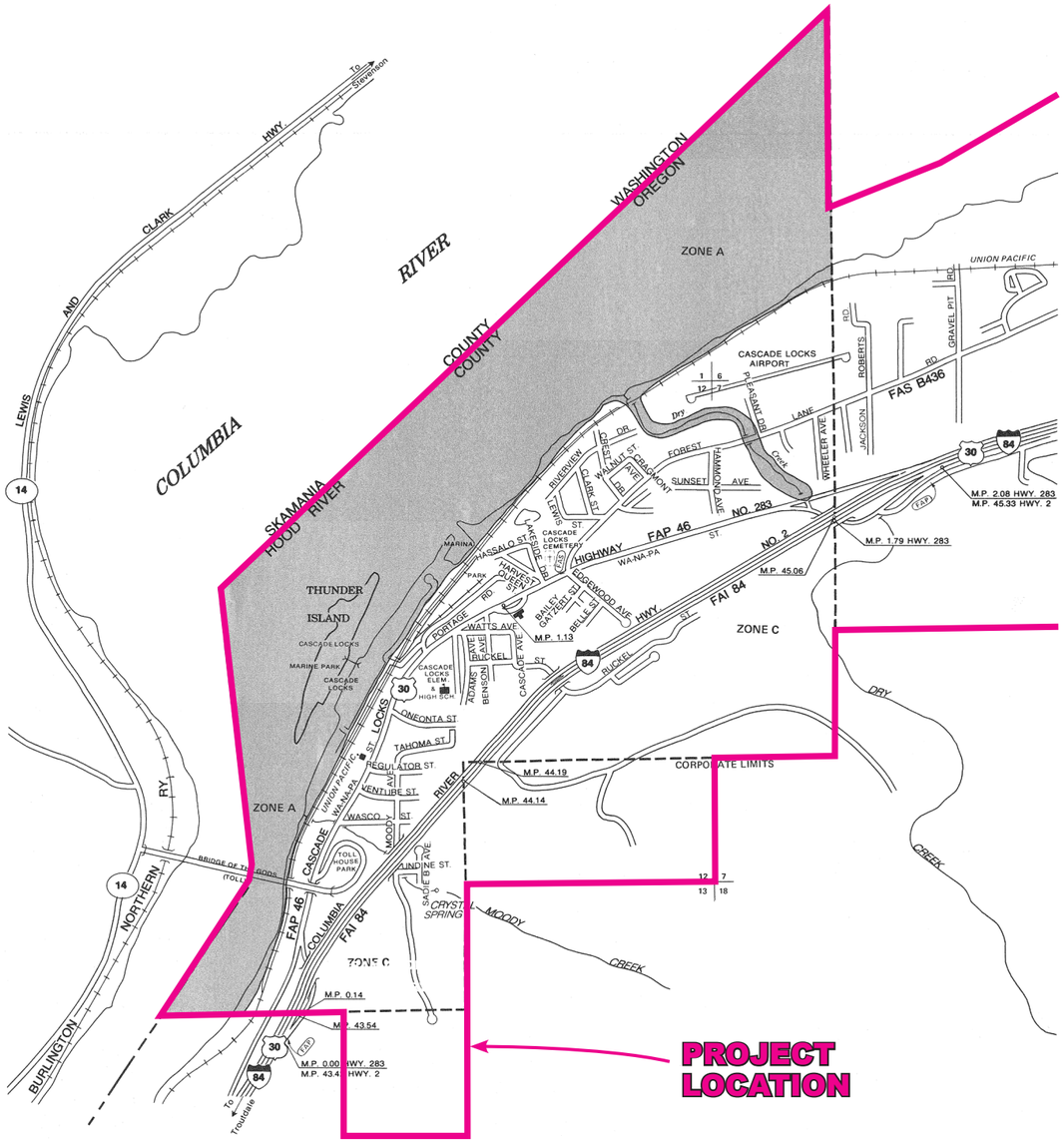
CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

NATIONAL WETLANDS INVENTORY MAP

FIGURE
1-4

Job# 208-02-020 Sep. 29, 2016 lbauer




## KEY TO MAP

| | |
|---|---|
| 500-Year Flood Boundary | |
| 100-Year Flood Boundary | ZONE B |
| Zone Designations | ZONE A1 / ZONE A5 |
| 100-Year Flood Boundary | |
| 500-Year Flood Boundary | ZONE B |
| Base Flood Elevation Line With Elevation In Feet** | 513 |
| Base Flood Elevation in Feet Where Uniform Within Zone** | (EL 987) |
| Elevation Reference Mark | RM7× |
| Zone D Boundary | |
| River Mile | •M1.5 |

**Referenced to the National Geodetic Vertical Datum of 1929

## EXPLANATION OF ZONE DESIGNATIONS

| ZONE | EXPLANATION |
|---|---|
| A | Areas of 100-year flood; base flood elevations and flood hazard factors not determined. |
| A0 | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined. |
| AH | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined. |
| A1-A30 | Areas of 100-year flood; base flood elevations and flood hazard factors determined. |
| A99 | Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. |
| B | Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading) |
| C | Areas of minimal flooding. (No shading) |
| D | Areas of undetermined, but possible, flood hazards. |
| V | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. |
| V1-V30 | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined. |

## NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

INITIAL IDENTIFICATION:
MAY 24, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:
NOVEMBER 28, 1975

FLOOD INSURANCE RATE MAP EFFECTIVE:
SEPTEMBER 24, 1984

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

N

APPROXIMATE SCALE IN FEET
800 0 800

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

CITY OF
CASCADE LOCKS,
OREGON
HOOD RIVER COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
410087 0005 B

EFFECTIVE DATE:
SEPTEMBER 24, 1984

Federal Emergency Management Agency

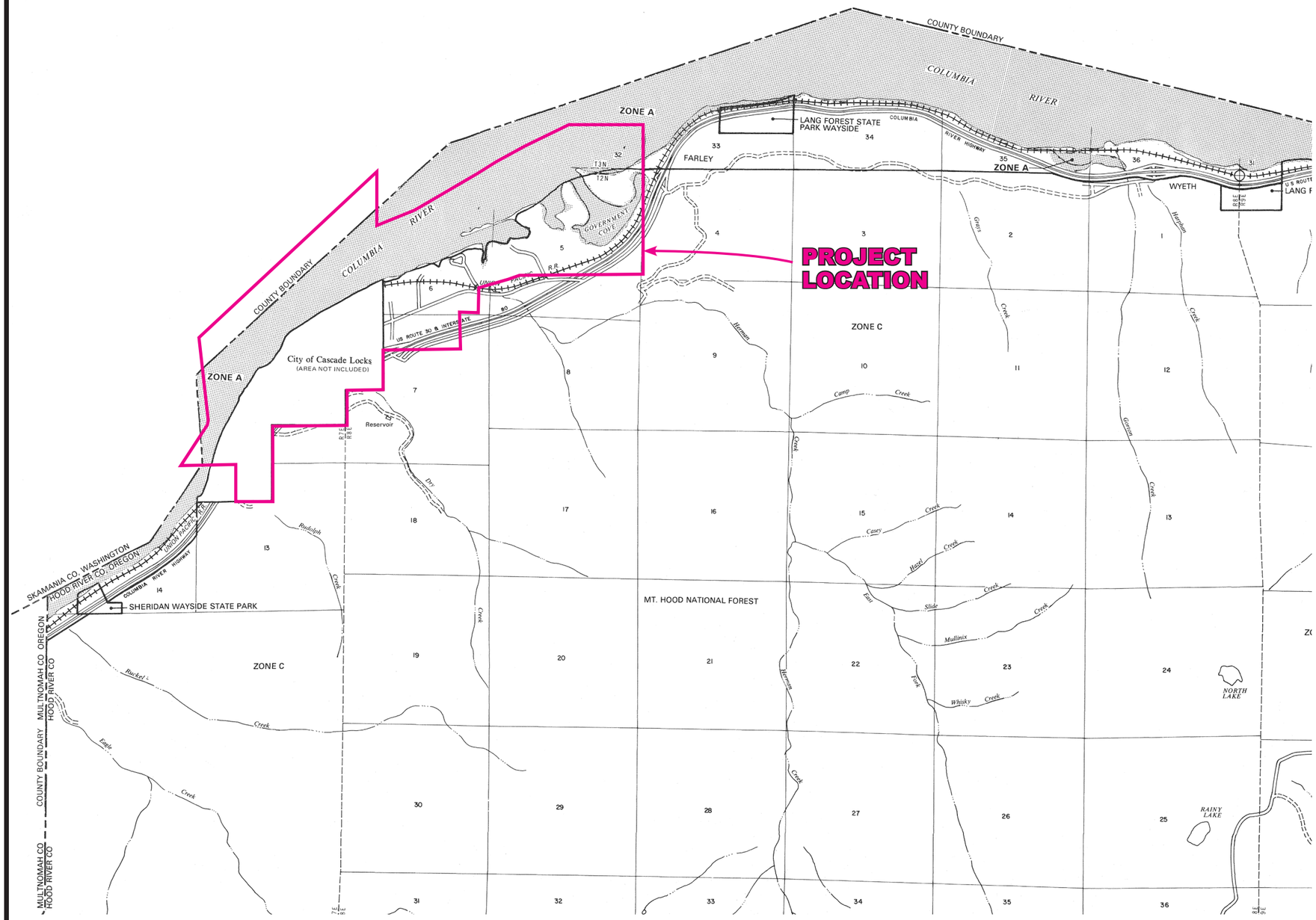
anderson perry & associates, inc.

CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

FLOODPLAIN MAP 1

FIGURE
1-5A

Job# 208-02-020 Sep. 29, 2016 lbauer




## KEY TO MAP

| | |
|---|---|
| SPECIAL FLOOD HAZARD AREA | ZONE A / ZONE B |
| Base Flood Elevation Line With Elevation In Feet** | 513 |
| Base Flood Elevation in Feet Where Uniform Within Zone** | (EL 987) |
| Elevation Reference Mark | RM7× |
| Zone D Boundary | |
| River Mile | •M1.5 |

**Referenced to the National Geodetic Vertical Datum of 1929

## EXPLANATION OF ZONE DESIGNATIONS

| ZONE | EXPLANATION |
|---|---|
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| AH | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined. |
| A1-A30 | Areas of 100-year flood; base flood elevations and flood hazard factors determined. |
| A99 | Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. |
| B | Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading) |
| C | Areas of minimal flooding. (No shading) |
| D | Areas of undetermined, but possible, flood hazards. |
| V | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. |
| V1-V30 | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined. |

## NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
DECEMBER 6, 1977

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:
SEPTEMBER 24, 1984

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

N

APPROXIMATE SCALE IN FEET
2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

## HOOD RIVER COUNTY, OREGON
(UNINCORPORATED AREAS)

PANEL 25 OF 200
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
410086 0025 B

EFFECTIVE DATE:
SEPTEMBER 24, 1984

Federal Emergency Management Agency

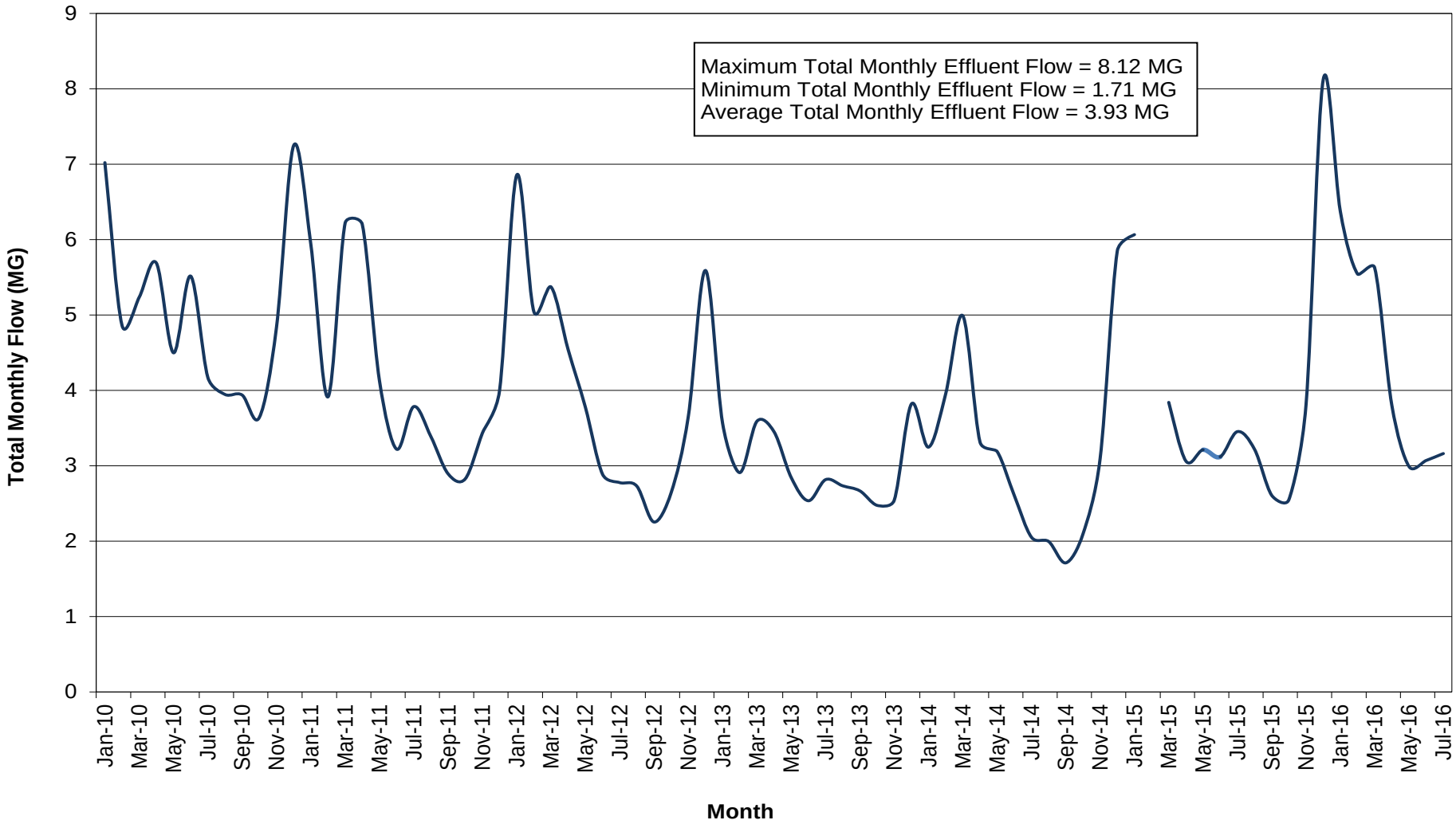
anderson perry & associates, inc.

CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

FLOODPLAIN MAP 2

FIGURE
1-5B

Job# 208-02-020 Sep. 29, 2016 lbauer



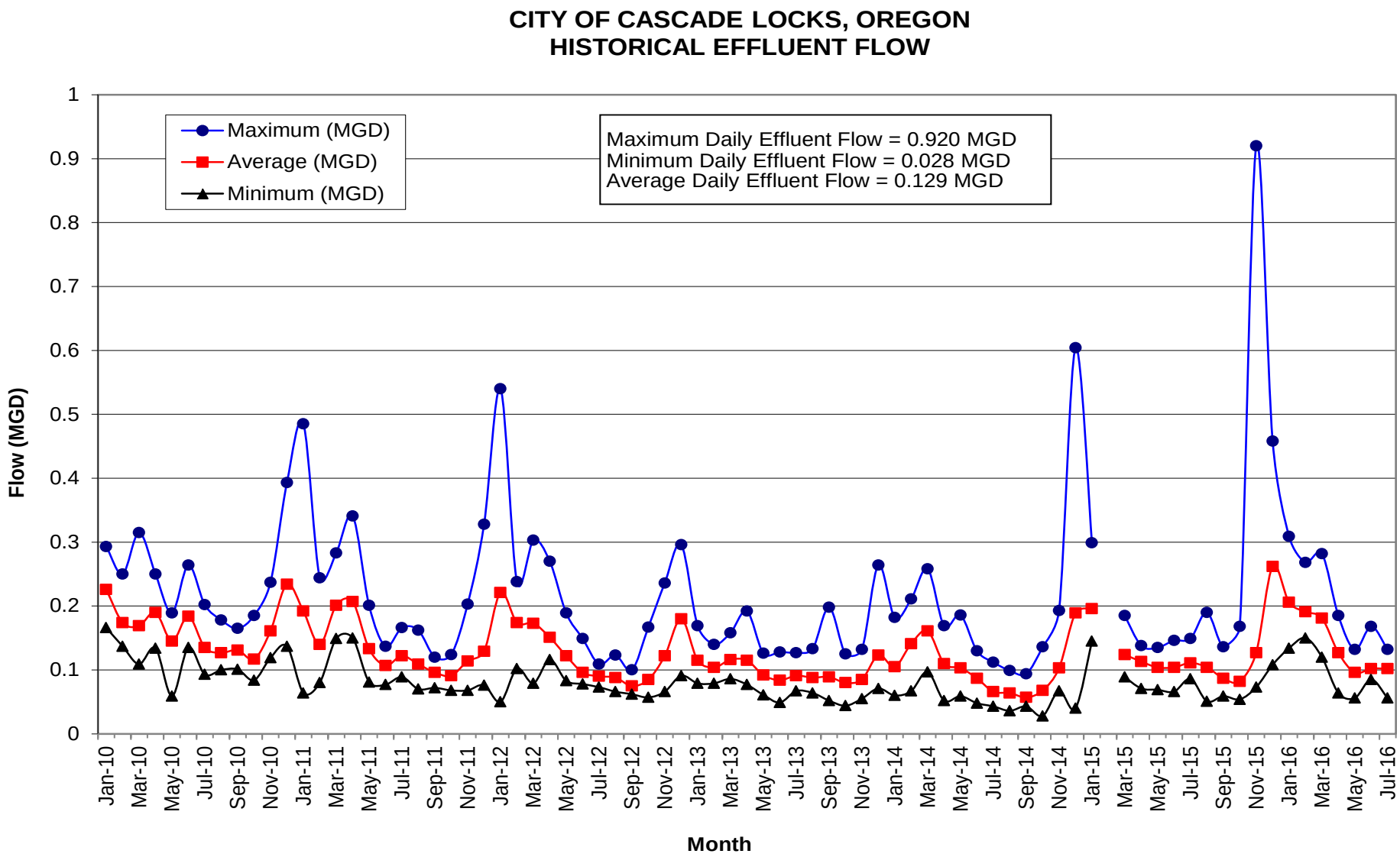

MG = million gallons

anderson perry & associates, inc.

CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

HISTORICAL TOTAL MONTHLY EFFLUENT FLOW

FIGURE
1-6




MGD = millions gallons per day

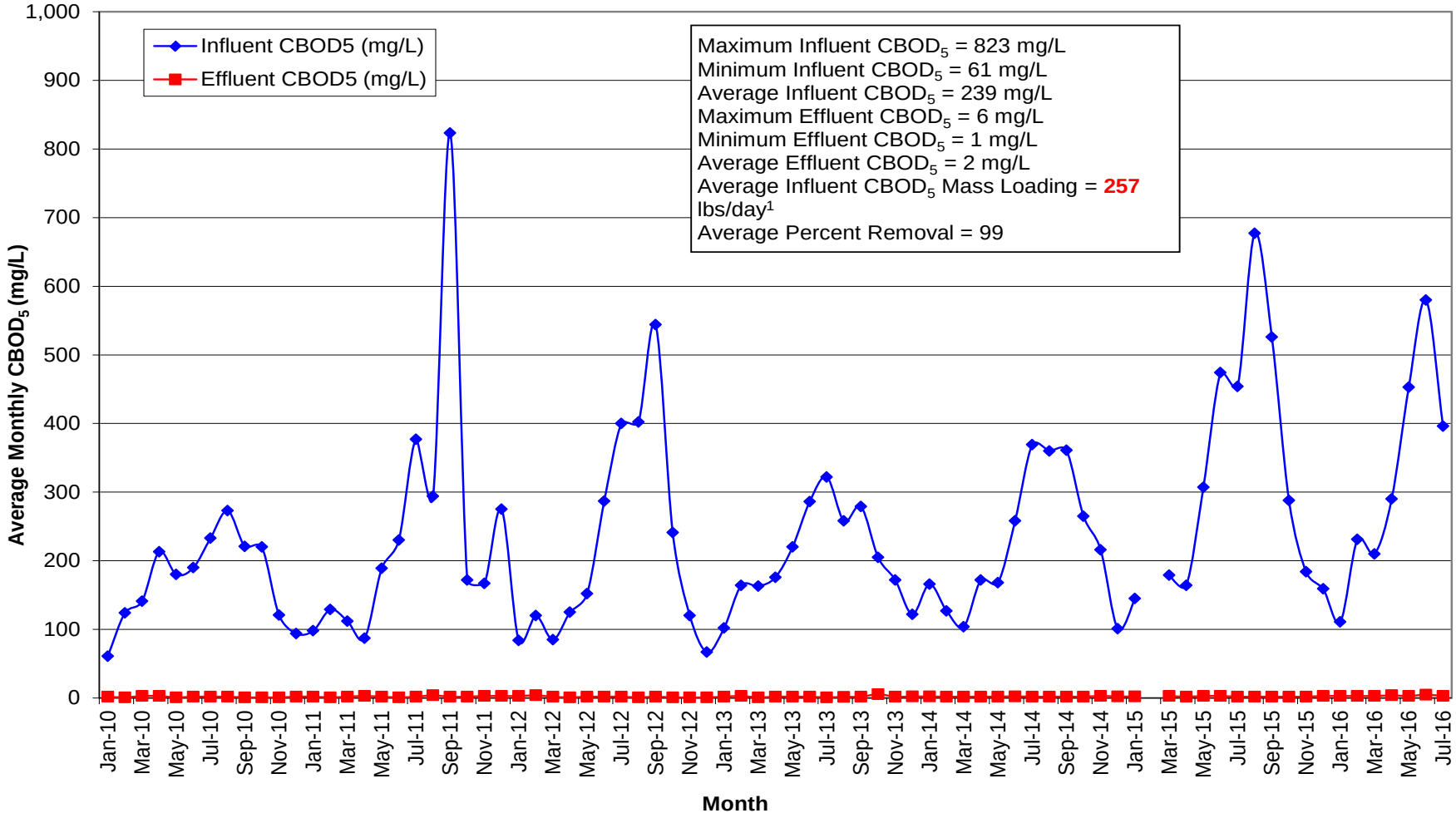
anderson perry & associates, inc.

CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

HISTORICAL EFFLUENT FLOW

FIGURE
1-7

## CITY OF CASCADE LOCKS, OREGON
## HISTORICAL FIVE-DAY CARBONACEOUS BIOCHEMICAL OXYGEN DEMAND




[1]Calculated using average annual effluent flow.

$CBOD_5$ = Five-day carbonaceous biochemical oxygen demand
lbs/day = pounds per day
mg/L = milligrams per liter

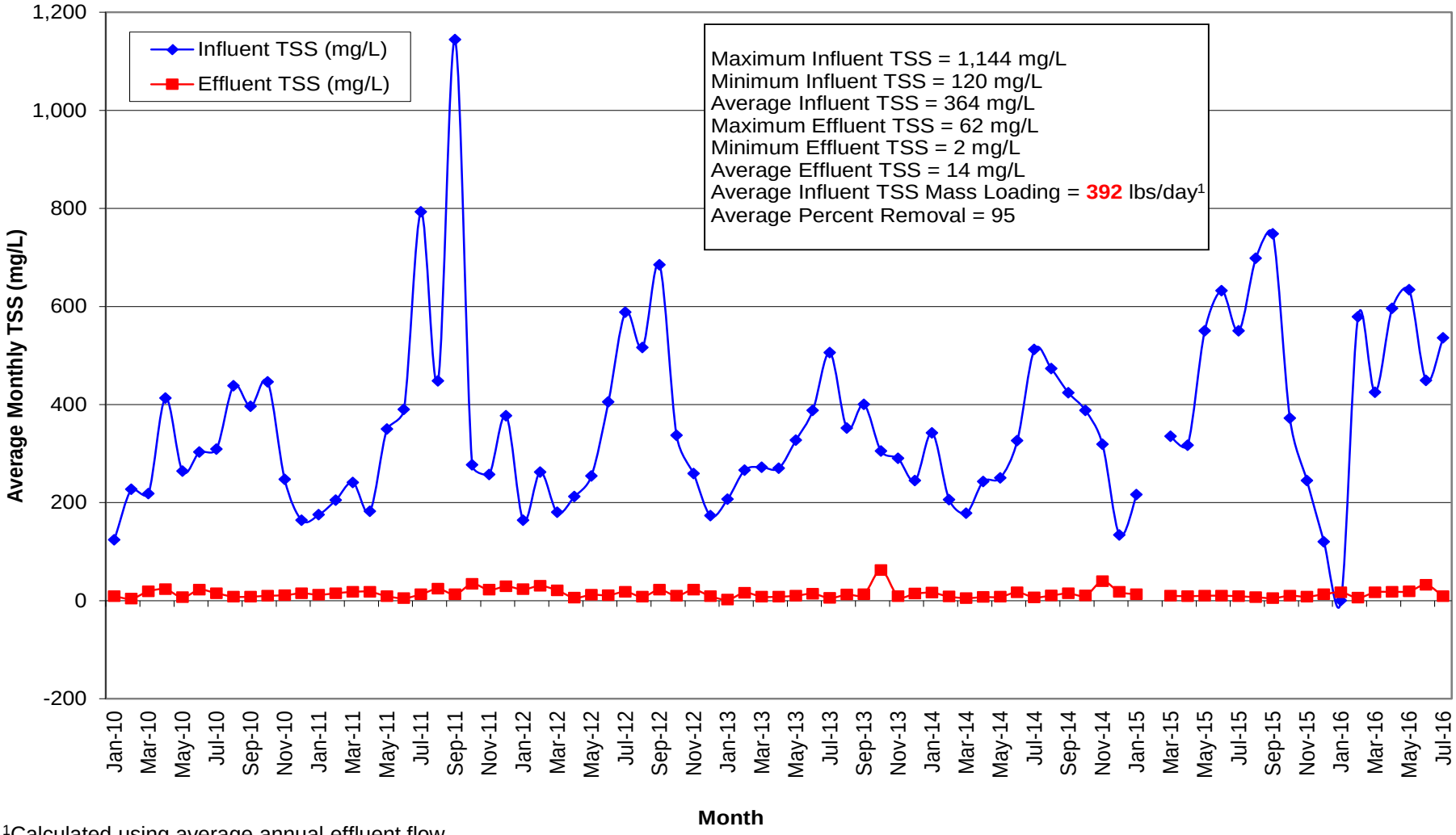
anderson perry & associates, inc.

CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

HISTORICAL FIVE-DAY CARBONACEOUS BIOCHEMICAL OXYGEN DEMAND

**FIGURE**
**1-8**

## CITY OF CASCADE LOCKS, OREGON
## HISTORICAL TOTAL SUSPENDED SOLIDS




[1]Calculated using average annual effluent flow.

lbs/day = pounds per day
mg/L = milligrams per liter
TSS = total suspended solids

anderson perry & associates, inc.

CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

HISTORICAL TOTAL SUSPENDED SOLIDS

**FIGURE**
**1-9**

## CITY OF CASCADE LOCKS, OREGON
## SUMMARY OF HISTORICAL WASTEWATER DATA

| | Influent | Effluent |
|---|---|---|
| **Flow Component** | | |
| Maximum Daily Flow (MGD)[1] | | 0.920 |
| Minimum Daily Flow (MGD)[2] | | 0.028 |
| Maximum Monthly Flow (MG) | | 8.112 |
| Average Annual Flow (MGD)[3] | | 0.262 |
| **Loading Component** | | |
| Maximum Average $CBOD_5$ (mg/L)[4] | 823.0 | 5.70 |
| Minimum Average $CBOD_5$ (mg/L)[5] | 61.0 | 1.00 |
| Average $CBOD_5$ (mg/L)[6] | 239.0 | 2.20 |
| Average $CBOD_5$ (lbs/day)[6, 7] | 259.0 | 2.00 |
| Maximum Average TSS (mg/L)[8] | 1144.0 | 62.10 |
| Minimum Average TSS (mg/L)[9] | 120.0 | 2.00 |
| Average TSS (mg/L)[9] | 364.0 | 14.30 |
| Average TSS (lbs/day)[7, 10] | 417.4 | 15.00 |

Note: Flow and loading components are based on the Discharge Monitoring Reports for the period January 2010 to July 2016.

[1] Maximum daily flow is the maximum flow rate that occurred over a 24-hour period. Maximum daily flow occurred in November 2015.

[2] Minimum daily flow is the minimum flow rate that occurred over a 24-hour period. Minimum daily flow occurred in October 2014.

[3] Average annual flow (AAF) is the average flow rate occurring over a 24-hour period based on the total annual flow (i.e., total annual flow divided by 365 days). The design AAF is the average of all of the average annual flows for each year

[4] Maximum average $CBOD_5$ is the maximum average monthly five-day CBOD concentration that occurred during the period analyzed.

[5] Minimum average $CBOD_5$ is the minimum average monthly five-day CBOD that occurred during the period analyzed.

[6] Average $CBOD_5$ is the average five-day CBOD (concentration and mass flux) that occurred during the period analyzed.

[7] Mass loadings estimates are based on the AAF. Mass loading (lbs/day) = concentration, mg/L x AAF (MGD) x 8.34.

[8] Maximum average TSS is the maximum average monthly total suspended solids that occurred during the period analyzed.

[9] Minimum average TSS is the minimum average monthly total suspended solids that occurred during the period analyzed.

[10] Average TSS is the average total suspended solids (concentration and mass flux) that occurred during the period analyzed.

$CBOD_5$ = Five-day carbonaceous biochemical oxygen demand
lbs/day = Pounds per day
MG = Million gallons
mg/L = Milligrams per liter
MGD = Million gallons per day
TSS = Total suspended solids

anderson perry & associates, inc.

CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

SUMMARY OF HISTORICAL WASTEWATER DATA

FIGURE
1-10

## CITY OF CASCADE LOCKS, OREGON
## EFFLUENT FLOW ANALYSIS SUMMARY

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| **Wet Weather Flows** | | | | | | | |
| Wet Weather Average Flow (MGD)[1] | 0.192 | 0.164 | 0.170 | 0.110 | 0.135 | 0.164 | 0.176 |
| Wet Weather Maximum Daily Flow (MGD)[2] | 0.393 | 0.485 | 0.540 | 0.264 | 0.604 | 0.920 | 0.309 |
| Wet Weather Minimum Daily Flow (MGD)[3] | 0.109 | 0.064 | 0.050 | 0.055 | 0.040 | 0.071 | 0.064 |
| Wet Weather Maximum Month Average Flow (MG)[4] | 7.245 | 5.941 | 6.853 | 3.817 | 5.846 | 8.117 | 6.372 |
| **Dry Weather Flows** | | | | | | | |
| Dry Weather Average Flow (MGD)[1] | 0.140 | 0.110 | 0.093 | 0.087 | 0.074 | 0.099 | 0.100 |
| Dry Weather Maximum Daily Flow (MGD)[2] | 0.264 | 0.201 | 0.189 | 0.198 | 0.186 | 0.190 | 0.168 |
| Dry Weather Minimum Daily Flow (MGD)[3] | 0.059 | 0.068 | 0.057 | 0.044 | 0.028 | 0.051 | 0.056 |
| Dry Weather Maximum Month Average Flow (MG)[4] | 5.515 | 4.131 | 3.778 | 2.842 | 3.188 | 3.452 | 3.161 |

Notes:
[1] Average flow during 6 low or high wastewater flow months.
[2] Maximum daily flow during 6 low or high wastewater flow months.
[3] Minimum daily flow during 6 low or high wastewater flow months.
[4] Maximum month average flow during six low or high wastewater flow months.

Wet weather months are defined as November through April
Dry weather months are defined as May through October

Note: 2016 data ends in July

MG = million gallons
MGD = million gallons per day

anderson perry & associates, inc.

CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

EFFLUENT FLOW ANALYSIS SUMMARY

**FIGURE**
**1-11**

# CITY OF CASCADE LOCKS, OREGON
## SUMMARY OF DISCHARGE MONITORING REPORT DATA
## JANUARY 2010 - JULY 2016

| | Influent | | | | Effluent | | | | | | | | | | | | | | | Sequencing Batch Reactor 1 | | | Sequencing Batch Reactor 2 | | | | Biosolids | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Organic and Solids Loadings | | | | Flow | | | | Organic and Solids Concentration | | | | | | | | | | | | | | | | | | | | | | |
| Month | $CBOD_5$ (mg/L) | TSS (mg/L) | TVSS (mg/L) | Volatile Solids (%) | Total (MG) | Maximum (MGD) | Minimum (MGD) | Average (MGD) | $CBOD_5$ (mg/L) | $CBOD_5$ (lb/d) | TSS (mg/L) | TSS (lb/d) | $CBOD_5$ Removal (%) | TSS Removal (%) | Average pH | Turbidity (NTU) | E. coli (MPN/ 100 ml) | Daily Temp Average (°c) | Daily Thermal Discharge Average (Kcals/day) | TSS (mg/L) | TVSS (mg/L) | Volatile Solids (%) | TSS (mg/L) | TVSS (mg/L) | Volatile Solids (%) | Rainfall (in/Day) | TSS (mg/L) | TVSS (mg/L) | Volatile Solids (%) | Total Solids (%) | Monthly Volume Hauled (gal.) |
| Jan-10 | 61 | 124 | 113 | 91.1 | 7.02 | 0.293 | 0.166 | 0.226 | 2 | 4 | 9 | 17 | 97 | 93 | 6.8 | 7.43 | 0.88 | | | 2,394 | 2,086 | 87.1 | 3164 | 2,784 | 88.0 | 0.46 | 8,233 | 6,836 | 83.0 | 0.82 | 36,000 |
| Feb-10 | 124 | 227 | 214 | 94.3 | 4.861 | 0.25 | 0.137 | 0.174 | 1 | 1 | 4 | 6 | 99 | 98 | 6.8 | 2.88 | 7.72 | | | 2,856 | 2,490 | 87.2 | 3426 | 2,992 | 87.3 | 0.57 | 8,100 | 7,363 | 90.9 | 0.81 | 42,000 |
| Mar-10 | 141 | 218 | 208 | 95.4 | 5.234 | 0.315 | 0.109 | 0.169 | 3 | 4 | 19 | 27 | 98 | 91 | 6.8 | 8.66 | 2.25 | | | 2,168 | 1,900 | 87.6 | 2848 | 2,492 | 87.5 | 0.66 | 10,700 | 8,688 | 81.2 | 1.07 | 30,000 |
| Apr-10 | 213 | 413 | 388 | 93.9 | 5.688 | 0.25 | 0.134 | 0.19 | 3 | 5 | 23 | 36 | 99 | 94 | 6.7 | 13.40 | 9.90 | | | 2,280 | 1,968 | 86.3 | 2788 | 2,211 | 79.3 | 0.33 | 4,000 | 4,000 | 100.0 | 0.40 | 30,000 |
| May-10 | 180 | 264 | 247 | 93.6 | 4.497 | 0.189 | 0.059 | 0.145 | 1 | 1 | 7 | 8 | 99 | 97 | 6.7 | 7.12 | 7.62 | | | 1,982 | 1,734 | 87.5 | 2988 | 2,597 | 86.9 | 0.41 | 9,733 | 8,142 | 83.7 | 0.97 | 30,000 |
| Jun-10 | 190 | 303 | 286 | 94.4 | 5.515 | 0.264 | 0.135 | 0.184 | 2 | 3 | 22 | 34 | 99 | 93 | 6.8 | 24.97 | 3.82 | | | 2,288 | 1,980 | 86.5 | 3256 | 2,816 | 86.5 | 0.92 | 6,125 | 5,277 | 86.2 | 0.61 | 36,000 |
| Jul-10 | 233 | 309 | 279 | 90.3 | 4.171 | 0.202 | 0.093 | 0.135 | 2 | 2 | 15 | 17 | 99 | 95 | 6.8 | 31.11 | 3.98 | | | 2,466 | 2,128 | 86.3 | 2823.3 | 2,437 | 86.3 | 0.60 | 10,240 | 9,078 | 88.7 | 1.02 | 36,000 |
| Aug-10 | 273 | 438 | 412 | 94.1 | 3.945 | 0.178 | 0.1 | 0.127 | 2 | 2 | 8 | 8 | 99 | 98 | 6.9 | 6.02 | 3.04 | | | 2,436 | 2,088 | 85.7 | 2740 | 2,334 | 85.2 | 0.70 | 9,933 | 7,526 | 75.8 | 0.99 | 42,000 |
| Sep-10 | 221 | 396 | 360 | 90.9 | 3.937 | 0.165 | 0.101 | 0.131 | 1 | 1 | 8 | 9 | 100 | 98 | 6.9 | 4.37 | 12.00 | | | 2,546 | 2,174 | 85.4 | 2788 | 2,404 | 86.2 | 0.74 | | | | | 30,000 |
| Oct-10 | 220 | 446 | 408 | 91.5 | 3.639 | 0.185 | 0.084 | 0.117 | 1 | 1 | 10 | 10 | 100 | 98 | 6.9 | 9.95 | 28.00 | | | 2,654 | 2,258 | 85.1 | 2420 | 2,056 | 85.0 | 0.85 | | | | | 18,000 |
| Nov-10 | 121 | 247 | 234 | 94.7 | 4.833 | 0.237 | 0.119 | 0.161 | 1 | 1 | 11 | 15 | 99 | 96 | 6.9 | 5.04 | 12.00 | | | | | | | | | 0.84 | | | | | 18,000 |
| Dec-10 | 94 | 164 | 149 | 90.9 | 7.245 | 0.393 | 0.137 | 0.234 | 2 | 4 | 15 | 29 | 98 | 91 | 6.7 | 3.44 | 10.00 | | | 2,450 | 2,026 | 82.7 | 2254 | 1,972 | 87.5 | 0.91 | | | | | 30,000 |
| Jan-11 | 98 | 175 | 166 | 94.9 | 5.941 | 0.485 | 0.064 | 0.192 | 2 | 3 | 12 | 19 | 98 | 93 | 6.6 | 6.58 | 3.00 | | | 2,640 | 2,248 | 85.2 | 1943 | 1,679 | 86.4 | 0.65 | | | | | 24,000 |
| Feb-11 | 129 | 205 | 197 | 96.1 | 3.912 | 0.244 | 0.08 | 0.14 | 1 | 1 | 15 | 18 | 99 | 93 | 6.7 | 17.24 | 16.00 | | | 2,432 | 2,120 | 87.2 | 1836 | 1,568 | 85.4 | 0.58 | | | | | 24,000 |
| Mar-11 | 112 | 241 | 231 | 95.9 | 6.216 | 0.283 | 0.149 | 0.201 | 2 | 3 | 18 | 30 | 98 | 93 | 6.6 | 13.71 | 5.00 | | | 2,373 | 1,859 | 78.3 | 1937 | 1,681 | 86.8 | 0.63 | 6,033 | 4,563 | 75.6 | 0.60 | 18,000 |
| Apr-11 | 87 | 182 | 178 | 97.8 | 6.201 | 0.341 | 0.15 | 0.207 | 3 | 5 | 18 | 31 | 97 | 90 | 6.5 | 10.84 | 2.00 | | | | | | | | | 0.61 | 6,150 | 4,750 | 77.2 | 0.62 | 24,000 |
| May-11 | 189 | 350 | 321 | 91.7 | 4.131 | 0.201 | 0.081 | 0.133 | 2 | 2 | 9 | 10 | 99 | 97 | 6.6 | 7.84 | 13.00 | | | 2,892 | 2,488 | 86.0 | 2024 | 1,744 | 86.2 | 0.40 | 7,240 | 6,325 | 87.4 | 0.72 | 30,000 |
| Jun-11 | 230 | 390 | 348 | 89.2 | 3.219 | 0.137 | 0.077 | 0.107 | 1 | 1 | 5 | 4 | 100 | 99 | 6.8 | 5.68 | 1.00 | | | 2,860 | 2,457 | 85.9 | 2664 | 2,284 | 85.7 | 0.10 | 9,500 | 8,363 | 88.0 | 0.95 | 18,000 |
| Jul-11 | 377 | 793 | 732 | 92.3 | 3.784 | 0.166 | 0.089 | 0.122 | 2 | 2 | 13 | 13 | 99 | 98 | 6.9 | 9.37 | 2.00 | | | | | | 3172 | 2,732 | 86.1 | 0.13 | 6,333 | 4,893 | 77.3 | 0.63 | 18,000 |
| Aug-11 | 294 | 448 | 406 | 90.6 | 3.386 | 0.162 | 0.07 | 0.109 | 4 | 4 | 24 | 22 | 99 | 95 | 6.8 | 7.63 | 7.00 | | | 2,936 | 2,516 | 85.7 | 3012 | 2,584 | 85.8 | | | | | | 24,000 |
| Sep-11 | 823 | 1,144 | 1,063 | 92.9 | 2.893 | 0.12 | 0.072 | 0.096 | 2 | 2 | 13 | 10 | 100 | 99 | 6.8 | 17.08 | 20.00 | | | 2,728 | 2,330 | 85.4 | 2956 | 2,519 | 85.2 | 0.44 | 10,000 | 7,950 | 79.5 | 1.00 | 6,000 |
| Oct-11 | 172 | 277 | 257 | 92.8 | 2.825 | 0.124 | 0.068 | 0.091 | 2 | 2 | 34 | 26 | 99 | 88 | 6.5 | 17.55 | 2.00 | | | 2,728 | 2,332 | 85.5 | 2454 | 2,094 | 85.3 | 0.30 | | | | | |
| Nov-11 | 167 | 257 | 230 | 89.5 | 3.432 | 0.203 | 0.068 | 0.114 | 3 | 3 | 22 | 21 | 98 | 91 | 6.8 | 14.09 | 7.00 | | | 2,168 | | | 2416 | 2,076 | 85.9 | 0.50 | 11,800 | 7,612 | 64.5 | 1.18 | 12,000 |
| Dec-11 | 275 | 377 | 356 | 94.4 | 3.995 | 0.328 | 0.076 | 0.129 | 3 | 3 | 29 | 31 | 99 | 92 | 6.6 | 11.84 | 3.00 | | | 2,412 | 2,068 | 85.7 | 1980 | 1,736 | 87.7 | 1.18 | | | | | 24,000 |
| Jan-12 | 84 | 164 | 154 | 93.9 | 6.853 | 0.54 | 0.05 | 0.221 | 3 | 6 | 23 | 42 | 96 | 86 | 6.4 | 11.16 | 5.00 | | | | | | 1928 | 1,652 | 85.7 | 0.86 | 9,367 | 7,584 | 81.0 | 0.94 | 18,000 |
| Feb-12 | 120 | 262 | 251 | 95.8 | 5.044 | 0.238 | 0.102 | 0.174 | 4 | 6 | 30 | 44 | 97 | 89 | 6.6 | 7.84 | 4.00 | | | 2,184 | 1,912 | 87.5 | 2176 | 1,912 | 87.9 | 0.40 | 10,500 | 8,730 | 83.1 | 1.05 | 12,000 |
| Mar-12 | 85 | 180 | 178 | 98.9 | 5.371 | 0.303 | 0.079 | 0.173 | 2 | 3 | 21 | 30 | 98 | 88 | 6.7 | 11.58 | 12.00 | | | 1,980 | 1,717 | 86.7 | | | | 0.75 | 11,500 | 9,540 | 83.0 | 1.15 | 24,000 |
| Apr-12 | 125 | 212 | 222 | 104.7 | 4.538 | 0.27 | 0.116 | 0.151 | 1 | 1 | 6 | 8 | 99 | 97 | 6.7 | 4.04 | 6.00 | | | 2,017 | 1,764 | 87.5 | 2476 | 2,168 | 87.6 | 0.38 | 9,000 | 7,606 | 84.5 | 0.90 | 12,000 |
| May-12 | 152 | 254 | 237 | 93.3 | 3.778 | 0.189 | 0.083 | 0.122 | 2 | 2 | 12 | 12 | 99 | 95 | 6.7 | 9.79 | 2.00 | | | 2,436 | 2,108 | 86.5 | 2366 | 2,044 | 86.4 | 0.38 | 12,320 | 9,794 | 79.5 | 1.23 | 30,000 |
| Jun-12 | 287 | 405 | 374 | 92.3 | 2.888 | 0.149 | 0.078 | 0.096 | 2 | 2 | 11 | 9 | 99 | 97 | 6.7 | 2.80 | 27.00 | | | | | | 3030 | 2,614 | 86.3 | 0.43 | 11,000 | 9,420 | 85.6 | 1.10 | 12,000 |
| Jul-12 | 400 | 588 | 544 | 92.5 | 2.776 | 0.109 | 0.073 | 0.09 | 2 | 2 | 18 | 14 | 100 | 97 | 6.8 | 5.06 | 44.00 | | | 2,484 | 2,140 | 86.2 | 3244 | 2,772 | 85.5 | 0.24 | | | | | 24,000 |
| Aug-12 | 402 | 516 | 484 | 93.8 | 2.729 | 0.123 | 0.066 | 0.088 | 1 | 1 | 8 | 6 | 100 | 98 | 6.7 | 2.38 | 3.00 | | | 2,428 | 2,093 | 86.2 | 3071 | 2,626 | 85.5 | | 9,000 | 7,920 | 88.0 | 0.90 | 18,000 |
| Sep-12 | 544 | 685 | 638 | 93.1 | 2.253 | 0.1 | 0.062 | 0.075 | 2 | 1 | 22 | 14 | 100 | 97 | 7.0 | 3.36 | 19.00 | | | | | | 2934 | 2,526 | 86.1 | 0.03 | | | | | |
| Oct-12 | 241 | 337 | 313 | 92.9 | 2.641 | 0.167 | 0.057 | 0.085 | 1 | 1 | 10 | 7 | 100 | 97 | 6.8 | 3.64 | 3.00 | | | 2,286 | 1,928 | 84.3 | 2556 | 2,199 | 86.0 | 0.78 | | | | | 24,000 |
| Nov-12 | 120 | 259 | 230 | 88.8 | 3.651 | 0.236 | 0.066 | 0.122 | 1 | 1 | 22 | 22 | 99 | 92 | 6.8 | 9.12 | 2.00 | | | 2,248 | 1,910 | 85.0 | | | | 0.78 | | | | | 24,000 |
| Dec-12 | 67 | 173 | 165 | 95.4 | 5.59 | 0.296 | 0.091 | 0.18 | 1 | 2 | 9 | 14 | 99 | 95 | 6.5 | 3.52 | 8.00 | | | | | | 2184 | 1,892 | 86.6 | 0.69 | 9,000 | 5,102 | 64.0 | 0.90 | 24,000 |
| Jan-13 | 102 | 207 | 199 | 96.1 | 3.561 | 0.169 | 0.079 | 0.115 | 2 | 2 | 2 | 2 | 98 | 99 | 6.6 | 12.49 | 3.00 | | | 2,184 | 1,752 | 80.2 | 1790 | 152 | 87.8 | 0.57 | 12,333 | 10,123 | 82.3 | 1.23 | 36,000 |
| Feb-13 | 164 | 266 | 252 | 94.7 | 2.908 | 0.14 | 0.079 | 0.104 | 3 | 3 | 16 | 14 | 98 | 94 | 6.6 | 2.30 | | | | | | | | | | 1.04 | 9,000 | 8,100 | 90.0 | 0.90 | 24,000 |
| Mar-13 | 163 | 272 | 255 | 93.8 | 3.589 | 0.158 | 0.086 | 0.116 | 1 | 1 | 8 | 8 | 99 | 97 | 6.7 | | | | | | | | | | | | | | | | 18,000 |
| Apr-13 | 176 | 270 | 252 | 93.3 | 3.449 | 0.192 | 0.077 | 0.115 | 2 | 2 | 8 | 8 | 99 | 97 | 6.7 | 2.16 | 1.00 | | | 2,324 | 1,976 | 85.0 | 2036 | 1,780 | 87.4 | 0.32 | 8,000 | 6,720 | 84.0 | 0.80 | 30,000 |
| May-13 | 220 | 327 | 315 | 96.3 | 2.842 | 0.126 | 0.061 | 0.092 | 2 | 2 | 10 | 8 | 99 | 97 | 6.9 | 1.42 | 3.00 | | | 2,436 | 2,092 | 85.9 | 2400 | 2,056 | 85.7 | 0.44 | 10,200 | 8,670 | 85.0 | 1.02 | 18,000 |
| Jun-13 | 286 | 388 | 350 | 90.2 | 2.535 | 0.128 | 0.049 | 0.084 | 2.0 | 1.4 | 14.0 | 10 | 99 | 96 | 7.0 | 5.49 | 3.00 | | | | | | 2,692 | 2,172 | 80.7 | 0.22 | 7,333 | 6,183 | 84.3 | 0.73 | 24,000 |
| Jul-13 | 322 | 506 | 458 | 90.5 | 2.815 | 0.127 | 0.067 | 0.091 | 1.0 | 0.8 | 5.4 | 4 | 100 | 99 | 7.0 | | 6.80 | 22.6 | 0.87 | 3,004 | 2,564 | 85.4 | 3,252 | 2,796 | 86.0 | | 6,800 | 5,518 | 80.8 | 0.68 | 30,000 |
| Aug-13 | 258 | 352 | 335 | 95.2 | 2.733 | 0.133 | 0.064 | 0.088 | 1.8 | 1.0 | 12.4 | 9 | 99 | 96 | 7.0 | | 6.92 | 23.2 | 1.12 | 3,036 | 2,556 | 84.2 | 3,336 | 2,836 | 86.0 | 0.16 | 12,750 | 10,635 | 83.2 | 1.27 | 24,000 |
| Sep-13 | 279 | 400 | 378 | 94.5 | 2.666 | 0.198 | 0.052 | 0.089 | 2.0 | 1.5 | 13.1 | 10 | 99 | 97 | 7.0 | | 17.02 | 21.6 | 0.60 | 2,822 | 2,384 | 84.4 | 3,012 | 2,532 | 84.1 | 0.67 | 3,500 | 2,740 | 78.5 | 0.35 | 18,000 |
| Oct-13 | 205 | 305 | 288 | 94.4 | 2.474 | 0.125 | 0.044 | 0.080 | 5.7 | 3.8 | 62.1 | 41 | 97 | 80 | 6.9 | | 8.93 | 16.9 | 0.92 | 2,228 | 1,840 | 82.6 | 2,564 | 2,164 | 84.4 | 0.25 | 9,400 | 7,888 | 81.5 | 0.94 | 27,000 |
| Nov-13 | 172 | 290 | 269 | 92.8 | 2.541 | 0.132 | 0.055 | 0.085 | 2.0 | 1.0 | 9.0 | 6 | 99 | 97 | 6.8 | | 37.10 | 13.6 | (2.07) | 2,310 | 1,950 | 84.4 | 2,352 | 2,012 | 85.5 | 0.57 | 7,650 | 6,437 | 81.8 | | 24,000 |
| Dec-13 | 122 | 245 | 228 | 93.7 | 3.817 | 0.264 | 0.071 | 0.123 | 2.3 | 2.4 | 14.3 | 15 | 98 | 94 | 6.6 | | 24.73 | 10.1 | (4.82) | 2,016 | 1,744 | 86.5 | 2,508 | 2,166 | 86.4 | 0.66 | 7,083 | 5,977 | 83.6 | 0.71 | 36,000 |
| Jan-14 | 166 | 342 | 319 | 93.7 | 3.246 | 0.182 | 0.060 | 0.105 | 2.3 | 2.0 | 16.1 | 14 | 99 | 95 | 6.4 | | 9.20 | 10.4 | (3.26) | 1,936 | 1,696 | 87.6 | | | | 0.62 | 6,500 | 5,460 | 84.0 | 0.65 | 24,000 |
| Feb-14 | 127 | 206 | 186 | 88.2 | 3.953 | 0.211 | 0.067 | 0.141 | 2.0 | 2.4 | 8.2 | 10 | 98 | 96 | 6.4 | | 1.42 | 8.9 | (6.00) | 2,316 | 2,020 | 87.2 | 1,968 | 1,728 | 87.8 | 0.81 | 8,500 | 7,284 | 85.7 | 0.85 | 6,000 |
| Mar-14 | 104 | 178 | 167 | 94.2 | 4.988 | 0.258 | 0.097 | 0.161 | 2.0 | 2.7 | 5.1 | 7 | 98 | 97 | 6.5 | | 1.00 | 10.7 | (6.01) | 2,932 | 2,560 | 87.3 | 2,124 | 1,860 | 87.6 | 0.77 | 5,000 | 4,220 | 84.0 | 0.50 | 12,000 |
| Apr-14 | 172 | 243 | 232 | 95.6 | 3.314 | 0.169 | 0.052 | 0.110 | 2.0 | 1.8 | 7.2 | 7 | 99 | 97 | 6.8 | | 3.06 | 13.4 | (2.82) | 3,048 | 2,678 | 87.9 | 2,476 | 2,160 | 87.2 | 0.50 | 12,750 | 11,130 | 87.5 | 1.27 | 24,000 |
| May-14 | 168 | 250 | 237 | 94.6 | 3.188 | 0.186 | 0.059 | 0.103 | 2.1 | 2.0 | 7.7 | 7 | 99 | 97 | 6.8 | | 7.46 | 16.7 | (1.24) | 2,816 | 2,440 | 86.6 | 2,770 | 2,408 | 86.9 | 0.54 | 12,500 | 10,778 | 86.2 | 1.25 | 24,000 |
| Jun-14 | 258 | 326 | 299 | 92.7 | 2.604 | 0.130 | 0.048 | 0.087 | 2.5 | 1.8 | 16.8 | 12 | 99 | 95 | 6.9 | | 5.41 | 18.9 | (0.43) | | | | 3,180 | 2,748 | 86.4 | 0.58 | 7,500 | 6,660 | 89.0 | 0.75 | 12,000 |
| Jul-14 | 369 | 512 | 488 | 97.4 | 2.051 | 0.112 | 0.043 | 0.066 | 2.0 | 1.1 | 6.7 | 4 | 99 | 99 | 7.0 | | 3.03 | 22.6 | 0.64 | 3,066 | 2,652 | 86.5 | 2,698 | 2,318 | 85.9 | 0.15 | 10,667 | 9,120 | 84.3 | 1.07 | 30,000 |
| Aug-14 | 360 | 473 | 449 | 95.1 | 1.995 | 0.099 | 0.036 | 0.064 | 2.0 | 1.1 | 10.5 | 6 | 99 | 98 | 7.1 | | 7.45 | 23.7 | 0.88 | 3,394 | 2,922 | 86.1 | 3,128 | 2,668 | 85.3 | 0.18 | 10,000 | 8,000 | 80.0 | 1.00 | 6,000 |
| Sep-14 | 361 | 424 | 400 | 94.8 | 1.711 | 0.094 | 0.043 | 0.057 | 2.1 | 1.0 | 14.8 | 7 | 99 | 97 | 7.0 | | 8.63 | 21.4 | 0.31 | 3,460 | 2,952 | 85.3 | | | | 0.23 | 14,250 | 12,000 | 84.0 | 1.42 | 24,000 |
| Oct-14 | 265 | 388 | 372 | 96.1 | 2.093 | 0.136 | 0.028 | 0.068 | 2.0 | 1.1 | 10.4 | 6 | 99 | 97 | 7.0 | | 3.77 | 19.1 | (0.28) | 3,224 | 2,770 | 85.9 | 2,360 | 2,028 | 85.9 | 0.55 | 15,000 | 12,905 | 86.0 | 1.50 | 36,000 |
| Nov-14 | 216 | 319 | 300 | 94.3 | 3.093 | 0.193 | 0.067 | 0.103 | 3.1 | 2.7 | 39.3 | 34 | 99 | 88 | 6.7 | | 11.94 | 13.1 | (2.69) | 2,156 | 1,872 | 86.8 | 2,644 | 2,244 | 84.9 | 0.49 | 13,000 | 11,250 | 86.5 | 1.30 | 18,000 |
| Dec-14 | 101 | 134 | 129 | 93.7 | 5.846 | 0.604 | 0.040 | 0.189 | 2.3 | 3.6 | 17.9 | 28 | 98 | 87 | 6.7 | | 8.55 | 10.7 | (6.84) | 2,616 | 2,260 | 86.4 | 2,580 | 2,204 | 85.4 | 0.38 | 4,000 | 3,400 | 85.0 | 0.40 | 24,000 |
| Jan-15 | 145 | 216 | 208 | 96.4 | 6.065 | 0.299 | 0.145 | 0.196 | 2.3 | 3.8 | 13.0 | 21 | 98 | 94 | 6.6 | | 1.20 | 10.0 | (7.26) | 3,146 | 2,700 | 85.8 | 1,612 | 1,424 | 88.3 | 0.52 | 18,000 | 15,660 | 87.0 | 1.80 | 18,000 |
| Feb-15 | | | | | | | | | | | | | | | | | 7.00 | 11.0 | (5.00) | 3,884 | 3,348 | 86.2 | 804 | 716 | 89.1 | | | | | | |
| Mar-15 | 179 | 335 | 292 | 89.5 | 3.840 | 0.185 | 0.089 | 0.124 | 3.0 | 3.0 | 10.0 | 10 | 98 | 97 | 6.8 | | 13.00 | 13.0 | (3.00) | 3,989 | 3,372 | 86.5 | 759 | 681 | 90.6 | 0.49 | 8,000 | 6,800 | 85.0 | 0.80 | 30,000 |
| Apr-15 | 164 | 317 | 302 | 94.7 | 3.061 | 0.138 | 0.071 | 0.113 | 2.0 | 2.0 | 9.0 | 8 | 99 | 97 | 6.8 | | 36.00 | 14.0 | (3.00) | 3,770 | 3,242 | 86.0 | 778 | 882 | 87.6 | 0.50 | 13,000 | 11,270 | 86.7 | 1.30 | 24,000 |
| May-15 | 307 | 550 | 512 | 90.8 | 3.211 | 0.135 | 0.069 | 0.104 | 3.0 | 3.0 | 10.0 | 9 | 99 | 98 | 6.9 | | 36.00 | 13.0 | (3.00) | 3,314 | 2,844 | 85.8 | 1,286 | 958 | 77.0 | 0.20 | | | | | 24,000 |
| Jun-15 | 474 | 632 | 612 | 95.7 | 3.118 | 0.146 | 0.066 | 0.104 | 3.0 | 2.0 | 10.0 | 18 | 99 | 97 | 6.9 | | 4.00 | 21.0 | 0.00 | 3,756 | 3,232 | 85.0 | 1,475 | 1,292 | 87.6 | 0.13 | | | | | 24,000 |
| Jul-15 | 454 | 550 | 505 | 91.5 | 3.452 | 0.149 | 0.086 | 0.111 | 2.0 | 2.0 | 9.0 | 8 | 99 | 98 | 7.0 | | 2.00 | 24.0 | 2.00 | 3,728 | 3,218 | 86.3 | 1,760 | 1,532 | 87.0 | 0.00 | 7,000 | 5,670 | 81.0 | 0.70 | 18,000 |
| Aug-15 | 677 | 698 | 652 | 94.8 | 3.217 | 0.190 | 0.051 | 0.104 | 2.0 | 2.0 | 7.0 | 6 | 100 | 99 | 6.9 | | 4.00 | 23.0 | 1.00 | 3,884 | 3,348 | 86.2 | 1,428 | 1,264 | 88.5 | 0.48 | | | | | 24,000 |
| Sep-15 | 526 | 748 | 702 | 95.9 | 2.607 | 0.136 | 0.059 | 0.087 | 2.0 | 2.0 | 5.0 | 3 | 100 | 99 | 7.0 | | 4.00 | 21.0 | 0.00 | 4,108 | 3,508 | 85.4 | 584 | 504 | 86.3 | 0.20 | | | | | 12,000 |
| Oct-15 | 288 | 372 | 350 | 94.2 | 2.549 | 0.168 | 0.054 | 0.082 | 2.0 | 1.0 | 10.0 | 7 | 99 | 97 | 7.0 | | 4.00 | 19.0 | 0.00 | 3,704 | 3,168 | 85.5 | 1,299 | 953 | 63.3 | 0.77 | | | | | 18,000 |
| Nov-15 | 184 | 245 | 238 | 97.0 | 3.807 | 0.920 | 0.073 | 0.127 | 2.0 | 2.0 | 8.0 | 8 | 99 | 97 | 6.8 | | 3.00 | 14.0 | (2.00) | 3,324 | 2,836 | 85.3 | 1,380 | 1,196 | 86.7 | 0.66 | 10,000 | 8,200 | 82.0 | 1.00 | 24,000 |
| Dec-15 | 159 | 120 | 111 | 93.9 | 8.117 | 0.458 | 0.108 | 0.262 | 3.0 | 4.0 | 13.0 | 23 | 98 | 89 | 6.8 | | 2.00 | 10.0 | (9.00) | 3,464 | 2,992 | 86.4 | | | | | 10,800 | 9,152 | 83.6 | 1.08 | 30,000 |
| Jan-16 | 111 | 1+1 | 165 | 94.3 | 6.372 | 0.309 | 0.134 | 0.206 | 3.0 | 5.0 | 17.0 | 30 | 97 | 90 | 6.6 | | 2.00 | 9.0 | (8.00) | 2,956 | 2,564 | 86.7 | 1,280 | 1,144 | 89.4 | 0.56 | 15,250 | 13,118 | 86.0 | 1.52 | 24,000 |
| Feb-16 | 231 | 579 | 533 | 93.6 | 5.543 | 0.268 | 0.150 | 0.191 | 3.0 | 4.0 | 6.0 | 9 | 99 | 99 | 6.6 | | 6.00 | 11.0 | (7.00) | 2,912 | 2,480 | 85.2 | 1,650 | 1,424 | 86.3 | 0.51 | | | | | 24,000 |
| Mar-16 | 210 | 425 | 392 | 92.9 | 5.625 | 0.282 | 0.120 | 0.181 | 3.0 | 5.0 | 17.0 | 27 | 98 | 96 | 6.7 | | 4.00 | 12.0 | 4.00 | 3,160 | 2,696 | 85.3 | 1,750 | 1,482 | 84.7 | 0.50 | 13,000 | 10,930 | 82.0 | 1.30 | 18,000 |
| Apr-16 | 290 | 596 | 562 | 94.1 | 3.802 | 0.185 | 0.064 | 0.127 | 4.0 | 4.0 | 18.0 | 18 | 99 | 97 | 6.8 | | 2.00 | 15.0 | (2.00) | 3,484 | 2,904 | 83.4 | 1,980 | 1,660 | 83.8 | 0.43 | 12,000 | 10,067 | 84.0 | 1.20 | 18,000 |
| May-16 | 453 | 634 | 596 | 94.9 | 2.990 | 0.132 | 0.056 | 0.096 | 3.0 | 3.0 | 19.0 | 15 | 99 | 97 | 6.8 | | 3.00 | 18.0 | (1.00) | 3,020 | 2,526 | 83.7 | 1,908 | 1,622 | 85.0 | 0.13 | 15,000 | 12,600 | 84.0 | 105.00 | 24,000 |
| Jun-16 | 580 | 449 | 412 | 91.8 | 3.069 | 0.168 | 0.085 | 0.102 | 5.0 | 5.0 | 32.0 | 28 | 99 | 93 | 7.0 | | 4.00 | 20.0 | 0.00 | 3,348 | 2,781 | 83.1 | 1,704 | 1,488 | 87.3 | 0.32 | | | | | 18,000 |
| Jul-16 | 396 | 536 | 492 | 90.1 | 3.161 | 0.132 | 0.056 | 0.102 | 3.0 | 3.0 | 9.0 | 9 | 99 | 98 | 7.1 | | 7.00 | 22.0 | 1.00 | | | | 1,734 | 1,470 | 84.8 | 0.45 | 14,333 | 11,980 | 83.3 | 1.40 | 18,000 |
| **Maximum** | 823 | 1,144 | 1,063 | 104.7 | 8.117 | 0.920 | 0.166 | 0.262 | 5.7 | 5.8 | 62.1 | 44 | 100 | 99 | 7.1 | 31.11 | 44.00 | 24.0 | 4.00 | 4,108 | 3,508 | 87.9 | 3,426 | 2,992 | 90.6 | 1.18 | 18,000 | 15,660 | 100 | 105.00 | 42,000 |
| **Minimum** | 61 | 120 | 111 | 88.2 | 1.711 | 0.094 | 0.028 | 0.057 | 1.0 | 0.7 | 2.0 | 2 | 96 | 80 | 6.4 | 1.42 | 0.88 | 8.9 | -9.00 | 1,936 | 1,696 | 78.3 | 584 | 152 | 63.3 | 0.00 | 3,500 | 2,740 | 64.0 | 0.35 | 6,000 |
| **Average** | 239 | 364 | 338 | 93.7 | 3.926 | 0.219 | 0.081 | 0.129 | 2.2 | 2.4 | 14.3 | 15 | 99 | 95 | 6.8 | 8.83 | 8.36 | 16.2 | -1.98 | 2,791 | 2,398 | 85.6 | 2,299 | 1,956 | 85.8 | 0.50 | 9,753 | 8,135 | 83.3 | 2.83 | 23,171 |

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
SUMMARY OF DISCHARGE MONITORING REPORT DATA

**FIGURE**
**1-12**

# Chapter 2 - Basic Planning and Design Data

## General

This chapter of the Wastewater Facilities Plan (WWFP) presents the basic planning and design data necessary to evaluate the City of Cascade Locks' existing wastewater treatment facility (WWTF). These data are used to determine the WWTF's ability to serve the wastewater needs of the City for the selected planning period and form the basis of evaluating feasible alternatives for required improvements. First, population information and year 2036 population projections for the City are presented. These are followed by a section that lists the year 2036 design criteria used for this WWFP. The last section of this chapter addresses pertinent treatment and regulatory agency requirements.

## Population

To estimate the demands that may be placed on a municipal wastewater system, estimates of the anticipated population to be served must be made. Projections are usually made on the basis of an annual percentage increase estimated from past growth rates combined with future expectations. The historical population data shown on Figure 2-1 were provided by the Population Research Center (PRC) at Portland State University (PSU). This agency is the official source of population data available in Oregon between the official census data generated at the beginning of each decade.

The period of time over which the population is to be projected usually depends on the type of improvements to be considered. Improvements that will require long-term financing should be designed for no less than the term of the financing. Facilities readily expanded or modified are normally designed for a period of 20 years. Facilities not easily modified or expanded, such as buried process pipelines, may be designed for their expected life, which is usually 40 to 50 years or more.

Historical and forecasted populations are provided by the PSU Oregon Population Forecast Program. In 2013, the Oregon Legislature approved legislation assigning coordinated population forecasting to the PRC at PSU. This allows counties to prepare coordinated population forecasts according to "generally accepted" demographic methods. Utilizing average annual growth rates (AAGR) provided by the PRC, historical population trends for the City are illustrated on Table 2-1 and on Figure 2-1. The 2010 population of the City was estimated to be 1,147.

**TABLE 2-1**
**HISTORICAL AND FORECASTED POPULATION**

| Historical | | | Forecast | | | | |
|---|---|---|---|---|---|---|---|
| **2000** | **2010** | **AAGR (2000-2010)** | **2016** | **2035** | **2036** | **AAGR (2016-2035)** | **AAGR (2035-2066)** |
| 1,117 | 1,147 | *0.3 percent* | 1,231 | 1,464 | 1,471 | *0.9 percent* | *0.5 percent* |

Population for the year 2036 was calculated utilizing a 0.9 percent AAGR provided for the City between the years 2016 and 2035 and a 0.5 percent AAGR between the years 2035 and 2036. The historical and forecasted population data shown on Table 2-1 and on Figure 2-1 were provided in PRC's Hood River County Final Forecast Report of 2016.

This population projection seems realistic based on the data currently available. However, it should be recognized that, over the planning period, actual growth could exceed or fall below the figures presented. Decisions requiring the investment of local dollars should be made with the understanding that this projected population figure may not occur, so any major investment should be weighed carefully. A design population of 1,471 for the year 2036 is used for planning purposes in this WWFP.

## Design Criteria

Figure 2-2 summarizes basic municipal wastewater design criteria used for this WWFP. The year 2036 design population, year 2036 design flows, and expected future influent wastewater strength characteristics are shown on Figure 2-2. This figure should be referred to during review of subsequent chapters of this WWFP, as it provides key information on which the existing WWTF and improvement alternatives were evaluated.

Municipal influent wastewater flow projections for the year 2036 were made using the existing per capita wastewater contributions (refer to the end of Chapter 1) extrapolated to the end of the 20-year planning period using the year 2036 design population of 1,471.

The total future anticipated municipal wastewater flows were projected by adding the estimated average base flow (average annual, average dry weather, average wet weather, maximum monthly, and maximum daily) to the estimated infiltration and inflow (I/I) components. The current average base flow is defined as the daily minimum flow recorded each year averaged over the six years of data analyzed. Based on the data, the current average base flow is 0.081 million gallons per day (MGD) or approximately 66 gallons per capita per day (gpcd). The year 2036 average base flow is estimated using the current per capita base flow of 66 gpcd applied to the projected design population of 1,471. The average contribution from I/I for each flow component (average annual, average dry weather, average wet weather, maximum monthly, and maximum daily) was estimated by taking the difference of each of the current total flow values and the current base flow.

For projection purposes, it was assumed the I/I flows currently being experienced in the system would remain constant throughout the 20-year planning period. Year 2036 I/I flows were not decreased to account for potential future reductions due to collection system improvements for the following reasons:

- The nature of I/I corrective work in general is such that it is difficult to accurately predict future success.
- The magnitude of the City's I/I problem is such that results may not be seen for an extended period of time.

Municipal influent design mass loadings (five-day carbonaceous biochemical oxygen demand [$CBOD_5$], total suspended solids [TSS], and total Kjeldahl nitrogen [TKN]) to the WWTF were estimated using the design average annual per capita $CBOD_5$ and TSS contributions (refer to the end of Chapter 1) projected to the end of the 20-year planning period using the year 2036 design population of 1,471 (i.e., mass loading [$CBOD_5$, TSS, or TKN] = per capita contribution [$CBOD_5$, TSS, or TKN] x 1,471). Using the design mass loading of 0.21 pound per capita per day (lb/capita/day) for $CBOD_5$, 0.32 lb/capita/day for TSS, and 0.03 lb/capita/day for TKN yields a year 2036 municipal mass loading of 307 pounds per day (lbs/day) of $CBOD_5$, 468 lbs/day of TSS, and 51 lbs/day of TKN.

## Treatment and Regulatory Requirements

Treated wastewater from the City's WWTF is discharged to the Columbia River at river mile 151. At this location, the Columbia River is water quality limited for temperature during the summer and total dissolved gas year-round. The Oregon Department of Environmental Quality (DEQ) 303(d) list for the Columbia River at the City's outfall lists pH and specifies that effluent is discharged in the range of 7.0 to 8.5 in the fall/winter/spring seasons. The Columbia River is also home to threatened and endangered species including bull trout, chum salmon, and steelhead. As of the latest National Pollutant Discharge Elimination System (NPDES) Permit renewal, the DEQ was not aware of any water quality violations that may be directly attributable to the City's wastewater treatment system. A total maximum daily load (TMDL) for temperature is currently being developed for the Columbia Basin. The TMDL may assign pollutant waste load allocations (WLA) to this point source discharge, and the NPDES Permit may be reopened to incorporate any WLA. The DEQ does not believe the temperature TMDL will impose any significant additional requirements upon the City; however, as shown on Figure 1-12 in Chapter 1, the discharge monitoring reports indicate the City discharges effluent often below the DEQ's 303(d) listed pH limit of 7.0, which will most likely require adjustments to be made prior to discharge. pH adjustment is further discussed and evaluated in Chapters 4 and 5 of this WWFP.

### *Wastewater Treatment Facility Requirements*

When considering WWTF design criteria, it is important to review a City's wastewater operating permit, which establishes the standards by which the WWTF must operate. The City operates their wastewater system in accordance with NPDES Permit No. 101328 issued by the DEQ. This NPDES Permit expires December 31, 2017. A copy of this NPDES Permit is included in Appendix A of this WWFP. This type of permit is required for WWTFs that discharge to surface waters. In the case of the City of Cascade Locks, the NPDES Permit authorizes the City to operate the wastewater collection, treatment, control, and disposal systems and to discharge treated wastewater to Waters of the State only from the authorized discharge point in conformance with the requirements, limits, and conditions set forth in the NPDES Permit. Schedule A of the NPDES Permit contains the proposed discharge limitations. Schedule B of the NPDES Permit describes the minimum monitoring and reporting necessary to demonstrate compliance with the conditions of the NPDES Permit. A summary of the NPDES Permit requirements contained in Schedule A is given below.

A key issue the City will need to evaluate as improvement alternatives are presented in subsequent chapters is how thoroughly the wastewater needs to be treated. Improvement alternatives are discussed, for example, that will likely help the existing WWTF achieve higher removal efficiency for $CBOD_5$ and TSS and/or improve operator process control and flexibility. The costs of these improvements will need to be carefully compared with the treatment and control benefits derived as decisions are made on which improvements to implement. The highest improvement priorities should be those that directly help the City continue to comply with their NPDES Permit and effectively treat and manage the biosolids.

#### Five-day Carbonaceous Biochemical Oxygen Demand and Total Suspended Solids

The NPDES Permit requires that treated effluent meet certain requirements for $CBOD_5$ and TSS limits during two time periods of the year, one from May 1 through October 31, the other from November 1 through April 30. The NPDES Permit establishes the monthly average $CBOD_5$ and

TSS concentration limits at 15 milligrams per liter (mg/L) and 20 mg/L, respectively, with a weekly average limit of 25 mg/L and 30 mg/L, respectively, for the summertime period, May 1 through October 31. During the wintertime period, November 1 through April 30, the monthly average $CBOD_5$ and TSS concentration limits are set at 25 mg/L and 30 mg/L, respectively, with a weekly average limit of 40 mg/L and 45 mg/L, respectively. The $CBOD_5$ concentration limits are considered equivalent to the minimum design criteria for $CBOD_5$ specified in Oregon Administrative Rules (OAR) Chapter 340, Division 41. The WWTF's summer mass limits for $CBOD_5$ and TSS are based on a flow of 0.493 MGD and an achievable effluent concentration of 10 mg/L. The WWTF's winter mass limits for $CBOD_5$ and TSS are based on a flow of 0.584 MGD and a concentration of 12 mg/L and 17 mg/L, respectively.

The NPDES Permit also contains the following additional requirements for the treated effluent outfall:

- $CBOD_5$ and TSS removal efficiency may not be less than 85 percent of the monthly average for $CBOD_5$ and TSS.
- *E. coli* bacteria monthly log mean may not exceed 126 organisms per 100 milliliters (ml). No single sample may exceed 406 organisms per 100 ml.
- pH must be within the range of 6.0 to 9.0 (will likely change to 7.0 to 8.5 in the next NPDES Permit renewal cycle).
- Heat energy discharge is limited to 69 million kilocalories per day.

## Regulatory Mixing Zone

No wastes may be discharged or activities conducted that cause or contribute to a violation of water quality standards in OAR Chapter 340, Division 41 applicable to the Columbia/Hood Basin except within the following regulatory mixing zone: The allowable mixing zone is that portion of the Columbia River 5 feet upstream and 100 feet downstream from the diffuser or point of discharge. The Zone of Immediate Dilution shall be defined as that portion of the allowable mixing zone that is within 10 feet of the point of discharge.

## Groundwater Protection

The NPDES Permit includes a condition that prohibits any adverse impacts on groundwater quality. Therefore, the City may not conduct any activities that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process-related residuals must be managed and disposed of in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR Chapter 340, Division 40).

According to the DEQ, the City's WWTF has a low potential for adversely impacting groundwater quality.

## Septage Requirements

Septage may not be accepted at the City's WWTF for treatment or processing without prior written approval from the DEQ.

## Chlorine Usage

No chlorine or chlorine compounds may be used for disinfection purposes and no chlorine residual may be allowed in the effluent due to chlorine used for maintenance or other purposes except in emergencies with prior approval from the DEQ.

## Biosolids Management

When treated biosolids are removed from the City's WWTF and land-applied, the City is required to perform these activities in accordance with a DEQ-approved Biosolids Management Plan (BMP). The BMP documents how the City will comply with state and federal regulations relating to biosolids treatment, removal, and application, including the 40 Code of Federal Regulations Part 503 Sludge Regulations. Since the City's biosolids are hauled from the aerobic digesters to the WWTF in Hood River for further stabilization in the anaerobic digesters, the receiving WWTF (Hood River) is responsible for ensuring compliance with the federal biosolids regulations. The City began hauling its biosolids to Hood River in July 1991, with ultimate disposal accomplished by land application on farmland. The NPDES Permit for the City of Hood River's WWTF is the governing authority for the biosolids. The City's NPDES Permit requires reporting of the transportation of biosolids to the City of Hood River's WWTF in an annual report.

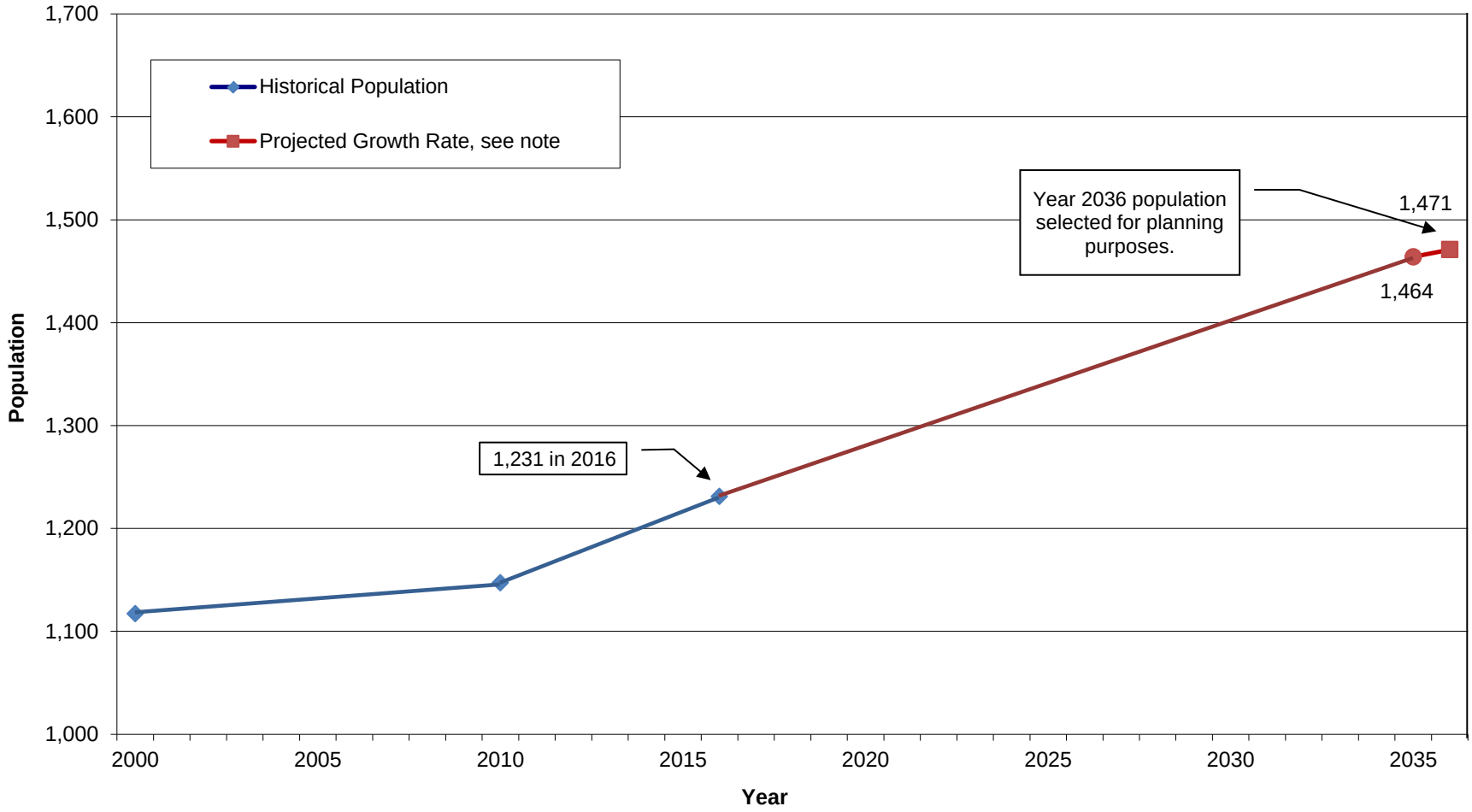
## Stormwater

The City's NPDES Permit does not address stormwater since general NPDES Permits for stormwater are not required for facilities with a design flow of less than 1 MGD.

## Industrial Pretreatment

The City does not have a DEQ-approved industrial pretreatment program.

## CITY OF CASCADE LOCKS, OREGON
## POPULATION PROJECTION




Note: The growth rate used was given by the Population Research Center at Portland State University.

anderson perry & associates, inc.

CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

POPULATION PROJECTION

**FIGURE**
**2-1**

## CITY OF CASCADE LOCKS, OREGON
## DESIGN CRITERIA

| | EXISTING[1,2] 2016 | | FUTURE 2036 | |
|---|---|---|---|---|
| | I/I[3] | Total | I/I[4] | Total[5] |
| Population[6] | | 1,231 | | 1,471 |
| ABF, MGD[7] | ---- | 0.081 | ---- | 0.095 |
| Per Capita Flow, gpcd | ---- | 66 | ---- | 66 |
| AAF, MGD | 0.048 | 0.129 | 0.048 | 0.143 |
| Per Capita Flow, gpcd | 39 | 105 | 33 | 97 |
| ADWF, MGD | 0.019 | 0.1 | 0.019 | 0.114 |
| Per Capita Flow, gpcd | 15 | 81 | 13 | 77 |
| AWWF, MGD | 0.078 | 0.159 | 0.078 | 0.173 |
| Per Capita Flow, gpcd | 63 | 129 | 53 | 118 |
| MMWWF, MGD | 0.181 | 0.262 | 0.181 | 0.276 |
| Per Capita Flow, gpcd | 147 | 213 | 123 | 188 |
| MMDWF, MGD | 0.097 | 0.178 | 0.097 | 0.192 |
| Per Capita Flow, gpcd | 79 | 145 | 66 | 131 |
| PHF, MGD[8] | ---- | 0.516 | ---- | 0.572 |
| Per Capita Flow, gpcd | ---- | 419 | ---- | 389 |
| Average Influent $CBOD_5$, mg/L | ---- | 239 | ---- | 258 |
| lbs/day | ---- | 257 | ---- | 307 |
| lb/capita/day | ---- | 0.21 | ---- | 0.21 |
| Average Influent TSS, mg/L | ---- | 364 | ---- | 392 |
| lbs/day | ---- | 392 | ---- | 468 |
| lb/capita/day | ---- | 0.32 | ---- | 0.32 |
| Average Influent TKN[9], mg/L | ---- | 40 | ---- | 43 |
| lbs/day | ---- | 43 | ---- | 51 |
| lb/capita/day | ---- | 0.03 | ---- | 0.03 |
| Maximum Month Influent $CBOD_5$, mg/L | ---- | 823 | ---- | 1104 |
| lbs/day | ---- | 879 | ---- | 1050 |
| lb/capita/day | ---- | 0.71 | ---- | 0.71 |
| Maximum Month Influent TSS, mg/L | ---- | 1144 | ---- | 1535 |
| lbs/day | ---- | 1221 | ---- | 1459 |
| lb/capita/day | ---- | 0.99 | ---- | 0.99 |

[1] The average annual, wet weather, and dry weather wastewater flows were determined by taking the average of the corresponding flows from 2010 through July 2016. Wet weather flows were estimated to occur from November through April, and dry weather flows were estimated to occur from May through October.

[2] Existing total flows and mass loads are based on historical plant operating data (i.e., Discharge Monitoring Reports).

[3] The average contribution from I/I for each flow component (AAF, ADWF, AWWF, and MMWWF) was estimated by taking the difference of each of the current total flow values and the current base flow (example: average annual I/I contribution = current AAF - ABF = 0.128 MGD - 0.079 MGD = 0.049 MGD).

[4] For projection purposes, it was assumed that the I/I flows currently experienced in the system will remain constant throughout the planning period.

[5] Future total flow is estimated by taking the sum of the future ABF and I/I (example: AAF = 0.095 MGD + 0.049 MGD = 0.144 MGD).

[6] Population estimate and projections from the Population Research Center at Portland State University.

[7] ABF is defined as the daily minimum flow recorded each month averaged over the 5 years of available data.

[8] The PHF was determined by multiplying the average annual wastewater flow by a peaking factor of 4.0. The peaking factor is an assumed value, as no data exist that allow direct calculation to determine the value.

[9] TKN (organic nitrogen and ammonia nitrogen) assumed concentration based on typical domestic wastewater influent values.

| | | | |
|---|---|---|---|
| AAF | = Average annual flow | lb/capita/day | = Pound per capita per day |
| ABF | = Average base flow | mg/L | = Milligrams per liter |
| ADWF | = Average dry weather flow | MGD | = Million gallons per day |
| AWWF | = Average wet weather flow | MMDWF | = Maximum month dry weather flow |
| $CBOD_5$ | = Five-day carbonaceous biochemical oxygen demand | MMWWF | = Maximum month wet weather flow |
| gpcd | = Gallons per capita per day | PHF | = Peak hour flow |
| I/I | = Infiltration and inflow | TSS | = Total suspended solids |
| lbs/day | = Pounds per day | TKN | = Total Kjeldahl nitrogen |

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

DESIGN CRITERIA

**FIGURE 2-2**

# Chapter 3 - Collection System Evaluation

## Introduction

This chapter of the Wastewater Facilities Plan (WWFP) provides an overview of the wastewater collection system evaluation completed as part of this WWFP; presents and summarizes the results of manhole inspections, a television (TV) inspection, and cleaning work completed; and lists high, medium, and low priority improvements. An evaluation of infiltration and inflow (I/I) was also completed, and suggested improvements pertaining to addressing I/I removal are provided. The existing wastewater lift stations are described and evaluated, and suggested improvements are outlined.

## Collection System Overview

### *General Background and History*

A brief history of the City of Cascade Locks' wastewater collection system is summarized below. Some material is condensed from the City's 1998 *Operations and Maintenance Manual, Wastewater Treatment Facilities,* prepared by KCM, Inc. (see Appendix C).

The City of Cascade Locks' original wastewater treatment system was constructed and placed into service in 1968. Most of the City's wastewater collection system was constructed in 1968, along with the original wastewater treatment system. Before 1968, the City relied on septic tank systems for wastewater containment and treatment. Since construction of the original collection system, some small residential subdivisions and sewer extensions have been added to the collection system.

To accommodate anticipated development and growth within the City, in 1998 the original wastewater treatment facility (WWTF) located at Marina Park was demolished and replaced with a new extended aeration, activated sludge mechanical WWTF. The 1998 improvements also consisted of the installation of two new pump stations and new gravity and pressure sewer pipelines to transport the wastewater from the pump stations to the WWTF. The 1998 improvements related to the collection system generally included:

1. Main Pump Station improvements at the site of the old WWTF, with conversion of the original WWTF's chlorine contact chamber to an emergency containment tank for wetwell overflows from the lift station.
2. Installation of hydrogen sulfide control equipment and a standby power generation system. The standby power generation system was installed in the old WWTF operations building located adjacent to the pump station.
3. Construction of approximately 6,700 lineal feet of 8-inch polyvinyl chloride (PVC) pressure sewer from the Main Pump Station to the gravity sewer main located on Forest Lane just east of Wheeler Avenue in the vicinity of the airport.
4. Installation of approximately 10,300 lineal feet of 12-inch PVC gravity sewer main along Forest Lane from the pressure sewer discharge manhole located just east of Wheeler Avenue to Herman Creek Lane.

5. Construction of the new Industrial Pump Station at the industrial park located east of Herman Creek. A hydrogen sulfide control system was installed in the vicinity of the bridge over Herman Creek on Forest Lane.
6. Construction of approximately 2,650 lineal feet of 8-inch PVC pressure sewer from the Industrial Pump Station along Forest Lane to the gravity sewer main located at the intersection of Forest Lane and Herman Creek Lane.
7. Approximately 1,060 lineal feet of 18-inch PVC gravity interceptor sewer from the intersection of Forest Lane and Herman Creek Lane to the new WWTF headworks.

### *Collection System Summary*

Municipal wastewater from the western portion of the City of Cascade Locks is collected in a gravity collection system and conveyed via an 18-inch interceptor to the Main Pump Station wetwell located at the site of the old WWTF adjacent to Marina Park. The Main Pump Station pumps the collected wastewater from the wetwell through an 8-inch pressure sewer to the 12-inch gravity main on Forest Lane that starts near the east end of the airport. The pumped untreated wastewater is then conveyed via gravity flow to the WWTF for processing. The Main Lift Station consists of two submersible solids handling sewage pumps equipped with constant speed drives. Each pump reportedly has the capacity to pump 340 gallons per minute (gpm) with one pump in operation. The Main Pump Station is equipped with a 150 kilowatt (KW) diesel-driven standby electrical generator set designed to automatically transfer the power in the event of a utility source outage. At the site of the Main Lift Station, an emergency overflow basin (converted chlorine contact basin from the old WWTF) exists for the purpose of intercepting overflow from the station wetwell in the event of high flow occurrences that exceed the capacity of the pumps. A hydrogen sulfide control system capable of metering chemicals into the pressure sewer is located adjacent to the Main Lift Station.

Industrial wastewater from the Port of Cascade Locks Industrial Park is conveyed through a 15-inch interceptor and collects at the Industrial Pump Station wetwell. The Industrial Pump Station is located on the east side of the City near the intersection of Forest Lane and Industrial Park Way. The Industrial Pump Station pumps the collected wastewater from the wetwell through an 8-inch pressure sewer to a manhole on the gravity main located at the intersection of Forest Lane and Herman Creek Lane. The pumped untreated wastewater is then conveyed via gravity flow to the WWTF for processing. The Industrial Lift Station consists of two 7.5 horsepower (Hp) Hydronix Model 60MP self-priming solids handling sewage pumps equipped with constant speed drives. Each pump has the capacity to pump 240 gpm with one pump in operation. The Industrial Pump Station is equipped with a trailer-mounted 100 KW diesel-driven standby electrical generator set designed to manually transfer power in the event of a utility source outage. A hydrogen sulfide control system capable of metering chemicals into the pressure sewer is located near the bridge that crosses Herman Creek.

Wastewater from a small residential area located south of City Hall is collected and pumped via a station consisting of dual Hydronix self-priming pumps housed in an underground fiberglass vault set directly above the wetwell. This station has 5 Hp Model 40MMPC500-437 Hydromatic pumps.

Map of the City's existing wastewater collection system are shown on Figures 3-1A and 3-1B, and a large version is included in a pocket at the end of this WWFP. The older (original) portions of the City's wastewater collection system are mostly reinforced concrete pipe, while system extensions

and new subdivisions generally use PVC pipe. Concrete manholes are used throughout the City. As part of this WWFP, 156 of these manholes were inspected. The wastewater collection system contains approximately 39,636 feet of gravity pipe and 9,435 feet of pressure sewer pipe. The gravity portion of the wastewater collection system ranges from 8- to 18-inch diameter pipe.

As mentioned above, two pressure sewer lines serve the City. The first pressure sewer line is approximately 6,712 feet of 8-inch diameter PVC pipe and transports wastewater from the Main Pump Station to a receiving manhole on Forest Lane. The second pressure sewer line is approximately 2,722 feet of 8-inch diameter PVC pipe and transfers wastewater from the industrial park to the intersection of Forest Lane and Herman Creek Lane.

Following are the pipe sizes and lengths in the City of Cascade Locks' collection system:

**TABLE 3-1**
**COLLECTION SYSTEM PIPE**

| Pipe Size (inches) | Pipe Length (feet) |
|---|---|
| 8 | 9,435 pressure sewer |
| 8 | 35,010 gravity sewer |
| 12 | 3,566 gravity sewer |
| 18 | 1,059 gravity sewer |

## Infiltration and Inflow

I/I is unwanted flows entering the wastewater collection system. I/I in a collection system can occur during different events at different times of the year. Winter rains and early spring runoff elevate groundwater levels, and groundwater, in turn, infiltrates into any available weakness in the wastewater collection system. Specifically, the components of I/I are defined as follows:

- Infiltration - Water entering the collection system and service connections from the ground through such means as, but not limited to, defective pipes, pipe joints, and defective service line connections or manhole walls. Infiltration does not include, and is distinguished from, inflow.
- Inflow - Water discharged into a collection system and service connections from such sources as, but not limited to, roof drains, cellars, yard and area drains, foundation drains, sump pumps, cooling water discharges, drains from springs and swampy areas, manhole covers, cross connections from storm sewers and combined sewers, catch basins, stormwater, surface runoff, and street washes or drainage.
- I/I - The total quantity of water from both infiltration and inflow without distinguishing the source.

Most cities have some I/I contributing to their wastewater collection systems. Excessive I/I can be a problem because these flows must be treated along with normal wastewater flows and take up valuable treatment capacity at a city's treatment plant. Excessive I/I is defined as the quantity of I/I that can be economically eliminated from a collection system by rehabilitation or other means, as determined by a cost analysis that compares the cost effectiveness of correcting the I/I conditions with the total cost for transportation and treatment of I/I.

The Oregon Department of Environmental Quality (DEQ) completed an evaluation report as part of the renewal process for the City's National Pollutant Discharge Elimination System Permit in 2012. In the evaluation report, the DEQ noted the average flow into the WWTF was 0.114 million gallons per day (MGD) during the previous three dry seasons and 0.179 MGD during the previous three wet weather periods. The report also noted the peak day flow of 0.540 MGD occurred during January 2012 and was two times the dry period peak flow of 0.264 MGD. Additionally, as shown on Figures 1-6 and 1-7 in Chapter 1 of this WWFP, the historical plant operational data indicate a recurring trend of significantly increased flows during the wet weather periods, typically November through May of each year. These repeat higher flow occurrences during wet weather periods likely indicate a significant I/I problem. High I/I normally signals that rehabilitation and repairs need to occur in the collection system to address leaking joints, pipe structural failures and deficiencies, leaking service lines or leaking service line connections at sewer mains or manholes, and other possible issues. The 2012 DEQ evaluation report states the City must have a program in place to identify and reduce I/I into the wastewater collection system and must submit an annual report detailing the wastewater collection maintenance activities that reduce I/I.

## Collection System Evaluation

The City of Cascade Locks has not had the capacity or manpower to perform a comprehensive evaluation of the collection system. Portions of the wastewater collection system are approaching 50 years of age and are nearing the end of their design life. Therefore, as part of this WWFP, a thorough evaluation of the wastewater collection system was completed for the purposes of identifying source areas of I/I and possible illegal taps into the sewer, inspecting and documenting the condition of manholes and sewer main lines, determining preferred methodologies for manhole and sewer line repairs, and prioritizing locations and areas for rehabilitation.

The evaluation of the City's wastewater collection system included visual flow monitoring, visual manhole inspections, smoke testing, and sewer line cleaning and TV inspection. These tasks are explained in further detail below.

### *Flow Monitoring*

To allow a comprehensive evaluation of the collection system, sewer line cleaning and closed-circuit TV monitoring were completed. Visual flow monitoring was performed in key areas of the collection system for the purpose of isolating potential areas of excessive I/I and for the purposes of prioritizing sections of the system and determining where closed-circuit TV monitoring work would be completed.

### *Collection System Smoke Testing, Cleaning, and TV Monitoring Work*

The City of Cascade Locks has not had the capacity to implement a TV and manhole inspection program. To complete system smoke testing, cleaning, and TV monitoring, the services of a qualified contractor with properly trained staff and equipment were procured by Anderson Perry & Associates, Inc. (AP). To hire a contractor to complete the work, a Request for Bids document was developed and prepared for distribution to contractors for completion of necessary smoke testing, sewer line cleaning, and TV monitoring work. Bids from contractors were obtained and evaluated and, based on the bids received, the sewer line smoke testing, cleaning, and TV monitoring work was awarded to and completed by Michels Corporation from Salem, Oregon. To help ensure that Michels Corporation completed the work in accordance with the bid documents, part-time

observation of their sewer line cleaning and TV monitoring operations was performed by City staff and AP.

In January and February 2016, Michels Corporation performed cleaning and TV monitoring of approximately 53 percent of the City's existing collection system gravity sewer main lines. In addition, they smoke tested a small section of the system with suspected illegal taps into the sewer and visually inspected manholes during the course of their TV monitoring work. An evaluation of the sewer service lines was not completed.

### *TV Monitoring Review and Results*

The TV inspection showed areas of the wastewater collection system that have cracks, broken lines, deterioration, and separated joints. It was possible to observe and identify many areas of infiltration resulting from the deteriorated, damaged, or broken pipes in the system. The TV inspection also showed leaks where service lines attach to the main line, some offset joints, and some sagging pipe sections.

After completion of the TV monitoring and inspection work, the TV monitoring video and reports provided by Michels Corporation were reviewed for purposes of documenting the gravity sewer lines' condition, determining problem areas and potential methodologies to repair and/or rehabilitate the identified deficiencies, and prioritizing the needed repairs and rehabilitation.

Funds should be accrued in a wastewater capital improvements account so, as deterioration continues, the City will have the necessary resources in place to finance an ongoing maintenance and replacement system.

### *Manhole Inspections and Results*

Visual inspection of 156 manholes was completed by City staff, AP, and Michels Corporation. The inspection focused primarily on those manholes in the older parts of the system and did not include the Shahala Drive development, Sheridan Street developments, or other newer developments in the City. The inspection identified some manholes that have offset rings, cracks, spalling concrete, reinforcement showing, and liners separating from the inside wall of the manholes. The inspection also found some manholes that are leaking and may be contributing to I/I. Based on the visual inspection, the condition of the manholes was assessed and needed repairs were documented, after which a prioritization plan was developed for addressing the manhole issues.

### *Mapping Revisions and Updates*

Based on the TV monitoring work and other fieldwork associated with the collection system evaluation, the City's collection system mapping was revised and updated to reflect changes needed and to make the mapping as accurate as possible.

## Evaluation of Wastewater Pump Stations

As part of this WWFP, a general evaluation of the three wastewater pump stations that serve the City was completed. Following is a summary of the results of the pump station evaluation.

### *Main Pump Station*

The Main Pump Station's submersible pumps are functioning well, but appear to be undersized. Operators report that each year, under high flow conditions, the pumps do not keep up with incoming flows, and wastewater is diverted into the old chlorine contact chamber where the surge is stored. The lift station wetwell is large (10- to 12-foot diameter), so if the pumps were adequately sized to accommodate the peak flow events, the surge tank would not be needed to control pump cycle time. Additionally, in a duplex (two) pump system, the DEQ requires that pumps be sized to handle the anticipated peak flow conditions with just one pump operating. Therefore, it is recommended the lift station be equipped with two new larger capacity pumps capable of handling peak flows.

The pump station piping is Schedule 80 PVC and is not adequately supported. It is suggested the piping be modified and supported appropriately.

Lift station components are constructed of materials such as carbon steel bolts, brackets, and cast iron fittings without an appropriate coating. These components are failing from corrosion. The corroded components need to be replaced with corrosion-resistant materials such as stainless steel, which will provide a system with a long expected life.

The electrical system does not appear to meet current electrical codes. The electrical control panels are located in a classified electrical area (Class 1, Division 1 hazardous environment) and were not designed to be installed in the classified area. There is also evidence of corrosion of the panels. It is recommended the electrical and control systems be upgraded to meet applicable codes and address the corrosion issue.

The estimated cost to upgrade the pump station to address the aforementioned deficiencies and issues is presented on Figure 3-2.

### *Industrial Pump Station*

At the time of the visual observation of the Industrial Pump Station, the pumps showed only three hours of run time. The wetwell was full of clear water. This station has not been used since its installation in 1998, as there have been no industries in operation at the industrial park to use the station.

The station appears to be operational and is in near-new condition. It is suggested the station be taken off line, the pumps drained, and all components "mothballed" until an industry comes into the area to use the lift station. As a maintenance measure, it is recommended the pumps and motors be turned by hand several times a year to make sure they remain rotational and operational. Also, lubricants should be kept fresh. Even though the pumps have only three hours of run time on them, they are nearly 20 years old, which may affect their remaining useful life. At this time, no improvements are recommended to be completed to this station.

### *Residential Pump Station*

The residential pump station appears to be functioning well. At the time of the visual observation of the station, the pumps had approximately 6,900 hours of operation on them. One motor had

recently been replaced, and the other motor had signs of impending bearing failure and needs to be replaced. There is evidence in the pump vault that plugging has been an issue in the past. The anticipated remaining life of the components is limited, and funds should be allocated for upgrading the station when the components start to fail. Immediate improvements are not anticipated to be needed.

## Evaluation and System Improvements Summary

This section provides a summary of the results of the collection system evaluation, outlines the suggested prioritization plan, and presents the recommendations and associated cost estimates to complete collection system improvements.

When determining the means of repair/replacement of problem areas, thought was given to the location and overall condition of the main line, service lines, and manholes. The decision to repair or replace the main line was based on the location and number of deficiencies. Replacement was suggested when the location was not in a high traffic or unrealistic area to dig (i.e., newly replaced highway). After researching options, it was decided that cured-in-place-pipe (CIPP) lining would be used to repair the main line because of its ease of use and capability to repair the existing problems. CIPP can be used successfully to seal and refurbish pipes that are still in-line. CIPP lining also reduces asphalt surface restoration and disruption to neighborhoods.

The recommended improvements have been placed in three priority categories based on opinion of necessity. The three priority categories are referred to as high priority, medium priority, and low priority improvements for purposes of discussion. High priority items include piping and manholes that are leaking or have root intrusion, cracking or spalling of concrete, visible reinforcement, or structural damage where leaking or failure may be an issue in the near future. Medium priority items include laterals that protrude into the main line, laterals that appear to be leaking, roots around laterals, and other problems that should be repaired in a timely manner. Low priority issues include sagging piping, debris in laterals, light roots around laterals, heavy grease in the pipe, or problems that could become sources of I/I in the future. Figures 3-3A, 3-3B, and 3-3C summarize the improvements. Some items noted on these figures will require additional inspection to determine the required repair. The cost estimates presented in this chapter do not reflect these items.

Figures 3-3A, 3-3B, and 3-3C denote additional categories including reference number, reach or manhole number, distance from manhole, description of work, and notes. Also included is the wastewater collection system map reference sheet number; this sheet number refers to the five sheets comprising Figure 3-4 and the existing Wastewater Collection System Priority Improvements Map (WCSPIM) included in a pocket at the end of this WWFP, and denotes which sheet the proposed improvement is located on. The reference number is not a ranking of importance, rather an identification of the improvement to be made. Reach or manhole numbers are a reference to the location of the improvement to be made. The distance from manhole is a description to further indicate where the problem exists, and the distance is referenced from the first manhole listed.

Figure 3-5 is a comprehensive summary listing of the collection system TV inspection. Figure 3-6 is a comprehensive summary listing of the manhole inspection.

## *High Priority Improvements*

The proposed high priority improvements include removal of roots, lining or replacement of cracked pipes, and repair of manholes. The estimated cost to complete the proposed high priority collection system improvements is presented on Figure 3-7A.

The most critical improvements for the City to undertake are lining of the pipes between manholes B7A and B7-2 and those items identified with a dark blue, brown, or yellow line on the WCSPIM indicating "infiltration medium to heavy flow." Southwest Sadie/B Avenue south of Undine Street has extremely high flow and is a graveled area, so it was decided to replace this section of pipe rather than repair it. The following pictures show the extent of flowing water at two locations in this section of pipe.

**Infiltration at 29.5 feet. Lateral at 29.5 feet. Heavy running clear water out of lateral.**

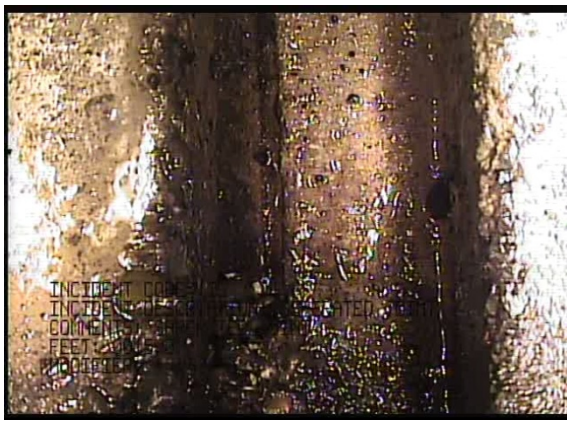
**Infiltration at 33.5 feet. Leaking cracks at 33.5 feet.**

Due to the multiple leaking joints, alignment of pipe joints, narrow street, and reasonably good condition of the asphalt, it was decided that CIPP lining would be used to seal the pipes instead of replacing them throughout the City.

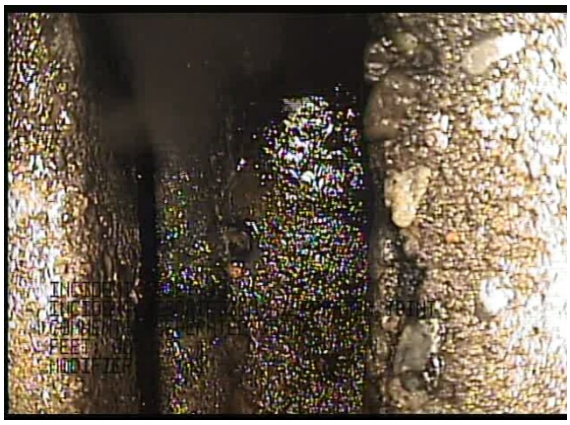
The following picture from Harvest Queen Street between manholes A2-3 and A2-1 shows an example of the extent of leaking joints and infiltration taking place.

**Infiltration at 28.6 feet. Leaking joint. Light roots at joint.**

The following pictures show separations of varying degrees on Clark Street between manholes A 18B and A 18A. The separated joints can lead to increased I/I.

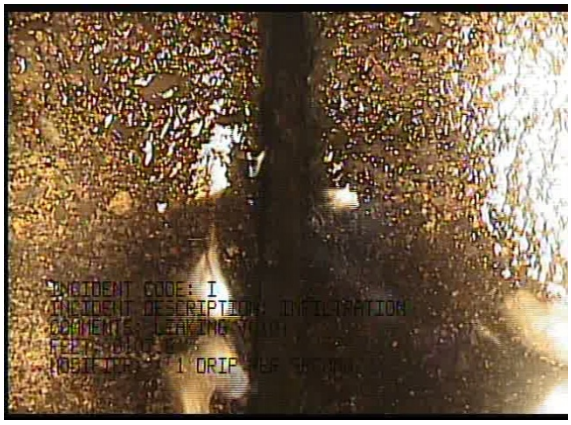


**Separated joint at 15.0.**

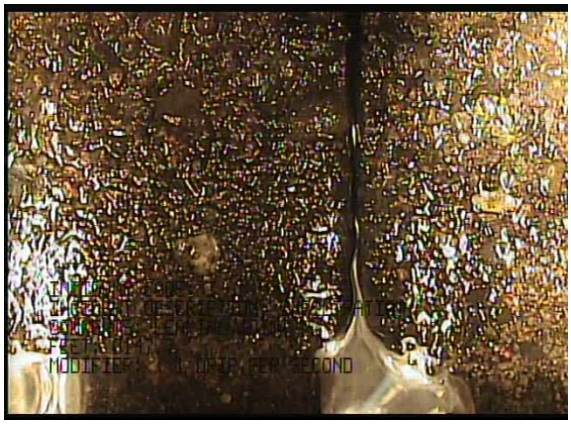


**Separted joint at 36.9.**

The section of pipe on Walnut Street has 20 leaky joints in 283.4 feet. Due to the alignment of the pipe joints, condition of the pipe, narrow street, and reasonably good condition of the pavement, it was decided this section of pipe is a good candidate for CIPP lining.



**Infiltration at 107.8 feet. Leaking joint.**



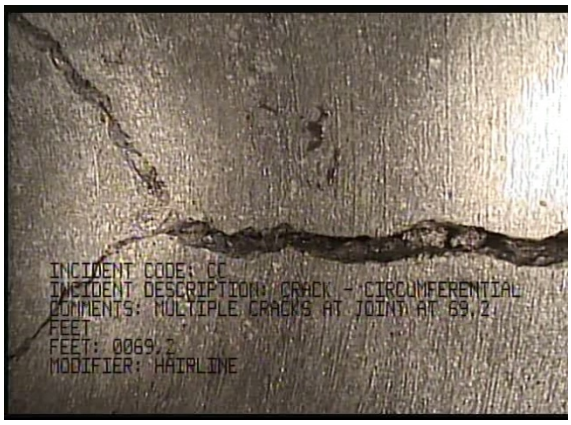
**Infiltration at 147.7 feet. Leaking joint.**

The pipe on Hammond Road south of Sunset Avenue is a high priority that needs to be replaced due to the pipe being broken; collapse of the pipe is imminent. The following pictures show the existing condition of the pipe in this area.

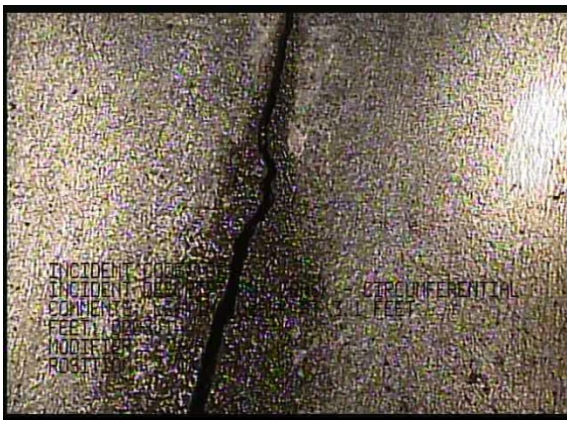
**Broken pipe - collapse imminent at 201.7 feet.**

**Broken pipe - piece detached at 201.7 feet. Badly cracked pipe. Hole in pipe.**

These are just a few samples of the problem areas in the system. The following pictures show pipes that are good candidates for CIPP lining.




**Circumferential crack at 69.2 feet. Multiple cracks at joint at 69.2 feet.**



**Circumferential crack at 3.1 feet. Leaking crack at 3.1 feet.**

## *Medium Priority Improvements*

Improvements designated as medium priority are related to improving I/I flow issues associated with a lateral and are not deemed as critical as the high priority improvements. The estimated cost to complete the proposed medium priority collection system improvements is presented on Figure 3-7B.

Improvements proposed include cleaning, repairing, and grouting manholes; sewer main replacement; and CIPP sewer service line replacement.

## *Low Priority Improvements*

Recommended low priority improvements are generally related to improving the overall condition of the collection system to minimize I/I in the future. The cost estimate to complete the proposed low priority collection system improvements is presented on Figure 3-7C.

Suggested improvements include sewer main line replacement and replacing service connections.

### *Monitor Items*

Items that should be monitored periodically are the low priority items on Figure 3-3C. These include grease in the pipes, foreign matter in the pipes, and existing pipe repairs. These items are not currently causing sufficient system malfunction that would justify the cost of the repairs; however, it will be important to periodically monitor them to ensure increased deterioration does not occur.

## Summary of Improvements Cost Estimates and Recommended Action

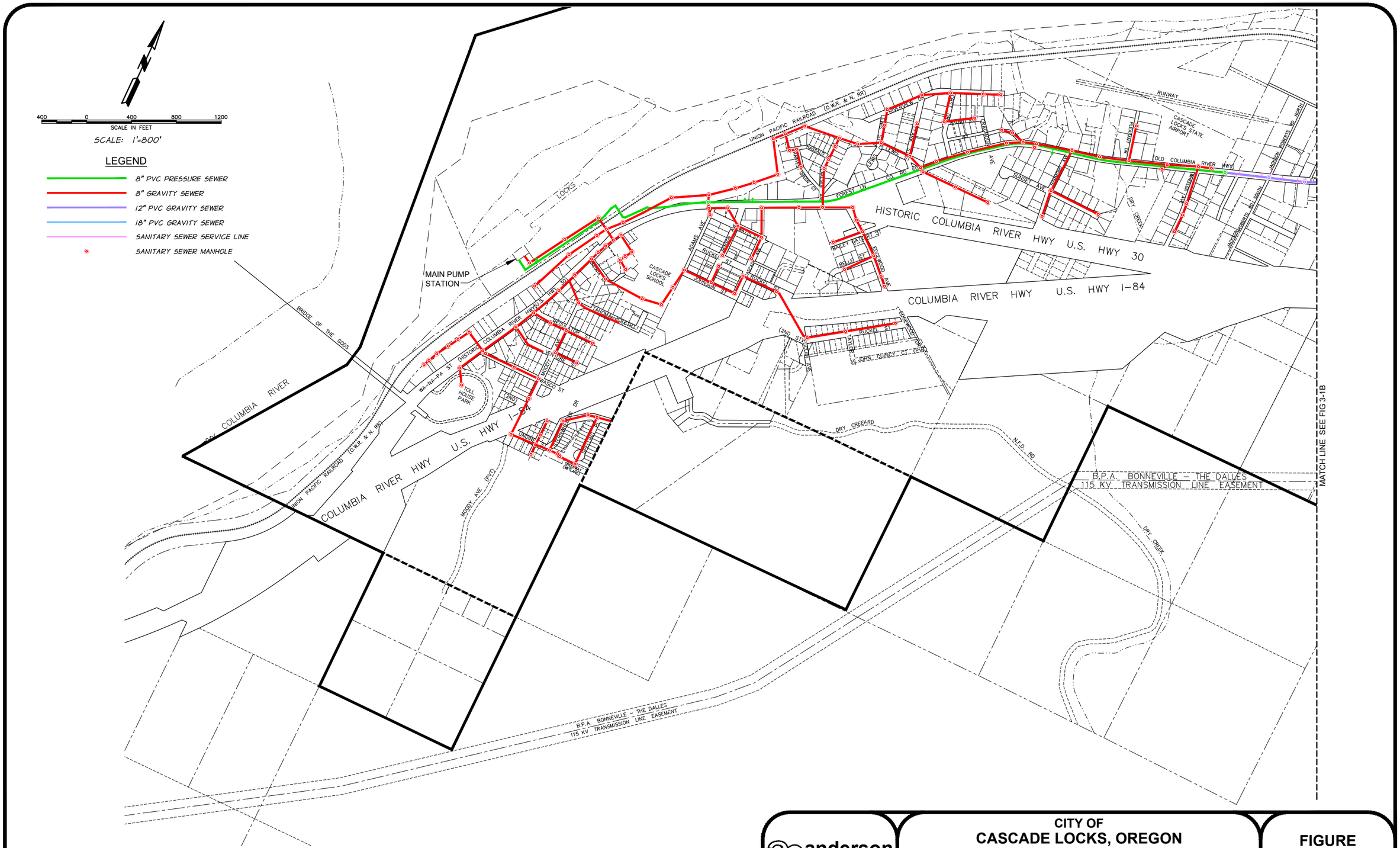
Following is a summary of estimated project costs for the three presented improvement priority levels proposed for the City of Cascade Locks' wastewater collection system. See Figures 3-7A, 3-7B, and 3-7C for a detailed itemization of anticipated collection system improvement costs.

**TABLE 3-2**
**IMPROVEMENT AND COST SUMMARY**

| Improvement Priority | Total Estimated Project Cost (2018 Dollars)[1] |
|---|---|
| Main Pump Station | $317,000 |
| High Priority Collection System | $467,850 |
| Medium Priority Collection System | $71,000 |
| Low Priority Collection System | $80,000 |
| **Total** | **$935,850** |

[1] *Includes the total estimated construction cost and estimated engineering fees.*

Based on information presented in this chapter, it is recommended the City complete the high priority improvements and suggested improvements to the Main Pump Station as part of an overall wastewater system improvements project that would include City-selected WWTF component upgrades.

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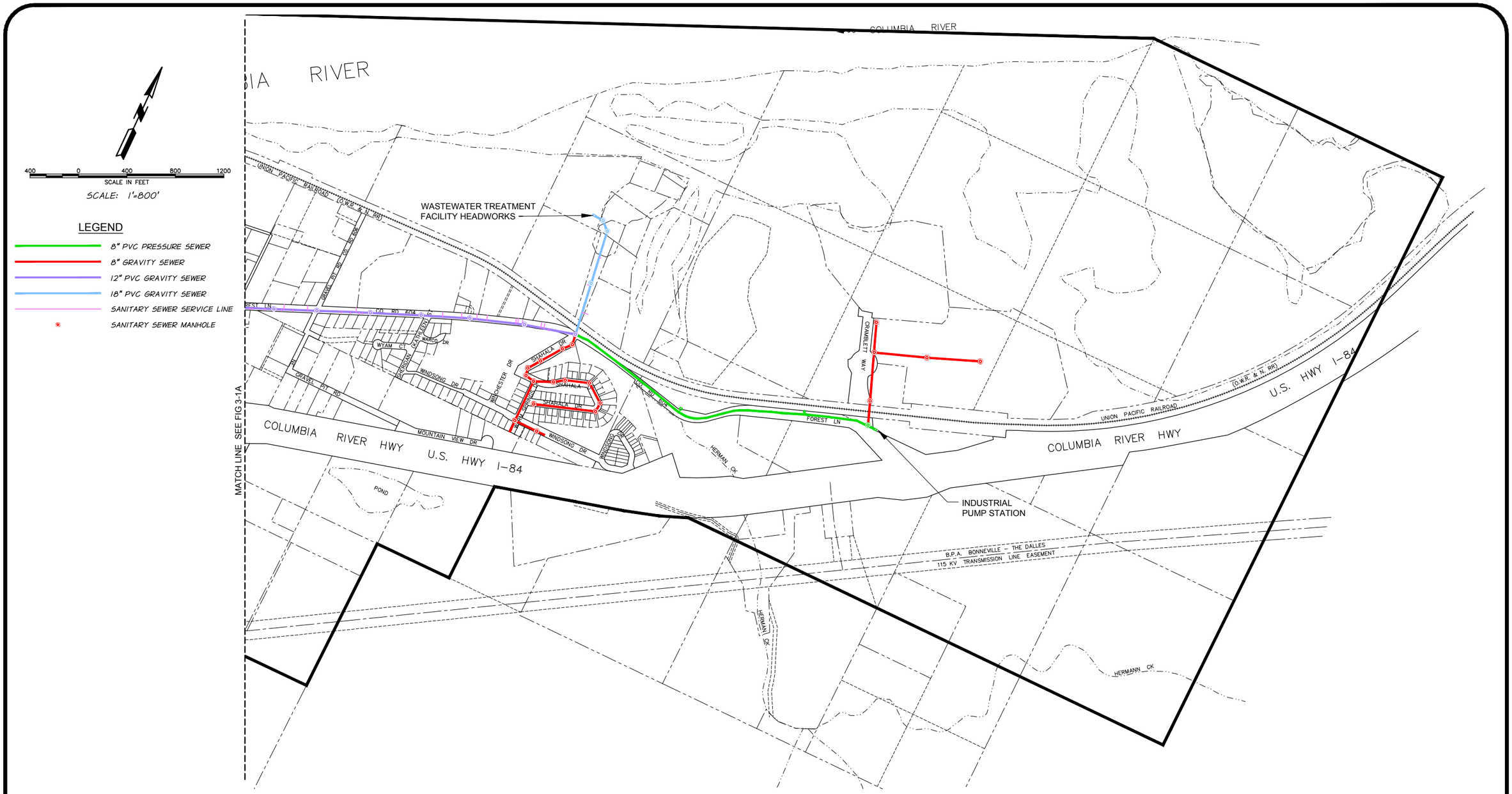
CITY OF
**CASCADE LOCKS, OREGON**
**WASTEWATER FACILITIES PLAN**

**EXISTING WASTEWATER COLLECTION SYSTEM MAP**

**FIGURE**
**3-1A**

Q:\CASCADE LOCKS\208-02 WW Fac Plan 2014\DRAFTING\PLOT FILES\020 Planning_Studies\CDBG Figs E-1 & F-1.dwg, FIG 3-1A, 7/18/2017 3:46:25 PM, AutoCAD PDF (General Documentation).pc3, DMC

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CITY OF
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**WASTEWATER FACILITIES PLAN**

**EXISTING WASTEWATER COLLECTION SYSTEM MAP**

**FIGURE**
**3-1B**

Q:\CASCADE LOCKS\208-02 WW Fac Plan 2014\DRAFTING\PLOT FILES\020 Planning_Studies\CDBG Figs E-1 & F-1.dwg, FIG 3-1B, 8/4/2017 10:30:17 AM, prichardson

**CITY OF CASCADE LOCKS, OREGON**
**MAIN PUMP STATION IMPROVEMENTS**
**PRELIMINARY COST ESTIMATE**
**(YEAR 2018 COSTS)**
**July 2017**

| NO. | DESCRIPTION | UNIT | UNIT PRICE | ESTIMATED QUANTITY | TOTAL PRICE |
|---|---|---|---|---|---|
| 1 | Mobilization/Demobilization | LS | $ 10,000 | All Req'd | $ 10,000 |
| 2 | Project Safety/Quality Control | LS | 5,000 | All Req'd | 5,000 |
| 3 | Removal and Demolition of Existing Equipment and Components | LS | 20,000 | All Req'd | 20,000 |
| 4 | New Submersible Pumps and Accessories | LS | 75,000 | All Req'd | 75,000 |
| 5 | Piping Modifications | LS | 30,000 | All Req'd | 30,000 |
| 6 | Electrical and Controls | LS | 75,000 | All Req'd | 75,000 |
| 7 | Painting | LS | 25,000 | All Req'd | 25,000 |
| | | | | **Subtotal Estimated Construction Cost** | $ 240,000 |
| | | | | Contingencies (10% of Estimated Construction Cost) | 24,000 |
| | | | | **TOTAL ESTIMATED CONSTRUCTION COST (2018 DOLLARS)** | **$ 264,000** |
| | | | | Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost) | 53,000 |
| | | | | **TOTAL ESTIMATED IMPROVEMENTS COST (2018 DOLLARS)** | **$ 317,000** |

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
MAIN PUMP STATION
IMPROVEMENTS
PRELIMINARY COST ESTIMATE

**FIGURE**
**3-2**

## Proposed High Priority Collection System Improvements Summary

| Reference Number | Wastewater Collection System Priority Improvements Map (Figure 3-4) Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Description of Work | Notes |
|---|---|---|---|---|---|
| H1 | 1 | B7-2 to B7-1 | 10.1 | Line pipe from 8 to 19 feet | |
| H2 | 1 | B7-2 to B7-1 | 40.6 | Line pipe | |
| H3 | 1 | B7-2 to B7-1 | 62.0 | Line or replace 6 feet of pipe | Protruding mortar may prevent lining |
| H4 | 1 | B7-4 to B7-3 | 13.2 | Line pipe | |
| H5 | 1 | B7-5 to B7-4 | 89.0 | Apply Root-X and line pipe | |
| H6 | 1 | B7-5 to B7-4 | 221.3 | Line pipe | |
| H7 | 1 | B7-7 to B7-6 | 108.9 | Additional inspection required/replace lateral | |
| H8 | 1 | B7.1-1 to B7-5 | 12.1 | Line pipe | Transitions from RCP to PVC |
| H9 | 1 | B7.1-1 to B7-5 | 17.7 | Line pipe | Transitions from PVC to RCP |
| H10 | 1 | B7.1-1 to B7-5 | 29.5 | Additional inspection required/replace lateral | |
| H11 | 1 | B7.1-1 to B7-5 | 33.5 | Line pipe | |
| H12 | 1 | B7.1-1 to B7-5 | 69.2 | Apply Root-X and line pipe | |
| H13 | 1 | B5-1 to B5 | 13.1 | Line pipe | |
| H14 | 1 | B5-2 to B5-1 | 22.4 | Line pipe | PVC pipe begins at Manhole No. B5-2 and transitions to RCP @ 176.5 feet |
| H15 | 1 | B5-2 to B5-1 | 42.7 | Line pipe | |
| H16 | 1 | B5-2 to B5-1 | 77.4 | Line pipe | |
| H17 | 1 | B5-2 to B5-1 | 145.8 | Line pipe | |
| H18 | 1 | B5-2 to B5-1 | 165.8 | Line pipe | Appears to be a significant leak |
| H19 | 1 | B5-3 to B5-2 | 1.7 | Line pipe | |
| H20 | 1 | B5-3 to B5-2 | 110.4 | Line pipe | |
| H21 | 1 | B5-3 to B5-2 | 148.7 | Line pipe from 146 to 151.3 feet | |
| H22 | 1 | B5-3 to B5-2 | 149.3 | Line pipe | |
| H23 | 1 | B5-3 to B5-2 | 204.1 | Replace lateral connection | Possible sump pump or leak. Heavy running clear water. |
| H24 | 1 | B3.1-1 to Downstream Manhole Tee at Main Line | 3.1 | Line pipe | |
| H25 | 1 | B3.1-1 to Downstream Manhole Tee at Main Line | 58.5 | Line pipe | |
| H26 | 1 | B3.1-1 to Downstream Manhole Tee at Main Line | 69.2 | Line pipe | |
| H27 | 1 | B3.1-1 to Downstream Manhole Tee at Main Line | 99.3 | Remove post and line pipe | Line unpassable; inspection abandoned due to metal post through line |
| H28 | 1 | B3.1-2 to B3.1-1 | 213.2 | Line pipe | |
| H29 | 1 | B3.1-2 to B3.1-1 | 284.8 | Line pipe from 281 to 353 feet | |
| H30 | 1 | B3.1-2 to B3.1-1 | 286.3 | Line pipe from 281 to 353 feet | |
| H31 | 1 | B3.1-2 to B3.1-1 | 288.5 | Line pipe from 281 to 353 feet | |
| H32 | 1 | B3.1-2 to B3.1-1 | 290.2 | Line pipe from 281 to 353 feet | |
| H33 | 1 | B3.1-2 to B3.1-1 | 301.8 | Line pipe from 281 to 353 feet | Cracks begin at 301.8 and end at 303.3 |
| H34 | 1 | B3.1-2 to B3.1-1 | 305.8 | Line pipe from 281 to 353 feet | |
| H35 | 1 | B3.1-2 to B3.1-1 | 307.1 | Line pipe from 281 to 353 feet | |
| H36 | 1 | B3.1-2 to B3.1-1 | 314.7 | Line pipe from 281 to 353 feet | Cracks begin at 307.1 and end at 314.1 |
| H37 | 1 | B3.1-2 to B3.1-1 | 317.1 | Line pipe from 281 to 353 feet | |
| H38 | 1 | B3.1-2 to B3.1-1 | 320.8 | Line pipe from 281 to 353 feet | |
| H39 | 1 | B3.1-2 to B3.1-1 | 326.6 | Line pipe from 281 to 353 feet | |
| H40 | 1 | B3.1-2 to B3.1-1 | 349.9 | Line pipe from 281 to 353 feet | |
| H41 | 1 | B51-1 to B5-2 | 48.8 | Line pipe | |
| H42 | 1 | B51-1 to B5-2 | 56.9 | Line pipe | |
| H43 | 1 | B51-1 to B5-2 | 77.1 | Line pipe | |



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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
PROPOSED HIGH PRIORITY COLLECTION SYSTEM IMPROVEMENTS SUMMARY

FIGURE
3-3A

| Reference Number | Wastewater Collection System Priority Improvement Map (Figure 3-4) Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Description of Work | Notes |
|---|---|---|---|---|---|
| H44 | 1 | B51-1 to B5-2 | 112.8 | Line pipe | Two steady streams of water spraying across pipe |
| H45 | 1 | B51-2 to B51-1 | 142.6 | Line pipe | |
| H46 | 1 | B51-2 to B51-1 | 163.2 | Line pipe from 159 to 180 feet | Cracks approximately 8 feet long, 163.2 to 170.0 |
| H47 | 1 | B51-2 to B51-1 | 173.3 | Line pipe from 159 to 180 feet | Cracks approximately 3.5 feet long, 173.3 to 176.7 |
| H48 | 1 | B51-2 to B51-1 | 177.9 | Line pipe | |
| H49 | 1 | B51-2 to B51-1 | 192.2 | Line pipe | |
| H50 | 1 | B51-2 to B51-1 | 206.4 | Line pipe | |
| H51 | 1 | B51-2 to B51-1 | 240.6 | Line pipe | |
| H52 | 1 | B3-4 to B3-3 | 197.7 | Line pipe | |
| H53 | 1 | B8-5 to B-4 | 92.2 | Line pipe | |
| H54 | 1 | B8 to B7 | 168.3 | Line pipe | |
| H55 | 1 | B8 to B7 | 171.2 | Line pipe | |
| H56 | 1 | B3 to B1 | 78.0 | Line pipe between 78.0 and 82.5 feet | |
| H57 | 1 | B3 to B1 | 82.5 | Line pipe between 78.0 and 82.5 feet | |
| H58 | 1 | B3 to B3-1 | 65.6 | Replace lateral connection | This may be a property owner issue |
| H59 | 1 | B3 to B3-1 | 106.6 | Replace lateral connection | |
| H60 | 1 | B4 to B3 | 10.8 | Replace lateral connection | |
| H61 | 1 | B4 to B3 | 72.5 | Replace lateral connection | |
| H62 | 2 | B3-8 to B3-7 | 13.2 | Apply Root-X and line pipe | Contractor cut out roots |
| H63 | 2 | B3-8 to B3-7 | 62.9 | Apply Root-X and line pipe | Contractor cut out roots |
| H64 | 2 | B3-8 to B3-7 | 149.8 | Replace lateral connection | This may be a property owner issue |
| H65 | 2 | B3.3-1 to B3-8 | 157.3 | Apply Root-X and line pipe | |
| H66 | 2 | B3.3-1 to B3-8 | 168.1 | Line pipe | |
| H67 | 2 | B3-9 to B3-8 | 236.8 | Apply Root-X and line pipe | |
| H68 | 2 | B3-11 to B3-10 | 7.4 | Apply Root-X and line pipe | |
| H69 | 2 | B3-11 to B3-10 | 94.4 | Replace lateral connection | |
| H70 | 2 | B3-14 to B3-13 | 490.8 | Line pipe | |
| H71 | 2 | A3.3-1 to A3-9 | 185.9 | Line pipe | |
| H72 | 2 | A3.3-1 to A3-9 | 268.4 | Line pipe from 266.4 to 277.5 feet | |
| H73 | 2 | A3.3-1 to A3-9 | 272.0 | Line pipe from 266.4 to 277.5 feet | |
| H74 | 2 | A3.3-1 to A3-9 | 275.5 | Line pipe from 266.4 to 277.5 feet | |
| H75 | 2 | A1-5 to A1-4 | 139.8 | Line pipe | If future plans call for using this lateral, excavate to replace cap instead of lining pipe |
| H76 | 2 | A1-5 to A1-4 | 156.7 | Line pipe | |
| H77 | 2 | A1-5 to A1-4 | 185.2 | Line pipe | |
| H78 | 2 | A1-5 to A1-4 | 235.6 | Line pipe from 233.5 to 269.4 feet | |
| H79 | 2 | A1-5 to A1-4 | 238.8 | Line pipe from 233.5 to 269.4 feet | |
| H80 | 2 | A1-5 to A1-4 | 249.5 | Line pipe from 233.5 to 269.4 feet | |
| H81 | 2 | A1-5 to A1-4 | 256.8 | Line pipe from 233.5 to 269.4 feet | |
| H82 | 2 | A1-5 to A1-4 | 261.0 | Line pipe from 233.5 to 269.4 feet | |
| H83 | 2 | A1-5 to A1-4 | 266.4 | Line pipe from 233.5 to 269.4 feet | Removed root ball |
| H84 | 2 | A1-5 to A1-4 | 267.4 | Line pipe from 233.5 to 269.4 feet | |
| H85 | 2 | A1-8 to A1-5 | 60.6 | Line pipe | |
| H86 | 2 | A1-7 to A1-6 | 28.4 | Replace lateral connection | Tap protrudes 1.5 inches; creates a blockage; required camera to come from other end. The boot is rubber w/PVC pipe lateral. |
| H87 | 2 | B3-13 to B3-12 | 144.5 | Line pipe | |
| H88 | 2 | B3-13 to B3-12 | 404.1 | Apply Root-X and line pipe | |
| H89 | 2 | A3.2-1 to A3-8 | 173.7 | Line pipe | |
| H90 | 2 | A3.2-1 to A3-8 | 252.6 | Line pipe from 250.6 to 261.7 feet | |
| H91 | 2 | A3.2-1 to A3-8 | 255.9 | Line pipe from 250.6 to 261.7 feet | |
| H92 | 2 | A3.2-1 to A3-8 | 259.7 | Line pipe from 250.6 to 261.7 feet | |
| H93 | 2 | A3-8 to A3-7 | 114.7 | Line pipe | Circumferential cracks |
| H94 | 2 | A3-8 to A3-7 | 120.3 | Line pipe from 118.3 to 133.1 feet | |
| H95 | 2 | A3-8 to A3-7 | 126.5 | Line pipe from 118.3 to 133.1 feet | |
| H96 | 2 | A3-8 to A3-7 | 131.1 | Line pipe from 118.3 to 133.1 feet | |



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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
PROPOSED HIGH PRIORITY COLLECTION SYSTEM IMPROVEMENTS SUMMARY

FIGURE
3-3A
CONT'D

| Reference Number | Wastewater Collection System Priority Improvements Map (Figure 3-4) Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Description of Work | Notes |
|---|---|---|---|---|---|
| H97 | 2 | A3-9 to A3-8 | 79.0 | Apply Root-X and line pipe | Circumferential crack |
| H98 | 2 | A3-9 to A3-8 | 124.0 | Line pipe | |
| H99 | 2 | A3-9 to A3-8 | 242.0 | Line pipe | Circumferential joint |
| H100 | 2 | A3-6 to A3-5 | 244.8 | Line pipe | |
| H101 | 2 | A3.1-2 to A3.1-1 | 12.5 | Line pipe | Circumferential crack |
| H102 | 2 | A3.1-2 to A3.1-1 | 212.3 | Line pipe | Circumferential crack |
| H103 | 2 | A3.1-2 to A3.1-1 | 242.1 | Line joint | |
| H104 | 2 | A1.1-1 to A1-3 | 139.7 | Replace lateral connection | Circumferential crack |
| H105 | 2 | A1-2 to A9 | 5.3 | Apply Root-X and line pipe | |
| H106 | 2 | A1-2 to A9 | 76.2 | Apply Root-X and line pipe | Root ball cut out by Michels 2-1-16 |
| H107 | 2 | B1 to A4 | 9.8 | Line pipe | Circumferential crack |
| H108 | 2 | A2-1 to A2 | 52.4 | Line pipe | |
| H109 | 2 | A2-3 to A2-1 | 7.0 | Line pipe from 7 to 30 feet | |
| H110 | 2 | A2-3 to A2-1 | 14.4 | Line pipe from 7 to 30 feet | |
| H111 | 2 | A2-3 to A2-1 | 15.6 | Line pipe from 7 to 30 feet | |
| H112 | 2 | A2-3 to A2-1 | 28.6 | Line pipe from 7 to 30 feet | |
| H113 | 3 | A5-1 to A19 | 28.4 | Line pipe | Circumferential crack |
| H114 | 3 | A5-1 to A19 | 35.6 | Line pipe | |
| H115 | 3 | A5-1 to A19 | 42.8 | Line pipe | |
| H116 | 3 | A25 to A24 | 17.6 | Additional inspection required | Cracks approximately 2 feet long |
| H117 | 3 | A26 to A25 | 41.2 | Replace lateral connection | |
| H118 | 3 | A4.1-1 to A4-4 | 42.6 | Line pipe | |
| H119 | 3 | A4.1-1 to A4-4 | 175.1 | Line pipe | Circumferential cracks |
| H120 | 3 | A4.1-1 to A4-4 | 268.4 | Line pipe | |
| H121 | 3 | A4.1-1 to A4-4 | 271.3 | Line pipe | Multiple circumferential cracks |
| H122 | 3 | A4-5 to A4-4 | 4.0 | Replace lateral connection | |
| H123 | 3 | A4-5 to A4-4 | 37.1 | Line pipe | |
| H124 | 3 | A4-5 to A4-4 | 179.3 | Replace lateral connection | |
| H125 | 3 | A4-5 to A4-4 | 302.5 | Line pipe | This appears to be an attempt to repair the invert of the pipe. |
| H126 | 3 | A4.1-2 to A4.1-1 | 22.0 | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H127 | 3 | A4.1-2 to A4.1-1 | 61.2 | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H128 | 3 | A4.1-2 to A4.1-1 | 107.8 | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H129 | 3 | A4.1-2 to A4.1-1 | 136.6 | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H130 | 3 | A4.1-2 to A4.1-1 | 140.4 | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H131 | 3 | A4.1-2 to A4.1-1 | 147.7 | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H132 | 3 | A4.1-2 to A4.1-1 | 162.0 | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H133 | 3 | A4.1-2 to A4.1-1 | 165.3 | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H134 | 3 | A4.1-2 to A4.1-1 | 169.0 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H135 | 3 | A4.1-2 to A4.1-1 | 194.4 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H136 | 3 | A4.1-2 to A4.1-1 | 201.4 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H137 | 3 | A4.1-2 to A4.1-1 | 204.9 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H138 | 3 | A4.1-2 to A4.1-1 | 241.1 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H139 | 3 | A4.1-2 to A4.1-1 | 259.1 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H140 | 3 | A4.1-2 to A4.1-1 | 262.2 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H141 | 3 | A4.1-2 to A4.1-1 | 266.2 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |



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CITY OF
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WASTEWATER FACILITIES PLAN
PROPOSED HIGH PRIORITY
COLLECTION SYSTEM
IMPROVEMENTS SUMMARY

FIGURE
3-3A
CONT'D

| Reference Number | Wastewater Collection System Priority Improvements Map (Figure 3-4) Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Description of Work | Notes |
|---|---|---|---|---|---|
| H142 | 3 | A4.1-2 to A4.1-1 | 269.3 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H143 | 3 | A4.1-2 to A4.1-1 | 273.3 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H144 | 3 | A4.1-2 to A4.1-1 | 276.4 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H145 | 3 | A4.1-2 to A4.1-1 | 280.4 | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet |
| H146 | 3 | A6-1 to A23.1 | 78.2 | Line pipe | |
| H147 | 3 | A6-2 to A6-1 | 11.3 | Line pipe | |
| H148 | 3 | A6-2 to A6-1 | 49.0 | Apply Root-X and line pipe | |
| H149 | 3 | A6-2 to A6-1 | 83.2 | Line pipe from 81.2 to 88.8 feet | |
| H150 | 3 | A6-2 to A6-1 | 86.8 | Line pipe from 81.2 to 88.8 feet | |
| H151 | 3 | A18B to A18A | 15.0 | Line pipe | |
| H152 | 3 | A18B to A18A | 36.9 | Line pipe | |
| H153 | 3 | A18B to A18A | 73.6 | Line pipe | |
| H154 | 3 | A4-4 to A4-3 | 29.1 | Line pipe | Circumferential crack |
| H155 | 3 | A7.1-2 to A7-1 | 201.7 | Line pipe from 195 to 210 feet | Collapse imminent |
| H156 | 3 | A7.1-2 to A7-1 | 202.7 | Line pipe from 195 to 210 feet | Circumferential cracks |
| H157 | 3 | A7.1-2 to A7-1 | 215.7 | Line pipe | Light roots at joint |
| H158 | 3 | A7.1-2 to A7-1 | 412.9 | Line pipe | Crack approximately 2 feet long |
| H159 | 3 | A7.1-2 to A7-1 | 414.0 | Repair lateral connection | |
| H160 | 3 | A7-1 to A7.1-1 | 436.9 | Replace pipe from 430 to 440 feet | Circumferential cracks |
| H161 | 3 | A7-1 to A7.1-1 | 439.0 | Replace pipe from 430 to 440 feet | Camera cannot pass the break |
| H162 | 3 | A7-2 to A7-1 | 73.6 | Replace lateral | |
| H163 | 3 | A7-2 to A7-1 | 105.9 | Replace lateral | |
| H164 | 3 | A7-2 to A7-1 | 140.5 | Line pipe | Crack is approximately 2 feet long |
| H165 | 3 | A4-1 to A18 | 17.0 | Line pipe | |
| H166 | 3 | A4-1 to A18 | 115.2 | Replace lateral connection and replace 3 feet of pipe | Roots cover 40 percent of pipe |
| H167 | 3 | A4-1 to A18 | 115.5 | Replace 3 feet of pipe and lateral connection | Hole on top of pipe; hole has been covered |
| H168 | 3 | A4-1 to A18 | 117.4 | Line pipe | Circumferential cracks are between the joint and hole at 115.5 |
| H169 | 3 | A4-3 to A4-2 | 69.9 | Replace lateral | |
| H170 | 3 | A4-3 to A4-2 | 394.0 | Line pipe | |
| H171 | 3 | A4-3 to A4-2 | 397.9 | Line pipe | |
| H172 | 3 | A4-3 to A4-2 | 408.3 | Line pipe | |
| H173 | 3 | A4-3 to A4-2 | 411.9 | Line pipe | |
| H174 | 4 | A9-3 to A9-2 | 7.4 | Apply Root-X and line pipe | Root ball cut out by Michels 2-1-16 |
| H175 | 3? | A7-1 to A7.1-1 | 74.7 | Replace lateral connection | Break in hammer tap (the reference to downstream MH A26 is actually MH A7.1-1) |
| H176 | 3? | A7-1 to A7.1-1 | 185.3 | Replace lateral connection | |
| H177 | 3? | A7-1 to A7.1-1 | 434.3 | Replace pipe from 430 to 440 feet | |
| H178 | 3? | A7-1 to A7.1-1 | 436.0 | Replace pipe from 430 to 440 feet | A piece of pipe is detached |
| H179 | 3? | A7.1-1 to A7.1-2 | 15.4 | Line pipe | |
| H180 | 1 | B3-4 | | Reset manhole ring, seal manhole. | 7' depth. Manhole metal ring offset. Water runs off the hill and into the manhole when it is raining. No asphalt around lid and ring. |
| H181 | 1 | B4 | | Replace manhole if repairs cannot be made. | 6' 6" depth. Crack in manhole, offset on bottom joint. |
| H182 | 1 | B5 | | Clean, repair, and grout manhole. Seal manhole cover. | 8' 4" depth. Bench deterioration due to drop from east. Crack in metal manhole ring. |
| H183 | 1 | B5-1 | | Reset risers and seal manhole. Evaluate drop inside manhole. | It appears the manhole has been raised several times. The risers are offset and likely leak. |
| H184 | 1 | B5-2 | | Repair pipe connection. | 8' 0" depth. Leak at outgoing PVC pipe collar. |



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CITY OF
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WASTEWATER FACILITIES PLAN
PROPOSED HIGH PRIORITY COLLECTION SYSTEM IMPROVEMENTS SUMMARY

FIGURE
3-3A
CONT'D

| Reference Number | Wastewater Collection System Priority Improvements Map (Figure 3-4) Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Description of Work | Notes |
|---|---|---|---|---|---|
| H185 | 1 | B5-3 | | Seal pipe connection. | 12' 6" depth. Leaks at 4" pipe connection about 5 gpm. |
| H186 | 1 | B7-3 | | Clean, repair, and grout manhole. | 7' 6" depth.First and second joints need repair. |
| H187 | 1 | B7-4 | | Clean, repair, and grout manhole. | 7' 0"depth. Leak in base of manhole. |
| H188 | 1 | B7-6 | | Clean, repair, and grout manhole. Seal manhole cover. | 5' 5" depth. The bottom joint is leaking. |
| H189 | 1 | B7-7 | | Clean, repair, and grout manhole. Seal manhole cover. | 6' 4" depth. Sides are damp and manhole cover leaks. |
| H190 | 1 | B7-5 | | Seal manhole cover. | 6' 0" depth. Manhole cover leaks. |
| H191 | 1 | B8 | | Seal riser and re-channel manhole. | 5' 0" depth. Base has been chipped out and needs rechanneling. Riser needs to be sealed. |
| H192 | 1 | B9 | | Clean, repair, and grout manhole. | 5' 0" depth. First joint needs repaired, bad spot of cement. |
| H193 | 2 | A10 | | Seal manhole cover. | 9' 8" depth. |
| H194 | 2 | A11 | | Seal manhole cover. | 7' 7" depth. |
| H195 | 2 | A1-2 | | Clean, repair, and grout manhole. | 7' 4" depth. Joints leaking. |
| H196 | 2 | A13 | | Clean, repair, and grout manhole. | 7' 5" depth. Leak in manhole. Spalling |
| H197 | 2 | A1-6 | | Repair ring and cover, seal manhole. | 4' 7" depth. Ring off center at top of manhole. |
| H198 | 2 | A2-3 | | Seal manhole cover. | 5' 3" depth. Three leaks at manhole ring. |
| H199 | 2 | A3 | | Seal manhole cover. | 11' 4" depth. |
| H200 | 2 | A4 | | Seal manhole cover. | 20' 8" depth. |
| H201 | 2 | A9 | | Seal manhole cover and clean the manhole base. | 14' 8" depth. Obstruction in channel. |
| H202 | 2 | B3.11-2 | | Clean, repair, and grout manhole. | 8' 4" depth. Spalling on north and south sides of manhole. |
| H203 | 2 | B1-4 | | Seal manhole cover. | 5' 0" depth. Manhole cover leaks. |
| H204 | 2 | B1-5 | | Seal manhole cover and ring. | 6' 0" depth. Manhole cover leaks and lid comes off ring. |
| H205 | 2 | B3.7-1 | | Seal manhole cover | 6' 11" depth. Manhole cover leaks. |
| H206 | 2 | B3.3-1 | | Clean, repair, and grout manhole. Seal manhole cover. | 5' 11" depth. Manhole cover leaks. Concrete spalling with signs of rust. |
| H207 | 2 | B3-10 | | Seal manhole cover. | 13' 2" depth. Manhole cover leaks. |
| H208 | 2 | B3-11 | | Clean, repair, and grout manhole. | 10' 10" depth. Roots growing through seams and roots growing on northeast side of manhole near bottom. |
| H209 | 2 | B3-12 | | Clean, repair, and grout manhole. Seal manhole cover. | 4' 9" depth. AP unable to locate. Small crack on riser. |
| H210 | 2 | B3-13 | | Seal manhole cover. | 4' 4" depth. Manhole cover leaks. |
| H211 | 2 | B3-14 | | Seal manhole cover. | 3' 10" depth. Manhole cover leaks. |
| H212 | 2 | B3-7 | | Reset and seal manhole cover. | 8' 2" depth. Manhole cover leaks. Metal ring is off center by 4" east. |
| H213 | 2 | B3-8 | | Seal manhole cover. | 6' 2" depth. Manhole cover leaks. |
| H214 | 2 | B3-9 | | Clean, repair, and grout manhole. Seal manhole cover. | 9' 11" depth. Manhole and manhole cover leak with roots growing between first and second rings. |
| H215 | 2 | C1 | | Seal manhole cover. | Manhole cover leaks. |
| H216 | 3 | A16 | | Seal manhole cover. | 5' 2" depth. Manhole cover leaks. |
| H217 | 3 | A18 | | Seal manhole cover. | 5' 10" depth. Manhole cover leaks. |
| H218 | 3 | A18-A | | Seal manhole cover by raising manhole lid 2" and paving. | 5' depth. Leaking from manhole lid. The ring and lid are below asphalt finished elevation. Spalling around the PVC lateral with exposed reinforcement. |
| H219 | 3 | A18-B | | Replace manhole if damage cannot be sealed. | 5' 4" depth. The manhole joints appear to be offset with vertical cracks in the wall. |



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CITY OF
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WASTEWATER FACILITIES PLAN
PROPOSED HIGH PRIORITY
COLLECTION SYSTEM
IMPROVEMENTS SUMMARY

FIGURE
3-3A
CONT'D

| Reference Number | Wastewater Collection System Priority Improvements Map (Figure 3-4) Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Description of Work | Notes |
|---|---|---|---|---|---|
| H220 | 3 | A20 | | Seal manhole cover. | 13' 0" depth. |
| H221 | 3 | A22 | | Clean, repair, and grout manhole and seal manhole cover. | 15' 4" depth. Two locations in the top 2' of the manhole have visible spalling of concrete. 3" radius, 1/4" deep. |
| H222 | 3 | A23 | | Seal manhole cover. | 16' depth. |
| H223 | 3 | A26 | | Seal manhole cover. | 14' 3" depth. |
| H224 | 3 | A26-A | | Seal manhole cover and clean manhole base. | 7' 4" depth. There is concrete / construction debris in the base of the manhole. |
| H225 | 3 | A4.1-1 | | Seal manhole cover. | 6' 8" depth. |
| H226 | 3 | A4.1-2 | | Clean, repair, and grout manhole and seal manhole cover. | 7' 6" depth. Ring is offset 3" and shows signs of leaking. |
| H227 | 3 | A4-2 | | Seal manhole cover. | 9' 1" depth. Manhole cover leaks. |
| H228 | 3 | A4-3 | | Seal manhole cover. | 10' 4" depth. Manhole cover leaks. |
| H229 | 3 | A4-4 | | Seal manhole cover. | 12' 8" depth. Leaking around bottom ring connection. |
| H230 | 3 | A4-5 | | Clean, repair, and grout manhole and seal manhole cover. | 12' depth. Spalling concrete at 8" elevation connection. |
| H231 | 3 | A4-6 | | Seal manhole cover. | 4' 2" depth. |
| H232 | 3 | A5-1 | | Seal manhole cover. | 7' 10" depth. 1-1/2" standing water in base of manhole. |
| H233 | 3 | A6-2 | | Seal manhole cover. | 7'2" depth. Did not collect depth. Manhole cover leaks. |
| H234 | 3 | A7.1-1 | | Seal manhole cover. | 5' 4" depth. Manhole cover leaks. |
| H235 | 3 | A7-1 | | Seal manhole cover. | 6' 3" depth. Manhole cover leaks. |
| H236 | 3 | A7-2 | | Seal manhole cover. | 7' 1" depth. Manhole cover leaks. |
| H237 | 4 | A28 | | Clean, repair, and grout manhole. Seal manhole cover. | 14' 10" depth. Spalling concrete around the 8" lateral with exposed reinforcement bar. |
| H238 | 4 | A29 | | Clean, repair, and grout manhole. Seal manhole cover. | 7'0 depth. Roots growing around metal ring. Flow is very slow with 3" of standing water. |
| H239 | 4 | A9-1 | | Seal manhole cover. | 5' 10" depth. Manhole cover leaks. |
| H240 | 4 | A9-2 | | Seal manhole cover. | 9' 4" depth. Manhole cover leaks. |
| H241 | 4 | D1 | | Clean, repair, and grout manhole. | 8' 9" depth. Liner falling off inside of manhole. |
| H242 | 4 | D10 | | Clean, repair, and grout manhole. Seal manhole cover. | 4' 8" depth. Liner falling off inside of manhole. Leaking around top metal ring. |
| H243 | 4 | D11 | | Seal manhole cover. | 12' 8" depth. Manhole cover leaks. |
| H244 | 4 | D12 | | Seal manhole cover. | Manhole cover leaks. |
| H245 | 4 | D2 | | Clean, repair, and grout manhole. Seal manhole cover. | 10' 8" depth. Liner falling off inside of manhole. Manhole cover leaks. |
| H246 | 4 | D4 | | Reset metal ring; clean, repair, grout; and seal manhole cover. | 7' 4" depth. Metal ring is very rusty. Manhole is wet and top ring is offset by 1-1/2". |
| H247 | 4 | D4-1 | | Seal manhole cover. | 10' 4" depth. Manhole cover leaks. |
| H248 | 4 | D5 | | Raise manhole, seal manhole cover. | Manhole is covered by 1/4" of water running into manhole. Needs to be raised 1". |
| H249 | 4 | D6 | | Seal manhole cover. | 13' depth. |
| H250 | 4 | D7 | | Seal manhole cover. | 12' 9" depth. Manhole cover leaks. |
| H251 | 4 | D8 | | Seal manhole cover. | 17' depth. Manhole cover leaks. |
| H252 | 4 | D9 | | Seal manhole cover. | 12' 5" depth. Manhole cover leaks. |
| H253 | 2 + 3 | A2-1 | | Seal manhole. | 5' 5" depth. Small leak in bottom third of manhole. |
| H254 | 3 + 4 | A27 | | Seal manhole cover. | 14' 4" depth. |
| H255 | 3 + 4 | A8-1 | | Seal manhole cover. | 3' 10" depth. Manhole cover leaks. |
| H256 | | E1 | | Seal manhole cover. | 12' 8" depth. Manhole cover leaks. |
| H257 | | E2 | | Seal manhole cover and seal holes in manhole cover. | 4' 8" depth. Manhole cover leaks. It appears the cover is for a storm drain manhole (16 holes). |
| H258 | | E3 | | Seal manhole cover. | 11' 3" depth. Manhole cover leaks. |



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CITY OF
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WASTEWATER FACILITIES PLAN
PROPOSED HIGH PRIORITY COLLECTION SYSTEM IMPROVEMENTS SUMMARY

FIGURE
3-3A
CONT'D

## Proposed Medium Priority Collection System Improvements Summary

| Reference Number | Wastewater Collection System Priority Improvement Map (Figure 3-4) Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Description of Work | Notes |
|---|---|---|---|---|---|
| M1 | 1 | B6-1 to B6 | 85.1 | Additional inspection required/replace lateral connection | Put 6-inch camera on and finished CCTV |
| M2 | 1 | B8-6 to B-5 | 62.0 | Replace lateral connection | |
| M3 | 1 | B7 to B6 | 163.5 | Replace lateral connection | Tap is unpassable with camera; had to enter from MH B6 to finish inspection |
| M5 | 2 | A3.3-1 to A3-9 | 2.0 | Replace lateral connection | |
| M6 | 2 | A3.3-1 to A3-9 | 113.5 | Replace lateral connection | |
| M7 | 2 | B3-13 to B3-12 | 367.6 | Replace lateral connection | |
| M8 | 2 | A3-3 to A3-2 | 47.6 | Additional inspection required/replace | Lateral may be leaking |
| M9 | 2 | A3-3 to A3-2 | 54.8 | Additional inspection required/replace lateral | This may be a property owner issue |
| M10 | 2 | A2-3 to A2-1 | 58.6 | Replace lateral connection | Protrudes 3 inches into main |
| M11 | 3 | A26 to A25 | 46.8 | Replace lateral connection | Tap protrudes 2 inches into main |
| M12 | 3 | A4.1-1 to A4-4 | 172.6 | Replace lateral connection | Unclear how far tap protrudes into main |
| M13 | 3 | A4-5 to A4-4 | 215.7 | Replace 6 feet of pipe | Sticks inside of pipe approximately 12 inches. Begins on the invert of the joint and rises toward the crown. |
| M14 | 3 | A4-3 to A4-2 | 223.4 | Additional inspection required | |
| M15 | 4 | A9-1 to A29 | 94.5 | Replace lateral connection | |
| M16 | 1 | B3.1-1 | | Clean, repair, and grout manhole | 12' 0" depth. Missing mortar between riser rings. First and second joints need repair. |
| M17 | 1 | B3.1-2 | | Grout to seal manhole ring. | 4' 6" depth. Missing mortar between metal ring and concrete at time of casting. |
| M18 | 2 + 3 | A14 | | Clean, repair, and grout manhole. | 9' 1" depth. Crack on Corbel of manhole. |

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WASTEWATER FACILITIES PLAN
PROPOSED MEDIUM PRIORITY COLLECTION SYSTEM IMPROVEMENTS SUMMARY

FIGURE
3-3B

## Proposed Low Priority Collection System Improvements Summary

| Reference Number | Wastewater Collection System Priority Improvements Map (Figure 3-4) Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Description of Work | Notes |
|---|---|---|---|---|---|
| L1 | 1 | B7-7 to B7-6 | 55.5 | Additional inspection required/replace pipe | |
| L2 | 1 | B5-1 to B5 | 68.3 | Additional inspection required | Significant chunk of debris |
| L3 | 1 | B5-1 to B5 | 109.9 | Additional inspection required/replace pipe | |
| L4 | 1 | B5-2 to B5-1 | 132.0 | Additional inspection required/replace | Lateral is about 1/3 full |
| L5 | 1 | B3-3 to B3-1 | 93.4 | Replace or seal lateral connection | |
| L6 | 1 | B8-3 to B8-2 to B8-1 | 35.5 | Additional inspection required; install grease trap at restaurant | Michels chain cut grease 2-2-16 |
| L7 | 1 | B8-4 to B-3 | 66.3 | Additional inspection required; install grease trap at restaurant | Michels chain cut grease 2-2-16 |
| L8 | 1 | B8-5 to B-4 | 151.4 | Additional inspection required; install grease trap at restaurant | Michels chain cut grease 2-2-16 |
| L9 | 1 | B8-6 to B-5 | 16.4 | Require property owner to install grease trap | |
| L10 | 1 | B8-6 to B-5 | 16.4 | Additional inspection required; install grease trap at restaurant | Michels chain cut grease 2-2-16 |
| L11 | 1 | B7 to B6 | 134.7 | Replace pipe from 38 to 89 feet | |
| L12 | 2 | B3-10 to B3-9 | 105.6 | Additional inspection required/replace lateral connection | This may be a property owner issue, 1/3 full |
| L13 | 2 | B3-13 to B3-12 | 219.5 | Additional inspection required/replace pipe from 216 to 233 feet | |
| L14 | 2 | B3-13 to B3-12 | 382.2 | Additional inspection required/replace pipe from 376 to 391 feet | |
| L15 | 2 | A3-6 to A3-5 | 249.5 | Replace lateral connection | Mortar is a small amount |
| L16 | 2 | A3.1-1 to A3-5 | 48.9 | Replace pipe from 39 to 57 feet | |
| L17 | 1 | B7 to B6 | 202.6 | Install grease trap per L9 | Grease in line; could not get to the grease due to protruding tap at 163.5 feet |
| L18 | 2 | A2-3 to A2-1 | 49.0 | Replace lateral connection | |
| L19 | 3 | A4-5 to A4-4 | 65.0 | Replace lateral connection | |
| L20 | 3 | A18B to A18A | 153.8 | Replace lateral connection | |
| L21 | 3 | A4-3 to A4-2 | 332.4 | Additional inspection required | |

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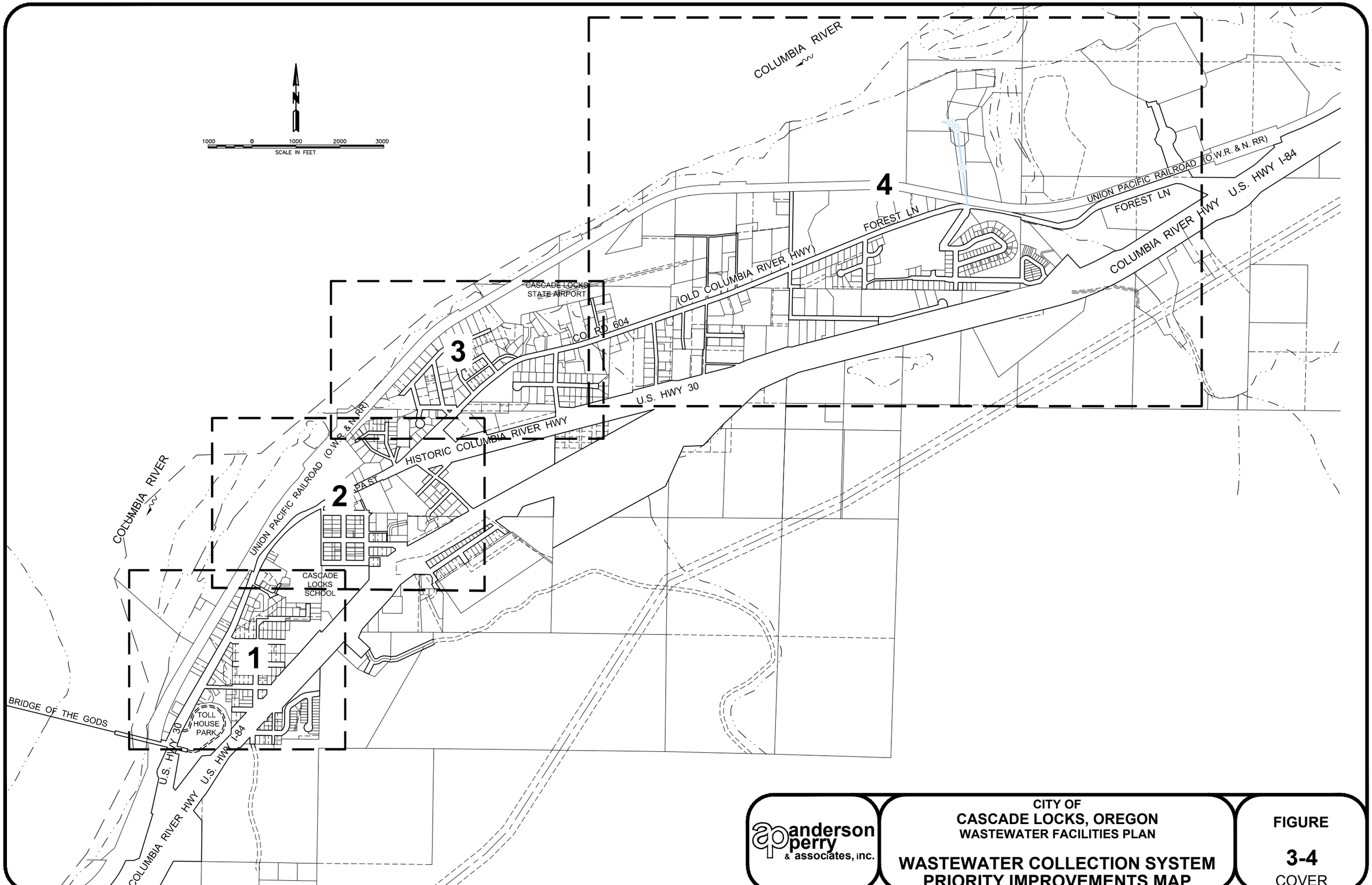
WASTEWATER FACILITIES PLAN
PROPOSED LOW PRIORITY COLLECTION SYSTEM IMPROVEMENTS SUMMARY

FIGURE
3-3C

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CITY OF
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WASTEWATER FACILITIES PLAN

WASTEWATER COLLECTION SYSTEM
PRIORITY IMPROVEMENTS MAP

FIGURE
3-4
COVER

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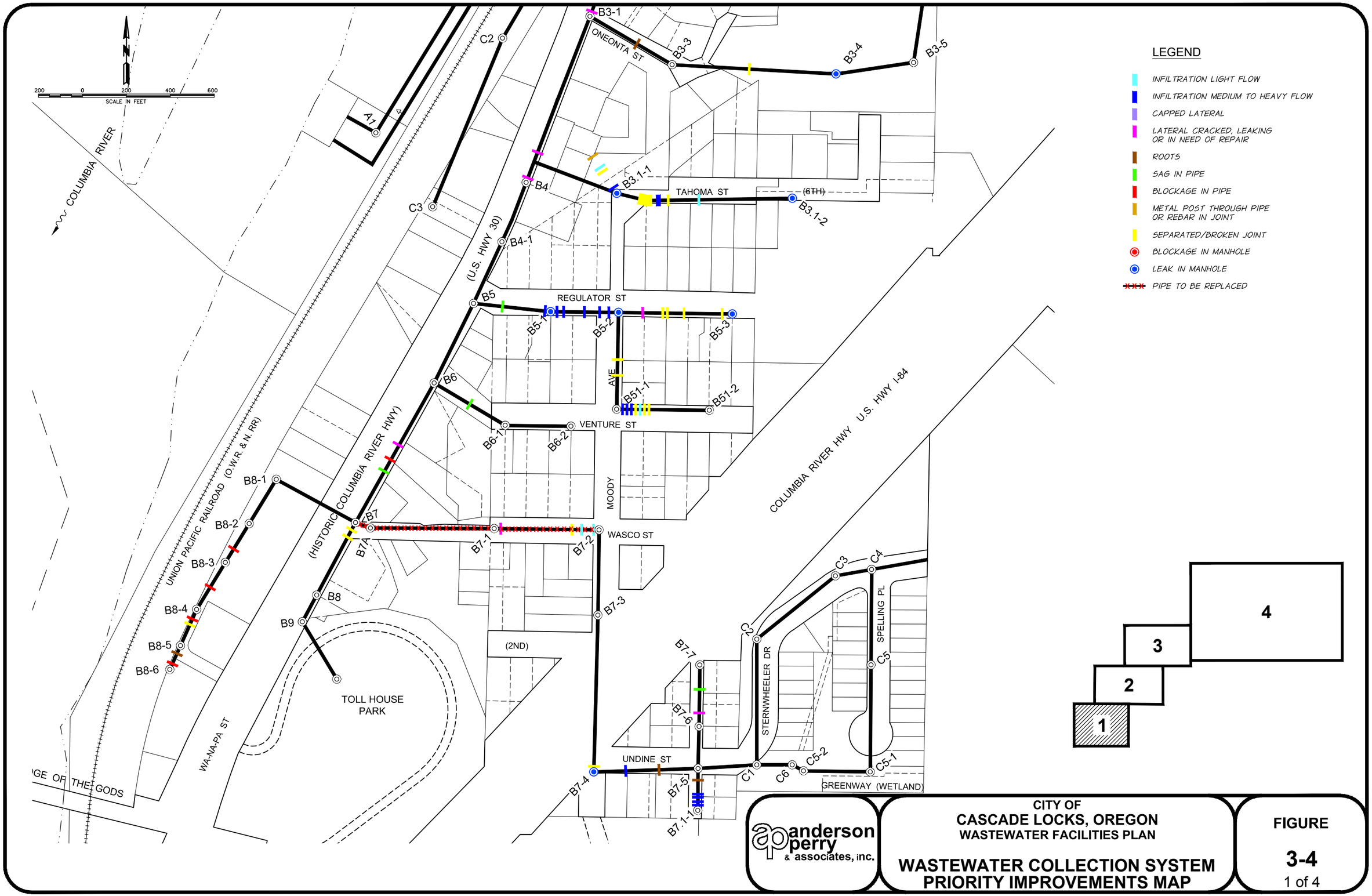


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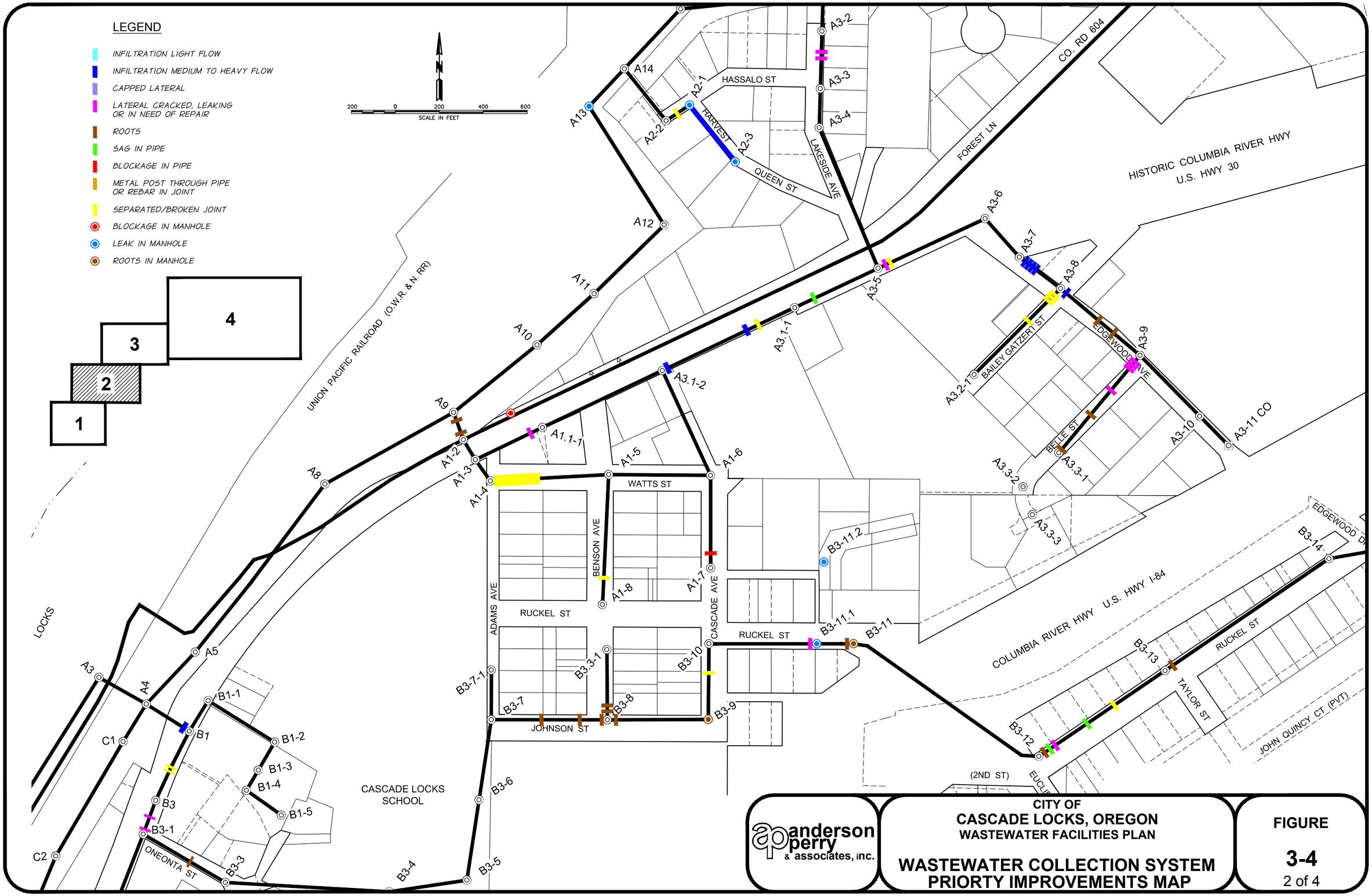


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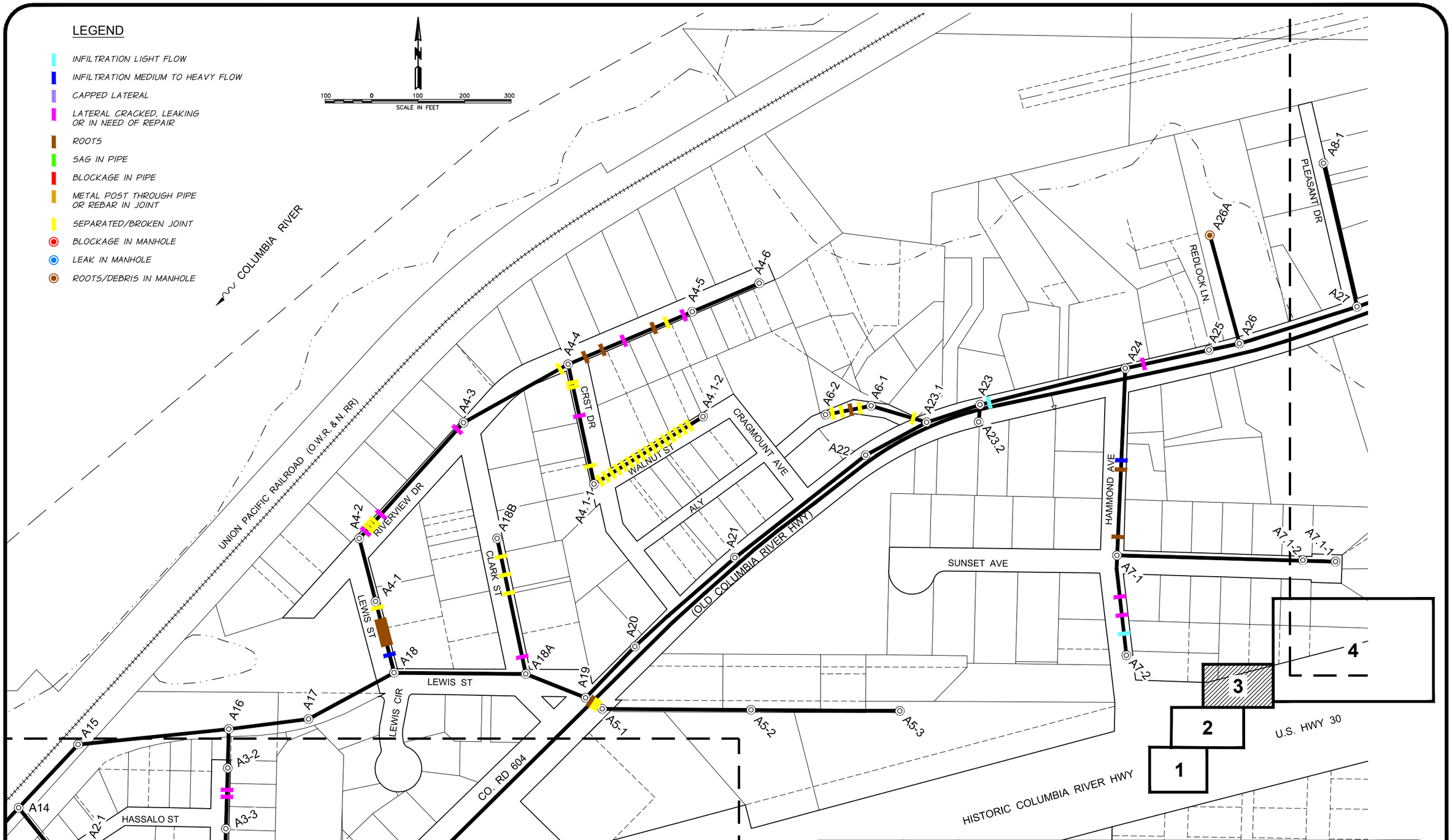


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WASTEWATER FACILITIES PLAN

WASTEWATER COLLECTION SYSTEM
PRIORITY IMPROVEMENTS MAP

FIGURE
3-4
3 of 4

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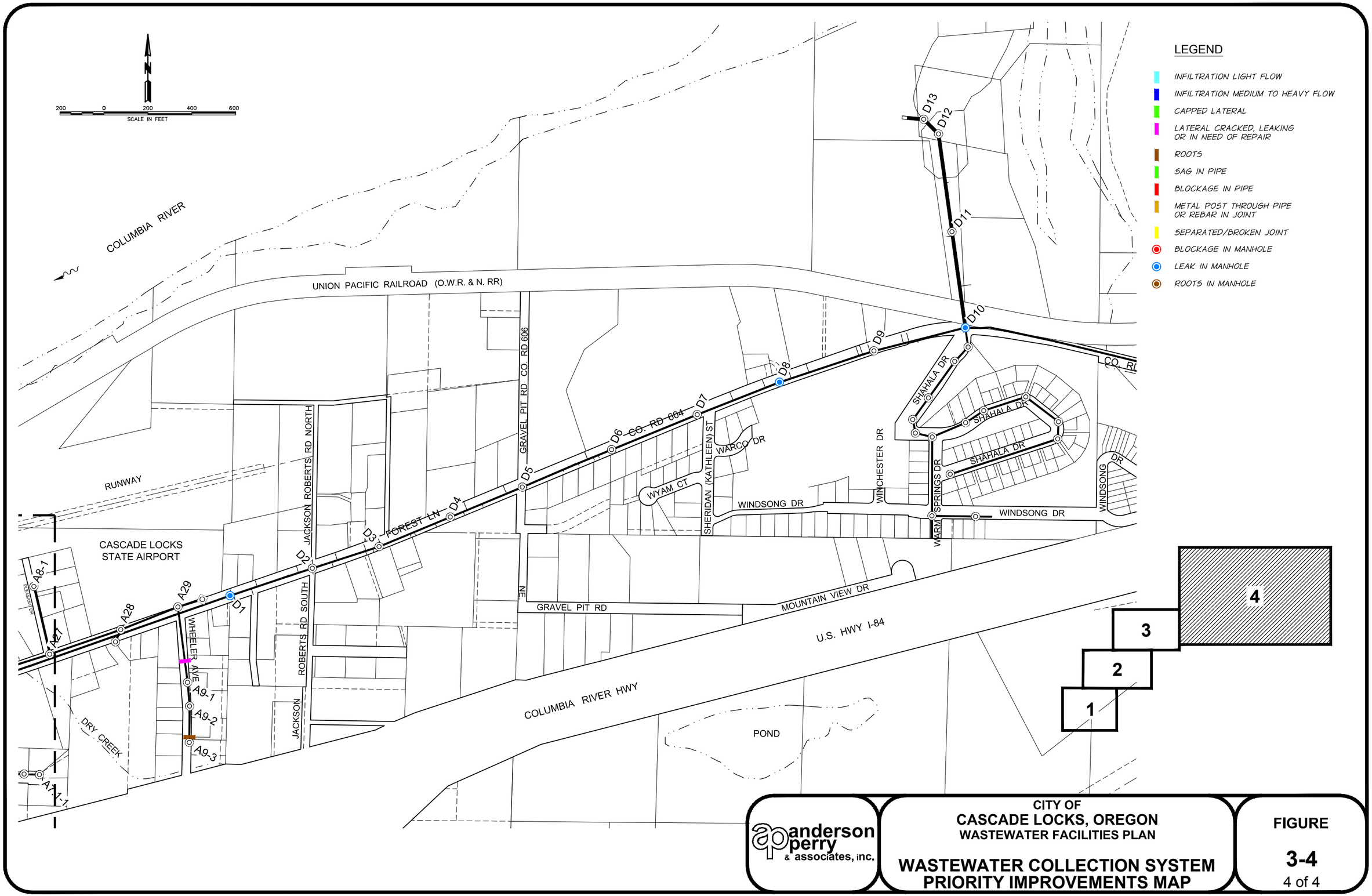


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WASTEWATER COLLECTION SYSTEM
PRIORITY IMPROVEMENTS MAP

FIGURE
3-4
4 of 4

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**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Collection System TV Inspection Summary**

| Reference Number | Wastewater Collection Map Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Damage Identified | Description of Work | Notes | Repair Length (feet) | Quantity | Estimated Cost (2018 Dollars) | Priority* |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | B7-2 to B7-1 | 10.1 | Longitudinal crack 10.5 to 16.4 feet | Line pipe from 8 to 19 feet | | 11 | | $1,075 | H |
| 2 | 1 | B7-2 to B7-1 | 40.6 | Multiple cracks leaking | Line pipe | | 6 | | $750 | H |
| 3 | 1 | B7-2 to B7-1 | 62.0 | Offset joint, mortar at joint | Line or replace 6 feet of pipe | Protruding mortar may prevent lining | 6 | | $750 | H |
| 4 | 1 | B7-4 to B7-3 | 13.2 | Hole at joint | Line pipe | | 6 | | $750 | H |
| 5 | 1 | B7-5 to B7-4 | 89.0 | Light roots at joint | Apply Root-X and line pipe | | 6 | | $750 | H |
| 6 | 1 | B7-5 to B7-4 | 221.3 | Offset joint leaking at bottom | Line pipe | | 6 | | $750 | H |
| 7 | 1 | B7-7 to B7-6 | 55.5 | Sag in pipe | Additional inspection required/replace pipe from 36 to 88 feet | | 52 | | $8,320 | L |
| 8 | 1 | B7-7 to B7-6 | 108.9 | Leaking around lateral | Additional inspection required/replace lateral | | | 1 | $800 | H |
| 9 | 1 | B7.1-1 to B7-5 | 12.1 | Leaking joint | Line pipe | Transitions from RCP to PVC | 6 | | $750 | H |
| 10 | 1 | B7.1-1 to B7-5 | 17.7 | Leaking joint | Line pipe | Transitions from PVC to RCP | 6 | | $750 | H |
| 11 | 1 | B7.1-1 to B7-5 | 29.5 | Lateral has heavy clear water running | Additional inspection required/replace lateral | | | 1 | $1,200 | H |
| 12 | 1 | B7.1-1 to B7-5 | 33.5 | Leaking cracks | Line pipe | | 6 | | $750 | H |
| 13 | 1 | B7.1-1 to B7-5 | 69.2 | Roots at crack | Apply Root-X and line pipe | | 6 | | $750 | H |
| 14 | 1 | B5-1 to B5 | 13.1 | Leaking crack | Line pipe | | 6 | | $750 | H |
| 15 | 1 | B5-1 to B5 | 68.3 | Debris in lateral | Additional inspection required. Clean, repair, and seal lateral. | Significant chunk of debris | | 1 | $800 | L |
| 16 | 1 | B5-1 to B5 | 109.9 | Sag in pipe | Additional inspection required/replace pipe from 102 to 113 feet | | 11 | | $1,760 | L |
| 17 | 1 | B5-2 to B5-1 | 22.4 | Leaking joint with cracks | Line pipe | PVC pipe begins at Manhole No. B5-2 and transitions to RCP @ 176.5 feet | 6 | | $750 | H |
| 18 | 1 | B5-2 to B5-1 | 42.7 | Leaking joint with cracks | Line pipe | | 6 | | $750 | H |
| 19 | 1 | B5-2 to B5-1 | 77.4 | 3-foot longitudinal crack | Line pipe | | 6 | | $750 | H |
| 20 | 1 | B5-2 to B5-1 | 132.0 | Debris in lateral | Additional inspection required/replace lateral | Lateral is about 1/3 full | | 1 | $800 | L |
| 21 | 1 | B5-2 to B5-1 | 145.8 | Heavy leak at joint | Line pipe | | 6 | | $750 | H |
| 22 | 1 | B5-2 to B5-1 | 165.8 | Leak at joint | Line pipe | Appears to be a significant leak | 6 | | $750 | H |
| 23 | 1 | B5-3 to B5-2 | 1.7 | Leaking crack | Line pipe | | 6 | | $750 | H |
| 24 | 1 | B5-3 to B5-2 | 110.4 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 25 | 1 | B5-3 to B5-2 | 148.7 | Heavy leaking joint | Line pipe from 146 to 151.3 feet | | 6 | | $750 | H |
| 26 | 1 | B5-3 to B5-2 | 149.3 | Leaking cracks at joint | Line pipe | | | | | H |
| 27 | 1 | B5-3 to B5-2 | 204.1 | Lateral appears to be leaking | Replace lateral connection | Possible sump pump or leak. Heavy running clear water | | 1 | $1,200 | H |
| 28 | 1 | B3.1-1 to Downstream Manhole | 3.1 | Leaking crack | Line pipe | | 6 | | $750 | H |
| 29 | 1 | B3.1-1 to Downstream Manhole | 58.5 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 30 | 1 | B3.1-1 to Downstream Manhole | 69.2 | Multiple cracks | Line pipe | | 6 | | $750 | H |
| 31 | 1 | B3.1-1 to Downstream Manhole Tee at Main Line | 99.3 | Metal post through pipe | Remove post and line pipe | Line unpassable; inspection abandoned due to metal post through line | 6 | | $1,000 | H |
| 32 | 1 | B3.1-2 to B3.1-1 | 213.2 | Hole in pipe | Line pipe | | 6 | | $750 | H |
| 33 | 1 | B3.1-2 to B3.1-1 | 284.8 | Multiple cracks in pipe | Line pipe from 281 to 353 feet | | 72 | | $4,680 | H |
| 34 | 1 | B3.1-2 to B3.1-1 | 286.3 | Broken pipe | Line pipe from 281 to 353 feet | | | | | H |
| 35 | 1 | B3.1-2 to B3.1-1 | 288.5 | Leaking cracks | Line pipe from 281 to 353 feet | | | | | H |

* H = High
M = Medium
L = Low



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CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM
TV INSPECTION SUMMARY

**FIGURE**
**3-5**

**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Collection System TV Inspection Summary**

| Reference Number | Wastewater Collection Map Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Damage Identified | Description of Work | Notes | Repair Length (feet) | Quantity | Estimated Cost (2018 Dollars) | Priority* |
|---|---|---|---|---|---|---|---|---|---|---|
| 36 | 1 | B3.1-2 to B3.1-1 | 290.2 | Multiple leaking cracks | Line pipe from 281 to 353 feet | | | | | H |
| 37 | 1 | B3.1-2 to B3.1-1 | 301.8 | Crack | Line pipe from 281 to 353 feet | Cracks begin at 301.8 and end at 303.3 | | | | H |
| 38 | 1 | B3.1-2 to B3.1-1 | 305.8 | Multiple leaking cracks | Line pipe from 281 to 353 feet | | | | | H |
| 39 | 1 | B3.1-2 to B3.1-1 | 307.1 | Broken joint, leaking at joint | Line pipe from 281 to 353 feet | | | | | H |
| 40 | 1 | B3.1-2 to B3.1-1 | 314.7 | Broken joint with multiple cracks | Line pipe from 281 to 353 feet | Cracks begin at 307.1 and end at 314.1 | | | | H |
| 41 | 1 | B3.1-2 to B3.1-1 | 317.1 | Leaking cracks at joint | Line pipe from 281 to 353 feet | | | | | H |
| 42 | 1 | B3.1-2 to B3.1-1 | 320.8 | Leaking cracks at joint | Line pipe from 281 to 353 feet | | | | | H |
| 43 | 1 | B3.1-2 to B3.1-1 | 326.6 | Leaking crack | Line pipe from 281 to 353 feet | | | | | H |
| 44 | 1 | B3.1-2 to B3.1-1 | 349.9 | Leaking joint | Line pipe from 281 to 353 feet | | | | | H |
| 45 | 1 | B6-1 to B6 | 85.1 | Hammer tap unpassable lateral connection | Additional inspection required/replace lateral connection | Put 6-inch camera on and finished CCTV | | 1 | $1,200 | M |
| 46 | 1 | B51-1 to B5-2 | 48.8 | Offset joint with crack | Line pipe | | 6 | | $750 | H |
| 47 | 1 | B51-1 to B5-2 | 56.9 | Hairline crack at lateral | Line pipe | | 6 | | $750 | H |
| 48 | 1 | B51-1 to B5-2 | 77.1 | Cracks at joint | Line pipe | | 6 | | $750 | H |
| 49 | 1 | B51-1 to B5-2 | 112.8 | Heavy leak at joint | Line pipe | Two steady streams of water spraying across pipe | 6 | | $750 | H |
| 50 | 1 | B51-2 to B51-1 | 142.6 | Cracks at joint | Line pipe | | 6 | | $750 | H |
| 51 | 1 | B51-2 to B51-1 | 163.2 | Cracks at joint | Line pipe from 159 to 180 feet | Cracks approximately 8 feet long, 163.2 to 170.0 | 21 | | $1,365 | H |
| 52 | 1 | B51-2 to B51-1 | 173.3 | Cracked pipe | Line pipe from 159 to 180 feet | Cracks approximately 3.5 feet long, 173.3 to 176.7 | | | | H |
| 53 | 1 | B51-2 to B51-1 | 177.9 | Broken joint | Line pipe | | 6 | | $750 | H |
| 54 | 1 | B51-2 to B51-1 | 192.2 | Cracks at joint | Line pipe | | 6 | | $750 | H |
| 55 | 1 | B51-2 to B51-1 | 206.4 | Leaking crack | Line pipe | | 6 | | $750 | H |
| 56 | 1 | B51-2 to B51-1 | 240.6 | Leaking crack | Line pipe | | 6 | | $750 | H |
| 57 | 2 | B3-8 to B3-7 | 13.2 | Roots at joint | Apply Root-X and line pipe | Contractor cut out roots | 6 | | $750 | H |
| 58 | 2 | B3-8 to B3-7 | 62.9 | Roots in line | Apply Root-X and line pipe | Contractor cut out roots | 6 | | $750 | H |
| 59 | 2 | B3-8 to B3-7 | 149.8 | Roots at lateral | Replace lateral connection | This may be a property owner issue | | 1 | $800 | H |
| 60 | 2 | B3.3-1 to B3-8 | 157.3 | Roots at joint | Apply Root-X and line pipe | | 6 | | $750 | H |
| 61 | 2 | B3.3-1 to B3-8 | 168.1 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 62 | 2 | B3-9 to B3-8 | 236.8 | Roots at joint | Apply Root-X and line pipe | | 6 | | $750 | H |
| 63 | 2 | B3-11 to B3-10 | 7.4 | Roots at joint | Apply Root-X and line pipe | | 6 | | $750 | H |
| 64 | 2 | B3-11 to B3-10 | 94.4 | Leaking around lateral | Replace lateral connection | | | 1 | $1,200 | H |
| 65 | 2 | B3-14 to B3-13 | 490.8 | Crack and light roots | Line pipe | | 6 | | $750 | H |
| 66 | 2 | B3-10 to B3-9 | 105.6 | Debris in lateral | Additional inspection required/replace lateral connection | This may be a property owner issue, 1/3 full | | 1 | $1,200 | L |
| 67 | 2 | A3.3-1 to A3-9 | 2.0 | Roots around lateral | Replace lateral connection | | | 1 | $800 | M |
| 68 | 2 | A3.3-1 to A3-9 | 113.5 | Roots around lateral | Replace lateral connection | | | 1 | $800 | M |
| 69 | 2 | A3.3-1 to A3-9 | 185.9 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 70 | 2 | A3.3-1 to A3-9 | 268.4 | Leaking joint | Line pipe from 266.4 to 277.5 feet | | 11.1 | | $1,082 | H |

* H = High
M = Medium
L = Low



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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM
TV INSPECTION SUMMARY

**FIGURE**
**3-5**
**CONT'D**

**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Collection System TV Inspection Summary**

| Reference Number | Wastewater Collection Map Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Damage Identified | Description of Work | Notes | Repair Length (feet) | Quantity | Estimated Cost (2018 Dollars) | Priority* |
|---|---|---|---|---|---|---|---|---|---|---|
| 71 | 2 | A3.3-1 to A3-9 | 272.0 | Leaking joint | Line pipe from 266.4 to 277.5 feet | | | | | H |
| 72 | 2 | A3.3-1 to A3-9 | 275.5 | Leaking joint | Line pipe from 266.4 to 277.5 feet | | | | | H |
| 73 | 2 | A1-5 to A1-4 | 139.8 | Leaking lateral cap | Line pipe | If future plans call for using this lateral, excavate to replace cap instead of lining pipe | 6 | | $750 | H |
| 74 | 2 | A1-5 to A1-4 | 156.7 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 75 | 2 | A1-5 to A1-4 | 185.2 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 76 | 2 | A1-5 to A1-4 | 235.6 | Leaking joint | Line pipe from 233.5 to 269.4 feet | | 36 | | $2,340 | H |
| 77 | 2 | A1-5 to A1-4 | 238.8 | Leaking joint | Line pipe from 233.5 to 269.4 feet | | | | | H |
| 78 | 2 | A1-5 to A1-4 | 249.5 | Leaking joint | Line pipe from 233.5 to 269.4 feet | | | | | H |
| 79 | 2 | A1-5 to A1-4 | 256.8 | Leaking joint | Line pipe from 233.5 to 269.4 feet | | | | | H |
| 80 | 2 | A1-5 to A1-4 | 261.0 | Leaking joint | Line pipe from 233.5 to 269.4 feet | | | | | H |
| 81 | 2 | A1-5 to A1-4 | 266.4 | Multiple leaking cracks | Line pipe from 233.5 to 269.4 feet | Removed root ball | | | | H |
| 82 | 2 | A1-5 to A1-4 | 267.4 | Leaking joint | Line pipe from 233.5 to 269.4 feet | | | | | H |
| 83 | 2 | A1-8 to A1-5 | 60.6 | Joint with evidence of leak | Line pipe | | 6 | | $750 | H |
| 84 | 2 | A1-7 to A1-6 | 28.4 | Lateral protruding into main line | Replace lateral connection | Tap protrudes 1.5 inches; creates a blockage; required camera to come from other end. The boot is rubber w/ PVC pipe lateral. | | 1 | $800 | H |
| 85 | 1 | B3-4 to B3-3 | 197.7 | Separated joint | Line pipe | | 6 | | $750 | H |
| 86 | 1 | B3-3 to B3-1 | 93.4 | Light roots around lateral | Replace or seal lateral connection | | | 1 | $1,200 | L |
| 87 | 2 | B3-13 to B3-12 | 144.5 | Broken and cracked separated joint | Line pipe | | 6 | | $750 | H |
| 88 | 2 | B3-13 to B3-12 | 219.5 | Sag in pipe | Additional inspection required/replace pipe from 216 to 233 feet | | 17 | | $2,720 | L |
| 89 | 2 | B3-13 to B3-12 | 367.6 | Evidence of leak around lateral | Replace lateral connection | | | 1 | $800 | M |
| 90 | 2 | B3-13 to B3-12 | 382.2 | Sag in pipe | Additional inspection required/replace pipe from 376 to 391 feet | | 15 | | $2,400 | L |
| 91 | 2 | B3-13 to B3-12 | 404.1 | Circumferential crack with roots | Apply Root-X and line pipe | | 6 | | $750 | H |
| 92 | 2 | A3.2-1 to A3-8 | 173.7 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 93 | 2 | A3.2-1 to A3-8 | 252.6 | Leaking joint | Line pipe from 250.6 to 261.7 feet | | 11.1 | | $1,082 | H |
| 94 | 2 | A3.2-1 to A3-8 | 255.9 | Leaking joint | Line pipe from 250.6 to 261.7 feet | | | | | H |
| 95 | 2 | A3.2-1 to A3-8 | 259.7 | Leaking joint | Line pipe from 250.6 to 261.7 feet | | | | | H |
| 96 | 2 | A3-8 to A3-7 | 114.7 | Multiple hairline leaking cracks | Line pipe | Circumferential cracks | 6 | | $750 | H |
| 97 | 2 | A3-8 to A3-7 | 120.3 | Leaking joint | Line pipe from 118.3 to 133.1 feet | | 14.8 | | $962 | H |
| 98 | 2 | A3-8 to A3-7 | 126.5 | Leaking cracks | Line pipe from 118.3 to 133.1 feet | | | | | H |
| 99 | 2 | A3-8 to A3-7 | 131.1 | Leaking joint | Line pipe from 118.3 to 133.1 feet | | | | | H |
| 100 | 2 | A3-9 to A3-8 | 79.0 | Crack with roots | Apply Root-X and line pipe | Circumferential crack | 6 | | $750 | H |
| 101 | 2 | A3-9 to A3-8 | 124.0 | Light roots at joint | Line pipe | | 6 | | $750 | H |
| 102 | 2 | A3-9 to A3-8 | 242.0 | Leaking crack | Line pipe | Circumferential joint | 6 | | $750 | H |
| 103 | 2 | A3-6 to A3-5 | 244.8 | Separated joint | Line pipe | | 6 | | $750 | H |
| 104 | 2 | A3-6 to A3-5 | 249.5 | Mortar at lateral | Replace lateral connection | Mortar is a small amount | | 1 | $800 | L |
| 105 | 2 | A3-3 to A3-2 | 47.6 | Clear water coming from lateral | Additional inspection required/replace lateral | Lateral may be leaking | | 1 | $1,200 | M |

* H = High
M = Medium
L = Low



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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM
TV INSPECTION SUMMARY

**FIGURE**
**3-5**
**CONT'D**

**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Collection System TV Inspection Summary**

| Reference Number | Wastewater Collection Map Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Damage Identified | Description of Work | Notes | Repair Length (feet) | Quantity | Estimated Cost (2018 Dollars) | Priority* |
|---|---|---|---|---|---|---|---|---|---|---|
| 106 | 2 | A3-3 to A3-2 | 54.8 | Lateral full of roots | Additional inspection required/replace lateral | This may be a property owner issue | | 1 | $1,200 | M |
| 107 | 2 | A3.1-1 to A3-5 | 48.9 | Sag in pipe | Replace pipe from 39 to 57 feet | | 18 | | $2,880 | L |
| 108 | 2 | A3.1-2 to A3.1-1 | 12.5 | Leaking crack | Line pipe | Circumferential crack | 6 | | $750 | H |
| 109 | 2 | A3.1-2 to A3.1-1 | 212.3 | Leaking crack | Line pipe | Circumferential crack | 6 | | $750 | H |
| 110 | 2 | A3.1-2 to A3.1-1 | 242.1 | Leaking joint | Line joint | | 6 | | $750 | H |
| 111 | 2 | A1.1-1 to A1-3 | 139.7 | Leaking crack at lateral | Replace lateral connection | Circumferential crack | | 1 | $800 | H |
| 112 | 2 | A1-2 to A9 | 5.3 | Roots at joint | Apply Root-X and line pipe | | 6 | | $750 | H |
| 113 | 2 | A1-2 to A9 | 76.2 | Large root ball at joint | Apply Root-X and line pipe | Root ball cut out by Michels 2-1-16 | 6 | | $750 | H |
| 114 | 4 | A9-1 to A29 | 94.5 | Lateral hammer tap | Replace lateral connection | | | 1 | $800 | M |
| 115 | 4 | A9-3 to A9-2 | 7.4 | Roots at joint | Apply Root-X and line pipe | Root ball cut out by Michels 2-1-16 | 6 | | $750 | H |
| 116 | 1 | B8-3 to B8-2 to B8-1 | 35.5 | Heavy grease in pipe | Additional inspection required; install grease trap at restaurant | Michels chain cut grease 2-2-16 | | 1 | $1,200 | L |
| 117 | 1 | B8-4 to B-3 | 66.3 | Heavy grease in pipe | Additional inspection required; install grease trap at restaurant | Michels chain cut grease 2-2-16 | | 1 | $1,200 | L |
| 118 | 1 | B8-5 to B-4 | 92.2 | Cracks at joint | Line pipe | | 6 | | $750 | H |
| 119 | 1 | B8-5 to B-4 | 151.4 | Heavy grease in pipe | Additional inspection required; install grease trap at restaurant | Michels chain cut grease 2-2-16 | | | | L |
| 120 | 1 | B8-6 to B-5 | 16.4 | Lateral full of grease | Install grease trap. | | | 1 | $1,200 | L |
| 121 | 1 | B8-6 to B-5 | 16.4 | Heavy grease blocking half of pipe | Additional inspection required; install grease trap at restaurant | Michels chain cut grease 2-2-16 | | | | L |
| 122 | 1 | B8-6 to B-5 | 62.0 | Roots in lateral | Replace lateral connection | | | 1 | $800 | M |
| 123 | 1 | B7 to B6 | 134.7 | Sag in pipe | Replace pipe from 38 to 89 feet | | 51 | | $8,160 | L |
| 124 | 1 | B7 to B6 | 163.5 | Lateral protruding tap | Replace lateral connection | Tap is unpassable with camera; had to enter from MH B6 to finish inspection | | 1 | $1,200 | M |
| 125 | 1 | B7 to B6 | 202.6 | Grease in line | | Grease in line; could not get to the grease due to protruding tap at 163.5 feet | | | | L |
| 126 | 1 | B8 to B7 | 168.3 | Separated joint | Line pipe | | 6 | | $750 | H |
| 127 | 1 | B8 to B7 | 171.2 | Broken joint | Line pipe | | 6 | | $750 | H |
| 128 | 1 | B8 to B7 | 175.2 | Outside drop | Noted for reference | | | | | N/A |
| 129 | 2 | B1 to A4 | 9.8 | Leaking crack | Line pipe | Circumferential crack | 6 | | $750 | H |
| 130 | 2 | B1 to A4 | 113.0 | Outside drop | Noted for reference | | | | | N/A |
| 131 | 1 | B3 to B1 | 78.0 | Offset joint | Line pipe between 78.0 and 82.5 feet | | 6 | | $750 | H |
| 132 | 1 | B3 to B1 | 82.5 | Offset joint | Line pipe between 78.0 and 82.5 feet | | | | | H |
| 133 | 1 | B3 to B1 | 87.2 | Outside drop | Noted for reference | | | | | N/A |
| 134 | 1 | B3 to B3-1 | 59.6 | 6-inch lateral | Noted for reference | | | | | N/A |
| 135 | 1 | B3 to B3-1 | 65.6 | Small leak in lateral | Replace lateral connection | This may be a property owner issue | | 1 | $800 | H |
| 136 | 1 | B3 to B3-1 | 106.6 | Leaking around lateral | Replace lateral connection | | | 1 | $800 | H |
| 137 | 1 | B4 to B3 | 10.8 | Leaking around lateral | Replace lateral connection | | | 1 | $800 | H |
| 138 | 1 | B4 to B3 | 72.5 | Leaking around lateral | Replace lateral connection | | | 1 | $800 | H |
| 139 | 3 | A5-1 to A19 | 28.4 | Cracked joint | Line pipe | Circumferential crack | 6 | | $750 | H |
| 140 | 3 | A5-1 to A19 | 35.6 | Leaking joint | Line pipe | | 6 | | $750 | H |

* H = High
M = Medium
L = Low



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CITY OF
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WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM
TV INSPECTION SUMMARY

**FIGURE**
**3-5**
**CONT'D**

**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Collection System TV Inspection Summary**

| Reference Number | Wastewater Collection Map Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Damage Identified | Description of Work | Notes | Repair Length (feet) | Quantity | Estimated Cost (2018 Dollars) | Priority* |
|---|---|---|---|---|---|---|---|---|---|---|
| 141 | 3 | A5-1 to A19 | 42.8 | Leaking joint with roots | Line pipe | | 6 | | $750 | H |
| 142 | 2 | A2-1 to A2 | 52.4 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 143 | 2 | A2-3 to A2-1 | 7.0 | Leaking joint | Line pipe from 7 to 30 feet | | 25 | | $1,625 | H |
| 144 | 2 | A2-3 to A2-1 | 14.4 | Leaking joint | Line pipe from 7 to 30 feet | | | | | H |
| 145 | 2 | A2-3 to A2-1 | 15.6 | Leaking joint | Line pipe from 7 to 30 feet | | | | | H |
| 146 | 2 | A2-3 to A2-1 | 28.6 | Leaking joint with roots | Line pipe from 7 to 30 feet | | | | | H |
| 147 | 2 | A2-3 to A2-1 | 49.0 | Light roots in lateral | Replace lateral connection | | | 1 | $1,200 | L |
| 148 | 2 | A2-3 to A2-1 | 58.6 | Hammer tap lateral | Replace lateral connection | Protrudes 3 inches into main | | 1 | $800 | M |
| 149 | 3 | A25 to A24 | 17.6 | Multiple cracks in pipe | Additional inspection required | Cracks approximately 2 feet long | 6 | | $750 | H |
| 150 | 3 | A26 to A25 | 41.2 | Leaking around lateral | Replace lateral connection | | | 1 | $1,200 | H |
| 151 | 3 | A26 to A25 | 46.8 | Hammer tap lateral | Replace lateral connection | Tap protrudes 2 inches into main | | 1 | $1,200 | M |
| 152 | 3 | A4.1-1 to A4-4 | 42.6 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 153 | 3 | A4.1-1 to A4-4 | 172.6 | Hammer tap lateral | Replace lateral connection | Unclear how far tap protrudes into main | | 1 | $800 | M |
| 154 | 3 | A4.1-1 to A4-4 | 175.1 | Cracks at lateral | | Circumferential cracks | 6 | | $750 | H |
| 155 | 3 | A4.1-1 to A4-4 | 268.4 | Offset joint | | | 6 | | $750 | H |
| 156 | 3 | A4.1-1 to A4-4 | 271.3 | Multiple cracks with light roots | Line pipe | Multiple circumferential cracks | 6 | | $750 | H |
| 157 | 3 | A4-5 to A4-4 | 4.0 | Leaking crack at lateral | Replace lateral connection | | | 1 | $1,200 | H |
| 158 | 3 | A4-5 to A4-4 | 37.1 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 159 | 3 | A4-5 to A4-4 | 65.0 | Light roots in lateral | Replace lateral connection | | | 1 | $1,200 | L |
| 160 | 3 | A4-5 to A4-4 | 179.3 | Crack around lateral with roots | Replace lateral connection | | | 1 | $1,200 | H |
| 161 | 3 | A4-5 to A4-4 | 215.7 | Rebar, insulation, or other foreign material in joint | Replace 6 feet of pipe | Sticks inside of pipe approximately 12 inches. Begins on the invert of the joint and rises towards the crown. | 6 | | $960 | M |
| 162 | 3 | A4-5 to A4-4 | 302.5 | Mortar grout on bottom of pipe | Line pipe | This appears to be an attempt to repair the invert of the | 6 | | $750 | H |
| 163 | 3 | A4.1-2 to A4.1-1 | 22.0 | Leaking joint | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | 284 | | $18,460 | H |
| 164 | 3 | A4.1-2 to A4.1-1 | 61.2 | Leaking joint | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 165 | 3 | A4.1-2 to A4.1-1 | 107.8 | Leaking joint | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 166 | 3 | A4.1-2 to A4.1-1 | 136.6 | Leaking joint | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 167 | 3 | A4.1-2 to A4.1-1 | 140.4 | Leaking joint | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 168 | 3 | A4.1-2 to A4.1-1 | 147.7 | Leaking joint | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 169 | 3 | A4.1-2 to A4.1-1 | 162.0 | Leaking joint | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 170 | 3 | A4.1-2 to A4.1-1 | 165.3 | Leaking joint | Line joint from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 171 | 3 | A4.1-2 to A4.1-1 | 169.0 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 172 | 3 | A4.1-2 to A4.1-1 | 194.4 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 173 | 3 | A4.1-2 to A4.1-1 | 201.4 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 174 | 3 | A4.1-2 to A4.1-1 | 204.9 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 175 | 3 | A4.1-2 to A4.1-1 | 241.1 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |

* H = High
M = Medium
L = Low



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CITY OF
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WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM
TV INSPECTION SUMMARY

**FIGURE**
**3-5**
**CONT'D**

**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Collection System TV Inspection Summary**

| Reference Number | Wastewater Collection Map Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Damage Identified | Description of Work | Notes | Repair Length (feet) | Quantity | Estimated Cost (2018 Dollars) | Priority* |
|---|---|---|---|---|---|---|---|---|---|---|
| 176 | 3 | A4.1-2 to A4.1-1 | 259.1 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 177 | 3 | A4.1-2 to A4.1-1 | 262.2 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 178 | 3 | A4.1-2 to A4.1-1 | 266.2 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 179 | 3 | A4.1-2 to A4.1-1 | 269.3 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 180 | 3 | A4.1-2 to A4.1-1 | 273.3 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 181 | 3 | A4.1-2 to A4.1-1 | 276.4 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 182 | 3 | A4.1-2 to A4.1-1 | 280.4 | Leaking joint | Line pipe from 0 to 284 feet | 20 leaking joints in 283.4 feet; one leak every 14 feet | | | | H |
| 183 | 3 | A6-1 to A23.1 | 78.2 | Cracked joint | Line pipe | | 6 | | $750 | H |
| 184 | 3 | A6-2 to A6-1 | 11.3 | Leaking separated joint | Line pipe | | 6 | | $750 | H |
| 185 | 3 | A6-2 to A6-1 | 49.0 | Leaking cracked joint with roots | Apply Root-X and line pipe | | 6 | | $750 | H |
| 186 | 3 | A6-2 to A6-1 | 83.2 | Leaking joint | Line pipe from 81.2 to 88.8 feet | | 7.6 | | $855 | H |
| 187 | 3 | A6-2 to A6-1 | 86.8 | Leaking joint | Line pipe from 81.2 to 88.8 feet | | | | | H |
| 188 | 3 | A18B to A18A | 15.0 | Separated joint | Line pipe | | 6 | | $750 | H |
| 189 | 3 | A18B to A18A | 36.9 | Separated joint | Line pipe | | 6 | | $750 | H |
| 190 | 3 | A18B to A18A | 73.6 | Separated joint | Line pipe | | 6 | | $750 | H |
| 191 | 3 | A18B to A18A | 153.8 | Lateral full of gravel | Replace lateral connection | | | 1 | $1,200 | L |
| 192 | 3 | A4-4 to A4-3 | 29.1 | Leaking cracked joint | Line pipe | Circumferential crack | 6 | | $750 | H |
| 193 | 3 | A7.1-2 to A7-1 | 201.7 | Badly cracked and broken pipe | Line pipe from 195 to 210 feet | Collapse imminent | 15 | | $975 | H |
| 194 | 3 | A7.1-2 to A7-1 | 202.7 | Multiple major cracks around lateral | Line pipe from 195 to 210 feet | Circumferential cracks | | | | H |
| 195 | 3 | A7.1-2 to A7-1 | 215.7 | Light roots in lateral | Line pipe | Light roots at joint | 6 | | $750 | H |
| 196 | 3 | A7.1-2 to A7-1 | 412.9 | Cracked pipe | Line pipe | Crack approximately 2 feet long | 6 | | $750 | H |
| 197 | 3 | A7.1-2 to A7-1 | 414.0 | Cracked at lateral with roots | Repair lateral connection | | | 1 | $800 | H |
| 198 | 3? | A7-1 to A7.1-1 | 74.7 | Roots in lateral | Replace lateral connection | Break in hammer tap (the reference to downstream MH A26 is actually MH A7.1-1) | | 1 | $800 | H |
| 199 | 3? | A7-1 to A7.1-1 | 185.3 | Leaking at lateral | Replace lateral connection | | | 1 | $800 | H |
| 200 | 3? | A7-1 to A7.1-1 | 434.3 | Offset joint | Replace pipe from 430 to 440 feet | | 10 | | $1,010 | H |
| 201 | 3? | A7-1 to A7.1-1 | 436.0 | Hole in pipe | Replace pipe from 430 to 440 feet | A piece of pipe is detached | | | | H |
| 202 | 3 | A7-1 to A7.1-1 | 436.9 | Multiple cracks | Replace pipe from 430 to 440 feet | Circumferential cracks | | | | H |
| 203 | 3 | A7-1 to A7.1-1 | 439.0 | Broken pipe | Replace pipe from 430 to 440 feet | Camera cannot pass the break | | | | H |
| 204 | 3 | A7-2 to A7-1 | 73.6 | Leaking around lateral | Replace lateral connection | | | 1 | $800 | H |
| 205 | 3 | A7-2 to A7-1 | 105.9 | Leaking around lateral | Replace lateral connection | | | 1 | $800 | H |
| 206 | 3 | A7-2 to A7-1 | 140.5 | Crack on bottom of pipe | Line pipe | Crack is approximately 2 feet long | 6 | | $750 | H |
| 207 | 3 | A4-1 to A18 | 17.0 | Separated joint | Line pipe | | 6 | | $750 | H |
| 208 | 3 | A4-1 to A18 | 115.2 | Root blockage | Replace lateral connection and replace 3 feet of pipe | Roots cover 40 percent of pipe | 3 | | $950 | H |
| 209 | 3 | A4-1 to A18 | 115.5 | Broken pipe | Replace 3 feet of pipe and lateral connection | Hole on top of pipe; hole has been covered | | 1 | $950 | H |
| 210 | 3 | A4-1 to A18 | 117.4 | Multiple cracks | Line pipe | Circumferential cracks are between the joint and hole at 115.5 | 6 | | $750 | H |

* H = High
M = Medium
L = Low



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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM
TV INSPECTION SUMMARY

**FIGURE**
**3-5**
**CONT'D**

**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Collection System TV Inspection Summary**

| Reference Number | Wastewater Collection Map Reference Sheet | Reach or Manhole No. | Distance from Manhole (feet) | Damage Identified | Description of Work | Notes | Repair Length (feet) | Quantity | Estimated Cost (2018 Dollars) | Priority* |
|---|---|---|---|---|---|---|---|---|---|---|
| 211 | 3 | A4-3 to A4-2 | 69.9 | Leaking lateral | Replace lateral connection | | | 1 | $800 | H |
| 212 | 3 | A4-3 to A4-2 | 223.4 | Steady clear water coming out of lateral | Additional inspection required. Replace lateral and line. | | | 1 | $1,200 | M |
| 213 | 3 | A4-3 to A4-2 | 332.4 | Debris in lateral | Additional inspection required. Replace lateral connection. | | | 1 | $800 | L |
| 214 | 3 | A4-3 to A4-2 | 394.0 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 215 | 3 | A4-3 to A4-2 | 397.9 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 216 | 3 | A4-3 to A4-2 | 408.3 | Cracked joint | Line pipe | | 6 | | $750 | H |
| 217 | 3 | A4-3 to A4-2 | 411.9 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 218 | 3? | A7.1-1 to A7.1-2 | 15.4 | Leaking joint | Line pipe | | 6 | | $750 | H |
| 219 | 2 | A2 to A14 | | No damage identified | | | | | | N/A |
| 220 | 3 | A27 to A26 | | No damage identified | | | | | | N/A |
| 221 | 4 | A28 to A27 | | No damage identified | | 121.6 total feet; unsure where this reach is | | | | N/A |
| 222 | 4? | A23 to A23.1 | | No damage identified | | | | | | N/A |
| 223 | 4 | A24 to A23 | | No damage identified | | | | | | N/A |
| 224 | 3 | A4-6 to A4-5 | | No damage identified | | | | | | N/A |
| 225 | 3 | A4-2 to A4-1 | | No damage identified | | | | | | N/A |
| 226 | 4 | A8-1 to A27 | | No damage identified | | | | | | N/A |
| 227 | 1 | B7 to B7A | | No damage identified | | | | | | N/A |
| 228 | 1 | B7-1 to B7 | | No damage identified | | | | | | N/A |
| 229 | 1 | B7-3 to B7-2 | | No damage identified | | | | | | N/A |
| 230 | 1 | B7-6 to B7-5 | | No damage identified | | | | | | N/A |
| 231 | 2 | B3.2-1 to B3-7 | | No damage identified | | | | | | N/A |
| 232 | 1 | B3-6 to B3-5 | | No damage identified | | | | | | N/A |
| 233 | 2 | B3-7 to B3-6 | | No damage identified | | | | | | N/A |
| 234 | 1 | B3-5 to B3-4 | | No damage identified | | | | | | N/A |
| 235 | 2 | A1-6 to A1-5 | | No damage identified | | | | | | N/A |
| 236 | 2 | A3-10 to A3-9 | | No damage identified | | | | | | N/A |
| 237 | 2 | A3-11CO to A3-10 | | No damage identified | | | | | | N/A |
| 238 | 2 | A1-4 to A1-3 | | No damage identified | | | | | | N/A |
| 239 | 2 | A3-7 to A3-6 | | No damage identified | | | | | | N/A |
| 240 | 3 | A3-2 to A16 | | No damage identified | | | | | | N/A |
| 241 | 2 | A3-4 to A3-3 | | No damage identified | | | | | | N/A |
| 242 | 3? | A16 to A16 Added | | No damage identified | | | | | | N/A |
| 243 | 2 | A1-3 to A1-2 | | No damage identified | | | | | | N/A |
| 244 | 4 | A9-2 to A9-1 | | No damage identified | | | | | | N/A |
| 245 | 1 | B8-1 to B7 | | No damage identified | | Heavy cleaning performed on this section of pipe | | | | N/A |
| 246 | 1 | B6 to B5 | | No damage identified | | | | | | N/A |
| 247 | 2 | B1-3 to B1-2 | | No damage identified | | | | | | N/A |
| 248 | 2 | B1-4 to B1-3 | | No damage identified | | | | | | N/A |
| 249 | 1 | B6-2 to B6-1 | | No damage identified | | | | | | N/A |
| 250 | 2 | B1-1 to B13 | | No damage identified | | | | | | N/A |
| 251 | 2 | B1-2 to B1-1 | | No damage identified | | | | | | N/A |
| 252 | 2 | B3-1 to B3 | | No damage identified | | | | | | N/A |
| 253 | 1 | B4-1 to B4 | | No damage identified | | | | | | N/A |

* H = High
M = Medium
L = Low



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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM
TV INSPECTION SUMMARY

**FIGURE**
**3-5**
**CONT'D**

**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Manhole Inspection Summary**

| Reference Number | City Collection Map Reference Sheet | Manhole | Condition* of Base | Condition of Riser | Condition of Corbel[1] | Description of Work | Estimated Cost (2018 Dollars) | Notes | Priority |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | A1 | G | G | G | | | | N/A |
| 2 | 2 | A1.1-1 | G | G | G | | | 6' 0" depth. | N/A |
| 3 | 2 | A10 | G | F | G | Seal manhole cover. | $200 | 9' 8" depth. | H |
| 4 | 2 | A11 | G | F | G | Seal manhole cover. | $200 | 7' 7" depth. | H |
| 5 | 2 | A12 | G | G | G | | | 8' 9" depth. | N/A |
| 6 | 2 | A1-2 | P | G | G | Clean, repair, and grout manhole. | $3,500 | Joints leaking. 7' 4" depth. | H |
| 7 | 2 | A13 | G | G | G | Clean, repair, and grout manhole. | $3,650 | 7' 5" depth. Leak in manhole. Spalling around ring with a hole below steel ring. | H |
| 8 | 2 | A1-3 | G | G | G | | | 5' 7" depth. | N/A |
| 9 | 2 + 3 | A14 | G | F | G | Clean, repair, and grout manhole. | $4,500 | 9' 1" depth. Crack on Corbel of manhole. | M |
| 10 | 2 | A1-4 | G | G | G | | | 5' 11" depth. | N/A |
| 11 | 3 | A15 | G | G | G | | | 6' 0" depth. | N/A |
| 12 | 2 | A1-5 | G | G | G | | | 6' 3" depth. | N/A |
| 13 | 3 | A16 | G | F | G | Seal manhole cover. | $200 | 5' 2" depth. Manhole cover leaks. | H |
| 14 | 2 | A1-6 | G | G | F | Repair ring and cover, seal manhole. | $1,400 | 4' 7" depth. Ring off center at top of manhole. | H |
| 15 | 3 | A17 | G | G | G | | | 8' 3" depth. | N/A |
| 16 | 2 | A1-7 | G | G | G | | | 7' 0" depth. | N/A |
| 17 | 3 | A18 | G | F | G | Seal manhole cover. | $200 | 5' 10" depth. Manhole cover leaks. | H |
| 18 | 2 | A1-8 | G | G | G | | | 7' 0" depth. | N/A |
| 19 | 3 | A18-A | G | F | G | Seal manhole cover by raising manhole lid 2" and paving. | $6,050 | 5' 0" depth. Leaking from manhole lid. The ring and lid are below asphalt finished elevation. Spalling around the PVC lateral with exposed reinforcement. | H |
| 20 | 3 | A18-B | P | F | G | Replace manhole if damage cannot be sealed. | $12,800 | 5' 4" depth. The manhole joints appear to be offset with vertical cracks in the wall. | H |
| 21 | 3 | A19 | G | G | G | | | 10' 6" depth. | N/A |
| 22 | 1 + 2 | A2 | G | G | G | | | 15' 0" depth. | N/A |
| 23 | 3 | A20 | G | F | G | Seal manhole cover. | $200 | 13' 0" depth. | H |
| 24 | 3 | A21 | G | G | G | | | 6' 10" depth. | N/A |
| 25 | 2 + 3 | A2-1 | G | F | G | Seal manhole. | $200 | 5' 5" depth. Small leak in bottom third of manhole. | H |
| 26 | 3 | A22 | F | F | F | Clean, repair, and grout manhole and seal manhole cover. | $5,700 | 15' 4" depth. Two locations in the top 2' of the manhole have visible spalling of concrete. 3" radius, 1/4" deep. | H |
| 27 | 2 | A2-2 | G | G | G | Reset manhole ring. | $800 | 5' 0" depth. Manhole ring is offset 3". | M |
| 28 | 3 | A23 | G | F | G | Seal manhole cover. | $200 | 16' 0" depth. | H |
| 29 | 3 | A23.2 | G | G | G | | | 8' 10" depth. | N/A |
| 30 | 2 | A2-3 | G | G | F | Seal manhole cover. | $200 | 5' 3" depth. Three leaks at manhole ring. | H |
| 31 | 3 | A24 | | | | | | Manhole was not inspected due to being covered with asphalt. | N/A |

* G = Good
F = Fair
P = Poor

[1] Corbel = top eccentric cone section



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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

MANHOLE INSPECTION SUMMARY

FIGURE
3-6

**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Manhole Inspection Summary**

| Reference Number | City Collection Map Reference Sheet | Manhole | Condition* of Base | Condition of Riser | Condition of Corbel[1] | Description of Work | Estimated Cost (2018 Dollars) | Notes | Priority |
|---|---|---|---|---|---|---|---|---|---|
| 32 | 3 | A25 | G | G | G | | | 16' 4" depth. | N/A |
| 33 | 3 | A26 | G | F | G | Seal manhole cover. | $200 | 14' 3" depth. | H |
| 34 | 3 | A26-A | F | F | G | Seal manhole cover and clean manhole base. | $450 | 7' 4" depth. There is concrete/construction debris in the base of the manhole. | H |
| 35 | 3 + 4 | A27 | G | F | G | Seal manhole cover. | $200 | 14' 4" depth. | H |
| 36 | 4 | A28 | F | F | G | Clean, repair, and grout manhole. Seal manhole cover. | $5,700 | 14' 10" depth. Spalling concrete around the 8" lateral with exposed reinforcement bar. | H |
| 37 | 3 | A28-1 | G | G | G | | | 7' 2" depth. Flow through manhole appears to be slow. | N/A |
| 38 | 4 | A29 | G | F | F | Clean, repair, and grout manhole. Seal manhole cover. | $3,700 | 7' 0" depth. Roots growing around metal ring. Flow is very slow with 3" of standing water. | H |
| 39 | 2 | A3 | G | G | G | Seal manhole cover. | $200 | 11' 4" depth. | H |
| 40 | 2 | A3.1-1 | G | G | G | | | 6' 10" depth. | N/A |
| 41 | 2 | A3.1-2 | G | G | G | | | 5' 9" depth. | N/A |
| 42 | 2 | A3.2-1 | G | G | G | | | 6' 7" depth. City unable to locate. | N/A |
| 43 | 2 | A3.3-1 | G | G | G | | | 6' 8" depth. City unable to locate. | N/A |
| 44 | 2 | A3.3-2 | G | G | G | | | | N/A |
| 45 | 2 | A3.3-3 | G | G | G | | | | N/A |
| 46 | 2 | A3-10 | G | G | G | | | 4' 7" depth. City unable to locate. | N/A |
| 47 | 2 + 3 | A3-2 | G | G | G | | | 5' 10" depth. | N/A |
| 48 | 2 + 3 | A3-3 | G | G | G | | | 6' 6" depth. | N/A |
| 49 | 2 | A3-4 | G | G | G | | | 5' 5" depth. | N/A |
| 50 | 2 | A3-5 | G | G | G | | | 5' 11" depth. | N/A |
| 51 | 2 | A3-6 | G | G | G | | | 5' 2" depth. | N/A |
| 52 | 2 | A3-7 | G | G | G | | | 7' 9" depth. | N/A |
| 53 | 2 | A3-8 | G | G | G | | | 6' 5" depth. City unable to locate. | N/A |
| 54 | 2 | A3-9 | G | G | G | | | 5' 0" depth. City unable to locate. | N/A |
| 55 | 2 | A4 | G | F | G | Seal manhole cover. | $200 | 20' 8" depth. | H |
| 56 | 3 | A4.1-1 | G | F | G | Seal manhole cover. | $200 | 6' 8" depth. | H |
| 57 | 3 | A4.1-2 | G | F | G | Clean, repair, and grout manhole and seal manhole cover. | $3,700 | 7' 6" depth. Ring is offset 3" and shows signs of leaking. | H |
| 58 | 3 | A4-1 | | | | | | Unable to locate. | N/A |
| 59 | 3 | A4-2 | G | F | G | Seal manhole cover. | $200 | 9' 1" depth. Manhole cover leaks. | H |
| 60 | 3 | A4-3 | G | F | G | Seal manhole cover. | $200 | 10' 4" depth. Manhole cover leaks. | H |
| 61 | 3 | A4-4 | G | F | G | Seal manhole cover. | $200 | 12' 8" depth. Leaking around bottom ring connection. | H |
| 62 | 3 | A4-5 | F | F | G | Clean, repair, and grout manhole and seal | $4,700 | 12' 0" depth. Spalling concrete at 8" elevation connection. | H |

* G = Good
F = Fair
P = Poor

[1] Corbel = top eccentric cone section



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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

MANHOLE INSPECTION SUMMARY

**FIGURE**
**3-6**
**CONT'D**

**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Manhole Inspection Summary**

| Reference Number | City Collection Map Reference Sheet | Manhole | Condition* of Base | Condition of Riser | Condition of Corbel[1] | Description of Work | Estimated Cost (2018 Dollars) | Notes | Priority |
|---|---|---|---|---|---|---|---|---|---|
| 63 | 3 | A4-6 | G | F | G | Seal manhole cover. | $200 | 4' 2" depth. | H |
| 64 | 2 | A5 | | | | | | Unable to locate. | N/A |
| 65 | 3 | A5-1 | G | F | G | Seal manhole cover. | $200 | 7' 10" depth. 1-1/2" standing water in base of manhole. | H |
| 66 | 3 | A5-2 | | | | | | Unable to locate. | N/A |
| 67 | 3 | A5-3 | | | | | | Unable to locate in the blackberry bushes behind the fire hall. | N/A |
| 68 | 3 | A6-1 | | | | | | Unable to locate. | N/A |
| 69 | 3 | A6-2 | G | F | G | Seal manhole cover. | $200 | 7'2" depth. Did not collect depth. Manhole cover leaks. | H |
| 70 | 3 | A7.1-1 | G | F | G | Seal manhole cover. | $200 | 5' 4" depth. Manhole cover leaks. | H |
| 71 | 3 | A7-1 | G | F | G | Seal manhole cover. | $200 | 6' 3" depth. Manhole cover leaks. | H |
| 72 | 3 | A7-2 | G | F | G | Seal manhole cover. | $200 | 7' 1" depth. Manhole cover leaks. | H |
| 73 | 3 + 4 | A8-1 | G | F | G | Seal manhole cover. | $200 | 3' 10" depth. Manhole cover leaks. | H |
| 74 | 2 | A9 | F | F | G | Seal manhole cover and clean the manhole | $500 | 14' 8" depth. Obstruction in channel. | H |
| 75 | 4 | A9-1 | G | F | G | Seal manhole cover. | $200 | 5' 10" depth. Manhole cover leaks. | H |
| 76 | 4 | A9-2 | G | F | G | Seal manhole cover. | $200 | 9' 4" depth. Manhole cover leaks. | H |
| 77 | 4 | A9-3 | G | G | G | | | 8' 10" depth. Large pool of standing water in manhole. | N/A |
| 78 | 2 | B1 | G | G | G | | | 10' 9" depth. | N/A |
| 79 | 2 | B1-1 | G | G | G | | | 9' 0" depth. | N/A |
| 80 | 2 | B3.11-1 | G | G | G | | | 9' 5" depth. | N/A |
| 81 | 2 | B3.11-2 | G | F | F | Clean, repair, and grout manhole. | $3,500 | 8' 4" depth. Spalling on north and south sides of manhole. | H |
| 82 | 2 | B1-2 | G | G | G | | | 4' 2" depth. | N/A |
| 83 | 2 | B1-3 | G | G | G | | | 4' 6" depth. | N/A |
| 84 | 2 | B1-4 | G | F | G | Seal manhole cover. | $200 | 5' 0" depth. Manhole cover leaks. | H |
| 85 | 2 | B1-5 | G | F | F | Seal manhole cover and ring. | $700 | 6' 0" depth. Manhole cover leaks and lid comes off ring. | H |
| 86 | 1 + 2 | B3 | G | G | G | | | 5' 6" depth. | N/A |
| 87 | 1 | B3.1-1 | G | P | G | Clean, repair, and grout manhole. | $4,500 | 12' 0" depth. Missing mortar between riser rings. First and second joints need repair. | M |
| 88 | 1 | B3.1-2 | G | G | G | Grout to seal manhole ring. | $500 | 4' 6" depth. Missing mortar between metal ring and concrete at time of casting. | M |
| 89 | 2 | B3.3-1 | G | F | G | Clean, repair, and grout manhole. Seal manhole cover. | $3,700 | 5' 11" depth. Manhole cover leaks. Concrete spalling with signs of rust. | H |
| 90 | 1 | B3-1 | G | G | G | | | 5' 3" depth. | N/A |
| 91 | 2 | B3-10 | G | F | G | Seal manhole cover. | $200 | 13' 2" depth. Manhole cover leaks. | H |
| 92 | 2 | B3-11 | F | F | F | Clean, repair, and grout manhole. | $4,500 | 10' 10" depth. Roots growing through seams and roots growing on northeast side of manhole near bottom. | H |
| 93 | 2 | B3-12 | G | G | G | Clean, repair, and grout manhole. Seal | $2,500 | 4' 9" depth. AP unable to locate. Small crack on riser. | H |

* G = Good
F = Fair
P = Poor

[1] Corbel = top eccentric cone section



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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

MANHOLE INSPECTION SUMMARY

**FIGURE**
**3-6**
**CONT'D**

**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Manhole Inspection Summary**

| Reference Number | City Collection Map Reference Sheet | Manhole | Condition* of Base | Condition of Riser | Condition of Corbel[1] | Description of Work | Estimated Cost (2018 Dollars) | Notes | Priority |
|---|---|---|---|---|---|---|---|---|---|
| 94 | 2 | B3-13 | G | F | G | Seal manhole cover. | $200 | 4' 4" depth. Manhole cover leaks. | H |
| 95 | 2 | B3-14 | G | F | G | Seal manhole cover. | $200 | 3' 10" depth. Manhole cover leaks. | H |
| 96 | 1 | B3-3 | G | G | G | | | 12' 6" depth. | N/A |
| 97 | 1 | B3-4 | G | P | G | Reset manhole ring, seal manhole. | $1,050 | 7' 0" depth. Manhole metal ring offset. Water runs off the hill and into the manhole when it is raining. No asphalt around lid and ring. | H |
| 98 | 1 | B3-5 | G | G | G | | | 6' 0" depth. | N/A |
| 99 | 2 | B3-6 | G | G | G | | | 7' 0" depth. | N/A |
| 100 | 2 | B3-7 | G | F | G | Reset and seal manhole cover. | $1,100 | 8' 2" depth. Manhole cover leaks. Metal ring is off center by 4" east. | H |
| 101 | 2 | B3-7-1 | G | F | G | Seal manhole cover. | $200 | 6' 5" depth. | H |
| 102 | 2 | B3-8 | G | F | G | Seal manhole cover. | $200 | 6' 2" depth. Manhole cover leaks. | H |
| 103 | 2 | B3-9 | F | F | F | Clean, repair, and grout manhole. Seal manhole cover. | $4,700 | 9' 11" depth. Manhole and manhole cover leak with roots growing between first and second rings. | H |
| 104 | 1 | B4 | P | P | P | Replace manhole if repairs cannot be made. | $12,800 | 6' 6" depth. Crack in manhole, offset on bottom joint. | H |
| 105 | 1 | B4-1 | G | G | G | | | 6' 0" depth. | N/A |
| 106 | 1 | B5 | F | F | G | Clean, repair, and grout manhole. Seal manhole cover. | $3,700 | 8' 4" depth. Bench deterioration due to drop from east. Crack in metal manhole ring. | H |
| 107 | 1 | B5 1-1 | G | G | G | | | 10' 0" depth. Minimal flow. | N/A |
| 108 | 1 | B5 1-2 | G | G | G | | | 9' 6" depth. No flow. | N/A |
| 109 | 1 | B5-1 | G | P | G | Reset risers and seal manhole. Evaluate drop inside manhole. | $1,350 | It appears the manhole has been raised several times. The risers are offset and likely leak. | H |
| 110 | 1 | B5-2 | G | G | G | Repair pipe connection. | $1,200 | 8' 0" depth. Leak at outgoing PVC pipe collar. | H |
| 111 | 1 | B5-3 | F | G | G | Seal pipe connection. | $1,200 | 12' 6" depth. Leaks at 4" pipe connection about 5 gpm. | H |
| 112 | 1 | B6 | G | G | G | | | 9' 0"depth. | N/A |
| 113 | 1 | B6-2 | | | | | | City unable to locate. | N/A |
| 114 | 1 | B-7A | G | G | G | | | 7' 6" depth. | N/A |
| 115 | 1 | B-7 | G | G | G | | | 12' 0"depth. | N/A |
| 116 | 1 | B7-1 | G | G | G | | | 10' 6" depth. | N/A |
| 117 | 1 | B7-2 | G | G | G | | | 9' 0"depth. | N/A |
| 118 | 1 | B7.1-1 | G | G | G | | | | N/A |
| 119 | 1 | B7-3 | G | F | G | Clean, repair, and grout manhole. | $3,500 | 7' 6" depth. First and second joints need repair. | H |
| 120 | 1 | B7-4 | P | G | G | Clean, repair, and grout manhole. | $3,500 | 7' 0"depth. Leak in base of manhole. | H |
| 121 | 1 | B7-6 | P | F | G | Clean, repair, and grout manhole. Seal | $3,700 | 5' 5" depth. The bottom joint is leaking. | H |
| 122 | 1 | B7-7 | F | F | F | Clean, repair, and grout manhole. Seal | $3,700 | 6' 4" depth. Sides are damp and manhole cover leaks. | H |
| 123 | 1 | B7-5 | G | F | G | Seal manhole cover. | $200 | 6' 0" depth. Manhole cover leaks. | H |
| 124 | 1 | B7A | G | G | G | | | | N/A |

* G = Good
F = Fair
P = Poor

[1] Corbel = top eccentric cone section



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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

MANHOLE INSPECTION SUMMARY

**FIGURE**
**3-6**
**CONT'D**

**City of Cascade Locks, Oregon**
**Wastewater Facilities Plan**
**Wastewater Collection System Evaluation**
**Manhole Inspection Summary**

| Reference Number | City Collection Map Reference Sheet | Manhole | Condition* of Base | Condition of Riser | Condition of Corbel[1] | Description of Work | Estimated Cost (2018 Dollars) | Notes | Priority |
|---|---|---|---|---|---|---|---|---|---|
| 125 | 1 | B8 | G | F | G | Seal riser and re-channel manhole. | $2,300 | 5' 0" depth. Base has been chipped out and needs rechanneling. Riser needs to be sealed. | H |
| 126 | 1 | B8-1 | G | G | G | | | 11' 6" depth. Manhole appears to have been raised some time ago. | N/A |
| 127 | 1 | B8-2 | | | | | | Unable to locate. | N/A |
| 128 | 1 | B8-3 | | | | | | Unable to inspect due to overgrown blackberry bushes. | N/A |
| 129 | 1 | B8-4 | | | | | | Unable to locate. | N/A |
| 130 | 1 | B8-5 | G | G | G | | | 4' 0" depth. Metal ring is off center 4". | N/A |
| 131 | 1 | B8-6 | G | G | G | | | 4' 0" depth. Grout spalling off the inside of the manhole. | N/A |
| 132 | 1 | B9 | G | F | G | Clean, repair, and grout manhole. | $2,500 | 5' 0" depth. First joint needs repaired, bad spot of cement. | H |
| 133 | 2 | C1 | G | F | G | Seal manhole cover. | $200 | Manhole cover leaks. | H |
| 134 | 1 | C2 | G | G | G | | | | N/A |
| 135 | 1 | C3 | G | G | G | | | | N/A |
| 136 | 4 | D1 | F | F | F | Clean, repair, and grout manhole. | $3,500 | 8' 9" depth. Liner falling off inside of manhole. | H |
| 137 | 4 | D10 | F | F | F | Clean, repair, and grout manhole. Seal manhole cover. | $2,700 | 4' 8" depth. Liner falling off inside of manhole. Leaking around top metal ring. | H |
| 138 | 4 | D11 | G | F | G | Seal manhole cover. | $200 | 12' 8" depth. Manhole cover leaks. | H |
| 139 | 4 | D12 | G | F | G | Seal manhole cover. | $200 | Manhole cover leaks. | H |
| 140 | 4 | D13 | G | G | G | | | 16' 8" depth. | N/A |
| 141 | 4 | D2 | F | F | F | Clean, repair, and grout manhole. Seal manhole cover. | $4,700 | 10' 8" depth. Liner falling off inside of manhole. Manhole cover leaks. | H |
| 142 | 4 | D4 | G | F | G | Reset metal ring; clean, repair, grout; and seal manhole cover. | $4,200 | 7' 4" depth. Metal ring is very rusty. Manhole is wet and top ring is offset by 1-1/2". | H |
| 143 | 4 | D4-1 | G | F | G | Seal manhole cover. | $200 | 10' 4" depth. Manhole cover leaks. | H |
| 144 | 4 | D5 | G | F | G | Raise manhole, seal manhole cover. | $5,400 | Manhole is covered by 1/4" of water running into manhole. Needs to be raised 1". | H |
| 145 | 4 | D6 | G | F | G | Seal manhole cover. | $200 | 13' 0" depth. | H |
| 146 | 4 | D7 | G | F | G | Seal manhole cover. | $200 | 12' 9" depth. Manhole cover leaks. | H |
| 147 | 4 | D8 | G | F | G | Seal manhole cover. | $200 | 17' 0" depth. Manhole cover leaks. | H |
| 148 | 4 | D9 | G | F | G | Seal manhole cover. | $200 | 12' 5" depth. Manhole cover leaks. | H |
| 149 | ** | E1 | G | F | G | Seal manhole cover. | $200 | 12' 8" depth. Manhole cover leaks. | H |
| 150 | ** | E2 | G | F | G | Seal manhole cover and seal holes in manhole cover. | $300 | 4' 8" depth. Manhole cover leaks. It appears the cover is for a storm drain manhole (16 holes). | H |
| 151 | ** | E3 | G | F | G | Seal manhole cover. | $200 | 11' 3" depth. Manhole cover leaks. | H |
| 152 | 1 | C4 | G | G | G | | | | |
| 153 | 1 | C5 | G | G | G | | | | |
| 154 | 1 | C5-1 | G | G | G | | | | |
| 155 | 1 | C5-2 | G | G | G | | | | |
| 156 | 1 | C6 | G | G | G | | | | |

* G = Good
F = Fair
P = Poor

[1] Corbel = top eccentric cone section
** See Figure 3-1B.



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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

MANHOLE INSPECTION SUMMARY

**FIGURE**
**3-6**
**CONT'D**

**CITY OF CASCADE LOCKS, OREGON**
**HIGH PRIORITY COLLECTION SYSTEM IMPROVEMENTS**
**PRELIMINARY COST ESTIMATE**
**(YEAR 2018 COSTS)**
**JULY 2017**

| NO. | DESCRIPTION | UNIT | ESTIMATED QUANTITY | UNIT PRICE | TOTAL PRICE |
|---|---|---|---|---|---|
| 1 | Mobilization/Demobilization | LS | All Req'd | $ 30,000 | 30,000 |
| 2 | Temporary Protection and Direction of Traffic/Project Safety | LS | All Req'd | 10,000 | 10,000 |
| 3 | Clean, Repair, and Grout Manhole 0 foot to 5 feet | EA | 3 | 2,500 | 7,500 |
| 4 | Clean, Repair, and Grout Manhole 5 feet to 9 feet | EA | 13 | 3,500 | 45,500 |
| 5 | Clean, Repair, and Grout Manhole 9 feet to 14 feet | EA | 5 | 4,500 | 22,500 |
| 6 | Clean, Repair, and Grout Manhole 14 feet to 18 feet | EA | 2 | 5,500 | 11,000 |
| 7 | Precast Manhole | EA | 1 | 4,000 | 4,000 |
| 8 | Reset Riser | EA | 4 | 800 | 3,200 |
| 9 | Application of RootX | EA | 15 | 50 | 750 |
| 10 | Clean Base of Manhole | EA | 2 | 300 | 600 |
| 11 | Rechannel Base of Manhole | EA | 2 | 1,500 | 3,000 |
| 12 | Seal Manhole Cover | EA | 70 | 200 | 14,000 |
| 13 | Cured-in-Place Pipe (CIPP) Main Line/Repair Spot | EA | 100 | 750 | 75,000 |
| 14 | CIPP Lining of Main | LF | 1,000 | 65 | 65,000 |
| 15 | Existing Service Line Connection Replacement up to 8-foot Depth | EA | 15 | 800 | 12,000 |
| 16 | Existing Service Line Connection Replacement Greater than 8-foot Depth | EA | 6 | 1,200 | 7,200 |
| 17 | Sewer Main Replacement 8-inch with Lateral | EA | 2 | 950 | 1,900 |
| 18 | Remove Metal Post | EA | 1 | 250 | 250 |
| 19 | Seal Manhole Ring | EA | 5 | 500 | 2,500 |
| 20 | Repair Manhole Pipe Connection | EA | 2 | 1,200 | 2,400 |
| 21 | Seal Holes in Manhole Cover | EA | 1 | 100 | 100 |
| 22 | Seal Manhole Risers | EA | 1 | 800 | 800 |
| 23 | Additional Potholing | HR | 10 | 90 | 900 |
| 24 | Gravel Surface Restoration (Shoulders, Driveways, Alleys, and Parking Areas) | SY | 450 | 15 | 6,750 |
| 25 | Asphalt Surface Restoration | SY | 150 | 100 | 15,000 |
| 26 | Temporary Bypassing and Pumping of Wastewater | LS | All Req'd | 7,000 | 7,000 |
| 27 | Dewatering | LS | All Req'd | 2,500 | 2,500 |
| 28 | Repair of Unmarked Utilities | LS | All Req'd | 2,500 | 2,500 |
| | | | | **Subtotal Estimated Construction Cost** | **$ 353,850** |
| | | | | Contingency (10% of Estimated Construction Cost) | 36,000 |
| | | | | **TOTAL ESTIMATED CONSTRUCTION COST (2018 DOLLARS)** | **$ 389,850** |
| | | | | Preliminary Design and Construction Engineering (20% of Total Estimated Construction Cost) | 78,000 |
| | | | | **TOTAL ESTIMATED IMPROVEMENTS COST (2018 DOLLARS)** | **$ 467,850** |

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
HIGH PRIORITY COLLECTION SYSTEM IMPROVEMENTS
PRELIMINARY COST ESTIMATE

**FIGURE**
**3-7A**

**CITY OF CASCADE LOCKS, OREGON**
**MEDIUM PRIORITY COLLECTION SYSTEM IMPROVEMENTS**
**PRELIMINARY COST ESTIMATE**
**(YEAR 2018 COSTS)**
**JULY 2017**

| NO. | DESCRIPTION | UNIT | ESTIMATED QUANTITY | UNIT PRICE | TOTAL PRICE |
|---|---|---|---|---|---|
| 1 | Mobilization/Demobilization | LS | All Req'd | $ 4,000 | 4,000 |
| 2 | Temporary Protection and Direction of Traffic/Project Safety | LS | All Req'd | 5,000 | 5,000 |
| 3 | Sewer Main Replacement 8-inch | FT | 6 | 160 | 960 |
| 4 | Clean, Repair, and Grout Manhole | EA | 2 | 4,500 | 9,000 |
| 5 | Existing Service Line Connection Replacement up to 8-foot Depth | EA | 7 | 800 | 5,600 |
| 6 | Existing Service Line Connection Replacement Greater than 8-foot Depth | EA | 6 | 1,200 | 7,200 |
| 7 | Reset Riser | EA | 1 | 800 | 800 |
| 8 | Grout Manhole Ring to Manhole | EA | 1 | 500 | 500 |
| 9 | Additional Potholing | HR | 10 | 90 | 900 |
| 10 | Asphalt Surface Restoration | SY | 70 | 150 | 10,500 |
| 11 | Temporary Bypassing and Pumping of Wastewater | LS | All Req'd | 5,000 | 5,000 |
| 12 | Dewatering | LS | All Req'd | 1,000 | 1,000 |
| 13 | Repair of Unmarked Utilities | LS | All Req'd | 4,000 | 4,000 |
| | | | | **Subtotal Estimated Construction Cost** | **$ 54,000** |
| | | | | Contingency (10% of Estimated Construction Cost) | 5,000 |
| | | | | **TOTAL ESTIMATED CONSTRUCTION COST (2018 DOLLARS)** | **$ 59,000** |
| | | | | Preliminary Design and Construction Engineering (20% of Total Estimated Construction Cost) | 12,000 |
| | | | | **TOTAL ESTIMATED IMPROVEMENTS COST (2018 DOLLARS)** | **$ 71,000** |

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
MEDIUM PRIORITY COLLECTION SYSTEM IMPROVEMENTS
PRELIMINARY COST ESTIMATE

**FIGURE**
**3-7B**

**CITY OF CASCADE LOCKS, OREGON**
**LOW PRIORITY COLLECTION SYSTEM IMPROVEMENTS**
**PRELIMINARY COST ESTIMATE**
**(YEAR 2018 COSTS)**
**JULY 2017**

| NO. | DESCRIPTION | UNIT | ESTIMATED QUANTITY | UNIT PRICE | TOTAL PRICE |
|---|---|---|---|---|---|
| 1 | Mobilization/Demobilization | LS | All Req'd | $ 4,000 | 4,000 |
| 2 | Temporary Protection and Direction of Traffic/Project Safety | LS | All Req'd | 5,000 | 5,000 |
| 3 | Sewer Main Replacement 8-inch | FT | 170 | 160 | 27,200 |
| 4 | Existing Service Line Connection Replacement Up to 8-foot Depth | EA | 4 | 800 | 3,200 |
| 5 | Existing Service Line Connection Replacement Greater than 8-foot Depth | EA | 4 | 1,200 | 4,800 |
| 6 | Install Grease Trap | EA | 3 | 1,200 | 3,600 |
| 7 | Additional Potholing | HR | 10 | 100 | 1,000 |
| 8 | Asphalt Surface Restoration | SY | 50 | 100 | 5,000 |
| 9 | Temporary Bypassing and Pumping of Wastewater | LS | All Req'd | 2,500 | 2,500 |
| 10 | Dewatering | LS | All Req'd | 1,000 | 1,000 |
| 11 | Repair of Unmarked Utilities | LS | All Req'd | 4,000 | 4,000 |
| | | | | **Subtotal Estimated Construction Cost** | **$ 61,000** |
| | | | | Contingency (10% of Estimated Construction Cost) | 6,000 |
| | | | | **TOTAL ESTIMATED CONSTRUCTION COST (2018 DOLLARS)** | **$ 67,000** |
| | | | | Preliminary Design and Construction Engineering (20% of Total Estimated Construction Cost) | 13,000 |
| | | | | **TOTAL ESTIMATED IMPROVEMENTS COST (2018 DOLLARS)** | **$ 80,000** |

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
LOW PRIORITY COLLECTION SYSTEM IMPROVEMENTS
PRELIMINARY COST ESTIMATE

**FIGURE**
**3-7C**

# Chapter 4 - Existing Wastewater Treatment Facility Description and Evaluation

## Introduction

This chapter of the Wastewater Facilities Plan (WWFP) provides an overview of the existing wastewater treatment facility (WWTF). An evaluation of the existing WWTF was completed for purposes of determining its adequacy for meeting the City's current and anticipated future wastewater treatment needs for the 20-year planning period. Based on the WWTF evaluation, system deficiencies are identified.

## Existing Wastewater Treatment Facility

### *General Background and History*

A brief history of the City of Cascade Locks' wastewater system is summarized below. Some material is condensed from the City's 1998 *Operations and Maintenance Manual, Wastewater Treatment Facilities,* prepared by KCM, Inc., (see Appendix C).

The City of Cascade Locks' original wastewater treatment system was constructed and placed into service in 1968. To accommodate anticipated development and growth within the City, in 1998 the original WWTF located at Marina Park was demolished and replaced with a new extended aeration, activated sludge mechanical WWTF. The existing WWTF is located about 1,000 feet west of Herman Creek on the south bank of the Columbia River. The location of the existing WWTF is shown on Figure 1-1 in Chapter 1. A complete listing of the wastewater system design data from the *Operations and Maintenance Manual, Wastewater Treatment Facilities* by KCM, Inc., is included as Appendix C of this WWFP.

### *Wastewater Treatment Facility Summary*

The City of Cascade Locks' existing mechanical WWTF provides secondary treatment of the City's municipal wastewater. The WWTF generally consists of a preliminary treatment system (headworks), two sequencing batch reactor (SBR) activated sludge units, a flow equalization basin, two aerobic digestion units (waste activated sludge [WAS] aerated holding tanks), an ultraviolet (UV) light disinfection system, an effluent outfall to the Columbia River, a laboratory/control building, a pump and blower building, and other miscellaneous supporting appurtenances (electrical and control systems, piping, air blowers and pumps, etc.) to make a completely functioning system. Refer to Figure 4-1 for a site plan of the existing WWTF and Figure 4-2 for a process schematic of the wastewater treatment unit processes.

### *Preliminary Treatment (Headworks)*

The purpose of the headworks is to remove inorganic debris (rags, plastics, etc.) that is non-treatable in the downstream biological process and that causes operational and mechanical

problems with treatment and pumping equipment. The City of Cascade Locks' headworks consists of an open concrete channel housing a mechanical fine screen (0.25-inch screen openings) and a manually cleaned bar screen. The mechanical screen is equipped with a material dewatering screw and press, and a trash receptacle is provided to collect the screened and dewatered debris. According to the 1998 Record Drawings from KCM, Inc., the mechanical screen has a peak flow capacity of 2.4 million gallons per day (MGD).

Wastewater from the City's 18-inch interceptor line flows via gravity into the headworks of the WWTF. Flow passes through the screen and the material collected on the screen is washed, transported, and dewatered in the screw conveyor, then is compacted and dropped into the trash receptacle. When the trash receptacle is full, it is replaced with an available second trash receptacle. The full trash receptacle is taken to the landfill, where the screenings are disposed of. After passing through the headworks, the wastewater flows via gravity to the SBR biological treatment units.

### *Sequencing Batch Reactor*

The existing treatment process utilized at the City of Cascade Locks' WWTF is an SBR batch proportional two-basin fill and draw extended aeration activated sludge process. Each SBR tank has a maximum treatment volume of 350,000 gallons, for a total maximum treatment volume of 700,000 gallons. The main purpose of the City's treatment system process is to provide conventional treatment to remove biochemical oxygen demand (BOD) and total suspended solids (TSS). The facility also has the capability to biologically remove nitrogen and phosphorus, although it is not specifically required to do so by the National Pollutant Discharge Elimination System (NPDES) Permit. The activated sludge process is a biological unit process. Its operation depends on a population of organisms in the SBR tanks that converts the organic material and nutrients in the wastewater to new organism cells, and the subsequent settling and removal of the cells.

Activated sludge treatment is accomplished by providing the naturally occurring microorganisms in wastewater an enhanced environment so they grow and multiply far beyond their normal populations. These large populations of microorganisms, termed mixed liquor suspended solids (MLSS), are then able to rapidly metabolize and stabilize the organics in the wastewater.

The MLSS contains bacteria, protozoa, fungi, and other organisms. These microorganisms "feed" on soluble and suspended organic matter and nutrients in the wastewater. Organic material is used to provide energy for the organisms and create new cells. Nutrients are also required for new microorganism growth. Nitrogen and phosphorous are primarily required along with other chemical compounds and nutrients in smaller or trace quantities.

Oxygen is necessary to sustain the living organisms and to oxidize the wastes to obtain energy for cell growth. Air is bubbled through the mixture of microorganisms and wastewater to provide the necessary oxygen in the SBR tanks to support cell maintenance and growth. The overall process of enhanced growth of microorganisms under aerated conditions is known as activated sludge.

Mixed liquor organisms are "aerobic" organisms, requiring the presence of oxygen to sustain the living organisms and to oxidize the wastes and obtain energy for cell growth. Oxygen is introduced into the SBR tanks by the use of air blowers and jet-type aerator assemblies. The jet aerators function to agitate (mix) the water and introduce air bubbles, thereby keeping the MLSS in

suspension during treatment and entraining oxygen into the water contained in the tanks. Inadequate aeration and mixing in the tanks can cause inefficient treatment and poor effluent quality.

In the SBR process, tanks are designed to operate together, filling in alternating sequence. They are also capable of operating independently. When operating sequentially, preliminarily treated influent is fed first to one tank, and then to the other. Influent is not normally fed to both tanks at the same time. It is the sequencing of feed from one tank to the other that gives the process its name. Each batch of influent wastewater is treated, clarified, and discharged while the other tank fills. Each tank will undergo four complete cycles per day at design flow (0.60 MGD maximum monthly wet weather). The cycle frequency will be reduced if operating at flows less than the design value and must increase as the flow rate increases in order to get the liquid through the system.

In considering the operation sequence of just one tank, the SBR works as follows:

1. Idle. At the beginning of the process cycle, the reactor has finished its treatment and discharge of the previous batch of influent. At this stage, the liquid level in the tank is at its lowest (bottom water level). While the other tank finishes filling, this tank will wait before receiving influent (idle period).
2. Anoxic Fill. After the idle period, the tank will begin the fill period. As the tank fills, no aeration is provided for a period of time. This fill period with no aeration is referred to as the anoxic fill cycle. During this cycle, influent is distributed throughout the settled sludge via an influent distribution/sludge collection (IDSC) manifold. Flow is by gravity from the headworks, and the pumps and blowers are not operated.
3. Aerated Fill. As the tank continues to fill, MLSS is drawn through the IDSC manifold, mixed with the influent flow, and pumped, as motive liquid, to the jet aerators. A blower is operated during the aerated fill cycle to provide air to the process.
4. React. At the react phase, the tank is filled to its upper water level point and the influent flow is diverted to the other reactor. Aeration continues in the filled tank until biochemical reactions are complete; MLSS is drawn through the IDSC manifold and used as a motive liquid for the jet aerators.
5. Settle. Aeration is discontinued and the MLSS is allowed to settle under quiescent conditions.
6. Decant. Treated, settled, and clarified effluent is withdrawn from approximately 2 feet below the water surface by a decanter mechanism and discharged to the equalization basin, where it then flows to the UV light disinfection system.
7. Anoxic Mixing (Denitrification). During this phase, the blowers are turned off and the jet mixing (motive) pumps operate. This provides anoxic mixing and conditions that promote denitrification (biological transformation of nitrate to nitrogen gas). The anoxic mixing phase can be added at any point within the aerated cycle provided aeration has progressed to the level where nitrification (biological transformation of ammonia to nitrate) has occurred.

8. Sludge Wasting. To maintain the appropriate amount of MLSS in the system, excess activated sludge produced each day in the process must be wasted. This portion is called WAS. WAS is wasted automatically and is drawn off the bottom of the reactors through the IDSC manifold and transferred to the aerobic digesters for further stabilization. This sludge wasting cycle occurs at an operator-adjustable time and at the end of a settle cycle. Sludge wasting and processing is discussed in greater detail below.

### *Equalization Basin and Effluent Control Vault*

As described above, after the settle cycle, clarified effluent from the SBR basins is decanted through the decanting mechanisms and is discharged to the equalization basin. The equalization basin is 81.5 feet long x 20 feet wide and the maximum operating water level is 4 feet, or about 49,000 gallons of storage capacity. The purpose of the equalization basin is to provide short-term storage of the treated and clarified effluent decanted from the SBR, which allows a controlled rate of discharge of effluent to the UV light disinfection system that is less than the decant rate. The controlled rate of discharge from the equalization basin less than the decant rate prevents the need to upsize the UV light disinfection system to treat high decant rate flows. The flow rate from the equalization basin to the UV light disinfection system is regulated via a modulating control valve.

### *Ultraviolet Light Disinfection*

Decanted treated and clarified effluent from the SBR system is discharged in a controlled rate from the equalization basin to the UV light disinfection unit. The purpose of the UV light disinfection system is to subject the effluent to ultraviolet radiation, which inactivates pathogenic bacteria and other microorganisms to acceptable levels to protect human health and the environment prior to discharge to the Columbia River.

The UV light disinfection system consists of two banks of UV lamps housed in a 24-inch wide by 43-foot long open concrete channel, a water level control weir, and a control system. Each bank of lamps contains eight modules with eight lamps per module, for a total of 64 lamps per bank. The UV channel is covered with a roof structure supported by a steel open-sided beam substructure. The UV light disinfection system is open to the outside environment. The lamps are continually activated regardless of where the SBR system is in the treatment cycle. The water level within the UV channel is maintained at approximately 24 inches by the level control weir located at the discharge end of the channel, thereby keeping the lamps completely submerged at all times, which prevents them from overheating.

The UV light disinfection system has been designed to treat up to 1,400 gallons per minute (gpm) (2 MGD) of effluent. At the peak design flow of 2 MGD, the system was designed to provide an exposure time of approximately 10 seconds and a UV intensity of 4,550 microwatts per square centimeter at 55 percent UV light transmittance.

### *Sludge Pumping and Processing*

The WWTF has two aerobic digester (aerobic holding) tanks where initial solids treatment occurs. The partially treated liquid sludge from the aerobic holding tanks is removed and hauled to the City of Hood River's WWTF for further treatment and final stabilization through anaerobic digestion.

The purpose of the aerobic digestion process is to further treat and stabilize the solids created in the SBR treatment process. These solids include the WAS removed from the SBR tanks. The aerobic digesters are intended to stabilize the solids to help prevent odors, flies, and other nuisances from occurring, to aerobically reduce the quantity of volatile solids and pathogens, and to reduce the total volume that needs to be trucked to Hood River. Stabilization means the rate that oxygen is consumed by the sludge is reduced.

Each digester tank is 40 feet by 28.5 feet by 16 feet deep with a normal maximum operating depth of 13.5 feet and an operational capacity of 115,000 gallons. A sump in each basin contains a sludge pump. Each pump is piped such that sludge can be discharged through the sludge loading arm into a truck or pumped to the other tank. A 12-inch diameter sluice gate between the two tanks, located near the bottom, allows the basins to be used in series.

The piping located in the existing pump and blower building provides the means to control WAS discharged from the SBR basins to the aerobic holding tanks. The valving allows the WAS to be transferred to Digester No. 1, No. 2, or both.

Two blowers housed in the pump and blower building supply air to both tanks through coarse bubble diffusers located near the bottom of the basins. One blower operates as a duty unit and the other is on standby. Each blower is designed to supply 640 standard cubic feet per minute (scfm) of air to the tanks.

Two flowmeters are used to measure sludge wasting within the WWTF. One flowmeter is located in the pump and blower building, is installed on the WAS line going from the SBRs to the digesters, and meters the WAS flow into the digesters. The other is located near the sludge loading arm; it meters the liquid waste digested sludge pumped from the digesters through the sludge loading arm and into the hauling truck.

The City has no ability to perform waste digested sludge dewatering. Liquid sludge is directly withdrawn from the aerobic digesters, pumped into a liquid sludge hauling truck through the loading arm, and hauled to the City of Hood River's WWTF for further processing and disposal. Currently, based on the WWTF operating data, the City is hauling an average of approximately 23,000 gallons of liquid sludge to Hood River per month.

### *Plant Lift Station*

The purpose of the Plant Lift Station is to return miscellaneous plant waste streams to the plant headworks. These miscellaneous WWTF waste streams (laboratory building wastewater, floor drains, sludge loading area catch basin) flow to the Plant Lift Station wetwell through the WWTF drain system. Two submersible grinder pumps pump the sludge, washdown water, and laboratory building wastewater from the wetwell to the WWTF headworks. The lift station is equipped with a separate valve vault that houses check valves and isolation valves.

### *Plant Potable and Non-Potable Water System*

The WWTF has a water system to provide potable and non-potable water to meet process and municipal requirements for the WWTF. The potable and non-potable water is supplied by the City's municipal water system. The potable system is protected from cross-contamination from the non-

potable system by a backflow prevention device located in the laboratory building. The potable system supplies the laboratory building plumbing. The non-potable system consists of the headworks water supply, future irrigation system, and WWTF wash water.

## Wastewater Treatment Facility Evaluation

### *General*

This section presents the results of an evaluation of the existing WWTF that was completed as part of this WWFP. This evaluation was limited to specific unit processes at the WWTF.

The evaluation of the WWTF was undertaken to identify deficiencies and needed improvements to address the identified deficiencies, to assist with development of improvement alternatives and prioritization of the needed improvements, and to determine the adequacy of the existing WWTF to meet the future wastewater treatment needs of the City of Cascade Locks and keep the facility operating in consistent compliance with the conditions of the NPDES Permit. The evaluation used design criteria included in the 1998 Record Drawings from KCM, Inc., 1998 *Operations and Maintenance Manual, Wastewater Treatment Facilities* (see Appendix C) prepared as part of the 1998 Wastewater Facilities Improvements Project, and commonly accepted design criteria related to each unit. The design criteria shown on Figure 2-2 in Chapter 2 were also used extensively in the evaluation.

### *Preliminary Treatment (Headworks)*

As discussed previously, the City of Cascade Locks' preliminary treatment consists of mechanical screening and a manually cleaned bar screen. The screening unit appears to be functioning adequately and performing to meet its intended purpose. However, the headworks does not have a grit (sand, gravel, egg shells, bone chips, coffee grounds, etc.) removal process unit. The existing mechanical screening system is not designed specifically to remove grit. As such, due to the lack of grit removal facilities, grit passes through the headworks screening and to the downstream processes.

Grit removal units function to provide protection of downstream mechanical equipment, such as pumps, from abrasion and accompanying abnormal premature wear, and to reduce the formation of heavy grit deposits in pipelines, channels, and aeration and digester tanks. It is likely that significant amounts of grit have accumulated in SBR tanks; however, it would be necessary to take the SBR tanks out of service to visually inspect them to know how much grit has actually accumulated. It is uncommon not to incorporate some type of grit removal facility in an SBR-type wastewater treatment facility; this is considered a deficiency that should be addressed as a long-term improvement. The impacts of not removing grit from the SBR aeration/mixing system are discussed below.

Two general types of grit removal processes could be employed at the WWTF: vortex and aerated. Vortex-type consists of a cylindrical tank in which the flow enters tangentially, creating a vortex-flow pattern; centrifugal and gravitational forces cause the grit to separate. Aerated-type consists of narrow long tanks containing aeration that induces a spiral flow pattern and causes a reduction in the density of the water within the tanks, which aids in the separation of the grit through

gravitational and rotational forces. Recommended headworks improvements are further outlined in Chapter 5.

### *Sequencing Batch Reactor*

According to the *Operations and Maintenance Manual, Wastewater Treatment Facilities* (see Appendix C), the design data for the existing SBRs are as follows:

**TABLE 4-1**
**DESIGN CRITERIA FOR THE EXISTING SEQUENCING BATCH REACTOR[1]**

| Design Parameter | Unit | Design Value |
|---|---|---|
| Population | | 1,654 |
| Average Dry Weather Flow | MGD | 0.40 |
| Maximum Month Dry Weather Flow | MGD | 0.50 |
| Maximum Month Wet Weather Flow | MGD | 0.60 |
| Peak Hour Flow | MGD | 1.60 |
| Average Day Organic Loading | Pounds (lbs) $BOD_5$[2] per day | 665 |
| Peak Month Organic Loading | lbs $BOD_5$/day | 1,130 |
| Average Day TSS | lbs/day | 665 |
| Peak Month TSS | lbs/day | 1,130 |
| Peak Month Total Kjeldahl Nitrogen (TKN) | lbs/day | 90 |
| Number of SBR Basins | | 2 |
| SBR Basin Treatment Volume | Million Gallons (MG) | 0.35 each, 0.70 total |
| Hydraulic Retention Time | Hours | 28 at maximum month wet weather flow |
| Mean MLSS | Milligrams Per Liter (mg/L) | 3,000 |
| F:M[3] | 1 per day | 0.07 |
| Number of Aeration Blowers | | 2 |
| Motor Size of Aeration Blowers | Horsepower (Hp) | 40 |
| Capacity of Aeration Blowers | scfm | 605 at 7.9 psig[4] |
| Number of Motive Pumps | | 2 |
| Motor Size of Motive Pumps | Hp | 25 |
| Capacity of Motive Pumps | gpm | 2,929 at 22 feet total dynamic head (TDH) |
| Peak Month Sludge Yield | lbs/day | 1,000 |
| Minimum Decant Rate | gpm | 2,000 |
| Maximum Decant Rate | gpm | 3,100 |

[1]*Taken from City of Cascade Locks, Operations and Maintenance Manual, Wastewater Treatment Facilities, KCM, Inc., July 1998.*

[2]*$BOD_5$ = Five-day biochemical oxygen demand*

[3]*F:M = Food to microorganism ratio*

[4]*psig = pounds per square inch gauge*

Table 4-2 compares the SBR design values to the current (2016) WWTF operating data and future (2036) projected operating conditions. Refer to Chapter 2, Figure 2-2, for the current and future

design criteria established in this WWFP based on the historical Discharge Monitoring Reports (DMRs) prepared by WWTF operating staff.

**TABLE 4-2**
**COMPARISON OF SBR DESIGN VALUES TO CURRENT WASTEWATER TREATMENT FACILITY OPERATING DATA AND FUTURE PROJECTED OPERATING CONDITIONS[1]**

| Design Parameter | Unit | Design Value | Current Operating Conditions | Projected Future Operating Conditions |
|---|---|---|---|---|
| Population | | 1,654 | 1,231 | 1,471 |
| Average Dry Weather Flow | MGD | 0.400 | 0.100[2] | 0.114 |
| Maximum Month Dry Weather Flow | MGD | 0.500 | 0.0135[2] | 0.174 |
| Maximum Month Wet Weather Flow | MGD | 0.600 | 0.262[2] | 0.308 |
| Peak Hour Flow | MGD | 1.600 | 0.516 | 0.570 |
| Average Day Organic Loading | lbs $BOD_5$/day | 665 | 257[2] | 307 |
| Maximum Month Organic Loading | lbs $BOD_5$/day | 1,130 | 879 | 1,050 |
| Average Day TSS Loading | lbs/day | 665 | 364 | 392 |
| Maximum Month TSS Loading | lbs/day | 1,130 | 1,144 | 1,459 |
| Peak Month TKN Loading | lbs/day | 90 | 43 | 51 |
| Maximum Month Standard Dissolved Oxygen (DO) Requirements per Basin[3] | lb oxygen ($O_2$/day ) | 1,252 | 1,170 | 1,280 |
| Maximum Month Standard Air Requirements per Basin | scfm | 605 | 583 | 685 |
| Maximum Month Sludge Yield | lbs/day | 1,000 | 117[2] | 1,017 |

[1]*Taken from City of Cascade Locks, Operations and Maintenance Manual, Wastewater Treatment Facilities, KCM, Inc., July 1998.*

[2]*Based on data taken from the City's DMRs from the period January 2010 through July 2016.*

[3]*Assumes a standard oxygen transfer efficiency of 22 percent and maintaining a residual DO concentration in the SBR tank of 0.5 mg/L.*

As Table 4-2 illustrates, the existing SBR process units and aeration system are larger than what is required to accommodate and treat the current and projected future influent flows and loadings. When comparing the average and maximum monthly flows and organic loadings that have historically been experienced at the WWTF to the given design values, it is evident the WWTF is seeing a fraction of what it is designed to handle. Based on the historical WWTF operating data, flows currently being experienced at the WWTF are approximately 25 percent of the design average and 44 percent of the maximum month wet weather, and current organic loadings are approximately 39 percent of the design average and 78 percent of the maximum monthly. The current maximum monthly standard air requirement per basin is approximately 96 percent of the design value. Table 4-2 also shows thhe existing WWTF has adequate capacity to accommodate the 20-year future estimated flows and loadings.

It is desirable to have a WWTF that has excess capacity to provide the means for system expansion and community growth. However, operating a WWTF at the significantly under-loaded conditions the City currently has, relative to the design capacity, can present operating and process control challenges and result in inefficient use of the required energy input needed to sustain the biomass

and maintain the system. The process control challenges can be overcome through operational changes and system improvements. The excess capacity should be considered a positive and an available City asset. It is apparent, when examining the data, that more efficient treatment and significant savings in energy costs could be realized by (1) minimizing the SBR treatment operating volume and inventory of solids contained in the basins (minimizing MLSS concentration), (2) providing a more efficient aeration system (smaller blowers and fine bubble diffusers), (3) replacing the existing inefficient motive pumps and jet mixing system with high efficiency mechanical mixing units, and (4) upgrading the existing SBR control system to provide enhanced control of the aeration system, minimize required blower run time, and provide enhanced process control capabilities.

Based on a preliminary treatment and energy efficiency evaluation of the SBR system, the following conclusions were made:

1. As the evaluation shows, the available existing SBR tank treatment volume is significantly greater than what is required to treat the current incoming loadings to the WWTF. As a result, the operating depths within the basins can be maintained at somewhat less than the design levels, which will minimize the amount of MLSS volume contained in the SBR tanks. Also, the MLSS concentration, to more closely achieve the design F:M ratio, can be controlled to much lower levels than those at which the WWTF has historically been operated. It appears, based on the available WWTF operating data given in the DMRs, the average MLSS concentration that has been maintained in the SBRs is approximately 2,600 mg/L. Based on the reported current loadings, this amount of solids being held in inventory is approximately 2.5 to 3 times the amount actually needed to operate the WWTF at the design F:M of 0.07. The SBR operating levels may be able to be reduced to approximately 11 to 12 feet and the decanter mechanisms would still function, which would reduce the overall operating volume to approximately 450,000 gallons, or a reduction of 40 percent of the designed maximum volume of 750,000 gallons. By minimizing the volume and the solids in inventory to more closely match what is actually required to achieve the desired level of treatment, the energy required to aerate and mix the MLSS in the basins would likely be reduced and the treatment process would function better. Prior to actually reducing the operating depth, the City would need to confirm with the manufacturer of the jet aeration/mixing equipment that the system would function effectively at these reduced water levels.
2. Replacing the existing jet aeration system with a new fine bubble aeration grid system would result in an estimated increase in oxygen transfer efficiency of approximately 10 percent, which would result in approximately 20 percent less air needing to be delivered to the process. Replacement of the existing jet aeration system with a new fine bubble aeration grid system is further evaluated in Chapter 5.
3. The existing 40 Hp blowers are operating inefficiently and could be replaced with 25 Hp units and achieve the required current and future airflow requirements. Replacement of the existing blower units is further evaluated in Chapter 5.
4. The existing 25 Hp motive pump jet aeration/mixing system is very inefficient and could be replaced with 10 Hp high efficiency mechanical mixers. Replacement of the motive pumps with mechanical mixers is further evaluated in Chapter 5.
5. Upgrading of the existing SBR control system from DO-based to an oxygen reduction potential type would provide the means to automatically control the anoxic fill cycle to take

full advantage of the available nitrate and, thereby, minimize the aeration cycle. The enhanced control to utilize available nitrates in the process would provide maximum opportunity to save energy and consequently reduce aeration costs. An upgraded control system would also provide better control capabilities related to the SBR process cycling to take full advantage of the process flexibility afforded to the City as a result of the available excess treatment capacity.

The estimated project costs to complete the treatment and energy efficiency improvements described above are outlined in Chapter 5.

Since the 1998 construction of the WWTF, the WWTF operating staff (CH2M) has made a series of process adjustments and improvements to the facility in an effort to address the challenges of operating the WWTF at flow and loading conditions that are significantly below the design capacity. The process adjustments that have been made include reducing the SBR operating volume and reducing the effluent decant rates, and improvements have consisted of installing a polymer chemical feed system and DO control system in conjunction with variable frequency drive (VFD) motor controls for the blowers.

In May 2006, OMI conducted an evaluation of the SBRs and concluded the working volume should be reduced by 22 percent to help bring the solids retention time (SRT) in the SBRs closer to the design value. In March 2007, a chemical system was added to feed polymer into the wastewater to aid in flocculation and settling of the solids in the SBRs.

In September 2008, a control system was installed to monitor the DO concentrations in the SBR tanks and adjust the aeration blower motor speed (VFD) to meet DO level setpoints for the SBR system. The added DO monitoring and VFD motor controls allow for automatic adjustment of air delivery into the SBR tanks, which has improved process performance. Prior operation of the blowers was based on simple timed intervals without any automatic monitoring and control of the DO levels in the tanks.

In September 2011, the City retained Thomas E. Coleman, P.E., Consulting Services (TEC) to conduct a preliminary evaluation of the treatment facilities to determine suggested short-term operational adjustments and maintenance items and medium-term and long-term improvements needed to help improve the performance and reliability of the WWTF and bring the facility into consistent compliance with the NPDES Permit. A Technical Memorandum was prepared by TEC based on a site visit to the WWTF, discussions with the WWTF operating staff, and observations made while on site. For reference, a copy of the Technical Memorandum prepared by TEC is included in Appendix D of this WWFP. Following are excerpts from the Technical Memorandum and a summary of observations made during the site visit to the WWTF related to the SBR system equipment and operation.

1. Due to the lack of grit removal, it is likely a significant amount of grit has accumulated in the SBR tanks since the commissioning of the WWTF. Further, due to the grit, it is also probable the abrasive nature of the wastewater has caused excessive wearing while travelling through the pumps and jet aerators. Excessive wear could cause inefficient pumping, mixing, and aeration due to the wear. To fully evaluate whether excessive grit and wear of the jet aeration system has occurred, the basins would need to be taken off line and drained to allow visual inspection.

2. It is apparent, based on the observations made of the aeration and mixing patterns within the SBR tanks, the jet aeration/mixing system is not likely functioning as originally designed. The mixing and aeration within the basins appeared to be non-uniform and did not exert the patterns typically observed with the jet aeration type of system. This may be due to excessive accumulation of grit within the basins causing hindering of the operation of the system or possible wearing of the jet aerators due to elevated levels of grit (abrasion) in the wastewater. This appears to be a significant deficiency with the operation of the WWTF and it is recommended it be considered a high priority item to address. Again, the tanks would need to be taken off line and drained to perform the required inspection and evaluation to provide full assessment of the issues with the jet aeration/mixing system.
3. The floating SBR decanter mechanism does not completely exclude MLSS from entering the decanter pipe during the mixed fill and react cycles. As a result of this, during initiation of each decant cycle, the discharge is visibly high with TSS. The amount of TSS entering the effluent from the decant mechanism probably would not normally be enough to result in an NPDES Permit violation, but it could be a contributing factor.
4. Much higher levels of TSS would be discharged when the decanter mechanism disrupts the settled MLSS blanket near the end of the decant cycle. Such a disruption is very likely to result in an exceedance of permitted TSS limits and could explain many of the past violations. Factors that could contribute to such a disruption of the sludge blanket include poor settling characteristics of the MLSS (high sludge volume index), insufficient settling time, higher than necessary decant flow rates and/or volume, and the design characteristics of the decanter mechanism.
5. The SBR effluent equalization (EQ) basin outlet control valve is not functioning, which means the EQ basin does not perform as intended. This results in inefficient operation of the UV light disinfection system.

To address the decant mechanism deficiencies and reduce the risk of violating permitted TSS effluent limits, the following improvements and operational adjustments are recommended:

1. Reduce the decant flow rate. With the current low flows experienced relative to the design capacity, it is not necessary to discharge the effluent at high volume rates. Reducing the decant rate will reduce the chance of disturbing the settled sludge blanket and solids carry-out from the basin.
2. Evaluate increasing the number of cycles per day with the objective of reducing the decant fraction. Reducing the decant drawdown per cycle will reduce the risk of disturbing the settled sludge blanket. Flows significantly below the design capacity afford a great deal of flexibility with the operation of the SBR with regard to increasing settling times and reduced decant flow rates and volumes during each cycle.
3. Replace the decant mechanisms with units that operate such that they will not allow solids to accumulate during mixed fill and react cycles.
4. Repair the automated valve regulating flow from the SBR equalization basin.

### *Ultraviolet Light Disinfection System*

The UV light disinfection equipment is nearly 19 years old and is reaching its intended design life. The equipment is showing its age and, according to operating staff, is requiring more and more maintenance as it ages. This is a critical component of the WWTF and must be reliable and work efficiently to disinfect properly and ensure continued consistent NPDES Permit compliance. As such, it is recommended the City consider replacing the existing equipment with a new reliable, more efficient system. UV light disinfection system replacement is further discussed in Chapter 5.

### *Effluent pH Adjustment*

As mentioned in Chapter 2, the Oregon Department of Environmental Quality's 303(d) list for the Columbia River at the City's outfall lists pH and specifies effluent be discharged in the range of 7.0 to 8.5. A new pH permit limit of 7.0 to 8.5 is anticipated to be stipulated in the next NPDES Permit renewal cycle. Historical operating data indicate that, more often than not, the pH of the effluent is below the 7.0 threshold. To address this concern, and consistently comply with the pH limits, adjustments to the effluent pH will need to be made prior to discharge into the Columbia River. To make the required pH adjustments, a chemical will need to injected into the effluent stream at a controlled rate. pH adjustment requirements are further discussed in Chapter 5.

### *Sludge Processing*

According to the *1998 Operations and Maintenance Manual, Wastewater Treatment Facilities* by KCM, Inc. (see Appendix C), the design data for the existing aerobic digesters are as follows:

**TABLE 4-3**
**DESIGN CRITERIA FOR THE EXISTING AEROBIC DIGESTERS**

| Design Parameter | Unit | Design Value |
|---|---|---|
| Number of SBR Basins | | 2 |
| Digester Treatment Volume | MG | 0.12 each, 0.24 total |
| Average Digested Sludge Yield | lbs/day | 399 |
| Peak Digested Sludge Yield | lbs/day | 799 |
| Average SRT at 1.5 Percent Solids | Days | 75 |
| Peak Month SRT at 1.5 Percent Solids | Days | 30 |
| Mixing Air Provided | scfm/1,000 Cubic Feet | 20 |
| Number of Aeration Blowers | | 2 |
| Motor Size of Aeration Blowers | Hp | 40 |
| Capacity of Aeration Blowers | scfm | 640 at 6.0 psig |
| Number of Motive Pumps | | 2 |
| Motor Size of Motive Pumps | Hp | 25 |
| Supernatant Decanting Pump Capacity | gpm | 320 at 24 feet TDH |

According to the City's DMRs, liquid sludge has typically been removed from the digesters on a weekly basis and hauled to the Hood River WWTF for further treatment and disposal. Over the previous 6-1/2-year period, the average volume of liquid sludge hauled from the digesters was approximately 23,000 gallons per month. This varied from 6,000 to 42,000 gallons per month. The

average total solids concentration of this liquid digested sludge was 0.94 percent (9,480 mg/L), and the average volatile solids content was approximately 83 percent. Given the average solids concentration of 9,480 mg/L and the average volume hauled per month of 23,000 gallons, the average dry solids hauled to Hood River was approximately 1,800 pounds per month or 59 lbs/day.

Given a typical sludge production rate of approximately 0.8 to 1.0 pounds of sludge produced per pound of BOD removed, the current estimated average WAS production is estimated to be in the range of approximately 190 to 240 pounds per day. Based on this analysis, there is an apparent discrepancy between the amount of solids that would normally be produced in a system of this type and the amount of waste digested solids being hauled to the Hood River WWTF. Although unlikely, this discrepancy could be due to significant destruction of the solids through the process as a result of the very long sludge ages the WWTF currently operates under.

The WWTF operating staff indicated they experience freezing problems with some of the digester control valves. Specifically, the valves that control the supernatant decant have historically had problems with freezing, which results in them not working. It is important to continuously maintain the decant system's operation as it provides the only available means for the sludge to be thickened in the digesters. The valve freezing issue should be addressed.

If the City continues to haul liquid sludge to Hood River for further processing, the existing aerobic sludge holding tanks should provide the needed capacity. One item the City should consider, however, is sludge thickening. Sludge thickening prior to hauling would result in a significant reduction in volume, which would then significantly reduce the number of trips required and the cost of hauling. As an example, if the City could thicken the waste digested solids from the current average concentration of 0.94 percent to an assumed 3 percent, a reduction in volume of approximately 69 percent would be realized. Therefore, if the liquid sludge could somehow be thickened from the current 0.94 to 3 percent solids, the average amount hauled would be reduced from the existing reported amount of 23,000 gallons per month to approximately 7,000 gallons per month. A sludge thickening system would also provide the City with more sludge management handling flexibility and enhanced ability to better control the solids in inventory, and could allow other options for sludge disposal besides hauling to Hood River. The City would likely need some form of mechanical thickening such as a drum-type or gravity belt-type thickening unit process. Thickening is discussed further in Chapter 5 along with the estimated costs to incorporate a thickening unit process into the plant operations.

## *Wastewater Treatment Facility Process Summary*

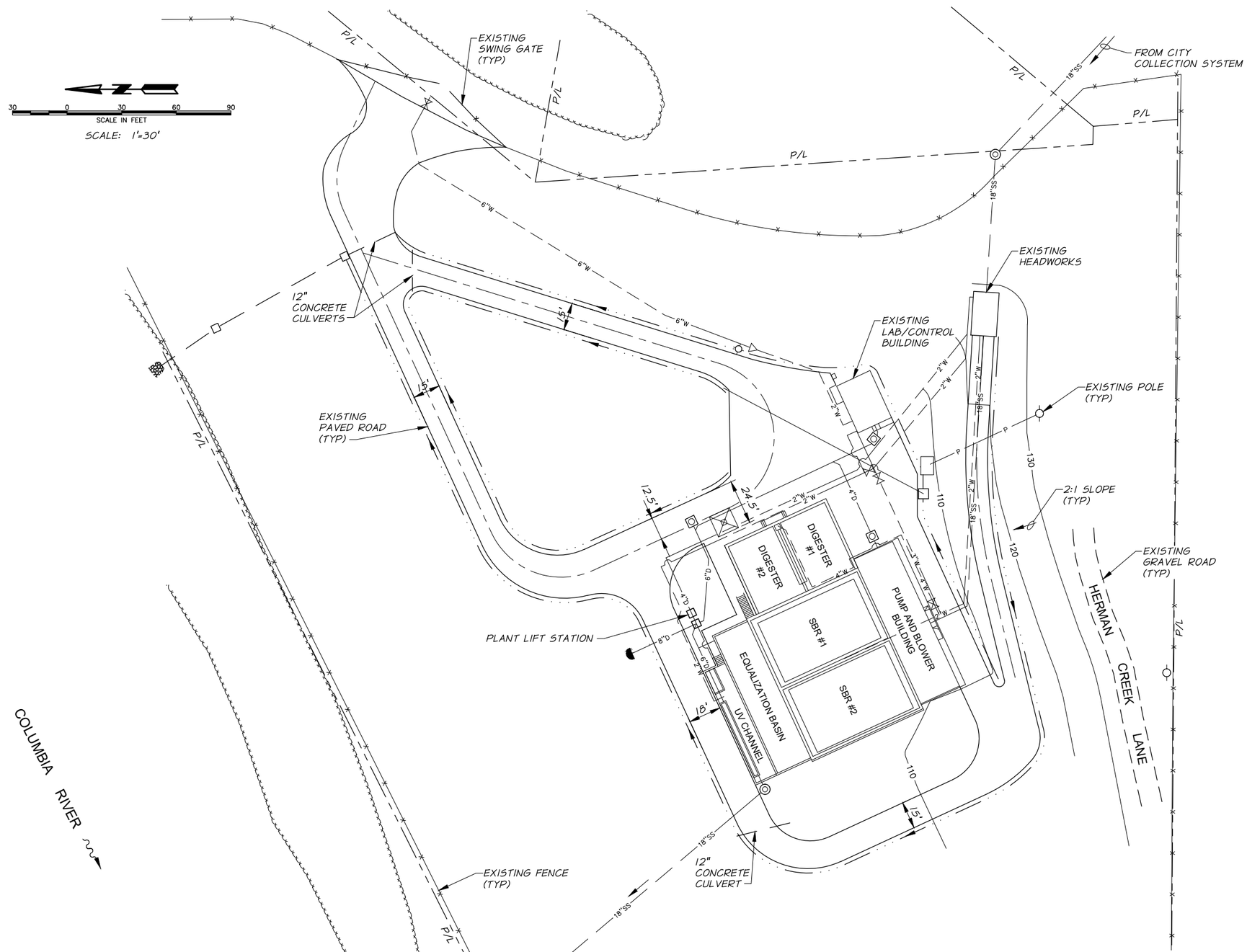
Based on the historical WWTF operating data, the process evaluation, and operational experience, the City's WWTF is currently operating at flow and loading conditions that are a fraction of the design capacity. The WWTF is currently not being operated as intended by the original design, operational adjustments need to be made, and general maintenance items need to be completed. As such, the WWTF appears, from a treatment and energy consumption standpoint, to be operating inefficiently. The existing headworks is lacking grit removal, which is likely causing buildup in the existing SBR tanks and could be resulting in the jet aeration/mixing system to not function as intended. The existing decanting system is allowing excess solids to be discharged into the effluent, which could lead to NPDES Permit violations for TSS. The existing MLSS concentration and operating volumes held in the SBRs could be reduced significantly and, thereby, save energy and help with NPDES Permit compliance. A significant reduction in the amount of liquid sludge that needs to be

hauled to Hood River, greater flexibility and enhanced control of solids inventory, and more options for sludge disposal could be realized by incorporation of a sludge thickening system.

Based on the process evaluation, observations, and issues discussed in this chapter, the steps for addressing the identified deficiencies and improving the performance of the WWTF could be considered under the following categories:

- Operational Adjustments and General Maintenance
- Headworks Improvements
- SBR Improvements
- UV Light Disinfection System Improvements
- Effluent pH Adjustment
- Sludge Management Improvements

In Chapter 5, improvements to address these different categories are further discussed and outlined.




## LEGEND

- 120 — CONTOUR LINE
- PROPERTY LINE
- EDGE OF PAVED ROAD
- EDGE OF UNPAVED ROAD
- CENTERLINE
- FENCE LINE
- DITCH
- CULVERT
- VEGETATION
- 4"D — 4" DRAIN LINE
- 6"D — 6" DRAIN LINE
- 8"D — 8" DRAIN LINE
- PLUG
- P — POWER LINE
- POWER POLE
- 18"SS — 18" SANITARY SEWER LINE
- SANITARY SEWER MANHOLE
- CLEANOUT
- 8"SD — 8" STORM DRAIN LINE
- CATCH BASIN
- 2"W — 2" WATER LINE
- 3"W — 3" WATER LINE
- 4"W — 4" WATER LINE
- 6"W — 6" WATER LINE
- WATER VALVE
- FIRE HYDRANT

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CITY OF
**CASCADE LOCKS, OREGON**
**WASTEWATER FACILITIES PLAN**

**EXISTING WASTEWATER TREATMENT FACILITY SITE PLAN**

**FIGURE**
**4-1**

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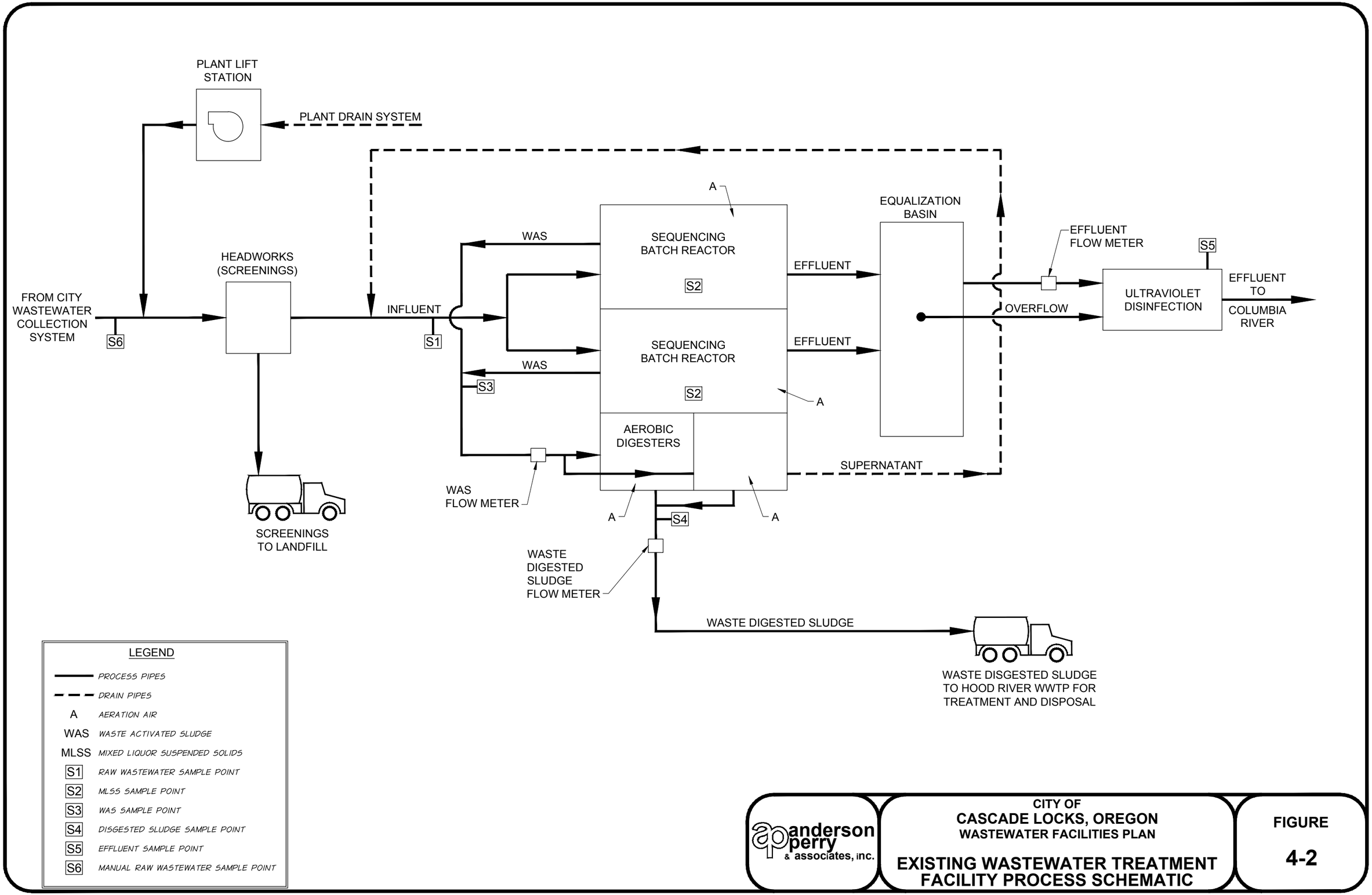


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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

EXISTING WASTEWATER TREATMENT FACILITY PROCESS SCHEMATIC

FIGURE
4-2

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# Chapter 5 - Development and Evaluation of Wastewater Treatment Facility Improvements

## General

In this chapter of the Wastewater Facilities Plan (WWFP), the categories of improvements identified in Chapter 4 are developed and evaluated. A summary of the operational issues and deficiencies identified is presented. Estimated costs for the evaluated categories of improvements are presented.

## Summary of Operational Issues and Deficiencies

Following is a summary of the existing treatment system operational issues and deficiencies identified in Chapter 4 of this WWFP.

- The wastewater treatment facility (WWTF) is currently not being operated as intended by the original design, operational adjustments need to be made, and general maintenance items need to be completed.
- The headworks has no grit removal process unit. Due to the lack of grit removal facilities, the grit passes through the headworks and to the downstream processes. In turn, the lack of grit removal can cause abnormal premature wear of pumps, the aeration system, and other equipment. It is likely a significant amount of grit has accumulated in the sequencing batch reactor (SBR) tanks since the commissioning of the WWTF. Due to the grit, it is also probable that the abrasive nature of the wastewater has caused excessive wearing while travelling through the pumps and jet aerators. Excessive wear could cause inefficient pumping, mixing, and aeration.
- The existing SBR process units and aeration system are significantly larger than what is required to accommodate and treat the current and projected future influent flows and loadings. Operating the WWTF at significantly under-loaded conditions has presented operating and process control challenges and results in inefficient use of the required energy input needed to sustain the biomass and maintain the system.
- The jet aeration/mixing system does not appear to be functioning as originally designed. The mixing and aeration within the basins appear to be non-uniform and do not exert the patterns typically observed with a jet aerated-type system. This may be due to excessive accumulation of grit within the basins, causing hindering of the system operation, or possible wearing of the jet aerators and/or piping system due to elevated levels of grit (abrasion) in the wastewater.
- Due the nature of the design of the floating SBR decanter mechanism, the mechanism appears to be allowing undesirable levels of mixed liquor suspended solids (MLSS) to enter the decanter pipe during the SBR cycles. During initiation of each decant cycle, the SBR effluent discharge is visibly high in total suspended solids.

- The SBR effluent equalization (EQ) basin outlet control valve is not functioning, which means the EQ basin is not performing as intended. This results in inefficient operation of the ultraviolet (UV) light disinfection system.
- The existing UV light disinfection system is nearly 20 years old and is reaching the end of its intended design life. Reportedly, the system has worked well, but has excessive maintenance and is not functioning efficiently.
- pH adjustment is needed to be able to consistently comply with anticipated pH permit limits.
- The aerobic digester's decant valves freeze and become inoperable. This prevents the digester supernatant decant system from functioning.
- The WWTF has no effective method to thicken the waste sludge within the digesters prior to hauling it to the City of Hood River. This results in inhibited ability to effectively manage the solids inventory within the WWTF and hauling a significantly greater volume of sludge than would be needed if a system was in place to allow thickening of the solids. The increased number of loads needed to manage the liquid sludge results in higher transportation and processing costs. The ineffective sludge thickening that currently exists presents problems with the ability to consistently waste solids from the system, thereby causing the MLSS concentration in the system to be much higher than was intended by the design. These high levels of solids, in turn, reduce treatment efficiency and contribute to National Pollutant Discharge Elimination System (NPDES) Permit compliance issues.

## Conceptual Discussion of Wastewater Treatment Facility Improvement Alternatives

### *General*

Conceptually, improvement alternatives could be considered to address the long-term wastewater treatment needs for the City of Cascade Locks other than upgrading the existing WWTF. Possible alternatives could include the following:

- No Action.
- Modify the WWTF from the existing SBR process to a membrane process.
- Abandon the existing WWTF and construct a new facultative lagoon treatment, storage, and effluent reuse system.

A brief discussion of each conceptual alternative follows.

### No Action

Under the No Action alternative, the City would continue to use the WWTF in its current condition. No work would be performed on the City's WWTF. If this alternative were chosen, none of the deficiencies identified in the evaluation of the WWTF would be addressed, the WWTF would continue to operate inefficiently, and the ongoing NPDES Permit non-compliance issues would not be addressed. Consequently, to effectively meet the long-term wastewater treatment needs of the City, this alternative is not considered viable.

## Modify the Wastewater Treatment Facility from the Existing Sequencing Batch Reactor Process to a Membrane Bioreactor Process

Under this alternative, the City would modify the existing WWTF from an SBR process to a membrane bioreactor (MBR) process. To implement this alternative, the existing aeration basins would be utilized and modified to allow installation of new membrane units that would function to filter the solids contained in the basins and discharge clear treated effluent through the membranes to the downstream UV light disinfection system. The process would no longer be operated as a batch process, but rather a continuous flow-through type. To implement such a process, modification would require major improvements to the headworks screening system to strain out very fine debris, which is required to protect the downstream membranes from fouling and plugging. Additionally, to keep the membranes clean and maintained, chemical feed systems such as sodium hypochlorite would need to be installed and maintained. The equipment associated with the SBR would be removed and a new aeration and membrane system would be installed. Major pumping and piping modifications would be required to accommodate the MBR process modification. Considering all of the required improvements and modifications that would be necessary under this alternative, as outlined above, it is estimated the project cost would be in the range of $3 to $4 million, not including improvements to address grit removal, sludge management, and UV light disinfection. Although this alternative is possible to implement, due to the very high capital and operating cost relative to the cost of upgrading and maintaining the existing SBR process with no real tangible benefits, it is not considered cost-effective or viable for the City. Therefore, this alternative will not be evaluated further in this WWFP.

## Abandon the Existing Wastewater Treatment Facility and Construct a New Facultative Lagoon Treatment, Storage, and Effluent Reuse System

This alternative would consist of abandoning the existing WWTF and constructing a new pumping station and pipeline to convey the collected wastewater to a new lagoon treatment, storage, and effluent reuse (irrigation) facility. This alternative would allow the City to discontinue discharging treated effluent to the Columbia River by winter storage of the wastewater and reuse of the treated effluent through summer irrigation.

This alternative is not considered feasible for the City to implement for several reasons. The City's location in the Columbia Gorge presents a situation where land availability to site such a facility is limited, and lagoon treatment and storage facilities require a significant amount of area. Abandoning the existing WWTF would not take advantage of the large investment that has already been made to construct the facility, and construction of a lagoon treatment, storage, and effluent reuse system would have a very high capital cost compared to upgrading the existing WWTF. The relatively large amount of precipitation typically experienced in the City does not allow the irrigation of crops utilizing the wastewater at rates that would be acceptable or permissible by the Oregon Department of Environmental Quality (DEQ) to meet regulations. There is no foreseeable reason the City should not be able to continue year-round discharge of treated effluent to the Columbia River and meet the NPDES Permit conditions utilizing the existing activated sludge treatment process, and as such, there is no real economical long-term benefit to implementing a lagoon treatment option. Therefore, this alternative will not be evaluated further in this WWFP.

It appears, based on the conceptual evaluation of possible improvement alternatives, the only feasible and cost-effective alternative is to continue to utilize the SBR process and complete improvements to the existing WWTF. Refer to subsequent sections for detailed evaluation of recommended improvements.

## Wastewater Treatment Facility Improvements Categories

### *Introduction*

In this section, WWTF improvements categories are briefly summarized. The recommended steps and improvements under each category are described. Estimated capital costs for the different elements associated with each improvement category are developed.

### *Evaluation of Improvement Categories*

To address the operational issues and identified deficiencies, help improve the performance of the WWTF, and reduce the risk of future violation of the NPDES Permit, several improvement categories have been developed. The following is a description and an evaluation of the improvement categories completed as part of this WWFP.

- Operational Adjustments and General Maintenance
- Headworks Improvements
- SBR Improvements
- UV Light Disinfection Improvements
- Effluent pH Adjustment
- Sludge Management Improvements

### Operational Adjustments and General Maintenance

The items identified under this category are operational and general maintenance steps that can be taken to help increase the performance of the WWTF and reduce the risk of future violations of the NPDES Permit. These are considered high priority items that are recommended to be completed in the short term.

- Consider reducing the operating depth within the SBR tanks. The available existing SBR tank treatment volume is significantly greater than what is required to treat the current incoming loadings to the WWTF. It appears the operating depths within the basins can be maintained at somewhat less than the design levels, which will minimize the amount of MLSS volume contained in the SBR tanks. Minimizing the volume will likely minimize energy usage. Prior to actually reducing the operating depth, confirmation with the manufacturer of the jet aeration/mixing equipment that the system would function effectively at these reduced water levels would need to occur.
- Consider significantly reducing the operating MLSS concentration in the SBRs. It appears the amount of solids being held in inventory is approximately 2.5 to 3 times the amount actually needed to operate the WWTF as intended by the original design. Minimizing

the solids in inventory will minimize energy usage and help with solids settling and treatment efficiency.

- Minimize the SBR decant flow rate. Consider increasing the number of cycles per day with the objective of reducing the decant fraction (i.e., reduce the decant drawdown volume per cycle to reduce the risk of disturbing the settled sludge blanket). Flows and loadings significantly below the design capacity afford a great deal of flexibility with regard to SBR operation.
- Repair the automated valve regulating the flow from the EQ basin to the UV light disinfection system.

## Headworks Improvements

Headworks improvements should be considered a high priority item to be implemented on a long-term basis as budget and funding allow. To improve the headworks, a new grit removal system would need to be installed. As mentioned in Chapter 4, two types of grit removal systems could be employed at the Cascade Locks facility: aerated and vortex. For various reasons, including the following, the vortex-type would be preferred over the aerated-type:

- A limited amount of elevation difference exists (approximately 3 feet) between the existing headworks screening channel and the high water level in the SBR tanks. This elevation difference provides the means for gravity flow from the headworks to the SBR tanks. It is most desirable to maintain hydraulic conditions that would allow continued gravity flow from the headworks through the WWTF. With a vortex-type system, the design allows for very low headloss through the grit chamber, whereas more headloss would be needed to operate an aerated grit chamber. Therefore, it is likely that an aerated grit chamber would necessarily need to include pumping to the SBRs rather than continued gravity flow.
- It has been demonstrated that vortex-type grit removal systems have significantly higher grit removal efficiencies than the aerated-type. This is particularly true for smaller particle sizes.
- The difference in power consumption is great. For units treating comparable flows, the energy required to operate an aerated-type can be two times or greater the amount of energy needed to run the system. One of the main reasons is blowers are needed for an aerated grit type that run continuously, 24 hours per day.
- The cost of installing the two types of systems is comparable.
- Typically, the space needed to install the vortex-type system is significantly less than the space needed for the aerated-type due to its configuration.

To provide the grit removal system, the following components would be required:

- A concrete vortex grit chamber equipped with a motor-driven rotating paddle (helps maintain the vortex in the chamber). The chamber would be installed immediately downstream of the existing screening system and buried in the ground. The grit chamber would be designed with a capacity to handle the expected design peak hourly flow.

- A grit pump system to pump the collected grit from the bottom of the chamber.
- A grit concentrator, washer, and dewatering unit.
- A building structure to cover the system to help protect the equipment from the elements.
- Process and yard piping.
- Electrical and controls.
- Site work.

Refer to Figure 5-1 for a process schematic of the vortex grit removal system. As shown on Figure 5-2, the estimated total cost of the identified headworks improvements is approximately $961,000.

## Sequencing Batch Reactor Improvements

Improvements to the SBRs need to be completed to provide a long-term, reliable, energy-efficient system capable of achieving high level, reliable wastewater treatment that will allow consistent compliance with the conditions of the NPDES Permit. To ensure the system will operate to consistently meet the conditions of the NPDES Permit, it is critical that vital components are well maintained and each functions as reliably and efficiently as possible. To address the identified deficiencies and ensure the WWTF can operate to consistently meet the conditions of the NPDES Permit, the SBR improvements should be considered a high priority and need to be completed as soon as budget and funding allow. Refer to Figure 5-3 for a process schematic of the recommended SBR improvements. The critical components of the SBR system essential to maintain a viable, efficient, and reliable working process include:

- Concrete Basins
- Air Blowers
- Aeration/Mixing System
- Motive Pumps and Mixing System
- Effluent Decanting System
- Aeration Control System

### *Concrete Basins*

The concrete SBR basins must be kept clean of grit, scum, and other debris that inhibit the operation of the aeration/mixing system and contribute to lower quality effluent. As previously mentioned, there is no grit removal system at the headworks and the basins have not been cleaned since commissioning of the WWTF approximately 19 years ago. As such, a significant amount of grit has very likely accumulated over the 19-year period, which appears to be hindering the operation of the aeration/mixing system. It is recommended the SBR tanks be taken off line, drained, and the grit and debris cleaned out.

To take the SBRs off line for draining and cleaning, and to allow continued wastewater treatment capabilities, it will be necessary to maintain one functioning basin while the other is taken out of service. To accomplish the cleaning tasks, the one remaining operational SBR will need to function to accept flow continuously into the reactor rather than operate as a fill-and-draw system, as is the case with the two-basin operation. This is possible with the existing design but may require some adjustments to maximize the treatment capabilities with just one basin operating. Careful coordination will be needed among the City, operational staff, and the DEQ during completion of the SBR cleaning, inspection, and repair procedures to ensure continued treatment at the highest possible efficiency.

The City will need to budget the required funds to cover the costs of equipment, labor, and materials to complete the SBR draining and cleaning procedures. The City will likely need to procure the services of a contractor specifically equipped to perform the heavy cleaning of the grit from the basins and haul the debris for disposal in an authorized landfill.

### *Air Blowers*

To provide aeration of the SBRs, there are currently two 40 horsepower (Hp) blowers (one for each SBR). The two existing 40 Hp air blowers are larger than they need to be, are approximately 19 years old, generate much noise, and are significantly less efficient than units available on the market today. It is estimated the existing blowers could be replaced with new 25 Hp high efficiency units that have adequate capacity to serve the City now and for the 20-year design period. This would be a reduction of 15 Hp per unit, or a total of 30 Hp. To provide a more efficient, quieter running blower system, it is recommended the old blowers be replaced with new efficient, reliable units.

### *Aeration/Mixing System*

As previously mentioned, it appears the jet aeration/mixing system is not functioning as originally designed. As with the other components of the system, the jet aeration system is approximately 19 years old and is very likely in need of repair due to its age and years of abrasive grit running through it. It is not recommended the City invest any money in repairing the old, inefficient jet aeration/mixing system. While the basins are off line for cleaning, it is recommended the existing jet aeration/mixing system be replaced with a new fine bubble aeration system to be installed in each tank.

The existing jet aeration system has a published standard oxygen transfer efficiency (SOTE) of 22 percent at the design high water level. This means that 78 percent of the oxygen that is blown and diffused into the MLSS within the SBR basins does not get transferred into the water, is unavailable to the microorganisms to use, and escapes into the atmosphere. A new fine bubble aeration system would deliver a significantly higher SOTE (30 to 35 percent). The approximate 10 percent increase in SOTE would result in approximately 30 percent less air that would need to be delivered to the basins from the blowers.

### *Motive Pumps and Mixing System*

With replacement of the old jet aeration/mixing system with a new fine bubble aeration grid, the old mixing system will need to be removed, which would result in new mechanical

mixers being required to replace the old, inefficient motive pump mixing system. The two existing 25 Hp motive pumps would be replaced with two new 10 Hp high efficiency mechanical mixers, one installed in each SBR tank. This would result in a reduction of 30 Hp for mixing.

### *Effluent Decanting System*

The City has had problems in the past with NPDES Permit violations related to elevated levels of solids in the effluent. It appears the design of the existing decanters is allowing excess solids to escape past the decanters and may be contributing significantly to the elevated effluent solids problem. Decanters available on the market today, with better design and functionality, would mitigate this problem. It is believed that new decanters to replace the existing ones would provide a great deal of improvement to help keep the solids contained in the SBRs and out of the effluent. As such, it is recommended the City replace the existing decanters with new ones.

### *Aeration Control System*

Operation of the existing blowers is controlled via an instrument that measures the dissolved oxygen (DO) in the basins and then signals the blower variable frequency drive motor controls either to speed up the motors or slow them down to allow the blowers to match the amount of air delivery needed to meet the demand. Although this works, a more efficient control scheme could be utilized to control the operation of the blowers. A control system that uses oxygen reduction potential as the measurement parameter rather than DO, along with a computerized program, would provide better and more efficient aeration control. Additionally, an upgraded control system would allow enhanced capabilities to better control the SBR process cycles relative to changing flow and loading conditions.

To make the installation of the new equipment discussed above complete and fully functioning, it would be necessary to remove and demolish the existing equipment, perform piping modifications, and complete electrical work and other ancillary items.

As shown on Figure 5-4, the estimate cost of the SBR improvements is approximately $1,722,500.

## UV Light Disinfection Improvements

Improvements to the existing UV light disinfection system are recommended to be completed. As discussed in Chapter 4, the UV light disinfection equipment is nearly 19 years old and is reaching the end of its intended design life. The equipment is showing its age and is requiring more and more maintenance. This is a critical component of the WWTF and must be reliable and work efficiently to disinfect properly and ensure continued consistent NPDES Permit compliance. Current systems available on the market utilize efficient low-pressure high-output lamps. With these new lamps, it is possible to configure systems such that they utilize fewer lamps than the City's existing system while achieving the same disinfection levels. The City's existing system has 64 lamps to operate and maintain; a new system could be installed that would incorporate two banks each consisting of three modules and each module containing four to six lamps, or a total of 12 to 16 lamps per bank or 24 to 32 lamps total.

The new UV light disinfection equipment would be installed in the existing concrete channel that houses the existing system. The new system would be equipped with new controls to provide efficient operation and control of the lamp modules.

As shown on Figure 5-5, the estimated cost of the UV light disinfection improvements is approximately $363,000.

## Effluent pH Adjustment

pH adjustment will be needed to consistently to meet the requirements that the effluent pH be maintained within the range of 7.0 to 8.5. pH adjustment is accomplished through a controlled dosing of chemical in the effluent stream prior to discharge to the Columbia River. Since historically the pH has been below the 7.0 limit, it will be necessary to add a chemical that will raise the pH.

The City is currently in the process of implementing a corrosion control system for the municipal water system for purposes of meeting the copper and lead rule for drinking water. As with the wastewater effluent, the drinking water will require adjustment of (increase) the pH through metering of a chemical into the water. In October 2016, John Grim & Associates completed a report entitled, *Cascade Locks Water System, Corrosion Control Treatment Project Report.* In this report it was concluded the preferred method of treatment for pH adjustment and control is the metering of a soda ash (sodium carbonate) solution into the water. To be consistent with operations, equipment, and chemical type, it is recommended the City implement a similar feed system as that being proposed for the drinking water utilizing soda ash as the pH adjustment chemical for the WWTF. To complete the soda ash feed system, the following components would be needed:

- Soda Ash Feed System. This would generally include the feed equipment, solution storage tank(s), soda ash solution metering pumps, controls, electrical and instrumentation, and process piping and valves.
- Concrete masonry unit building to house the equipment and store the soda ash.
- Site Work.

The aforementioned report suggested the soda ash feed system for pH adjustment for the drinking water be sized based on a fixed rate (dosage) of 30 parts per million (ppm).

It is assumed that a similar dosage of soda ash solution would be required for the wastewater effluent to achieve the desired pH. Further, the system would be sized based on the design maximum month wet weather flow of 0.276 million gallons per day (MGD)(see Figure 2-2 in Chapter 2) and a feed concentration of 10 percent soda ash by weight (i.e., 1 pound of soda ash per 10 pounds of mixing water). With this design assumption, the system would need to be sized to feed a maximum of approximately 70 pounds of soda ash per day and 84 gallons per day of solution into the effluent stream. The average soda ash consumption, based on the design average annual flow of 0.143 MGD (see Figure 2-2 in Chapter 2) and 30 ppm dosage rate, would be approximately 36 pounds per day or approximately 13,000 pounds per year.

As shown on Figure 5-6, the estimated cost of the pH adjustment system is approximately $458,000.

### Sludge Management Improvements

As discussed in Chapter 4, incorporation of a mechanical sludge thickening system would result in significant reduction in the volume of sludge that would need to be hauled to Hood River's WWTF and would provide enhanced control of the solids inventory. Enhanced control capabilities afforded by a sludge thickening system would allow the process to be operated more easily as intended by the original design and, thereby, increase the treatment efficiency and help with consistent NPDES Permit compliance. Several types of sludge thickening systems are available that could be employed at the WWTF. All types function to separate water from solids, thereby providing the thickening. Some of the different types include rotary drum, gravity belt, and dissolved air floatation. Prior to implementation of a sludge thickening system, the City would need to complete further study that is beyond the scope of this WWFP and possibly perform actual pilot testing of different types of equipment to determine the preferred system. The system would likely be designed to thicken both waste activated sludge from the SBR tanks and the waste digested sludge from the aerobic digesters. Sludge thickening improvements should be considered a high priority item to be completed as budget and funding allow. To complete the sludge thickening improvements, the following components would need to be provided:

- A new sludge thickening system including polymer feed system, flocculation tank, sludge thickening unit, and thickened sludge pump.
- Piping modifications to allow connection of the new sludge thickening system to the existing sludge piping system.
- A new building structure to house the equipment to protect it from the elements and prevent freezing.
- Electrical and control work.
- Site work.

Additionally, as mentioned in Chapter 4, there is an issue with the existing sludge control valves freezing. This issue should be addressed regardless of whether sludge thickening improvements are completed.

Refer to Figure 5-7 for a process schematic. As shown on Figure 5-8, the estimated total cost of the sludge management improvements is approximately $791,000.

## Selected Improvements

Selected improvements will be included after City Council action.

# Preliminary Environmental Review

## *Introduction*

This section presents a preliminary environmental review of the recommended wastewater system improvements. As the project is further developed and funding is sought, a more detailed report should be completed to meet specific agency requirements.

## Affected Environment/Environmental Consequences

### *Land Use*

The City of Cascade Locks is located in the northwest corner of Hood River County in Oregon's Columbia River Gorge. The majority of land in the vicinity is privately owned and is residential, commercial, or used as a public space.

The current zoning in the City is shown on Figure 1-3 in Chapter 1. Four Comprehensive Plan land use designations have been identified within the city limits: residential, commercial, industrial, and public. The majority of the City is designated for residential use. Areas along the Columbia River are primarily designated as public. Industrial areas are located in the east part of the City between Interstate 84 (I-84) and the Columbia River.

A land use compatibility statement may be required for any upgrades or improvements to the existing WWTF.

### *Important Farmland*

A comprehensive soil survey by the Natural Resources Conservation Service (NRCS) is not currently available for the City of Cascade Locks; therefore, there is no designation for farmlands. Currently there is no land within the project area zoned Exclusive Farm Use. The proposed improvements will occur at the existing WWTF and throughout the City within the existing collection system. It is not anticipated the project will impact Important Farmland; however, prior to construction, the City should consult with the local NRCS to address potential impacts to Important Farmland.

### *Formally Classified Lands*

Formally classified lands are lands designated by federal, state, and local governments for special purposes. These include parks, monuments, landmarks, historic trails, wild and scenic areas, wilderness areas, Native American-owned lands, etc.

The Historic Columbia River Highway State Trail - Bridge of the Gods Trailhead is located in the southwest portion of the project area along with Toll House Park, which is operated by the U.S. Forest Service (USFS). There are also multiple USFS trailheads located on the southeast side of I-84. The Port of Cascade Locks is home to Marine Park, which is operated by the Port. The City owns and operates one designated city park, known as Tooth Rock Park. No national monuments are located within the project area. There are no wild and scenic rivers in the project area; therefore, this project will have no effect on wild and scenic rivers.

### *Floodplains*

According to the Federal Emergency Management Agency (FEMA) Map Service Center, FEMA Flood Insurance Rate Map (FIRM) Panels Number 410086 0025 B and 410087 0005 B have been assigned to the project area. The existing WWTF is not located in a Special Flood Hazard Area. The proposed improvements are not located in Special Flood Hazard Areas. The FEMA FIRM panels are shown on Figures 1-5A and 1-5B in Chapter 1.

### *Wetlands*

A Local Wetlands Inventory was prepared by Pacific Habitat Services in 2005 and approved by the Oregon Department of State Lands (DSL) in 2006 (see Appendix E). This inventory identified eight confirmed wetland areas as well as several smaller potential wetland areas within the urban growth boundary (UGB). These areas include Palustrine Aquatic Bed and Palustrine Emergent wetlands located south of Frontage Road south of I-84, Palustrine Shrub-Scrub and Palustrine Emergent wetlands on Government Island, and Palustrine Forested wetlands associated with Herman Creek and Moody Creek. A wetland determination/delineation should be completed prior to construction. If wetlands are found that would be impacted by the recommended project, permits may be required.

### *Cultural/Historic Resources*

According to the Oregon Historic Sites Database, there are three historic structures in the vicinity of the City of Cascade Locks, all three of which are listed as eligible or contributing. According to the Oregon Archaeological Records Remote Access Database, 31 cultural resource surveys and 23 previously recorded archaeological sites exist within the City of Cascade Locks. In 1989, an archaeological survey was conducted in the vicinity of the WWTF area for the proposed disposal sites for the Port of Cascade Locks. This survey resulted in no archaeological sites being discovered in the WWTF area. The Cascade Locks location is recorded as having been the home of at least one Upper Chinook band and has been settled by European-Americans since the mid-1800s.

As such, there potentially may be significant cultural resources present that have not yet been recorded. Potential impacts to archaeological resources as a result of construction include excavation, sediment disturbance, sediment compaction, and other ground-disturbing construction activities. An examination of historic maps, such as General Land Office and Sanborn maps, should occur as specific plans and designs are made to ascertain if such work could potentially impact historical archaeological deposits and mitigate for such impacts. Additionally, efforts may be required to identify previous areas of disturbance within proposed work areas so undisturbed areas may be avoided or investigated for archaeological materials. The Oregon State Historic Preservation Office and the appropriate tribal governments should be consulted prior to finalizing the project design. Tribes with interest in the Cascade Locks area include the Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of the Warm Springs Indian Reservation of Oregon, Confederated Tribes and Bands of the Yakama Nation, Nez Perce Tribe, and Confederated Tribes of the Grande Ronde Community of Oregon.

Additional requirements may be necessary depending on federal involvement (funding or permits), which may necessitate compliance with Section 106 of the National Historic Preservation Act. If no federal nexus is identified, the project must still comply with Oregon Revised Statutes (ORS) (ORS 97.740, 358.905 through 358.961, and 390.235) and Oregon Administrative Rules (OAR) 736-051-0090, which protect Native American cairns, graves, and associated items, items of cultural patrimony, and archaeological sites on non-federal and private lands. Additional archaeological survey, testing, and/or permitting may be required to comply with state laws.

### *Biological Resources*

Important fish and wildlife habitat in the proposed project area and vicinity includes the riparian area surrounding the Columbia River, Moody Creek, Dry Creek, and Herman Creek. Riparian areas are critical to the health of streams, as the riparian vegetation provides shade and temperature regulation for streams, provides cover for aquatic organisms, and stabilizes streambanks, thus preventing erosion.

Information from the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) websites and corresponding species lists indicates the following federally listed species and critical habitat may occur in Hood River County.

**TABLE 5-1**
**ENDANGERED SPECIES ACT-LISTED SPECIES AND CRITICAL HABITAT IN HOOD RIVER COUNTY**

| Species | ESU/DPS[1] | ESA[2] status | Critical Habitat in Project Vicinity | Potential Effect |
|---|---|---|---|---|
| Northern Spotted Owl (*Strix occidentalis caurina*) | N/A | Threatened | **No.** The closest area of spotted owl critical habitat is approximately 0.4 mile southeast of the UGB. | **Possible Impact**. There is no dispersal, foraging, or nesting and roosting habitat within the UGB, but noise effects from certain construction activities could affect owl nesting up to a mile from the action. Coordination and/or consultation with the USFWS may be required if nests are present and high noise impacts are expected. |
| Bull Trout *(Salvelinus confluentus)* | N/A | Threatened | **Yes**. The Columbia River is included in bull trout designated critical habitat. | **Possible Impact**. Any in-water work or discharge to waters listed as supporting or providing habitat for bull trout has the potential to affect this species or its critical habitat and would require consultation with the USFWS. |
| Steelhead *(Oncorhynchus mykiss*) | Middle Columbia River DPS | Threatened | **Yes**. The Columbia River, Dry Creek, and Herman Creek are included in designated critical habitat for steelhead. | **Possible Impact.** Any in-water work or discharge to waters listed as supporting or providing habitat for steelhead has the potential to affect this species or its critical habitat and would require consultation with NMFS. |
| | Snake River Basin DPS | Threatened | | |
| | Lower Columbia River DPS | Threatened | | |
| | Upper Columbia River DPS | Threatened | | |

| Species | ESU/DPS[1] | ESA[2] status | Critical Habitat in Project Vicinity | Potential Effect |
|---|---|---|---|---|
| Chinook salmon (*Oncorhynchus tshawytscha*) | Snake River fall-run ESU | Threatened | **Yes**. The Columbia River and Herman Creek are included in designated critical habitat for Chinook salmon. | **Possible Impact.** Any in-water work or discharge to waters listed as supporting or providing habitat for Chinook salmon has the potential to affect this species or its critical habitat and would require consultation with NMFS. |
| | Snake River spring/summer run ESU | Threatened | | |
| | Upper Columbia River spring-run ESU | Endangered | | |
| | Lower Columbia River ESU | Threatened | | |
| Sockeye salmon (*Oncorhynchus nerka*) | Snake River ESU | Endangered | **Yes**. The Columbia River is included in designated critical habitat for sockeye salmon. | **Possible Impact.** Any in-water work or discharge to waters listed as supporting or providing habitat for sockeye salmon has the potential to affect this species or its critical habitat and would require consultation with NMFS. |
| Chum salmon (*Oncorhynchus keta*) | Columbia River ESU | Threatened | **Yes**. The Columbia River is included in designated critical habitat for chum salmon. | **Possible Impact.** Any in-water work or discharge to waters listed as supporting or providing habitat for chum salmon has the potential to affect this species or its critical habitat and would require consultation with NMFS. |
| Coho salmon (*Oncorhynchus kisutch*) | Lower Columbia River ESU | Threatened | **Yes**. The Columbia River and Herman Creek are included in the designated critical habitat for coho salmon. | **Possible Impact.** Any in-water work or discharge to waters listed as supporting or providing habitat for Coho salmon has the potential to affect this species or its critical habitat and would require consultation with NMFS. |

[1]*ESU = Evolutionarily Significant Unit*
*DPS = Distinct Population Segment*
[2]*ESA = Endangered Species Act*

Because the Columbia River and Herman Creek provide habitat for Chinook salmon and coho salmon, they are considered Pacific Salmon Essential Fish Habitat under the Magnuson-Stevens Act. The DSL has also designated the Columbia River, Dry Creek, and Herman Creek as Essential Salmonid Habitat.

### *Water Quality*

The recommended improvements will not change the effluent disposal. Effluent will still be discharged to the Columbia River; however, improvements to the WWTF should allow the City to consistently comply with the conditions of the NPDES Permit.

The project area lies within the Columbia Plateau Regional Aquifer System. According to the U.S. Geologic Survey website, this system occupies approximately 50,600 square miles and extends across a large part of southeastern and central Washington, a small part of northern Idaho, and northeastern Oregon, including nearly all of Hood River County. According to the U.S. Environmental Protection Agency (EPA), the City of Cascade Locks is not located in a sole source aquifer area. According to the Oregon Water Resources Department website, the project is not located within a Groundwater Restricted Area.

### *Impacts to Groundwater*

The City's NPDES Permit includes a condition that prohibits any adverse impacts on groundwater quality. Therefore, the City may not conduct any activities that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process-related residuals must be managed and disposed of in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR Chapter 340, Division 40).

According to the DEQ, the City's WWTF has a low potential for adversely impacting groundwater quality. Improvements to the WWTF are not anticipated to impact groundwater.

### *Socioeconomic/Environmental Justice*

The population of the City of Cascade Locks as of 2016 is estimated at 1,231. The profile published by the U.S. Census Bureau shows the City is a predominately white community at 91.0 percent, with 2.0 percent Hispanic, 4.0 percent American Indian, 1.0 percent Asian, and 5.0 percent identifying as other. These percentages do not total 100 percent due to changes in Hispanic origin Census questions.

It is not anticipated that elderly or minority populations residing adjacent to the proposed project area will be impacted by the project. No business or residential relocations will be required as part of the proposed project.

It should be noted the City will need to comply with the policies of the Uniform Relocation Assistance and Real Property Acquisition Policies Act if federal funds are utilized to fund system improvements.

### *Air*

According to the DEQ, the City is not in an air quality non-attainment area and the project area will not require an EPA air quality permit. However, construction activities will be subject to any dust or particulate ordinances of Hood River County and the City, as appropriate.

### *Noise*

The proposed wastewater system improvements will not emit additional noise. However, construction activities will create significant intermittent and temporary noise. To minimize

impacts, work will generally be confined to the project area during daylight hours. Construction activities will be subject to any noise ordinance of the County and/or City.

### *Traffic*

During construction, there may be temporary increases in traffic due to construction vehicles. No permanent or long-term impacts to transportation are anticipated as a result of the proposed project.

### *Hazardous Material*

According to the DEQ Environmental Cleanup database, there are five leaking underground storage tanks and 12 cleanup sites within the project area. Of the 12 sites, seven have been cleaned up and require no further action, and the other five are still under investigation. One of the sites requiring further investigation is the WWTF. According to the database, the site is listed as contaminated, needing further investigation. According to the Site Summary Report, the site was first used as a storage and maintenance facility for an electrical utility in 1938. Electrical equipment (including transformers) frequently contained polychlorinated biphenyl (PCB) until the production of PCB was banned in 1977. PCBs typically enter the environment through leaky equipment, illegal dumping, and improper disposal of waste oil from electrical equipment. Anecdotal evidence suggests that sometime in the late 1980s the facility had a large stockpile of transformers and electrical equipment (potentially from the decommissioning of Pyramid Metals: ECSI 5533). The equipment was apparently removed from the property and buried nearby in the vicinity of Herman Creek. If federal funding is utilized to implement this project, further investigation of the site may be required.

If there are repairs to asbestos cement (AC) pipe, the City and contractor will follow OAR 340-248, Asbestos Requirements, when AC pipe is encountered. The City and contractor may initiate consultation with the Occupational Safety and Health Administration prior to construction, if necessary.

### *Summary*

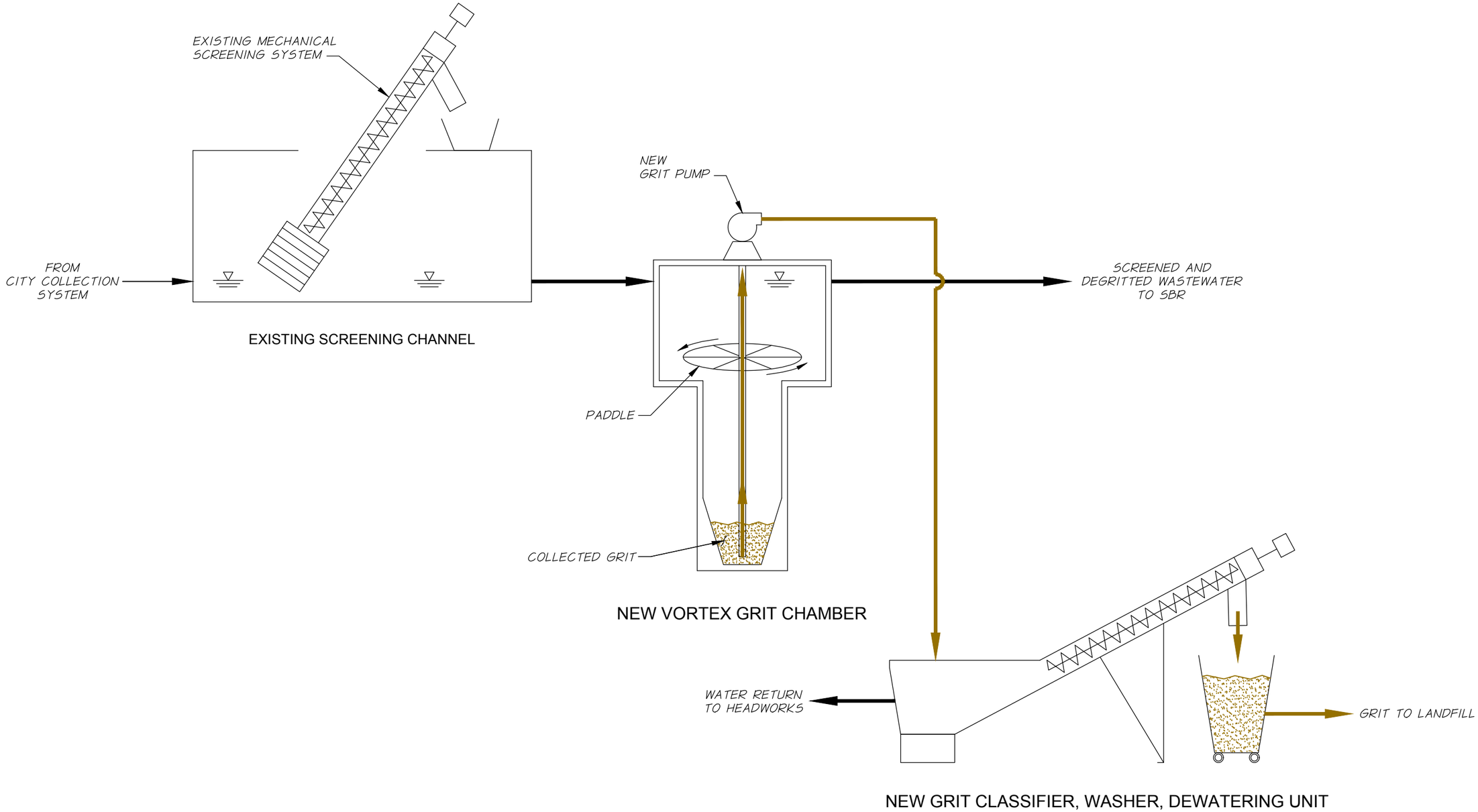
As previously mentioned, this limited environmental review is a brief collection of available information. Should the City decide to move forward with recommended improvements and pursue funding for the project a full Environmental Report will be completed, as needed, in conjunction with funding application(s) to meet specific agency requirements.

## General Discussion

The key to implementing the recommended WWTF improvements is the ability of the City of Cascade Locks to acquire the necessary funding that will allow sewer rates to remain as low as possible. It is probably not possible for the City to complete the identified improvements without seeking funding assistance from both state and federal funding sources. A summary of the estimated costs for recommended WWTF improvements is presented on Figure 5-9. Depending on timing, available funding, and affordability, all or a portion of the recommended WWTF improvement items could be

included as part of an overall wastewater system improvements project that may include the recommended collection system improvements identified in Chapter 3 of this WWFP.

The City of Cascade Locks' WWTF is approximately 19 years old. The typical design life of facility improvements is 20 years. Because the City has had issues in the past and continues to have problems, the City will likely continue to violate the conditions of the NPDES Permit and may be subject to penalties and fines, unless improvements are completed to the WWTF. The identified and recommended improvements, if operated properly and as intended by the design, will provide the City with an efficient treatment system that will allow consistent compliance with the NPDES Permit. Overall, the recommended improvements will provide a much improved and more reliable wastewater treatment system that should serve the City of Cascade Locks for many years.




LEGEND

LIQUID PROCESS STREAM

GRIT PROCESS STREAM

anderson perry & associates, inc.

CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

HEADWORKS IMPROVEMENTS
PROCESS SCHEMATIC

FIGURE
5-1

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**CITY OF CASCADE LOCKS, OREGON**
**HEADWORKS IMPROVEMENTS**
**PRELIMINARY COST ESTIMATE**
**(YEAR 2018 COSTS)**
**July 2017**

| NO. | DESCRIPTION | UNIT | UNIT PRICE | ESTIMATED QUANTITY | TOTAL PRICE |
|---|---|---|---|---|---|
| 1 | Mobilization/Demobilization | LS | $ 35,000 | All Req'd | $ 35,000 |
| 2 | Project Safety/Quality Control | LS | 12,000 | All Req'd | 12,000 |
| 3 | New Vortex-Type Grit Removal System[1] | LS | 360,000 | All Req'd | 360,000 |
| 4 | Building Structure | LS | 60,000 | All Req'd | 60,000 |
| 5 | Process and Yard Piping | LS | 90,000 | All Req'd | 90,000 |
| 6 | Electrical and Controls | LS | 100,000 | All Req'd | 100,000 |
| 7 | Site Work | LS | 36,000 | All Req'd | 36,000 |
| 8 | Painting | LS | 35,000 | All Req'd | 35,000 |
| | | | | **Subtotal Estimated Construction Cost** | $ 728,000 |
| | | | | Contingencies (10% of Estimated Construction Cost) | 73,000 |
| | | | | **Total Estimated Construction Cost (2018 Dollars)** | **$ 801,000** |
| | | | | Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost) | 160,000 |
| | | | | **TOTAL ESTIMATED IMPROVEMENTS COST (2018 DOLLARS)[2]** | **$ 961,000** |

[1] Includes grit chamber, grit chamber equipment, grit pumping system, grit classifier, washer, and dewatering unit.

[2] See Figure 5-9 for a summary of Preliminary Project Costs, including improvements and other project costs.

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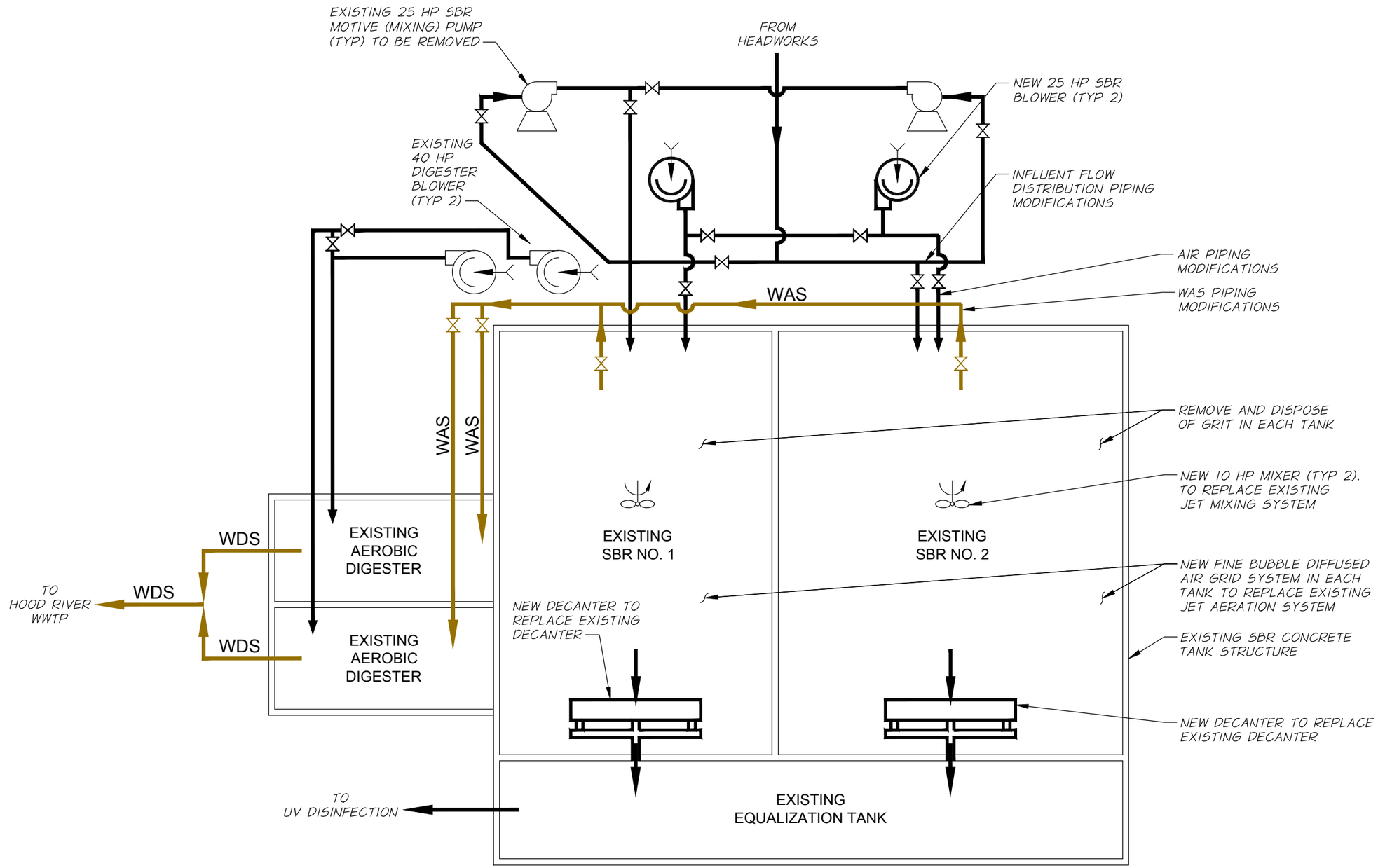
CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

HEADWORKS IMPROVEMENTS
PRELIMINARY COST ESTIMATE

**FIGURE**
**5-2**




## LEGEND

| | | | |
|---|---|---|---|
| | LIQUID PROCESS STREAM | ⋈ | VALVE |
| | SOLIDS PROCESS STREAM | MG | = MILLION GALLONS |
| | AIR STREAM | WDS | = WASTE DIGESTED SLUDGE |
| | PUMP | WAS | = WASTE ACTIVATED SLUDGE |

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CITY OF
**CASCADE LOCKS, OREGON**
**WASTEWATER FACILITIES PLAN**

**SBR IMPROVEMENTS PROCESS SCHEMATIC**

**FIGURE**
**5-3**

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**CITY OF CASCADE LOCKS, OREGON**
**SBR IMPROVEMENTS**
**PRELIMINARY COST ESTIMATE**
**(YEAR 2018 COSTS)**
**July 2017**

| NO. | DESCRIPTION | UNIT | UNIT PRICE | ESTIMATED QUANTITY | TOTAL PRICE |
|---|---|---|---|---|---|
| 1 | Mobilization/Demobilization | LS | $ 60,000 | All Req'd | $ 60,000 |
| 2 | Project Safety/Quality Control | LS | 30,000 | All Req'd | 30,000 |
| 3 | Basin Grit Cleaning, Hauling, and Disposal | LS | 60,000 | All Req'd | 60,000 |
| 4 | Demolition and Equipment Removal | LS | 75,000 | All Req'd | 75,000 |
| 5 | New Air Blowers | LS | 140,000 | All Req'd | 140,000 |
| 6 | New Mechanical Mixers | LS | 135,000 | All Req'd | 135,000 |
| 7 | New Fine Bubble Aeration System | LS | 300,000 | All Req'd | 300,000 |
| 8 | New Effluent Decanters | LS | 135,000 | All Req'd | 135,000 |
| 9 | New Aeration Control System | LS | 55,000 | All Req'd | 55,000 |
| 10 | Process Piping Modifications | LS | 180,000 | All Req'd | 180,000 |
| 11 | Electrical Work | LS | 90,000 | All Req'd | 90,000 |
| 12 | Painting | LS | 45,000 | All Req'd | 45,000 |
| | | | | **Subtotal Estimated Construction Cost** | $ 1,305,000 |
| | | | | Contingencies (10% of Estimated Construction Cost) | 130,500 |
| | | | | **Total Estimated Construction Cost (2018 Dollars)** | **$ 1,435,500** |
| | | | | Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost) | 287,000 |
| | | | | **TOTAL ESTIMATED IMPROVEMENTS COST (2018 DOLLARS)[1]** | **$ 1,722,500** |

[1]See Figure 5-9 for a summary of Preliminary Project Costs, including improvements and other project costs.

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

SBR IMPROVEMENTS
PRELIMINARY COST ESTIMATE

**FIGURE**
**5-4**

**CITY OF CASCADE LOCKS, OREGON**
**ULTRAVIOLET LIGHT DISINFECTION SYSTEM IMPROVEMENTS**
**PRELIMINARY COST ESTIMATE**
**(YEAR 2018 COSTS)**
**July 2017**

| NO. | DESCRIPTION | UNIT | UNIT PRICE | ESTIMATED QUANTITY | TOTAL PRICE |
|---|---|---|---|---|---|
| 1 | Mobilization/Demobilization | LS | $ 15,000 | All Req'd | $ 15,000 |
| 2 | Project Safety/Quality Control | LS | 5,000 | All Req'd | 5,000 |
| 3 | New Ultraviolet Light Disinfection System | LS | 175,000 | All Req'd | 175,000 |
| 4 | Removal and Demolition of Existing Ultraviolet Equipment | LS | 25,000 | All Req'd | 25,000 |
| 5 | Electrical and Controls | LS | 55,000 | All Req'd | 55,000 |
| | | | | **Subtotal Estimated Construction Cost** | $ 275,000 |
| | | | | Contingencies (10% of Estimated Construction Cost) | 27,500 |
| | | | | **Total Estimated Construction Cost (2018 Dollars)** | **$ 302,500** |
| | | | | Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost) | 60,500 |
| | | | | **TOTAL ESTIMATED IMPROVEMENTS COST (2018 DOLLARS)[1]** | **$ 363,000** |

[1]See Figure 5-9 for a summary of Preliminary Project Costs, including improvements and other project costs.

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
ULTRAVIOLET LIGHT DISINFECTION SYSTEM IMPROVEMENTS
PRELIMINARY COST ESTIMATE

**FIGURE**
**5-5**

**CITY OF CASCADE LOCKS, OREGON**
**pH ADJUSTMENT SYSTEM**
**PRELIMINARY COST ESTIMATE**
**(YEAR 2018 COSTS)**
**July 2017**

| NO. | DESCRIPTION | UNIT | UNIT PRICE | ESTIMATED QUANTITY | TOTAL PRICE |
|---|---|---|---|---|---|
| 1 | Mobilization/Demobilization | LS | $ 17,000 | All Req'd | $ 17,000 |
| 2 | Project Safety/Quality Control | LS | 5,000 | All Req'd | 5,000 |
| 3 | New Soda Ash Feed System[1] | LS | 135,000 | All Req'd | 135,000 |
| 4 | Yard and Process Piping | LS | 25,000 | All Req'd | 25,000 |
| 5 | New Building | LS | 70,000 | All Req'd | 70,000 |
| 6 | Electrical and Controls Work | LS | 50,000 | All Req'd | 50,000 |
| 7 | Site Work | LS | 30,000 | All Req'd | 30,000 |
| 8 | Painting | LS | 15,000 | All Req'd | 15,000 |
| | | | | **Subtotal Estimated Construction Cost** | $ 347,000 |
| | | | | Contingencies (10% of Estimated Construction Cost) | 35,000 |
| | | | | **Total Estimated Construction Cost (2018 Dollars)** | **$ 382,000** |
| | | | | Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost) | 76,000 |
| | | | | **TOTAL ESTIMATED IMPROVEMENTS COST (2018 DOLLARS)[2]** | **$ 458,000** |

[1]Includes soda ash feed system, mixing tank and equipment, scale, and chemical loading system.
[2]See Figure 5-9 for a summary of Preliminary Project Costs, including improvements and other project costs.

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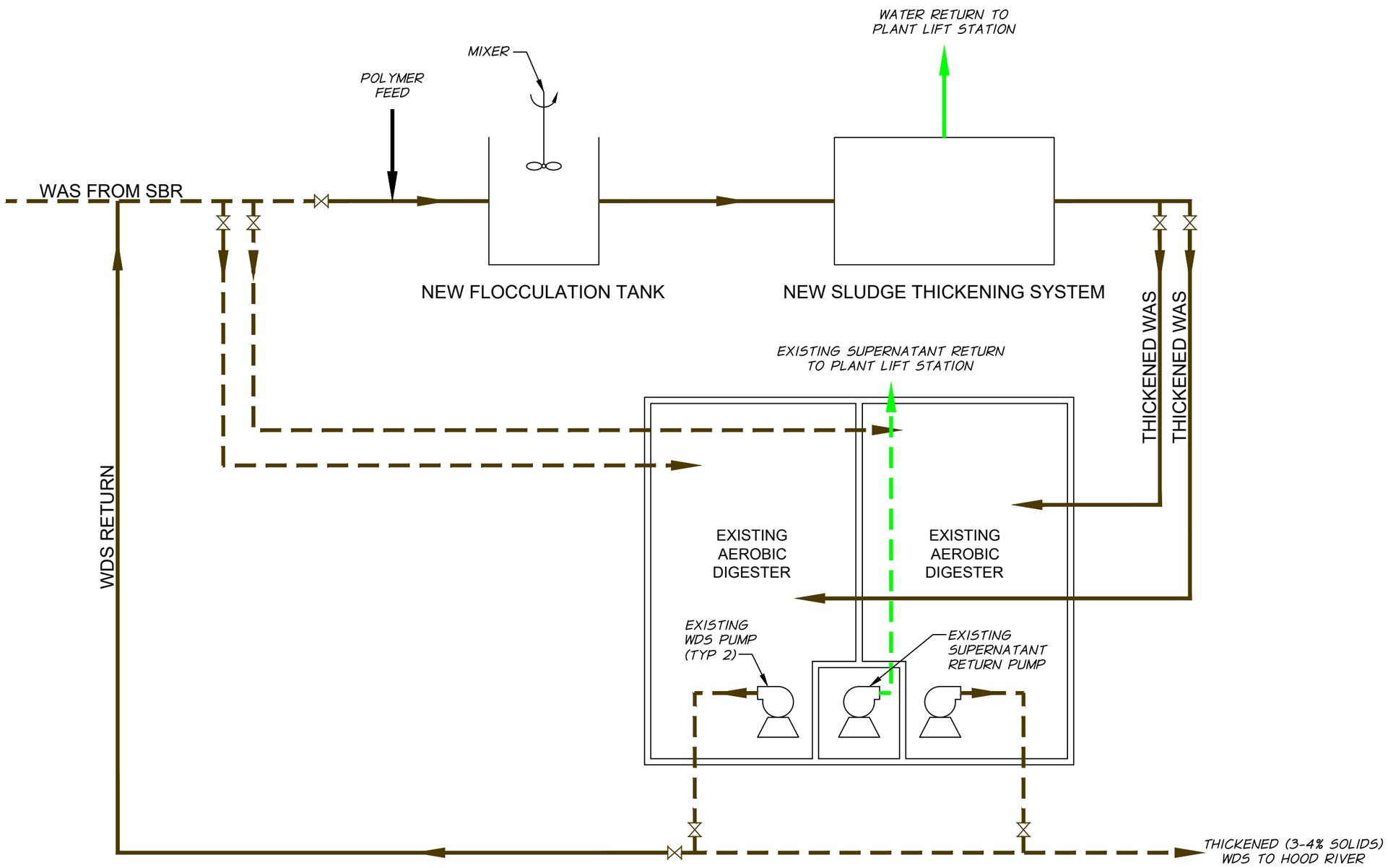
CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

pH ADJUSTMENT SYSTEM
PRELIMINARY COST ESTIMATE

**FIGURE**
**5-6**




## LEGEND

- NEW LIQUID PROCESS STREAM
- EXISTING LIQUID PROCESS STREAM
- NEW SOLIDS PROCESS STREAM
- EXISTING SOLIDS PROCESS STREAM
- NEW POLYMER FEED
- VALVE
- PUMP

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

SLUDGE MANAGEMENT IMPROVEMENTS
PROCESS SCHEMATIC

FIGURE
5-7

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**CITY OF CASCADE LOCKS, OREGON**
**SLUDGE MANAGEMENT IMPROVEMENTS**
**PRELIMINARY COST ESTIMATE**
**(YEAR 2018 COSTS)**
**July 2017**

| NO. | DESCRIPTION | UNIT | UNIT PRICE | ESTIMATED QUANTITY | TOTAL PRICE |
|---|---|---|---|---|---|
| 1 | Mobilization/Demobilization | LS | $ 30,000 | All Req'd | $ 30,000 |
| 2 | Project Safety/Quality Control | LS | 6,000 | All Req'd | 6,000 |
| 3 | New Sludge Thickening System[1] | LS | 225,000 | All Req'd | 225,000 |
| 4 | Sludge Piping Maintenance | LS | 78,000 | All Req'd | 78,000 |
| 5 | New Building | LS | 90,000 | All Req'd | 90,000 |
| 6 | Electrical and Controls Work | LS | 105,000 | All Req'd | 105,000 |
| 7 | Site Work | LS | 35,000 | All Req'd | 35,000 |
| 8 | Painting | LS | 30,000 | All Req'd | 30,000 |
| | | | | Subtotal Estimated Construction Cost | $ 599,000 |
| | | | | Contingencies (10% of Estimated Construction Cost) | 60,000 |
| | | | | **Total Estimated Construction Cost (2018 Dollars)** | **$ 659,000** |
| | | | | Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost) | 132,000 |
| | | | | **TOTAL ESTIMATED IMPROVEMENTS COST (2018 DOLLARS)[2]** | **$ 791,000** |

[1]Includes polymer feed system, flocculation tank and equipment, sludge thickening unit, and thickened sludge pump.

[2]See Figure 5-9 for a summary of Preliminary Project Costs, including improvements and other project costs.

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
SLUDGE MANAGEMENT IMPROVEMENTS
PRELIMINARY COST ESTIMATE

**FIGURE**
**5-8**

## CITY OF CASCADE LOCKS, OREGON
## WASTEWATER FACILITIES PLAN
## RECOMMENDED WASTEWATER TREATMENT FACILITY IMPROVEMENTS
## SUMMARY OF PRELIMINARY COSTS
## July 2017

| | | |
|---|---|---|
| **Estimated Improvements Cost[1]** | | |
| Headworks Improvements | $ | 961,000 |
| Equalization Basin Automatic Flow Control Valve Repair | | 10,000 |
| SBR Improvements | | 1,722,500 |
| UV Light Disinfection System Improvements | | 363,000 |
| pH Adjustment System | | 458,000 |
| Sludge Management Improvements | | 791,000 |
| **Total Estimated Improvements Cost (2018 Dollars)** | **$** | **4,305,500** |
| | | |
| **Other Estimated Project Costs** | | |
| Funding Acquisition | $ | 30,000 |
| Legal and Administration | | 35,000 |
| Labor Standards | | 15,000 |
| Environmental Review Report | | 35,000 |
| Archaeological Report | | 20,000 |
| Cultural Resource Monitoring[2] | | 35,000 |
| Regulatory Agency Permitting, Reporting, and Review Fees | | 15,000 |
| **Total Other Estimated Project Costs (2018 Dollars)** | **$** | **185,000** |
| | | |
| **TOTAL ESTIMATED PROJECT COSTS (2018 DOLLARS)** | **$** | **4,490,500** |

[1] Includes total estimated construction costs and engineering fees.
[2] Assumes a 12-month construction period with one part-time monitor on site.

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
RECOMMENDED WASTEWATER TREATMENT FACILITY IMPROVEMENTS SUMMARY OF PRELIMINARY COSTS

**FIGURE**
**5-9**

# Chapter 6 - Project Financing and Implementation

## General

This chapter evaluates the financial status of the City of Cascade Locks' Sewer Department and outlines options for financing and implementing the proposed wastewater system improvements for the City. A summary of state and federal funding programs is presented, including a review of funding options potentially available to the City for the proposed wastewater system improvements project. To design and construct the proposed improvements, a financing plan that is acceptable to the citizens of the City of Cascade Locks must be developed to complete the improvements. Financing resources will need to include low interest loans coupled with grant funding, if available, to make it feasible for the City to implement the improvements.

Although a detailed analysis of the City's current sewer rate structure is beyond the scope of this Wastewater Facilities Plan (WWFP), some discussion of the existing rate structure, and current and future wastewater system budgets, is included. A summary of potential sewer rate structures to provide project funding is also presented. As a general rule, most utility rate structures include funding for periodic minor system improvements and maintenance items, payroll costs for staff, and a set-aside for future improvements. A summary of the current sewer rate structure is presented hereafter.

## Current Sewer Rates and Revenue

The operation and maintenance (O&M) of the existing wastewater system is financed through the City's annual budget. Revenue is obtained primarily from sewer user and connection fees. The current monthly sewer rates at the time this WWFP was prepared are summarized on Table 6-1.

**TABLE 6-1**
**MONTHLY SEWER RATE INFORMATION**

| | Fixed Up to 5,000 Gallons Per Unit Per Month | Over 5,000 Gallons Per Unit Per Month Per 1,000 Gallons | Fixed Up to 10,000 Gallons Per Unit Per Month | Over 10,000 Gallons Per Unit Per Month Per 1,000 Gallons |
|---|---|---|---|---|
| Residential Sewer [1] | | | 45.40 | 8.77 |
| Commercial[2] | 45.40 | 8.77 | | |
| Public Agency[2] | 45.40 | 8.77 | | |
| Unoccupied Units[3] | | | 22.70 | |
| Demolished Buildings and Vacant Lots | No charge assessed | | | |

*[1]The residential summer water rate is in effect between April 21 and October 19, and a fixed flat rate is charged per month. The residential winter water rate is in effect between October 20 and April 20, and a fixed flat rate is charged per month up to 10,000 gallons of usage. If usage exceeds 10,000 gallons per month, the rate per 1,000 gallons is assessed.*

*[2]The non-residential rate is a fixed flat rate up to 5,000 gallons of usage. If usage exceeds 5,000 gallons per month, the rate per 1,000 gallons is assessed.*

*[3]Unoccupied units must disconnect the water meter to receive a flat rate of one-half the fixed residential flat rate per month.*

The rates were set by Resolution No. 1317, repealing Resolution No. 1005, and were approved on October 27, 2014. A copy of Resolution No. 1317 is presented in Appendix F.

As of September 2016, the City of Cascade Locks billed the following number of sewer service accounts. The data presented on Table 6-2 were provided by the City.

**TABLE 6-2**
**2016 SEWER SERVICE ACCOUNTS**

| Account Type | Total Number of Accounts |
|---|---|
| Residential | 386 |
| Commercial | 40 |
| Public | 17 |
| **TOTAL** | **443** |

Revenue generated from the City's sewer rates and connection fees is presented on Table 6-3. Revenue has increased at an average annual rate of approximately 2.8 percent per year from 2008-09 through 2015-16. Using the fiscal year 2015-16 sewer revenue amount of $373,736 and assuming 443 accounts, the City currently has average monthly sewer revenue of approximately $46.37 per residential account, $264.35 per commercial account, and $157.16 per public account.

**TABLE 6-3**
**SEWER DEPARTMENT REVENUE**

| Fiscal Year | Revenue from Sewer Service Fees | Interest Income, Reimbursable Projects, and Miscellaneous Income | Total Sewer Revenue |
|---|---|---|---|
| 2008-09 | $333,746 | $4,050 | $333,746 |
| 2009-10 | $343,633 | $670 | $344,303 |
| 2010-11 | $358,128 | $974 | $359,102 |
| 2011-12 | $336,731 | $1,292 | $338,023 |
| 2012-13 | $352,768 | $6,586 | $359,354 |
| 2013-14 | $373,804 | $320 | $374,124 |
| 2014-15 | $358,461 | $11,266 | $369,727 |
| 2015-16 | $373,736 | $32,583 | $406,319 |
| 2016-17[1] | $360,000 | $11,550 | $371,550 |

[1] *City of Cascade Locks' fiscal year adopted budget.*

## Current Financial Status

The annual revenue received and the cost of operating and maintaining the City's wastewater system are summarized on Figure 6-1. The costs presented were obtained from the City's audited financial statements and include all costs for the wastewater system, such as O&M, personnel services, materials and services, capital outlay, capital reserves, and debt service. These data are presented to provide insight into the general costs required to operate the City's existing wastewater system.

## Historical and Projected Budget Trends

The average annual cost over eight years of operating and maintaining the City of Cascade Locks' wastewater treatment and collection system was $276,771. Annual wastewater system O&M costs, not including inter-fund transfers, have varied from a low of approximately $241,104 in fiscal year 2009-10

to $334,800 in fiscal year 2012-13, with the highest O&M costs being projected in the adopted budget for fiscal year 2016-17 at $366,386. The City sewer budget, showing revenues and expenditures from fiscal year 2007-08 through 2015-16, is shown on Figure 6-2. Based on information obtained from the City, the O&M costs are associated with personnel services, materials and services, capital outlay, inter-fund transfers to debt service, and the capital reserve fund. These costs are based on the audited financial statements and the fiscal year 2016-17 adopted budget.

To project future costs, an inflation rate of 5 percent annually was assumed. The proposed wastewater system improvements are assumed to be constructed in the budget year 2018-19. As shown on Figure 6-2, based on historical and budgeted expenditures, the City's estimated O&M costs for 2018-19 will be approximately $375,000. This does not include any debt service associated with loans required to construct the proposed improvements. Further discussion on funding and debt service options is presented later in this chapter.

For the purpose of the analysis, sewer accounts have been separated into five types based on the City's billing methodology: residential, commercial, public agency, disconnection, and demolished buildings/vacant lots, as illustrated on Table 6-4.

**TABLE 6-4**
**2016 SEWER ACCOUNTS REVENUE SUMMARY**

| Account Type | Number of Accounts | Revenue | Percent of Revenue |
|---|---|---|---|
| Residential | 386 | $214,786 | 57.5 |
| Commercial | 40 | $126,889 | 34 |
| Public Agency | 17 | $ 32,061 | 8.5 |
| Disconnection | 0 | $0 | 0 |
| Demolished Buildings and Vacant Lots | 0 | NC[1] | NC |
| **TOTAL** | **443** | **$373,736** | **100%** |

[1]*No charge assessed.*

## Existing Debt

The City has a U.S. Department of Agriculture Rural Development (RD) bond serviced by wastewater system revenues. The bond was created in 1998 with a total principal amount of $954,000, a 40-year repayment period, and an annual percentage rate of 4.75 percent compounded annually. The current annual loan payment amount is approximately $18,479 in principal and $35,232 in interest, for a total annual debt service payment of $57,311, with approximately $723,244 in principal remaining.

## State and Federal Grant and Loan Programs

Financing of public improvements projects is a complex issue that must be resolved before a project can move beyond the planning stage. The cost of providing local financing for wastewater system improvements often exceeds the financial capability of local businesses and residents. Federal and state financing programs are in place that may allow the City of Cascade Locks to access low interest loans and, possibly, grants. Federal and state programs are designed to keep monthly user rates at an affordable level, simultaneously making the improvements project possible.

A number of state and federal grant and loan programs can provide assistance for municipal improvement projects to Oregon cities. These programs offer various levels of funding aimed at different types of projects. These include programs administered by RD, the U.S. Economic Development Administration (EDA), Business Oregon, the Oregon Department of Environmental Quality (DEQ), and others. These agencies can provide low interest loan funding, and possibly grant funding, to assist rural communities with public works projects. Most of these agencies will require sewer rates that equal or exceed the City of Cascade Locks' Affordability Index of approximately $42 per month to support a loan for wastewater system improvements, both as a condition of receiving monies and prior to being considered for grant funds. The Affordability Index is used by state funding agencies to determine typical rate requirements in relation to the City's median household income (MHI).

The following section briefly summarizes the primary funding programs available to assist the City of Cascade Locks with a wastewater system improvements project. It should be noted the monthly user rates discussed in this section can represent a combination of monthly usage fees and taxes.

## Summary of Federal Grant and Loan Programs

### *U.S. Department of Agriculture Rural Development*

This agency can provide financial assistance to communities with a population under 10,000 through both loans and direct grants. The interest rate for these bonds is dependent on the MHI of the community and other factors, and varies from year to year based on other economic factors nationally. The fixed interest rate is generally in the 2.0 to 3.0 percent range, with a repayment period of up to 40 years. For the City of Cascade Locks, the reported MHI for 2015 is $40,000, which will likely qualify the City for low interest rates with a repayment period of up to 40 years through this program. Application for this type of funding is a fairly lengthy process involving development of an Environmental Report and a detailed funding application.

The agency generally requires communities to establish average residential user costs in the range of similar systems with similar demographics before the community qualifies for grant funds. Typical monthly cost requirements are in the $45 to $50 per month range. It should be noted that loans without grant funds may be acquired from RD that may not require rates to reach this level, depending on the results of an RD funding analysis. The user costs must provide sufficient revenue to pay for all system O&M costs and pay for the local debt service incurred as a result of the project. All project costs above this level may be paid for by grant funds, up to given limits, which are usually not more than 45 percent of the total project cost. The objective of the RD loan/grant program is to keep the cost for utilities in small, rural communities at a level that is similar to what other communities are paying.

Another of the agency's requirements is that loan recipients establish a reserve fund of 10 percent of the bond repayment during the first 10 years of the project, which can make the net interest rate higher if such a reserve does not already exist. The RD program requires either revenue or general obligation bonds to be established through the agency for the project (refer to the Local Financing Options information later in this section for further discussion). These bonds can usually be purchased for a period of 40 years if grant funding is also received. A loan and possibly grant funds from RD are likely options for the City of Cascade Locks to implement wastewater system improvements and are evaluated later in this chapter.

### *U.S. Economic Development Administration*

EDA grant and loan monies are available to public agencies to fund projects that stimulate the economy of an area, and the overall goal of the program is to create or retain jobs. The EDA has invested a great deal of money in Oregon to fund public works improvements projects in areas where new industries are locating or planning to locate in the future. In addition, the agency has a program known as the Public Works Impact Program to fund projects in areas with extremely high rates of unemployment. This program is targeted toward creating additional jobs and reducing the unemployment rate in the area. Unless the City's wastewater system improvements can be linked directly to industrial expansion or job retention, the City is not likely to be in a competitive position to receive funding under the EDA.

Hardship grants may also be available through this program for rural communities that have:

1. Fewer than 3,000 residents with no access to a centralized wastewater treatment/collection system or need improvements to on-site systems.
2. A community per capita income less than 80 percent of the national average.
3. An unemployment rate exceeding the national average by one percentage point or more.

The City of Cascade Locks may meet these criteria, so a hardship grant through the EDA may be available.

## Summary of State Funding Programs

### *Business Oregon Finance Programs*

#### Special Public Works Fund

The Special Public Works Fund (SPWF) program was established by the Oregon Legislature in 1985 to provide primarily loan funding for municipally owned infrastructure and other facilities that support economic and community development. Loans and grants are available to municipalities for planning, designing, purchasing, improving, and constructing municipally owned facilities, replacing owned essential community facilities, and emergency projects as a result of a disaster.

For design and construction projects, loans are primarily available; however, grants are available for projects that will create and/or retain traded-sector jobs. A traded-sector industry sells its goods or services into nationally or internationally competitive markets. Loans range in size from less than $100,000 to $10 million. The SPWF is able to offer very attractive interest rates that reflect tax-exempt market rates for very good quality creditors. Loan terms can be up to 25 years or the useful life of the project, whichever is less. Grants are limited to projects associated with job creation/retention. The maximum grant award is $500,000 or 85 percent of the project cost, whichever is less. The grant amount per project is based on up to $5,000 per eligible job created or retained. Unless the City of Cascade Locks can tie the needed improvements to job creation, the SPWF is not a likely funding source for wastewater system improvements.

## Water/Wastewater Financing Program

This is a loan and grant program that provides for the design and construction of public infrastructure when needed to ensure compliance with the Safe Drinking Water Act (SDWA) or the Clean Water Act (CWA). To be eligible, a system must have received, or is likely to soon receive, a Notice of Non-Compliance by the appropriate regulatory agency associated with the SDWA or the CWA.

While this is primarily a loan program, grants are available for municipalities that meet eligibility criteria. The loan/grant amounts are determined by a financial analysis of the applicant's ability to afford a loan (debt capacity, repayment sources, current and projected utility rates, and other factors). The maximum loan term is 25 years or the useful life of the infrastructure financed, whichever is less. The maximum loan amount is $10 million per project, is determined by financial review, and may be offered through a combination of direct and/or bond-funded loans. Loans are generally repaid with utility revenues or voter-approved bond issues. A limited tax general obligation pledge may also be required. "Creditworthy" borrowers may be funded through the sale of state revenue bonds.

The maximum grant is $750,000 per project based on a financial analysis. An applicant is not eligible for grant funds if the applicant's annual MHI is equal to or greater than 100 percent of the state average MHI for the same year. The State of Oregon's five-year average annual MHI through 2015 was $51,243. The City of Cascade Locks' five-year average annual MHI through 2015 was $40,000, which is 71.8 percent of the statewide MHI. The Water/Wastewater program is a potential funding source for the proposed wastewater system improvements project.

## Community Development Block Grant Program

The primary objective of the Community Development Block Grant (CDBG) program is the development of viable (livable) urban communities by expanding economic opportunities and providing decent housing and a suitable living environment principally for persons of low and moderate income (LMI).

This is a federally funded grant program. The state receives an annual allocation from Housing and Urban Development for the CDBG program. Grant funding is subject to the applicant need, availability of funds, and any other restrictions in the state's Method of Distribution (i.e., program guidelines). It is not possible to determine how much, if any, grant funds may be awarded prior to an analysis of the application and financial information.

Eligibility for the CDBG program requires a low to moderate percent income of equal to or greater than 51 percent. The State of Oregon's 2015 MHI was $51,243. The City of Cascade Locks' percentage of LMI is 44.50 percent, based on the Business Oregon 2015 Low/Moderate Income Summary Data used by the CDBG program, so funding from the CDBG program does not appear to be available to the City of Cascade Locks at present. It is important to note these data are updated annually and should be monitored to see if the City becomes eligible for CDBG program funds in future years.

It is possible to request a Local Income Survey process through Business Oregon. If authorized, this survey could document eligibility for the CDBG program.

#### For Business Oregon Programs - Contact Regional Development Officer

Since program eligibility and funds availability may change from year to year, potential applicants are encouraged to contact their respective Regional Development Officer to obtain the most accurate and up-to-date information for each program.

### *Oregon Department of Environmental Quality*

#### Clean Water State Revolving Fund Program

This program, administered by the DEQ, provides low interest rate loans to public agencies for the planning, design, and construction of various projects that prevent or mitigate water pollution (e.g., wastewater treatment facilities [WWTFs]), as well as for some publicly owned estuary management and non-point source control projects. Priority in the agency's ranking process is always given to projects addressing documented water quality problems and health hazards.

Under the Clean Water State Revolving Fund (CWSRF) program rules, interest rates on all standard design and/or construction loans are set at 65 percent of the municipal bond rate as of the quarter preceding signing of the loan agreement. These percentages vary from 25 to 55 percent of the bond rate depending on the length of the repayment period. In 2016, loans for design and construction for small communities had an interest rate that varied from 1.14 to 1.30 percent, with repayment of 15 years, or up to 30 years, depending on the MHI and other factors. In addition, fees were assessed to cover program administration costs by the DEQ. A servicing fee of 0.5 percent of the outstanding balance is collected annually, and a loan reserve equal to 50 percent of the annual debt service is also to be set aside in a separate fund. This program has also implemented measures for principal forgiveness or hardship grants to be allocated to cities in combination with loans. The DEQ CWSRF program is an attractive low interest loan and potential grant source for the City of Cascade Locks, although priority in the agency's ranking process would need to be sought by the City.

There are multiple funding scenarios available through the CWSRF program. Two are evaluated later in this chapter: a design/construction loan with an up to 30-year repayment period, and a bond purchase option with a 30-year repayment period. Both scenarios would provide design/ construction funding.

## Funding Program Summary

It appears that more than one funding source is available to the City, potentially including the Business Oregon Water/Wastewater program, the DEQ CWSRF program, and the U.S. Department of Agriculture RD program. These programs appear to be sources that can provide the funds needed to potentially make the proposed improvements financially feasible for the City.

It is important for the City to consult with funding agencies early in the project development stages to ascertain under which funding programs the City would be eligible to receive funding for their proposed

improvements, and understand which funding programs would provide the best funding package for the proposed improvements. This consultation with funding agencies may be done at a One Stop meeting, which is described in more detail later in this chapter. The remainder of this chapter focuses on evaluating loan capacities and funding options for the City's proposed wastewater system improvements project.

## Preliminary Equivalent Residential Unit Analysis

When projecting future revenue for a wastewater system, an Equivalent Residential Unit (ERU) analysis is usually completed. One ERU is intended to represent the average residential wastewater flow for a "typical" user. As an example, generally each residential connection in the City of Cascade Locks would represent one ERU. A commercial or industrial connection user with wastewater flows similar to the average residential flow would also be considered one ERU. A commercial connection such as a café, with three times the typical wastewater flows as an average residential sewer connection, would be considered three ERUs.

The City of Cascade Locks does not bill wastewater accounts based on usage but, instead, bills a flat rate per connection type. Residential accounts are billed the base charge, up to 10,000 gallons per month. Commercial and public accounts are billed the base charge, up to 5,000 gallons per month. Disconnection accounts are charged one-half of the base rate only if they disconnect the water meter. Vacant land and demolished buildings are not charged at this time. For the purposes of this WWFP, the ERUs have been estimated based on revenue generated in 2016 for each type of account and compared with revenues from the residential accounts. A comparison analysis was used to determine ERUs in each category. A total to 614 ERUs was used in this WWFP to complete the Preliminary Sewer Rate Analysis for Loan Capacity (Figure 6-3), discussed later in this chapter. The formulas used to estimate the number of ERUs are illustrated on the following table.

**TABLE 6-5**
**ERU ESTIMATION FORMULA**

| | |
|---|---|
| **Residential Calculation** | Annual Residential Revenue ÷ Number of Accounts ÷ 12 = Average Monthly Revenue, Assumed 1 ERU |
| **Public and Commercial Calculation** | Annual Account Type Revenue ÷ Number of Accounts ÷ 12 = Average Account Type Monthly Revenue<br>Average Account Type Monthly Revenue ÷ Residential Assumed 1 ERU x Number of Accounts = ERUs |

The City of Cascade Locks has 443 sewer accounts and an undetermined number of disconnected accounts. The ERU determination is intended to equitably distribute wastewater system costs among all users. The ERU determination helps funding agencies determine the maximum loan (debt) amount a city can incur prior to being considered for grant funds for a wastewater system improvements project. The analysis presented hereafter for the City's future sewer rate revenue and estimated loan capacity is based on the preliminary determination of the estimated ERUs.

## Debt Repayment Options and Loan Capacity

### *Debt Repayment Using Sewer User Fees*

One method for repayment of loans is through increased sewer user fees. Sewer user fee increases would be determined by the annual debt service cost of the proposed improvements selected by

the City of Cascade Locks and annual O&M costs for the WWTF and collection system. Figure 6-3 was prepared to determine the City's capacity for repayment of loans with sewer user fees given different funding options (discussed below). Several assumptions were made to develop the analysis presented on Figure 6-3.

1. Monthly sewer rates are for residential, commercial, public, and vacation/disconnection users. It is assumed the vacation/disconnection users pay $22.70 or one-half per month less than the sewer base charge to still cover sewer debt service.
2. O&M costs for 2016-17 were set at $366,386 per year. For the purpose of the analysis, it has been assumed the City would put $25,000 in a replacement fund account to pay for future equipment replacement, etc. Therefore, the total estimated operation, maintenance, and replacement cost for 2018-19 including a 5 percent inflation percentage each year and the replacement fund is $400,000. The assumed total annual expenditures without existing debt service are $400,000. The year 2018 was used because this is the time period in which the project construction would most likely begin.
3. Ten percent of the net annual funds available to service debt were set aside under the RD scenario to create a reserve account in accordance with RD requirements. Business Oregon does not require reserve funds to be set aside.

### *Debt Repayment Using Property Tax Revenue*

Under the Oregon Property Tax Limitation-Measure 5, property tax rates can be used to repay wastewater system improvements costs through property tax revenues. Figure 6-4 lists the increases in property tax rates required to finance loan amounts solely with property taxes.

Debt repayment may also be achieved by some combination of sewer user fees and property taxes.

## Project Funding Options

### *General*

Of the various funding programs, the most likely sources of funding for the proposed wastewater system improvements project appear to be the Business Oregon Water/Wastewater program, RD, or the DEQ CWSRF program. To complete all recommended improvements (main lift station, high priority collection system, and WWTF), grant funds coupled with low interest loan funds will most likely need to be acquired. It is recommended the City thoroughly investigate potential funding sources, as previously described, to ensure the best funding package is obtained for the project. Actual funding amounts and breakdowns will be based on a financial review completed by each agency and could vary from the estimated amounts shown herein. The following scenarios are worst-case as they are based on the assumption that all recommended improvements would be completed and funded entirely through a loan. Other potential funding measures may be available to the City to reduce the potential rate increase impact on City customers. It will be important for the City to work directly with the Business Oregon Regional Development Officer, the RD Area Specialist, and the DEQ Finance Administrators to evaluate these options.

## *100 Percent Project Funding Scenarios*

### Scenario A - Clean Water State Revolving Fund 30-Year Bond Purchase

Scenario A considers funding the entire proposed project with a 30-year bond purchase through the CWSRF. The interest rate effective between July 1 and September 30, 2017, is 1.48 percent with an annual fee amount of 0.5 percent of the outstanding balance. If the City were to obtain a bond for the entire 2018 proposed project cost of $5,274,500 from the CWSRF, then, as shown on Figure 6-3, this would equate to an approximate average monthly sewer rate of $91 to $92 per ERU, which is likely not affordable for City residents and businesses. Under this alternative, the City would pay approximately $1,147,000 in interest over the life of the bond.

### Scenario B1 - Clean Water State Revolving Fund 20-Year Design/Construction Loan

Scenario B1 considers funding the entire proposed project with a 20-year design/construction loan through the CWSRF. The interest rate effective between July 1 and September 30, 2017, is 1.48 percent with an annual fee amount of 0.5 percent of the outstanding balance. As shown on Figure 6-3, for the City to fund the entire 2018 proposed project cost of $5,274,500 through the CWSRF program, the City would need to set sewer rates over $102 per month per ERU, which would likely not be affordable for City residents and businesses. Under this scenario, the City would pay approximately $759,000 in interest over the life of the loan.

### Scenario B2 - Clean Water State Revolving Fund 30-Year Design/Construction Loan

Scenario B2 considers funding the entire proposed project with a 30-year design/construction loan through the CWSRF. The interest rate effective between July 1 and September 30, 2017, is 1.48 percent with an annual fee amount of 0.5 percent of the outstanding balance. If the City were to obtain a loan for the entire 2018 proposed project cost of $5,274,500 from the CWSRF, then, as shown on Figure 6-3, this would equate to an approximate average monthly sewer rate of $91 to $92 per ERU, which is likely not affordable for City residents and businesses. Under this alternative, the City would pay approximately $1,147,000 in interest over the life of the loan.

### Scenario C - Rural Development 40-Year Design/Construction Loan

Scenario C considers funding the entire proposed project with a 40-year design/construction loan through RD. As of July 2017, the current fixed interest rate is 2.625 percent, which may change depending on when the loan is funded. If the City were to obtain a loan for the entire 2018 proposed project cost of $5,274,500 from RD, then, as shown on Figure 6-3, this would equate to an approximate average monthly sewer rate of $94 per ERU, which is likely not affordable for City residents and businesses. Under this alternative, the City would pay approximately $3,315,000 in interest over the life of the loan.

### Scenario D - Business Oregon Water/Wastewater Funds 25-Year Design/ Construction Loan

Scenario D considers funding the entire proposed project with a loan from the Business Oregon Water/ Wastewater program. As of July 2017, the current fixed interest rate is 3.56 percent, which may change depending on when the project is funded. As shown on Figure 6-3, for the City to fund the entire 2018 proposed project cost of $5,274,500 through the Business Oregon program, sewer rates would need to be set in excess of $104 per month per ERU, which is likely not affordable for City residents and businesses.

## *Prioritized Funding Options*

Based on the funding available and established priorities, there may be an option to separate and/or bundle the recommended improvements based on the City's prioritized needs. The recommended improvements may be packaged to be affordable, based on priorities and available funding. Refer to Table 6-6 for various options potentially available under this concept.

## TABLE 6-6
## IMPROVEMENTS PRIORITIZATION SCENARIOS FUNDING COMPARISON

| Improvements Prioritization Included Elements | Estimated Improvements Cost | Estimated Other Costs | Estimated Total Improvements Costs | Funding Scenarios[1,2] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Business Oregon Water/ Wastewater Program 25-Yr Loan | Estimated Monthly Rate | DEQ CWSRF 20-Yr Loan | Estimated Monthly Rate | DEQ CWSRF 30-Yr Bond/Loan | Estimated Monthly Rate | RD 40-Yr Loan | Estimated Monthly Rate | Business Oregon SPWF | Business Oregon CDBG |
| pH Adjustment System (PA) | $458,000 | $185,000 | $643,000 | $643,000 | $67 | $643,000 | $67 | $643,000 | $65 | $643,000 | $66 | TBD | None |
| PA and High Priority Collection System Improvements (CSI) | $1,242,000 | $185,000 | $1,427,000 | $1,427,000 | $74 | $1,427,000 | $73 | $1,427,000 | $70 | $1,427,000 | $70 | TBD | None |
| PA, CSI, and Headworks (HW) | $2,203,000 | $185,000 | $2,388,000 | $2,388,000 | $81 | $2,388,000 | $81 | $2,388,000 | $76 | $2,388,000 | $76 | TBD | None |
| PA, CSI, HW, and Flow Control Valve Repair (FCV) | $2,213,000 | $185,000 | $2,398,000 | $2,398,000 | $81 | $2,398,000 | $81 | $2,398,000 | $75 | $2,398,000 | $76 | TBD | None |
| PA, CSI, and Sequencing Batch Reactor (SBR) | $2,964,500 | $185,000 | $3,149,500 | $3,149,500 | $88 | $3,149,500 | $86 | $3,149,500 | $79 | $3,149,500 | $81 | TBD | None |
| PA, CSI, HW, FCV, and SBR | $3,935,000 | $185,000 | $4,120,000 | $4,120,000 | $96 | $4,120,000 | $94 | $4,120,000 | $85 | $4,120,000 | $87 | TBD | None |
| PA, CSI, HW, FCV, SBR, and Ultraviolet (UV) Light Disinfection | $4,298,500 | $185,000 | $4,483,500 | $4,483,500 | $98 | $4,483,500 | $97 | $4,483,500 | $87 | $4,483,500 | $89 | TBD | None |
| PA, CSI, HW, FCV, SBR, UV, and Sludge Management | $5,089,500 | $185,000 | $5,274,500 | $5,274,500 | $105 | $5,274,500 | $103 | $5,274,500 | $91 | $5,274,500 | $94 | TBD | None |

[1] *Depending on the selected funding package, monthly rates may increase as shown above and on Figure 6-3, or annual taxes may increase as shown on Figure 6-4, or a combination of monthly rates and taxes may also be used.*

[2] *For the purpose of this financial analysis, it is assumed the City would acquire funding only from loans.*

*TBD = To be determined*

### *Project One Stop Meeting*

If the City chooses to finance the proposed wastewater system improvements project through funding sources administered by Business Oregon, a One Stop meeting must be scheduled. The One Stop meeting provides a forum to evaluate funding opportunities and find the most suitable funding package for the City. After the One Stop meeting with representatives of the major funding agencies, Business Oregon and/or RD may invite the City to submit a funding application to the preferred funding program identified by Business Oregon.

## Local Financing Options

Regardless of the ultimate project scope and agency from which loan and grant funds are obtained, the City may need to develop authorization to incur debt, i.e., bonding, for the needed project improvements. The need to develop authorization to incur debt depends on funding agency requirements and provisions in the City Charter. RD requires a city to obtain authorization to incur debt.

There are generally two options a city may use for its bonding authority: general obligation bonds and revenue bonds. General obligation bonds require a vote of the people to give the City the authority to repay the debt service through tax assessments, sewer rate revenues, or a combination of both. The taxing authority of the City provides the guarantee for the debt. Revenue bonds are financed through revenues of the wastewater system. Authority to issue revenue bonds can come in two forms. One would be through a local bond election similar to that needed to sell a general obligation bond, and the second would be through City Council action authorizing the sale of revenue bonds, if the City Charter allows. If more than 5 percent of the registered voters do not object to the bonding authority resolution during a 60-day remonstrance period, the City would have authority to sell these revenue bonds.

The RD program accepts either revenue bonds or general obligation bonds. Bonding is not typically required for the Business Oregon and CWSRF programs. Due to current tax measure limitations in the State of Oregon, careful consultation with experienced, licensed bonding attorneys needs to be made if the City of Cascade Locks begins the process of obtaining bonding authority for the proposed wastewater system improvements. It would be wise for the City to consult its City Charter and City attorney to see if debt for the wastewater system can be assumed.

## Project Implementation

For the City of Cascade Locks to successfully implement the selected wastewater system improvements presented herein, the City will need to coordinate directly with the DEQ, RD, and Business Oregon to aggressively pursue federal, state, and potentially local financing opportunities provided through low interest loans and potential grants. It is recommended the City pursue funding for the full project, to maximize potential grant and low interest loan opportunities.

The City of Cascade Locks needs to perform the following action items and implementation steps to implement the proposed wastewater system improvements project. The steps outlined are general in nature and include only the major steps that need to be undertaken.

### *Action Items*

1. The City needs to consult with Business Oregon and set up a One Stop meeting to initiate funding discussions.
2. Chapters IX and X of the City of Cascade Locks' Charter regulate financing of the sewage disposal system and limits indebtedness, respectively. To successfully fund a wastewater system improvements project, the City will need to maintain good communications with City residents. A bond election may also be necessary if RD funding is sought. Once a debt mechanism has been selected (revenue bond or general obligation bond), a bonding attorney should be consulted and the appropriate resolution paperwork should be prepared and considered for implementation.
3. The City will need to hold public information meetings to inform its citizens of the needs and scope of the project, to answer questions, and to generate support for the required sewer rate increase.

## Implementation Steps

Should the City wish to proceed with a wastewater system improvements project, the following plan outlines the key steps the City would need to undertake to proceed with project implementation.

**TABLE 6-7**
**IMPLEMENTATION PLAN AND SCHEDULE**

| Item No. | Implementation Item | Time Frame |
|---|---|---|
| 1 | Submit draft WWFP to agencies for review. | October 31, 2016 |
| 2 | Finalize and adopt the WWFP. | August 2017 |
| 3 | Initiate discussions with the DEQ, Business Oregon, RD, and other appropriate funding agencies. | Fall 2017 |
| 4 | Consult with Business Oregon and attend a One Stop meeting with funding agencies. | Fall 2017 |
| 5 | Conduct public information meeting(s), as required. | Fall 2017 |
| 6 | Prepare and submit funding application(s) to appropriate agency(ies). | Winter 2017/2018 |
| 7 | Hold a public vote authorizing additional indebtedness, if required. | Winter/Spring 2018 |
| 8 | Complete and submit the necessary Environmental Report. | Summer 2018 |
| 9 | Funding agency review of application(s). | Summer 2018 |
| 10 | Finalize project funding. | Fall 2018 |
| 11 | Conduct public information meeting(s), as required. | Fall 2018 |
| 12 | Environmental permitting process. | Winter 2018 to Spring 2019 |
| 13 | Complete project design of system improvements. | Winter 2018 to Summer 2019 |
| 14 | Submit draft design documents for agency review. | Summer 2019 |
| 15 | Advertise, bid, and award construction project. | Fall 2019 |
| 16 | Project construction, startup, and completion. | Fall 2019 to Spring 2021 |

The key to implementing part or all of the City of Cascade Locks' proposed wastewater system improvements project is the City's ability to acquire low interest loan and grant funds. The City will have to work closely with its citizens to inform them of the system needs and the necessity for increased sewer user costs. It is likely not possible for the City to complete the identified improvements without

seeking funding assistance from both state and federal funding sources. Depending on the scope of improvements and the ultimate funding package selected, the City may need to plan on average user costs being in the range of approximately $91 to $105 per month, or annual property taxes increasing to approximately $264 to $326 per $100,000 of tax assessed value, or some combination of the two.

**CITY OF**
**CASCADE LOCKS, OREGON**
**HISTORICAL SEWER SYSTEM FUNDS**

| Fiscal Year | Revenue | | Expenditures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sewer Fees Revenue | Additional Revenue[1] | Personnel Services[2] | Materials and Services[3] | Capital Outlay | Transfers to Capital Reserve | Total O&M[4] Expenditures | Annual RD[5] Debt Service | Transfer to Sewer OEDD[6] Debt Service | Total Expenditures | Net Fund Balance[7, 8] |
| 2008-09 | $333,746 | $4,050 | $68,666 | $166,695 | $0 | $36,074 | $271,435 | $53,711 | $76,167 | $401,313 | ($63,517) |
| 2009-10 | $343,633 | $670 | $75,088 | $162,171 | $3,845 | $0 | $241,104 | $53,711 | $118,147 | $412,962 | ($68,659) |
| 2010-11 | $358,128 | $974 | $58,307 | $185,823 | $0 | $28,000 | $272,130 | $53,711 | $0 | $325,841 | $33,261 |
| 2011-12 | $336,731 | $1,292 | $36,653 | $185,538 | $5,031 | $66,000 | $293,222 | $53,711 | $31,757 | $378,690 | ($40,667) |
| 2012-13 | $352,768 | $6,586 | $47,333 | $221,467 | $0 | $66,000 | $334,800 | $53,711 | $24,641 | $413,152 | ($53,798) |
| 2013-14 | $373,804 | $320 | $55,010 | $192,785 | $0 | $29,770 | $277,565 | $53,711 | $0 | $331,276 | $42,848 |
| 2014-15 | $358,461 | $11,266 | $32,181 | $190,543 | $2,572 | $50,000 | $275,296 | $77,711 | $0 | $353,007 | $16,720 |
| 2015-16 | $373,736 | $32,583 | $35,341 | $209,343 | $3,700 | $80,000 | $328,384 | $77,711 | $0 | $406,095 | $224 |
| 2016-17[9] | $360,000 | $11,550 | $34,320 | $218,779 | $13,000 | $100,287 | $366,386 | $77,711 | $0 | $444,097 | ($72,547) |

[1]Additional revenue includes interest income, reimbursable projects, and miscellaneous income.
[2]Includes sewer and administration personnel services.
[3]Includes sewer and administration materials and services.
[4]O&M = operation and maintenance.
[5]RD = Rural Development
[6]OEDD = Oregon Economic Development Department.
[7]Parentheses indicate a deficit in net operating income.
[8]Net fund balance does not include annual cash carryover or capital reserve transfers into fund.
[9]2016-17 City of Cascade Locks adopted budget.

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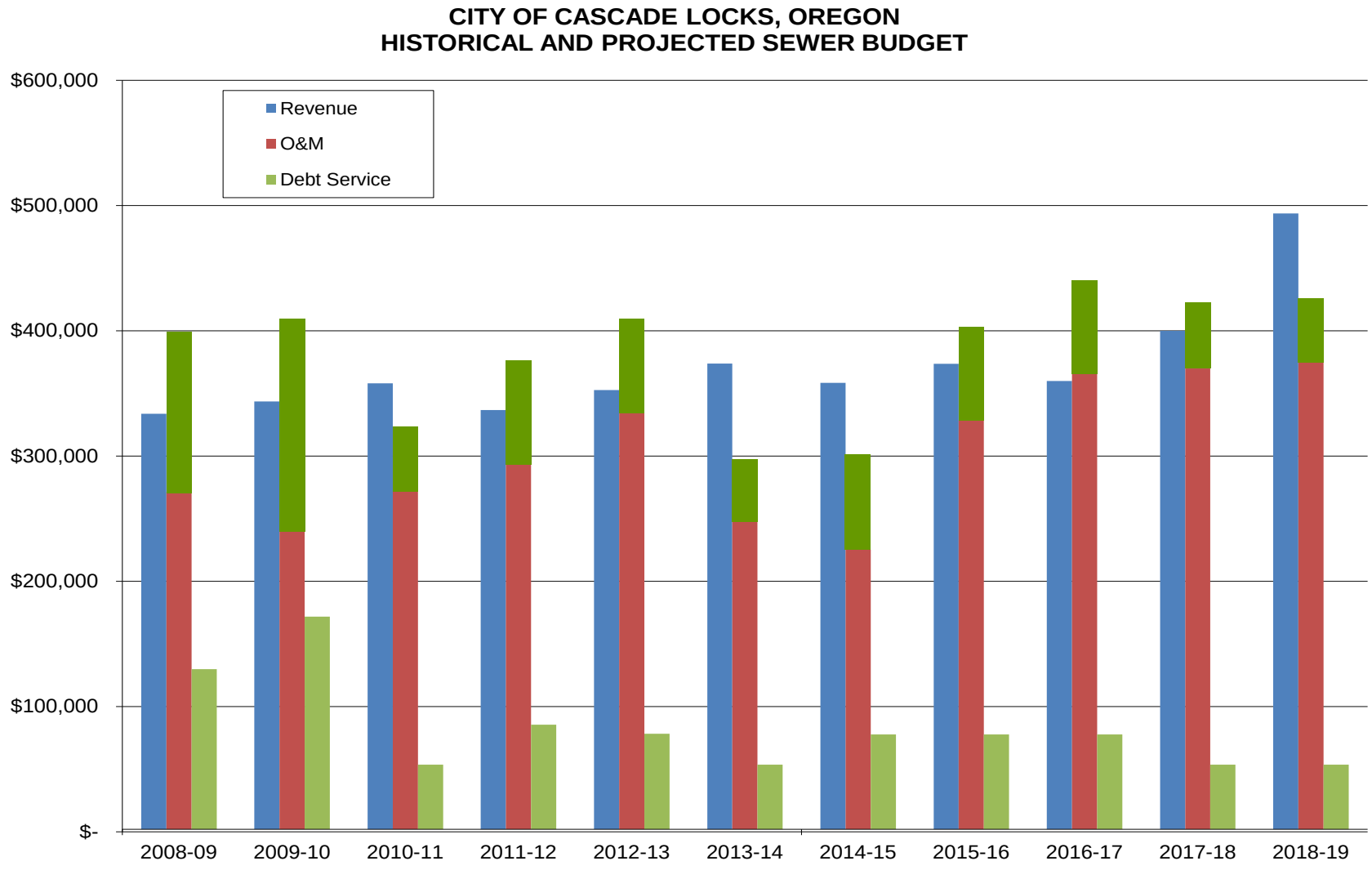
CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
HISTORICAL SEWER
SYSTEM FUNDS

**FIGURE**
**6-1**




Notes:
[1] The data shown for fiscal year 2016-17 reflect the approved budget, not historical data.
[2] O&M expenditures include transfers to Capital Reserve Fund.

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CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN

HISTORICAL AND PROJECTED SEWER BUDGET

FIGURE
6-2

## PRELIMINARY SEWER RATE ANALYSIS
## FOR LOAN CAPACITY

| Average Monthly Residential Rate | Annual Revenue[1] | Expenditures | | | | Net Annual Funds (Revenue Less Expenditures) | Annual Loan Payment (Net Annual Funds Less 10 Percent Reserve) | Oregon Department of Environmental Quality Clean Water State Revolving Fund Funds | | | | Rural Development Funds | | Business Oregon Water/Wastewater Program Funds | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 30-Year Bond Purchase or Design/Construction Loan | | 20-Year Design/ Construction Loan | | 40-Year Design/ Construction Loan | | 25-Year Design/ Construction Loan | |
| | | Estimated Operation and Maintenance Costs[2] | Estimated Replacement Costs | Approximate Existing Debt Service | Total Expenditures | | | Loan Capacity | Estimated Interest Paid | Loan Capacity | Estimated Interest Paid | Loan Capacity | Estimated Interest Paid | Loan Capacity | Estimated Interest Paid |
| $ 64 | $ 471,552 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 17,841 | $ 16,057 | $ 429,684 | $ 105,546 | $ 306,910 | $ 49,910 | $ 394,718 | $ 247,558 | $ 292,141 | $ 153,884 |
| $ 65 | $ 478,920 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 25,209 | $ 22,688 | $ 607,135 | $ 149,135 | $ 433,659 | $ 70,521 | $ 557,730 | $ 349,794 | $ 412,790 | $ 217,435 |
| $ 66 | $ 486,288 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 32,577 | $ 29,319 | $ 784,587 | $ 192,723 | $ 560,407 | $ 91,133 | $ 720,741 | $ 452,031 | $ 533,439 | $ 280,986 |
| $ 67 | $ 493,656 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 39,945 | $ 35,951 | $ 962,038 | $ 236,312 | $ 687,155 | $ 111,745 | $ 883,753 | $ 554,267 | $ 654,088 | $ 344,537 |
| $ 68 | $ 501,024 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 47,313 | $ 42,582 | $ 1,139,489 | $ 279,901 | $ 813,904 | $ 132,356 | $ 1,046,764 | $ 656,504 | $ 774,737 | $ 408,088 |
| $ 69 | $ 508,392 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 54,681 | $ 49,213 | $ 1,316,941 | $ 323,489 | $ 940,652 | $ 152,968 | $ 1,209,775 | $ 758,741 | $ 895,385 | $ 471,640 |
| $ 70 | $ 515,760 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 62,049 | $ 55,844 | $ 1,494,392 | $ 367,078 | $ 1,067,400 | $ 173,580 | $ 1,372,787 | $ 860,977 | $ 1,016,034 | $ 535,191 |
| $ 71 | $ 523,128 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 69,417 | $ 62,475 | $ 1,671,843 | $ 410,667 | $ 1,194,148 | $ 194,192 | $ 1,535,798 | $ 963,214 | $ 1,136,683 | $ 598,742 |
| $ 72 | $ 530,496 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 76,785 | $ 69,107 | $ 1,849,295 | $ 454,255 | $ 1,320,897 | $ 214,803 | $ 1,698,809 | $ 1,065,451 | $ 1,257,332 | $ 662,293 |
| $ 73 | $ 537,864 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 84,153 | $ 75,738 | $ 2,026,746 | $ 497,844 | $ 1,447,645 | $ 235,415 | $ 1,861,821 | $ 1,167,687 | $ 1,377,981 | $ 725,844 |
| $ 74 | $ 545,232 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 91,521 | $ 82,369 | $ 2,204,198 | $ 541,432 | $ 1,574,393 | $ 256,027 | $ 2,024,832 | $ 1,269,924 | $ 1,498,630 | $ 789,395 |
| $ 75 | $ 552,600 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 98,889 | $ 89,000 | $ 2,381,649 | $ 585,021 | $ 1,701,142 | $ 276,638 | $ 2,187,843 | $ 1,372,161 | $ 1,619,278 | $ 852,947 |
| $ 76 | $ 559,968 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 106,257 | $ 95,631 | $ 2,559,100 | $ 628,610 | $ 1,827,890 | $ 297,250 | $ 2,350,855 | $ 1,474,397 | $ 1,739,927 | $ 916,498 |
| $ 77 | $ 567,336 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 113,625 | $ 102,263 | $ 2,736,552 | $ 672,198 | $ 1,954,638 | $ 317,862 | $ 2,513,866 | $ 1,576,634 | $ 1,860,576 | $ 980,049 |
| $ 78 | $ 574,704 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 120,993 | $ 108,894 | $ 2,914,003 | $ 715,787 | $ 2,081,386 | $ 338,474 | $ 2,676,878 | $ 1,678,870 | $ 1,981,225 | $ 1,043,600 |
| $ 79 | $ 582,072 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 128,361 | $ 115,525 | $ 3,091,455 | $ 759,375 | $ 2,208,135 | $ 359,085 | $ 2,839,889 | $ 1,781,107 | $ 2,101,874 | $ 1,107,151 |
| $ 80 | $ 589,440 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 135,729 | $ 122,156 | $ 3,268,906 | $ 802,964 | $ 2,334,883 | $ 379,697 | $ 3,002,900 | $ 1,883,344 | $ 2,222,523 | $ 1,170,702 |
| $ 81 | $ 596,808 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 143,097 | $ 128,787 | $ 3,446,357 | $ 846,553 | $ 2,461,631 | $ 400,309 | $ 3,165,912 | $ 1,985,580 | $ 2,343,172 | $ 1,234,253 |
| $ 82 | $ 604,176 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 150,465 | $ 135,419 | $ 3,623,809 | $ 890,141 | $ 2,588,380 | $ 420,920 | $ 3,328,923 | $ 2,087,817 | $ 2,463,820 | $ 1,297,805 |
| $ 83 | $ 611,544 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 157,833 | $ 142,050 | $ 3,801,260 | $ 933,730 | $ 2,715,128 | $ 441,532 | $ 3,491,934 | $ 2,190,054 | $ 2,584,469 | $ 1,361,356 |
| $ 84 | $ 618,912 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 165,201 | $ 148,681 | $ 3,978,711 | $ 977,319 | $ 2,841,876 | $ 462,144 | $ 3,654,946 | $ 2,292,290 | $ 2,705,118 | $ 1,424,907 |
| $ 85 | $ 626,280 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 172,569 | $ 155,312 | $ 4,156,163 | $ 1,020,907 | $ 2,968,624 | $ 482,756 | $ 3,817,957 | $ 2,394,527 | $ 2,825,767 | $ 1,488,458 |
| $ 86 | $ 633,648 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 179,937 | $ 161,943 | $ 4,333,614 | $ 1,064,496 | $ 3,095,373 | $ 503,367 | $ 3,980,969 | $ 2,496,763 | $ 2,946,416 | $ 1,552,009 |
| $ 87 | $ 641,016 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 187,305 | $ 168,575 | $ 4,511,066 | $ 1,108,084 | $ 3,222,121 | $ 523,979 | $ 4,143,980 | $ 2,599,000 | $ 3,067,065 | $ 1,615,560 |
| $ 88 | $ 648,384 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 194,673 | $ 175,206 | $ 4,688,517 | $ 1,151,673 | $ 3,348,869 | $ 544,591 | $ 4,306,991 | $ 2,701,237 | $ 3,187,714 | $ 1,679,111 |
| $ 89 | $ 655,752 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 202,041 | $ 181,837 | $ 4,865,968 | $ 1,195,262 | $ 3,475,618 | $ 565,202 | $ 4,470,003 | $ 2,803,473 | $ 3,308,362 | $ 1,742,663 |
| $ 90 | $ 663,120 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 209,409 | $ 188,468 | $ 5,043,420 | $ 1,238,850 | $ 3,602,366 | $ 585,814 | $ 4,633,014 | $ 2,905,710 | $ 3,429,011 | $ 1,806,214 |
| $ 91 | $ 670,488 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 216,777 | $ 195,099 | $ 5,220,871 | $ 1,282,439 | $ 3,729,114 | $ 606,426 | $ 4,796,025 | $ 3,007,947 | $ 3,549,660 | $ 1,869,765 |
| $ 92 | $ 677,856 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 224,145 | $ 201,731 | $ 5,398,323 | $ 1,326,027 | $ 3,855,862 | $ 627,038 | $ 4,959,037 | $ 3,110,183 | $ 3,670,309 | $ 1,933,316 |
| $ 93 | $ 685,224 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 231,513 | $ 208,362 | $ 5,575,774 | $ 1,369,616 | $ 3,982,611 | $ 647,649 | $ 5,122,048 | $ 3,212,420 | $ 3,790,958 | $ 1,996,867 |
| $ 94 | $ 692,592 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 238,881 | $ 214,993 | $ 5,753,225 | $ 1,413,205 | $ 4,109,359 | $ 668,261 | $ 5,285,059 | $ 3,314,657 | $ 3,911,607 | $ 2,060,418 |
| $ 95 | $ 699,960 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 246,249 | $ 221,624 | $ 5,930,677 | $ 1,456,793 | $ 4,236,107 | $ 688,873 | $ 5,448,071 | $ 3,416,893 | $ 4,032,255 | $ 2,123,970 |
| $ 96 | $ 707,328 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 253,617 | $ 228,255 | $ 6,108,128 | $ 1,500,382 | $ 4,362,855 | $ 709,485 | $ 5,611,082 | $ 3,519,130 | $ 4,152,904 | $ 2,187,521 |
| $ 97 | $ 714,696 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 260,985 | $ 234,887 | $ 6,285,579 | $ 1,543,971 | $ 4,489,604 | $ 730,096 | $ 5,774,094 | $ 3,621,366 | $ 4,273,553 | $ 2,251,072 |
| $ 98 | $ 722,064 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 268,353 | $ 241,518 | $ 6,463,031 | $ 1,587,559 | $ 4,616,352 | $ 750,708 | $ 5,937,105 | $ 3,723,603 | $ 4,394,202 | $ 2,314,623 |
| $ 99 | $ 729,432 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 275,721 | $ 248,149 | $ 6,640,482 | $ 1,631,148 | $ 4,743,100 | $ 771,320 | $ 6,100,116 | $ 3,825,840 | $ 4,514,851 | $ 2,378,174 |
| $ 100 | $ 736,800 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 283,089 | $ 254,780 | $ 6,817,934 | $ 1,674,736 | $ 4,869,849 | $ 791,931 | $ 6,263,128 | $ 3,928,076 | $ 4,635,500 | $ 2,441,725 |
| $ 101 | $ 744,168 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 290,457 | $ 261,411 | $ 6,995,385 | $ 1,718,325 | $ 4,996,597 | $ 812,543 | $ 6,426,139 | $ 4,030,313 | $ 4,756,149 | $ 2,505,276 |
| $ 102 | $ 751,536 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 297,825 | $ 268,043 | $ 7,172,836 | $ 1,761,914 | $ 5,123,345 | $ 833,155 | $ 6,589,150 | $ 4,132,550 | $ 4,876,797 | $ 2,568,828 |
| $ 103 | $ 758,904 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 305,193 | $ 274,674 | $ 7,350,288 | $ 1,805,502 | $ 5,250,093 | $ 853,767 | $ 6,752,162 | $ 4,234,786 | $ 4,997,446 | $ 2,632,379 |
| $ 104 | $ 766,272 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 312,561 | $ 281,305 | $ 7,527,739 | $ 1,849,091 | $ 5,376,842 | $ 874,378 | $ 6,915,173 | $ 4,337,023 | $ 5,118,095 | $ 2,695,930 |
| $ 105 | $ 773,640 | $ 375,000 | $ 25,000 | $ 53,711 | $ 453,711 | $ 319,929 | $ 287,936 | $ 7,705,191 | $ 1,892,679 | $ 5,503,590 | $ 894,990 | $ 7,078,184 | $ 4,439,260 | $ 5,238,744 | $ 2,759,481 |

[1] Revenue is based on 614 Equivalent Residential Units x 12.
[2] Projected costs for year 2018.

anderson perry & associates, inc.

CITY OF
CASCADE LOCKS, OREGON
WASTEWATER FACILITIES PLAN
PRELIMINARY SEWER RATE ANALYSIS FOR LOAN CAPACITY

FIGURE
6-3

## PRELIMINARY PROPERTY TAX BONDING CAPACITY ANALYSIS

**Typical CWSRF Loan**

| Loan Amount | Interest Rate[1] | Loan Period | Estimated Annual Payment | Estimated Annual Tax Rate Increase per $1,000[2] | Estimated Annual Tax Increase for a $100,000 Home | |
|---|---|---|---|---|---|---|
| | | | | | Monthly | Annual |
| $1,000,000 | 1.48% | 30 Yrs | $41,521 | $0.50 | $4.17 | $50.00 |
| $2,000,000 | 1.48% | 30 Yrs | $83,042 | $1.00 | $8.33 | $100.00 |
| $3,000,000 | 1.48% | 30 Yrs | $124,564 | $1.50 | $12.50 | $150.00 |
| $4,000,000 | 1.48% | 30 Yrs | $166,085 | $2.00 | $16.67 | $200.00 |
| $5,000,000 | 1.48% | 30 Yrs | $207,606 | $2.51 | $20.92 | $251.00 |
| $6,000,000 | 1.48% | 30 Yrs | $249,127 | $3.01 | $25.08 | $301.00 |
| $7,000,000 | 1.48% | 30 Yrs | $290,649 | $3.51 | $29.25 | $351.00 |
| $8,000,000 | 1.48% | 30 Yrs | $332,170 | $4.01 | $33.42 | $401.00 |
| $9,000,000 | 1.48% | 30 Yrs | $373,691 | $4.51 | $37.58 | $451.00 |

**Typical CWSRF Loan**

| Loan Amount | Interest Rate[1] | Loan Period | Estimated Annual Payment | Estimated Annual Tax Rate Increase per $1,000[2] | Estimated Annual Tax Increase for a $100,000 Home | |
|---|---|---|---|---|---|---|
| | | | | | Monthly | Annual |
| $1,000,000 | 1.48% | 20 Yrs | $58,131 | $0.70 | $5.83 | $70.00 |
| $2,000,000 | 1.48% | 20 Yrs | $116,262 | $1.40 | $11.67 | $140.00 |
| $3,000,000 | 1.48% | 20 Yrs | $174,393 | $2.10 | $17.50 | $210.00 |
| $4,000,000 | 1.48% | 20 Yrs | $232,524 | $2.81 | $23.42 | $281.00 |
| $5,000,000 | 1.48% | 20 Yrs | $290,655 | $3.51 | $29.25 | $351.00 |
| $6,000,000 | 1.48% | 20 Yrs | $348,786 | $4.21 | $35.08 | $421.00 |
| $7,000,000 | 1.48% | 20 Yrs | $406,917 | $4.91 | $40.92 | $491.00 |
| $8,000,000 | 1.48% | 20 Yrs | $465,048 | $5.61 | $46.75 | $561.00 |
| $9,000,000 | 1.48% | 20 Yrs | $523,179 | $6.31 | $52.58 | $631.00 |

**Typical RD Loan**

| Loan Amount | Interest Rate[1] | Loan Period | Estimated Annual Payment | Estimated Annual Tax Rate Increase per $1,000[2] | Estimated Annual Tax Increase for a $100,000 Home | |
|---|---|---|---|---|---|---|
| | | | | | Monthly | Annual |
| $1,000,000 | 2.63% | 40 Yrs | $40,713 | $0.49 | $4.08 | $49.00 |
| $2,000,000 | 2.63% | 40 Yrs | $81,427 | $0.98 | $8.17 | $98.00 |
| $3,000,000 | 2.63% | 40 Yrs | $122,140 | $1.47 | $12.25 | $147.00 |
| $4,000,000 | 2.63% | 40 Yrs | $162,853 | $1.97 | $16.42 | $197.00 |
| $5,000,000 | 2.63% | 40 Yrs | $203,566 | $2.46 | $20.50 | $246.00 |
| $6,000,000 | 2.63% | 40 Yrs | $244,280 | $2.95 | $24.58 | $295.00 |
| $7,000,000 | 2.63% | 40 Yrs | $284,993 | $3.44 | $28.67 | $344.00 |
| $8,000,000 | 2.63% | 40 Yrs | $325,706 | $3.93 | $32.75 | $393.00 |
| $9,000,000 | 2.63% | 40 Yrs | $366,420 | $4.42 | $36.83 | $442.00 |

Actual loan interest rates could vary.

The annual tax rate increase is based on the City of Cascade Locks' 2016-17 assessed valuation of $82,857,663. It was also assumed that 100 percent of taxes would be collected. Typically, a small percentage of taxes are not paid, which would require the estimated tax rate to be increased slightly higher than what is shown herein.

CWSRF = Clean Water State Revolving Fund
RD = Rural Development

anderson perry & associates, inc.

CITY OF
CASCASE LOCKS, OREGON
WASTEWATER FACILTIES PLAN
PRELIMINARY PROPERTY TAX
BONDING CAPACITY ANALYSIS

**FIGURE**
**6-4**

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Appendix B Mutual Agreement and Order

Appendix C Wastewater System Design Data from *Operations and Maintenance Manual, Wastewater Treatment Facilities,* KCM, Inc., July 1998

Appendix D Thomas E. Coleman, P.E., Consulting Services, Cascade Locks WWTP Technical Memorandum (September 30, 2011)

Appendix E Environmental Support Information

Appendix F City of Cascade Locks Resolution No. 1317

# APPENDIX A
## National Pollutant Discharge Elimination System Permit

# NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM WASTE DISCHARGE PERMIT

Oregon Department of Environmental Quality
Eastern Region – Bend Office
475 NE Bellevue Dr. Suite 110 Bend, OR 97701
Telephone: 541-388-6146

Issued pursuant to ORS 468B.050 and The Federal Water Pollution Control Act (The Clean Water Act)

**ISSUED TO:**

City of Cascade Locks
P.O. Box 308
Cascade Locks, OR 97014

**SOURCES COVERED BY THIS PERMIT:**

| Type of Waste | Outfall Number | Outfall Location |
|---|---|---|
| Treated Wastewater | 001 | Columbia River R.M. 151.0 |

**FACILITY TYPE AND LOCATION:**

Activated Sludge - Sequencing Batch Reactor
Approximately 600 feet west of the mouth of Herman Creek on the Columbia River
Cascade Locks

**Treatment System Class Level:** II
**Collection System Class Level:** II

**RECEIVING STREAM INFORMATION:**

WRD Basin: Hood
USGS Subbasin: Middle Columbia-Hood
Receiving Stream: Columbia River
LLID: 1240483462464-148.17-D
County: Hood River

**EPA REFERENCE #:** OR004127-1

Issued in response to application #963178 received 07/02/12 and based on the land use compatibility statement in the permit record.

Cheryll Hutchens-Woods — June 7, 2013 — June 27, 2013
Cheryll Hutchens-Woods, WQ Manager — Issuance Date — Effective Date
Eastern Region

## PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to: 1) operate a wastewater collection, treatment, control and disposal system; and 2) discharge treated wastewater to waters of the state only from the authorized discharge point or points in Schedule A in conformance with the requirements, limits, and conditions set forth in this permit.

Unless specifically authorized by this permit, by another NPDES or WPCF permit, or by Oregon statute or administrative rule, any other direct or indirect discharge of pollutants to waters of the state is prohibited.

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## SCHEDULE A
## Waste Discharge Limits

1. **Treated Effluent Outfall 001**
   a. CBOD$_5$, and TSS
      i. May 1 – October 31: During this time period the permittee must comply with the limits in the following table:

**Table A1: CBOD$_5$ and TSS Limits**

| Parameter | Average Effluent Concentrations, mg/L | | Monthly Average lbs/day | Weekly Average lbs/day | Daily Maximum lbs |
|---|---|---|---|---|---|
| | Monthly | Weekly | | | |
| CBOD$_5$ | 15 | 25 | 41 | 62 | 82 |
| TSS | 20 | 30 | 41 | 62 | 82 |

      ii. November 1 – April 30: During this time period the permittee must comply with the limits in the following table:

**Table A2: CBOD$_5$ and TSS Limits**

| Parameter | Average Effluent Concentrations, mg/L | | Monthly Average lbs/day | Weekly Average lbs/day | Daily Maximum lbs |
|---|---|---|---|---|---|
| | Monthly | Weekly | | | |
| CBOD$_5$ | 25 | 40 | 58 | 88 | 117 |
| TSS | 30 | 45 | 83 | 124 | 166 |

      iii. Additional information for the limits in Tables A1 and A2 above.
         *1)* The CBOD$_5$ concentration limits are considered equivalent to the minimum design criteria for BOD$_5$ specified in OAR Chapter 340, Division 41.
         *2)* Average dry weather design flow to the facility equals 0.493 MGD. Summer mass load limits are based upon average dry weather design flow to the facility and upon an achievable concentration of 10 mg/l. Winter mass load limits are based upon average wet weather design flow to the facility equaling 0.584 MGD and upon an achievable concentration of 12 mg/l CBOD5 and 17 mg/l TSS. The daily mass load limit is suspended on any day in which the flow to the treatment facility exceeds 0.986 MGD (twice the design average dry weather flow).

   b. Additional Parameters: Year-round the permittee must comply with the Limits for Additional Parameters in Table A3, below.

**Table A3: Limits for Additional Parameters**

| Year-round | Limits |
|---|---|
| CBOD$_5$ and TSS Removal Efficiency | May not be less than 85% monthly average for CBOD$_5$ and TSS |
| *E. coli* Bacteria (see Note a.) | Monthly log mean may not exceed 126 organisms per 100 ml.<br>No single sample may exceed 406 organisms per 100 ml. |
| pH | Must be within the range of 6.0 to 9.0 S.U. |
| Temperature | 69 million Kcals/day |

Notes

a. No single *E. coli* sample may exceed 406 organisms per 100 mL; however, no violation has occurred if the permittee takes at least 5 consecutive re-samples over five consecutive work days beginning as soon as practicable (preferably within 28 hours after the original sample is taken) and the log mean of the 5 re-samples is less than or equal to 126 *E. coli* organisms/100 mL.

2. **Regulatory Mixing Zone**
No wastes may be discharged or activities conducted that cause or contribute to a violation of water quality standards in OAR Chapter 340, Division 41 applicable to the Columbia /Hood Basin except within the following regulatory mixing zone:

The allowable mixing zone is that portion of the Columbia River 5 feet upstream and 100 feet downstream from the diffuser or point of discharge. The Zone of Immediate Dilution (ZID) shall be defined as that portion of the allowable mixing zone that is within 10 feet of the point of discharge.

3. **Groundwater Protection**
The permittee may not conduct any activities that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process related residuals must be managed and disposed of in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR Chapter 340, Division 40).

4. **Septage Requirements**
Septage may not be accepted at this facility for treatment or processing without prior written approval from DEQ.

5. **Chlorine Usage**
No chlorine or chlorine compounds may be used for disinfection purposes and no chlorine residual may be allowed in the effluent due to chlorine used for maintenance or other purposes except in emergencies with prior approval by the Department.

## SCHEDULE B
## Minimum Monitoring and Reporting Requirements

1. **Monitoring and Reporting Protocols**
   a. Quality Assurance and Quality Control (QA/QC)
   The permittee must develop and implement a written QA/QC program to verify the accuracy of sample analysis as specified in 40 CFR Part 136. The QA/QC program must conform to the requirements of 40 CFR Part 136.7. For additional instructions on proper sampling techniques, test methods and QA/QC procedures, see Schedule F, Sections B.1 and C.

   b. Re-analysis, Re-sampling and Reporting of Data if QA/QC Requirements Not Met
   If QA/QC requirements are not met for any analysis, the permittee must have the sample re-analyzed. If the sample cannot be re-analyzed, the permittee must re-sample at the earliest available opportunity. If a sample result does not meet QA/QC requirements, the result must be included in the DMR along with a notation but may not be used in any calculation required by the permit.

   c. Reporting Procedures
      i. Significant Figures
      The permittee must report the same number of significant digits as the permit limit for a given parameter. Regardless of the rounding conventions used by the permittee (i.e., rounding 5 up for the calculated results or, in the case of laboratory results, rounding 5 to the nearest even number), the permittee must use the convention consistently, and must ensure that laboratories employed by the permittee use the same convention.

      ii. Calculating Mass Loads
      The permittee must calculate mass loads as follows:
      Flow (in MGD) X Concentration (in mg/L) X 8.34 = Pounds per day

2. **Influent Monitoring Requirements**
   The permittee must monitor influent as listed below. Influent grab samples and measurements and composite samples must be taken just before the fine screen removal device at the headworks. The composite sampler is located in the headworks structure along the easterly concrete wall.

**Table B1: Influent Monitoring**

| Item or Parameter | Time Period | Minimum Frequency | Sample Type/Action | Report |
|---|---|---|---|---|
| Total Flow (MGD) | Year-round | Daily | Measurement | 1. Daily values<br>2. Monthly total<br>3. Monthly average |
| Flow Meter Calibration | Year-round | Annual | Verification | Report that calibration was completed. |
| $CBOD_5$ and TSS (mg/L) | Year-round | 1/Week | 24-hour composite | 1. Daily values<br>2. Monthly average |
| pH (S.U.) | Year-round | 2/Week | Grab | 1. Daily values<br>2. Maximum daily value<br>3. Minimum daily value |

3. **Effluent Monitoring Requirements**
The permittee must monitor effluent at Outfall 001 in accordance with Table B2, below **year-round**. Effluent grab samples and measurements must be taken from the downstream end of the U.V. trough. The composite sampler is located on the west (outfall) end of the covered U.V. channel.

**Table B2: Effluent Monitoring**

| Item or Parameter | Minimum Frequency | Sample Type/Action | Report |
|---|---|---|---|
| $CBOD_5$ and TSS (mg/L) | 1/Week | 24-hour composite | 1. Daily values<br>2. Monthly average<br>3. Weekly averages<br>4. Maximum weekly average<br>5. Maximum daily value |
| $CBOD_5$ and TSS Mass Load (lb/day) | 1/Week | Calculation | 1. Daily values<br>2. Monthly average<br>3. Weekly averages<br>4. Maximum weekly average<br>5. Maximum daily value |
| $CBOD_5$ and TSS Percent Removal (%) | Monthly | Calculation | 1. Daily values<br>2. Monthly average minimum percent value |
| pH (S.U.) | 2/Week | Grab | 1. Daily values<br>2. Maximum daily value<br>3. Minimum daily value |
| Ammonia ($NH_3$-N) | 2/year | 24-hour composite | 1. Maximum daily value |
| • Alkalinity as CaCO3<br>• Dissolved Oxygen<br>• Nitrate/Nitrite<br>• TKN<br>• Oil & Grease<br>• Phosphorous<br>• TDS | Annual/first 4 years | 24-hour composite | 1. Daily values |
| Temperature (degrees Celsius) | Daily | Grab or Continuous | Daily Maximum (See Notes a. and b.) |
| Temperature (degrees Celsius) | Weekly | Calculation | Weekly Average of Daily Maximums |

| Item or Parameter | Minimum Frequency | Sample Type/Action | Report |
|---|---|---|---|
| Thermal Load | Weekly | Calculation (See Note c) | Thermal Load (Mkcal/day) |
| *E. coli* (#/100 mL) | 1/Week | Grab | 1. Daily values<br>2. Maximum daily value<br>3. Monthly geometric mean<br>4. Re-sample geometric mean |
| UV dose (mJ/cm$^2$) | Daily | Calculation based on UVI grab and average daily flow | 1. Daily average values<br>2. Monthly minimum |
| Lamp Life (Hrs) | Daily | Recording | Cumulative total hours |

Notes:

a. If continuous temperature monitors are used for effluent monitoring, the devices must be audited in June and September, following procedures described in DEQ Procedural Guidance for Water Temperature Monitoring.

b. If continuous temperature monitors are used, the monitors are to be checked visually monthly to insure that the devices are still in place and submerged.

c. Calculated as follows:

Q (3.78541) (T-20°C) =million kCal/day

Where:
Q = river flow, MGD
T = effluent temperature when T > 20°C
3.78541 = density of water (kg/gal)
1 kCal = (1 kg $H_2O$) (1° C increase)

4. **Biosolids Monitoring Requirements**
The permittee must monitor and record biosolids as listed below.

**Table B3: Biosolids Monitoring**

| Item or Parameter | Minimum Frequency | Sample Type/Action |
|---|---|---|
| Solids pumped from treatment system | Each Occurrence | Date, volume pumped (gallons), percent solids, hauler identification, delivery point |

5. **Minimum Reporting Requirements**
The permittee must report monitoring results as listed below.

**Table B4: Reporting Requirements and Due Dates**

| Reporting Requirement | Frequency | Due Date | Report Form (unless otherwise specified in writing) | Submit To: |
|---|---|---|---|---|
| 1. Table B1: Influent Monitoring, p. 7<br>2. Table B2: Effluent Monitoring, p. 8-10 | Monthly | 15th day of the following month | DEQ-approved discharge monitoring report (DMR) form. (See Notes a. and b.) | DEQ Regional Office |
| Wastewater solids annual report describing quality, quantity, and use or disposal of wastewater solids generated at the facility. | Annually | February 19 | 2 hard copies | One each to:<br>• DEQ Regional Office<br>• DEQ Biosolids Program Coordinator |
| Inflow and Infiltration report | Annually | February 1 | 1 hard copy | DEQ Regional Office |

Notes:
a. Name, certificate classification, and grade level of each responsible principal operator, as well as, identification of each system classification must be included on DMRs.
b. Equipment breakdowns and bypass events must be noted on DMRs.

## SCHEDULE D
## Special Conditions

1. **Inflow Removal**
   a. Within 180 days of the effective date of the permit, the permittee must submit to DEQ for approval an Inflow Removal Plan. The Plan must consist of the following:
      i. Identification of all overflow points. .
      ii. Verification that sewer system overflows are not occurring up to a 24-hour, 5-year storm event or equivalent.
      iii. Monitoring of all pump station overflow points.
      iv. A process for identifying and removing all inflow sources into the permittee's sewer system over which the permittee has legal control, including a time schedule for identifying and reducing inflow.
      v. If the permittee does not have the necessary legal authority for all portions of the sewer system or treatment facility, a strategy and schedule for gaining legal authority to require inflow reduction and a process and schedule for identifying and removing inflow sources once legal authority has been obtained.
   b. Within 60 days of receiving written DEQ comments, the permittee must submit a final approvable plan and time schedule.
   c. A copy of the plan must be kept at the wastewater treatment facility for review upon request by DEQ.
   d. An annual inflow and infiltration report must be submitted to the DEQ as required in Schedule B. The report must include the following:
      i. Details of activities performed in the previous year to identify and reduce inflow and infiltration.
      ii. Details of activities planned for the following year to identify and reduce inflow and infiltration.
      iii. A summary of sanitary sewer overflows that occurred during the previous year.
      iv. Information that demonstrates compliance with the DEQ-approved Inflow Removal Plan required by condition 1.a above.

2. **Emergency Response and Public Notification Plan**
   The permittee must develop and maintain an Emergency Response and Public Notification Plan per Schedule F, Section B, and Conditions 7 & 8. The permit holder must develop the Emergency Response and Public Notification Plan within six months of permit issuance and update it annually to ensure that telephone and email contact information for applicable public agencies are current and accurate. An updated copy must be kept on file at the wastewater treatment facility for Department review. The latest revision date must be listed on the Emergency Response and Public Notification Plan cover along with the reviewer's initials or signature.

3. **Wastewater Solids**
   a. <u>Transfers</u>
      i. *Within state.* The permittee may transfer wastewater solids to another facility permitted to process or dispose of wastewater solids, including but not limited to: another wastewater treatment facility, landfill, or incinerator. The permittee must monitor, report, and dispose of solids as required under the permit of the receiving facility and by Schedule B, Table B3.
      ii. *Out of state.* If wastewater solids, including Class A and Class B biosolids, are transferred out of state for use or disposal, the permittee must obtain written authorization from DEQ, meet Oregon requirements for the use or disposal of wastewater solids, notify in writing the receiving state of the proposed use or disposal of wastewater solids, and satisfy the requirements of the receiving state.

   b. <u>Acceptance</u>
      i. *Within state.* The permittee may accept wastewater solids from another wastewater treatment facility. The permittee must monitor, report, and dispose of solids as required by this permit.
      ii. *Out of state.* The permittee may accept wastewater solids from out-of-state facilities for treatment and land application when authorized in writing by DEQ provided the pollutant concentrations in

the out-of-state solids do not exceed the ceiling concentration limits in Schedule A, **Error! eference source not found.**.

4. **Operator Certification**
   a. Definitions
      i. "Supervise" means to have full and active responsibility for the daily on site technical operation of a wastewater treatment system or wastewater collection system.
      ii. "Supervisor" or "designated operator" means the operator delegated authority by the permittee for establishing and executing the specific practice and procedures for operating the wastewater treatment system or wastewater collection system in accordance with the policies of the owner of the system and any permit requirements.
      iii. "Shift Supervisor" means the operator delegated authority by the permittee for executing the specific practice and procedures for operating the wastewater treatment system or wastewater collection system when the system is operated on more than one daily shift.
      iv. "System" includes both the collection system and the treatment systems.

   b. The permittee must comply with OAR Chapter 340, Division 49, "Regulations Pertaining to Certification of Wastewater System Operator Personnel" and designate a supervisor whose certification corresponds with the classification of the collection and/or treatment system as specified on p. 1 of this permit.

   c. The permittee must have its system supervised full-time by one or more operators who hold a valid certificate for the type of wastewater treatment or wastewater collection system, and at a grade equal to or greater than the wastewater system's classification as specified on p. 1 one of this permit.

   d. The permittee's wastewater system may not be without the designated supervisor for more than 30 days. During this period, there must be another person available to supervise who is certified at no more than one grade lower than the classification of the wastewater system. The permittee must delegate authority to this operator to supervise the operation of the system.

   e. If the wastewater system has more than one daily shift, the permittee must have another properly certified operator available to supervise operation of the system. Each shift supervisor, if any, must be certified at no more than one grade lower than the system classification.

   f. The permittee is not required to have a supervisor on site at all times; however, the supervisor must be available to the permittee and operator at all times.

   g. The permittee must notify DEQ in writing of the name of the system supervisor. The permittee may replace or re-designate the system supervisor with another properly certified operator at any time and must notify DEQ in writing within 30 days of replacement or re-designation of operator in charge. As of this writing, the notice of replacement or re-designation must be sent to Water Quality Division, Operator Certification Program, 2020 SW 4th Avenue, Suite 400, Portland, OR 97201.

   h. Upon written request, DEQ may grant the permittee reasonable time, not to exceed 120 days, to obtain the services of a qualified person to supervise the wastewater system. The written request must include a justification for the time needed, schedule for recruiting and hiring, date the system supervisor availability ceased, and name of the alternate system supervisor as required by above.

## SCHEDULE F
## NPDES GENERAL CONDITIONS – DOMESTIC FACILITIES

### SECTION A. STANDARD CONDITIONS

A1. Duty to Comply with Permit

The permittee must comply with all conditions of this permit. Failure to comply with any permit condition is a violation of Oregon Revised Statutes (ORS) 468B.025 and the federal Clean Water Act and is grounds for an enforcement action. Failure to comply is also grounds for DEQ to terminate, modify and reissue, revoke, or deny renewal of a permit.

A2. Penalties for Water Pollution and Permit Condition Violations

The permit is enforceable by DEQ or EPA, and in some circumstances also by third-parties under the citizen suit provisions 33 USC § 1365. DEQ enforcement is generally based on provisions of state statutes and Environmental Quality Commission (EQC) rules, and EPA enforcement is generally based on provisions of federal statutes and EPA regulations.

ORS 468.140 allows DEQ to impose civil penalties up to $10,000 per day for violation of a term, condition, or requirement of a permit. The federal Clean Water Act provides for civil penalties not to exceed $32,500 and administrative penalties not to exceed $11,000 per day for each violation of any condition or limitation of this permit.

Under ORS 468.943, unlawful water pollution, if committed by a person with criminal negligence, is punishable by a fine of up to $25,000, imprisonment for not more than one year, or both. Each day on which a violation occurs or continues is a separately punishable offense. The federal Clean Water Act provides for criminal penalties of not more than $50,000 per day of violation, or imprisonment of not more than 2 years, or both for second or subsequent negligent violations of this permit.

Under ORS 468.946, a person who knowingly discharges, places, or causes to be placed any waste into the waters of the state or in a location where the waste is likely to escape into the waters of the state is subject to a Class B felony punishable by a fine not to exceed $250,000 and up to 10 years in prison per ORS chapter 161. The federal Clean Water Act provides for criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment of not more than 3 years, or both for knowing violations of the permit. In the case of a second or subsequent conviction for knowing violation, a person is subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

A3. 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. In addition, upon request of DEQ, the permittee must correct any adverse impact on the environment or human health resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

A4. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and have the permit renewed. The application must be submitted at least 180 days before the expiration date of this permit.

DEQ may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

A5. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any term, condition, or requirement of this permit, a rule, or a statute.
b. Obtaining this permit by misrepresentation or failure to disclose fully all material facts.
c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.
d. The permittee is identified as a Designated Management Agency or allocated a wasteload under a total maximum daily load (TMDL).
e. New information or regulations.
f. Modification of compliance schedules.

g. Requirements of permit reopener conditions
h. Correction of technical mistakes made in determining permit conditions.
i. Determination that the permitted activity endangers human health or the environment.
j. Other causes as specified in 40 CFR §§ 122.62, 122.64, and 124.5.
k. For communities with combined sewer overflows (CSOs):
   (1) To comply with any state or federal law regulation for CSOs that is adopted or promulgated subsequent to the effective date of this permit.
   (2) If new information that was not available at the time of permit issuance indicates that CSO controls imposed under this permit have failed to ensure attainment of water quality standards, including protection of designated uses.
   (3) Resulting from implementation of the permittee's long-term control plan and/or permit conditions related to CSOs.

The filing of a request by the permittee for a permit modification, revocation or reissuance, termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

A6. Toxic Pollutants
The permittee must comply with any applicable effluent standards or prohibitions established under Oregon Administrative Rule (OAR) 340-041-0033 and section 307(a) of the federal Clean Water Act for toxic pollutants, and with standards for sewage sludge use or disposal established under section 405(d) of the federal Clean Water Act, within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

A7. Property Rights and Other Legal Requirements
The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege, or authorize any injury to persons or property or invasion of any other private rights, or any infringement of federal, tribal, state, or local laws or regulations.

A8. Permit References
Except for effluent standards or prohibitions established under section 307(a) of the federal Clean Water Act and OAR 340-041-0033 for toxic pollutants, and standards for sewage sludge use or disposal established under section 405(d) of the federal Clean Water Act, all rules and statutes referred to in this permit are those in effect on the date this permit is issued.

A9. Permit Fees
The permittee must pay the fees required by OAR.

## SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

B1. Proper Operation and Maintenance
The permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

B2. Need to Halt or Reduce Activity Not a Defense
For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee must, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It is not a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

B3. Bypass of Treatment Facilities
a. Definitions
   (1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, provided

the diversion is to allow essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs b and c of this section.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Prohibition of bypass.

(1) Bypass is prohibited and DEQ may take enforcement action against a permittee for bypass unless:

i. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

ii. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventative maintenance; and

iii. The permittee submitted notices and requests as required under General Condition B3.c.

(2) DEQ may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, if DEQ determines that it will meet the three conditions listed above in General Condition B3.b.(1).

c. Notice and request for bypass.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, a written notice must be submitted to DEQ at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee must submit notice of an unanticipated bypass as required in General Condition D5.

B4. Upset

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operation error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of General Condition B4.c are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. 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 causes(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required in General Condition D5, hereof (24-hour notice); and

(4) The permittee complied with any remedial measures required under General Condition A3 hereof.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

B5. Treatment of Single Operational Upset

For purposes of this permit, a single operational upset that leads to simultaneous violations of more than one pollutant parameter will be treated as a single violation. A single operational upset is an exceptional incident that causes simultaneous, unintentional, unknowing (not the result of a knowing act or omission), temporary noncompliance with more than one federal Clean Water Act effluent discharge pollutant parameter. A single operational upset does not include federal Clean Water Act violations involving discharge without a NPDES permit or noncompliance to the extent caused by improperly designed or inadequate treatment facilities. Each day of a single operational upset is a violation.

B6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations

a. Definition. "Overflow" means any spill, release or diversion of sewage including:

(1) An overflow that results in a discharge to waters of the United States; and

(2) An overflow of wastewater, including a wastewater backup into a building (other than a backup caused solely by a blockage or other malfunction in a privately owned sewer or building lateral), even if that overflow does not reach waters of the United States.

b. Prohibition of overflows. Overflows are prohibited. DEQ may exercise enforcement discretion regarding overflow events. In exercising its enforcement discretion, DEQ may consider various factors, including the adequacy of the conveyance system's capacity and the magnitude, duration and return frequency of storm events.
c. Reporting required. All overflows must be reported orally to DEQ within 24 hours from the time the permittee becomes aware of the overflow. Reporting procedures are described in more detail in General Condition D5.

B7. Public Notification of Effluent Violation or Overflow
If effluent limitations specified in this permit are exceeded or an overflow occurs that threatens public health, the permittee must take such steps as are necessary to alert the public, health agencies and other affected entities (for example, public water systems) about the extent and nature of the discharge in accordance with the notification procedures developed under General Condition B8. Such steps may include, but are not limited to, posting of the river at access points and other places, news releases, and paid announcements on radio and television.

B8. Emergency Response and Public Notification Plan
The permittee must develop and implement an emergency response and public notification plan that identifies measures to protect public health from overflows, bypasses, or upsets that may endanger public health. At a minimum the plan must include mechanisms to:
a. Ensure that the permittee is aware (to the greatest extent possible) of such events;
b. Ensure notification of appropriate personnel and ensure that they are immediately dispatched for investigation and response;
c. Ensure immediate notification to the public, health agencies, and other affected public entities (including public water systems). The overflow response plan must identify the public health and other officials who will receive immediate notification;
d. Ensure that appropriate personnel are aware of and follow the plan and are appropriately trained;
e. Provide emergency operations; and
f. Ensure that DEQ is notified of the public notification steps taken.

B9. Removed Substances
Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must be disposed of in such a manner as to prevent any pollutant from such materials from entering waters of the state, causing nuisance conditions, or creating a public health hazard.

## SECTION C. MONITORING AND RECORDS

C1. Representative Sampling
Sampling and measurements taken as required herein must be representative of the volume and nature of the monitored discharge. All samples must be taken at the monitoring points specified in this permit, and must be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points must not be changed without notification to and the approval of DEQ.

C2. Flow Measurements
Appropriate flow measurement devices and methods consistent with accepted scientific practices must be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices must be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected must be capable of measuring flows with a maximum deviation of less than ± 10 percent from true discharge rates throughout the range of expected discharge volumes.

C3. Monitoring Procedures
Monitoring must be conducted according to test procedures approved under 40 CFR part 136 or, in the case of sludge use and disposal, approved under 40 CFR part 503 unless other test procedures have been specified in this permit.

C4. Penalties of Tampering
The federal 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 may, upon conviction, be punished by a fine of not more than $10,000 per violation, imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both.

C5. Reporting of Monitoring Results
Monitoring results must be summarized each month on a discharge monitoring report form approved by DEQ. The reports must be submitted monthly and are to be mailed, delivered or otherwise transmitted by the 15th day of the following month unless specifically approved otherwise in Schedule B of this permit.

C6. Additional Monitoring by the Permittee
If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR part 136 or, in the case of sludge use and disposal, approved under 40 CFR part 503, or as specified in this permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the discharge monitoring report. Such increased frequency must also be indicated. For a pollutant parameter that may be sampled more than once per day (for example, total residual chlorine), only the average daily value must be recorded unless otherwise specified in this permit.

C7. Averaging of Measurements
Calculations for all limitations that require averaging of measurements must utilize an arithmetic mean, except for bacteria which must be averaged as specified in this permit.

C8. Retention of Records
Records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities must be retained for a period of at least 5 years (or longer as required by 40 CFR part 503). Records of all monitoring information including all calibration and maintenance records, all original strip chart 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 must be retained for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of DEQ at any time.

C9. Records Contents
Records of monitoring information must include:
a. The date, exact place, time, and methods of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

C10. Inspection and Entry
The permittee must allow DEQ or EPA upon the presentation of credentials to:
a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by state law, any substances or parameters at any location.

C11. Confidentiality of Information
Any information relating to this permit that is submitted to or obtained by DEQ is available to the public unless classified as confidential by the Director of DEQ under ORS 468.095. The permittee may request that information be classified as confidential if it is a trade secret as defined by that statute. The name and address of the permittee, permit applications, permits, effluent data, and information required by NPDES application forms under 40 CFR § 122.21 are not classified as confidential [40 CFR § 122.7(b)].

## SECTION D. REPORTING REQUIREMENTS

D1. Planned Changes
The permittee must comply with OAR 340-052, "Review of Plans and Specifications" and 40 CFR § 122.41(l)(1). Except where exempted under OAR 340-052, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers may be commenced until the plans and specifications are submitted to and approved by DEQ. The permittee must give notice to DEQ as soon as possible of any planned physical alternations or additions to the permitted facility.

D2. Anticipated Noncompliance
The permittee must give advance notice to DEQ of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

D3. Transfers
This permit may be transferred to a new permittee provided the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of the permit and EQC rules. No permit may be transferred to a third party without prior written approval from DEQ. DEQ may require modification, revocation, and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under 40 CFR § 122.61. The permittee must notify DEQ when a transfer of property interest takes place.

D4. Compliance Schedule
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 14 days following each schedule date. Any reports of noncompliance must include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

D5. Twenty-Four Hour Reporting
The permittee must report any noncompliance that may endanger health or the environment. Any information must be provided orally (by telephone) to the DEQ regional office or Oregon Emergency Response System (1-800-452-0311) as specified below within 24 hours from the time the permittee becomes aware of the circumstances.

a. Overflows.
   (1) Oral Reporting within 24 hours.
      i. For overflows other than basement backups, the following information must be reported to the Oregon Emergency Response System (OERS) at 1-800-452-0311. For basement backups, this information should be reported directly to the DEQ regional office.
         *(a)* The location of the overflow;
         *(b)* The receiving water (if there is one);
         *(c)* An estimate of the volume of the overflow;
         *(d)* A description of the sewer system component from which the release occurred (for example, manhole, constructed overflow pipe, crack in pipe); and
         *(e)* The estimated date and time when the overflow began and stopped or will be stopped.
      ii. The following information must be reported to the DEQ regional office within 24 hours, or during normal business hours, whichever is earlier:
         *(a)* The OERS incident number (if applicable); and
         *(b)* A brief description of the event.
   (2) Written reporting within 5 days.
      i. The following information must be provided in writing to the DEQ regional office within 5 days of the time the permittee becomes aware of the overflow:
         *(a)* The OERS incident number (if applicable);
         *(b)* The cause or suspected cause of the overflow;
         *(c)* Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
         *(d)* Steps taken or planned to mitigate the impact(s) of the overflow and a schedule of major milestones for those steps; and
         *(e)* For storm-related overflows, the rainfall intensity (inches/hour) and duration of the storm associated with the overflow.

      DEQ may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

b. Other instances of noncompliance.
   (1) The following instances of noncompliance must be reported:
      i. Any unanticipated bypass that exceeds any effluent limitation in this permit;
      ii. Any upset that exceeds any effluent limitation in this permit;
      iii. Violation of maximum daily discharge limitation for any of the pollutants listed by DEQ in this permit; and
      iv. Any noncompliance that may endanger human health or the environment.

(2) During normal business hours, the DEQ regional office must be called. Outside of normal business hours, DEQ must be contacted at 1-800-452-0311 (Oregon Emergency Response System).
(3) A written submission must be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission must contain:
   i. A description of the noncompliance and its cause;
   ii. The period of noncompliance, including exact dates and times;
   iii. The estimated time noncompliance is expected to continue if it has not been corrected;
   iv. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and
   v. Public notification steps taken, pursuant to General Condition B7.
(4) DEQ may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

D6. Other Noncompliance
The permittee must report all instances of noncompliance not reported under General Condition D4 or D5 at the time monitoring reports are submitted. The reports must contain:
a. A description of the noncompliance and its cause;
b. The period of noncompliance, including exact dates and times;
c. The estimated time noncompliance is expected to continue if it has not been corrected; and
d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

D7. Duty to Provide Information
The permittee must furnish to DEQ within a reasonable time any information that DEQ may request to determine compliance with the permit or to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit. The permittee must also furnish to DEQ, upon request, copies of records required to be kept by this permit.

Other Information: When the permittee becomes aware that it has failed to submit any relevant facts or has submitted incorrect information in a permit application or any report to DEQ, it must promptly submit such facts or information.

D8. Signatory Requirements
All applications, reports or information submitted to DEQ must be signed and certified in accordance with 40 CFR § 122.22.

D9. Falsification of Information
Under ORS 468.953, any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, is subject to a Class C felony punishable by a fine not to exceed $125,000 per violation and up to 5 years in prison per ORS chapter 161. Additionally, according to 40 CFR § 122.41(k)(2), any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit including monitoring reports or reports of compliance or non-compliance will, upon conviction, be punished by a federal civil penalty not to exceed $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

D10. Changes to Indirect Dischargers
The permittee must provide adequate notice to DEQ of the following:
a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the federal Clean Water Act if it were directly discharging those pollutants and;
b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
c. For the purposes of this paragraph, adequate notice must include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

## SECTION E. DEFINITIONS

E1. *BOD* or $BOD_5$ means five-day biochemical oxygen demand.
E2. *CBOD* or $CBOD_5$ means five-day carbonaceous biochemical oxygen demand.
E3. *TSS* means total suspended solids.
E4. *Bacteria* means but is not limited to fecal coliform bacteria, total coliform bacteria, *Escherichia coli* (*E. coli*) bacteria, and *Enterococcus* bacteria.

E5. *FC* means fecal coliform bacteria.
E6. *Total residual chlorine* means combined chlorine forms plus free residual chlorine
E7. *Technology based permit effluent limitations* means technology-based treatment requirements as defined in 40 CFR § 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-041.
E8. *mg/l* means milligrams per liter.
E9. *µg/l* means microgram per liter.
E10. *kg* means kilograms.
E11. $m^3/d$ means cubic meters per day.
E12. *MGD* means million gallons per day.
E13. *Average monthly effluent limitation* as defined at 40 CFR § 122.2 means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
E14. *Average weekly effluent limitation* as defined at 40 CFR § 122.2 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.
E15. *Daily discharge* as defined at 40 CFR § 122.2 means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge must be calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge must be calculated as the average measurement of the pollutant over the day.
E16. *24-hour composite sample* means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow. The sample must be collected and stored in accordance with 40 CFR part 136.
E17. *Grab sample* means an individual discrete sample collected over a period of time not to exceed 15 minutes.
E18. *Quarter* means January through March, April through June, July through September, or October through December.
E19. *Month* means calendar month.
E20. *Week* means a calendar week of Sunday through Saturday.
E21. *POTW* means a publicly-owned treatment works.

# APPENDIX B
## Mutual Agreement and Order

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION

OF THE STATE OF OREGON

| | | |
|---|---|---|
| IN THE MATTER OF: | ) | MUTUAL AGREEMENT |
| | ) | AND ORDER |
| CITY OF CASCADE LOCKS, | ) | NO. WQ/M-ER-13-163 |
| Permittee. | ) | HOOD RIVER COUNTY |
| | ) | |

WHEREAS:

1. On June 27, 2013, the Department of Environmental Quality (Department or DEQ) issued National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit Number 101328 (Permit) to the city of Cascade Locks (Permittee). The Permit authorizes the Permittee to construct, install, modify or operate wastewater treatment control and disposal facilities (facilities) and discharge adequately treated wastewaters into the Columbia River, waters of the state, in conformance with the requirements, limitations and conditions set forth in the Permit. The Permit expires on December 31, 2017.

2. Condition 1 of Schedule A of the Permit does not allow Permittee to exceed the following waste discharge limitations after the Permit issuance date:

Outfall Number 001:

| | AVERAGE EFFLUENT CONCENTRATIONS | | EFFLUENT LOADINGS | | |
|---|---|---|---|---|---|
| May 1 – October 31 | | | | | |
| Parameter | Monthly | Weekly | Monthly Average lbs/day | Weekly Average lbs/day | Daily Maximum Lbs |
| TSS | 20 mg/L | 30 mg/L | 41 | 62 | 82 |
| November 1 – April 30 | | | | | |
| Parameter | Monthly | Weekly | Monthly Average lbs/day | Weekly Average lbs/day | Daily Maximum Lbs |
| TSS | 30 mg/L | 45 mg/L | 83 | 124 | 166 |

3. Permittee has violated the Permit's TSS limits as follows:

| Parameter | Occurrence | Reported Concentration or Loading | Violation Classification[1] |
|---|---|---|---|
| Weekly Average Concentration | October 13-19, 2013 | 159 mg/L | I |
| Weekly Average Mass Limit | October 13-19, 2013 | 112 lbs/day | I |
| Daily Maximum Load | October 18, 2013 | 210 lbs | I |
| Daily Maximum Load | October 19, 2013 | 88 lbs | III |
| Monthly Average TSS Concentration | October 2013 | 62 mg/L | I |
| Month Average Mass Limit | October 2013 | 43 lbs/day | III |

In addition, Permittee violated its Permit in October 2013 by not achieving a TSS removal efficiency of 85%, which is a Class III violation. Permittee's October 2013 removal efficiency was 80%, a Class III violation.

4. DEQ and the Permittee recognize that until new or modified facilities are constructed and put into full operation, Permittee might continue to violate the permit effluent limitations listed in Paragraph 2 at times.

5. The Department and Permittee recognize that the Environmental Quality Commission has the authority to impose a civil penalty and to issue an abatement order for violations of conditions of the Permit. Therefore, pursuant to ORS 183.415(5), the Department and Permittee wish to settle those past violations referred to in Paragraph 3 and to limit and resolve the future violations referred to in Paragraph 4 (unless caused negligently, willfully or intentionally) in advance by this Mutual Agreement and Order (MAO).

[1] Per OAR 340-012-0055

6. The U.S. Environmental Protection Agency appropriately delegated the federal NPDES permitting program to the Department, making the Department the primary administrator and enforcer of the NPDES permits. The Department believes that this MAO furthers the goals of the NPDES permitting program by ensuring progress towards compliance and is consistent with the Department's goal of protecting human health and the environment. However, the Department and Permittee recognize that this MAO does not modify the Permit and therefore possibility of enforcement of Permit requirements by the U.S. Environmental Protection Agency or citizens under the federal citizen suit provisions.

7. This MAO is not intended to limit, in any way, the Department's right to proceed against Permittee in any forum for any past or future violations not expressly settled herein.

NOW THEREFORE, it is stipulated and agreed that:

8. The Environmental Quality Commission shall issue a final order:

A. Requiring Permittee to comply with the following compliance order:

(1) By no later June 1, 2015, the Permittee must complete an evaluation of its collection system sufficient to allow the development of a Facilities Plan.

(2) By no later than October 31, 2015, the permittee shall submit a Facilities Plan Report to the Department for review and approval.

(3) Within 60 days of receiving comments from DEQ on the Facilities Plan, revise the plan consistent with the comments and resubmit for DEQ review and approval.

(4) By no later than July 15, 2017, the permittee must submit Plans and Specifications necessary to upgrade the City's wastewater collection and treatment facilities to the Department for review and approval.

(5) Within 60 days of receiving comments from DEQ on the Plans and Specifications, revise the plans and specifications consistent with the comments and resubmit for DEQ review and approval.

(6) By no later than December 1, 2018, the permittee shall complete the upgrade to the wastewater collection and treatment facilities and comply with all NPDES permit limitations and requirements.

B. Requiring Permittee to meet the following effluent limitations, measured as specified in the Permit, until December 1, 2018.

| | AVERAGE EFFLUENT CONCENTRATIONS | | EFFLUENT LOADINGS | | |
|---|---|---|---|---|---|
| Parameter | Monthly | Weekly | Monthly Average lbs/day | Weekly Average lbs/day | Daily Maximum Lbs |
| TSS | 55 mg/L | 70 mg/L | 268 | 402 | 536 |

C. Requiring Permittee, upon receipt of a written Penalty Demand Notice from the Department, to pay the following civil penalties:

(1) $500 for each day of violation of the compliance order set forth in Paragraph 8A.

(2) $250, $125 and $75 respectively for each Class I, Class II, and Class III violation of each waste discharge limitation set forth in Paragraph 8B.

D. Requiring Permittee to pay a civil penalty of $875 for the violations listed in Paragraph 3 above. Payment must be received within 30 days of full execution of this MAO. Make the check or money order payable to "State Treasurer, State of Oregon" and send it to the DEQ, Revenue Section, 811 S.W. Sixth Avenue, Portland, Oregon 97204.

9. If any event occurs that is beyond Permittee's reasonable control and that causes or may cause a delay or deviation in performance of the requirements of this MAO, Permittee shall immediately notify the Department verbally of the cause of delay or deviation and its anticipated duration, the measures that have been or will be taken to prevent or minimize the delay or deviation, and the timetable by which Permittee proposes to carry out such measures. Permittee shall confirm in writing this information within five (5) working days of the onset of the event.

1 It is Permittee's responsibility in the written notification to demonstrate to the Department's
2 satisfaction that the delay or deviation has been or will be caused by circumstances beyond the
3 control and despite due diligence of Permittee. If Permittee so demonstrates, the Department
4 shall extend times of performance of related activities under this MAO as appropriate.
5 Circumstances or events beyond Permittee's control include, but are not limited to, acts of nature,
6 unforeseen strikes, work stoppages, fires, explosion, riot, sabotage, or war. Increased cost of
7 performance or a consultant's failure to provide timely reports are not considered circumstances
8 beyond Permittee's control.
9 10. The violations set forth in Paragraphs 4 above are expressly settled herein without
10 penalty, except as provided for in Paragraph 8.
11 11. Permittee and the Department hereby waive any and all of their rights to any and all
12 notices, hearing, judicial review, and to service of a copy of the final order herein. The
13 Department reserves the right to enforce this order through appropriate administrative and
14 judicial proceedings.
15 12. Regarding the order set forth in Paragraph 8A above, Permittee acknowledges that
16 Permittee is responsible for complying with that order regardless of the availability of any
17 federal or state grant monies.
18 13. The terms of this MAO may be amended by mutual agreement of the Department
19 and Permittee.
20 14. The Department may amend the compliance order and conditions in this MAO upon
21 finding that such modification is necessary because of changed circumstances or to protect
22 public health and the environment. The Department shall provide Permittee a minimum of thirty
23 (30) days written notice prior to issuing an Amended MAO. If Permittee contests the Amended
24 MAO, the applicable procedures for conduct of contested cases in such matters shall apply.
25 15. This MAO shall be binding on the parties and their respective successors, agents,
26 and assigns. The undersigned representative of each party certifies that he or she is fully

1 authorized to execute and bind such party to this MAO. No change in ownership or corporate or
2 partnership status relating to the facility shall in any way alter Permittee's obligations under this
3 MAO, unless otherwise approved in writing by DEQ.

4 16. All reports, notices and other communications required under or relating to this
5 MAO should be directed to Jayne West, DEQ Eastern Regional Bend Office, 475 NE Bellevue
6 Dr. Suite 110, Bend, Oregon 97701, phone number 541-633-2028. The contact person for
7 Permittee shall be Gordon Zimmerman, P.O. Box 308 Cascade Locks, OR 97014, phone number
8 541-374-8484.

9 17. Permittee acknowledges that it has actual notice of the contents and requirements of
10 this MAO and that failure to fulfill any of the requirements hereof will constitute a violation of
11 this MAO and subject Permittee to payment of civil penalties pursuant to Paragraph 8, above.

12 18. Any stipulated civil penalty imposed pursuant to Paragraph 8 shall be due upon
13 written demand. Stipulated civil penalties shall be paid by check or money order made payable
14 to the "Oregon State Treasurer" and sent to: Business Office, Department of Environmental
15 Quality, 811 S.W. Sixth Avenue, Portland, Oregon 97204. Within 21 days of receipt of a
16 "Demand for Payment of Stipulated Civil Penalty" Notice from the Department, Permittee may
17 request a hearing to contest the Demand Notice. At any such hearing, the issue shall be limited
18 to Permittee's compliance or non-compliance with this MAO. The amount of each stipulated
19 civil penalty for each violation and/or day of violation is established in advance by this MAO
20 and shall not be a contestable issue.

21 19. This MAO shall terminate at the end of the day on the date the final compliance task
22 in Paragraph 8A above is to be completed. However, Permittee remains liable for stipulated
23 penalties for any violations of the MAO occurring during the period the MAO was in effect and
24 demanded pursuant to Paragraph 18.

25

26

**PERMITTEE**

1-14-14
Date

Gordon Zimmerman
Cascade Locks City Administrator

**DEPARTMENT OF ENVIRONMENTAL QUALITY**

1/21/14
Date

Leah Feldon, Manager
Office of Compliance and Enforcement

FINAL ORDER

IT IS SO ORDERED:

**ENVIRONMENTAL QUALITY COMMISSION**

1/21/14
Date

Leah Feldon, Manager
Office of Compliance and Enforcement
on behalf of DEQ pursuant to OAR 340-012-0170
on behalf of the EQC pursuant to OAR 340-011-0505

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION

OF THE STATE OF OREGON

| | | |
|---|---|---|
| IN THE MATTER OF: | ) | AMENDMENT NO. 1 |
| **CITY OF CASCADE LOCK,** | ) | MUTUAL AGREEMENT AND ORDER NO.WQ/M-ER-13-163 |
| Permittee. | ) | |

WHEREAS:

1. On January 21, 2014, the Department of Environmental Quality (DEQ) and Permittee entered into Mutual Agreement and Order (MAO) No.WQ/M-ER-13-163.

2. Paragraph #13 of MAO states: "The terms of this MAO may be amended by the mutual agreement of the Department and Permittee.

NOW THEREFORE, it is stipulated and agreed that the compliance order of the MAO should be amended as follows:

3. Paragraph #8 is amended to read:

NOW THEREFORE, it is stipulated and agreed that:

4. The Environmental Quality Commission shall issue a final order:

A. Requiring Permittee to comply with the following compliance order:

(1) By no later June 1, 2016, the Permittee must complete an evaluation of its collection system sufficient to allow the development of a Facilities Plan.

(2) By no later than October 31, 2016, the permittee shall submit a Facilities Plan Report to the Department for review and approval.

(3) Within 60 days of receiving comments from DEQ on the Facilities Plan, revise the plan consistent with the comments and resubmit for DEQ review and approval.

(4) By no later than July 15, 2018, the permittee must submit Plans and Specifications necessary to upgrade the City's wastewater collection and treatment facilities to the Department for review and approval.

(5) Within 60 days of receiving comments from DEQ on the Plans and Specifications, revise the plans and specifications consistent with the comments and resubmit for DEQ review and approval.

(6) By no later than December 1, 2019, the permittee shall complete the upgrade to the wastewater collection and treatment facilities and comply with all NPDES permit limitations and requirements.

PERMITTEE

| | |
|---|---|
| Date | Signature |
| | Gordon Zimmerman<br>Name (print) |
| | Cascade Locks City Administrator<br>Title (print) |

DEPARTMENT OF ENVIRONMENTAL QUALITY and
ENVIRONMENTAL QUALITY COMMISSION

| | |
|---|---|
| Date | Sarah Wheeler, Manager<br>Office of Compliance and Enforcement<br>on behalf of DEQ pursuant to OAR 340-012-0170<br>on behalf of the EQC pursuant to OAR 340-011-0505 |

# APPENDIX C
## Wastewater System Design Data from *Operations and Maintenance Manual, Wastewater Treatment Facilities*, KCM, Inc., July 1998

Herman Creek. They both discharge into gravity mains, which transport the wastewater to the treatment plant.

The wastewater treatment plant is located about 1,000 feet west of Herman Creek on the bank of the Columbia River. The treatment plant is constructed to EPA Class I Reliability Standards using an extended aeration activated sludge treatment system. The treatment plant facilities include a lab/control building, a headworks, a sequencing batch reactor (SBR), an effluent flow equalization basin, ultra-violet (UV) disinfection, and two aerobic digesters. Treated effluent from the facility flows by gravity to the Columbia River. Figure 1.2 shows the site plan for the treatment plant.

## Process Theory

Influent flow enters the Headworks by gravity where non-treatable objects are removed from the flow by a fine screen. The material removed is dewatered and compacted, and deposited into a dumpster for disposal at a later date. Flow proceeds by gravity to the SBR where solids are removed to produce clarified effluent. From this point wastewater flow is separated into effluent flow and sludge.

Effluent is decanted periodically from the SBR basins into the Equalization basin and is then directed to the UV Disinfection Channel and subjected to ultra-violet radiation. After disinfection, effluent is piped to the outfall in the Columbia River.

Waste Activated Sludge is pumped from the SBR to the two Aerobic Digester Cells where the volatile solids and pathogens are aerobically reduced. The digested sludge is then trucked to the Hood River WWTP for further treatment.

Figure 1.3 shows the design schematic for the wastewater treatment plant facilities. Chapter 3 gives detailed descriptions on each component of the treatment facilities.

## Plant Design Data

Design Year.....2004

Design Population.....1654

Design flow

Average Dry Weather.....0.40 mgd
Max. Dry Weather Month.....0.50 mgd
Max. Wet Weather Month.....0.60 mgd
Peak Hour.....1.60 mgd

Design Loading

Average Day BOD.....665 lbs./day
Peak Month BOD .....1130 lbs./day
Peak Month TKN .....90 lbs./day
Average Day TSS.....665 lbs./day
Peak Month TSS .....1130 lbs./day

Main Lift Station

Type.....Duplex suction lift pumps w/constant speed drive

Redundant Pump Capacity

1 Pump Running: .....340 gpm @ 90 FT TDH

Pump Speed .....1400/1750 rpm

Motor Horsepower(Each Pump) .....30 hp

Emergency Power

Type.....Diesel

Capacity..... 150 KW

Transfer.....Auto

Hydrogen Sulfide Control - Bioxide

Industrial Lift Station

Type.....Duplex suction lift pumps w/constant speed drive

Redundant Pump Capacity

1 Pump Running: .....240 gpm @ 22 FT TDH

Pump Speed .....870/1750 rpm

Motor Horsepower(Each Pump) .....7.5 hp

Emergency Power - Manual Transfer Switch

Trailer mounted 100 KW generator

Hydrogen Sulfide Control - Bioxide

Headworks

Screen Type .....Rotomat Fine Screen

Screen Opening Width .....1/4 inch

Peak Flow Capacity .....2.4 mgd

Screenings Disposal .....Licensed Landfill

Number of Screens.....1

Screw Conveyor .....10-inch diameter

Screening Press.....1

Drive Motor Size .....2 hp

Dumpster.....2 - 1 cy/ea

Sequencing Batch Reactor

Aeration/Decant Basins

Number of Basins.....2

Basin Size.....40' wide x 64' long x 18' high

Basin Volume at High

Water Level.....0.35 million gallons each

.....0.70 million gallons total

Hydraulic Retention Time .....28 hours at 0.60 mgd

BOD Loading (Average Day) .....665 lbs./day

BOD loading (Peak Month) .....1130 lbs./day

Mean MLSS (at Max W.S.) .....3000 mg/l

F:M .....0.07 mg/l

Aeration Type.....Jet

Standard Oxygen Supplied.....2866 lbs./day
Aeration Blowers
- Number.....2
- Horsepower .....40
- Capacity.....605 SCFM @ 7.9 psig

Motive Pumps
- Number.....2 Centrifugal
- Capacity.....2929 gpm @ 22 feet TDH

Waste Sludge
- Withdrawal Type .....Automatic

Peak Month Sludge Yield .....1000 lbs./day
WAS meter
- Type.....Electromagnetic
- Size .....6-inch
- Range .....0-500 gpm

Decanter
- Type.....Floating w/Solids Excluding Mechanism
- Min. Decant Rate.....2000 gpm
- Ave. Decant Rate.....2500 gpm
- Max. Decant Rate .....3100 gpm
- Decant time .....29 minutes

Cycle Times
- Normal .....6.0 hours/basin

Equalization Basin

Volume.....49,000 gallons
Max. Depth.....4 feet
Max. Outflow.....1400 gpm
Max. Time to Empty .....64 minutes
Flow Control .....modulating butterfly valve

Aerobic Digester

Number of Basins.....2
Volume (Each) .....120,000 gallons
Ave. Sludge Yield.....399 lb./day
Peak Month Sludge Yield .....799 lb./day
App. Average SRT @ 1.5% .....75 days
App. Peak Month SRT @ 1.5%.....30 days
Mixing Oxygen Provided.....20 scfm/kcf
No. of Blowers .....2
Blower Capacity .....640 scfm @ 6 psig
Blower Horsepower.....40 hp
Decanting Pump Capacity.....320 gpm @ 24' TDH

Digested Sludge Meter

Type.....Electromagnetic
Size .....4 inch
Range .....0-400 gpm

Sludge Loading Dock

Pump Capacity .....320 gpm @ 24' tdh
Pump Type.....Submersible
Sludge Loading Arm

UV Disinfection System

Peak Design Flow.....1400 gpm (2.0 mgd)
Tank Size .....2' x 43'
Exposure Time.....10.06 seconds
UV Intensity @ 55% Transmsn.....4550 Microwatts/$cm^2$
No. of UV Modules/Bank.....8
Bulbs per Module.....8
No. of Banks.....2
Liquid Depth.....2'-0"

Effluent Flow Measurement

Type.....Sonic (transit time)
Size .....16-inch
Range .....200-1600 gpm

Emergency Power

Type.....Diesel
Capacity.....350 KW
Transfer.....Auto

Plant Lift Station

Type.....Duplex Grinder Pumps
with Constant Speed Drives
Speed.....1750 rpm
Capacity.....70 gpm
Total Head.....39 feet
Horsepower .....3 hp

Expected Plant Effluent Quality

BOD (mg/L).....<15
TSS (mg/L).....<15

Complete descriptions of all the processes occurring at the treatment plant are provided in Chapter 3.

# APPENDIX D
# Thomas E. Coleman, P.E., Consulting Services, Cascade Locks WWTP Technical Memorandum (September 30, 2011)

**Thomas E. Coleman, P.E.**
***Consulting Services***

105 South 3rd Street, Suite 207
Yakima, WA 98901

(509) 454-5094
FAX (509) 576-6273

**Cascade Locks WWTP**
**Technical Memorandum**
**(September 30, 2011)**

**Background**

The City of Cascade Locks operates a wastewater treatment facility that serves the western portion of Cascade Locks, Oregon. Wastewater is heated and discharged to the Columbia River in accordance with National Pollutant Discharge Elimination System (NPDES) Permit number 101328. The existing Permit for the facility was issued on May 13, 2010 and expires on December 31, 2012. Although the Department of Environmental Quality (DEQ) had originally intended to issue this permit in 2007, all NPDES permits had been placed on hold until just recently due to discussions with EPA regarding sewer overflows.

The Cascade Locks wastewater treatment plant (WWTP) was originally placed into operation in 1968. To accommodate growth the City constructed a new treatment facility in 1998. The current population is 1,050 people. The existing facility consists of the following components: influent pump station, headworks with fine screens, two sequencing batch reactor (SBR) units, flow equalization basin, aerobic digestion (waste activated sludge holding tanks), and ultra-violet (UV) disinfection. A complete listing of the WWTP design data from the Operation and Maintenance Manual (KCM, July 1998) is included as Attachment 1 to this Technical Memorandum.

The average design dry weather flow for the wastewater facility is 0.493 million gallons/day (MGD). The actual dry weather flow for May 1 to October 31, for the two years prior to issuance of the current permit, ranged from 0.064 to 0.084 MGD. The actual average wet weather flow (November 1 through April 30) for these same two years, ranged from 0.071 to 0.134 MGD. The plant is currently under utilized with respect to the design flow and loading conditions. Some of the operational problems which the plant has experienced have been attributed to these low loading conditions.

The City's most current biosolids management plan was approved on July 1,1998. Biosolids are hauled from the aerobic digester (aerobic holding tank) to the treatment facility in Hood River where it is further stabilized through anaerobic digestion. The City began hauling its biosolids to Hood River in July 1991. Ultimate disposal is accomplished by land application on farmland. The receiving treatment facility is responsible for ensuring compliance with the federal biosolids regulations (40 CFR Part 503) and the permit for that facility is the governing authority. This permit requires monthly reporting of the transportation of biosolids to the Hood River facility, however, no annual report is required.

**NPDES Permit Limits**
The current NPDES Permit Effluent Limits are as follows:

(1) May 1 - October 31:

| Parameter | Average Effluent Concentrations Monthly | Weekly | Monthly Average lb/day | Weekly Average lb/day | Daily Maximum Lbs |
|---|---|---|---|---|---|
| $CBOD_5$ | 15 mg/L | 25 mg/L | 41 | 62 | 82 |
| TSS | 20 mg/L | 30 mg/L | 41 | 62 | 82 |

(2) November 1 - April 30:

| Parameter | Average Effluent Concentrations Monthly | Weekly | Monthly Average lb/day | Weekly Average lb/day | Daily Maximum Lbs |
|---|---|---|---|---|---|
| $CBOD_5$ | 25 mg/L | 40 mg/L | 58 | 88 | 117 |
| TSS | 30 mg/L | 45 mg/L | 83 | 124 | 166 |

Calculations

(1) Summer $CBOD_5$

(a) 0.493 MGD x 8.34 #/gal x 10 mg/L monthly avg. = 41 lbs/day
(b) 41 lbs/day monthly avg. x 1.5 = 62 lbs/day weekly avg.
(c) 41 lbs/day monthly avg. x 2.0 = 82 lbs/day daily max.

(2) Summer TSS

(a) 0.493 MGD x 8.34 #/gal x 10 mg/L monthly avg. = 41 lbs/day
(b) 41 lbs/day monthly avg. x 1.5 = 62 lbs/day weekly avg.
(c) 41 lbs/day monthly avg. x 2.0 = 82 lbs/day daily max.

(3) Winter $CBOD_5$

(a) 0.584 MGD x 8.34 #/gal x 12 mg/L monthly avg. = 58 lbs/day
(b) 58 lbs/day monthly avg. x 1.5 = 88 lbs/day weekly avg.
(c) 58 lbs/day monthly avg. x 2.0 = 117 lbs/day daily max.

(4) Winter TSS

(a) 0.584 MGD x 8.34 #/gal x 17 mg/L monthly avg. = 83 lbs/day
(b) 83 lbs/day monthly avg. x 1.5 = 124 lbs/day weekly avg.
(c) 83 lbs/day monthly avg. x 2.0 = 166 lbs/day daily max.

The DEQ has taken the following actions with regards to compliance of the existing permit during the previous permit cycle as summarized in Table 1:

| Table 1 – Summary of DEQ action regarding NPDES permit compliance | |
|---|---|
| **Effective Date** | **Action** |
| October 7,2002 | Notice of Noncompliance (NON) for exceedance of the weekly average TSS concentration limit. |
| December 12,2002 | NON for exceedances of the weekly and monthly average TSS limit. |
| May 27, 2003 | NON-Temperature limit exceedance. |
| December 29, 2005 | 2005 Warning Letter (WL) for exceedances of the daily maximum, weekly average, and monthly average TSS limit. |
| January 24,2006 | WL-spill of raw sewage to the ground surface. |
| February 14,2008 | WL for TSS and CBOD exceedances |
| April 17,2009 | Pre-Enforcement Notice (PEN) for TSS exceedances |

The April 17,2009 Pre-Enforcement Notice documented TSS permit exceedences with the last event dated October 2008.

On December 9, 2009, DEQ issued a Mutual Agreement and Order (MAO) to the City of Cascade Locks (MAO No. WQ/M-ER-09-185). The MAO established a compliance date of July 15, 2012 for completion of upgrades as needed to meet all Permit requirements and limitations.

**Process Improvements and Operational Adjustments from 2006 to present**

In an effort to address the challenges of operating the WWTP at flow and loading conditions that are below the design capacity, the plant operation staff (OMI) have made a series of process improvements to the WWTF, including reducing the SBR operating volume, and installing a polymer system and a dissolved oxygen (DO) control system. In May 2006, the low influent flows into the SBRs were evaluated against the design influent flows and the treatment objectives. Based on input from OMI's wastewater process expert, the operations staff reduced the working volume in the SBRs by 22% to bring the solids retention time (SRT) in the SBRs closer to the design criteria. In March 2007, a chemical system was added to aid in removing total suspended solids (TSS) in the system. Polymer is added to the wastewater as necessary to help settle solids in the SBR.

In September 2008, a control system was installed to monitor dissolved oxygen (DO) and adjust aeration blower speed to meet DO setpoints for the SBR. The added controls allow for automatic adjustment of DO in the SBR, which has improved process performance. Prior operation of the blowers was based on timed intervals to meet DO demands in the SBR.

**Consideration of Additional Improvements and Operational Adjustments**

A site visit to the Cascade Locks WWTP was conducted on June 30, 2011 to review plant operation and performance with the operations staff (OMI) and City representatives. While there

have been no recent exceedances of the TSS or CBOD effluent limits, DEQ, the operators, and the City staff remain concerned about the potential for violations of the permit limits. In large part, the operators attribute the operational difficulties which have been experienced to the fact that the plant is significantly underloaded with respect to the design capacity.

Aside from the perceived problems due to low loading conditions, several observation were made during the site visit which could help explain the specific mechanisms by which elevated levels of suspended solids enter the plant effluent and thereby increase the potential for violation of the TSS and CBOD limits. These observations include:

1) The floating SBR decanter mechanism does not completely exclude mixed liquor suspended solids (MLSS) from entering the decanter pipe during the mixed fill and react cycles. As a result of this, during the first moments of each decant cycle the discharge is visibly high in TSS. After the MLSS which has accumulated in the decanter has been flushed out, the SBR effluent is again clear. The amount of TSS entering the effluent from this mechanism would normally not be enough to result in a permit violation, but it could be a contributing factor.

2) Much higher levels of TSS would be discharged when the decanter mechanism disrupts the settled MLSS blanket near the end of the decant cycle. Such a disruption is very likely to result in an exceedance of permitted TSS limits could explain many of the past violations. Factors which could contribute to such a disruption of the sludge blanket include, poor settling characteristics of the MLSS (high sludge volume index), insufficient settling time, higher than necessary decant flowrates and /or volume, and the design characteristics of the decanter mechanism.

3) The SBR effluent equalization (EQ) basin outlet control valve is not functioning, which means that the EQ basin does not perform as intended. This results in inefficient operation of the UV disinfection system. Additionally, if the EQ basin is working properly is would enable some of the TSS discharged from the SBR to settle out before reaching the effluent. TSS removal in the EQ basin should not be relied on routinely to achieve TSS effluent limits, but it could provide an additional margin of safety in the case of occasional elevated TSS discharges from the SBRs.

Several other plant operation and design issues were reviewed with the operators and City representatives during the site visit. These issues include.

1) The plant headworks lacks a grit removal process unit. It is likely that significant amounts of grit have accumulated in the SBR tanks. Since it is difficult to take an SBR tank out of service for cleaning, the amount of grit accumulation in these tanks is not known.

2) The jet aeration/mixing system is performing adequately and the addition of automated DO control in 2008 was a significant improvement over the original timer control of the blowers. However, the use of the jet aeration/mixing system for mixing

only is very inefficient. High efficiency mechanical mixing, if installed for use in the unaerated mixing cycles, could result in significant energy savings.

3) The current "aerobic digester" design does not provide an effective means of thickening or stabilizing the biosolids. This increases the hauling costs for transportation of the biosolids to Hood River for further processing and limits disposal options for Cascade Locks.

Based on the observations and issues discussed above, steps for improving the performance and reliability of the WWTP could be considered under the following categories:

1) Short Term Operational Adjustments and Maintenance Items

2) Intermediate Term Improvements and Operational Modifications

3) Longer Term Improvements

**Short Term Operational Adjustments and Maintenance Items**
The steps identified under this category would be aimed at reducing the risk of violating permit TSS limits.

- Repair the automated valve regulating the flow from the UV equalization basin.
- Reduce the decant flow rate.
- Consider increasing the number of cycles per day with the objective of reducing the decant fraction (i.e. reduce the decant drawdown per cycle to reduce the risk of disturbing the settled sludge blanket. Since the current flows and loadings are significantly below the design capacity, there is a great deal of flexibility with regard to increasing settling times and reducing decant flow rates and volume per cycle).

**Intermediate Term Improvements and Operational Modifications**
The steps identified under this category should be evaluated in a facilities plan prior to implementation, however, it might be possible to implement some or all of these improvements after completing an evaluation and report addressing these specific items and their energy savings potential. Such a report would be submitted to the Oregon Energy Trust and to DEQ. The Oregon Energy Trust offers incentive payments for energy saving improvements which meet certain criteria.

- Upgrade the SBR control system and add an ORP sensor in each tank. With the new system, a control algorithm would be implemented to automatically control the duration of the anoxic fill cycle to maximized nitrate utilization.
- Adjust the other cycle times to optimize the operation under the low loading conditions.
- Add high efficiency mechanical mixing and use the jet aeration system for aeration only.

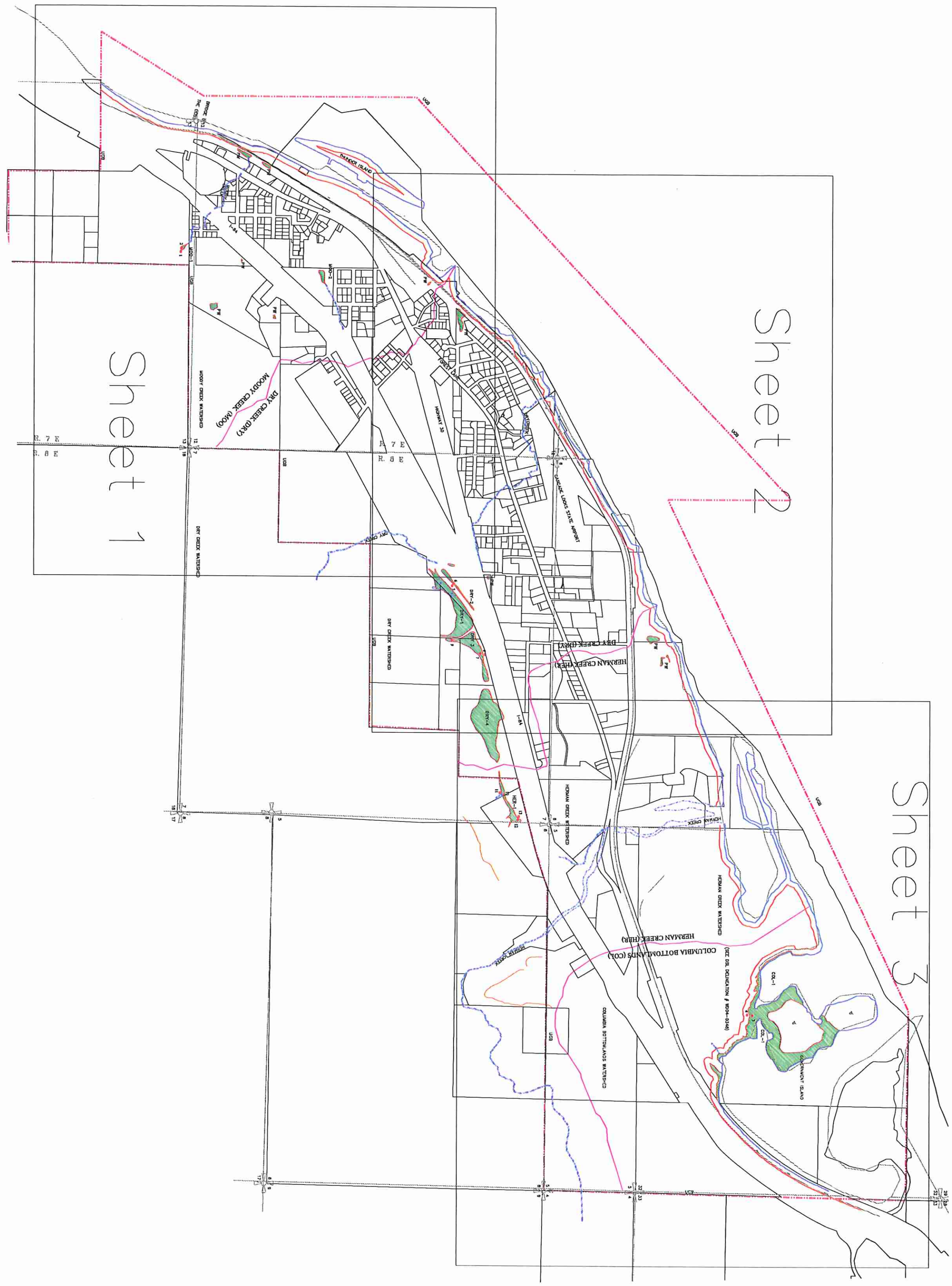
**Longer Term Improvements**
The steps identified under this category would have to be evaluated in a facilities plan prior to implementation. The facilities plan would take a comprehensive look at the projected WWTP needs over the next 20 years.

- Add grit removal.
- Consider modifying or replacing the existing decanter system (alternatively, decant replacement might be considered under the immediate term improvements discussed above).
- WAS handling and Digester modifications to improve WAS stabilization and thickening (reduce hauling costs and meet Class B requirements, if possible).
- Consider conversion to diffused air aeration (might also be eligible for energy savings incentives).

**Summary and Recommendations**
It is recommended that the Short Term Operational Adjustments and Maintenance Items identified above be implemented as soon as possible. These steps will help to avoid any further violations of the permitted TSS limits over the near term. DEQ should be notified that these steps will be implemented and when they will be completed with the operational adjustment in service. There should be no problem in getting these items complete before July 15, 2012.

The intermediate and longer term improvements will need to be evaluated in an engineering report or facilities plan. Discussion with DEQ representatives should be conducted in the near future to determine the scope of the needed planning effort, schedule for completion, and financing options.

# APPENDIX E
# Environmental Support Information




| | | | |
|---|---|---|---|
| Watershed Boundary | | Wetland Field Verified | |
| Project Boundary/UGB | | Sample Point | 58 |
| Potentially Jurisdictional Waterways | | Wetland Code | HER-1 |
| Approximate bank of Columbia River | | Probable Wetland | PW |
| 75 ft setback of Approximate bank of Columbia River | | | |

GRAPHIC SCALE

Scale in Feet

THIS MAP WAS FUNDED by OREGON DEPARTMENT of LAND CONSERVATION and LAND DEVELOPMENT

THIS MAP IS FOR PLANNING PURPOSES ONLY
WETLAND BOUNDARIES ARE APPROXIMATE
AND SUBJECT TO CHANGE

Information shown on this map is for planning purposes only and wetland information is subject to change. There may be unmapped wetlands subject to regulation and all wetland boundary mapping is approximate. In all cases, actual field conditions determine wetland boundaries. You are advised to contact the Department of State Lands and the U.S. Army Corps of Engineers with any regulatory questions.

DATE: June, 2005

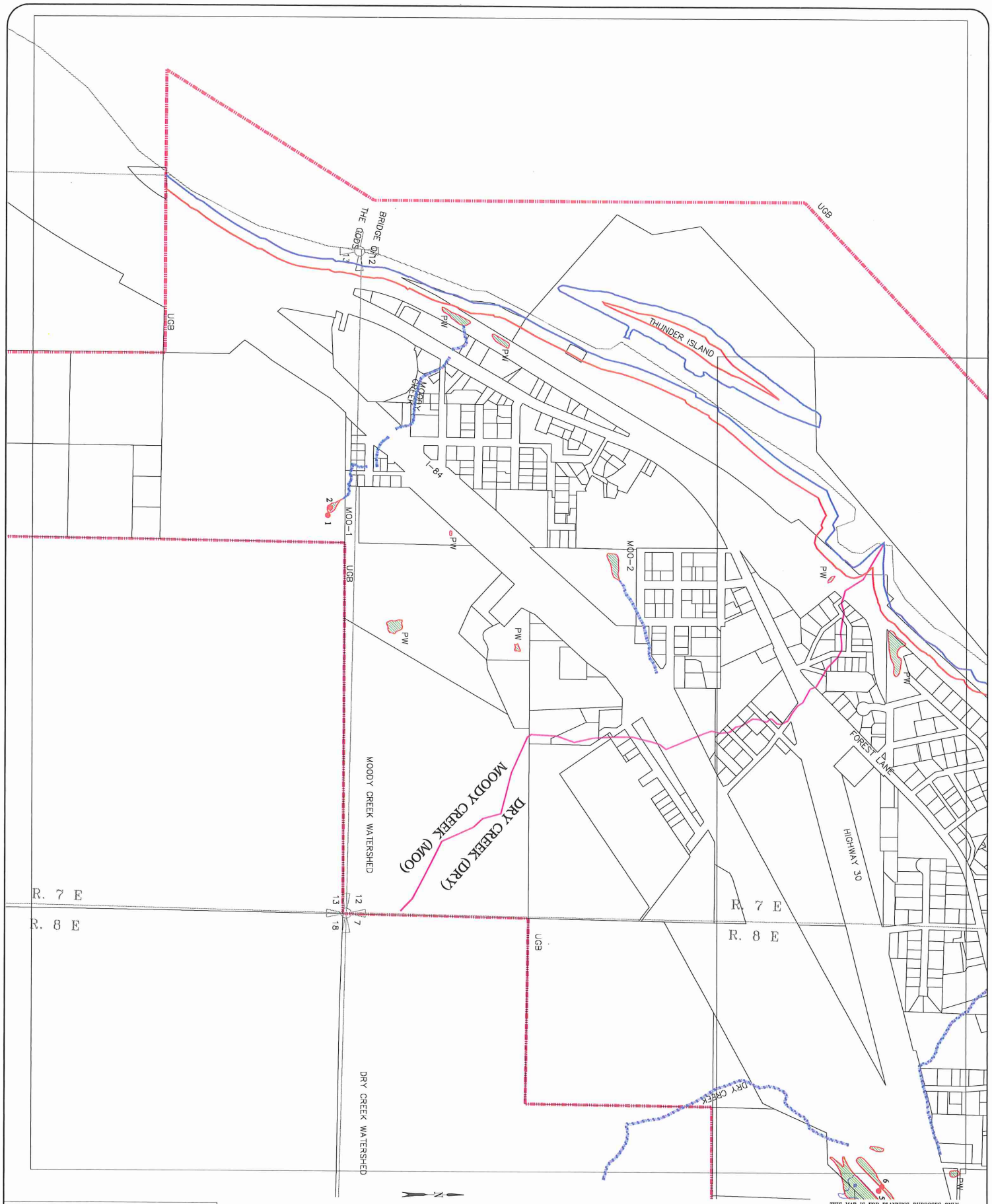
BASE MAP INFO: Supplied by Hood River County

JOB NO.: 2669

# Cascade Locks
## Local Wetlands Inventory


Pacific Habitat Services,Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, Oregon 97070
Phone: (503) 570-0800


INDEX SHEET




| | | | |
|---|---|---|---|
| Watershed Boundary | | Wetland Field Verified | |
| Project Boundary/UGB | | Sample Point | 5B |
| Potentially Jurisdictional Waterways | | Wetland Code | HER-1 |
| Approximate bank of Columbia River | | Probable Wetland | PW |
| 75 ft setback of Approximate bank of Columbia River | | | |

GRAPHIC SCALE

Scale in Feet

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## Local Wetlands Inventory

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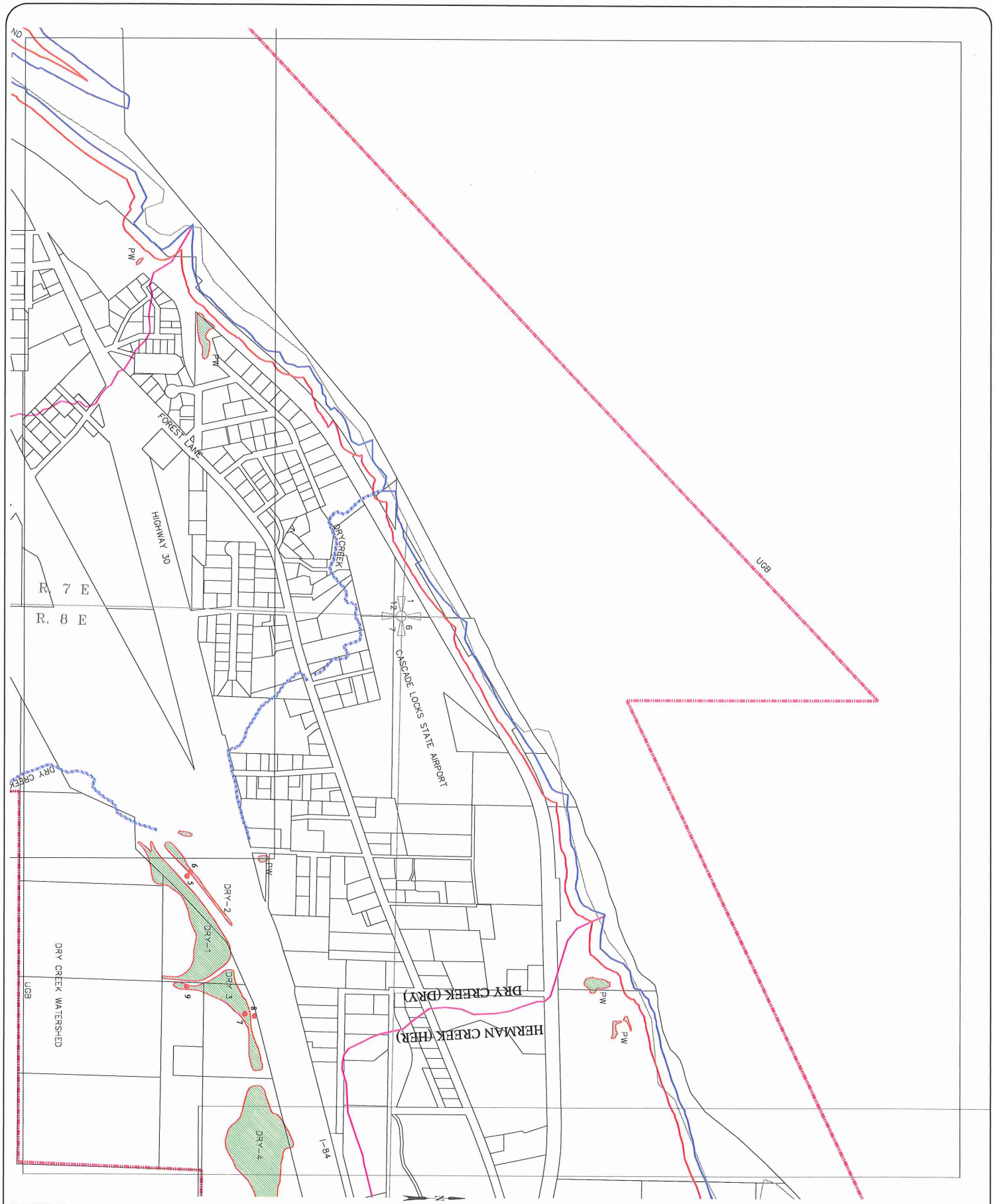
Phone: (503) 570-0800

Sheet: 1

of: 3




| | | | |
|---|---|---|---|
| Watershed Boundary | | Wetland Field Verified | |
| Project Boundary/UGB | | Sample Point | 58 |
| Potentially Jurisdictional Waterways | | Wetland Code | HER-1 |
| Approximate bank of Columbia River | | Probable Wetland | PW |
| 75 ft setback of Approximate bank of Columbia River | | | |

GRAPHIC SCALE

100 0 200 400 600 800 1000

Scale in Feet

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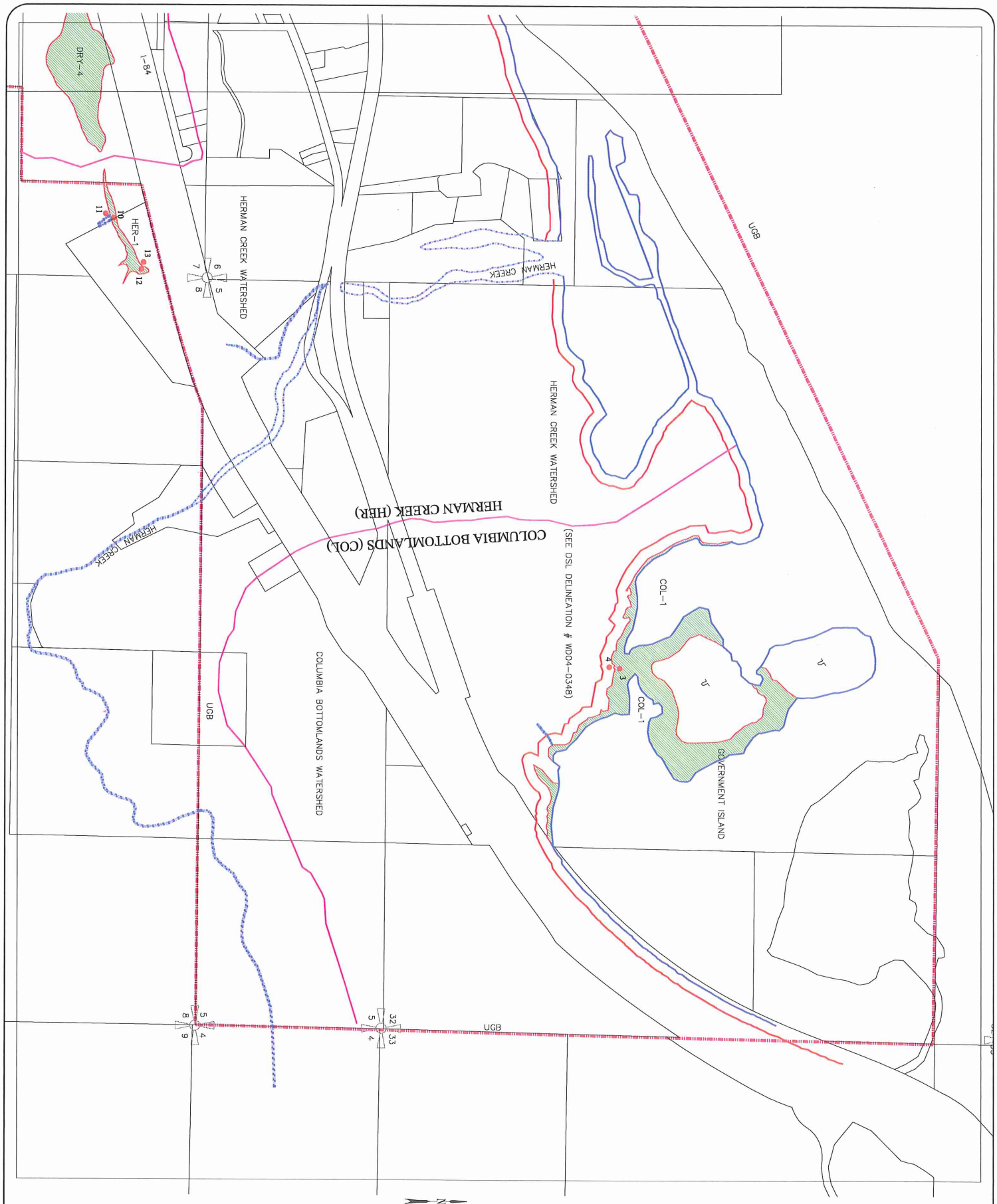
9450 SW Commerce Circle, Suite 180
Wilsonville, Oregon 97070
Phone: (503) 570-0800

PHS

Sheet: 2

of: 3




Watershed Boundary
Project Boundary/UGB
Potentially Jurisdictional Waterways
Approximate bank of Columbia River
75 ft setback of Approximate bank of Columbia River
Wetland Field Verified
Sample Point
Wetland Code
Probable Wetland
58
HER-1
PW

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BASE MAP INFO: Supplied by Hood River County

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# Cascade Locks
## Local Wetlands Inventory

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, Oregon 97070
Phone: (503) 570-0800
PHS

Sheet: 3

of: 3

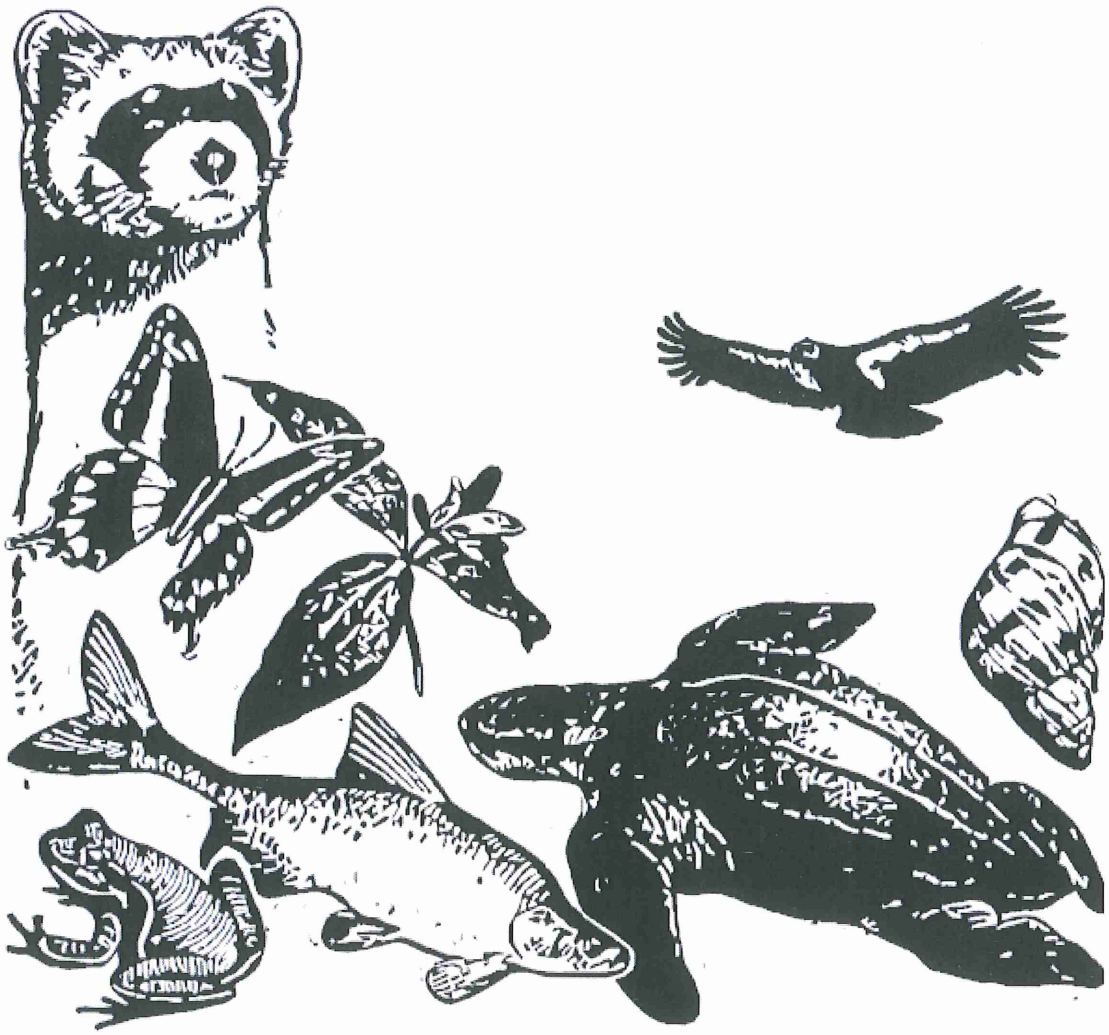
U.S. Fish & Wildlife Service

# Hood River County

## *IPaC Trust Resources Report*

Generated October 27, 2016 03:02 PM MDT, IPaC v3.0.9

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

# Table of Contents

IPaC Trust Resources Report . . . . . 1
Project Description . . . . . 1
Endangered Species . . . . . 2
Migratory Birds . . . . . 4
Refuges & Hatcheries . . . . . 7
Wetlands . . . . . 8

U.S. Fish & Wildlife Service

# IPaC Trust Resources Report

NAME

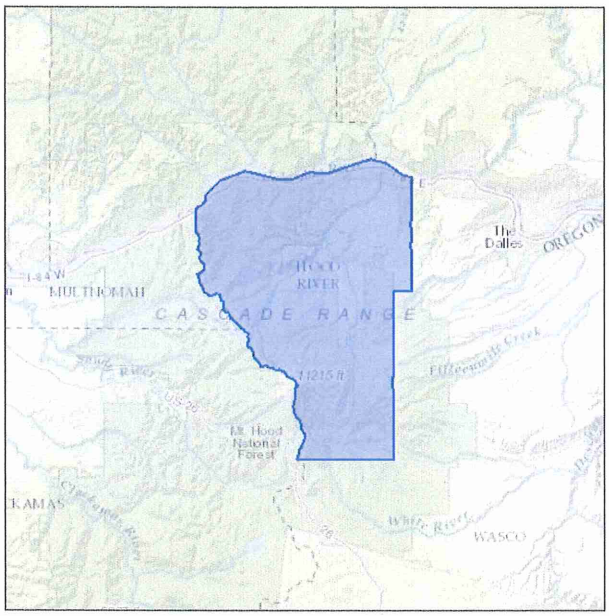
Hood River County

LOCATION

Hood River County, Oregon

IPAC LINK

https://ecos.fws.gov/ipac/project/QJVMG-LVVHV-DONMG-DUZUQ-LEUVKA




## U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

**Oregon Fish And Wildlife Office**
2600 Southeast 98th Avenue, Suite 100
Portland, OR 97266-1398
(503) 231-6179

# Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

**This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.**

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

**A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.**

The list of species below are those that may occur or could potentially be affected by activities in this location:

## Birds

**Northern Spotted Owl** Strix occidentalis caurina — Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B08B

## Conifers and Cycads

**Whitebark Pine** Pinus albicaulis — Candidate

CRITICAL HABITAT
**No critical habitat** has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=R00E

## Fishes

**Bull Trout** Salvelinus confluentus — Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E065

# Critical Habitats

This location overlaps all or part of the critical habitat for the following species:

**Bull Trout** Salvelinus confluentus

Final designated critical habitat
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E065#crithab

**Chinook Salmon** Oncorhynchus (=Salmo) tshawytscha

Final designated critical habitat
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E06D#crithab

**Northern Spotted Owl** Strix occidentalis caurina

Final designated critical habitat
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B08B#crithab

**Steelhead** Oncorhynchus (=Salmo) mykiss

Final designated critical habitat
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E08D#crithab

# Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish & Wildlife Service.[1] There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

---

1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The following species of migratory birds could potentially be affected by activities in this location:

**Bald Eagle** Haliaeetus leucocephalus — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

**Black Swift** Cypseloides niger — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FW

**Brewer's Sparrow** Spizella breweri — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HA

**Calliope Hummingbird** Stellula calliope — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0K3

**Caspian Tern** Hydroprogne caspia — Bird of conservation concern
Season: Breeding

**Cassin's Finch** Carpodacus cassinii — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0J6

**Eared Grebe** Podiceps nigricollis — Bird of conservation concern
Season: Breeding

**Flammulated Owl** Otus flammeolus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0DK

**Fox Sparrow** Passerella iliaca — Bird of conservation concern
Season: Breeding

**Green-tailed Towhee** Pipilo chlorurus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0IO

**Lewis's Woodpecker** Melanerpes lewis — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HQ

**Loggerhead Shrike** Lanius ludovicianus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FY

**Long-billed Curlew** Numenius americanus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06S

**Olive-sided Flycatcher** Contopus cooperi — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0AN

**Peregrine Falcon** Falco peregrinus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

**Purple Finch** Carpodacus purpureus — Bird of conservation concern
Season: Year-round

**Rufous Hummingbird** selasphorus rufus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0E1

**Sage Thrasher** Oreoscoptes montanus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0ID

**Short-eared Owl** Asio flammeus — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

**Swainson's Hawk** Buteo swainsoni — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B070

**Vesper Sparrow** Pooecetes gramineus ssp. affinis — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F9

**Western Grebe** aechmophorus occidentalis — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EA

**White Headed Woodpecker** Picoides albolarvatus — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HU

**Williamson's Sapsucker** Sphyrapicus thyroideus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FX

**Willow Flycatcher** Empidonax traillii — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6

# Wildlife refuges and fish hatcheries

**There are no refuges or fish hatcheries in this location**

# Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

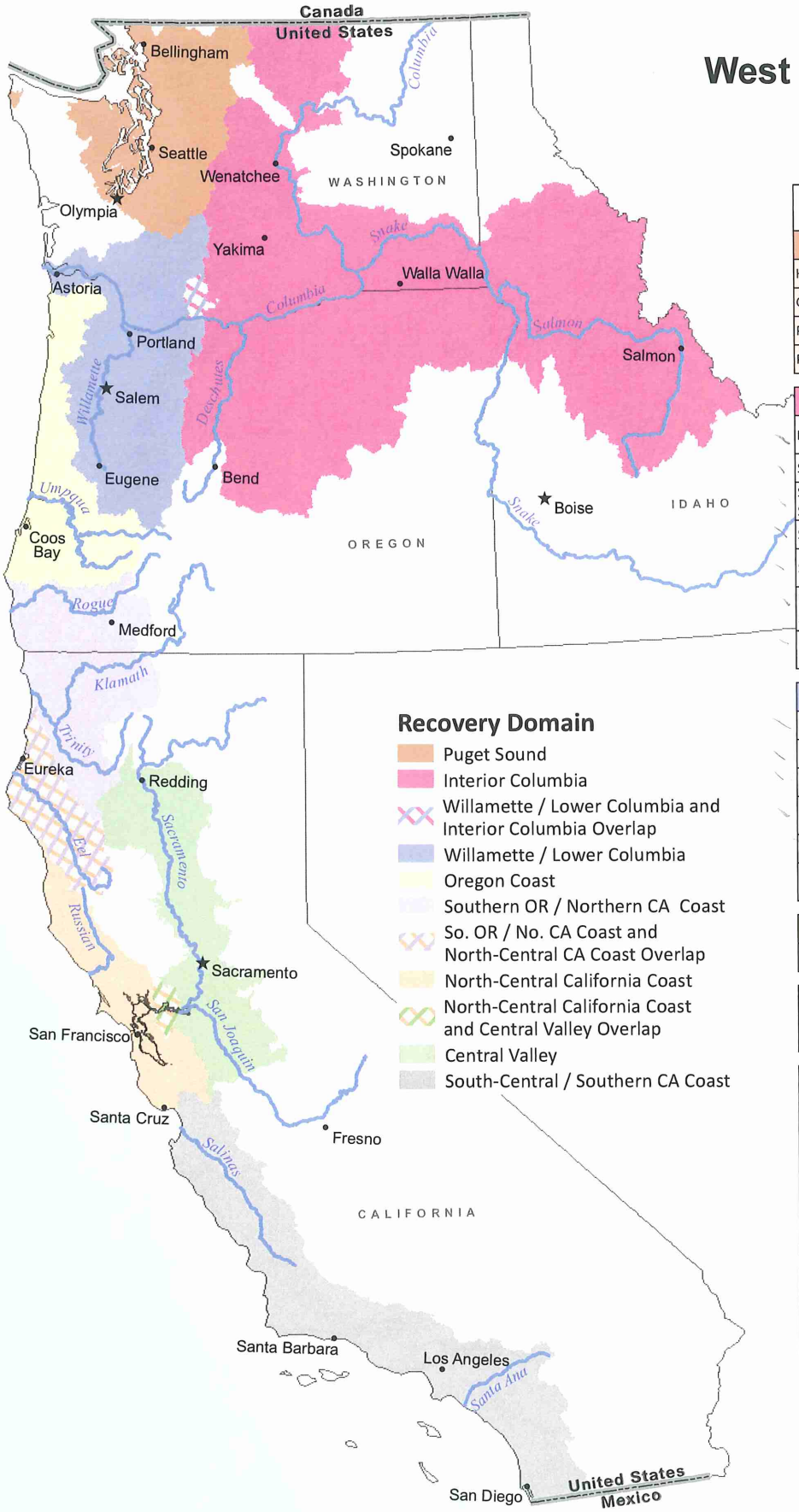
Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Wetland data is unavailable at this time.

# Status of ESA Listings & Critical Habitat Designations for West Coast Salmon & Steelhead




| Evolutionarily Significant Unit / Distinct Population Segment | ESA Status | Date of ESA Listing | Date of CH Designation |
|---|---|---|---|
| **Puget Sound Recovery Domain** | | | |
| Hood Canal Summer-run Chum Salmon | T | 3/25/1999 | 9/2/2005 |
| Ozette Lake Sockeye Salmon | T | 3/25/1999 | 9/2/2005 |
| Puget Sound Chinook Salmon | T | 3/24/1999 | 9/2/2005 |
| Puget Sound Steelhead | T | 5/11/2007 | 2/24/2016 |
| **Interior Columbia Recovery Domain** | | | |
| Middle Columbia River Steelhead | T | 3/25/1999<br>1/5/2006 | 9/2/2005 |
| Snake River Fall-run Chinook Salmon | T | 4/22/1992 | 12/28/1993 |
| Snake River Spring / Summer-run Chinook Salmon | T | 4/22/1992 | 10/25/1999 |
| Snake River Sockeye Salmon | E | 11/20/1991 | 12/28/1993 |
| Snake River Steelhead | T | 8/18/1997<br>1/5/2006 | 9/2/2005 |
| Upper Columbia River Spring-run Chinook Salmon | E | 3/24/1999 | 9/2/2005 |
| Upper Columbia River Steelhead | T | 8/18/1997<br>1/5/2006 | 9/2/2005 |
| **Willamette / Lower Columbia Recovery Domain** | | | |
| Columbia River Chum Salmon | T | 3/25/1999 | 9/2/2005 |
| Lower Columbia River Chinook Salmon | T | 3/24/1999 | 9/2/2005 |
| Lower Columbia River Coho Salmon | T | 6/28/2005 | 2/24/2016 |
| Lower Columbia River Steelhead | T | 3/19/1998<br>1/5/2006 | 9/2/2005 |
| Upper Willamette River Chinook Salmon | T | 3/24/1999 | 9/2/2005 |
| Upper Willamette River Steelhead | T | 3/25/1999<br>1/5/2006 | 9/2/2005 |
| **Oregon Coast Recovery Domain** | | | |
| Oregon Coast Coho Salmon | T | 2/11/2008 | 2/11/2008 |
| **Southern Oregon / Northern California Coast Recovery Domain** | | | |
| Southern OR / Northern CA Coasts Coho Salmon | T | 5/6/1997 | 5/5/1999 |
| **North-Central California Coast Recovery Domain** | | | |
| California Coastal Chinook Salmon | T | 9/16/1999 | 9/2/2005 |
| Central California Coast Coho Salmon | E | 10/31/1996 (T)<br>6/28/2005 (E)<br>4/2/2012 (RE) | 5/5/1999 |
| Central California Coast Steelhead | T | 8/18/1997<br>1/5/2006 | 9/2/2005 |
| Northern California Steelhead | T | 6/7/2000<br>1/5/2006 | 9/2/2005 |
| **Central Valley Recovery Domain** | | | |
| California Central Valley Steelhead | T | 3/19/1998<br>1/5/2006 | 9/2/2005 |
| Central Valley Spring-run Chinook Salmon | T | 9/16/1999 | 9/2/2005 |
| Sacramento River Winter-run Chinook Salmon | E | 11/5/1990 (T)<br>1/4/1994 (E) | 6/16/1993 |
| **South-Central / Southern California Coast Recovery Domain** | | | |
| South-Central California Coast Steelhead | T | 8/18/1997<br>1/5/2006 | 9/2/2005 |
| Southern California Steelhead | E | 8/18/1997<br>5/1/2002 (RE)<br>1/5/2006 | 9/2/2005 |

ESA = Endangered Species Act, CH = Critical Habitat, RE = Range Extension
E = Endangered, T = Threatened,

Updated July 2016

Critical Habitat Rules Cited

- 2/24/2016 (81 FR 9252) Final Critical Habitat Designation for Puget Sound Steelhead and Lower Columbia River Coho Salmon
- 2/11/2008 (73 FR 7816) Final Critical Habitat Designation for Oregon Coast Coho Salmon
- 9/2/2005 (70 FR 52630) Final Critical Habitat Designation for 12 ESU's of Salmon and Steelhead in WA, OR, and ID
- 9/2/2005 (70 FR 52488) Final Critical Habitat Designation for 7 ESU's of Salmon and Steelhead in CA
- 10/25/1999 (64 FR 57399) Revised Critical Habitat Designation for Snake River Spring/Summer-run Chinook Salmon
- 5/5/1999 (64 FR 24049) Final Critical Habitat Designation for Central CA Coast and Southern OR/Northern CA Coast Coho Salmon
- 12/28/1993 (58 FR 68543) Final Critical Habitat Designation for Snake River Chinook and Sockeye Salmon
- 6/16/1993 (58 FR 33212) Final Critical Habitat Designation for Sacramento River Winter-run Chinook Salmon

ESA Listing Rules Cited

- 4/2/2012 (77 FR 19552) Final Range Extension for Endangered Central California Coast Coho Salmon
- 2/11/2008 (73 FR 7816) Final ESA Listing for Oregon Coast Coho Salmon
- 5/11/2007 (72 FR 26722) Final ESA Listing for Puget Sound Steelhead
- 1/5/2006 (71 FR 5248) Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead
- 6/28/2005 (70 FR 37160) Final ESA Listing for 16 ESU's of West Coast Salmon
- 5/1/2002 (67 FR 21586) Range Extension for Endangered Steelhead in Southern California
- 6/7/2000 (65 FR 36074) Final ESA Listing for Northern California Steelhead
- 9/16/1999 (64 FR 50394) Final ESA Listing for Two Chinook Salmon ESUs in California
- 3/25/1999 (64 FR 14508) Final ESA Listing for Hood River Canal Summer-run and Columbia River Chum Salmon
- 3/25/1999 (64 FR 14517) Final ESA Listing for Middle Columbia River and Upper Willamette River Steelhead
- 3/25/1999 (64 FR 14528) Final ESA Listing for Ozette Lake Sockeye Salmon
- 3/24/1999 (64 FR 14308) Final ESA Listing for 4 ESU's of Chinook Salmon
- 3/19/1998 (63 FR 13347) Final ESA Listing for Lower Columbia River and Central Valley Steelhead
- 8/18/1997 (62 FR 43937) Final ESA Listing for 5 ESU's of Steelhead
- 5/6/1997 (62 FR 24588) Final ESA Listing for Southern Oregon / Northern California Coast Coho Salmon
- 10/31/1996 (61 FR 56138) Final ESA Listing for Central California Coast Coho Salmon
- 1/4/1994 (59 FR 222) Final ESA Listing for Sacramento River Winter-run Chinook Salmon
- 4/22/1992 (57 FR 14653) Final ESA Listing for Snake River Spring/summer-run and Snake River Fall Chinook Salmon
- 11/20/1991 (56 FR 58619) Final ESA Listing for Snake River Sockeye Salmon
- 11/5/1990 (55 FR 46515) Final ESA Listing for Sacramento River Winter-run Chinook Salmon

# APPENDIX F
## City of Cascade Locks Resolution No. 1317

# RESOLUTION NO. 1317

## A RESOLUTION TO MAINTAIN CURRENT RATES ESTABLISHED BY RESOLUTION NO. 1005, ADOPT A PROVISION FOR SEWER RATES FOR LARGE INDUSTRIAL WATER USERS, AND REPEALING RESOLUTION NO. 1005.

**WHEREAS,** the City has an outstanding sewer bond; and

**WHEREAS,** the rates established in 2005 shall be maintained, and

**WHEREAS,** the City has need to provide a fair rate for large water users (over 250,000 gallons per month) of an industrial nature; now therefore

**THE COMMON COUNCIL FOR THE CITY OF CASCADE LOCKS, HOOD RIVER COUNTY, OREGON, RESOLVES AS FOLLOWS:**

**SECTION 1.** **Sewer Charges.** The sewer user charges as established in 2005 shall be as follows:

A. **Residential Sewer Charges** shall be as follows:

| | Fixed Charge per Unit Up to 10,000 gallons/unit/month | Charge per 1,000 gallons |
|---|---|---|
| June 20, 2005 | $45.40 | $8.77 |

B. **Residential Summer Sewer Charges** shall be a flat rate per month from April 21 through October 19 each year, and the amount of the flat rate shall be the current Fixed Charge per Unit used in the Residential Sewer Charges table above.

C. **Commercial, Public Agency and Small Industrial Sewer Charges** shall be as follows:

| | Fixed Charge per Unit Up to 5,000 gallons/unit/month | Charge per 1,000 gallons |
|---|---|---|
| June 20, 2005 | $45.40 | $8.77 |

**SECTION 2.** **Residential Customers.** A residential customer is a single-family house, an apartment unit that is intended for year-around occupancy, a mobile-home either on a separate lot or in a mobile-home court that is leased on a month-to-month or longer period. It does NOT include RV parks, motels, hotels, hostels or other living quarters occupied on a seasonal, daily, or weekly basis, nor live-in care facilities. No exceptions from these rates will be allowed for unoccupied units unless the water meter is physically disconnected. In the event that a water meter is disconnected for more than one month, a flat sewer rate of one-half the regular rate per month will be charged to the property owner.

1. **Single Family Housing:**

   a. Summer Rate: April 21 through October 19. The regular flat rate per month for each single-family residence will be charged and reflected on the bills received June 1 to November 1.

b. Winter Rate: October 20 through April 20. The regular flat rate per month per single-family residence and for each residential unit for usage up to 10,000 gallons of water per residential unit will be charged. If usage exceeds 10,000 gallons of water per month, the regular base rate will not be used and the rate per every 1,000 gallons of water will be assessed. (Example: up to 10,000 gal = $45.40; OR 11,000 = 11 x 8.77 = $96.47).

3. **Multiple Housing Units on a Single Water Meter:** (duplexes, apartment buildings and mobile home parks). No exceptions from these rates will be allowed for unoccupied units.

   a. **Summer Rate:** April 21 through October 19. The regular flat rate per month for each residential unit served by the same water meter will be charged.

   b. **Winter Rate:** October 20 through April 20. The regular flat rate per housing unit for up to 10,000 gallons of water times the number of housing units will be charged. If the average usage exceeds 10,000 gallons of water times the number of housing units, the base regular flat rate will not be used and the current rate per every 1,000 gallons of water will be assessed.

**SECTION 3.** **Non-Residential Customers.** Non-residential customers include RV parks, motels, hotels, hostels or other living quarters occupied on a seasonal, daily, or weekly basis, all retail businesses, offices, medical facilities, food services, wholesale businesses, manufacturers, institutional (including hospitals, day-care, clinic, live-in facilities), clubs, churches, and government owned, leased, or used buildings, schools, parks, warehouses, and any other use not specifically described as a Residential Customer or as an Industrial Customer. If a water meter feeds more than one unit and some of the units could be classified as Residential and some could be classified Non-residential, then the Non-residential rates will apply to all the units on that water meter.

1. **Non-Residential Rate:** Without regard to seasons, the rate will be the regular flat rate per month for usage up to 5,000 gallons of water per month. If usage exceeds 5,000 gallons of water per month, the regular flat rate will not be used and the current rate per every 1,000 gallons of water will be assessed.

**SECTION 4.** **Large Industrial Customers.** For industrial customers who use more than 250,000 gallons of water per month, the wastes from industrial customers that send process water to the sewer system will be evaluated for "strength" as milligrams of suspended solids (SS) per liter (mg/l) of sewage and by biological oxygen demand (BOD) in milligrams per liter (mg/l), by a testing agency of the City's choice and at the customer's expense. The City will determine from these tests the cost to treat that strength of sewage and determine a rate per month.

**SECTION 5.** **Future Development.** Any future development will be required to install a water meter for each category (Residential, Non-residential or Industrial) of units served in order to facilitate determination of sewer rates. Rates for any development not easily designated as one of the categories described above, shall be determined by the City Administrator. In these cases the developer can appeal the City Administrator's decision to the Council by submitting a written appeal for review within ten (10) days of the notice of the original decision.

**SECTION 6.** **Prohibition of Discounts**. The grant and loan conditions of the USDA Rural Development program prohibit the City from subsidizing any class of customer with sewer rates. The City will bill each customer according to the above schedule. The City is also prohibited from subsidizing sewer rates (or System Development Charges (SDC)) for economic development purposes.

**SECTION 7.** **Exceptions to Established Rates.**

1. **Unoccupied Units**: No exceptions from the rates established in this Resolution will be allowed for unoccupied units unless the water meter is physically disconnected. In the event that a water meter is disconnected, a flat sewer rate of ~~$16.25~~ one-half the regular flat rate per residential unit per month will be charged to the property owner.
2. **Demolished Buildings**: Property with no buildings or lots with demolished buildings that are not connected to water service and sewer service will not be charged for sewer service.
3. **No sewer charge shall be assessed to any vacant lot within a mobile home park.**

**SECTION 8.** **Repeal of Prior Resolution**. Resolutions No. 1005 is hereby repealed.

**SECTION 9.** **Effective Date**. This resolution shall become effective upon adoption by the City Council and approval by the Mayor.

**SECTION 11.** **Expiration**. This resolution shall remain in effect until repealed or amended by the City Council.

**ADOPTED** by the City Council this 27th day of October, 2014.

**APPROVED** by the Mayor this 27th day of October, 2014.

Tom Cramblett

Tom Cramblett, Mayor

ATTEST:

Kathy Woosley

Kathy Woosley, City Recorder