CITY OF DAYTON
Wastewater Facilities Plan
Dayton, Oregon

EXECUTIVE SUMMARY

Purpose of Facilities Plan

The purpose of this study is to evaluate the City's sanitary sewerage system with respect to its existing and future needs, identify improvements and associated costs necessary to meet those needs, and provide the City with a guide for future growth of the City's sanitary sewerage system. The information contained herein is intended to assist the City in the planning and implementation of capital improvements to the sanitary sewerage system, as well as ongoing system maintenance.

Background Information and Need for Plan

The City of Dayton owns and operates the wastewater utility serving the City. The system currently serves a population of approximately 2,550 people. The system consists of a gravity collection system with four pump stations and a facultative lagoon treatment plant operated in a summer-hold, winter-discharge configuration. The City currently operates the wastewater utility under a NPDES permit issued by the Oregon Department of Environmental Quality (DEQ). For the most part, the City has been able to meet the permit requirements. However, due to the age and condition of the facility, permit violations are likely to occur early in the planning period.

The City does not have a current planning document for the wastewater utility. The most recent planning documents were prepared in the 1970's. The existing treatment plant was constructed in 1968 and subsequently upgraded in 1980. With the exception of a dechlorination system, the plant has not been significantly altered since 1980. Therefore, the City anticipates the need to perform significant upgrades during the next planning cycle. In addition to the age of the facilities, the potential for rapid residential growth exists in Dayton due to the proximity to the Portland and McMinnville metro areas and the relatively low cost of living. For these reasons, the City is in need of a new Facilities Plan for the wastewater utility. Based on this need, the City authorized Westech Engineering to proceed with the preparation of this Facilities Plan in the November of 2007. This Facilities Plan is intended to meet the current requirements of the regulatory and funding agencies and to serve as a roadmap for the development of the wastewater utility during the next planning cycle.

Basis of Facilities Planning

During the coming years, improvements to the City's existing wastewater collection and treatment facilities will be required to ensure reliable operation and compliance with regulatory standards. Haphazard improvements that do not adequately consider all of the issues that impact the system may end up costing the City more in the long run than well thought-out, carefully applied solutions. For example, if a particular sewer pipe can not convey the volume of wastewater that flows into it, a logical solution is to replace the pipe with a larger pipe. However, if the larger pipe is sized only to accommodate the existing flow volumes, and future growth upstream of the pipe occurs, the pipe size may need to be increased a second time to accommodate the flow increases. Instead of replacing the pipe twice, a more cost-effective solution is to replace the pipe once with a pipe sized to accommodate the existing flows plus the anticipated future growth. As this example illustrates, most wastewater facilities cannot be expanded incrementally to accommodate growth. More often that not, the most cost effective solution is to initially size the facilities to accommodate anticipated growth within the planning period. Therefore, this Facilities Plan not only considers the existing deficiencies, but also considers what improvements are going to be required during the planning period as the City grows and develops. The intent of the recommendations proposed in the plan is to provide the City

with reliable wastewater facilities that not only meet current demands, but will also adequately serve the City well into the future.

The DEQ recommends a minimum 20-year planning period for facilities planning. This planning period begins once the construction of the required improvements is completed. The intent of this approach is to construct improvements that have minimum design life of 20-years. Based on the project schedule outlined in **Section 8**, the construction of the first phase of the recommended improvements should be completed during the 2015 calendar year. Based on a 20-year planning period, the recommended improvements are expected to serve the City's needs until 2035. In order to assess the City's needs in the year 2035, population growth projections must be made to determine future wastewater flows and loads. The DEQ mandates the use of County coordinated growth rates and population projections. Therefore, the growth rates and population projections used in the Facilities Plan are based on growth developed by Yamhill County. Using the growth rate projected by Yamhill County, the projected population of Dayton in the year 2035 is expected to be approximately 4,548 (see **Section 2**). Projected wastewater flows and loads are based, in part, on this population. Wastewater flow and load projections are detailed in **Section 5**.

The DEQ mandates that the planning area for facilities planning be limited to the land within the present UGB of the City. Therefore, the improvements recommended in this plan are based on development of land within the UGB in its present location, as well as the existing land use zoning for these areas. It is assumed that no significant development will occur within the study area that will require major changes to the existing zoning, and that there will be no significant expansions of the UGB within the study period. Changes in any of these assumptions could change the recommendations contained in this facilities plan. Should significant changes in any of the above occur, the facilities plan should be updated accordingly.

Overview of Existing Facilities

Dayton's original sewer system was built in 1965 and 1966 and replaced all the individual septic tank systems. It served most of the area within the present City limits from 10th Street east to Water Street and from Mill Street north to Ash Street. This area also included that portion of town southeast of the HWY 221 bridge from Conifer Place north to Jarika Place.

Concrete pipe was used for the construction of the original gravity collection piping. Three sewage lift stations were constructed as part of the original system in 1966. These included the Main Pump Station, the 9th Street Pump Station, and the HWY 221 Pump Station. Though modified over the years, these pump stations are still in operation today. As originally constructed, the 9th Street and HWY 221 stations discharged into the upper ends of the gravity collection system that drained to the Main Pump Station. The Main Pump Station conveys all wastewater collected in the City to the treatment facility. The treatment facility was constructed in 1966 and consisted of two stabilization lagoons operated in parallel located at the current site north east of the Yamhill River. The Main Pump Station received raw wastewater from the entire collection system and pumped the sewage under the Yamhill River via a 6-inch forcemain into the treatment facility. Plant effluent from the 1966 treatment facility was then disinfected with chlorine and discharged to the Yamhill River through an 8-inch outfall pipeline.

In 1982, a new facultative lagoon treatment facility was constructed north of the existing wastewater lagoons on the east side of the Yamhill River. The new facility created three new treatment lagoons and utilized the two existing 1966 lagoons as polishing cells. The dike between the two existing

lagoons was removed to form the single polishing lagoon (lagoon #4) that is currently in service. To convey wastewater to the upstream end of the new lagoons, the 6-inch diameter forcemain from the Main Pump Station was replaced with a new 8-inch forcemain. Also at that time, the Main Pump Station pumps and motors were upsized to convey the increased flow, while the wetwell and drywell remained unchanged. The 9th Street and HWY 221 Pump Stations, forcemains, and discharge locations remain unchanged since 1966. The only exception being the HWY 221 forcemain that was replaced when the new bridge was constructed in 1982. The 9th Street and HWY 221 Pump Stations operate by lifting sewage into the gravity collection system that drains to the Main Pump Station.

In the time since the lagoons were constructed, additional development in town resulted in the construction of new gravity mains and one additional pump station. The new Palmer Creek Pump Station was originally constructed in 2007 and is located south of Joe Palmer Way and east of the Elizabeth Court cul-de-sac. This pump station serves the Palmer Creek Basin composed of primarily single family residential services.

An overall schematic representation of the existing wastewater collection and treatment system including pump stations and forcemains are shown in Figure 4-1. Figure 4-2 illustrates the existing wastewater collection facilities. These collection system maps show the sizes and material for each line segment.

Collection System Deficiencies and Recommended Improvements

As previously stated, much of the collection system was constructed in 1966 and is nearing the end of its useful life. The collection system collects large amounts of infiltration and inflow (I/I). Surcharging in all trunk sewers is common except for the HWY 221 Basin. I/I is problematic because it overloads the collection piping and pump stations and must be treated and disposed of as if it were wastewater. In addition to the infiltration and inflow problems, several sewer mains lack the capacity to convey existing peak flows. The HWY 221, 9th Street and the Main pump stations also lack the capacity to convey existing peak flows. Furthermore, much of the equipment at these stations is likely to become obsolete during the planning period.

The primary purpose of the recommended collection system improvements is to increase the capacity of the undersized and antiquated facilities. The recommended improvements consist of sewer gravity main and force main capacity increases, pump station capacity increases and updating, and the ongoing I/I reduction program.

Portions of the collection system lack capacity to convey existing sanitary sewer flows. Therefore, the recommended improvements include upsizing the undersized trunk sewers. The HWY 221, 9th Street and the Main pump stations lack capacity to convey existing peak flows and are nearing the end of their useful life and should be upgraded early in the planning period. The Palmer Creek pump station may lack the capacity to the convey peak flows associated with growth. As such, capacity upgrades may be required toward the end of the planning period. The HWY 221, 9th Street and the Main pump stations will require upgrades early in the planning period. In addition, the Main Pump Station forcemain is undersized and will need to be upsized early in the planning period. This forcemain is suspended from the pedestrian bridge over the Yamhill River. The existing pedestrian bridge has many timbers that need to be replaced soon. Given the cost associated with ongoing bridge maintenance and/or replacement, and anticipated timeframe for the new ODOT bridge, other alternatives were developed. These include removing the pedestrian bridge and install a new forcemain under the Yamhill River, and routing the forcemain to the HWY 18 Bridge north of town

and hang the new forcemain from this bridge. Refer to **Section 6** for a more detailed discussion of bridge replacement costs and alternatives. The least cost option was to install a new forcemain under the Yamhill River via directional drilling. The recommended improvements for the collection system are listed in Table 6-5. The costs associated with these recommended improvement can also be found in Table ES-1.

Treatment System Deficiencies and Recommended Improvements

The existing wastewater treatment plant (WWTP) operates as a summer hold winter discharge facility. The existing treatment facilities are undersized to treat the existing wastewater flows. The existing WWTP is undersized with respect to hydraulic storage capacity and organic treatment capacity of the lagoons as shown in **Section 7**. Over the last few discharge seasons the City has had to discharge additional days beyond the permitted window to dispose of the effluent stored during the summer and winter time flows. Table 7-3 provides a summary of each component of the treatment system and associated deficiencies.

Three primary alternatives for addressing the remaining treatment plant shortcomings were evaluated. All of these alternatives included summer hold winter discharge to the Yamhill River. They also include increasing the hydraulic and organic capacity of the plant to accommodate future growth. The primary alternatives are explained in greater detail in **Section 7** of the Facilities Plan.

Alternatives 1 and 3 include expansion of the existing treatment plant. Alternative 2 include constructing a new WWTP northeast of the existing WWTP. Since Alternatives 1 and 3 expand the existing storage lagoons they have the advantage of utilizing the existing storage capacity of the existing lagoons. Under all of the alternatives, all wastewater collected in the City is pumped by the Main Pump Station to the treatment plant site north east of the City near where it is treated today.

In addition to the three primary alternatives other "bigger picture" treatment alternatives were considered. These include regional treatment, and year round discharge facilities. Regional treatment was more expensive than the recommended alternative and therefore was not considered. Year around discharge facilities require discharge during the summer which is currently not permitted and not likely to be permitted by the DEQ. For further discussion on these options refer to **Section 7** of the Facilities Plan.

Under alternatives 1, 2 and 3 all wastewater collected in the summer months is stored in the facultative lagoons and released during the winter months. Alternative 1 expands the existing facultative lagoons and utilizes dissolved air floatation and filtration to polish the facultative lagoon effluent to meet the permit limits. Alternative 2 provides all new lagoons and utilizes dissolved air floatation and filtration to polish the facultative lagoon effluent to meet the permit limits. Alternative 3 expands the existing facultative lagoons and adds two aerated lagoons that provide increased BOD removal and allows the expanded lagoons to be deeper and a smaller footprint. Dissolved air floatation and filtration is then used to polish the facultative lagoon effluent to meet the permit limits.

The total project costs for each of the three alternatives was determined. This work is presented in **Section 7**. This work showed that the total project costs for alternatives 1 and 3 is very similar. The least expensive capital cost alternative was alternative 3. However, alternative 3 has a substantially higher annual energy costs associated with the two aerated lagoons. Therefore, this alternative is more costly over the life cycle of the plant than alternative 1. Due to lower life cycle and energy costs Alternative 1 is the recommended alternative. A detailed cost estimate of each alternative is presented in Appendix G of the Facilities Plan.

It is recommended that improvements be constructed in two phases. A detailed cost estimate that lists each component included in each phase are listed in Table 7-7. Phase I includes all the treatment plant components except for the construction of the media filters. Phase II includes the construction of media filters. The purpose of phase I is to increase the organic treatment and hydraulic storage capacity of the plant in order to meet the NPDES permit. The existing treatment facilities lack organic treatment and hydraulic storage capacity. Therefore, the phase I improvements are required early in the planning period. Based on the population growth and flow projections described in **Section 5**, the Phase I improvements should enable the City to comply with the NPDES discharge permit limits until approximately 2020. Beyond 2020, the WWTP may have trouble producing effluent of the needed quality at certain times of the year due to the limitations of the DAF clarifiers. If this proves to be the case, the media filters can be added to enable the City meet the permit limits for the remainder of the planning period. This phased approach provides the City with some flexibility in the event that growth is slower than anticipated. On the other hand, if the City attracts an industrial water user, Phase II might have to be implemented earlier in the planning period. The costs associated with the recommended improvement can also be found in Table ES-1.

Recommended Capital Improvement Plan

The recommended collection system, pump station, and treatment system improvements were evaluated and assigned a priority ranking based on a number of factors identified in **Section 8**. At a minimum, all of the Priority 1A, 1B, and Priority 2 improvements should be included in the City's Capital Improvement Plan (CIP). The Priority 3 improvements are largely growth driven. In general, it is envisioned that the Priority 3 improvements will be constructed as part of future development and that the developer will pay for the improvements. It is recommended that the City implement the Priority 1A improvements under a single funding package. Work on the Priority 1A improvements should begin immediately after agency approval and City adoption of this Facilities Plan. The Priority 1B and Priority 2 projects should be implemented after the Priority 1A improvements as finances become available and the need arises.

The total preliminary project cost estimates for each priority classification are listed on the **Table ES-1** on the following page. The project cost projections listed in the following table reflect costs in 2011 dollars and are planning level estimates intended to be in the range of +35% to –25% of the actual projects costs. The projected costs include legal, administration, permitting, engineering, and contingency as well as construction costs.

Financing

Dayton does not currently have the resources nor is the City's existing user fee structure sufficient to fund the recommended improvements. Therefore, alternative funding sources must be pursued. Several potential funding sources are identified and discussed in **Section 8** of the Facilities Plan. All likely funding options will require the City to increase user and SDC fees.

As available grant funding on public works projects has decreased in the last several years, it will be incumbent upon the City to aggressively pursue grant funding. The first step in this process is to schedule a "one stop meeting" with OBDD-IFA and the preparation of applicable grant applications as soon as possible. The City may qualify for a number of grant programs since 53.9% of residents in

the City are in the low and moderate income brackets. The City must also determine if any users outside the city limits are in the low and moderate income brackets.

Implementation Plan

It is recommended that the City begin the preliminary groundwork for the Priority 1 improvements as soon as possible after the final approval of the Facilities Plan. A key early step involves putting together a funding package and adjusting SDC and user fees accordingly. The SDC and user fee structure should be sufficient to fund all of the Priority 1A, 1B, and Priority 2 improvements over the duration of the planning period. It is recommended that the City's initial efforts be focused on the Priority 1A improvements. After these improvements are completed, the Priority 1B and Priority 2 improvements can be implemented as finances become available. Clearly, the Priority 1A improvement project is substantial. Based on discussions with City Staff it will be the largest single project the City has ever undertaken.

A recommended implementation schedule for the Priority 1A improvements is shown on the following page for the City's consideration. Since the recommended improvements are substantial in nature, and since the tasks associated with these improvements are complex and interrelated, it is likely that the actual implementation schedule will vary from that as shown below. It should be noted that the City and its project team will need to complete many of the tasks concurrently in order to meet the schedule as outlined below.

TABLE ES-1: Recommended Capital Improvement Plan

Project	Priority	Total Estimated Project Cost[1]
Collection System Improvements		
Main Pump Station (Ferry & Water)	1A	$1,728,000
Main Pump Station Force Main (to WWTP) & Bore Under the Yamhill River	1A	$1,835,000
Reroute RV Park Forcemain	1A	$137,000
Ferry Street (9th Street P.S. to MH 34)	1B	$38,000
9th Street Pump Station	1B	$473,000
9th Street P.S. Force Main (P.S. to MH 11)	1B	$307,000
Main Street (MH 19 to Overflow)	1B	$73,000
Main Street (MH 19 to MH 20	1B	$89,000
Ferry Street (Main Pump Station to MH 3)	1B	$124,000
1st Street (MH 3 to MH 8)	1B	$448,000
5th Street (MH 8 to MH 11)	1B	$227,000
HWY 221 Pump Station	1B	$1,042,000
HWY 221 P.S. Force Main (connect to existing)	1B	$23,000
1st Street (MH 3 to MH 71)	2	$100,000
1st Street (MH 71 to MH 76)	2	$201,000
Ferry Street (Main Pumps Station to MH 19)	2	$100,000
1st Street (MH 20 to MH 54)	2	$117,000
2nd Street (MH 54 to MH 58)	2	$350,000
HWY 221 P.S. (Old PS Wet Well to MH 176)	2	$230,000
1st Street (MH 20 to MH 24)	2	$396,000
3rd Street (MH 24 to MH 28)	2	$413,000
Palmer Creek P.S. Uprades When School Connects	3	$135,000
New Foster Pump Station	3	$1,350,000
New Foster Pump Station Force Main	3	$744,000
		$10,680,000
Wastewater Treatment Plant Improvements		
Phase I WWTP Improvements	1A	$8,473,000
Existing Lagoons Biosolids Removal	1B	$540,000
Phase II WWTP Improvements	2	$1,000,000
		$10,013,000

(1) Costs are in 2011 dollars and assume dry weather construction, publicly bid project, ENR 20 cities index = 9,103. See Section 3.6 for basis of project cost estimates (i.e., 10% construction contingency, 20% engineering, 5% legal, permits, easement, and administration)

Table ES-2: Recommended Implementation Schedule

Milestone	Date
Facilities Plan	
Submit final Facilities Plan and EA to DEQ and Agency for final review	6/1/2012
DEQ and Agency approval of final Facilities Plan	6/15/2012
City adopts Final Facilities Plan	6/15/2012
Funding Package	
Evaluate potential funding sources/schedule one-stop meeting	1/30/2015
Decision on final funding sources to pursue	3/30/2015
Submit funding applications	4/30/2015
Update user rates analysis and SDC fees	8/30/2015
Finalize funding package	12/30/2015
Land and Easement Acquisition	
Identify land and easement needs	3/28/2016
Contact property owners and enter into negotiations	4/31/2016
Prepare legal documents and finalize purchases	7/1/2016
Design Engineering	
Select and retain engineering team	3/30/2016
Notice to proceed for preliminary engineering	4/30/2016
Submit Draft Predesign Report to DEQ & Funding Agency	1/30/2017
Receive Predesign Report comments from DEQ & Funding Agency	3/30/2017
Submit Final Predesign Report to DEQ & Funding Agency	3/15/2017
DEQ and Agency Approval of Predesign Report	6/1/2017
Notice to proceed for final engineering	7/1/2017
Complete final design	12/30/2017
DEQ and agency approval of plans & specifications	2/30/2018
Construction	
Advertise for Construction Bids	3/15/2018
Receive Construction Bids	4/15/2018
Award Contracts	5/15/2018
Start Construction	6/1/2018
Complete Construction of Priority 1A improvements	11/1/2019
Improvements fully Operational	12/31/2019