CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN

2010

REGISTERED PROFESSIONAL
ENGINEER
65318PE
OREGON
MAR. 12, 2002
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SIGNED 04-12-10

The City of John Day has reviewed this Wastewater Facilities Plan and adopted it.
Mayor   4-13-10
Signature and Title   Date

This project was funded with a financial award from the Oregon Business Development Department's Water/Wastewater Technical Assistance Grant program.

Anderson·Perry & Associates, Inc.

Civil Engineers

La Grande, Oregon
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Job No. 592-22

ACKNOWLEDGMENTS

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EXECUTIVE SUMMARY

OVERVIEW

This section briefly summarizes the results of the Wastewater Facilities Plan prepared by Anderson·Perry & Associates, Inc., for the City of John Day. The recommendations outlined hereafter have been developed in cooperation with the John Day City Council, City staff, Public Works Committee, and the Oregon Department of Environmental Quality (DEQ). The majority of the focus of this Plan is on the treatment system. A limited analysis of the existing collection system was also completed as part of the Plan. The Plan includes an analysis of the existing system and its performance, an analysis of historical wastewater data and design criteria development, an evaluation of system deficiencies and needs, an evaluation of improvement alternatives, and development of a financial plan and project implementation plan. Included in this Executive Summary is a brief discussion of the existing wastewater system, the wastewater system improvements project selected by the City of John Day, the current financial status and loan capacity of the City, a discussion of potentially available funding sources, action items, and the implementation plan. The reader is encouraged to refer to the chapters of this Plan for a more detailed discussion of the topics briefly outlined hereafter.

EXISTING WASTEWATER COLLECTION AND TREATMENT

Wastewater Collection System. Construction of the original wastewater collection system began in 1949. Major additions were completed in 1970 and 1978. Since 1978 the collection system has been expanded several times to support the City's growth.

The collection system consists of a single 18-inch interceptor and 6-, 8-, and 12-inch trunk and lateral lines that transport wastewater via gravity from the residential and commercial developments of the City of John Day and Canyon City to the wastewater treatment facility. Three wastewater lift stations aid in the transportation of wastewater from low lying areas to the gravity collection system. One station located west of the City near the Grant County Road Department Shops collects wastewater from the Grant County facilities and pumps it via a 4-inch forcemain to the Patterson Road Lift Station. The Patterson Road Lift Station is located next to the John Day River on the intersection of Patterson Road and U.S Highway 395. This lift station collects wastewater from developments in that area and pumps it to another lift station, referred to as the Bowling Alley Lift Station. The Bowling Alley Lift Station is located in front of the Bowling Alley along U.S. Highway 395, east of Northwest Lyons Street. The Bowling Alley Lift Station collects the wastewater pumped from the Patterson Road Lift Station and a small gravity line. Wastewater from the Bowling Alley Lift Station is pumped into the gravity system at a manhole located near the intersection of West Main Street and N.W. 3rd.

The system consists of approximately 84,145 lineal feet of 4-, 6-, 8-, 10-, 12-, and 18-inch gravity sewer pipe. In addition, there are approximately 10,528 lineal feet of 4-, 6-, and 8-inch forcemain. The collection system has 357 manholes and 34 cleanouts based on review of the collection system map.

Wastewater Treatment. The existing WWTF is located on the northwestern end of the City at the end of 7th Street. The City of John Day's existing mechanical wastewater treatment facility (WWTF) provides secondary treatment of the City's domestic wastewater. Construction of the original WWTF was completed in 1949. However, due to continued expansion of the system, the original trickling filter facility became overloaded, resulting in the need for an upgraded treatment facility. In 1978, the facility was upgraded and incorporated several of the original plant structures from the 1949 treatment plant. The current facility consists of an influent lift station, a headworks structure, two primary clarifiers, two trickling filters, one secondary clarifier, gas chlorination and chlorine contact basin, four percolation ponds for effluent disposal, two-stage high rate anaerobic sludge digestion, and four sludge drying beds

Minor modifications have been made to the WWTF since its construction in 1978. The secondary clarifier has been retrofitted to include a chlorination line around the launder to reduce algae growth. In addition, a floating cover was installed on the secondary anaerobic digester. Other modifications include changes to telemetry, electrical, controls, flowmeters, and the distribution piping to the percolation ponds.

EXISTING WASTEWATER SYSTEM EVALUATION SUMMARY

Collection System Evaluation. Seasonally, the City experiences excessive infiltration and inflow (I/I) into the collection system. To determine potential areas of the system that may be experiencing excessive I/I, a limited analysis of the collection system was completed as part of this Plan. The analysis consisted of flow monitoring in selected areas throughout the City's system. The City also completed a television inspection of sewer lines in areas identified during the flow monitoring and completed improvements to the collection system based on the television inspection. Refer to Chapter 3 for a more detailed discussion of the evaluation and a summary of the results.

Wastewater Treatment Facility Evaluation. Based upon the process evaluation, the City's WWTF is in need of major improvements, regardless of whether any growth occurs in the John Day and Canyon City service areas. The following factors indicate upgrading is needed:

> **Age and Insufficient Capacity**. A portion of the existing components and treatment units were constructed during the original 1949 plant construction. Due to these units being 60 years old, they are showing severe degradation and will not serve the long-term treatment needs of the City and are in need of replacement. Additionally, most of the existing facilities were constructed as part of the 1978 construction project and have been in service for 30 years. These 30-year-old components of the plant are at the end or have surpassed their expected service life and are in need of rehabilitation and/or replacement. Other units do not have adequate capacity or the ability to meet the treatment needs of

the City now or in the future. Refer to Chapter 3 for a more comprehensive discussion of the evaluation of the existing plant and the identified deficiencies.

WASTEWATER SYSTEM IMPROVEMENTS PROJECT

Four conceptual wastewater treatment alternatives and one conceptual effluent reuse alternative were evaluated during preparation of this Wastewater Facilities Plan. The conceptual treatment alternatives include no action, improve the existing trickling filter wastewater treatment facility, upgrade the existing trickling filter wastewater treatment facility, and construct a new activated sludge mechanical wastewater treatment facility. The conceptual effluent reuse alternative includes construction a new lagoon treatment, storage, and reuse (irrigation) facility. Based upon work sessions, teleconferences, and meetings held after reviewing the Wastewater Facilities Plan, the John Day City Council selected the following to constitute its wastewater system improvements project. The selected improvements package is outlined in detail in Chapters 4 and 5. The year 2011 total estimated project cost for the selected wastewater system improvements project described hereafter is $8.29 million (based on the upper level of the cost range) as outlined on Table ES-1.

Collection System. As mentioned above, a limited evaluation of the existing collection system was completed in this Plan. Based upon the evaluation, it appears the City's collection system is seasonally experiencing excessive I/I. The flow monitoring and TV work completed as part of this Plan identified areas in the collection system that needed to have repairs and rehabilitation completed. The City prioritized these areas and has addressed the needed repairs and rehabilitation concerns.

Treatment Facility. Continued discharge into the existing percolation ponds appears to be the only viable option available to the City. As such, to provide the level of treatment that will be necessary to consistently meet the current and anticipated future conditions of the discharge permit, the City selected the alternative to construct a new activated sludge biological treatment process. Furthermore, as a result of having to provide the new activated sludge process, the City decided integration of existing treatment units with the new process will not be efficient or feasible and elected to completely abandon and demolish the existing facility.

Five biological treatment process options are presented in this Plan for consideration under the selected alternative (refer to Chapter 4). Although five biological treatment process options were presented for consideration under the selected WWTF alternative, the City Council elected not to choose a specific option as part of this Wastewater Facilities Plan. Instead, the City decided to complete a Request for Proposals (RFP) process in order to select the most appropriate treatment process. The RFP process would be completed during the pre-design stage of the project. Once the option is selected by committee, and upon the DEQ's approval of the selection (an addendum to this Plan describing the proposed process selected would be submitted to the DEQ for approval), the design would be completed. A preliminary list of items included in an RFP has been provided in Chapter 5.

The selected WWTF improvements recommended for construction by the City of John Day will meet effluent requirements for biochemical oxygen demand (BOD) and total suspended solids (TSS) removal, nitrogen removal (nitrification and denitrification), disinfection and a stabilized digested sludge to meet the state and federal requirements for land application, and will provide a reliable, efficient, and long-life treatment facility. The selected treatment alternative will include the following components:

- **New Preliminary Treatment (Headworks)**. New headworks consisting of a fine screening system to remove plastics, rags, etc., a new 6-inch Parshall flume packaged flowmetering manhole to measure influent flows, and a vortex-type grit chamber to remove grit will be necessary. The fine screening system will include a mechanical vertically-mounted fine screen, screenings washer, and compactor system. The grit removal system will be a vortex-type consisting of a grit removal pumping system and dewatering equipment. To provide protection and prevent freezing of the new headworks equipment (screening and grit dewatering equipment), a new concrete masonry block (CMU) headworks building will be constructed.

- **Influent Lift Station**. Due to the depth of the existing influent gravity sewer, screened wastewater will need to be pumped from the screen unit into the vortex grit removal system. A new influent lift station will need to be constructed to accomplish the required pumping. The lift station, in order to meet DEQ requirements for redundancy and reliability, must have adequate capacity to handle the anticipated design peak hour flow (1.5 million gallons per day [MGD]) with the largest pump out of service. To meet this requirement, three new submersible pumps, each with a capacity of 525 gallons per minute (gpm), would be provided. With three pumps, any one of the pumps could be out of service and the other two would meet the capacity requirement.

- **New Activated Sludge Treatment Process**. A new activated sludge treatment process will be needed to provide the level of treatment necessary to meet the conditions of the City's existing and anticipated future Water Pollution Control Facilities (WPCF) Permit. The treatment process will be selected pre-design through an RFP process. The selected process will form the basis of design for the new WWTF and will be provided with adequate capacity to meet the anticipated flows and loadings through the 20-year planning period.

- **Disinfection System**. Prior to discharge of the treated effluent into percolation ponds, it must be disinfected to inactivate pathogenic microorganisms to acceptable levels as specified in the permit. To accomplish the needed disinfection, a new UV light disinfection system will be installed in new concrete channels. A total of 36 low-pressure high-intensity lamps will be installed in the channels. The system will be designed with the required UV intensity to treat the projected peak hour design flow and to allow future installation of an additional bank of 18 lamps, if required. A spare module of lamps will be provided for rapid replacement in the event of a module failure. To provide protection and prevent freezing of the new UV light disinfection equipment, a new concrete masonry block (CMU) building will be constructed.

- **Sludge Handling**. Sludge derived as a result of the treatment process must receive additional treatment to make it acceptable for land application. To provide the required sludge treatment, a minimum of two aerobic digesters with a total combined working capacity of 220,000 gallons will be needed. Air blowers will be required to provide the needed air to maintain the process and accomplish the mixing of the sludge contained in the reactors. The digesters will be equipped with a coarse bubble aeration system to distribute the air within the tanks.

- **Yard and Process Piping**. New process piping will be necessary in order to transport raw wastewater from the collection system to the new screening system, to the influent lift station, from the influent lift station to the new grit removal system, to the new biological treatment process, to the clarifiers (if clarifiers are used), to the UV disinfection facilities, and to the effluent outfall. Piping would also be needed for sludge recirculation from the clarifiers (if used) to the aeration basins (activated sludge reactors), and for waste sludge transport to and from the sludge treatment components. Other miscellaneous piping, such as yard piping, will be needed to transport water for washdown and drainage.

- **Electrical, Instrumentation, and Controls**. New electrical, instrumentation, and controls will be required for the new process units. The new instrumentation and controls system is needed to provide accurate sampling, metering, monitoring, and control of the new facilities. The new control system will be computer-based in order to reduce operator time and requirements. The WPCF Permit requires periodic flow paced composite sampling of the influent and effluent. This will be accomplished using automatic composite samplers that take small samples proportionate to the volume of influent and effluent flow over a 24-hour period of time and add them together to make a composite for testing. Two new composite samplers will be needed to accomplish this task. A new standby electrical generator set and automatic power transfer switch will be needed to allow continued operation of critical components of the system during a power outage.

- **Demolition, Site Work, and Landscaping**. Although not needed to provide space for the new treatment plant, complete demolition of the existing facilities would be desirable for safety and aesthetic reasons. Inclusion of site work (excavation, grading, paving, sidewalks, fencing, etc.) to accommodate the new facility will be provided. To provide an aesthetically pleasing finished plant, landscaping would be desirable.

- **New Operations Building**. For efficient operations of the new facility, a new 1,680 square foot CMU operations building is proposed. The operations building would include a new laboratory and furnishings, office, Americans with Disabilities Act (ADA) compliant bathroom, utility room, and control center room. To equip the laboratory, miscellaneous modern laboratory instruments and glassware would be purchased.

- **New Blower/Generator/Electrical Building**. To house the required air blowers, electrical and controls, and standby generator set, a new CMU blower/generator/electrical building would be constructed. The building would be designed to attenuate and minimize noise associated with operation of the blowers and generator.

CURRENT FINANCIAL STATUS AND LOAN CAPACITY

The annual cost of operating and maintaining the wastewater system is summarized in Table 6-1 in Chapter 6. This includes all costs for the wastewater system such as operation, maintenance, and replacement (O,M,&R), staff payroll, and existing debt service. A graphical plot of the City of John Day's sewer system budget, both revenue and expenditures, is shown on Figure 6-1 in Chapter 6. By plotting a "trend" line for the expenditures, the expenditures in a future year can be estimated, assuming no changes to the wastewater system occur. The trend line for the City of John Day's operations and maintenance (O&M) expenditures suggests expenditures will likely be in the range of $459,000 in the budget year 2010-11.

In order to determine the City's ability to fund a wastewater system improvements project, Tables 6-2, 6-3, and 6-4 (in Chapter 6) were prepared. It is a requirement of this Plan to show how high the City would need to raise sewer rates in order to fund a project from strictly loan funds. The data shown on Table 6-3 provide a general idea of the amount of debt the City could afford to service at various average monthly sewer rates. If the City of John Day were to fund the selected improvement alternative identified in Chapter 5 without any grants and without the City of Canyon City contributing any funds to the project, monthly sewer rates would need to be raised to approximately $64 to $68. If the City of Canyon City were to pay for 15 percent of the selected improvements, the City of John Day would need to raise the monthly sewer rate to approximately $56 to $58. Fifteen percent was used because this is approximately the percentage of OM&R costs of the City's WWTF anticipated to be paid by the City of Canyon City.

Table 6-4 provides a general idea of the impact to property taxes for varying interest rates and loan amounts if the debt payment is supported only by property taxes. In the same two scenarios discussed in the previous paragraph, the City would need to raise property taxes to approximately $5.50 to $8 per $1,000 assessed value if funding the project on its own and $4.60 to $6.80 if receiving 15 percent of funds from the City of Canyon City.

A major financial commitment will be required on the part of the City in order to implement the selected wastewater system improvements project outlined in this Plan. Based on the estimated cost of the project, the City will need to obtain low interest loans coupled with grants to fund the project. The most likely sources of loan and grant funding are the U.S. Department of Agriculture's Rural Development (RD) and the Oregon Department of Environmental Quality (DEQ) Clean Water State Revolving Loan Fund programs. In order to qualify for outside grant funds under the RD program, the City will need to increase average sewer costs in the range of $48.00 to $52.00 per month. Therefore, if the City decides to utilize RD funding, in order to qualify for grant money, the rates will need likely need to be set at a minimum of about $50 per month. See Chapter 6 for a more detailed discussion of the potential project funding sources.

PROJECT IMPLEMENTATION

The following action items and implementation steps need to be made by the City of John Day to implement the proposed wastewater system improvements project. The steps outlined are general in nature and include the major steps that need to be undertaken.

Action Items

1. The City will need to formally adopt this Wastewater Facilities Plan (WWFP), which includes review comments by the DEQ, RD, and the Oregon Business Development Department (OBDD). A formally adopted WWFP is required by state and federal funding and regulatory agencies if the City pursues funding from these state and federal agencies to complete the improvements.

2. The City needs to consult and initiate funding discussions with funding agencies (OBDD, DEQ, RD) to ensure the best possible funding package is developed and obtained for the project. The City will need to contact the OBDD regional coordinator to initiate the intake process and, as necessary, complete the intake form and submit it to OECDD to initiate the funding discussions.

3. The City will need to prepare and submit funding applications to appropriate funding agencies.

4. The City will need to investigate if authorization to incur debt for the wastewater system improvements project is required by City charter. If authorization is required by City charter, the City will need to decide how to obtain the authorization to incur debt. Once decided (revenue bond or general obligation bond), a bond attorney should be consulted and the appropriate resolution paperwork should be prepared and considered for implementation.

5. The City needs to provide the necessary documentation and testimony in an effort to obtain and maintain a high ranking in Grant County for the Needs and Issues prioritization process.

6. 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 Implementation Plan outlines the key steps the City would need to undertake to proceed with project implementation. The following implementation steps and stated completion dates are presented as general guidance only and provide the estimated time needed to complete a project of this complexity and magnitude. The dates are subject to change and will be dependent on economic conditions within the community of John Day and implementation of the project could be delayed due to economic conditions.

	ITEM	COMPLETION DATE
1.	Adopt the Wastewater Facilities Plan.	Spring 2010
2.	Initiate funding discussions with funding agencies.	Spring 2010
3.	Consult with funding agencies as necessary and complete and submit the applications as necessary.	Spring 2010
4.	File with the Grant County Clerk for a November election if election for a revenue bond or general obligation bond is desired.	By September 2010
5.	Hold public information meetings.	Summer 2010
6.	Hold bond election (if election desired/ required).	November 2010
7.	Finalize project funding.	Fall 2010
8.	Initiate design.	Fall 2010
9.	Complete project design.	Summer/Fall 2011
10.	Bid and award construction contract.	Fall/Winter 2011
11.	Start project construction.	Winter 2011/Spring 2012
12.	Complete project construction.	Winter 2012/Spring 2013
13.	Close out project.	Spring 2013

The key to implementing the wastewater system improvements project, as outlined in this Plan, is the ability of the City to acquire DEQ and/or RD low-interest loans coupled with grant funding. In addition, it is vital that the City of Canyon City supports the project and contributes their appropriate share of the cost. The total project will likely not be economically feasible to John Day and Canyon City unless grant funds can be obtained. The City will have to work closely with its citizens and Canyon City to inform them of the system needs and the necessity for increased sewer user costs.

Wastewater system improvements as outlined in this Wastewater Facilities Plan will provide the City with a reliable, quality wastewater system that would meet the needs of the City for many years to come. The upgraded treatment facility will provide safer, more reliable operation and increased protection of the groundwater water quality and public health.

SELECTED IMPROVEMENTS
YEAR 2010 COST ESTIMATE SUMMARY

Item Description	Total Estimated Cost
New Activated Sludge Mechanical Wastewater Treatment Facility - Construction Cost including 10 Percent Construction Contingency	\$6,159,000 to \$6,480,000
Preliminary, Design, and Construction Engineering	\$1,232,000 to \$1,296,000
Environmental and Permitting	\$45,000
Funding Acquisition	\$30,000
Legal and Funding Administration	\$45,000
TOTAL ESTIMATED PROJECT COST (2010 DOLLARS)	\$7,511,000 to \$7,896,000
TOTAL ESTIMATED PROJECT COST (2011 DOLLARS)	\$7,886,550 to \$8,290,800

Notes:

1. Cost ranges are shown on this summary table because the final selection of an option for the proposed new activated sludge mechanical wastewater treatment facility has not been made. The cost ranges cover Options 1 to 4 (nitrogen removal scenario only) for Alternative C on Table 4-25 in Chapter 4.
2. If project funding is pursued prior to final option selection, it is recommended the highest cost be selected for the total estimated project cost.
3. Inflation was assumed to be 5 percent from 2010 to 2011. If construction occurs later than 2011, the total estimated project cost should be increased as appropriate to account for annual inflation.

CHAPTER 1

BACKGROUND INFORMATION

INTRODUCTION

The City of John Day owns and operates a trickling filter wastewater treatment facility (WWTF). Currently, the City's wastewater system serves a population of 2,520 residents and several small commercial establishments. The wastewater collection and treatment system operates under authority of a Water Pollution Control Facilities (WPCF) Permit issued by the Oregon Department of Environmental Quality (DEQ). The WPCF Permit authorizes the City to discharge disinfected secondary treated effluent on-site utilizing percolation ponds.

In recent years the City has been alerted to the fact that the wastewater treatment plant's percolation ponds may be degrading the groundwater quality by raising the nitrate concentration, according to Oregon Administrative Rule (OAR) 340-40. In addition to the concerns of groundwater contamination, the wastewater treatment plant is nearly 30 years old and has exceeded its design life.

AUTHORIZATION

Funding assistance for this Wastewater Facilities Plan is being sought from the State of Oregon Economic and Community Development Department (OECDD) and other sources, if available. The City of John Day, through an Agreement for Engineering Services signed on May 9, 2007, authorized Anderson·Perry & Associates, Inc., to prepare this Plan. This Plan is generally completed in accordance with the DEQ's guidance document "Preparation of Facilities Plans and Environmental Reports for Community Wastewater Projects" dated December 2005.

PROJECT PURPOSE

This Wastewater Facilities Plan has been prepared for the purposes of determining the existing wastewater collection, treatment, and disposal system's ability to handle anticipated growth and provide the City of John Day with a comprehensive planning document that outlines recommended wastewater system improvements. The Plan outlines existing system deficiencies and provides the City with several improvement alternatives for the treatment system. The alternatives were developed with consideration of the current groundwater issues that the City is facing due to the discharge of treated effluent into the percolation ponds and the associated groundwater quality impacts. The Plan presents the wastewater system improvements needed for the City based upon an evaluation of the system to efficiently and effectively treat the anticipated wastewater flows and loadings. Also, a key component of the planning project is the development of a financial plan for implementing the recommended improvements.

SCOPE

In order to meet the intentions and goals of the Plan, the following scope was identified in the Agreement for Engineering Services:

- A statement of purpose, background, and need for the wastewater facilities planning, while demonstrating consistency with the City's Comprehensive Land Use Plan.

- A technical description and evaluation of all current wastewater collection, treatment, and disposal systems in the study area sufficiently detailed to meet current DEQ guidelines.

- A projection of future wastewater flows and waste loads for a 20-year period.

- An evaluation of the regulatory requirements that must be met for all viable alternatives. These include regulations concerning surface water, effluent reuse, groundwater, and sludge management. The evaluation also includes a determination of whether each alternative is permitted by the local comprehensive plan and zoning regulations. This discussion will include a summary of anticipated future water quality regulations.

- An evaluation of the feasibility of various alternatives, including the no-action alternative and cost effectiveness analysis of the alternatives over a 20-year period. Treatment standards and cost estimates for each alternative will be identified.

- A detailed description of the preferred alternative that will meet current regulatory requirements.

- A list of items for the preferred alternative that needs to be addressed in a pre-design engineering report. *Note: This scope of work does not include the preparation of a pre-design engineering report.*

- Analysis of financing options for the preferred and competitive alternatives and financing plan for construction, long-term operation, and projection of sewer use charges.

- A preliminary environmental analysis of the preferred alternative. *Note: This scope of work does not include the preparation of environmental reports for design and construction funding applications, biological assessments, wetland delineations, mitigation plans, or other related environmental documents.*

Description of Community

The City of John Day is located about 1 mile north of Canyon City in Grant County at the intersection of U.S. Highways 26 and 395. The general location of the community is shown on Figure 1-1.

John Day was settled and founded around 1862, when gold was discovered in Canyon Creek. The City was incorporated in 1901 and was named for John Day, a member of the Astor Expedition. Initially, mining was the sole support of the community, with agriculture slowly providing community support. After mining died out, agriculture and forest products became the primary community support. Currently, agriculture continues to be a primary support for the area, with alfalfa being the principal crop. Cattle ranching is also prominent in the surrounding area. Two of Grant County's three remaining lumber mills are located just west of the City limits.

The City of John Day has had a fluctuating population over its history. The July 2008 estimated population for the City is 1,845. During the period from 1960 through the present, the City's population has fluctuated from a low of 1,520 in 1960 to a high of 2,012 in 1980.

The City of Canyon City's population was also analyzed because it shares the wastewater system with John Day. The July 2008 estimated population for Canyon City is 675. During the period from 1960 through the present, the City's population has fluctuated from a low of 600 in 1970 to a high of 669 in 2000.

Study Area

The study area for this Wastewater Facilities Plan encompasses the entire area within the City limits and Urban Growth Boundary (UGB) of John Day and Canyon City. As mentioned, Canyon City is included because it shares the wastewater system with John Day. An illustration of the study area is shown on Figure 1-1.

Land Use

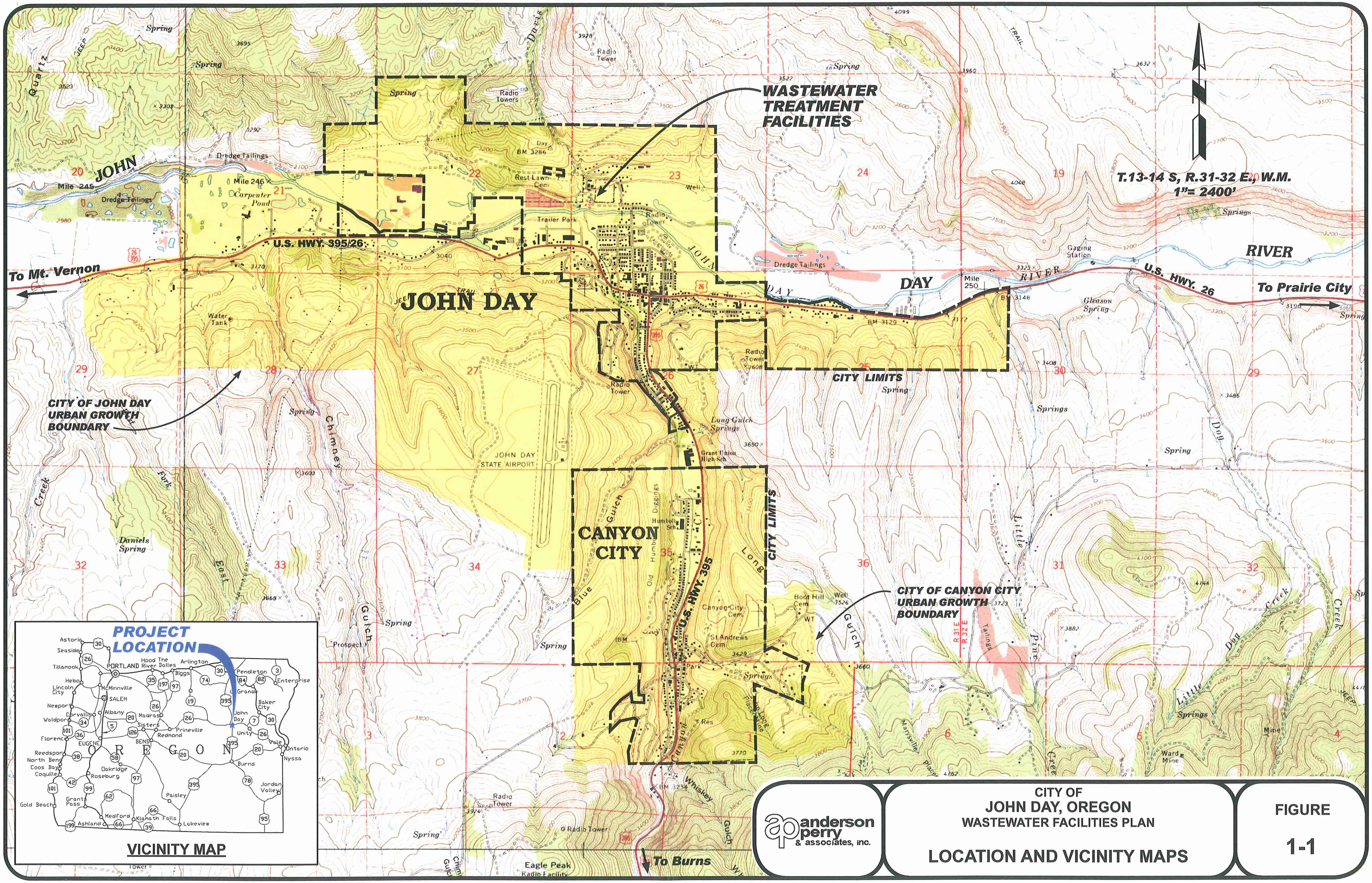
The City of John Day has an adopted Comprehensive Land Use Plan. The current zoning in the City is shown on Figure 1-2. According to the Comprehensive Land Use Plan, the current John Day City limits (and Urban Growth Boundary) encompass an area of about 3,463 acres. Commercial areas are primarily located in the southeastern section of the City, in the downtown area along the John Day Highway (U.S. Highway 26). A large residential area is located exclusively on the south side of the John Day Highway and in the northeastern section of the City. The City has two separate classifications for the industrial area: one is general industrial and the other is county industrial general. Both classifications are commingled and located on the north side of the John Day Highway, between the end of the downtown area and the west edge of the UGB. A large open space area is located south of the John Day Highway that extends almost the entire length of the City, beyond the City limits but within the UGB.

Large undeveloped areas are present within the current City limits and UGB. These areas are mainly held for residential and open space with a minor amount designated for industrial growth.

EXISTING WASTEWATER SYSTEM

The City of John Day's WWTF was first constructed in 1949. Major additions were completed in 1970 and 1978. Since 1978, the collection system has been expanded several times to support new growth. A general description of the wastewater system is provided hereafter.

The collection system is composed of approximately 84,000 lineal feet of gravity sewer pipe ranging from 4-inch to 18-inch diameter, about 10,500 lineal feet of pressure sewer pipe ranging from 4-inch to 8-inch diameter, three lift stations, and manholes and cleanouts. The WWTF generally consists of a wetwell, headworks, two primary clarifiers, two trickling filters, a secondary clarifier, a primary and secondary anaerobic digester, four sludge drying beds, a chlorine contact basin, and four percolation ponds. The WWTF and collection system are discussed in greater detail in Chapter 3.



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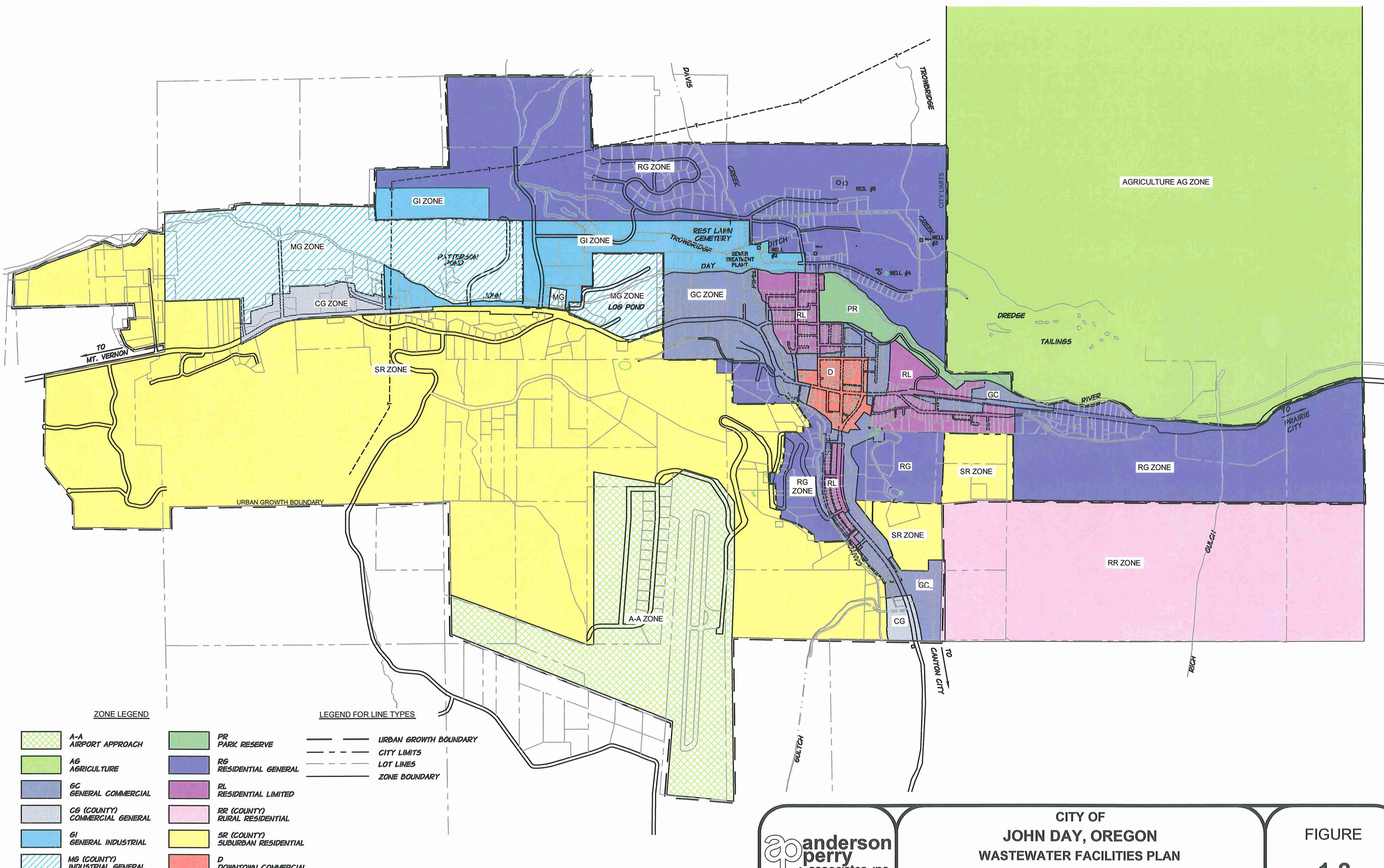
LOCATION AND VICINITY MAPS

FIGURE 1-1



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ZONING MAP

FIGURE 1-2

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CHAPTER 2

BASIC PLANNING AND DESIGN DATA

GENERAL

This chapter of the Wastewater Facilities Plan presents the basic planning and design data necessary to evaluate the City of John Day's existing wastewater collection, treatment, and disposal facilities. These data are used to determine the facilities' ability to serve the wastewater system needs of John Day (including adjacent Canyon City) for the selected planning period, and form the basis for evaluating alternatives for required improvements. First, population information and year 2030 population projections for the City of John Day and Canyon City are presented. This is followed by a summary of the historical wastewater data and the year 2030 design criteria used for this Plan. Also, a discussion on treatment and regulatory agency requirements is provided.

POPULATION

In order to estimate future wastewater system demands, population projections must be made. Projections are usually made on the basis of an annual percentage increase estimated from past growth rates tempered by future expectations. Significant population fluctuations are typical in small communities as demonstrated by the population history of John Day. The addition of a major business, industry, or recreational facility in the community can dramatically affect the population. This being the case, it is somewhat difficult to accurately predict the population of a small community.

The present population of the City of John Day is estimated to be 1,845. Past population trends for the City of John Day, comparing data from 1960 through the present, have varied from a high of 2,012 in 1980 to a low of 1,520 in 1960. Historical populations for the City of John Day are discussed hereafter and shown on Figure 2-1.

The present population of the City of Canyon City is estimated to be 675. Past population trends for Canyon City, comparing data from 1960 through the present, have varied from a high of 669 in 2000 to a low of 600 in 1970. Historical populations for Canyon City are discussed hereafter and are shown on Figure 2-2.

Projecting increased population into the future is difficult based on the erratic nature of the City's population history. The large fluctuation in population for the City of John Day has been due, historically, to the instability of the timber industry.

Population data for John Day and Canyon City were provided by the Center for Population Research and Census at Portland State University. 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 University does not project population increases for individual cities within the state. Therefore, no official projection is available for John Day or Canyon City. The population projections for John Day and Canyon City as shown on Figures 2-1 and 2-2 (0.5, 1.0, 1.5, 2.0, and 2.5 percent annual growth) would seem a realistic range of projections based on the data currently available.

Historical population information for the City of John Day is as follows:

Year	Population	Average Annual Growth/Decline Rate (%)[1]	Population Change
1960	1,520	--	--
1970	1,566	0.3	46
1980	2,012	2.5	446
1990	1,857	-0.8	-155
2000	1,821	-0.2	-36
2001	1,830	0.5	9
2002	1,840	0.5	10
2003	1,840	0.0	--
2004	1,840	0.0	--
2005	1,845	0.3	5
2006	1,850	0.3	5
2007	1,850	0.0	--
2008	1,845	-0.03	5

[1] The time period between successive rows is variable. The average annual growth rate is calculated based upon the time span between each successive population shown.

Historical population information for the City of Canyon City is as follows:

Year	Population	Average Annual Growth/Decline Rate (%)[1]	Population Change
1960	654	--	--
1970	600	-0.9	-54
1980	639	0.6	39
1990	648	0.1	-9
2000	669	0.3	21
2001	670	0.1	1
2002	650	-3.0	-20
2003	670	3.1	20
2004	640	-4.5	-30
2005	650	1.6	10
2006	660	1.5	10
2007	670	1.5	10
2008	675	0.75	5

[1] The time period between successive rows is variable. The average annual growth rate is calculated based upon the time span between each successive population shown.

For the purposes of this Plan, the population projections for both the City of John Day and the Town of Canyon City will be added to determine the design population because both communities utilize the wastewater treatment facility. The City Council of John Day authorized a growth rate of 2 percent per year, which results in a projected population of 2,796 in the year 2030. The City of Canyon City's Water System Master Plan prepared by Curran-McLeod, Inc., stated that Canyon City's growth rate is projected to be 1 percent. This plan was prepared in the year 2000 and, since this time, Canyon City has added a new subdivision and believes a 2 percent growth rate would be more appropriate. Given the current population for Canyon City of 675 and a 2 percent average annual growth rate, the projected population in 2030 would be about 1,023. Therefore, by adding the two communities' projected populations together, the resulting design population in the year 2030 is 3,819. It should be recognized, however, that over the planning period of this study, the actual growth of John Day or Canyon City could either exceed or fall well below the projected design population.

HISTORICAL WASTEWATER DATA

This section provides a summary of the historical wastewater quality data for the City of John Day's wastewater treatment facility. Information provided in this section was obtained from the City's discharge monitoring reports (DMRs).

A summary of the historical flow including maximum daily flow, minimum daily flow, and the average monthly flow as estimated by the treatment plant operator and recorded on the DMRs is shown on Figure 2-3. The recorded maximum daily flow, minimum daily flow, and average monthly flow were plotted for the period between January 2001 and November 2008. According to the data, the maximum daily flow occurred on May 20, 2008, and was 0.840 million gallons per day (MGD). The minimum daily flow occurred on September 25, 2005, and was 0.115 MGD. The average annual flow was 0.240 MGD during the same period, or about 95 gallons per capita per day (gpcd).

Figure 2-4 summarizes historical influent and effluent five-day biochemical oxygen demand (BOD_5) concentrations as recorded on the DMRs during the period discussed above. As shown on Figure 2-4, the maximum, minimum, and average **influent** BOD_5 concentrations were 388 milligrams per liter (mg/L), 117 mg/L, and 230 mg/L, respectively. The maximum, minimum, and average **effluent** BOD_5 concentrations were 31 mg/L, 7 mg/L, and 16 mg/L, respectively. According to the DMR data, the WWTF average BOD_5 mass loading was 461 lbs/day and the facility removed an average of 92 percent of the BOD_5.

The historical influent and effluent total suspended solids (TSS) concentrations, as reported on the DMRs during the same period described above, are shown on Figure 2-5. As illustrated on the figure, the maximum, minimum, and average **influent** TSS concentrations were 831 mg/L, 113 mg/L, and 247 mg/L, respectively. The maximum, minimum, and average **effluent** TSS concentrations were 34 mg/L, 6 mg/L, and 17 mg/L, respectively. The WWTF's average TSS mass loading was approximately 495 lbs/day. According to the data, the City's secondary wastewater facility achieved an average TSS removal of 91 percent.

As shown in Figures 2-4 and 2-5, **influent** BOD_5 and TSS concentrations increased significantly since the beginning of 2007. Upon discussing this matter with the operator, he noted that beginning in the year 2007, sampling procedures were changed. Instead of sampling influent inside the wet well, samples were taken from the raw influent just prior to it entering the wet well. This appears to be a more representative sample as it samples raw influent and not a mix of raw influent and partially treated wastewater, which exist inside the wet well. This being the case, **influent** BOD_5 and TSS were analyzed for the year 2007 and 2008 only to obtain maximum, minimum, and average concentrations and average loadings. Since this appears to be a more representative sampling procedure, these data will be used to establish design criteria for future operations.

Maximum, minimum, and average **influent** BOD_5 concentrations in the year 2007 and 2008 were 366 mg/L, 197 mg/L, and 285 mg/L, respectively. According to the DMR data, the WWTF average **influent** BOD_5 mass loading was 600 lbs/day and the facility removed an average of 95 percent of the BOD_5.

Maximum, minimum, and average **influent** TSS concentrations in the year 2007 and 2008 were 831 mg/L, 272 mg/L, and 440 mg/L, respectively. According to the DMR data, the WWTF average **influent** TSS mass loading was 926 lbs/day and the facility removed an average of 97 percent of the TSS.

Table 2-1 provides a summary of the historical flow and loading data discussed above. These data have been analyzed for the purpose of establishing the future design criteria used in the evaluation of the wastewater collection and treatment alternatives and the existing facilities.

Table 2-2 shows a summary of the domestic influent flow analysis for specific flow components of interest. The flow components have been separated into dry weather flow and wet weather flow categories.

Table 2-3 is a summary of the City's DMR data. Included in the summary are total, maximum, and average monthly influent and effluent flows. Additionally, Table 2-3 presents the historical influent and effluent BOD_5, TSS concentration, and mass loading data.

The historical wastewater flows for the City of John Day are within the range that normally would be expected. Data collected from many domestic wastewater systems similar to John Day's indicate that average annual flows usually range from 80 to 120 gpcd. The typical average annual flow is 100 gpcd. John Day's flow is approximately 95 gpcd (average annual). The average annual flow will be evaluated by determining an average base flow and subtracting that from the average annual flow, which will determine how much flow contribution may be attributed to infiltration and inflow (I/I).

Historical BOD_5 and TSS mass loadings appear to be above average when compared with other domestic wastewater systems similar to John Day's. Typical BOD_5 and TSS per capita contributions range from 0.15 to 0.25 lb/cap/day with a normal contribution of approximately 0.2 lb/cap/day. John Day's BOD_5 and TSS per capita loadings are in the range of 0.24 lb/cap/day and 0.37 lb/cap/day, respectively. While

BOD_5 loadings are close to average, TSS loadings are well above average. For design and evaluation purposes, these conditions for BOD_5 and TSS mass loadings will be used.

DESIGN CRITERIA

Table 2-4 summarizes basic wastewater design criteria developed for this Wastewater Facilities Plan. Shown in Table 2-4 are the year 2030 design population, design flows, and expected future influent wastewater strength characteristics. This table should be referred to during the review of subsequent chapters of this Plan as it provides key information upon which wastewater system alternatives will be developed and evaluated.

WASTEWATER FLOW PROJECTIONS

Domestic. The total future anticipated domestic wastewater flows (average annual, average dry weather, average wet weather, maximum monthly, and maximum daily) were projected by adding the projected average base flow to the respective estimated infiltration and inflow (I/I) components for each flow. The current average base flow is defined as the daily minimum flow recorded each year averaged over the 8 years of available data. Based upon the data, the current average base flow is 0.146 million gallons per day (MGD) or about 58 gallons per capita per day (gpcd). The year 2030 average base flow is estimated using the current per capita base flow of 58 gpcd applied to the projected design population of 3,819. 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 (examples: average annual I/I contribution = current average annual flow - base flow = 0.240 MGD - 0.146 MGD = 0.094 MGD; average dry weather I/I contribution = current average dry weather flow - base flow = 0.213 MGD - 0.146 MGD = 0.067 MGD; etc.).

For projection purposes, it was assumed that the I/I flows currently being experienced in the system would remain constant throughout the 20-year planning period. Year 2030 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 issue is such that results may not be seen for an extended period of time.

MASS LOADINGS

Domestic. The domestic design mass loadings (five-day biochemical oxygen demand [BOD_5], total suspended solids [TSS], and total Kjeldahl nitrogen [TKN]) to the wastewater treatment facility were estimated using the design average annual per capita BOD_5, TSS, and TKN contributions (refer to Historical Wastewater Data in this chapter) projected to the end of the 20-year planning period using the year 2030 design population of 3,819 (i.e., mass loading [BOD_5, TSS, or TKN] = contribution [BOD_5, TSS, or TKN], pounds per capita per day x 3,819). Using the design mass loading of 0.24 pounds per capita per day for BOD_5, 0.37 pounds per capita per day for TSS, and 0.03 pounds per capita per day for TKN yields a year 2030 domestic mass loading of 904 lbs/day of BOD_5, 1,395 lbs/day of TSS, and 119 lbs/day of TKN.

TREATMENT AND REGULATORY REQUIREMENTS

Liquid Treatment. The City's existing wastewater treatment facility provides secondary treatment of the City's domestic wastewater. Discharge of treated effluent from the treatment facility is regulated under a Water Pollution Control Facilities (WPCF) Permit. The WPCF Permit (No. 102481), issued in 2002, is authorized and administered by the Oregon Department of Environmental Quality (DEQ), and the Permit expired on February 28, 2007. An application for renewal was made by the City to the DEQ on December 20, 2006. Although the Permit has expired, pursuant to Oregon Administrative Rule (OAR) 340-045-0040 the conditions outlined in the existing 2002 Permit still apply until a new permit is established.

Current effluent limitations for the City of John Day wastewater treatment facility are given in the City's 2002 WPCF Permit (Refer to Appendix A for a copy of the existing WPCF Permit). These limitations are based on the groundwater quality protection rules for permitted operations as established in OAR 340-40-0030, additional requirements contained in OAR 340-40-0040, OAR 340-40-0020, and the permitted facility average dry weather design flow of 0.60 MGD.

Solids Treatment. As required by the Clean Water Act Amendments of 1987, the U.S. Environmental Protection Agency (EPA) developed a regulation to protect public health and the environment from reasonably anticipated adverse effects of certain pollutants that might be present in municipal sewage biosolids. This regulation, *The Standards for the Use or Disposal of Sewage Biosolids* (40 CFR, Part 503), was published in the Federal Register (58 FR 9248 to 9404) on February 19, 1993, and became effective on March 22, 1993. The regulations that govern recycling and disposal of sewage biosolids in Oregon are contained in OAR 340-50 and follow 40 CFR, Part 503.

The provisions of the Part 503 Rule are consistent with EPA's policy of promoting beneficial uses of biosolids (refer to 49 FR 24358, June 12, 1984, for further information). Land application takes advantage of the soil conditioning and fertilizing properties of biosolids.

The Part 503 Rule includes five subparts: Subpart A - General Provisions, Subpart B - Requirements for Land Application, Subpart C - Surface Disposal, Subpart D - Pathogen and Vector Attraction Reduction, and Subpart E - Incineration. For each of the three use or disposal options (land application, surface disposal, and incineration), a Part 503 standard includes general requirements, pollutant limits, management practices, operational standards and requirements for frequency of monitoring, record keeping, and reporting. Since the City of John Day currently beneficially uses their biosolids through land application, the only regulations pertaining to the City are Subparts A, B, and D, as Subparts C and E pertain to disposal and incineration of biosolids.

Part 503 separates biosolids into two classifications related to pathogen densities contained within the biosolids at the time of land application: "Class A" and "Class B." Class A biosolids have much more stringent requirements related to pathogen density levels than do Class B biosolids. Biosolids meeting Class A requirements can be sold in bags or bulk and applied on public areas such as lawns and home gardens. Class B biosolids are restricted to bulk application to agricultural land, rangeland, forest, public contact sites, or reclamation sites. Appendix B contains excerpts from an EPA Guidance Document entitled, *A Plain English Guide to the EPA Part 503 Biosolids Rule* (EPA/832/R-93/003), which more fully explains the Part 503 regulations. Appendix C includes the City's current DEQ-approved Sludge Management Plan.

Other regulatory agency requirements specific to the feasible alternatives are discussed in subsequent chapters.

City of John Day, Oregon
Summary of Historical Wastewater Data
January 2001 through November 2008

	Influent									Effluent																
Date	Maximum Daily Flow (MGD)	Minimum Daily Flow (MGD)	Average Monthly Flow (MGD)	Average Monthly BOD5 (mg/L)	Average Monthly BOD5 Loading (lb/day)	Average Monthly TSS (mg/L)	Average Monthly TSS Loading (lb/day)	Daily Max. pH	Daily Min. pH	Total Monthly Flow (MG)	Average Monthly BOD5 (mg/L)	BOD5 % Removal	Average Monthly BOD5 Loading (lb/day)	Average Monthly TSS (mg/L)	TSS % Removal	Average Monthly TSS Loading (lb/day)	Daily Max. pH	Daily Min. pH	Avg. Monthly pH	Avg. Total Chlorine Used (lb)	Avg. Daily Chlorine Residual (mg/L)	Monthly Geo Mean Ecoli Conc. (organisms /100 mL)	TKN (mg/L)	NO2/NO3 as N (mg/L)	TDS (mg/L)	Total Volume of Sludge Wasted (gal)
Jan-01	0.267	0.192	0.238	211	419	153	304	8.55	8.09	7.37	22	90	44	15	90	30	7.72	7.32	7.51	10	3.2	131				12,000
Feb-01	0.271	0.214	0.237	220	435	149	295	8.48	7.90	6.69	25	89	49	17	89	34	7.82	7.41	7.54	11	3.4	35				-
Mar-01	0.449	0.179	0.247	200	412	146	301	8.26	7.85	7.64	26	87	54	18	88	37	7.59	7.34	7.48	10	2.6	6				9,000
Apr-01	0.286	0.22	0.263	188	412	148	325	8.40	7.95	7.90	21	89	46	21	86	46	7.54	7.21	7.34	12	3.3	5				6,000
May-01	0.306	0.216	0.272	229	519	159	361	8.35	7.93	8.42	25	89	57	18	89	41	7.55	7.10	7.63	10	1.6	110				9,000
Jun-01	0.26	0.199	0.232	219	424	206	399	8.15	7.77	6.95	22	90	43	20	90	39	7.80	7.28	7.47	10	2	5				10,800
Jul-01	0.309	0.151	0.223	299	556	212	394	8.05	7.56	6.92	17	94	32	17	92	32	8.03	7.08	7.36	12	2	0				4,000
Aug-01	0.279	0.16	0.225	283	531	198	372	8.05	7.50	6.98	16	94	30	19	90	36	7.57	7.05	7.35	15	2.7	2				12,600
Sep-01	0.298	0.191	0.194	245	396	166	269	8.05	7.20	5.82	14	94	23	18	89	29	7.89	7.02	7.48	14	2.3	3				7,200
Oct-01	0.255	0.193	0.217	232	420	189	342	8.12	7.70	6.72	18	92	33	21	89	38	7.83	7.20	7.35	15	2.7	2				18,900
Nov-01	0.263	0.182	0.212	205	362	149	263	8.23	7.90	6.36	20	90	35	21	86	37	7.37	7.10	7.25	16	3.1	5				10,800
Dec-01	0.264	0.189	0.224	255	476	152	284	8.17	7.75	6.93	22	91	41	22	86	41	8.17	7.75	8.02	16	3.6	2				4,000
Jan-02	0.279	0.199	0.237	267	528	187	370	8.12	7.60	7.35	19	93	38	13	93	26	7.49	7.00	7.17	13	4	2				6,300
Feb-02	0.24	0.204	0.224	250	467	169	316	8.40	7.85	6.27	26	90	49	18	89	34	7.60	7.20	7.31	13	4	2				9,000
Mar-02	0.247	0.194	0.22	292	536	260	477	8.32	7.45	6.83	25	91	46	19	93	35	8.32	7.45	7.99	13	4.3	4				6,300
Apr-02	0.307	0.186	0.256	267	570	161	344	7.82	8.24	7.68	23	91	49	17	89	36	7.48	7.14	7.28	13	4					-
May-02	0.262	0.208	0.243	276	559	176	357	8.14	7.60	7.55	24	91	49	25	86	51	8.14	7.60	7.90	13	3.4					20,700
Jun-02	0.298	0.195	0.246	201	412	124	254	8.20	7.50	7.38	24	88	49	20	84	41	7.69	7.27	7.48	13	2					14,400
Jul-02	0.238	0.165	0.208	388	673	227	394	8.12	6.90	6.45	18	95	31	22	90	38	7.45	7.14	7.35	13	2.1					7,200
Aug-02	0.261	0.18	0.213	246	437	184	327	8.05	7.77	6.59	14	94	25	21	89	37	7.65	7.15	7.35	13	1.8					13,500
Sep-02	0.249	0.141	0.194	276	447	235	380	8.06	7.60	5.82	18	93	29	22	91	36	7.53	7.01	7.27	13	2.4					9,000
Oct-02	0.25	0.172	0.206	229	393	159	273	8.05	7.43	6.38	22	90	38	24	85	41	7.46	7.07	7.23	14	2.7					-
Nov-02	0.234	0.185	0.206	237	407	177	304	8.11	7.53	6.18	23	90	40	24	86	41	7.36	7.12	7.23	14	2.7					5,400
Dec-02	0.239	0.169	0.201	260	436	162	272	8.09	7.40	6.24	22	92	37	21	87	35	7.38	7.12	7.26	14	3.8					10,800
Jan-03	0.274	0.197	0.223	299	556	190	353	8.38	7.89	6.91	26	91	48	17	91	32	7.68	7.26	7.43	14	4.6					5,400
Feb-03	0.279	0.211	0.239	304	606	189	377	8.38	7.23	6.68	28	91	56	15	92	30	7.50	7.28	7.38	13	4					7,200
Mar-03	0.286	0.184	0.224	170	318	177	331	8.20	7.41	6.94	13	92	24	17	90	32	7.65	7.33	7.45	13	4.3					9,000
Apr-03	0.332	0.224	0.278	210	487	147	341	8.28	7.75	8.35	23	89	53	21	86	49	7.59	7.29	7.46	13	3.3					6,000
May-03	0.637	0.258	0.349	246	716	149	434	8.03	7.66	10.81	22	91	64	22	85	64	7.58	7.15	7.36	12	2.2					6,000
Jun-03	0.574	0.193	0.271	221	499	164	371	8.00	7.60	8.14	19	91	43	21	87	47	7.50	7.11	7.37	13	2					13,500
Jul-03	0.249	0.174	0.211	211	371	165	290	8.05	7.24	6.57	12	94	21	21	87	37	7.97	7.08	7.30	13	2					14,400
Aug-03	0.262	0.165	0.212	166	294	138	244	8.07	7.14	6.58	10	94	18	19	86	34	7.45	7.05	7.24	13	2.1					6,300
Sep-03	0.23	0.182	0.21	207	363	196	343	8.10	7.10	6.28	15	93	26	20	90	35	7.50	7.10	7.33	11	1.6					8,100
Oct-03	0.236	0.182	0.199	212	352	237	393	8.10	6.89	6.18	16	92	27	19	92	32	7.51	7.16	7.31	10	2.3					9,900
Nov-03	0.238	0.181	0.208	190	330	178	309	8.10	7.95	6.15	14	93	24	16	91	28	7.38	7.16	7.27	12	2.7					6,000
Dec-03	0.245	0.185	0.219	190	347	187	342	8.25	7.78	6.78	15	92	27	20	89	37	7.62	7.15	7.35	10	2.6					6,000
Jan-04	0.267	0.21	0.235	198	388	235	461	8.48	7.65	7.27	20	90	39	16	93	31	7.59	7.20	7.45	9	2.7					-
Feb-04	0.263	0.216	0.232	203	393	161	312	8.22	7.93	6.74	22	89	43	18	89	35	7.70	7.44	7.55	9	2.7					-
Mar-04	0.41	0.147	0.269	179	402	208	467	8.12	7.60	8.33	17	91	38	14	93	31	7.82	7.19	7.41	11	2.7					4,000
Apr-04	0.315	0.235	0.269	173	388	170	381	8.15	7.70	8.08	15	91	34	23	86	52	7.49	7.22	7.36	12	2.9					7,200
May-04	0.403	0.217	0.298	155	385	152	378	7.95	6.88	9.23	19	88	47	21	86	52	7.38	7.00	7.23	11	1.6					7,000
Jun-04	0.351	0.119	0.259	126	272	164	354	7.81	7.13	7.77	11	91	24	18	89	39	7.78	7.06	7.22	11	1.7					9,000
Jul-04	0.264	0.168	0.201	165	277	202	339	7.82	6.71	6.24	9	95	15	19	91	32	7.24	6.96	7.11	11	2.3					9,000
Aug-04	0.247	0.171	0.204	150	255	184	313	7.96	7.18	6.32	12	92	20	22	88	37	7.28	6.97	7.14	11	1.7					6,000
Sep-04	0.217	0.164	0.199	145	241	206	342	8.07	7.20	5.96	10	93	17	21	90	35	7.69	6.92	7.17	12	1.9					6,000
Oct-04	0.236	0.158	0.195	117	190	199	324	8.02	7.44	6.05	12	90	20	20	90	33	7.51	6.92	7.16	12	2.8					-
Nov-04	0.234	0.172	0.202	127	214	191	322	8.09	7.56	6.06	12	91	20	24	87	40	7.26	6.94	7.06	12	4					6,000
Dec-04	0.258	0.152	0.212	144	255	196	347	7.99	7.59	6.56	16	89	28	26	87	46	7.19	6.84	7.00	13	3.3					4,500

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
SUMMARY OF HISTORICAL WASTEWATER DATA

TABLE
2-1

City of John Day, Oregon
Summary of Historical Wastewater Data
January 2001 through November 2008

	Influent									Effluent																
Date	Maximum Daily Flow (MGD)	Minimum Daily Flow (MGD)	Average Monthly Flow (MGD)	Average Monthly BOD5 (mg/L)	Average Monthly BOD5 Loading (lb/day)	Average Monthly TSS (mg/L)	Average Monthly TSS Loading (lb/day)	Daily Max. pH	Daily Min. pH	Total Monthly Flow (MG)	Average Monthly BOD5 (mg/L)	BOD5 % Removal	Average Monthly BOD5 Loading (lb/day)	Average Monthly TSS (mg/L)	TSS % Removal	Average Monthly TSS Loading (lb/day)	Daily Max. pH	Daily Min. pH	Avg. Monthly pH	Avg. Total Chlorine Used (lb)	Avg. Daily Chlorine Residual (mg/L)	Monthly Geo Mean Ecoli Conc. (organisms /100 mL)	TKN (mg/L)	NO2/NO3 as N (mg/L)	TDS (mg/L)	Total Volume of Sludge Wasted (gal)
Jan-05	0.234	0.171	0.207	155	268	152	262	8.07	7.79	6.41	19	88	33	20	87	35	7.50	7.00	7.22	12	4.1					-
Feb-05	0.238	0.174	0.204	135	230	136	231	8.08	7.55	5.71	23	83	39	21	85	36	7.30	7.05	7.14	12	4.2					6,000
Mar-05	0.224	0.171	0.200	140	234	226	377	8.14	7.38	6.19	18	87	30	19	92	32	7.29	7.03	7.14	13	4.6					-
Apr-05	0.291	0.201	0.238	117	232	131	260	7.91	7.58	7.13	17	85	34	18	86	36	7.60	6.94	7.16	12	4					7,200
May-05	0.444	0.263	0.331	124	342	139	384	7.90	7.41	10.26	18	85	50	24	83	66	7.55	6.96	7.16	11	2					12,000
Jun-05	0.267	0.187	0.24	222	444	177	354	7.91	7.16	7.19	31	86	62	27	85	54	8.05	7.05	7.32	11	1.9					5,400
Jul-05	0.241	0.186	0.212	146	258	113	200	7.92	7.57	6.58	20	86	35	21	81	37	7.57	7.06	7.30	10	1.6					10,800
Aug-05	0.427	0.191	0.228	178	338	145	276	7.88	7.46	7.06	15	92	29	18	88	34	7.88	7.19	7.32	11	2.2					21,900
Sep-05	0.257	0.115	0.208	217	376	183	317	8.17	7.70	6.23	13	94	23	15	92	26	7.81	7.21	7.44	11	1.9					45,056
Oct-05	0.29	0.187	0.211	233	410	202	355			6.51	14	94	25	17	92	30				9	1.9					
Nov-05	0.275	0.175	0.225	260	488	214	402			6.74	17	93	32	19	91	36				10	1.8					
Dec-05	0.315	0.212	0.245	197	403	183	374			7.60	12	94	25	12	93	25				11	2.5					
Jan-06	0.352	0.178	0.278	181	420	155	359	8.36	7.65	8.62	13	93	30	9	94	21	7.80	7.27	7.60	10	3.6					
Feb-06	0.326	0.236	0.26	209	453	209	453	8.70	7.80	7.27	14	93	30	10	95	22	7.90	7.40	7.70	6	2.5					
Mar-06	0.343	0.169	0.25	265	553	213	444	8.60	7.90	7.75	18	93	38	6	97	13	7.90	7.40	7.70	6	2.2					
Apr-06	0.533	0.127	0.321	257	688	135	361	8.50	8.00	9.64	19	93	51	8	94	21	8.40	7.20	7.80	6	1.9		1.63			
May-06	0.808	0.278	0.447	208	775	133	496	8.40	7.90	13.86	15	93	56	12	91	45	7.80	7.20	7.50	10	1.8		10.50			
Jun-06	0.346	0.209	0.26	207	449	202	438	8.25	7.69	7.80	12	94	26	13	94	28	7.86	7.45	7.62	7	3.4		5.46	13.8	405	
Jul-06	0.263	0.209	0.227	185	350	191	362	8.21	7.89	7.04	7	96	13	10	95	19	7.73	7.37	7.59	5	2.7		9.35			
Aug-06	0.351	0.16	0.235	205	402	215	421	8.40	7.79	7.30	8	96	16	12	94	24	7.74	7.17	7.53	7	3		7.30			
Sep-06	0.264	0.192	0.218	230	418	241	438	8.36	7.65	6.54	8	97	15	10	96	18	7.71	7.16	7.43	7	3		6.10	14.7	493	
Oct-06	0.278	0.163	0.212	183	324	211	373	8.44	7.98	6.56	13	93	23	10	95	18	7.81	7.23	7.55	11	3.9		7.30			
Nov-06	0.261	0.178	0.218	320	582	439	798	8.22	7.83	6.55	10	97	18	11	97	20	7.88	7.11	7.46	12	4.6		5.70			
Dec-06	0.264	0.130	0.218	264	480	373	678	8.70	7.84	6.76	11	96	20	13	97	24	7.81	7.24	7.51	9	4.6		6.55	16.2	355	
Jan-07	0.309	0.130	0.229	293	560	425	812	8.62	7.89	7.09	12	96	23	11	97	21	7.89	7.21	7.45	6	4.5		13.50			
Feb-07	0.302	0.21	0.234	227	443	444	866	8.62	7.94	6.55	18	92	35	34	92	66	7.82	7.44	7.68	6	4.9		13.40			
Mar-07	0.303	0.221	0.251	243	509	272	569	5.95	8.24	7.77	12	95	25	11	96	23	7.90	7.34	7.70	10	3.8		16.30	2.5	425	
Apr-07	0.289	0.216	0.251	290	607	312	653	8.49	8.11	7.52	13	96	27	15	95	31	7.85	7.31	7.64	9	3		11.80			
May-07	0.380	0.190	0.261	268	583	350	762	8.54	8.08	8.09	18	93	39	17	95	37	7.72	7.22	7.49	12	1.8		8.25			
Jun-07	0.340	0.210	0.263	333	730	472	1035	8.35	8.01	7.89	17	95	37	14	97	31	7.65	7.25	7.43	12	2.6		11.50	8	483	
Jul-07	0.300	0.170	0.242	309	624	469	947	8.33	8.03	7.49	13	96	26	14	97	28	7.65	7.32	7.50	14.5	1.44		6.80			
Aug-07	0.300	0.130	0.224	318	594	471	880	8.31	7.98	6.95	14	96	26	14	97	26	7.52	7.18	7.37	17.7	1.48		7.60	17.8	518	
Sep-07	0.260	0.200	0.227	324	613	555	1051	8.32	7.94	6.81	12	96	23	16	97	30	7.42	7.13	7.28	17.6	1.8		7.25			
Oct-07	0.270	0.220	0.236	298	587	362	713	8.22	7.86	7.32	11	96	22	11	97	22	7.43	7.11	7.25	11.5	7.7		6.50			
Nov-07	0.330	0.240	0.278	309	716	457	1060	8.24	7.68	8.61	9	97	21	7	98	16	7.57	7.14	7.34	9.5	1.8		8.05	0.35	405	
Dec-07	0.270	0.210	0.238	300	595	390	774	8.64	7.62	7.14	10	97	20	13	97	26	7.68	7.18	7.23	11.5	1.8		5.80			
Jan-08	0.330	0.240	0.282	269	633	473	1112	8.37	7.84	8.73	12	95	27	7	98	16	7.95	7.22	7.46	8.5	1.8		10.30			
Feb-08	0.310	0.240	0.280	235	549	301	703	8.33	7.85	8.11	13	94	30	10	97	22	7.75	7.24	7.45	7.2	1.75		12.70	2.49	388	
Mar-08	0.300	0.250	0.272	253	574	333	755	8.01	7.88	8.42	18	93	40	8	97	19	7.44	7.21	7.30	6.9	1.62					
Apr-08	0.310	0.240	0.267	312	695	403	897	8.13	7.88	8.02	15	95	33	12	97	27	7.66	7.21	7.35	7.33	1.56		16.20	2.45	395	
May-08	0.840	0.280	0.430	197	706	300	1076	8.11	7.84	13.22	13	92	45	13	95	45	7.51	7.32	7.42	13.19	1.46					
Jun-08	0.590	0.230	0.330	298	820	685	1885	8.21	7.96	9.91	12	96	33	14	97	35	7.51	7.23	7.38	13.4	1.5					
Jul-08	0.260	0.200	0.220	264	484	412	756	8.22	8.01	6.81	11	96	20	15	96	29	7.95	7.31	7.48	17.5	1.3		7.10	17.9	490	
Aug-08	0.230	0.190	0.213	260	462	591	1050	8.31	8.06	6.60	9	95	16	13	97	23	7.91	7.54	7.73	11.9	1.6					
Sep-08	0.260	0.200	0.217	313	566	480	869	8.23	8.00	6.52	9	97	17	9	98	16	7.63	7.33	7.46	13.1	1.6					
Oct-08	0.230	0.200	0.210	366	641	831	1455	8.31	7.99	6.51	13	96	23	11	98	18	7.53	7.24	7.43	8.5	1.7		6.75	18.3	463	
Nov-08	0.270	0.180	0.216	284	512	340	612	8.21	8.00	6.47	13	95	23	13	96	24	7.63	5.50	7.31	11.2	1.6					
Max	0.840	0.280	0.447	388	820	831	1885	8.70	8.24	13.86	31	97	64	34	98	66	8.40	7.75	8.02	17.7	7.7	131	16.30	18.3	518	45,056
Min	0.217	0.115	0.194	117	190	113	200	5.95	6.71	5.71	7	83	13	6	81	13	7.19	5.50	7.00	5.0	1.3	0	1.63	0.4	355	0
Avg	0.309	0.192	0.240	230	462	247	496	8.19	7.68	7.31	16	92	33	17	91	33	7.66	7.17	7.40	11.3	2.7	21	8.83	10.4	438	8,276

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
SUMMARY OF HISTORICAL WASTEWATER DATA

TABLE
2-1
Cont.

Influent Flow Analysis Summary[1]

	2001	2002	2003	2004	2005	2006	2007	2008
Dry Weather Flows (MGD)[2] Six Low Wastewater Flow Months								
Dry Weather Average Flow[3]	0.22	0.21	0.21	0.20	0.21	0.22	0.23	0.22
Dry Weather Maximum Daily Flow[4]	0.31 (7/11)	0.26 (8/28)	0.26 (8/9)	0.26 (7/2)	0.29 (10/2)	0.35 (8/11)	0.31 (1/15)	0.27 (10/12)
Dry Weather Minimum Daily Flow[5]	0.15 (7/24)	0.14 (9/5)	0.17 (7/5)	0.15 (12/24)	0.12 (9/25)	0.13 (12/31)	0.13 (1/2)	0.18 (10/28)
Dry Weather Maximum Month Average Flow[6]	0.23 (Aug)	0.21 (Aug)	0.22 (Dec)	0.30 (Dec)	0.21 (July)	0.24 (Aug)	0.24 (Oct.)	0.22 (July)
Wet Weather Flows (MGD)[2] Six High Wastewater Flow Months								
Wet Weather Average Flow[3]	0.25	0.24	0.26	0.26	0.25	0.30	0.26	0.31
Wet Weather Maximum Daily Flow[4]	0.45 (3/29)	0.31 (4/18)	0.64 (5/31)	0.41 (3/25)	0.44 (5/7)	0.81 (5/20)	0.38 (5/25)	0.84 (5/20)
Wet Weather Minimum Daily Flow[5]	0.18 (3/14)	0.19 (4/12)	0.18 (3/9)	0.12 (6/27)	0.18 (11/22)	0.13 (4/24)	0.17 (7/25)	0.23 (6/30)
Wet Weather Maximum Month Average Flow[6]	0.27 (May)	0.26 (April)	0.35 (May)	0.30 (May)	0.33 (May)	0.45 (May)	0.28 (Dec.)	0.43 (May)

Notes:

[1] Effluent flows are measured and reported as influent flows on the City's DMRs. For the purposes of this analysis, it has been assumed that the two flows are equal and all minor losses are negligible.

[2] MGD = Million Gallons per Day

[3] Average flow during six low or high wastewater flow months.

[4] Maximum daily flow during six low or high wastewater flow months. Refer to Table 2-1 for a definition of maximum daily flow.

[5] Minimum daily flow during six low or high wastewater flow months. Refer to Table 2-1 for a definition of minimum daily flow.

[6] Maximum month average flow during six low or high wastewater flow months.

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN

INFLUENT FLOW ANALYSIS SUMMARY

TABLE
2-2

Summary of Historical Wastewater Data

	Influent	Effluent	
Flow Component			
Maximum Daily Flow (MGD)[1]		0.840	5/20/2008
Minimum Daily Flow (MGD)[2]		0.115	9/25/2005
Average Annual Flow (MGD)[3]		0.240	
Loading Component			
Maximum Average BOD_5 (mg/L)[4]	366	31	
Minimum Average BOD_5 (mg/L)[5]	197	7	
Average BOD_5 (mg/L)[6]	285	16	
Average BOD_5 (lb/d)[6, 10]	600	33	
Maximum Average TSS (mg/L)[7]	831	34	
Minimum Average TSS (mg/L)[8]	272	6	
Average TSS (mg/L)[8]	440	17	
Average TSS (lb/d)[9, 10]	926	33	

Note: Flow components are based upon the discharge monitoring reports (DMRs) for the period of January 2001 to November 2008. Effluent flows are recorded as influent flows on the City's DMRs. It has been assumed that the two flows are equal and all minor losses are negligible. The influent loading components are based upon 2007 and 2008 data only as it is assumed that this period more closely reflects actual loadings to the plant due to a change in sampling procedure which provides a more representative sample.

All effluent components are based upon analyzing the entire 7 years of DMR data.

1 Maximum daily flow is the maximum flow that occurred over a 24-hour period.

2 Minimum daily flow is the minimum flow rate that occurred over a 24-hour period.

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

4 Maximum average BOD_5 is the maximum average monthly five-day BOD concentration.

5 Minimum average BOD_5 is the minimum average monthly five-day BOD.

6 Average BOD_5 is the average five-day BOD (concentration and mass flux).

7 Maximum average TSS is the maximum average monthly total suspended solids.

8 Minimum average TSS is the minimum average monthly total suspended solids.

9 Average TSS is the average total suspended solids (concentration and mass flux).

10 Mass loadings estimates based upon using AAF. Mass loading (lb/d) = concentration, (mg/L) x AAF (MGD) x 8.34.

BOD_5 = Five-day biochemical oxygen demand
MGD = Million gallons per day
TSS = Total suspended solids
mg/L = Milligrams per liter
lb/d = Pounds per day

Preliminary Design Criteria

	EXISTING 2009[1]		FUTURE 2030[4]	
	I/I[2]	Total[3]	I/I[5]	Total[6]
Population		2,520[7]		3,819
Average Base Flow (ABF), MGD[8]	----	0.146	----	0.220
Per Capita Flow, gpcd	----	58	----	58
Average Annual Flow (AAF), MGD	0.094	0.240	0.094	0.314
Per Capita Flow, gpcd	37	95	25	83
Average Dry Weather Flow (ADWF), MGD	0.067	0.213[9]	0.067	0.287
Per Capita Flow, gpcd	27	85	18	76
Average Wet Weather Flow (AWWF), MGD	0.120	0.266[9]	0.120	0.340
Per Capita, gpcd	48	106	32	90
Maximum Month Flow (MMF), MGD	0.301	0.447	0.301	0.521
Per Capita, gpcd	119	177	79	137
Maximum Daily Flow (MDF), MGD	0.694	0.840	0.694	0.914
Per Capita, gpcd	275	333	183	241
Peak Hour Flow (PHF), MGD	----	1.08[10]	----	1.41
Per Capita, gpcd	----	429	----	372
Average Influent BOD_5, mg/L	----	285[11]	----	345
lb/day	----	600[11]	----	904
lb/capita/day	----	0.240	----	0.240
Average Influent TSS, mg/L	----	440	----	533
lb/day	----	926	----	1,395
lb/capita/day	----	0.370	----	0.370
Average Influent TKN[12], mg/L	----	40	----	45
lb/day	----	79[11]	----	119
lb/capita/day	----	0.03	----	0.03

1 Existing 2009 column based upon a review of previous 8 years of historical data.
2 The average contribution from Infiltration and Inflow (I/I) for each flow component (AAF, ADWF, AWWF, MMF, and MDF) 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 = 0.240 MGD - 0.146 MGD = 0.094 MGD).
3 Existing total flows and mass loads are based on historical plant operating data (i.e., Discharge Monitoring Reports).
4 Population projected using a 2.0 percent growth rate for John Day and a 2.0 percent growth rate for Canyon City utilizing the 2008 populations.
5 For projection purposes, it was assumed that the I/I flows currently being experienced in the system will remain constant throughout the planning period.
6 Future total flow is estimated by taking the sum of the future ABF and I/I (example: AAF = 0.220 MGD + 0.094 MGD = 0.314 MGD).
7 Source: Portland State University, July 1, 2008, Certified Estimate. Combined population for the City of John Day (1,845) and Canyon City (675).
8 ABF is defined as the daily minimum flow recorded each year averaged over the 8 years of available data.
9 ADWF and AWWF from Table 1-2.
10 Based on an assumed factor of 4.5 times the AAF.
11 Only 2007 and 2008 BOD_5 and TSS DMR data used for the basis of design as this year is assumed to most closely reflect actual loadings currently being experienced. Mass loading estimated using AAF.
12 Total Kjeldahl Nitrogen (Organic nitrogen and ammonia nitrogen). Assumed concentration based on typical domestic wastewater influent values.

MGD = million gallons per day
gpcd = gallons per capita per day
mg/L = milligrams per liter
lb/d = pounds per day

BOD_5 = five-day biochemical oxygen demand
TSS = total suspended solids
TKN = total kjeldahl nitrogen

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CITY OF
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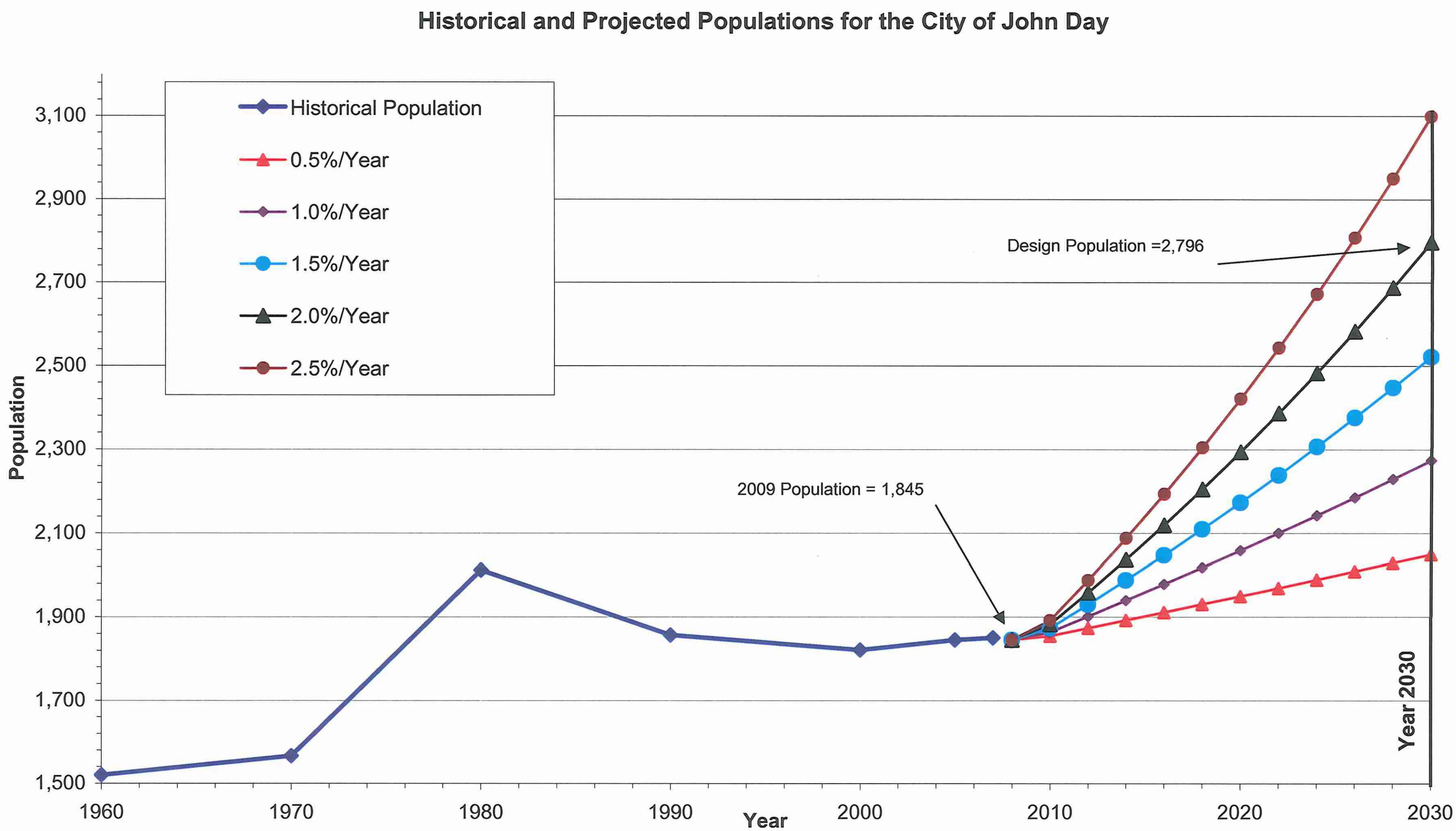
WASTEWATER FACILITIES PLAN

DESIGN CRITERIA

TABLE
2-4



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CITY OF
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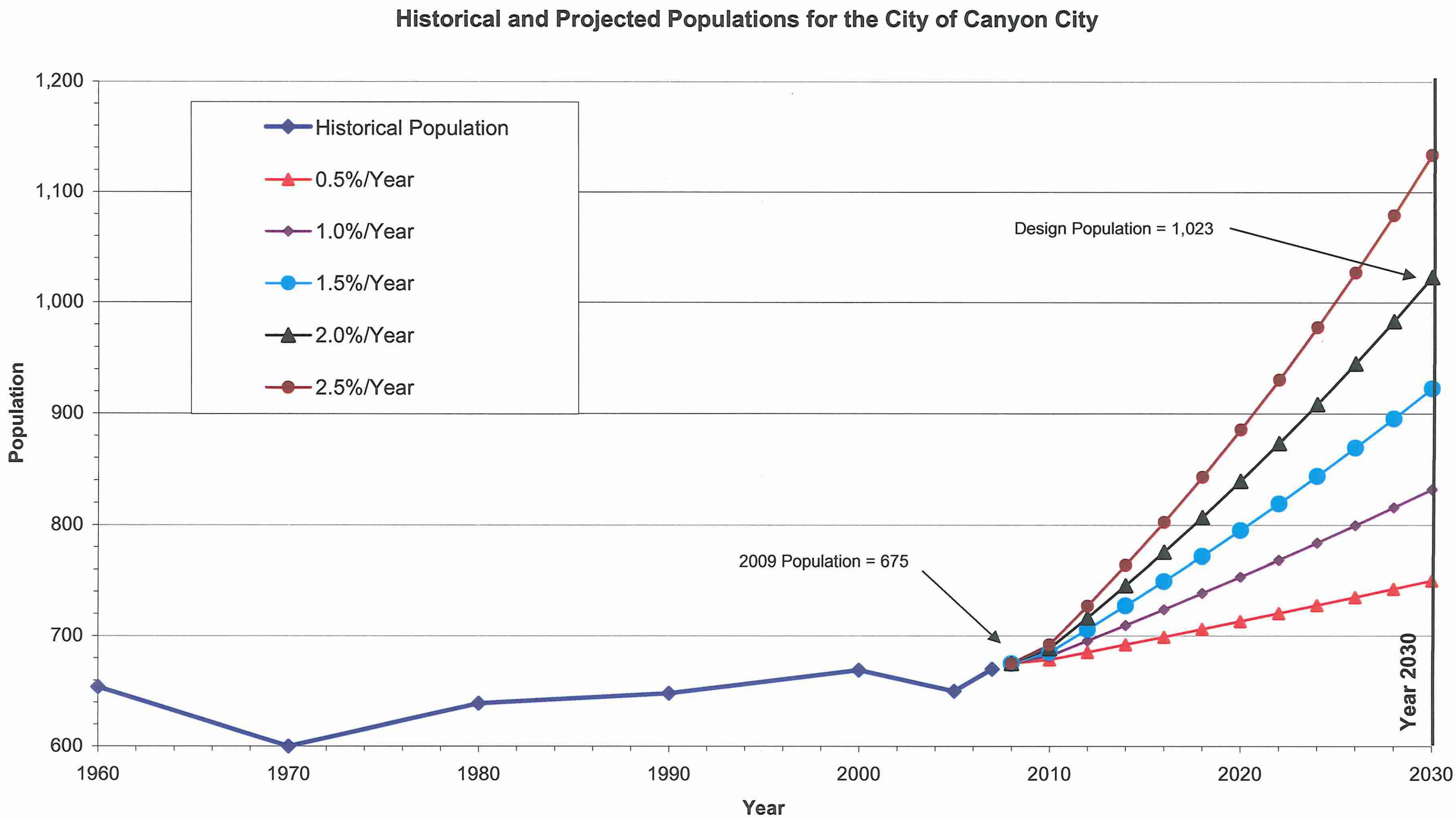
WASTEWATER FACILITIES PLAN
HISTORICAL AND PROJECTED
POPULATION - JOHN DAY

FIGURE
2-1



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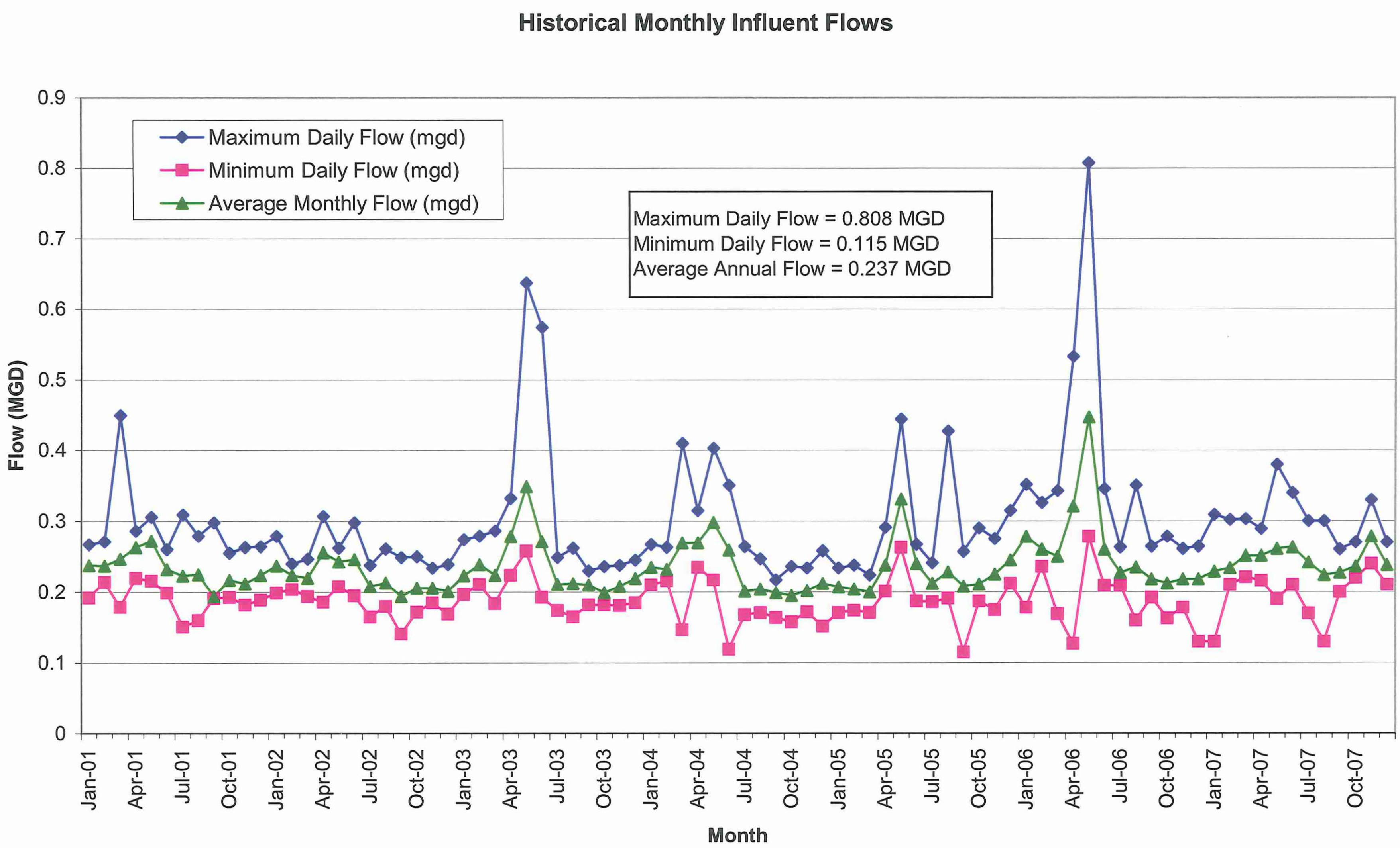
CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
HISTORICAL AND PROJECTED
POPULATION - CANYON CITY

FIGURE
2-2



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CITY OF
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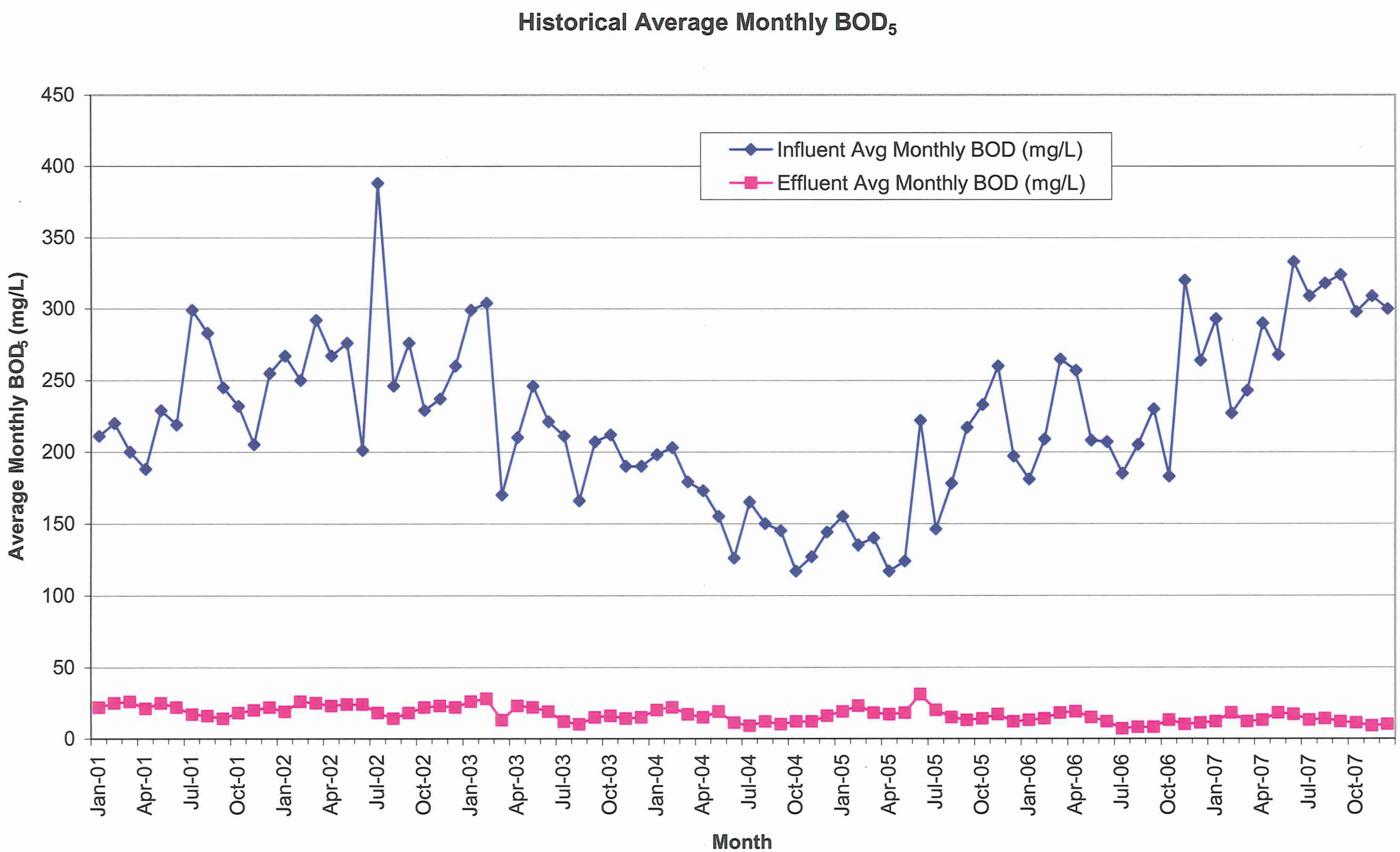
WASTEWATER FACILITIES PLAN
HISTORICAL MONTHLY
INFLUENT FLOWS

FIGURE
2-3



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CITY OF
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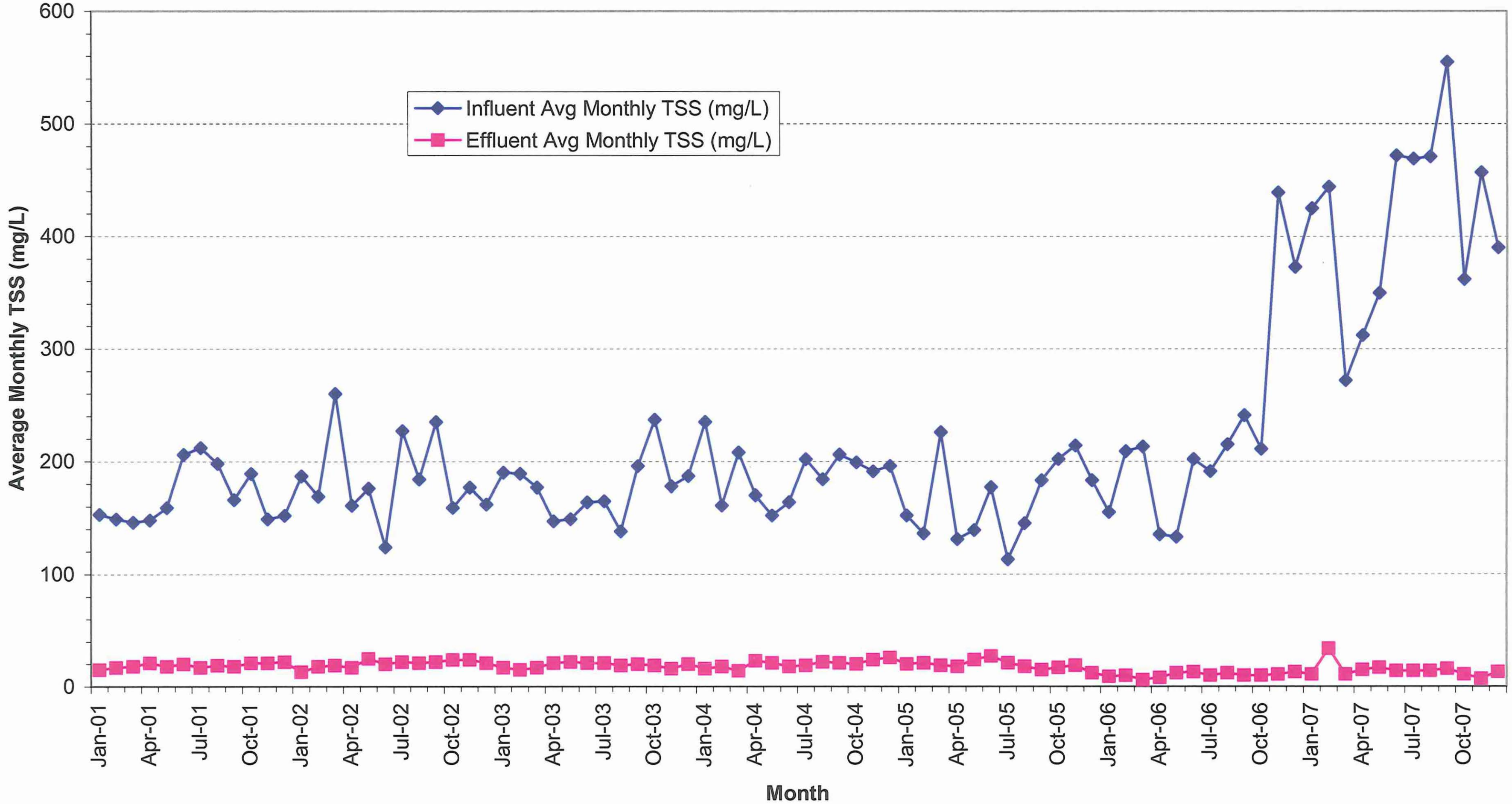
WASTEWATER FACILITIES PLAN
HISTORICAL AVERAGE
MONTHLY BOD_5

FIGURE
2-4

Historical Average Monthly TSS



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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
HISTORICAL AVERAGE
MONTHLY TSS

FIGURE
2-5

CHAPTER 3

EXISTING WASTEWATER SYSTEM DESCRIPTION AND EVALUATION

INTRODUCTION

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

COLLECTION SYSTEM DESCRIPTION AND EVALUATION

Construction of the original wastewater collection system began in 1949. Major additions were completed in 1970 and 1978. Since 1978 the collection system has been expanded several times to support the growing community. The wastewater collection system serving the City of John Day is shown on Figure 3-1.

Referring to Figure 3-1, the collection system consists of a single 18-inch interceptor and 6-, 8-, and 12-inch trunk and lateral lines that transport wastewater via gravity from the residential and commercial developments of the City of John Day and Canyon City to the WWTF. Three lift stations aid in the transportation of wastewater from low lying areas to the gravity collection system. One station located west of the City near the Grant County Road Department Shops collects wastewater from the Grant County facilities and pumps it via a 4-inch forcemain to the Patterson Road Lift Station. The Patterson Road Lift Station is located next to the John Day River on the intersection of Patterson Road and U.S Highway 395. This lift station collects wastewater from developments in that area and pumps it to another lift station, referred to as the Bowling Alley Lift Station. The Bowling Alley Lift Station is located in front of the Bowling Alley along U.S. Highway 395, east of Northwest Lyons Street. The Bowling Alley Lift station collects the wastewater pumped from the Patterson Road Lift Station and a small gravity line. Wastewater from the Bowling Alley Lift Station is pumped into the gravity system at a manhole located near the intersection of West Main Street and N.W. 3rd.

Based upon a review of the recently updated collection system map, the system consists of approximately 84,145 lineal feet of 4-, 6-, 8-, 10-, 12-, and 18-inch gravity sewer pipe. In addition, there are approximately 10,528 lineal feet of 4-, 6-, and 8-inch forcemain. The collection system has 357 manholes and 34 cleanouts based on review of the collection system map.

Flow Monitoring Evaluation and Television Inspection

Infiltration and inflow (I/I) are unwanted flows entering the wastewater collection system. I/I in a collection system can occur during different times of the year. During the winter and early spring, the source of I/I are normally storm events and spring runoff. During the summer, heavy irrigation and the filling of irrigation ditches and canals can raise groundwater levels, which can lead to increased I/I. Poorly lined irrigation canals and ditches can be a source of I/I because leaking irrigation water can elevate groundwater levels in the vicinity of sewer main lines. Specifically, infiltration and inflow are defined as follows:

Infiltration - The 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 - The water discharged into a collection system and service connections from such sources as, but not limited to, roof drains; cellar; yard and area drains; foundation drains; 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.

Infiltration/Inflow (I/I) - The total quantity of water from both infiltration and inflow without distinguishing the source.

Nearly all cities have some amount of I/I into their wastewater collection systems. Excessive I/I can be a problem because these flows must be treated along with normal wastewater flows. Excessive I/I is defined as the quantities of infiltration/inflow that can be economically eliminated from a collection system by rehabilitation, as determined by a cost effectiveness analysis that compares the cost for correcting the I/I conditions with the total cost for transportation and treatment of the I/I. I/I is a concern for mechanical treatment plants because treatment costs are usually more with a mechanical system.

Seasonally, the City does experience excessive I/I into the collection system. To determine potential areas of the system that may be experiencing excessive I/I, a limited analysis of the collection system was completed as part of this Plan. The analysis consisted of flow monitoring in selected areas throughout the City's system. The City also completed a television inspection of sewer lines in areas identified during the flow monitoring.

Based on knowledge and experience of the City staff, specific areas within the system were identified to be analyzed. Based on this information provided by the City, a flow monitoring plan was developed and the actual flow measurements conducted on May 12 through May 14, 2009. Flow measurements were taken between the hours of 11 p.m. and 5 a.m. when domestic water use should be at the lowest. The flow measurements were limited to the areas where higher flows were suspected because of the presence of groundwater encountered in the past when sewer or water lines in the area were exposed and repaired. Flow measurements were taken in consecutive manholes in order to locate areas where flow increases between manholes would indicate I/I flowing into the collection system. Manholes where flows were measured are identified on Figure 3-1, with sections where flows increased significantly also identified. The summary of the flow measurement work along with suggested action to be taken is described in Table 3-1.

The measuring was accomplished with the use of an ISCO Flowmetering Insert and an electronic manometer. The flowmetering inserts allow the flow to be measured from the ground surface with no need to enter the manhole. The flowmetering insert has a V-notch weir attached so when the fluid depth is measured the flow rate in gallons per minute may be determined from a chart provided with the metering insert. When the insert is installed in the sewer pipe a rubber bladder is inflated to seal the insert and then the fluid depth is measured by the amount of pressure exerted on the air line connected to the manometer.

With the flow monitoring information gathered, the areas of the system that needed to be television inspected were determined. The television inspection of the collection system helps isolate, determine, and prioritize the type and location of repairs that need to be made to the system to target reduction of the amount of I/I flowing into the collection system. In the time since the flow measurements were taken, the City contracted with Pipeline Inspection Services Inc., a television inspection company, and some of the sewer lines were television inspected. The areas that were television inspected are shown on Figure 3-2 and a summary of the findings are presented on Table 3-1.

Based on the results of the television inspection work, the City completed improvements to the collection system in September 2009 and March 2010. Appendix F contains the television inspection observation reports, which identify the specific locations fixed/repaired, the dates of the fixes, and the repair items completed (pipe joint, sewer service connection, etc.). Items fixed/repaired included pipe joints, sewer service connections, broken pipes, pipe cracks, abandoned laterals, and root intrusion.

EXISTING WASTEWATER TREATMENT FACILITY

Background. The existing WWTF is located on the northwestern end of the City at the end of 7th Street. The City of John Day's existing mechanical wastewater treatment facility (WWTF) provides secondary treatment of the City's domestic wastewater. Construction of the original WWTF was completed in 1949. However, due to continued expansion of the system, the original trickling filter facility became overloaded, resulting in the need for an upgraded treatment facility. In 1978, the facility was upgraded and incorporated several of the original plant structures from the 1949 treatment plant. The current facility consists of an influent lift station, a headworks structure, two primary clarifiers, two trickling filters, one secondary clarifier, gas chlorination and chlorine contact basin, four percolation ponds for effluent disposal, two-stage high rate anaerobic sludge digestion, and four sludge drying beds. A site plan of the existing WWTF is shown on Figure 3-2.

Site modifications have been made to the WWTF since its construction in 1978. The secondary clarifier has been retrofitted to include a chlorination line around the launder to reduce algae growth. In addition, a floating cover was installed on the secondary anaerobic digester. Other modifications include changes to telemetry, controls, flowmeters, and the distribution piping to the percolation ponds.

Existing Wastewater Treatment Facility Overview. The City of John Day's existing mechanical WWTF provides secondary treatment of the City's domestic wastewater. The WWTF generally consists of two wet wells, a preliminary treatment system (headworks), a primary treatment system, a trickling filter secondary treatment system, secondary clarification, an anaerobic sludge digestion system, sludge drying beds, gas chlorine disinfection, a chlorine contact basin, and percolation ponds. Refer to Figure 3-3 for a process schematic of the existing WWTF.

Preliminary Treatment (Headworks). Influent from the collection system enters first into a wet well where it is pumped to the headworks. The City of John Day's preliminary treatment consists of a gravity grit removal channel, comminution, and a bar screen. The gravity grit channel functions to remove, via gravity, settling incoming particles that are largely inert such as sand, gravel, egg shells, bone chips, coffee, and seeds. The comminutor functions to cut up (comminute) coarse solids to theoretically improve the downstream operations and processes and to help eliminate problems caused by the varied sizes of solids present in wastewater. The bar screen acts as an alternative method to prevent large debris from entering the wastewater treatment plant in the case that the comminutor is dysfunctional. Large debris is suspended on the bar screen and manually removed. After passing through the headworks, the wastewater flows, via gravity, to the primary clarifier.

Primary Clarifiers. The objective of treatment by primary sedimentation (clarification) is to remove readily settleable solids and floating materials (scum) and thus reduce the suspended solids content of the wastewater. The incoming wastewater is directed to a center-feed well where the wastewater is directed equally in all directions of the tank. The feed well provides an environment of limited agitation that helps create settleable flocculated solids and directs the flow equally toward the bottom center of the clarifier. Suspended solids settle and accumulate in the bottom of the tank. The clarifier is equipped with a slow-moving rotating sludge scraper located on the bottom of the tank that transports the settled sludge to a center hopper for withdrawal. Scum rises to the water surface in the clarifier and is prevented from flowing over the effluent weirs by a baffle ring that is installed on the periphery of the tank. A skimmer collects the scum from the water surface and directs the floating material to a scum trough where it is collected and periodically wasted to the anaerobic digester. The clarified effluent leaves the clarifier by flowing under the scum baffle and over a steel ring containing V-notch weirs, and into an effluent launder which runs along the entire periphery of the tank. Primary effluent flows by gravity to one of two 66-foot diameter trickling filters.

Trickling Filters. The flow enters a rotating distributor arm of the trickling filter and is distributed evenly over a 6-foot deep bed of rock media via nozzles strategically located on the arms. The organic material present in the wastewater is degraded by a population of microorganisms attached to the filter rock media. Organic material from the liquid is adsorbed onto the biological film or slime layer. In the outer portions of the biological slime layer, the organic material is degraded by aerobic microorganisms. As the microorganisms grow, the thickness of the slime layer increases, and the diffused oxygen is consumed before it can penetrate the full depth of the slime layer, resulting in an anaerobic environment near the surface of the media. As the slime layer increases in thickness, the adsorbed organic matter is metabolized before it can reach the microorganisms near the media face. As a result of having no source of food available, the microorganisms near the media face begin to consume their own protoplasm (endogenous growth phase) and eventually starve and lose their ability to cling to the media. The liquid then washes the slime off the media, and a new slime layer starts to grow. This phenomenon of losing the slime layer is called "sloughing" and is primarily a function of organic and hydraulic loading on the filter. The hydraulic loading accounts for the scouring effect and the organic loading accounts for the rate of metabolism in the slime layer.

The treated wastewater containing the metabolic end products such as carbon dioxide, water, nitrates, and sulfates, the sloughed off material (humus), and other solids flow into the trickling filter underdrain system which supports the media and permits air circulation. The trickling filter effluent flows via gravity to a second wet well and is then pumped from the wet well to either the secondary clarifier, back to one of the primary clarifiers, or back to the trickling filter where it is further treated.

Secondary Clarifier. The secondary clarifier functions to remove floating scum, trickling filter humus, and other solids through gravity separation. The secondary clarifier is identical in design to the primary clarifier. The secondary sludge is periodically removed by gravity back to the first wet well where it is combined with the raw influent. The combined raw influent and secondary sludge collected in the primary clarifier is periodically wasted to the primary anaerobic digester. As effluent flows out of the secondary clarifier, it is injected with chlorine just outside the effluent box. The chlorinated effluent then travels to a 28,000-gallon chlorine contact basin.

Chlorine Contact Basin and Percolation Ponds. The chlorine contact basin functions to allow adequate time for the chlorine disinfectant to contact the bacteria in the wastewater and provide effective kill rates. The disinfected wastewater flows via gravity through the chlorine contact basin to a meter basin and then on to one of four different percolation ponds. The pond allows the disinfected treated wastewater to be exposed to ultraviolet rays from the sun which naturally provides dechlorination prior to percolating through the soil and into the ground water.

Sludge Pumping and Processing. Combined primary and secondary sludge and scum collected in the primary clarifier is periodically withdrawn . The combined sludge in the clarifier is pumped by a sludge pump, located in the operations building, to the primary anaerobic digester. The sludge is then pumped into a secondary digester.

The anaerobic digester functions to treat the primary and secondary sludge to provide a stable end product that can be safely and beneficially utilized as soil amendment on the City's land application sites. The purpose of the digestion process is to reduce the volatile solids content in the waste sludge, thereby reducing the overall volume needing to be disposed of and minimize the likelihood of vector (flies, rodents, etc.) attraction. Additionally, although not as easily achieved as vector attraction reduction, the digestion process functions to reduce the overall number of pathogens present in the biosolids. Significant reductions in the sludge volume occur as a result of biological breakdown of the volatile solids and through sludge thickening that takes place within the digester. On the order of 50 percent volatile solids destruction can be achieved in a well-designed and operated anaerobic digester.

Anaerobic digestion is a natural biological process that occurs in the absence of oxygen. Anaerobic digesters are typically designed as either "standard-rate" or "high-rate" single-stage or two-stage systems. The high-rate system differs from the standard-rate system primarily in that the solids-loading rate is much greater, the sludge is intimately mixed, and it is heated to higher temperatures (95° to 100°F as compared to about 85°F in a standard-rate system) in order to achieve optimum digestion rates.

The most significant characteristics of the City's system are that two vessels are employed, and the contents in the digesters are heated to optimal digestion conditions and the primary digester is mixed. As such, the digestion process employed at the John Day plant is a two-stage high-rate system.

The City has a functional sludge drying bed dewatering facility. The sludge drying beds consist of coarse sand and an underdrain system that discharges the water removed from the sludge back to the first wet well of the plant. The City currently uses the beds during periods of the year when it is not possible to haul liquid sludge to the land application sites. Weather permitting, treated liquid sludge is directly withdrawn from the anaerobic digester and hauled by the City's liquid sludge hauling truck and land-applied.

EXISTING WASTEWATER TREATMENT FACILITY EVALUATION

General. The unit process evaluation was undertaken to determine the adequacy of the existing mechanical WWTF to meet the current and future wastewater processing needs of the City of John Day. The evaluation is based on using published and commonly accepted design criteria related to each unit. The design criteria shown on Table 2-4 in Chapter 2 will also be used extensively in the evaluation.

Preliminary Treatment (Headworks). The City of John Day's headworks consists of an influent lift station, gravity grit removal, and comminution. The influent lift station collects all of the incoming wastewater and pumps it to the grit removal channels. The grit channels provide the means to remove a portion of the incoming small inert solids and the comminutor functions to cut up (comminute) coarse solids to theoretically improve the downstream operations and processes and to help eliminate problems caused by the varied sizes of solids present in wastewater.

The lift station pumps and wet well are in need of rehabilitation. The pumps need replacement as the City has been experiencing problems and they are a continual high maintenance item. The wet well needs to be rehabilitated to extend the life of the concrete.

Currently, the comminutor is not functional and a manually cleaned bar screen is the only method of preventing large debris from entering the WWTF.

The grit removal system being utilized by the City is outdated and the components have reached their design life. Updating or replacing the components is recommended.

The condition of the concrete of the existing headworks structure is very poor. The concrete walls of the structure are badly weathered and are falling apart.

Due to the overall poor condition of the structure and the inadequacy of the preliminary treatment unit to provide efficient treatment, it is recommended that a new headworks be constructed if the City decided to upgrade the existing WWTF. A number of configurations utilizing different treatment components (screening, grit removal, etc.) can be utilized in an upgraded headworks depending on the type of downstream treatment processes being employed. New headworks improvement options and recommendations are outlined in Chapter 4.

Primary Clarification. Primary clarifiers are designed mainly on the basis of surface overflow rate and detention time. The overflow rate is defined as the flow rate entering the clarifier divided by the surface area. Suitable overflow rates are dependent upon the type of processes that are employed downstream. Typical design criteria for primary clarifiers followed by secondary treatment units such as trickling filters are given in the following table.

Typical Design Criteria for Circular Primary Clarifiers*

Design Parameter	Unit	Value	
		Range	Typical
Depth	feet	10-15	12
Average Overflow Rate	gal/sq-ft/day	800-1,200	1,000
Peak Hour Overflow Rate	gal/sq-ft/day	2,000-3,000	2,500
Weir Loading	gal/ft/day	10,000-40,000	20,000
Detention Time	hours	1.5 - 2.5	2.0

* Taken from *Wastewater Engineering: Treatment and Reuse*, Metcalf and Eddy, Inc., 4th Edition.

The primary clarifiers are 34-feet in diameter and have an effective overflow area of approximately 800 square feet. The unit has an approximate sidewater depth of 10 feet. With a 10-foot depth, the clarifier has a volume of about 60,000 gallons. Referring to Chapter 2, Table 2-4, the existing average wet weather flow (AWWF) and estimated peak hour flow are 0.266 million gallons per day (MGD) and 1.08 MGD, respectively. Therefore, the current average overflow rate is 332 gallons per day per square foot (gpdsf) and the existing peak hour overflow rate is about 1,350 gpdsf. Considering the design AWWF (year 2030) of 0.340 MGD and the peak hour design flow (2030 flow) of 1.41 MGD, the year 2030 average and peak hour overflow rates would be around 425 and 1,763 gpdsf, respectively. At the design AWWF, the detention time is about 4.2 hours.

Based upon typical design criteria as listed in the table above, it appears that each clarifier has adequate capacity to handle current and anticipated design flows. Although the units appear to have sufficient capacity, the existing clarifier structures and equipment are more than 30 years old and are in poor condition. Thirty years is beyond the expected life of the structure and equipment. Severe cracks in the concrete and worn out equipment suggest the clarifiers are in need of rehabilitation. Recommendations for upgrading or rehabilitating the primary clarifiers are discussed in further detail in Chapter 4.

Trickling Filter. Trickling filters are classified according to the applied hydraulic and organic loadings. The hydraulic loading is the total volume of liquid, including recirculation, per unit time per square unit of filter surface area. Organic loading is the biochemical oxygen demand (BOD_5), not including BOD_5 contained in recirculation, per unit time per cubic units of filter volume. The following table lists typical design criteria used for sizing rock media trickling filters.

Typical Design Criteria for Trickling Filters Utilizing Rock Media*

		Trickling Filter Classification		
Design Parameter	**Unit**	**Low-Rate**	**Intermediate Rate**	**High-Rate**
Organic Loading	lb BOD_5/1,000 cu-ft/day	4-14	15-30	25-150
Hydraulic loading**	gal/day/sq-ft	25-90	85-230	230-920
Media (Rock) Depth	feet	6-8	6-8	6-8

* Taken from *Criteria for Sewage Works Design*, Washington State Department of Ecology, revised October 1985, reprinted 1992.
** Includes recycled flow.

The existing tricking filters are 65 feet in diameter and have an average media depth of approximately 6 feet. This is equivalent to a media volume of about 19,900 cubic feet per filter. A four-arm hydraulically driven distributor applies wastewater to the filter media surface through use of properly sized and spaced nozzles.

A number of models are available for use in estimating trickling filter performance. The model that is used in this Plan to evaluate the performance of the trickling filter is the National Research Council (NRC) design equation.

The performance of the trickling filter using the NRC approach is dependent on the organic (BOD_5) loading to the filter without regard to the BOD_5 in the recirculated flow, the volume of the media, the amount of recirculation, and the temperature of the wastewater. Recirculation is an important factor in the overall performance of the filter. Based upon recent assessment (from several different published studies) of trickling filter installations, it appears that the benefits of recirculation are due primarily to improved wetting and flushing of the filter media. By properly managing the hydraulic loading rate, it has been possible to maintain a thinner biomass layer consistently, with associated improvement in performance, and to avoid the periodic sloughing phenomenon often observed in most rock-type trickling filters. The following table is a summary of the trickling filter evaluation, including efficiency of the filter as related to hydraulic and organic loading and recirculation.

The process summary shown below indicates that the City's trickling filter appears to be adequately sized to handle the year 2030 design organic and hydraulic loadings. In order to obtain an overall BOD_5 removal of 85 percent by the plant (the minimum percent removal that will likely be stipulated by the Department of Environmental Quality [DEQ] in the next National Pollutant Discharge Elimination System [NPDES] Permit cycle) the trickling filter must be capable of removing at least 79 percent of the incoming BOD_5, assuming 25 percent removal in the primary clarifier. Based upon the process evaluation, it appears the filter will be able to consistently achieve the required 79 percent removal efficiency with a recycle rate of that assumed to complete the evaluation. It is important to note, however, that at the end of the design period, the plant will likely be at capacity.

Trickling Filter Evaluation Summary*

	Without Recirculation		**Theoretical Efficiency (% Rem.) *****		**With Recirculation****		**Theoretical Efficiency (% Rem.) *****	
Parameter	**2008**	**2030**	**2008**	**2030**	**2008**	**2030**	**2008**	**2030**
Organic Loading (lb BOD_5/1000 cu-ft/day)**	23	34	78.9	75.3	23	34	82.8	79.7
Hydraulic Loading (gal/day/sq-ft)	72	95	-------	-------	145	189	------	-------

* Based upon the NRC equation.
** Assumes 25 percent removal of the BOD_5 in the primary clarifier.
** Assumes a recirculation ratio, R = 1 (R = Recirculation Flow ÷ Average Annual Flow)
*** Efficiency at a wastewater temperature of 20°C. % Rem. = percent BOD_5 removal

As noted, each trickling filter has the organic and hydraulic capacity to handle current and projected wastewater flows. The trickling filter located to the west was installed in approximately 1978 and appears to be in good condition. As the equipment, rock media, concrete, etc., are about 30 years old, it is recommended that key components be replaced or rehabilitated to decrease the potential for a major breakdown. It is proposed that the City replace components such as spray nozzles, bearings, rock media, etc., if the WWTF is to be upgraded.

The trickling filter to the east is in worse condition than the one to the west. This filter was constructed in 1949 and contains many of the original components. Spalling concrete, corroded metal, and broken-down rock media are among issues being experienced at the east trickling filter. With the east trickling filter being about 60 years old and with noticeable degradation, it does not appear that it can be counted on as a reliable unit for the next 20 years. It is recommended that the east trickling filter be demolished and rebuilt if upgrades to the WWTF are pursued. Recommendations for the trickling filters are discussed further in Chapter 4.

Secondary Clarifier. As mentioned previously, the wastewater treatment plant has one circular 34-foot diameter secondary clarifier. The clarifier has an approximate side water depth of 10 feet. The clarifier is a center-feed design with mechanical sludge scraper assemblies. The secondary sludge is withdrawn and recirculated to the influent lift station wet well where it is pumped back into the headworks, is settled and combined with the primary sludge in the primary clarifier, then is withdrawn and pumped to the anaerobic digester for processing.

Secondary clarifier design is commonly based upon surface overflow rate and solids loading rates. Hydraulic loading criteria depend on the secondary treatment process used. For secondary clarifiers following trickling filtration, the following design criteria should be used.

Design Criteria for Secondary Clarifiers following Trickling Filtration*

Overflow Rate (gal/day/sq-ft)		Solids Loading (lb/hour/sq-ft)		Depth (feet)
Average	Peak	Average	Peak	
400-600	1,000-1,200	0.6-1.0	1.6	10-15

* Taken from *Wastewater Engineering: Treatment and Reuse*, Metcalf and Eddy, Inc., 4th Edition.

At 600 gpdsf average overflow rate, the hydraulic capacity of the secondary clarifier is approximately 480,000 gallons per day (gpd). Based on this calculation it appears that the secondary clarifier is adequately sized to meet the current system demands and also the projected 2030 system demands. Even at the year 2030 average wet weather flow of 340,000 gpd, the secondary clarifier has adequate capacity.

Although the capacity appears to be adequate to meet future needs, the clarifier is more than 30 years old and has many noticeable cracks in the concrete and appears to need rehabilitation if the WWTF is going to be rehabilitated. Recommendations for the secondary clarifier are discussed further in Chapter 4.

Other important aspects that should be considered in evaluating the adequacy of the secondary clarifier facilities are redundancy and reliability. It is most desirable to have at least two units each with the capacity necessary to continue to provide the required treatment should one clarifier be off-line for repairs. Two clarifiers provide the necessary redundancy and reliability that would ensure consistent and ongoing compliance with the conditions of the Permit. The City may use one of the primary clarifiers as a backup in an emergency situation; however, this is not a true form of redundancy and reliability for the secondary clarifier.

Chlorine Contact Basin. The secondary effluent is injected with chlorine and then flows into a chlorine contact basin. The chlorine contact basin is approximately 30 feet in diameter and has a 5-foot static water depth, giving the total volume of approximately 28,000 gallons and an effective volume of approximately 22,400 gallons, assuming an 80 percent contact efficiency. At the existing AWWF of 266,000 gpd, the outfall provides about 2.0 hours detention. At the existing average dry weather flow (ADWF) of 213,000 gpd, the outfall provides about 2.5 hours detention. At the Year 2030 design AWWF of 340,000 gallons, approximately 1.6 hours detention is provided by the chlorine contact basin. In order to achieve the required disinfection levels, at least one hour of detention needs to be provided.

The chlorine contact basin appears to have adequate capacity to meet the City's needs now and throughout the design period. Although the chlorine contact basin has the capacity, it is important to point out that the contact basin was originally a clarifier and was later converted to be used as a contact basin. Because of the configuration and design of the contact basin, short circuiting of the wastewater through the basin is likely happening. The chlorine contact basin is not effective and consequently requires high chlorine usage to get proper disinfection and meet permit limits. As a result of the configuration of the basin and the apparent short circuiting that is occurring, it is recommended that the City replace the existing basin with a more effective unit. Recommendation for a chlorine contact basin is further discussed in Chapter 4.

Percolation Ponds. The City completed a wastewater system improvements project in 1978. As part of the 1978 improvements, four percolation ponds were constructed for the purposes of polishing the effluent from the treatment plant and providing natural dechlorination via stripping and ultraviolet rays from the sun. The ponds have water surface areas of approximately 1.5 acres, a maximum water depth of about 2 feet, and a useable treatment volume of 970,000 gallons each. The design percolation rate is in the range of 5 inches/day. With a percolation rate of 5 inches/day and an approximate area of 1.5 acres, each pond is capable of discharging in the range of 200,000 gpd into the groundwater. Given the 2030 AWWF of 340,000 gpd, two of the four ponds have the capability to handle the flows. Based on this calculation, it appears that the percolation ponds are adequately sized to meet current and future flows up to the end of the design period.

Although the percolation ponds are adequately sized for flows through the design period, the amount of nitrate being introduced to the ground water as a result of seepage from the ponds has been excessive at times. In December 2003, data from discharge monitoring wells (DMWs) located upstream and downstream of the percolation ponds began to be recorded. The results of the data, along with a site map showing the location of the monitoring wells, are presented in Appendix D. From December 2003 to December 2007 nitrate levels have ranged from a low of 0.10 mg/L to a high of 17.0 mg/L in DMWs MW-5 and MW-6, which are located downstream of the percolation ponds. Typically, nitrate levels greater than 10 mg/L are considered excessive.

George Chadwick, with George Chadwick Consulting in La Grande, Oregon, has been collecting data from the DMWs since December 2003. Upon discussing the high nitrate levels with him, it was pointed out that the high nitrate levels have consistently occurred in the past in the month of December. According to Mr. Chadwick, the City discharged into percolation Ponds 1, 2, 3, and 4 on a quarterly basis with all the wastewater effluent generated in January through March being sent to Pond 1, April through June to Pond 2, July through September to Pond 3, and October through December to Pond 4. Pond 4 is located closest to the DMWs that are showing high nitrate levels.

Another point that was discussed with Mr. Chadwick was the fact that effluent being discharged into the percolation ponds in the past was dispelled at a single point. More specifically, water was being dispelled by wastewater being sent to a manhole in each pond and then overflowing out of the manhole into the pond at one location. This method of discharge, coupled with the proximity of the DMWs to Pond 4, was thought to be the cause of high nitrate levels. In short, the wastewater did not have adequate time to dissipate and dilute itself before being monitored in the DMWs. This was evident in the fact that only high readings were being experienced in the month of December when discharging into Pond 4 was occurring.

To remedy this situation, in the spring of 2007 the City installed a discharge piping system that allows for a more even distribution of wastewater in percolation ponds and eliminated the point discharge system that was being used. Also, the City stopped sending water to Pond 4 and began discharging effluent into Ponds 1, 2, and 3 simultaneously. Since these changes have been incorporated, the highest nitrate reading has been 4.0 mg/L. Based on readings taken in June, September, and December, it appears that the new method of discharging to the ponds has helped reduce the nitrate levels at the DMWs. Although it appears the nitrate levels have decreased, it is not considered a long-term solution to the nitrate issue and it would be premature to say that the nitrate level issue has been resolved. Refer to Chapter 4 for more discussion on the nitrate concerns and recommendations for addressing the concerns.

Sludge Processing. Currently, the City processes the sludge in a two-stage high-rate anaerobic digester to a Class B level. The digested sludge is land applied on DEQ approved land application sites. Depending upon the season and weather conditions, the digested sludge is either hauled directly from the digester via a tanker truck to the land application sites in a liquid form or wasted to drying beds for storage and dewatering.

The existing primary anaerobic digester has a diameter of 20 feet and a maximum sidewater depth of 15.5 feet. The total available treatment volume is about 36,400 gallons. The digester is equipped with a fixed cover, methane fired boiler, and internal heat exchanger and a fixed mixer mounted to the fixed cover.

The existing secondary anaerobic digester has a diameter of approximately 20 feet and a maximum side water depth of about 20 feet. The total available treatment volume is about 47,000 gallons. The digester is equipped with a floating gas cover and an external heat exchanger. The secondary digester is unmixed.

Anaerobic digester design is commonly based upon a loading factor (pounds of volatile solids [VS] added per day per cubic foot of digester capacity), and detention time. Digestion tanks are also designed on a volumetric basis by providing a given amount of volume per capita (i.e., population basis of design). For high-rate digesters processing primary sludge and trickling filter humus, the following design criteria should be used.

Design Criteria for High-Rate Anaerobic Digesters Processing Primary Sludge and Trickling Filter Humus*

Design Parameter	Unit	Range
Volume	cu-ft per capita	2.6-3.3
Solids Loading Rate	lb VS per 1,000 cu-ft per day	100-200
Solids Retention Time	days	15-20

*Taken from *Wastewater Engineering: Treatment and Reuse*, Metcalf and Eddy, Inc., 4th Edition.

The City's current 2008 sludge production is estimated to be about 728 pounds of volatile solids per day or a loading rate of 150 pounds of VS per 1,000 cubic feet per day for the primary digester. Assuming the combined sludge can be thickened to a concentration of 4.0 percent solids, the existing combined thickened sludge wasting rate to the digester is approximately 2,776 gallons per day, which equates to a combined solids retention time in the primary digester of approximately 13 days.

Based on the digester analysis, the anaerobic digester facilities do not have sufficient capacity to meet current or design loading. It is therefore recommended that the City upgrade the digestion facility if the WWTF is upgraded. Recommendations regarding the digester are discussed further in Chapter 4.

The City has four drying beds. Each drying bed has the dimensions of 50-feet by 25-feet or a total of 5,000 square feet considering all four beds. Each drying bed has an available sludge storage depth of 1-foot. This equates to an available sludge storage volume of 9,350 gallons per bed or a total volume of 37,400 gallons. The drying beds have historically performed well due primarily to the geographic location of John Day. The City typically uses the two lower beds and normally the two upper beds are not used.

WASTEWATER TREATMENT FACILITY PROCESS SUMMARY

Based upon the process evaluation, the City's WWTF is in need of improvements, regardless of whether any growth occurs in the John Day and Canyon City service area. Several factors indicate upgrading is needed:

Headworks. The lift station is in need of rehabilitation. The influent pumps need to be replaced and the wet well concrete needs to be rehabilitated to extend its life. The comminutor is not functional and many of the components of the grit removal system are worn out and need to be replaced. Also, the concrete is cracking and structurally is in poor condition.

Primary Clarifiers. The structures are more than 30 years old and cracking of the concrete is occurring suggesting structural degradation of the units. Equipment is in need of replacement.

Trickling Filters. The east trickling filter is in poor condition. Concrete is spalling from the walls, steel components are corroding, there are cracks in the concrete, filter media is failing, etc. The unit is approximately 60 years old and it does not appear that it will meet the long-term needs of the City. The west trickling filter is 30 years old and is in need of rehabilitation to meet long-term treatment needs.

Secondary Clarifier. The clarifier is structurally degrading based on observed cracks in the concrete. Equipment is in need of replacement. Redundancy and reliability issues exist in this aspect of the facility.

Chlorine Contact Basin. This system uses a high amount of chlorine due to it being a converted clarifier, suggesting the basin is functioning inefficiently.

Digesters. The anaerobic digester facilities are currently undersized and do not allow adequate detention time at existing loadings to achieve desired treatment levels.

Percolation Ponds. The City has experienced high nitrogen readings in its percolation ponds' monitoring wells in past years. It appears that continued discharge into the percolation ponds (indirect discharge to the John Day River) is the only viable option available to the City of John Day (refer to Chapter 4 for more discussion). In order for the City to continue this practice, it may be necessary to have the ability to remove nitrogen from the wastewater in order to prevent degrading the groundwater.

In Chapter 4, alternatives to improve the City's WWTF are developed and evaluated to address the deficiencies identified in this chapter.

SUMMARY OF FLOW MONITORING EVALUATION AND TELEVISION INSPECTION - MAY 2009

Reference Number	City Collection Map Reference Sheet	Manhole Number	Address	Monitoring Date	Monitoring Time	Pipe Diameter (Inches)	Measured Weir Depth (Inches)	Estimated Flow Monitored (gpm)	Flow Increase from Previous Manhole	Estimated I/I Flow Contributed in Section (gpd)	Summary of Flow Measurements	Suggested Action to be Taken	Results of Television Inspection of the Sewer Lines
1	16	28-3	NE Elm Street and Trowbridge Ave.	5/12/2009	11:15	8	2.85	1		0	Base flow measurement.		Between Manholes 28-3 and 28-2, there are six joints with heavy I/I, four joints with medium and light I/I, and one hole in the pipe.
2	16	28-2	NE Elm Street and NE 1st Ave.	5/12/2009	11:30	8	4.6	16	15	21,600	Increase of 15 gpm flow.	TV section between 28-3 and 28-2.	Between Manholes 28-2 and 28-1, there are four joints that have heavy I/I, two joints that have light I/I, one section that needs a spot repair, and one service tee that has heavy I/I.
3	16	28-1	NE Elm Street and NE 3rd Ave.	5/13/2009	12:00	8	5.3	30	14	20,160	Increase of 14 gpm flow.	TV section between 28-2 and 28-1.	
4	16	27-2	NE Elm Street and NE 3rd Ave.	5/13/2009	12:30	East 8, Southeast 10				0	Flows combine in this manhole from the east and from the south. No measurement was taken in this manhole.		Between Manholes 27-2 and 27-1, there is one joint that has light I/I.
5	17	27-3	South of NE 3rd Ave., and east of Elm in the fairground field.	5/13/2009	1:15	8	3.3	3		0			
6	16	27-1	East of Dayton Street and NE 3rd Ave., intersection.	5/13/2009	1:40	8	5.6	37	4	5,760	Combined flows from 27-3 and 28-1.	TV section between 28-1 and 27-1.	Between Manholes 27-1 and 20-2, there are three joints that have light I/I.
7	16	20-6	Dayton Street north of Main Street and north of the private alley behind the hardware store.	5/13/2009	1:50	8				0	No flow in this manhole.		
8	16	20-5	Dayton Street and Trowbridge Ave.	5/13/2009	1:55	8				0	No significant flow in this manhole.		
9	16	20-4	Dayton Street and NE 1st Ave.	5/13/2009	2:15	8	4.1	10	10	14,400	Increase of 10 gpm from 20-5.	TV section between 20-5 and 20-4.	Between Manholes 20-4 and 20-3, there are four joints or cracks with medium or light I/I.
10	16	20-3	Dayton Street and NE 2nd Ave.	5/13/2009	2:35	South 8, West 8	4.5	15	5	7,200	Increase of 5 gpm from 20-4.	TV section between 20-4 and 20-3.	Between Manholes 20-3 and 20-2, there is one hole in the pipe and one leak at a service tee. (The television inspection report lists this section as between Manholes 20-3 and 27-1.)
11	16	20-2	Dayton Street and NE 3rd Ave.	5/13/2009	2:50	South 8	4.8	19.5	4.5	6,480	Increase of 4.5 gpm from 20-3.	TV section between 20-3 and 20-2.	Between Manholes 20-2 and 20-1, there are two areas with light I/I.
12	16	20-2	Dayton Street and NE 3rd Ave.	5/13/2009	2:50	East 8	5.45	33		0	Measured a 3 gpm decrease from what was measured in 27-1.	TV section between 27-1 and 20-2.	
13	16	1-12	Canyon Blvd. and NE 1st Ave.	5/13/2009	4:00	8	4.6	16		0	Base flow measurement. Most of flow from Canyon City.		
14	16	1-11	Canyon Blvd. and NE 2nd Ave.	5/13/2009	4:15	8	4.7	18	2	2,880	Increase of 2.0 gpm from 1-12 to 1-11.		Between Manholes 1-11 and 1-10, there are three joints with light I/I.
15	16	1-10	Canyon Blvd. and NE 3rd Ave.	5/13/2009	4:35	8	5.4	32	14	20,160	Increase of 14 gpm from 1-11 to 1-10.	TV section between 1-11 and 1-10.	
										0			
16	27	1-29	SW Brent Drive and SW 6th Ave.	5/13/2009	11:25	8	5.1	26		0	Base flow for line from Canyon City.		
17	27	1-25	Alley and SW 4th Ave.	5/13/2009	11:40	8	5.2	28		0	2 gpm increase from 1-29 to 1-25,	Not a significant amount of flow increase to warrant any further inspection.	
18	21	1-22	Alley and SW 3rd Ave.	5/13/2009	11:55	8	5.3	30		0	2 gpm increase from 1-25 to 1-22.	Not a significant amount of flow increase to warrant any further inspection.	
19	21	1-20	Alley and SW 2nd Ave.	5/14/2009	12:05	8	5.2	28		0	2 gpm decrease from 1-22 to 1-20.	Not a significant amount of flow increase to warrant any further inspection. This manhole is the intersection with the flows from the airport area and there was no significant flow from that area.	

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CITY OF
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WASTEWATER FACILITIES PLAN
SUMMARY OF FLOW MONITORING EVALUATION AND TV INSPECTION

TABLE
3-1

20	16	1-12	Canyon Blvd. and NE 1st Ave.	5/14/2009	12:20	8	5.5	35		0	7 gpm increase from 1-20 to 1-12.	Considering the distance from 1-20 to 1-12, the 7 gpm increase is not significant enough to warrant further action in this area. It is noted that the 35 gpm measured in 1-12 is 19 gpm higher than the previous night.	
21	16	11-3	NW Canton and south of NW 1st Ave.	5/14/2009	12:40	8	3	1.5		0	Base flow measurement.	None	
22	16	11-1	NW Canton and NW 2nd Ave.	5/14/2009	12:50	8	3	1.5		0	No change from 11-3 to 11-1.	None	
23	16	15-1	Boyce Place and NE 3rd Ave.	5/14/2009	1:00	8				0	Insignificant flow, no measurement taken.	None	
24	16	6-3	NW Bridge Street and NW 3rd Ave.	5/14/2009	1:15	8				0	When weir was inserted and sealed, infiltration was evident from under the pipe penetration into the manhole. No flow measurement was taken.	Seal under the pipe to stop the infiltration into the manhole.	
25	16	20-2	Dayton Street and NE 3rd Ave.	5/14/2009	1:25	8 EAST	5.24	28		0	Flow measurement taken to determine the combined flows into this manhole in order to compare to the flow entering Manhole 1-9 from the southeast.	None	
26	16	20-2	Dayton Street and NE 3rd Ave.	5/14/2009	1:30	8 SOUTH	4.81	20		0	Flow measurement taken to determine the combined flows into this manhole in order to compare to the flow entering Manhole 1-9 from the southeast. Combined flows total 48 gpm.	None	
27	16	1-9	In line with Canyon Blvd., north of NE 3rd Ave., in the fairgrounds.	5/14/2009	1:45	8 SOUTH	5.54	36		0	Increase in flow of 1 gpm from 1-12 to 1-9. Not a significant increase.	From the flow measurements of the previous night, it is recommended to TV the section between 1-11 and 1-10.	
28	16	1-9	In line with Canyon Blvd. north of NE 3rd Ave. in the fairgrounds.	5/14/2009	1:55	10 EAST	6.7	51		0	Increase in flow of 3 gpm from 20-2 to 1-9.	Considering the flow, the 3 gpm increase was determined to be insignificant with no action required between manholes 20-2 and 1-9.	
								Total:	**68.5**	**98,640**			

Notes:

1. Flows from 1-9 to 1-5 were not measured. The 12-inch pipe is all ductile iron from 1-9 to 1-6.
2. The main areas of concern are areas where the groundwater is known to be high and the sewer lines are 3 foot concrete pipe sections.
3. All manholes observed during the flow measurements were in good condition.
4. Flow measurement was not taken in some manholes where visual inspection showed insignificant flows.
5. See Figure 3-1 for manhole locations.

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CITY OF
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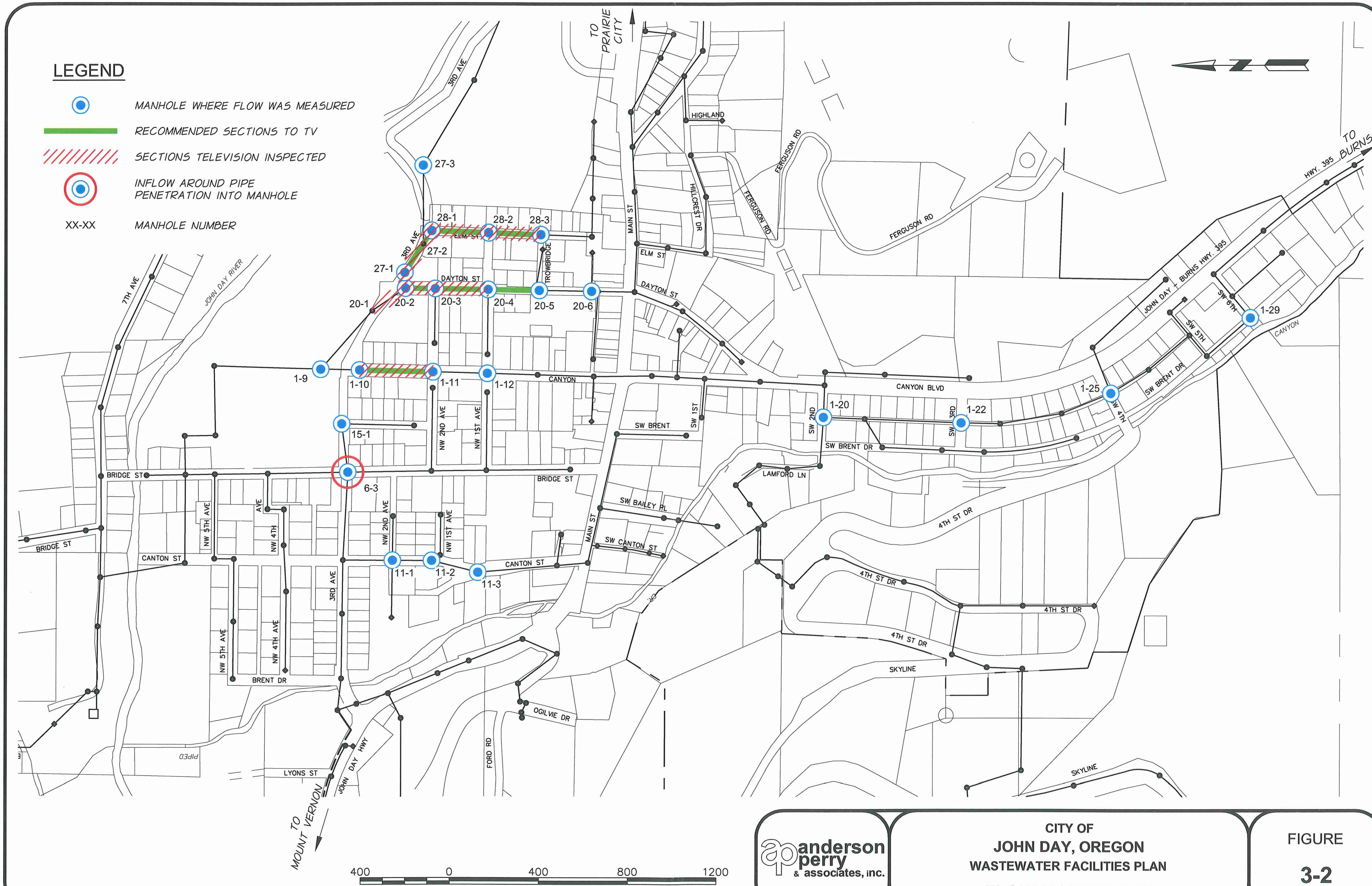
WASTEWATER FACILITIES PLAN
SUMMARY OF FLOW MONITORING EVALUATION AND TV INSPECTION

TABLE 3-1 Cont.



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CITY OF
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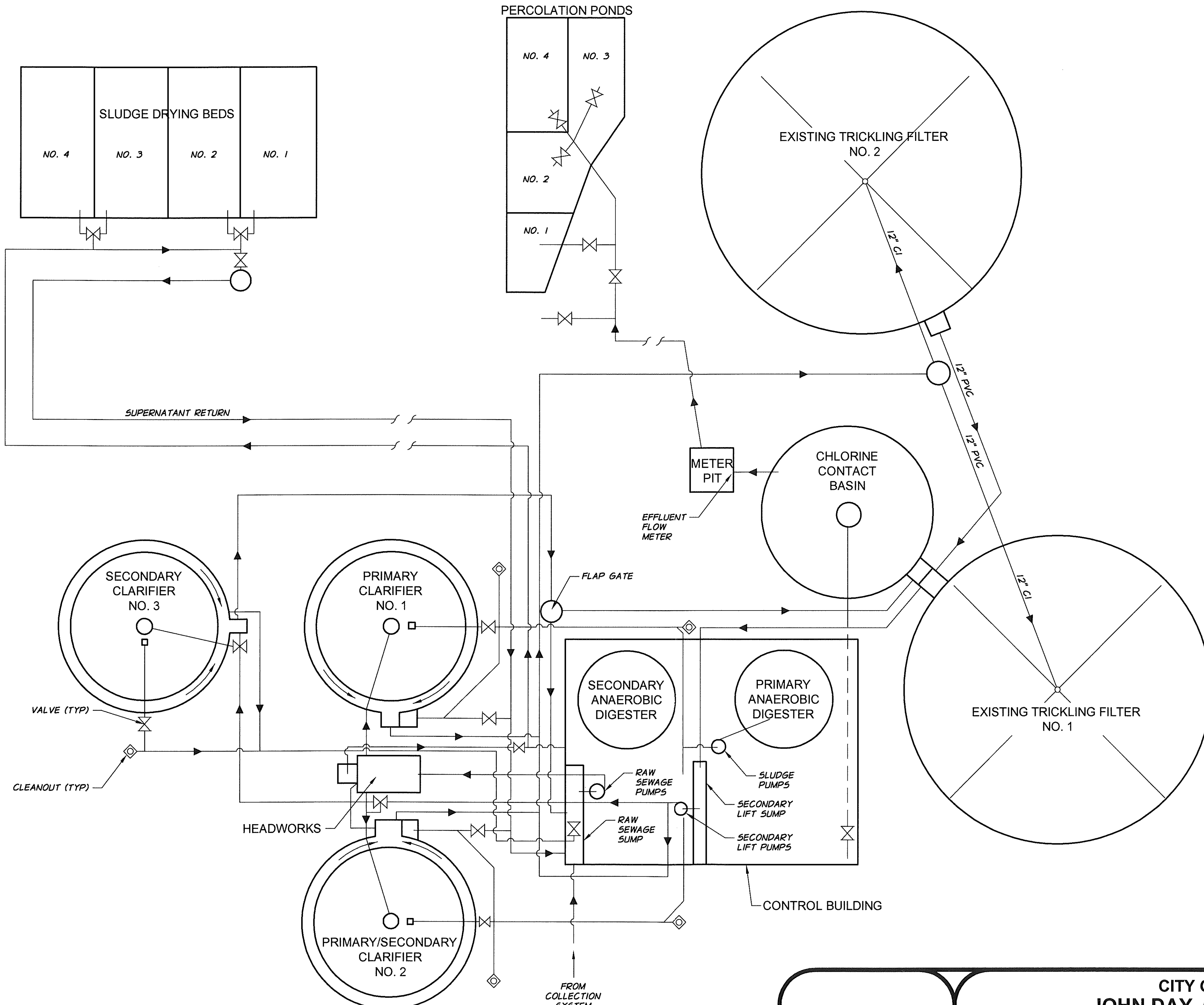
WASTEWATER FACILITIES PLAN
FLOW MONITORING

FIGURE
3-2

Q:\JOHNDAY\592-22_WWSystem\dwg\FlowMonitor.dwg, INDEX, 10/27/2009 10:33:52 AM, earntz



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CITY OF
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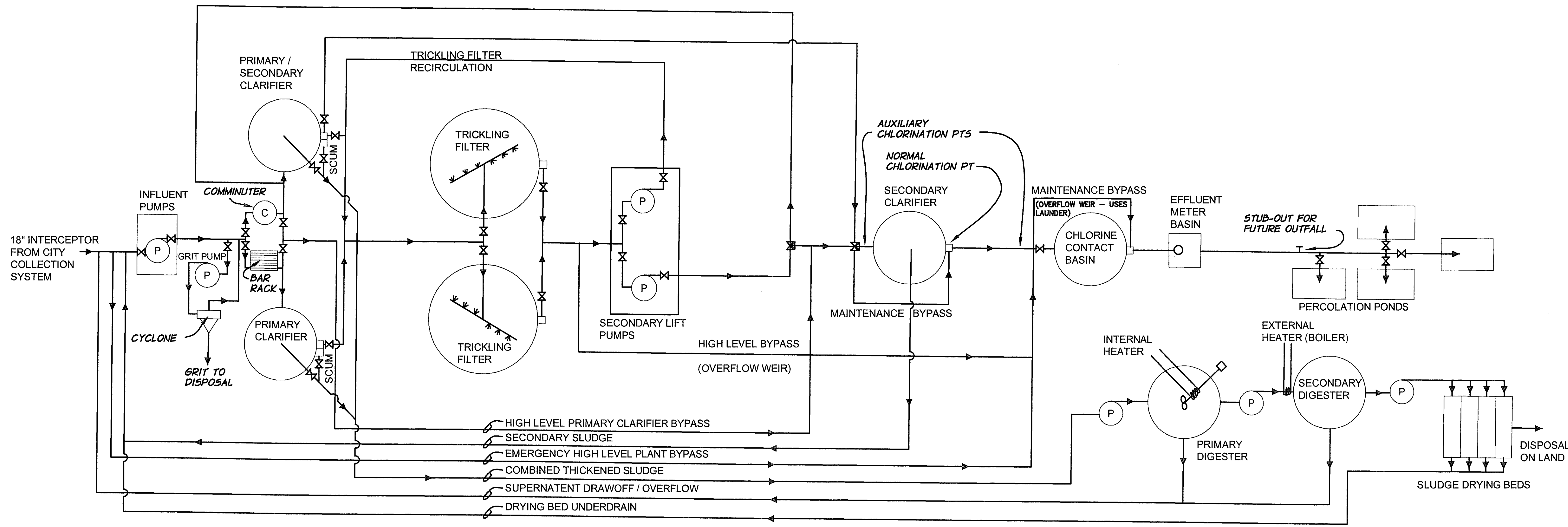
WASTEWATER FACILITIES PLAN

WASTEWATER TREAMENT FACILITY
EXISTING SITE PLAN

FIGURE
3-3

Q:\JOHNDAY\592-22_WWSystem\dwg\ExtgSitePln.dwg, Extg Site, 10/27/2009 10:32:54 AM, earntz

PLANT FLOW SCHEMATIC



DESIGN CRITERIA

DESIGN POPULATION

4300 (20 YR)

DESIGN FLOW

MAX DAILY: 600,000 GPD

PEAK: 900,000 GPD

RAW SEWAGE PUMPS

1 - 300 GPM WITH ELECTRIC MOTOR
2 - 500 GPM WITH ELECTRIC MOTORS
1 - 700 GPM ENGINE DRIVEN EMERGENCY PUMP

PRIMARY CLARIFIERS

2 - 34 FT DIA x 10 FT SWD
PERIFERAL FEED
(2ND UNIT CAN FUNCTION AS SECONDARY CLARIFIER)
OVERFLOW RATE AT DESIGN FLOW w/ ONE CLARIFIER:
600 GAL / SF / DAY

TRICKLING FILTERS

2- 65 FT DIA x 6 FT ROCK DEPTH
NATIVE ROCK MEDIA
MIN FLOW RATE: 300 GPM EA
MAX FLOW RATE: 850 GPM EA
MIN RECIRC RATE: 800 GPM

SECONDARY LIFT PUMPS

2 - 300 GPM
2 - 500 GPM

SECONDARY CLARIFIER

1- 34 FT DIA x 10 FT SWD
PERIFERAL FEED

CHLORINE CONTACT BASIN

1 - 30 FT DIA x 5 FT SWD WITH MECHANICAL SCRAPER
TOTAL VOLUME = 28,000 GAL
DETENTION TIME = 67 MIN AT 600,000 GPD FLOW RATE

ANAEROBIC SLUDGE DIGESTION

PRIMARY DIGESTER HEATED AND MIXED 20 FT DIA x 15.5 FT SWD
VOLUME = 5000 CF
SECONDARY DIGESTER WITH GAS HOLDER FLOATING COVER.
20 FT DIA x 20 FT SWD
VOL = 6300 CF
DRYING BEDS: 4 BEDS, 1250 SF EACH

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN

WASTEWATER TREAMENT FACILITY
PROCESS FLOW SCHEMATIC

FIGURE
3-4

CHAPTER 4

DEVELOPMENT AND EVALUATION OF WASTEWATER TREATMENT FACILITY IMPROVEMENT ALTERNATIVES

GENERAL

In this chapter, alternatives to improve the City of John Day's wastewater treatment facility (WWTF) are developed and evaluated to address the deficiencies identified in Chapter 3. First, a conceptual discussion of the treatment and effluent reuse/disposal alternatives considered in this Plan are presented. Feasible alternatives deserving further consideration in the Plan will be identified, and further discussion and evaluation of the feasible treatment and reuse alternatives will be provided.

WASTEWATER TREATMENT FACILITY AND EFFLUENT REUSE/DISPOSAL ALTERNATIVES

Introduction. In this section, WWTF and effluent reuse improvement alternatives are briefly summarized. The treatment and effluent reuse/disposal alternatives are conceptually discussed. Those treatment and effluent reuse alternatives deemed to be feasible are evaluated in further detail prior to outlining the recommended improvements strategy.

Conceptual Discussion of Wastewater Treatment Plant and Effluent Reuse/Disposal Alternatives. A key step in the conceptual evaluation of WWTF and effluent reuse/disposal alternatives considered in this Plan occurred during Public Works Committee and Council meetings held at John Day City Hall. In attendance at the planning meetings were staff and City Council members of the City of John Day, and Anderson·Perry & Associates, Inc. Additionally, teleconference meetings were held with the City staff, representatives of the Oregon Department of Environmental Quality (DEQ), George Chadwick of George Chadwick Consulting, and Anderson·Perry and Associates. Key issues discussed and decisions made during these meetings are highlighted below and incorporated into the evaluation of the foregoing conceptual alternatives.

- Concerns with area groundwater contamination from continued utilization of the existing percolation ponds for effluent disposal were discussed. The City concluded that the selection criteria of any treatment system improvements package must include the potential liability and long-term permitting issues associated with continued discharge of effluent into the ponds.

- Direct discharge of treated effluent to the John Day River was discussed. The DEQ indicated that the City could potentially receive a river discharge permit. General concerns the City expressed with a John Day River discharge were:

1. Future regulatory agency limitations that may restrict or complicate a direct river discharge, one of the main concerns being thermal load limits that may restrict the City's ability to meet the permit over the long term.

2. A John Day River discharge did not seem to be consistent with the current state goals of limiting surface water discharges in an effort to enhance aquatic habitat and water quality of streams.

3. The potential for increased testing and monitoring requirements for a river discharge was not desirable.

Based on these concerns, the City expressed the desire not to pursue a permit for direct discharge into the John Day River. If the option of direct discharge into the John Day River is abandoned, then the only other known options available to the City are continued discharge into the existing percolation ponds and abandonment of the percolation ponds and reuse of the effluent at a land application site or a constructed wetland.

As an outcome of the meetings, the City made the preliminary decision to evaluate three separate treatment level options under each treatment alternative. Each alternative would consider improvements to provide the following treatment level scenarios, if applicable:

- Only secondary treatment levels (biochemical oxygen demand [BOD_5] and total suspended solids [TSS] removal only);
- Advanced treatment to biologically remove nitrogen; and
- Advanced treatment to biologically remove nitrogen and biologically/chemically remove phosphorus.

Conceptual Discussion of Wastewater Treatment Facility Alternatives. Three WWTF alternatives are considered and conceptually evaluated in this Plan:

- Alternative A - No Action
- Alternative B1 - Improve the Existing Trickling Filter Wastewater Treatment Facility.
- Alternative B2 - Upgrade the Existing Trickling Filter Wastewater Treatment Facility
- Alternative C - Construct a New Activated Sludge Mechanical Wastewater Treatment Facility

A brief description of each conceptual alternative follows.

Alternative A - No Action Alternative. Under the No Action Alternative, the City would continue to use the WWTF in its current condition and continue to discharge the treated effluent into the percolation ponds. Refer to Chapter 3 for a comprehensive discussion of the existing plant. No work would be performed on the City's wastewater treatment system.

As discussed previously, a concern exists with the discharging of the treated effluent from the existing treatment plant into the existing percolation pond effluent disposal system and introducing excessive nitrate nitrogen into the surrounding shallow groundwater. Although minor modifications to the existing piping have been completed at the percolation ponds to allow more wide-spread distribution of the water into the ponds, which appears to have helped reduce the overall concentration of nitrate appearing in the surrounding groundwater monitoring network, it has not reduced the amount of nitrate being discharged. Therefore, because the existing treatment plant and process does not have the ability to consistently and effectively reduce overall nitrogen concentration in the effluent, if the City continues to use the percolation ponds as the method of effluent disposal, the No Action Alternative does not address the long-term concern regarding the discharge of excessive nitrate into surrounding groundwater. Furthermore, based on the evaluation that was completed on the existing facility, some of the treatment units are of inadequate capacity to accommodate existing and anticipated future flows and loadings, and the majority of the components and equipment have reached or are nearing their useful life. Consequently, the No Action Alternative is not considered to be a long-term viable option available to the City.

Alternative B1 – Improve Existing Trickling Filter Wastewater Treatment Facility. This alternative would consist of limited improvements to the existing trickling filter wastewater treatment plant to upgrade known failing components and add new components as needed to reduce wear on the existing system and prepare for future expansion to meet potential increased treatment limits. The treated effluent would continue to be disposed of through utilization of the existing percolation ponds. Based on discussion with Public Works personnel and an evaluation of the existing treatment plant, the facility improvements would generally consist of construction of screening and grit removal systems, painting and repair of existing clarifier tanks and mechanisms, construction of new secondary clarifier, construction of a new chlorine contact basin, construction of a new anaerobic digestion system with heating and circulation systems, and miscellaneous piping and other improvements as needed.

Currently, there is no indication from the Department of Environmental Quality (DEQ) that significant changes to the City's Water Pollution Control Facilities (WPCF) Permit will occur during the upcoming renewal cycle. Therefore, at this time, it appears that improving the existing treatment plant and continued discharge of treated effluent into the percolation ponds is a viable alternative. However, the existing process does not have the capability to consistently and effectively remove nitrate nitrogen to address the long-term concern regarding the discharge of nitrate into the surrounding shallow groundwater.

Alternative B2 - Upgrade the Existing Trickling Filter Wastewater Treatment Facility. Under this alternative, the City would upgrade and continue to utilize the existing trickling filter wastewater treatment facility. The treated effluent would continue to be disposed of through utilization of the existing percolation ponds. Based upon the evaluation of the existing treatment plant, the necessary upgrades to the facility would generally consist of a new preliminary treatment system (headworks) including rehabilitation of the existing influent lift station, rehabilitation of the existing primary clarifiers, a new East trickling filter to replace the existing one, rehabilitation of the existing West trickling filter, new flow distribution structure for the trickling filters, rehabilitation of the existing secondary lift station including new pumps and wet well rehabilitation, rehabilitation of the existing secondary clarifier and a new secondary clarifier, new chorine contact basin, new anaerobic sludge digestion system facility, new sludge dewatering facility, existing operations building rehabilitation, new electrical, controls and instrumentation, new process and yard piping, site work, painting, and miscellaneous other improvements as needed.

As discussed under Alternative B1 above, there currently is no indication from the DEQ that significant changes to the City's Water Pollution Control Facilities (WPCF) Permit will occur during the upcoming renewal cycle. Therefore, it appears that at this time, upgrading the existing treatment plant and continued discharge of treated effluent into the percolation ponds is a viable alternative. However, as mention previously, if the City continues to utilize the percolation ponds as the means of effluent disposal, the treatment plant evaluation indicated the existing process does not have the capability to consistently and effectively remove nitrate nitrogen to address the long-term concern regarding the discharge of nitrate into the surrounding shallow groundwater. Nevertheless, due to the apparent viability of the alternative to upgrade the existing treatment plant, a detailed evaluation was completed and will be presented later in this chapter.

Alternative C - Construct a New Activated Sludge Mechanical Wastewater Treatment Facility. With this alternative, the existing trickling filter plant would be completely demolished and a new activated sludge mechanical WWTF constructed. The existing percolation ponds would continue to be utilized as the method of effluent disposal. The new facility would generally consist of a new preliminary treatment system (screening, pumping and grit removal), new activated sludge biological treatment system, new ultraviolet (UV) light disinfection system, new sludge management system (aerobic digestion and associated components), new operations building, new electrical, controls and instrumentation, new process and yard piping, painting, site work, and various other buildings to house the new required equipment.

Construction of a new WWTF would provide the City with the means to consistently and effectively meet or exceed the existing and anticipated future conditions of the WPCF Permit. A new activated sludge mechanical WWTF could be designed with the ability to biologically remove nutrients (nitrogen and phosphorus), which would alleviate the nitrate concern with continued discharge into the existing percolation ponds. Given the above considerations, it is evident that a new activated sludge biological treatment process is a viable alternative available to the City. Therefore, a detailed evaluation of the activated sludge mechanical WWTF option was completed and will be detailed later in this chapter.

Conceptual Discussion of Effluent Reuse Alternatives. In this section, one effluent reuse system alternative is considered and conceptually evaluated:

Construct a New Lagoon Treatment, Storage and Effluent Reuse Facility. This alternative would consist of abandonment and demolition of the existing treatment facility and construction of a new main pumping station and pipeline to convey the collected wastewater to a new three-cell lagoon treatment, storage, and effluent reuse (irrigation or wetland) facility. This alternative would allow the City to discontinue discharging treated effluent into the percolation ponds.

For several reasons, construction of a lagoon treatment, storage, and effluent reuse facility to allow the City to discontinue its discharge into the percolation ponds is not deemed feasible. To accommodate the design flow and loadings, based upon the preliminary water balance analysis, assuming a facultative lagoon treatment system, the system would require about 50 acres of total pond area including the storage lagoon and approximately 125 acres of irrigation area for effluent reuse. Considering the overall large amount of property required to site the facility, the associated land acquisition (estimated to be 200 to 250 acres considering necessary buffers, etc.) presents almost insurmountable challenges given the extremely limited, suitable available property in, and adjacent to, the City. In addition, as shown on Table 4-0, the high initial capital cost (estimated to be $10.5 million, including land acquisition and easements, pumping, piping, new lagoons, effluent reuse system, operations building, etc.) prohibits construction of such a facility. Therefore, since this conceptual alternative is not considered viable, a detailed evaluation of this alternative was not completed.

DETAILED EVALUATION OF FEASIBLE ALTERNATIVES

General. As presented above in the discussion of conceptual improvement alternatives, it was concluded that three feasible alternatives are available to the City. The three alternatives that will be evaluated in detail are as follows:

- Alternative B1 - Improve the Existing Trickling Filter Wastewater Treatment Facility.
- Alternative B2 - Upgrade the Existing Trickling Filter Wastewater Treatment Facility
- Alternative C - Construct a New Activated Sludge Mechanical Wastewater Treatment Facility

Selection of these improvement alternatives for further evaluation was based upon preliminary discussions between City Council members and staff from the City of John Day and Anderson·Perry & Associates, Inc. Public Works Committee work sessions were held at the John Day City Hall and, along with water quality, regulatory, and funding issues, the options were presented and discussed. It was the general consensus of all parties involved that the aforementioned alternatives are the most appropriate to consider for further evaluation.

In this section, an evaluation of the regulatory requirements is presented and the alternatives are described and evaluated in detail. Criteria used to evaluate the options are presented. The recommended improvements strategy is outlined.

Evaluation of Regulatory Requirements. Presented hereafter is an evaluation of the regulatory requirements that may need to be met as part of implementation of the feasible alternatives. These include regulations concerning groundwater quality protection, sludge management, and wetland and waterway impacts. Additionally, potential regulatory permitting requirements for erosion control plans and stormwater management plans are identified. Although reuse does not appear likely to be included as part of the planned wastewater system improvements package, regulations regarding effluent reuse are presented for completeness.

Groundwater Quality Protection. The criteria and guidelines for groundwater quality protection are contained in OAR, Chapter 340, Division 40 (OAR 340-040). Under both alternatives, the City would need to comply with the groundwater quality conditions stipulated in the most current WPCF Permit issued by the DEQ.

Effluent Reuse Regulations. This section provides a general discussion of the effluent reuse regulations currently in place in Oregon. The criteria and guidelines for effluent irrigation summarized below are found in OAR, Chapter 340, Division 55 (OAR 340-055).

- In order to assume groundwater protection, treated wastewater must be applied at agronomic rates. This refers to the practice of applying the treated wastewater at rates that are not in excess of what the crop being grown can use. This limitation applies to the hydraulic loading as well as the nutrient loading. For a typical municipal wastewater and a crop such as alfalfa, hydraulic loading will be the controlling factor.

- In general, crops with a long growing season are preferable so that water uptake is maximized. Grain crops by themselves, for example, are typically not desirable for wastewater irrigation in the eastern Oregon area as their consumptive water use is relatively small and occurs during a concentrated two- to three-month period of time. Their use is acceptable if used as a secondary crop. This tends to make pasture grasses, turf grasses, alfalfa crops, or other high water use crops a preferred primary crop for land application of wastewater. These crops have a relatively long growing season, a high consumptive use of water, and also consume fair amounts of nitrogen.

- OAR 340-055 states that for irrigated land not under the direct control of a City, a contract is required between the City and the landowner.

- Buffer zones surrounding the irrigation area will be required. For Class D wastewater and spray irrigation, buffer zones are required as indicated in OAR 340-055.

- A spray irrigation system that requires a minimum amount of physical handling is desirable. In this way, operators of the irrigation system will have limited contact with equipment that has been saturated with treated wastewater.

- Access to the irrigation area should be controlled using fencing and the area would require signs informing people that treated wastewater is used on the site.

Sludge (Biosolids) Management. Any sludge that is produced in the process and land-applied would need to comply with current state and federal regulations. Applicable state regulations are OAR 340-050, Land Application of Domestic Wastewater Treatment Facility Biosolids, Biosolids Derived Products and Domestic Septage. Applicable federal regulations are found in the Code of Federal Regulations (CFR), Part 503. The City will also need to comply with all biosolids management conditions stipulated in the most current WPCF Permit issued by the DEQ. Refer to Chapter 2 for a more comprehensive discussion of the regulations regarding land application of biosolids

Wetland Impacts and Waterway Protection. Neither alternative has the potential to discharge any wastewater into wetlands. Therefore, no impacts to existing wetlands are anticipated.

Under both of the evaluated alternatives, the City will continue to discharge treated effluent into the existing percolation ponds. Therefore, no direct discharge of wastewater into a surface water body will occur and no adverse impacts to the adjacent John Day River are anticipated.

Regulatory Permitting Requirements for Erosion Control Plans and Stormwater Management Plans. Construction projects that disturb one acre or more must have an Erosion and Sediment Control Plan approved by the DEQ or a DEQ agent prior to commencement of any on-site activities. The applicable permit is referred to as 1200-C. The 1200-C Permit generally requires the following:

- No discharge of significant amounts of sediment to surface waters. Examples of what DEQ considers significant are provided in the permit.

- Preparation and implementation of an Erosion and Sediment Control Plan to prevent such discharges.

- Maintenance of erosion and sediment controls, cleanup of deposits of sediment that leave the site, and proper storage, handling, and disposal of hazardous materials.

- Compliance with water quality standards in OAR 340-041 and any Total Maximum Daily Loads (TMDLs) established for specific basins. For example, no discharge can cause more than a 10 percent increase of in-stream turbidity from background.

- Visual inspections of erosion and sediment control measures.

- As part of the permit application, an Erosion and Sediment Control Plan, which must specify how polluted runoff will be reduced or controlled, will be required. The public has the opportunity to view and comment on the permit application and plan before DEQ issues the permit for any project.

- If discharging to water bodies that are on DEQ's 303(d) List or have established TMDLs for sedimentation and turbidity pollution, permit applicants have to implement one of the following requirements: (A) Runoff monitoring of turbidity during rain events to meet a specified benchmark; or (B) Implementation of additional treatment Best Management Practices (BMPs) listed in the permit, with DEQ approval.

  In addition, quarterly monitoring to the DEQ of visual inspections or, if applicable, turbidity meter monitoring results are required for all projects.

- Permittees discharging to 303(d) and TMDL streams listed for turbidity and sedimentation, who have selected the requirement listed in (A) referenced above, are subject to a specific turbidity "benchmark." A benchmark is a quantitative guideline used to determine if BMPs are effective. The proposed permit would require the benchmark convert to an enforceable effluent limit if it has been exceeded multiple times. Current and future construction projects that disturb one or more acres of land are affected. Large and small contractors, builders, and developers are required to comply with all permit requirements.

Both alternatives would require a 1200-C Permit as more than one acre would be disturbed during construction. Application for the permit should be completed during the design phase of the improvements.

The Environmental Protection Agency (EPA) stormwater regulations require that certain stormwater discharges "associated with industrial activity" need NPDES Permits. In general, a permit is needed if:

1. The industry is listed by the EPA.

2. Stormwater from rain or snowmelt leaves the site through a "point source" and reaches surface waters either directly or through storm drainage. A point source discharge refers to a natural or human-made conveyance of water through such things as pipes, culverts, ditches, catch basins, or any other type of channel.

Neither of these two conditions would apply to the City. Wastewater treatment plants with less than 1 million gallons per day (MGD) design capacity are not listed. Stormwater should not leave the site through a point source because it will likely all be contained on site.

Description and Evaluation of Feasible Alternatives.

Alternative B1 - Improve Existing Trickling Filter Wastewater Treatment Facility. For this alternative, the existing plant would be improved with continued discharge to the existing percolation ponds.

Based on conversations with Public Works staff and an evaluation of the existing treatment plant, the needed improvements would generally consist of construction of screening and grit removal systems, painting and repair of existing clarifier tanks and mechanisms, construction of new secondary clarifier, construction of a new chlorine contact basin, construction of a new anaerobic digester with heating and circulation systems, and miscellaneous piping and other improvements as needed.

Criteria for evaluation and development of Alternative B1 include the following:

- Design to meet expected loads through the year 2030, as shown in Chapter 2.

- Class II reliability. The upgraded facility will meet Class II reliability criteria. This means all mechanical components (pumps, clarifiers, disinfection equipment, etc.) would have backup to allow operation with the largest single component out of service and two units of each treatment component would be provided so at least 50 percent capacity would remain.

- Production of effluent that meets DEQ requirements for secondary treatment. This is interpreted as meeting the effluent criteria shown in Chapter 2 for BOD_5, TSS, and *E.coli* bacteria, (i.e., meets the conditions of the Permit).

- Sludge treatment to meet Class B biosolids quality, as a minimum, as defined by 40 CFR Part 503 to allow beneficial use on agricultural land as needed. Sludge will be hauled and land-applied in liquid form or dewatered in the existing sludge drying beds for ease of storage and handling.

Refer to Figure 4-1A for a process schematic and Table 4-1A for a list of the components identified for improvements to the existing treatment plant. The estimated project cost and present worth analysis for Alternative B1 is summarized on Table 4-1B.

It is important to note that the identified improvements are based on an assessment of the minimum requirements needed to meet the design criteria, and do not take into consideration replacing facilities at the end of their life, but rather rehabilitating them. The improvements to the existing treatment plant will not provide an increased ability to treat effluent to a higher level. It should be understood that even with these improvements to the existing treatment plant, the trickling filter process will still be limited in its ability to meet changing regulations and effluent permit limits, and it will likely only be able to consistently meet the conditions as specified in the current Permit. The upgraded facility could not be cost-effectively upgraded to have the means to remove nitrogen and would only possess BOD_5/TSS removal capabilities.

Alternative B2 - Upgrade the Existing Trickling Filter Wastewater Treatment Facility. As mention previously, under this alternative the existing wastewater treatment plant would be upgraded and the treated effluent would continue to be discharged to the existing percolation ponds.

Based upon the evaluation of the existing treatment plant, the necessary upgrades to the facility would generally consist of a new preliminary treatment system (headworks) including rehabilitation of the existing influent lift station, rehabilitation of the existing primary clarifiers, a new East trickling filter to replace the existing one, rehabilitation of the existing West trickling filter, new flow distribution structure for the trickling filters, rehabilitation of the existing secondary lift station including new pumps and wet well rehabilitation, rehabilitation of the existing secondary clarifier and a new secondary clarifier, new chorine contact basin, new anaerobic sludge digestion system facility, new sludge dewatering facility, existing operations building rehabilitation, new electrical, controls and instrumentation, new process and yard piping, site work, painting, and miscellaneous other improvements as needed.

Criteria for evaluation and development of Alternative B2 include the following:

- Design to meet expected loads through the year 2030, as shown in Chapter 2.
- Class II reliability. The upgraded facility will meet Class II reliability criteria. This means all mechanical components (pumps, clarifiers, disinfection equipment, etc.) would have backup to allow operation with the largest single component out of service and two units of each treatment component would be provided so at least 50 percent capacity would remain.
- Production of effluent that meets DEQ requirements for secondary treatment. This is interpreted as meeting the effluent criteria shown in Chapter 2 for BOD_5, TSS and *E.coli* bacteria, (i.e., meets the conditions of the NPDES Permit).
- Sludge treatment to meet Class B biosolids quality, as a minimum, as defined by 40 CFR Part 503 to allow beneficial use on agricultural land as needed. Sludge will be hauled and applied in a liquid form or dewatered in the existing sludge drying beds for ease of storage and handling.

Refer to Figure 4-1B for a process schematic and Table 4-2A for a list of the components necessary to properly upgrade the existing treatment plant. The estimated project cost and present worth analysis for Alternative B is summarized on Table 4-2B.

Of utmost importance in the overall assessment of upgrading the existing plant and comparison of the available feasible alternatives is the ability and flexibility of the system to meet the challenges of changing regulations and the possibility of more stringent permit limits in the future. It should be understood that even with an upgrade of the existing treatment plant, the trickling filter process will still be limited in its ability to meet changing regulations and effluent permit limits, and it will likely be able to consistently meet the conditions as specified in the current permit only. The upgraded facility would not have the ability to be cost-effectively upgraded to have the means to remove nitrogen and would only possess BOD_5/TSS removal capabilities.

Alternative C - Construct a New Activated Sludge Mechanical Wastewater Treatment Facility. As outlined above, with this alternative, the existing trickling filter plant would be completely demolished and a new activated sludge mechanical WWTF constructed. The existing percolation ponds would continue to be utilized as the method of effluent disposal. To provide a fully functioning system, the new facility would generally consist of a new preliminary treatment system (screening, pumping, and grit removal), new activated sludge biological treatment system, new UV light disinfection system, new sludge management system (digestion and dewatering), new operations building, new electrical, controls and instrumentation, new process and yard piping, painting, site work, and various other buildings to house the new required equipment.

Criteria for evaluation and development of Alternative C include the following:

- Design to meet expected loads through the year 2030, as shown in Chapter 2.

- Class II reliability. The upgraded facility will meet Class II reliability criteria. This means all mechanical components (pumps, blowers, clarifiers, disinfection equipment, etc.) would have backup to allow operation with the largest single component out of service and two units of each treatment component would be provided so at least 50 percent capacity would remain.

- Production of effluent that meets DEQ requirements for secondary treatment. This is interpreted as meeting the effluent criteria shown in Chapter 2 for BOD_5, TSS and *E. coli* bacteria, (I.e., meets the conditions of the NPDES Permit). Additionally, provide systems designed for advanced wastewater treatment for removal of nitrogen to the anticipated levels to meet future restrictions for protection of groundwater. Systems will be designed to allow incorporation of biological/chemical phosphorus removal should future limits be imposed on the City.

- Sludge treatment to meet Class B biosolids quality, as a minimum, as defined by 40 CFR Part 503 to allow beneficial use on agricultural land as needed. Sludge will be dewatered for ease of storage and handling.

Construction of a new activated sludge WWTF would provide the City with the means to consistently and effectively meet or exceed the existing and anticipated future conditions of the WPCF Permit. Unlike Alternative B, a new activated sludge mechanical WWTF could be designed with the ability to biologically remove nutrients (nitrogen and phosphorus), which would alleviate the nitrate concern with continued discharge into the existing percolation ponds. In addition to providing all new structures and components, the ability to provide advanced wastewater treatment with a new activated sludge process is the overall greatest advantage of Alterative C when comparing the pros and cons with Alternative B.

Four process options were developed and evaluated to meet the effluent quality requirements and to provide a reliable, long-lasting activated sludge treatment facility. The four treatment process options evaluated to provide biological treatment to meet the effluent requirements consist of the following:

- Option 1 - Intermittent Cycle Sequencing Batch Reactor

- Option 2 - Modular Extended Aeration
- Option 3 - Integrated Sludge Sequencing Batch Reactor
- Option 4 - Phased Isolation Oxidation Ditch
- Option 5 - Membrane Bioreactor

In addition to the five options presented and evaluated, it should be mentioned that many other variations of the activated sludge process are available and could be used successfully to treat the wastewater to the required level. Consequently, many other options could have been selected for evaluation. However, the five options selected were considered to be comparable to a wide cross-section of available options and technologies regarding wastewater treatment capabilities and capital and operating cost. Therefore, the options evaluated in this Plan should be representative of others that could be utilized by the City in terms of overall cost and developing a project budget for implementation of a selected alternative. Further discussion on this topic is presented below.

To compare estimated costs for systems to provide distinct levels of treatment capabilities under each of the five process options, one to three scenarios were developed for each option. The scenarios developed under each option include systems that range from the ability to remove only BOD_5/TSS to those with advanced wastewater treatment capability to also remove nutrients (nitrogen and phosphorus). The City desired to evaluate the different treatment level scenarios under each option to aid in the assessment of the alternatives and selection of the preferred alternative. The scenarios developed for the treatment process options include the following:

- Option 1 – Intermittent Cycle Sequencing Batch Reactor (SBR)
  - Scenario C1A – BOD_5/TSS Only
  - Scenario C1B – Biological Nutrient Removal – Nitrogen
  - Scenario C1C – Biological Nutrient Removal – Nitrogen/ Phosphorus
- Option 2 – Modular Extended Aeration
  - Scenario C2A – BOD5/TSS Only
  - Scenario C2B – Biological Nutrient Removal – Nitrogen
  - Scenario C2C – Biological Nutrient Removal – Nitrogen/ Phosphorus
- Option 3 – Integrated Sludge Sequencing Batch Reactor
  - Scenario C3A – Biological Nutrient Removal – Nitrogen
  - Scenario C3B – Biological Nutrient Removal – Nitrogen/ Phosphorus

- Option 4 – Phased Isolation Oxidation Ditch
  - Scenario C4A – Biological Nutrient Removal – Nitrogen
  - Scenario C4B – Biological Nutrient Removal – Nitrogen/ Phosphorus

- Option 5 - Membrane Bioreactor
  - Scenario C5A - Biological Nutrient Removal - Nitrogen

Common Components Required for each Option. Each of the five treatment process options will be capable of meeting the effluent requirements. If Alternative C is selected, regardless of the treatment process option and scenario implemented, the John Day treatment plant must also have facilities for influent preliminary treatment to remove debris (rags, etc.) and grit, a new influent lift station to meet the anticipated peak flows, a new effluent disinfection system, new process and yard piping to convey the liquid and solids throughout the facility, new electrical, controls and instrumentation, and facilities for processing and handling the sludge. In addition, to provide a modern completed treatment facility and to protect the new equipment from the weather and provide efficient and safe plant operations, new buildings will be necessary. Specific treatment components that must be included under all of the options, in addition to the biological treatment process, include the following:

- **New Preliminary Treatment (Headworks).** Removal of grit and debris are essential to protect treatment equipment and pumps from excessive wear and plugging. To accomplish this task, a new headworks consisting of a fine screening system to remove plastics, rags, etc., a new 6-inch Parshall flume flowmetering manhole to measure influent flows, and a grit chamber to remove grit will be necessary. The fine screening system would include a vertically mounted mechanical fine screen and screenings washer and compactor system. The grit removal system would be a vortex type consisting of a vortex grit chamber, grit removal pumping system, and grit dewatering equipment. To provide protection and prevent freezing of the new headworks equipment (screening and grit dewatering equipment), a new concrete masonry block (CMU) headworks building would be constructed.

- **Influent Lift Station**. Due to the depth of the existing influent gravity sewer, screened wastewater will need to be pumped from the screen unit into the vortex grit removal system. A new influent lift station will need to be constructed to accomplish the required pumping. The lift station, in order to meet DEQ requirements for redundancy and reliability, must have adequate capacity to handle the anticipated design peak hour flow (1.5 MGD) with the largest pump out of service. To meet this requirement, three new submersible pumps, each with a capacity of 525 gallons per minute (gpm), would be provided. With three pumps, any one of the pumps could be out of service and the other two would meet the capacity requirement.

- **Disinfection System**. Prior to discharge of the treated effluent into the percolation ponds, it must be disinfected to inactivate pathogenic microorganisms to acceptable levels as specified in the permit. Two common methods that are employed to disinfect wastewater are chemical addition (chlorine gas or liquid chlorine compounds) and UV light.

  Disinfection by chemical addition, whether gas or liquid chlorine, would require construction of a new chlorine contact basin with an effective volume that would allow adequate time (minimum one-hour detention time at average annual flows) for the disinfectant to contact the wastewater prior to discharge. Retention of a gas chlorine disinfection system would also require compliance with the gas spill safety provisions of the Uniform Fire Code, which significantly increases the complexity and cost of the system. With consideration of long-term requirements including safety issues, complex operations, and cost associated with chlorination, it appears that changing the disinfection method to UV light is justified and is the preferred technology to implement under Alternative C.

  A new UV light disinfection system would be installed in new concrete channels. A total of 36 low-pressure high intensity lamps would be installed in the channels, or two channels provided with each having 18 lamps installed. An additional channel would be constructed for future expansion. The system would be designed with the required UV intensity to treat the projected peak hour design flow and to allow future installation of an additional bank of 18 lamps, if required. A spare module of lamps would be provided for rapid replacement in the event of a module failure. To provide protection and prevent freezing of the new UV light disinfection equipment, a new CMU building would be constructed.

- **Sludge Handling**. Sludge derived as a result of the treatment process must receive additional treatment to make it acceptable for land application. Further processing of the sludge can be performed by utilization of a variety of different methods. Two commonly used methods are anaerobic digestion and aerobic digestion. As mentioned previously, the sludge in the existing plant is processed through the use of anaerobic digestion. Sludge from each of the process options considered would be primarily biological in nature. Normally, processing sludges from these types of treatment processes is most effectively and economically accomplished utilizing aerobic digestion. John Day is no exception and, given the anticipated characteristics of the sludge that will be processed, aerobic digestion is the preferred methodology. All process options and scenarios, with the exception of the integrated sludge SBR option (Option 3), would utilize aerobic digestion (see subsequent discussion on Option 3).

  Sludge processing must occur to a level that meets requirements for Class B biosolids quality as defined by 40 CFR Part 503 to allow beneficial use on agricultural land as needed (refer to Chapter 2 for more information on the regulatory requirements). In order to meet the criteria for Class B quality biosolids with aerobic digestion, the digesters must be sized to provide at least 60 days of solids retention time at 15 degrees Celsius. The average design solids production is estimated to be about 715 pounds of dry solids (DS) per day. It is estimated that the solids will be wasted out of the system and into the digesters at about 0.8 percent or a concentration of 8,000 milligrams per liter (mg/L). At this solids production rate and concentration, the sludge wasting rate from the treatment process into the digestion system would be about 10,715 gallons per day (gpd). Through decanting procedures, the solids concentration in the digesters could be thickened from the incoming level of 0.8 percent to about 2.0 percent. It can be expected that around 65 percent of the incoming solids to the digestion system will be volatile and at a minimum 25 percent reduction of the volatile solids will occur. Given these assumptions, sludge would accumulate in the tanks at a rate of approximately 3,600 gpd. Therefore, with the 60 days of solids retention time needed to meet the Part 503 regulations for Class B sludge, the amount of digester working volume that will be needed is about 216,000 gallons (digester working volume = 60 days x 3,600 gpd = 216,000 gallons). A minimum of two digesters would be constructed, each with a working volume of about 110,000 gallons.

Sludge dewatering is needed in order to provide efficient handling of the waste digested sludge. The City will continue to use the existing sludge drying beds for dewatering purposes. In addition, the City will continue to haul liquid sludge and land-apply the liquid when weather conditions permit.

- **Yard and Process Piping**. New process piping will be necessary in order to transport raw wastewater from the collection system to the new screening system, to the influent lift station, from the influent lift station to the new grit removal system, to the new biological treatment process, to the clarifiers (if clarifiers are used), to the UV disinfection facilities, and to the effluent outfall. Piping would also be needed for sludge recirculation from the clarifiers (if used) to the aeration basins (activated sludge reactors), and for waste sludge transport to and from the sludge treatment components. Other miscellaneous piping, such as yard piping, will be needed to transport water for washdown and drainage.

- **Electrical, Instrumentation, and Controls**. New electrical, instrumentation, and controls will be required for the new process units. The new instrumentation and controls system is needed to provide accurate sampling, metering, monitoring, and control of the new facilities. The new control system for each of the options would be computer-based in order to reduce operator time and requirements. A new standby electrical generator set and automatic power transfer would be needed to allow continued operation of critical components of the system during a power outage.

- **Demolition, Site Work, and Landscaping**. Although not required to provide space for the new treatment plant, complete demolition of the existing facilities would be desirable for safety and aesthetic reasons. Inclusion of site work (excavation, grading, paving, sidewalks, fencing, etc.) to accommodate the new facility would be required with each option. To provide an aesthetically pleasing finished plant, landscaping would be needed.

- **New Operations Building**. For efficient operations of the new facility, a new 1,220 square-foot CMU operations building is proposed. The operations building would include a new laboratory and furnishings, office, Americans with Disabilities Act (ADA) compliant bathroom, utility room, and an electrical and controls room. To equip the laboratory, miscellaneous new modern laboratory instruments and glassware would be purchased.

- **New Blower/Generator/Electrical Building**. To house the required air blowers, electrical and controls, and standby generator set, a new CMU blower/generator building would be constructed. The building would be designed to attenuate and minimize noise associated with operation of the blowers and generator.

Description of the Process Options. Following is a general description of the five process options developed and evaluated for this Wastewater Facilities Plan. As outlined above, scenarios were developed for each option to address different levels of treatment capabilities for comparison purposes and to aid in selection of the preferred alternative. Process schematics, tables listing specific components associated with each scenario under each option, and project cost and present worth tables have be prepared for each scenario.

Option 1 - Intermittent Cycle SBR. The intermittent cycle SBR process consists of a concrete common-wall constructed structure containing the pre-react tanks, aeration basins, equalization basin, and aerobic digesters. The system would be equipped with pumps, diffused aeration system, mixers, scum skimmers, control valves, piping, and effluent decanters. The intermittent cycle SBR process is a modification of the conventional fill-and-draw batch activated sludge process. The convention SBR process operates on cyclical basis with one cycle typically consisting of filling, reacting, settling, and decanting. In a conventional SBR configuration, flow is diverted from the reactor basin during the settling and decanting phases of the cycle. With the intermittent cycle SBR, the process operates as a time-based control system allowing continuous inflow of wastewater during all phases of the cycle. Therefore, a typical cycle with the intermittent cycle SBR process consists of react/fill, settle/fill, decant/fill. As shown on Figures 4-2, 4-3 and 4-4, screened and degritted influent flows into a flow distribution structure where it is directed into two pre-react tanks. These pre-react tanks function to trap grease and other floatables, equalize flow, and minimize short circuiting through the process. The pre-react tank also serves as a biological selector that improves sludge settleability. Effluent from the pre-react tanks flows by gravity through a baffle wall and into the main aeration tanks containing activated sludge. Within the aeration tanks, periods of aeration/and or mixing are applied to achieve the desired level of biological treatment. Aeration and/or mixing are discontinued, allowing solids to settle to the bottom of the aeration basins and leaving a layer of clear, treated water at the top. The clear, treated water is removed by an automatic, time-controlled decant mechanism. The decanted treated wastewater is sent downstream to an equalization basin. Since discharge from the reactor is at a high flow rate over a short-time duration, creating peaks in the effluent flow rate, an equalization basin is required to level off the flow rates prior to disinfection. Therefore, all steps of the process (aeration and clarification) occur sequentially in the same tank. This eliminates the need to provide separate secondary clarifiers. In the intermittent cycle SBR process, waste solids are pumped directly from the aeration tanks to aerobic digesters where the solids receive additional treatment prior to dewatering and land application. In the City's case, to provide the required redundancy, two SBR basins would need to be provided, which would allow isolation of one side from the other in the event maintenance would need to be completed on the system.

Refer to Figures 4-2, 4-3, and 4-4 for process schematics of the three treatment scenarios and Tables 4-3, 4-5, and 4-7 for a list of the components necessary to make a complete intermittent cycle SBR activated sludge facility for each scenario. Tables 4-4, 4-6, and 4-8 present the estimated project cost and present worth analysis for each scenario.

Option 2 - Modular Extended Aeration. The modular extended aeration alternative would require construction of a concrete common-wall structure containing the aeration basins, clarifiers, and aerobic sludge digesters. Screened and degritted influent flows into the system where it is combined with the activated sludge contained in the aeration basins. This system would be operated utilizing two trains with each train having two stages (two aeration basins in each train operated in a series, or a total of four aeration basins). Unlike the intermittent SBR option, the activated sludge would be sent to secondary clarifiers for solids separation. The clarified effluent would be disinfected and discharged. The settled solids (return activated sludge, or RAS) are withdrawn from the bottom of the clarifiers and combined with the incoming wastewater in the selector tank. Solids are wasted directly from the first stage aeration basins into aerobic digesters for further processing.

Refer to Figures 4-5, 4-6, and 4-7 for process schematics of the three treatment scenarios and Tables 4-9, 4-11, and 4-13 for a list of the components necessary to make a complete modular extended aeration activated sludge facility for each scenario. Tables 4-10, 4-12, and 4-14 present the estimated project cost and present worth analysis for each scenario.

Option 3 - Integrated Sludge SBR Activated Sludge. The integrated sludge SBR process consists of concrete common-wall constructed reactors equipped with pumps, submerged aerators, control valves, and effluent decanters. The

SBR process is a fill-and-draw batch activated sludge treatment process. As shown on Figures 4-8 and 4-9, with this process, screened influent flows into two anaerobic conditioning basins where solids are allowed to settle much like a septic tank. Effluent from the anaerobic tanks flows into a surge basin containing activated sludge. When the surge basin reaches a certain level, wastewater is pumped rapidly into one of the SBR reactors containing activated sludge. When the level in the SBR basin reaches a predetermined level, the contents are aerated for a period of time to provide the treatment necessary. After the aeration time period has expired, the aerators are shut off to allow settling of the contained solids. The clear treated effluent is then withdrawn, or decanted at a rapid rate to an equalization basin. Since discharge from the reactor is at a high flow rate over a short-time duration, creating peaks in the effluent flow rate, an equalization basin is required to level off the flow rates prior to disinfection. Therefore, all steps of the process (aeration and clarification) occur sequentially in the same tank. This eliminates the need to provide separate secondary clarifiers. In the integrated sludge SBR process, waste solids are pumped from the surge tank, combined with the influent flow to the anaerobic tanks, and settled and stabilized in the these tanks. This eliminates the need to provide separate digesters. In the City's case, two SBR basins would need to be provided as one reactor would be in the fill mode while the other goes through react, settle, and effluent withdrawal.

Refer to Figures 4-8 and 4-9 for process schematics of the two treatment scenarios and Tables 4-15 and 4-17 for a list of the components necessary to make a complete integrated sludge SBR activated sludge facility for each scenario. Tables 4-16 and 4-18 present the estimated project cost and present worth analysis for each scenario.

Option 4 - Phased Isolation Oxidation Ditch (PID) Activated Sludge. The PID activated sludge process consists of two concrete common-wall constructed oxidation ditches equipped with brush aerators and motor-actuated influent and effluent flow control weirs. The PID process is a continuous flow activated sludge process in which the main treatment phases are isolated into separate oxidation ditches and the conditions within each ditch are alternated, or phased. Process conditions within each ditch are varied between aerobic (brush aerators operating) and settling (brush aerators not operating) to obtain the desired level of treatment. The alternating process strategy allows for complete treatment of the wastewater within the ditches themselves without the need to provide external secondary clarifiers or RAS pumping. To enable the alternating flow pattern between the oxidation ditches, automatic influent and effluent flow control weirs are necessary in order to direct the incoming flow to the appropriate reactor and control the effluent flow from the ditch that is in the settling mode. The clarified effluent withdrawn from the settled ditch would be disinfected and discharged. The settled solids are withdrawn directly from the bottom of the ditches (during the settling mode) and are wasted into aerobic digesters for further processing.

Refer to Figures 4-10 and 4-11 for process schematics of the two treatment scenarios and Tables 4-19 and 4-21 for a list of the components necessary to make a complete PID activated sludge facility for each scenario. Tables 4-20 and 4-22 present the estimated project cost and present worth analysis for each scenario.

Option 5 - Membrane Bioreactor (MBR). An MBR is an activated sludge treatment process that utilizes a physical barrier (the membrane) to filter sludge and other contaminants from the treated wastewater. The MBR process consists of aeration basins coupled with submerged membrane units installed within the aeration basins. Utilizing submerged membranes eliminates the need for secondary clarification for solids separation. The MBR process can be operated at very high mixed liquor suspended solids (MLSS) concentrations (10,000 to 15,000 mg/L), which allows reduction of treatment volume when compared to other processes requiring clarification. The MBR process would consist of a concrete common wall constructed structure containing a flow splitter box, two anoxic selector tanks, two pre-aeration tanks, two MBR aeration basins, and two aerobic sludge digesters. The system would be equipped with pumps, mixers, diffused aeration system, submerged membrane units, scum skimmer, control valves, and piping. Other ancillary equipment needed includes a chemical cleaning system to periodically clean the membranes. Effluent (permeate) from the membranes would be disinfected with UV and discharged. The solids from the process are wasted directly from the anoxic selector tanks into the aerobic digester for further processing.

Refer to Table 4-23 for a list of components necessary to make a complete MBR activated sludge facility capable of biological removal of nitrogen. Table 4-24 presents the estimated project cost and present worth analysis.

SUMMARY OF ESTIMATED COSTS OF THE ALTERNATIVES AND ALTERNATIVE SELECTION

Summary of Estimated Costs. Table 4-25 summarizes the estimated construction costs; project costs; annual operation, maintenance, and replacement (O,M&R) costs; and present worth of the four available alternatives (Alternative A, B1, B2, and C). The table also presents the estimated costs of each scenario under each treatment process option developed under Alternative C. Alternative A has no cost associated with it as nothing would be completed, but it was deemed not a viable long-term alternative. As shown on Table 4-25, based upon the evaluation of the feasible alternatives and options available, Alternative B1 has the lowest overall capital cost and present worth and Alternative C, Option 3, Scenario C3A has the lowest annual operation and maintenance costs. As illustrated on the table, to provide treatment process options with the capability to remove nitrogen does not incrementally cost significantly more to construct and operate than systems that will only treat for removal of conventional pollutants (BOD_5/TSS). In every case, it does add cost both in terms of construction and operation/maintenance to provide the phosphorus removal feature as additional basins, chemical addition, etc., will be necessary in order to have a functioning system. As can be seen on the cost summary table, in comparing the cost of upgrading the existing treatment plant with the construction of a new activated sludge mechanical wastewater treatment facility, the present worth costs of the two alternatives is virtually the same.

Alternative Selection, General Discussion. As discussed in this chapter, three feasible alternatives for system improvements appear to be available to the City of John Day. In comparing the three feasible alternatives, the following advantages and disadvantages were noted:

Alternatives B1 and B2

- Advantages – Continues to use the same treatment process familiar to City staff.
- Disadvantages – Utilizes old rehabilitated structures; complex operational issues during construction related to maintaining the existing facility on-line while rehabilitation of the plant is completed; plant does not have the ability to be feasibly upgraded economically to have the ability to remove nitrogen; upgrade only has BOD_5/TSS removal ability.

Alternative C

- Advantages – Process flexibility to meet changing regulations; all new structures and components utilized; easy transition from the existing plant to the new; simplifies construction process (uninterrupted operation of the existing plant while new is being built); easy future expandability through design.
- Disadvantages – New process for City staff to learn; higher capital cost, although relatively small difference when compared to existing plant upgrading.

Based on information presented in this chapter, comparison of the costs, advantages and disadvantages, discussions with representatives of the DEQ, recommendations of City staff and the Public Works Committee, and the City's Engineer, the John Day City Council selected for implementation the alternative to design and construct a new activated sludge mechanical wastewater treatment facility. The Council also made the decision that the new system must have the ability to remove nitrogen (biological nutrient removal) and be designed to allow future incorporation of phosphorus removal, if it becomes necessary to meet a permit limit.

The main factors influencing the Council's decision in the selection of the preferred alternative is the ability to provide a system with process flexibility to meet the long-term treatment needs of the City and to better meet the challenges of changing regulations, and the fact that a new plant can be constructed and operated for essentially the same cost as upgrading the existing plant (Alternative B2).

Although five biological treatment process options were presented for consideration under the selected alternative, many variations of the activated sludge process are available and could be used successfully to treat the wastewater to the required levels. Many of these process variations, including the five options that were evaluated in this Plan, are proprietary and/or patented and are only available through one vendor. Consequently, because of the patented/proprietary nature of options analyzed in this Plan, the City was not be able to select a specific proprietary process during the planning stage and design around the process and be able to comply with the State of Oregon public contracting and funding agency regulations regarding maximum free and open competition among the various treatment process equipment suppliers. The public contracting rules do not generally allow sole sourcing unless specific criteria can be met that dictate that sole sourcing is the only viable and justifiable option available. The public contracting rules, however, do allow the City to complete a Request for Proposal (RFP) process in order to select the most appropriate treatment process and equipment package. The City elected to complete a RFP process. The RFP would be developed and publicized, providing all interested treatment process equipment manufacturers and suppliers the opportunity to submit a proposal for consideration by the City. The RFP process would be completed during the pre-design stage of the project. Once the option is selected by committee, and upon DEQ and funding agency approval of the selection, the design would be completed.

To develop the necessary funding package, given the City's decision not to select a specific treatment process at this time, the proposed budget will be based on the estimated upper level of the range of total project cost of the nitrogen removal scenarios under the four options (not including the MBR scenario), or $8.29 million. The City's decision to move ahead with this project is contingent on development of a reasonable funding package that will be affordable and acceptable to the citizens of the City of John Day and Canyon City. Further details regarding the selected alternative are presented in Chapter 5 and the funding and implementation analysis is given in Chapter 6.

LAGOON TREATMENT, STORAGE AND EFFLUENT REUSE FACILITY
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010 DOLLARS)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 300,000	All Req'd	$ 300,000
2	Existing Treatment Plant Demolition and Site Work	LS	115,000	All Req'd	115,000
3	New Main Lift Station, including Piping and Valve Vault, Standby Generator and ATS, Electrical and Controls, Site Work, etc.	LS	310,000	All Req'd	310,000
4	PVC Pressure Sewer	LF	40	15,000	600,000
5	50-Acre Three-Cell Facultative Lagoon Treatment and Storage System and Piping and Control Structures	LS	4,100,000	All Req'd	4,100,000
6	Operations and Irrigation Pump Building	LS	225,000	All Req'd	225,000
7	Disinfection System, Including Chlorine Contact Chamber, Chemical Feed System, and Drainage Pump Station	LS	215,000	All Req'd	215,000
8	Irrigation System, including Pump Station, Filter, Piping and Pivot System	LS	550,000	All Req'd	550,000
9	Electrical, Controls, and Instrumentation	LS	325,000	All Req'd	325,000
10	Fencing and Signing	LF	5.50	20,000	110,000
	Subtotal Estimated Construction Costs (2010 Dollars)				**$ 6,850,000**
	Contingency @ 10%				690,000
	Total Estimated Construction Costs				**$ 7,540,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	$ 1,360,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Land Acquisition (Approximately 250 acres) and Easements @ $6,000 Per Acre	1,500,000
Subtotal Other Costs	**$ 2,980,000**

TOTAL ESTIMATED PROJECT COST (2010 DOLLARS) $ 10,520,000

anderson perry & associates, inc.

CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
LAGOON TREATMENT, STORAGE, & REUSE FACILITY COST ESTIMATE

TABLE
4-0

PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description		Annual Cost
ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)			
1	Labor, Including Benefits	$	25,000
2	Utilities		22,600
3	Supplies, Parts, Maintenance, chemicals, and Repairs		12,500
4	Sampling, Testing, and Permit Fees		7,500
5	Operator Training and Certification		2,500
6	Capital Outlay		10,000
7	Replacement		25,000
	Total O, M, & R	**$**	**105,100**
	Annual Crop Revenue (125 ac. @ 6 Tons per Ac. @ $45/Ton)		33,750
	Net O, M, & R		71,350
	Present Worth O, M, & R (5%, 20 yrs.)		889,000
	Subtotal Present Worth	**$**	**11,409,000**
SALVAGE			
	Estimated WWTF Salvage Value, Including Property		5,000,000
	Present Worth of Salvage Value (5%, 20 yrs.)		1,885,000
	PRESENT WORTH (2010 DOLLARS)	**$**	**9,524,000**

ALTERNATIVE B1
IMPROVE EXISTING WASTEWATER TREATMENT FACILITY
SYSTEM IMPROVEMENT COMPONENTS

1. PRELIMINARY TREATMENT SYSTEMS (HEADWORKS)

- New vertically-mounted fine screen/washer/compactor
- New packaged Parshall flume (6-inch) flowmetering manhole
- Rehabilitate influent distribution structure and grit removal system; remove existing bar screening

2. PRIMARY CLARIFICATION

- Rehabilitate existing bridges drives and scrapers of both units
- Rehabilitate concrete structures of both units

3. SECONDARY CLARIFICATION

- Construct new clarifier splitter box
- One new 34-foot diameter secondary clarifier, 12-foot side water depth
- Rehabilitate drive and scraper mechanism for the existing clarifier
- Rehabilitate the existing clarifier concrete structure

4. DISINFECTION SYSTEM

- Abandon the existing chlorine contact basin
- New chlorine contact basins (two basins), 60-minute contact time at AWWF=0.374 MGD and an assumed contact efficiency of 80 percent, or 20,000 gallons each basin

5. SLUDGE DIGESTION

- Abandon existing anaerobic digesters and remove existing boiler, sludge pumps, piping, etc.
- New high-rate two-stage anaerobic digestion system
- Two new 25-foot diameter x 25-foot deep digesters
  - Primary digester heated and mixed; fixed cover system
  - Secondary digester unheated and unmixed; floating cover system
  - 500 BTU/hour boiler package capable of utilizing digester gas or an auxiliary gas source
  - 5 Hp recirculating pump
  - Waste gas burner
  - Manometers, pressure regulators, drip traps, sediment traps, flame arresters, and associated safety equipment
  - Two new double-disk sludge pumps

6. SLUDGE DEWATERING AND STORAGE

- Maintain existing sludge beds; provide improvements as needed to liquid disposal system

7. PROCESS AND YARD PIPING

- New and existing piping modifications

ALTERNATIVE B1
IMPROVE EXISTING WASTEWATER TREATMENT FACILITY
PROJECT COST ESTIMATE (2010)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 170,000	All Req'd	$ 170,000
2	Demolition Work	LS	75,000	All Req'd	75,000
3	Site Work and Landscaping	LS	50,000	All Req'd	50,000
4	New Preliminary Treatment System (Headworks)	LS	250,000	All Req'd	250,000
5	Rehabilitation of Existing Primary Clarifiers	LS	200,000	All Req'd	200,000
6	Rehabilitation of Existing Secondary Clarifier	LS	100,000	All Req'd	100,000
7	New 34-Foot Diameter Secondary Clarifier	LS	525,000	All Req'd	525,000
8	New Chlorine Contact Basin	LS	155,000	All Req'd	155,000
9	New Anaerobic Sludge Digestion System Facility	LS	1,050,000	All Req'd	1,050,000
10	Process and Yard Piping	LS	350,000	All Req'd	350,000
11	Electrical, Controls, and Instrumentation	LS	50,000	All Req'd	50,000
12	Painting	LS	375,000	All Req'd	375,000
13	Dewatering, Bypass Pumping, and Piping	LS	80,000	All Req'd	80,000
	Subtotal Estimated Construction Costs (2010 Dollars)				**$ 3,430,000**
	Contingency @ 10%				343,000
	Total Estimated Construction Costs				**$ 3,773,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	$ 676,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 796,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 4,569,000**

PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description		Annual Cost
ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)			
1	Labor, Including Benefits	$	65,000
2	Utilities		25,000
3	Supplies, Parts, Chemicals, Maintenance, and Repairs		35,000
4	Sampling, Testing, and Permit Fees		15,000
5	Operator Training and Certification		3,000
6	Capital Outlay		20,000
7	Replacement		50,000
	Total O, M, & R	**$**	**213,000**
	Present Worth O, M, & R (5%, 20 yrs.)		2,654,000
	Subtotal Present Worth	**$**	**7,223,000**
SALVAGE			
	Estimated WWTF Salvage Value, Including Property	$	2,500,000
	Present Worth of Salvage Value (5%, 20 yrs.)		942,000
	PRESENT WORTH (2010 DOLLARS)	**$**	**6,281,000**

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
ALT. B1 - IMPROVE
EXISTING WWTF COST ESTIMATE

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CONT'D

ALTERNATIVE B2
UPGRADE EXISTING WASTEWATER TREATMENT FACILITY
SYSTEM IMPROVEMENT COMPONENTS

1. PRELIMINARY TREATMENT SYSTEMS (HEADWORKS)

- New vertically-mounted fine screen/washer/compactor
- New packaged Parshall flume (6-inch) flowmetering manhole
- Rehabilitate existing influent lift station
  - Concrete wet well rehabilitation
  - Three new influent pumps at 525 gpm and 7.5 Hp each
- Rehabilitate influent distribution structure and grit removal system; remove existing bar screening
- New 600 sq. ft. (20 ft. x 30 ft.) CMU building to house screen and grit dewatering equipment.

2. PRIMARY CLARIFICATION

- New clarifier drives, scrapers, and screen mechanisms in both units
- Rehabilitate existing bridges of both units
- Rehabilitate concrete structures of both units

3. BIOLOGICAL TREATMENT SYSTEM (TRICKLING FILTERS)

- Demolish the oldest (east) trickling filter
- Construct a new east trickling filter (65-foot diameter)
- Remove media, replace media, replace underdrain system, and rehabilitate the concrete structure for the newer (west) trickling filter
- New flow distribution structure

4. SECONDARY CLARIFICATION

- Rehabilitate existing secondary lift station
  - Four new secondary lift pumps, three at 420 gpm and 5Hp each and 1 at 250 gpm and 3 Hp
- One new 34-foot diameter secondary clarifier, 12-foot side water depth
- New drive and scraper mechanism for the existing clarifier
- Rehabilitate the existing clarifier concrete structure

5. DISINFECTION SYSTEM

- Demolish the existing chlorine contact basin
- New chlorine contact basins (two basins), 60-minute contact time at AWWF=0.374 MGD and an assumed contact efficiency of 80 percent, or 20,000 gallons each basin

6. PERCOLATION PONDS

- Piping and effluent distribution modifications and improvements

7. **SLUDGE DIGESTION**

- Abandon existing anaerobic digesters and remove existing boiler, sludge pumps, piping, etc.
- New high-rate two-stage anaerobic digestion system
- Two new 25-foot diameter x 25-foot deep digesters
    - Primary digester heated and mixed; fixed cover system
    - Secondary digester unheated and unmixed; floating cover system
    - 500 BTU/hour boiler package capable of utilizing digester gas or an auxiliary gas source
    - 5 Hp draft tube mixer with heat exchange jacket installed with draft tubes
    - Waste gas burner
    - Manometers, pressure regulators, drip traps, sediment traps, flame arresters, and associated safety equipment
    - Two new double-disk sludge pumps

8. **SLUDGE DEWATERING AND STORAGE**

- Maintain existing sludge beds; provide improvements as needed

9. **PROCESS AND YARD PIPING**

- New and existing piping modifications

10. **ELECTRICAL, CONTROLS, AND INSTRUMENTATION**

- New plant control system
- Required electrical work
- New instrumentation

11. **OPERATIONS BUILDING**

- Rehabilitate existing operations building including laboratory, bathroom, etc.

12. **SITE WORK**

- Paving, sidewalks, etc.

13. **DEMOLITION WORK**

ALTERNATIVE B2
UPGRADE EXISTING WASTEWATER TREATMENT FACILITY
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 300,000	All Req'd	$ 300,000
2	Demolition Work	LS	75,000	All Req'd	75,000
3	Site Work and Landscaping	LS	115,000	All Req'd	115,000
4	New Preliminary Treatment System (Headworks) including Rehabilitation of Existing Influent Lift Station	LS	450,000	All Req'd	450,000
5	Rehabilitation of Existing Primary Clarifiers	LS	423,000	All Req'd	423,000
6	New East Trickling Filter	LS	450,000	All Req'd	450,000
7	Rehabilitation of Existing West Trickling Filter	LS	188,000	All Req'd	188,000
8	New Trickling Filters Flow Distribution Structure	LS	65,000	All Req'd	65,000
9	Rehabilitation of Existing Secondary Lift Station including New Pumps and Wetwell Rehabilitation	LS	95,000	All Req'd	95,000
10	Rehabilitation of Existing Secondary Clarifier	LS	205,000	All Req'd	205,000
11	New 34-Foot Diameter Secondary Clarifier	LS	525,000	All Req'd	525,000
12	New Chlorine Contact Basin	LS	155,000	All Req'd	155,000
13	New Anaerobic Sludge Digestion System Facility	LS	1,050,000	All Req'd	1,050,000
14	Existing Operations Building Rehabilitation	LS	110,000	All Req'd	110,000
15	Process and Yard Piping	LS	350,000	All Req'd	350,000
16	Electrical, Controls, and Instrumentation	LS	425,000	All Req'd	425,000
17	Painting	LS	375,000	All Req'd	375,000
18	Dewatering, Bypass Pumping, and Piping	LS	80,000	All Req'd	80,000
19	Miscellaneous Metals, Grating, and Handrailing	LS	45,000	All Req'd	45,000

Subtotal Estimated Construction Coss (2010 Dollars)	**$ 5,481,000**
Contingency @ 10%	548,000
Total Estimated Construction Costs	**$ 6,029,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	1,069,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,189,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 7,218,000**

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
ALT. B2 - UPGRADE
EXISTING WWTF COST ESTIMATE

TABLE
4-2B

PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description		Annual Cost
ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)			
1	Labor, Including Benefits	$	65,000
2	Utilities		25,000
3	Supplies, Parts, Chemicals, Maintenance, and Repairs		40,000
4	Sampling, Testing, and Permit Fees		15,000
5	Operator Training and Certification		3,000
6	Capital Outlay		20,000
7	Replacement		35,000
	Total O, M, & R	**$**	**203,000**
	Present Worth O, M, & R (5%, 20 yrs.)		2,530,000
	Subtotal Present Worth	**$**	**9,748,000**
SALVAGE			
	Estimated WWTF Salvage Value, Including Property	$	2,500,000
	Present Worth of Salvage Value (5%, 20 yrs.)		942,000
	PRESENT WORTH (2010 DOLLARS)	**$**	**8,806,000**

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
ALT. B2 - UPGRADE
EXISTING WWTF COST ESTIMATE

TABLE 4-2B
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ALTERNATIVE C, OPTION 1 - INTERMITTENT CYCLE SEQUENCING BATCH REACTOR (SBR) SCENARIO C1A - BOD_5 AND TSS REMOVAL ONLY SYSTEM IMPROVEMENT COMPONENTS

1. **PRELIMINARY TREATMENT SYSTEMS (HEADWORKS)**

- Vertically-mounted fine screen/washer/compactor
- New packaged Parshall flume (6-inch) flowmetering manhole
- Influent lift station
  - Three pumps at 525 gpm and 7.5 Hp each
- Vortex grit removal system and grit dewatering unit
- 600 sq. ft. (20 ft. x 30 ft.) building to house screen and grit dewatering equipment

2. **BIOLOGICAL TREATMENT SYSTEM**

- Intermittent cycle SBR activated sludge
  - Common wall reinforced concrete construction
  - Two pre-react basins, 0.04 MG each
  - Two SBR reactor basins, 0.26 MG each, decanters, and fine bubble diffused aeration system
  - Two waste activated sludge pumps (one for each SBR basin), 2 Hp each
  - Two aerobic digesters, 0.11 MG each, and coarse bubble aeration system
  - Three 30 Hp blowers, one 20 Hp blower
  - Equalization tank, 0.063 MG, with two 1,050 gpm, 10 Hp effluent pumps

3. **DISINFECTION SYSTEM**

- Ultraviolet light, two banks, 18 low pressure, high intensity lamps per bank, 36 total pumps
- Install in concrete open channels, spare channel for future expansion
- 840 sq. ft. (20 ft. x 42 ft.) CMU building to house UV equipment

4. **SLUDGE DEWATERING AND STORAGE**

- Maintain existing sludge beds; provide improvements as needed

5. **PROCESS AND YARD PIPING**

6. **ELECTRICAL, CONTROLS, AND INSTRUMENTATION**

7. **SITE WORK AND LANDSCAPING**

- Pave, fencing, sidewalks, etc.

8. **OPERATIONS BUILDING**

- 1,680 sq. ft. CMU building
- Laboratory and furnishings
- Office space
- ADA compliant bathroom
- Utility room
- Control center room

9. **BLOWER/GENERATOR/ELECTRICAL BUILDING**

- 1,460 sq. ft. CMU building to house blowers, standby power generator system, and electrical and control equipment

10. **DEMOLITION OF EXISTING TREATMENT PLANT**

ALTERNATIVE C
OPTION 1 - INTERMITTENT CYCLE SEQUENCING BATCH REACTOR
SCENARIO C1A - BOD AND TSS REMOVAL ONLY
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 265,000	All Req'd	$ 265,000
2	Demolition of Existing Treatment Plant	LS	115,000	All Req'd	115,000
3	Site Work and Landscaping	LS	110,000	All Req'd	110,000
4	New Preliminary Treatment System (Headworks)	LS	770,000	All Req'd	770,000
5	Intermittent Cycle SBR	LS	1,577,000	All Req'd	1,577,000
6	UV Light Disinfection System, Including Building	LS	409,000	All Req'd	409,000
7	Blowers	LS	80,000	All Req'd	80,000
8	Blower/Generator/Electrical Building	LS	234,000	All Req'd	234,000
9	Operations Building	LS	336,000	All Req'd	336,000
10	Process and Yard Piping	LS	355,000	All Req'd	355,000
11	Electrical, Controls, and Instrumentation	LS	485,000	All Req'd	485,000
12	Painting	LS	395,000	All Req'd	395,000
13	Miscellaneous Metals, Grating, and Handrailing	LS	65,000	All Req'd	65,000
14	Site Dewatering	LS	45,000	All Req'd	45,000
	Subtotal Estimated Construction Costs (2010 Dollars)				**$ 5,241,000**
	Contingency @ 10%				524,000
	Total Estimated Construction Costs				**$ 5,765,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	1,153,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,273,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 7,038,000**

PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description		Annual Cost
ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)			
1	Labor, Including Benefits	$	65,000
2	Utilities		40,000
3	Supplies, Parts, Chemicals, Maintenance, and Repairs		20,000
4	Sampling, Testing, and Permit Fees		15,000
5	Operator Training and Certification		3,000
6	Capital Outlay		20,000
7	Replacement		35,000
	Total O, M, & R	**$**	**198,000**
	Present Worth O, M, & R (5%, 20 yrs.)		2,467,000
	Subtotal Present Worth	**$**	**9,505,000**
SALVAGE			
	Estimated WWTF Salvage Value, Including Property	$	3,000,000
	Present Worth of Salvage Value (5%, 20 yrs.)		1,131,000
	PRESENT WORTH (2010 DOLLARS)	**$**	**8,374,000**

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
ALT. C - OPTION 1 - SCENARIO C1A
COST ESTIMATE

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ALTERNATIVE C, OPTION 1 -
INTERMITTENT CYCLE SEQUENCING BATCH REACTOR (SBR)
SCENARIO C1B - BNR - NITROGEN REMOVAL
SYSTEM IMPROVEMENT COMPONENTS

1. PRELIMINARY TREATMENT SYSTEMS (HEADWORKS)

- Vertically-mounted fine screen/washer/compactor
- New packaged Parshall flume (6-inch) flowmetering manhole
- Influent lift station
  - Three pumps at 525 gpm and 7.5 Hp each
- Vortex grit removal system and grit dewatering unit
- 600 sq. ft. (20 ft. x 30 ft.) building to house screen and grit dewatering equipment

2. BIOLOGICAL TREATMENT SYSTEM

- Intermittent cycle SBR activated sludge
  - Common wall reinforced concrete construction
  - Two pre-react basins, 0.04 MG each
  - Two SBR reactor basins, 0.34 MG each, decanters, and fine bubble diffused aeration system
  - Two 7.5 Hp mixers per reactor basin (four total)
  - Two waste activated sludge pumps (one for each SBR basin), 2 Hp each
  - Two aerobic digesters, 0.11 MG each, and coarse bubble aeration system
  - Three 40 Hp blowers, one 20 Hp blower
  - Equalization tank, 0.063 MG, with two 1,050 gpm, 10 Hp effluent pumps

3. DISINFECTION SYSTEM

- Ultraviolet light, two banks, 18 low pressure, high intensity lamps per bank, 36 total lamps
- Install in concrete open channels, spare channel for future expansion
- 840 sq. ft. (20 ft. x 42 ft.) CMU building to house UV equipment

4. SLUDGE DEWATERING AND STORAGE

- Maintain existing sludge beds; provide improvements as needed

5. PROCESS AND YARD PIPING

6. ELECTRICAL, CONTROLS, AND INSTRUMENTATION

7. SITE WORK AND LANDSCAPING

- Pave, fencing, sidewalks, etc.

8. **OPERATIONS BUILDING**

- 1,680 sq. ft. CMU building
- Laboratory and furnishings
- Office space
- ADA compliant bathroom
- Utility room
- Control center room

9. **BLOWER/GENERATOR/ELECTRICAL BUILDING**

- 1,460 sq. ft. CMU building to house blowers, standby power generator system, and electrical and control equipment

10. **DEMOLITION OF EXISTING TREATMENT PLANT**

ALTERNATIVE C
OPTION 1 - INTERMITTENT CYCLE SEQUENCING BATCH REACTOR
SCENARIO C1B - BNR - NITROGEN REMOVAL
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010)

CAPITAL IMPROVEMENT COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 305,000	All Req'd	$ 305,000
2	Demolition of Existing Treatment Plant	LS	115,000	All Req'd	115,000
3	Site Work and Landscaping	LS	110,000	All Req'd	110,000
4	New Preliminary Treatment System (Headworks)	LS	770,000	All Req'd	770,000
5	Intermittent Cycle SBR	LS	1,900,000	All Req'd	1,900,000
6	UV Light Disinfection System, Including Building	LS	409,000	All Req'd	409,000
7	Blowers	LS	87,000	All Req'd	87,000
8	Blower/Generator/Electrical Building	LS	234,000	All Req'd	234,000
9	Operations Building	LS	336,000	All Req'd	336,000
10	Process and Yard Piping	LS	355,000	All Req'd	355,000
11	Electrical, Controls, and Instrumentation	LS	485,000	All Req'd	485,000
12	Painting	LS	395,000	All Req'd	395,000
13	Miscellaneous Metals, Grating, and Handrailing	LS	65,000	All Req'd	65,000
14	Site Dewatering	LS	45,000	All Req'd	45,000
	Subtotal Estimated Construction Costs (2010 Dollars)				**$ 5,611,000**
	Contingency @ 10%				561,000
	Total Estimated Construction Costs				**$ 6,172,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	1,234,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,354,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 7,526,000**

anderson perry & associates, inc.

CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
ALT. C - OPTION 1 - SCENARIO C1B
COST ESTIMATE

TABLE
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PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description		Annual Cost
ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)			
1	Labor, Including Benefits	$	65,000
2	Utilities		39,500
3	Supplies, Parts, Chemicals, Maintenance, and Repairs		20,000
4	Sampling, Testing, and Permit Fees		15,000
5	Operator Training and Certification		3,000
6	Capital Outlay		20,000
7	Replacement		35,000
	Total O, M, & R	**$**	**197,500**
	Present Worth O, M, & R (5%, 20 yrs.)		2,461,000
	Subtotal Present Worth	**$**	**9,987,000**
SALVAGE			
	Estimated WWTF Salvage Value, Including Property	$	3,000,000
	Present Worth of Salvage Value (5%, 20 yrs.)		1,131,000
	PRESENT WORTH (2010 DOLLARS)	**$**	**8,856,000**

ALTERNATIVE C, OPTION 1 - INTERMITTENT CYCLE SEQUENCING BATCH REACTOR (SBR) SCENARIO C1C - BNR - NITROGEN/PHOSPHORUS REMOVAL SYSTEM IMPROVEMENT COMPONENTS

1. PRELIMINARY TREATMENT SYSTEMS (HEADWORKS)

- Vertically-mounted fine screen/washer/compactor
- New packaged Parshall flume (6-inch) flowmetering manhole
- Influent lift station
  - Three pumps at 525 gpm and 7.5 Hp each
- Vortex grit removal system and grit dewatering unit
- 600 sq. ft. (20 ft. x 30 ft.) building to house screen and grit dewatering equipment

2. BIOLOGICAL TREATMENT SYSTEM

- Intermittent cycle SBR activated sludge
  - Common wall reinforced concrete construction
  - Two pre-react basins, 0.04 MG each
  - Two SBR reactor basins, 0.34 MG each, decanters, and fine bubble diffused aeration system
  - Two 7.5 Hp mixers per reactor basin (four total)
  - Two waste activated sludge pumps (one for each SBR basin), 2 Hp each
  - Two aerobic digesters, 0.11 MG each, and coarse bubble aeration system
  - Three 40 Hp blowers, one 20 Hp blower
  - Equalization tank, 0.063 MG, with two 1,050 gpm, 10 Hp effluent pumps

3. CHEMICAL FEED SYSTEM (PHOSPHORUS REMOVAL)

- Alum or ferric chloride chemical feed system
- 300 sq. ft. CMU building to house feed equipment and chemical storage

4. DISINFECTION SYSTEM

- Ultraviolet light, two banks, 18 low pressure, high intensity lamps per bank, 36 total lamps
- Install in concrete open channels, spare channel for future expansion
- 840 sq. ft. (20 ft. x 42 ft.) CMU building to house UV equipment

5. SLUDGE DEWATERING AND STORAGE

- Maintain existing sludge beds; provide improvements as needed

6. PROCESS AND YARD PIPING

7. ELECTRICAL, CONTROLS, AND INSTRUMENTATION

8. **SITE WORK AND LANDSCAPING**

- Pave, fencing, sidewalks, etc.

9. **OPERATIONS BUILDING**

- 1,680 sq. ft. CMU building
- Laboratory and furnishings
- Office space
- ADA compliant bathroom
- Utility room
- Control center room

10. **BLOWER/GENERATOR/ELECTRICAL BUILDING**

- 1,460 sq. ft. CMU building to house blowers, standby power generator system, and electrical and control equipment

11. **DEMOLITION OF EXISTING TREATMENT PLANT**

ALTERNATIVE C
OPTION 1 - INTERMITTENT CYCLE SEQUENCING BATCH REACTOR
SCENARIO C1C - BNR - NITROGEN/PHOSPHORUS REMOVAL
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 305,000	All Req'd	$ 305,000
2	Demolition of Existing Treatment Plant	LS	115,000	All Req'd	115,000
3	Site Work and Landscaping	LS	110,000	All Req'd	110,000
4	New Preliminary Treatment System (Headworks)	LS	770,000	All Req'd	770,000
5	Intermittent Cycle SBR	LS	1,900,000	All Req'd	1,900,000
6	UV Light Disinfection System, Including Building	LS	409,000	All Req'd	409,000
7	Blowers	LS	87,000	All Req'd	87,000
8	Chemical Feed System, Including Safety Equipment and Building	LS	185,000	All Req'd	185,000
9	Blower/Generator/Electrical Building	LS	234,000	All Req'd	234,000
10	Operations Building	LS	336,000	All Req'd	336,000
11	Process and Yard Piping	LS	355,000	All Req'd	355,000
12	Electrical, Controls, and Instrumentation	LS	485,000	All Req'd	485,000
13	Painting	LS	395,000	All Req'd	395,000
14	Miscellaneous Metals, Grating, and Handrailing	LS	65,000	All Req'd	65,000
15	Site Dewatering	LS	45,000	All Req'd	45,000
	Subtotal Estimated Construction Costs (2010 Dollars)				**$ 5,796,000**
	Contingency @ 10%				580,000
	Total Estimated Construction Costs				**$ 6,376,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	1,275,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,395,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 7,771,000**

PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description	Annual Cost
	ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)	
1	Labor, Including Benefits	$ 65,000
2	Utilities	39,500
3	Supplies, Parts, Chemicals, Maintenance, and Repairs	38,000
4	Sampling, Testing, and Permit Fees	15,000
5	Operator Training and Certification	3,000
6	Capital Outlay	20,000
7	Replacement	35,000
	Total O, M, & R	**$ 215,500**
	Present Worth O, M, & R (5%, 20 yrs.)	2,686,000
	Subtotal Present Worth	**$ 10,457,000**
	SALVAGE	
	Estimated WWTF Salvage Value, Including Property	$ 3,000,000
	Present Worth of Salvage Value (5%, 20 yrs.)	1,131,000
	PRESENT WORTH (2010 DOLLARS)	**$ 9,326,000**

ALTERNATIVE C, OPTION 2
MODULAR EXTENDED AERATION
SCENARIO C2A - BOD_5 AND TSS REMOVAL ONLY
SYSTEM IMPROVEMENT COMPONENTS

1. **PRELIMINARY TREATMENT (HEADWORKS)**

   - Vertically-mounted fine screen/washer/compactor
   - New packaged Parshall flume (6-inch) flowmetering manhole
   - Influent lift station
     - Three pumps at 525 gpm and 7.5 Hp each
   - Vortex grit removal system and grit dewatering unit
   - 600 sq. ft. (20 ft. x 30 ft.) building to house screen and grit dewatering equipment

2. **BIOLOGICAL TREATMENT SYSTEM**

   - Extended aeration activated sludge
     - Common wall reinforced concrete construction
     - 25,000-gallon selector basin
     - Dual train, two-stage aeration basin design, 0.12 MG each train (0.24 MG total volume)
     - Two secondary clarifiers, 640 square feet (40 ft. x 16 ft.) each
     - Two aerobic digesters, 110,000 gallons each
     - Three 30 Hp blowers, one 20 Hp blower

3. **DISINFECTION SYSTEM**

   - Ultraviolet light, two banks, 18 low pressure, high intensity lamps per bank, 36 total lamps
   - Install in concrete open channels spare channel for future expansion
   - 840 square foot (20 ft. x 42 ft) CMU building to house UV equipment

4. **SLUDGE DEWATERING AND STORAGE**

   - Maintain existing sludge beds; provide improvements as needed

5. **PROCESS AND YARD PIPING**

6. **ELECTRICAL, CONTROLS, AND INSTRUMENTATION**

7. **SITE WORK AND LANDSCAPING**

   - Paving, fencing, sidewalks, etc.

8. **OPERATIONS BUILDING**

   - 1,680 sq. ft. CMU building
   - Laboratory and furnishings
   - Office space
   - ADA compliant bathroom
   - Utility room
   - Control center room

9. **BLOWER/GENERATOR/ELECTRICAL BUILDING**

- 1,460 sq. ft. CMU building to house blowers, standby power generator system, and electrical and control equipment

10. **DEMOLITION OF EXISTING TREATMENT PLANT**

ALTERNATIVE C
OPTION 2 - MODULAR EXTENDED AERATION
SCENARIO C2A - BOD AND TSS REMOVAL ONLY
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 310,000	All Req'd	$ 310,000
2	Demolition of Existing Treatment Plant	LS	115,000	All Req'd	115,000
3	Site Work and Landscaping	LS	110,000	All Req'd	110,000
4	New Preliminary Treatment System (Headworks)	LS	770,000	All Req'd	770,000
5	Modular Extended Aeration Treatment System	LS	1,880,000	All Req'd	1,880,000
6	UV Light Disinfection System, Including	LS	409,000	All Req'd	409,000
7	Blowers	LS	87,000	All Req'd	87,000
8	Blower/Generator/Electrical Building	LS	234,000	All Req'd	234,000
9	Operations Building	LS	336,000	All Req'd	336,000
10	Process and Yard Piping	LS	385,000	All Req'd	385,000
11	Electrical, Controls, and Instrumentation	LS	495,000	All Req'd	495,000
12	Painting	LS	415,000	All Req'd	415,000
13	Miscellaneous Metals, Grating, and Handrailing	LS	50,000	All Req'd	50,000
14	Site Dewatering	LS	45,000	All Req'd	45,000
	Subtotal Estimated Construction Costs (2010 Dollars)				**$ 5,641,000**
	Contingency @ 10%				564,000
	Total Estimated Construction Costs				**$ 6,205,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	1,241,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,361,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 7,566,000**

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
ALT. C - OPTION 2 - SCENARIO C2A
COST ESTIMATE

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PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description	Annual Cost
	ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)	
1	Labor, Including Benefits	$ 65,000
2	Utilities	49,000
3	Supplies, Parts, Chemicals, Maintenance, and Repairs	20,000
4	Sampling, Testing, and Permit Fees	15,000
5	Operator Training and Certification	3,000
6	Capital Outlay	20,000
7	Replacement	35,000
	Total O, M, & R	**$ 207,000**
	Present Worth O, M, & R (5%, 20 yrs.)	2,580,000
	Subtotal Present Worth	**$ 10,146,000**
	SALVAGE	
	Estimated WWTF Salvage Value, Including Property	$ 3,000,000
	Present Worth of Salvage Value (5%, 20 yrs.)	1,131,000
	PRESENT WORTH (2010 DOLLARS)	**$ 9,015,000**

ALTERNATIVE C, OPTION 2
MODULAR EXTENDED AERATION
SCENARIO C2B - BNR - NITROGEN REMOVAL
SYSTEM IMPROVEMENT COMPONENTS

1. **PRELIMINARY TREATMENT (HEADWORKS)**

   - Vertically-mounted fine screen/washer/compactor
   - New packaged Parshall flume (6-inch) flowmetering manhole
   - Influent lift station
     - Three pumps at 525 gpm and 7.5 Hp each
   - Vortex grit removal system and grit dewatering unit
   - 600 sq. ft. (20 ft. x 30 ft.) building to house screen and grit dewatering equipment

2. **BIOLOGICAL TREATMENT SYSTEM**

   - Extended aeration activated sludge
     - Common wall reinforced concrete construction
     - 25,000-gallon selector basin
     - Dual train, two-stage aeration basin design, 0.185 MG each train (0.37 MG total volume)
     - Two secondary clarifiers, 640 square feet (40 ft. x 16 ft.) each
     - Two aerobic digesters, 110,000 gallons each
     - Three 40 Hp blowers, one 20 Hp blower

3. **DISINFECTION SYSTEM**

   - Ultraviolet light, two banks, 18 low pressure, high intensity lamps per bank, 36 total lamps
   - Install in concrete open channels spare channel for future expansion
   - 840 square foot (20 ft. x 42 ft) CMU building to house UV equipment

4. **SLUDGE DEWATERING AND STORAGE**

   - Maintain existing sludge beds; provide improvements as needed

5. **PROCESS AND YARD PIPING**

6. **ELECTRICAL, CONTROLS, AND INSTRUMENTATION**

7. **SITE WORK AND LANDSCAPING**

   - Paving, fencing, sidewalks, etc.

8. **OPERATIONS BUILDING**

   - 1,680 sq. ft. CMU building
   - Laboratory and furnishings
   - Office space
   - ADA compliant bathroom
   - Utility room
   - Control center room

9. **BLOWER/GENERATOR/ELECTRICAL BUILDING**

- 1,460 sq. ft. CMU building to house blowers, standby power generator system, and electrical and control equipment

10. **DEMOLITION OF EXISTING TREATMENT PLANT**

ALTERNATIVE C
OPTION 2 - MODULAR EXTENDED AERATION
SCENARIO C2B - BNR - NITROGEN REMOVAL
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 320,000	All Req'd	$ 320,000
2	Demolition of Existing Treatment Plant	LS	115,000	All Req'd	115,000
3	Site Work and Landscaping	LS	110,000	All Req'd	110,000
4	New Preliminary Treatment System (Headworks)	LS	770,000	All Req'd	770,000
5	Modular Extended Aeration Treatment System	LS	2,100,000	All Req'd	2,100,000
6	UV Light Disinfection System, Including	LS	409,000	All Req'd	409,000
7	Blowers	LS	87,000	All Req'd	87,000
8	Blower/Generator/Electrical Building	LS	234,000	All Req'd	234,000
9	Operations Building	LS	336,000	All Req'd	336,000
10	Process and Yard Piping	LS	405,000	All Req'd	405,000
11	Electrical, Controls, and Instrumentation	LS	495,000	All Req'd	495,000
12	Painting	LS	415,000	All Req'd	415,000
13	Miscellaneous Metals, Grating, and Handrailing	LS	50,000	All Req'd	50,000
14	Site Dewatering	LS	45,000	All Req'd	45,000

Subtotal Estimated Construction Costs (2010 Dollars)	**$ 5,891,000**
Contingency @ 10%	589,000
Total Estimated Construction Costs	**$ 6,480,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	1,296,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,416,000**

TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 7,896,000**

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
ALT. C - OPTION 2 - SCENARIO C2B
COST ESTIMATE

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PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description	Annual Cost
ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)		
1	Labor, Including Benefits	$ 65,000
2	Utilities	53,500
3	Supplies, Parts, Chemicals, Maintenance, and Repairs	20,000
4	Sampling, Testing, and Permit Fees	15,000
5	Operator Training and Certification	3,000
6	Capital Outlay	20,000
7	Replacement	35,000
	Total O, M, & R	**$ 211,500**
	Present Worth O, M, & R (5%, 20 yrs.)	2,636,000
	Subtotal Present Worth	**$ 10,532,000**
SALVAGE		
	Estimated WWTF Salvage Value, Including Property	$ 3,250,000
	Present Worth of Salvage Value (5%, 20 yrs.)	1,225,000
	PRESENT WORTH (2010 DOLLARS)	**$ 9,307,000**

ALTERNATIVE C, OPTION 2
MODULAR EXTENDED AERATION
SCENARIO C2C - BNR - NITROGEN/PHOSPHORUS REMOVAL
SYSTEM IMPROVEMENT COMPONENTS

1. **PRELIMINARY TREATMENT (HEADWORKS)**

- Vertically-mounted fine screen/washer/compactor
- New packaged Parshall flume (6-inch) flowmetering manhole
- Influent lift station
  - Three pumps at 525 gpm and 7.5 Hp each
- Vortex grit removal system and grit dewatering unit
- 600 sq. ft. (20 ft. x 30 ft.) building to house screen and grit dewatering equipment

2. **BIOLOGICAL TREATMENT SYSTEM**

- Extended aeration activated sludge
  - Common wall reinforced concrete construction
  - 16,500-gallon fermentor tank
  - 16,500-gallon anaerobic selector tank
  - Dual train, two-stage aeration basin design, 0.185 MG each train (0.37 MG total volume)
  - Two secondary clarifiers, 640 square feet (40 ft. x 16 ft.) each
  - Two aerobic digesters, 110,000 gallons each
  - Three 40 Hp blowers, one 20 Hp blower

3. **DISINFECTION SYSTEM**

- Ultraviolet light, two banks, 18 low pressure, high intensity lamps per bank, 36 total lamps
- Install in concrete open channels spare channel for future expansion
- 840 square foot (20 ft. x 42 ft) CMU building to house UV equipment

4. **SLUDGE DEWATERING AND STORAGE**

- Maintain existing sludge beds; provide improvements as needed

5. **PROCESS AND YARD PIPING**

6. **ELECTRICAL, CONTROLS, AND INSTRUMENTATION**

7. **SITE WORK AND LANDSCAPING**

- Paving, fencing, sidewalks, etc.

8. **OPERATIONS BUILDING**

- 1,680 sq. ft. CMU building
- Laboratory and furnishings
- Office space
- ADA compliant bathroom
- Utility room
- Control center room

9. **BLOWER/GENERATOR/ELECTRICAL BUILDING**

- 1,460 sq. ft. CMU building to house blowers, standby power generator system, and electrical and control equipment

10. **DEMOLITION OF EXISTING TREATMENT PLANT**

ALTERNATIVE C
OPTION 2 - MODULAR EXTENDED AERATION
SCENARIO C2C - BNR - NITROGEN/PHOSPHORUS REMOVAL
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 325,000	All Req'd	$ 325,000
2	Demolition of Existing Treatment Plant	LS	115,000	All Req'd	115,000
3	Site Work and Landscaping	LS	110,000	All Req'd	110,000
4	New Preliminary Treatment System (Headworks)	LS	770,000	All Req'd	770,000
5	Modular Extended Aeration Treatment System	LS	2,200,000	All Req'd	2,200,000
6	UV Light Disinfection System, Including Building	LS	409,000	All Req'd	409,000
7	Blowers	LS	87,000	All Req'd	87,000
8	Blower/Generator/Electrical Building	LS	234,000	All Req'd	234,000
9	Operations Building	LS	336,000	All Req'd	336,000
10	Process and Yard Piping	LS	405,000	All Req'd	405,000
11	Electrical, Controls, and Instrumentation	LS	495,000	All Req'd	495,000
12	Painting	LS	415,000	All Req'd	415,000
13	Miscellaneous Metals, Grating, and Handrailing	LS	50,000	All Req'd	50,000
14	Site Dewatering	LS	45,000	All Req'd	45,000
	Subtotal Estimated Construction Costs (2010 Dollars)				**$ 5,996,000**
	Contingency @ 10%				600,000
	Total Estimated Construction Costs				**$ 6,596,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	1,319,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,439,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 8,035,000**

PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description	Annual Cost
	ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)	
1	Labor, Including Benefits	$ 65,000
2	Utilities	53,500
3	Supplies, Parts, Chemicals, Maintenance, and Repairs	20,000
4	Sampling, Testing, and Permit Fees	15,000
5	Operator Training and Certification	3,000
6	Capital Outlay	20,000
7	Replacement	35,000
	Total O, M, & R	**$ 211,500**
	Present Worth O, M, & R (5%, 20 yrs.)	2,636,000
	Subtotal Present Worth	**$ 10,671,000**
	SALVAGE	
	Estimated WWTF Salvage Value, Including Property	$ 3,250,000
	Present Worth of Salvage Value (5%, 20 yrs.)	1,225,000
	PRESENT WORTH (2010 DOLLARS)	**$ 9,446,000**

ALTERNATIVE C, OPTION 3
INTEGRATED SLUDGE SEQUENCING BATCH REACTOR (SBR)
SCENARIO C3A - BNR - NITROGEN REMOVAL
SYSTEM IMPROVEMENT COMPONENTS

1. **PRELIMINARY TREATMENT (HEADWORKS)**

   - Vertically-mounted fine screen/washer/compactor
   - New packaged Parshall flume (6-inch) flowmetering manhole
   - Influent lift station
     - Three pumps at 525 gpm and 7.5 Hp each
   - Vortex grit removal system and grit dewatering unit
   - 600 sq. ft. (20 ft. x 30 ft.) building to house screen and grit dewatering equipment

2. **BIOLOGICAL TREATMENT SYSTEM**

   - Integrated sludge SBR activated sludge
     - Common wall reinforced concrete construction
     - Two anaerobic reactors, 0.12 MG each
     - Two surge reactor basins, 0.075 MG each, with one 20 Hp transfer pump for each reactor basin and two 5 Hp auxiliary transfer
     - Two SBR reactor basins, 0.24 MG each, decanters, four 30 Hp blowers, jet aeration system
     - One effluent equalization basin, 0.062 MG with two 10 Hp, 1,050 gpm effluent pumps

3. **DISINFECTION SYSTEM**

   - Ultraviolet light, two banks, 18 low pressure, high intensity lamps per bank, 36 total lamps
   - Install in concrete open channels, spare channel for future expansion
   - 840 sq. ft. (20-foot by 42-foot) CMU building to house UV equipment

4. **SLUDGE DEWATERING AND STORAGE**

   - Maintain existing sludge beds; provide improvements as needed

5. **PROCESS AND YARD PIPING**

6. **ELECTRICAL, CONTROLS, AND INSTRUMENTATION**

7. **SITE WORK AND LANDSCAPING**

   - Pave, fencing, sidewalks, etc.

8. **OPERATIONS BUILDING**

- 1,680 sq. ft. CMU building
- Laboratory and furnishings
- Office space
- ADA compliant bathroom
- Utility room
- Control center room

9. **BLOWER/GENERATOR/ELECTRICAL BUILDING**

- 1,460 sq. ft. CMU building to house blowers, standby power generator system, and electrical and control equipment

10. **DEMOLITION OF EXISTING TREATMENT PLANT**

ALTERNATIVE C
OPTION 3 - INTEGRATED SLUDGE SBR
SCENARIO C3A - BNR - NITROGEN REMOVAL
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 300,000	All Req'd	$ 300,000
2	Demolition of Existing Treatment Plant	LS	115,000	All Req'd	115,000
3	Site Work and Landscaping	LS	110,000	All Req'd	110,000
4	New Preliminary Treatment System (Headworks)	LS	770,000	All Req'd	770,000
5	Integrated Sludge SBR Treatment System	LS	1,875,000	All Req'd	1,875,000
6	UV Light Disinfection System, Including Building	LS	409,000	All Req'd	409,000
7	Blowers	LS	80,000	All Req'd	80,000
8	Blower/Generator/Electrical Building	LS	234,000	All Req'd	234,000
9	Operations Building	LS	336,000	All Req'd	336,000
10	Process and Yard Piping	LS	385,000	All Req'd	385,000
11	Electrical, Controls, and Instrumentation	LS	495,000	All Req'd	495,000
12	Painting	LS	395,000	All Req'd	395,000
13	Miscellaneous Metals, Grating, and Handrailing	LS	50,000	All Req'd	50,000
14	Site Dewatering	LS	45,000	All Req'd	45,000
	Subtotal Estimated Construction Costs (2010 Dollars)				**$ 5,599,000**
	Contingency @ 10%				560,000
	Total Estimated Construction Costs				**$ 6,159,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	1,232,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,352,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 7,511,000**

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
ALT. C - OPTION 3 - SCENARIO C3A
COST ESTIMATE

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PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description	Annual Cost
ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)		
1	Labor, Including Benefits	$ 65,000
2	Utilities	36,500
3	Supplies, Parts, Chemicals, Maintenance, and Repairs	20,000
4	Sampling, Testing, and Permit Fees	15,000
5	Operator Training and Certification	3,000
6	Capital Outlay	20,000
7	Replacement	35,000
	Total O, M, & R	**$ 194,500**
	Present Worth O, M, & R (5%, 20 yrs.)	2,424,000
	Subtotal Present Worth	**$ 9,935,000**
SALVAGE		
	Estimated WWTF Salvage Value, Including Property	3,000,000
	Present Worth of Salvage Value (5%, 20 yrs.)	1,131,000
	PRESENT WORTH (2010 DOLLARS)	**$ 8,804,000**

ALTERNATIVE C, OPTION 3
INTEGRATED SLUDGE SEQUENCING BATCH REACTOR (SBR)
SCENARIO C3B - BNR - NITROGEN/PHOSPHORUS REMOVAL
SYSTEM IMPROVEMENT COMPONENTS

1. **PRELIMINARY TREATMENT (HEADWORKS)**
   - Vertically-mounted fine screen/washer/compactor
   - New packaged Parshall flume (6-inch) flowmetering manhole
   - Influent lift station
     - Three pumps at 525 gpm and 7.5 Hp each
   - Vortex grit removal system and grit dewatering unit
   - 600 sq. ft. (20 ft. x 30 ft.) building to house screen and grit dewatering equipment

2. **BIOLOGICAL TREATMENT SYSTEM**
   - Integrated sludge SBR activated sludge
     - Common wall reinforced concrete construction
     - Two anaerobic reactors, 0.12 MG each
     - Two surge reactor basins, 0.075 MG each, with one 20 Hp transfer pump for each reactor basin and two 5 Hp auxiliary transfer
     - Two SBR reactor basins, 0.24 MG each, decanters, four 30 Hp blowers, jet aeration system
     - One effluent equalization basin, 0.062 MG with two 10 Hp, 1,050 gpm effluent pumps

3. **CHEMICAL FEED SYSTEM (PHOSPHORUS REMOVAL)**
   - Alum or ferric chloride chemical feed system
   - 300 sq. ft. CMU building to house chemical feed system and chemical storage

4. **DISINFECTION SYSTEM**
   - Ultraviolet light, two banks, 18 low pressure, high intensity lamps per bank, 36 total lamps
   - Install in concrete open channels, spare channel for future expansion
   - 840 sq. ft. (20-foot by 42-foot) CMU building to house UV equipment

5. **SLUDGE DEWATERING AND STORAGE**
   - Maintain existing sludge beds; provide improvements as needed

6. **PROCESS AND YARD PIPING**

7. **ELECTRICAL, CONTROLS, AND INSTRUMENTATION**

8. **SITE WORK AND LANDSCAPING**
   - Pave, fencing, sidewalks, etc.

9. **OPERATIONS BUILDING**

- 1,680 sq. ft. CMU building
- Laboratory and furnishings
- Office space
- ADA compliant bathroom
- Utility room
- Control center room

10. **BLOWER/GENERATOR/ELECTRICAL BUILDING**

- 1,460 sq. ft. CMU building to house blowers, standby power generator system, and electrical and control equipment

11. **DEMOLITION OF EXISTING TREATMENT PLANT**

ALTERNATIVE C
OPTION 3 - INTEGRATED SLUDGE SBR
SCENARIO C3B - BNR - NITROGEN/PHOSPHORUS REMOVAL
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 310,000	All Req'd	$ 310,000
2	Demolition of Existing Treatment Plant	LS	115,000	All Req'd	115,000
3	Site Work and Landscaping	LS	110,000	All Req'd	110,000
4	New Preliminary Treatment System (Headworks)	LS	770,000	All Req'd	770,000
5	Integrated Sludge SBR Treatment System	LS	1,875,000	All Req'd	1,875,000
6	UV Light Disinfection System, Including Building	LS	409,000	All Req'd	409,000
7	Blowers	LS	80,000	All Req'd	80,000
8	Chemical Feed System, Including Safety Equipment and Building	LS	185,000	All Req'd	185,000
9	Blower/Generator/Electrical Building	LS	234,000	All Req'd	234,000
10	Operations Building	LS	336,000	All Req'd	336,000
11	Process and Yard Piping	LS	385,000	All Req'd	385,000
12	Electrical, Controls, and Instrumentation	LS	495,000	All Req'd	495,000
13	Painting	LS	395,000	All Req'd	395,000
14	Miscellaneous Metals, Grating, and Handrailing	LS	50,000	All Req'd	50,000
15	Site Dewatering	LS	45,000	All Req'd	45,000

Subtotal Estimated Construction Costs (2010 Dollars)	**$ 5,794,000**
Contingency @ 10%	579,000
Total Estimated Construction Costs	**$ 6,373,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	1,275,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,395,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 7,768,000**

PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description	Annual Cost
ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)		
1	Labor, Including Benefits	$ 65,000
2	Utilities	36,500
3	Supplies, Parts, Chemicals, Maintenance, and Repairs	38,000
4	Sampling, Testing, and Permit Fees	15,000
5	Operator Training and Certification	3,000
6	Capital Outlay	20,000
7	Replacement	35,000
	Total O, M, & R	**$ 212,500**
	Present Worth O, M, & R (5%, 20 yrs.)	2,648,000
	Subtotal Present Worth	**$ 10,416,000**
SALVAGE		
	Estimated WWTF Salvage Value, Including Property	$ 3,000,000
	Present Worth of Salvage Value (5%, 20 yrs.)	1,131,000
	PRESENT WORTH (2010 DOLLARS)	**$ 9,285,000**

ALTERNATIVE C, OPTION 4
PHASE ISOLATION OXIDATION DITCH
SCENARIO C4A - BNR - NITROGEN REMOVAL
SYSTEM IMPROVEMENT COMPONENTS

1. PRELIMINARY TREATMENT (HEADWORKS)

- Vertically-mounted fine screen/washer/compactor
- New packaged Parshall flume (6-inch) flowmetering manhole
- Influent lift station
  - Three pumps at 525 gpm and 7.5 Hp each
- Vortex grit removal system and grit dewatering unit
- 600 sq. ft. (20 ft. x 30 ft.) building to house screen and grit dewatering equipment

2. BIOLOGICAL TREATMENT SYSTEM

- Phase isolation oxidation ditch activated sludge
  - Two reactor basins, 0.23 MG each: two 20 Hp aeration rotors in each basin (40 Hp installed in each reactor basin)
  - One 4 Hp mixer in each basin (two total)
  - Automatic influent distributor
  - Motor-actuated adjustable effluent weirs
  - WAS pump station

3. DISINFECTION SYSTEM

- Ultraviolet light, two banks, 18 low pressure, high intensity lamps per bank, 36 total lamps
- Install in concrete open channels, spare channel for future expansion
- 840 sq. ft. (20 ft. x 42 ft.) CMU building to house UV equipment

4. AEROBIC DIGESTERS

- Two reactors: 110,000 gallons each
- Three blowers: 20 Hp each
- Coarse bubble aerator system

5. SLUDGE DEWATERING AND STORAGE

- Maintain existing sludge beds; provide improvements as needed

6. PROCESS AND YARD PIPING

7. ELECTRICAL, CONTROLS, AND INSTRUMENTATION

8. SITE WORK AND LANDSCAPING

- Paving, fencing, sidewalks, etc.

9. **OPERATIONS BUILDING**

- 1,680 sq. ft. CMU building
- Laboratory and furnishings
- Office space
- ADA compliant bathroom
- Utility room
- Control center room

10. **BLOWER/GENERATOR/ELECTRICAL BUILDING**

- 1,460 sq. ft. CMU building to house blowers, standby power generator system, and electrical and control equipment

11. **DEMOLITION OF EXISTING TREATMENT PLANT**

ALTERNATIVE C
OPTION 4 - PHASED ISOLATION OXIDATION DITCH
SCENARIO C4A - BNR - NITROGEN REMOVAL
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 315,000	All Req'd	$ 315,000
2	Demolition of Existing Treatment Plant	LS	115,000	All Req'd	115,000
3	Site Work and Landscaping	LS	110,000	All Req'd	110,000
4	New Preliminary Treatment System (Headworks)	LS	770,000	All Req'd	770,000
5	Phased Isolation Oxidation Ditch Treatment System	LS	1,680,000	All Req'd	1,680,000
6	UV Light Disinfection System, Including Building	LS	409,000	All Req'd	409,000
7	Blowers	LS	65,000	All Req'd	65,000
8	Aerobic Digesters		460,000	All Req'd	460,000
9	Blower/Generator/Electrical Building	LS	234,000	All Req'd	234,000
10	Operations Building	LS	336,000	All Req'd	336,000
11	Process and Yard Piping	LS	365,000	All Req'd	365,000
12	Electrical, Controls, and Instrumentation	LS	495,000	All Req'd	495,000
13	Painting	LS	395,000	All Req'd	395,000
14	Miscellaneous Metals, Grating, and Handrailing	LS	50,000	All Req'd	50,000
15	Site Dewatering	LS	45,000	All Req'd	45,000
	Subtotal Estimated Construction Costs (2010 Dollars)				**$ 5,844,000**
	Contingency @ 10%				584,000
	Total Estimated Construction Costs				**$ 6,428,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	1,286,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,406,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 7,834,000**

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
ALT. C - OPTION 4 - SCENARIO C4A
COST ESTIMATE

TABLE
4-20

PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description	Annual Cost
ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)		
1	Labor, Including Benefits	$ 65,000
2	Utilities	42,500
3	Supplies, Parts, Chemicals, Maintenance, and Repairs	20,000
4	Sampling, Testing, and Permit Fees	15,000
5	Operator Training and Certification	3,000
6	Capital Outlay	20,000
7	Replacement	35,000
	Total O, M, & R	**$ 200,500**
	Present Worth O, M, & R (5%, 20 yrs.)	2,499,000
	Subtotal Present Worth	**$ 10,333,000**
SALVAGE		
	Estimated WWTF Salvage Value, Including Property	$ 3,250,000
	Present Worth of Salvage Value (5%, 20 yrs.)	1,225,000
	PRESENT WORTH (2010 DOLLARS)	**$ 9,108,000**

ALTERNATIVE C, OPTION 4
PHASE ISOLATION OXIDATION DITCH
SCENARIO C4B - BNR - NITROGEN/PHOSPHORUS REMOVAL
SYSTEM IMPROVEMENT COMPONENTS

1. **PRELIMINARY TREATMENT (HEADWORKS)**

- Vertically-mounted fine screen/washer/compactor
- New packaged Parshall flume (6-inch) flowmetering manhole
- Influent lift station
  - Three pumps at 525 gpm and 7.5 Hp each
- Vortex grit removal system and grit dewatering unit
- 600 sq. ft. (20 ft. x 30 ft.) building to house screen and grit dewatering equipment

2. **BIOLOGICAL TREATMENT SYSTEM**

- Phase isolation oxidation ditch activated sludge
  - 3-stage anaerobic selector, 2 Hp mixer installed in each stage (three total)
  - Two reactor basins, 0.23 MG each: two 20 Hp aeration rotors in each basin (40 Hp installed in each reactor basin)
  - One 4 Hp mixer in each basin (two total)
  - Automatic influent distributor
  - Motor-actuated adjustable effluent weirs
  - WAS pump station
  - RAS pump station

3. **DISINFECTION SYSTEM**

- Ultraviolet light, two banks, 18 low pressure, high intensity lamps per bank, 36 total lamps
- Install in concrete open channels, spare channel for future expansion
- 840 sq. ft. (20 ft. x 42 ft.) CMU building to house UV equipment

4. **AEROBIC DIGESTERS**

- Two reactors: 110,000 gallons each
- Three blowers: 20 Hp each
- Coarse bubble aerator system

5. **SLUDGE DEWATERING AND STORAGE**

- Maintain existing sludge beds; provide improvements as needed

6. **PROCESS AND YARD PIPING**

7. **ELECTRICAL, CONTROLS, AND INSTRUMENTATION**

8. **SITE WORK AND LANDSCAPING**

- Paving, fencing, sidewalks, etc.

9. **OPERATIONS BUILDING**

- 1,680 sq. ft. CMU building
- Laboratory and furnishings
- Office space
- ADA compliant bathroom
- Utility room
- Control center room

10. **BLOWER/GENERATOR/ELECTRICAL BUILDING**

- 1,460 sq. ft. CMU building to house blowers, standby power generator system, and electrical and control equipment

11. **DEMOLITION OF EXISTING TREATMENT PLANT**

ALTERNATIVE C
OPTION 4 - PHASED ISOLATION OXIDATION DITCH
SCENARIO C4B - BNR - NITROGEN/PHOSPHORUS REMOVAL
PROJECT COST ESTIMATE AND PRESENT WORTH ANALYSIS (2010)

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 335,000	All Req'd	$ 335,000
2	Demolition of Existing Treatment Plant	LS	115,000	All Req'd	115,000
3	Site Work and Landscaping	LS	110,000	All Req'd	110,000
4	New Preliminary Treatment System (Headworks)	LS	770,000	All Req'd	770,000
5	Phased Isolation Oxidation Ditch Treatment System	LS	2,000,000	All Req'd	2,000,000
6	UV Light Disinfection System, Including Building	LS	409,000	All Req'd	409,000
7	Blowers	LS	65,000	All Req'd	65,000
8	Aerobic Digesters		460,000	All Req'd	460,000
9	Blower/Generator/Electrical Building	LS	234,000	All Req'd	234,000
10	Operations Building	LS	336,000	All Req'd	336,000
11	Process and Yard Piping	LS	400,000	All Req'd	400,000
12	Electrical, Controls, and Instrumentation	LS	495,000	All Req'd	495,000
13	Painting	LS	395,000	All Req'd	395,000
14	Miscellaneous Metals, Grating, and Handrailing	LS	50,000	All Req'd	50,000
15	Site Dewatering	LS	45,000	All Req'd	45,000
	Subtotal Estimated Construction Costs (2010 Dollars)				**$ 6,219,000**
	Contingency @ 10%				622,000
	Total Estimated Construction Costs				**$ 6,841,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	1,368,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,488,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 8,329,000**

PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description	Annual Cost
ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)		
1	Labor, Including Benefits	$ 65,000
2	Utilities	49,000
3	Supplies, Parts, Chemicals, Maintenance, and Repairs	20,000
4	Sampling, Testing, and Permit Fees	15,000
5	Operator Training and Certification	3,000
6	Capital Outlay	20,000
7	Replacement	35,000
	Total O, M, & R	**$ 207,000**
	Present Worth O, M, & R (5%, 20 yrs.)	2,580,000
	Subtotal Present Worth	**$ 10,909,000**
SALVAGE		
	Estimated WWTF Salvage Value, Including Property	$ 3,250,000
	Present Worth of Salvage Value (5%, 20 yrs.)	1,225,000
	PRESENT WORTH (2010 DOLLARS)	**$ 9,684,000**

ALTERNATIVE C, OPTION 5
MEMBRANE BIOREACTOR (MBR)
SCENARIO C5A - BNR - NITROGEN REMOVAL
SYSTEM IMPROVEMENT COMPONENTS

1. **PRELIMINARY TREATMENT (HEADWORKS)**

- Vertically-mounted fine screen/washer/compactor
- New packaged Parshall flume (6-inch) flowmetering manhole
- Influent lift station
  - Three pumps at 525 gpm and 7.5 Hp each
- Vortex grit removal system and grit dewatering unit
- 600 sq. ft. (20 ft. x 30 ft.) building to house screen and grit dewatering equipment

2. **BIOLOGICAL TREATMENT SYSTEM**

- MBR activated sludge
  - Common-wall concrete construction
  - Two anoxic reactors, 36,000 gallons each, with two 10 Hp feed-forward pumps for each reactor basin and one 5 Hp mixer in each reactor
  - Two pre-aerator basins, 9,000 gallons each, two 5 Hp blowers, fine bubble diffused air system
  - Two MBR basins with 8 flat plate type submerged membranes per basin (16 total), two 75 Hp blowers, fine bubble aeration system, permeate pumps, membrane chemical cleaning system
  - Two aerobic digesters, 110,000 gallons each with two 20 Hp blowers, coarse bubble aeration system

3. **DISINFECTION SYSTEM**

- Ultraviolet light, two banks, 18 low pressure, high intensity lamps per bank, 36 total lamps
- Install in concrete open channels, spare channel for future expansion
- 840 sq. ft. (20-foot by 42-foot) CMU building to house UV equipment

4. **SLUDGE DEWATERING AND STORAGE**

- Maintain existing sludge beds; provide improvements as needed

5. **PROCESS AND YARD PIPING**

6. **ELECTRICAL, CONTROLS, AND INSTRUMENTATION**

7. **SITE WORK AND LANDSCAPING**

- Pave, fencing, sidewalks, etc.

8. **OPERATIONS BUILDING**

- 1,680 sq. ft. CMU building
- Laboratory and furnishings
- Office space
- ADA compliant bathroom
- Utility room
- Control center room

9. **BLOWER/GENERATOR/ELECTRICAL BUILDING**

- 1,460 sq. ft. CMU building to house blowers, standby power generator system, and electrical and control equipment

10. **DEMOLITION OF EXISTING TREATMENT PLANT**

ALTERNATIVE C - OPTION 5 - MEMBRANE BIOREACTOR
SCENARIO C5A - BNR - NITROGEN REMOVAL

ESTIMATED CONSTRUCTION COSTS

Item	Description	Unit	Unit Price	Estimated Quantity	Total 2010 Price
1	Mobilization/Demobilization	LS	$ 310,000	All Req'd	$ 310,000
2	Demolition of Existing Treatment Plant	LS	115,000	All Req'd	115,000
3	Site Work and Landscaping	LS	110,000	All Req'd	110,000
4	New Preliminary Treatment System (Headworks)	LS	625,000	All Req'd	625,000
5	MBR Treatment System Equipment Package Including Contractor Markup and Installation	LS	2,500,000	All Req'd	2,500,000
6	MBR Treatment System and Aerobic Digester Concrete Structure		680,000	All Req'd	680,000
7	UV Light Disinfection System, Including Building	LS	409,000	All Req'd	409,000
8	Blower/Generator/Electrical Building	LS	234,000	All Req'd	234,000
9	Operations Building	LS	336,000	All Req'd	336,000
10	Process and Yard Piping	LS	350,000	All Req'd	350,000
11	Electrical, Controls, and Instrumentation	LS	495,000	All Req'd	495,000
12	Painting	LS	365,000	All Req'd	365,000
13	Miscellaneous Metals, Grating and Handrailing	LS	50,000	All Req'd	50,000
14	Site Dewatering	LS	45,000	All Req'd	45,000
	Subtotal Estimated Construction Costs (2010 Dollars)				**$ 6,624,000**
	Contingency @ 10%				662,000
	Total Estimated Construction Costs				**$ 7,286,000**

OTHER PROJECT COSTS

Preliminary, Design, and Construction Engineering	$ 1,457,000
Environmental and Permitting	45,000
Funding Acquisition	30,000
Legal and Funding Administration	45,000
Subtotal Other Costs	**$ 1,577,000**
TOTAL ESTIMATED PROJECT COSTS (2010 DOLLARS)	**$ 8,863,000**

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
ALT. C - OPTION 5 - SCENARIO C5A
COST ESTIMATE

TABLE 4-24

PRESENT WORTH ANALYSIS (2010 DOLLARS)

Item	Description		Annual Cost
ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (O, M, & R)			
1	Labor, Including Benefits	$	65,000
2	Utilities		45,000
3	Supplies, Parts, Chemicals, Maintenance, and Repairs		35,000
4	Sampling, Testing, and Permit Fees		15,000
5	Operator Training and Certification		3,000
6	Capital Outlay		20,000
7	Replacement		35,000
	Total O, M, & R	**$**	**218,000**
	Present Worth O, M, & R (5%, 20 yrs.)		2,717,000
	Subtotal Present Worth	**$**	**11,580,000**
SALVAGE			
	Estimated WWTF Salvage Value, Including Property	$	3,000,000
	Present Worth of Salvage Value (5%, 20 yrs.)		1,131,000
	PRESENT WORTH (2010 DOLLARS)	**$**	**10,449,000**

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
ALT. C - OPTION 5 - SCENARIO C5A
COST ESTIMATE

TABLE 4-24
CONT'D

SUMMARY
PROJECT COST ESTIMATE AND PRESENT WORTH VALUE

ALTERNATIVE A - DO NOTHING				
	Estimated Construction Cost (2010 Dollars)	Total Estimated Project Cost (2010 Dollars)	Total Estimated Annual O, M, & R	Present Worth (2010 Dollars)
	$0	$0	$350,000	N/A
ALTERNATIVE B1 - IMPROVE EXISTING WASTEWATER TREATMENT FACILITY / ALTERNATIVE B2 - UPGRADE EXISTING WASTEWATER TREATMENT FACILITY				
	Estimated Construction Cost (2010 Dollars)	Total Estimated Project Cost (2010 Dollars)	Total Estimated Annual O, M, & R	Present Worth (2010 Dollars)
Alternative B1 - BOD and TSS Removal Only	$3,430,000	$4,569,000	$213,000	$6,281,000
Alternative B2 - BOD and TSS Removal Only	$6,029,000	$7,218,000	$203,000	$8,806,000
ALTERNATIVE C - NEW ACTIVATED SLUDGE MECHANICAL WASTEWATER TREATMENT FACILITY				
	Estimated Construction Cost (2010 Dollars)[1]	Total Estimated Project Cost (2010 Dollars)	Total Estimated Annual O, M, & R	Present Worth (2010 Dollars)
Option 1 - Intermittent Cycle Sequencing Batch Reactor				
Scenario C1A - BOD and TSS Removal Only	$5,765,000	$7,038,000	$198,000	$8,374,000
Scenario C1B - BNR - Nitrogen Removal	$6,172,000	$7,526,000	$197,500	$8,856,000
Scenario C1C - BNR - Nitrogen/Phosphorus Removal	$6,376,000	$7,771,000	$215,500	$9,326,000
Option 2 - Modular Extended Aeration				
Scenario C2A - BOD and TSS Removal Only	$6,205,000	$7,566,000	$207,000	$9,015,000
Scenario C2B - BNR - Nitrogen Removal	$6,480,000	$7,896,000	$211,500	$9,307,000
Scenario C2C - BNR - Nitrogen/Phosphorus Removal	$6,056,000	$8,035,000	$211,500	$9,446,000
Option 3 - Integrated Sludge SBR				
Scenario C3A - BNR - Nitrogen Removal	$6,159,000	$7,511,000	$194,500	$8,804,000
Scenario C3B - Nitrogen/Phosphorus Removal	$6,373,000	$7,768,000	$212,500	$9,285,000
Option 4 - Phased Isolation Oxidation Ditch				
Scenario C4A - BNR - Nitrogen Removal	$6,428,000	$7,834,000	$200,500	$9,108,000
Scenario C4B - BNR - Nitrogen/Phosphorus Removal	$6,841,000	$8,329,000	$207,000	$9,684,000
Option 5 - Membrane Bioreactor				
Scenario C5A - BNR - Nitrogen Removal	$7,286,000	$8,863,000	$218,000	$10,449,000

[1] Estimated costs shown are based on systems utilizing aerobic digestion. To provide the systems with anaerobic digestion is estimated to cost an additional $625,000.

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CITY OF
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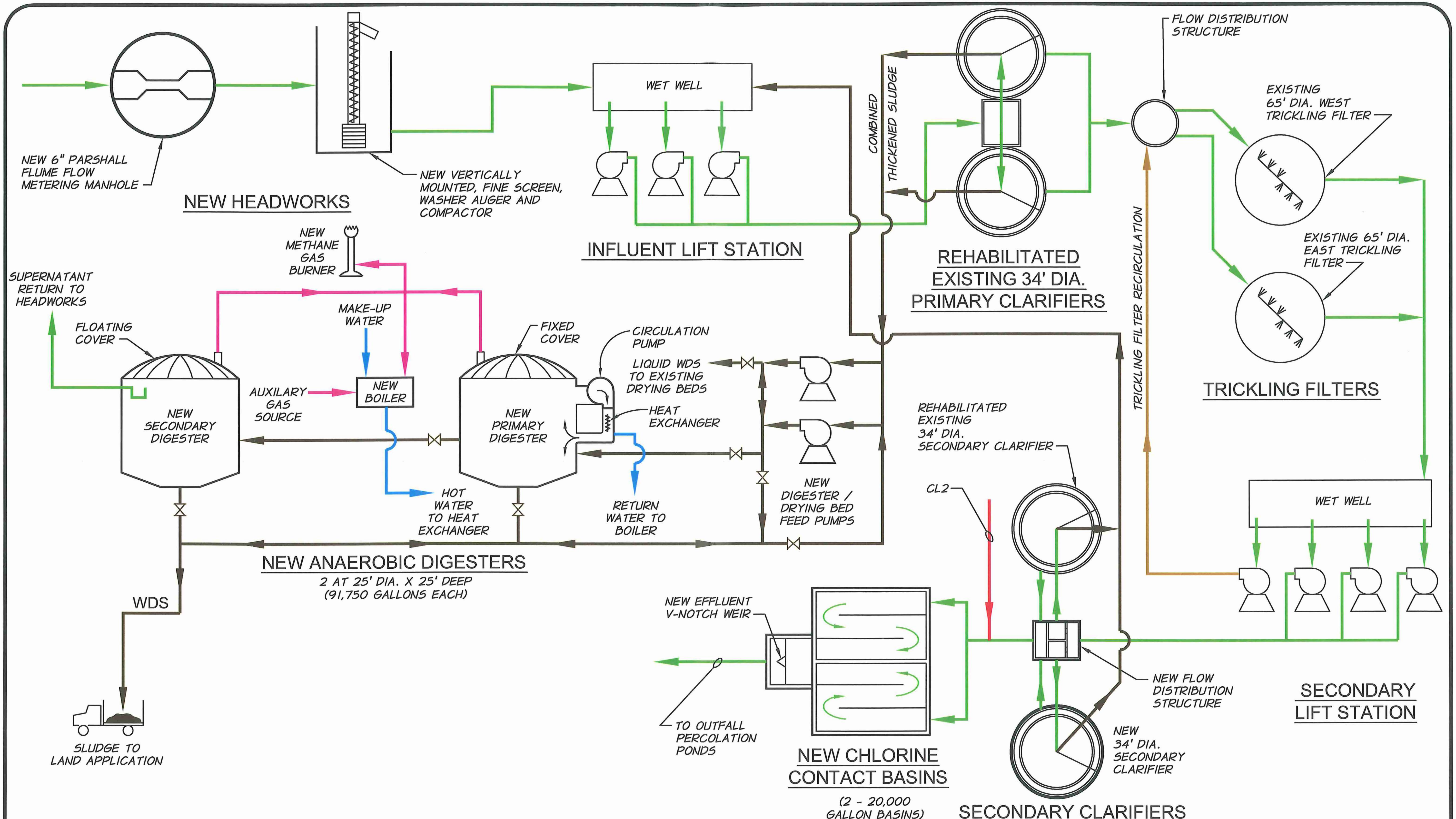
WASTEWATER FACILITIES PLAN
PROJECT COST ESTIMATE AND PRESENT WORTH VALUE

TABLE
4-25



LEGEND

	LIQUID PROCESS STREAM		VALVE
	SOLIDS PROCESS STREAM	MG	= MILLION GALLONS
	METHANE / AUXILIARY GAS STREAM	WDS	= WASTE DIGESTED SLUDGE
	PUMP		

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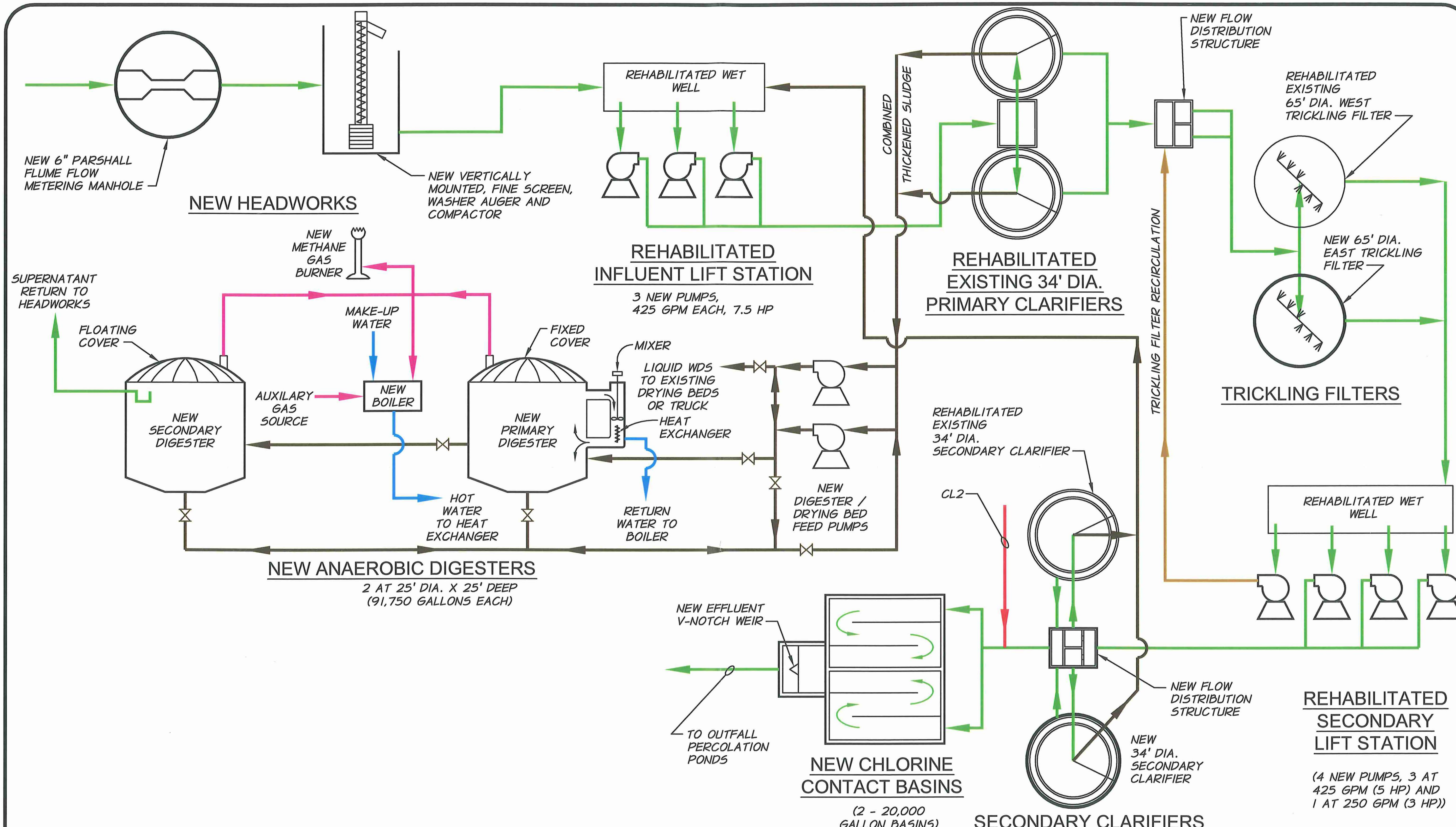
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC
ALTERNATIVE B - OPTION B1
IMPROVE EXISTING WASTEWATER TREATMENT FACILITY

FIGURE
4-1A



LEGEND

LIQUID PROCESS STREAM	⋈ VALVE
SOLIDS PROCESS STREAM	MG = MILLION GALLONS
METHANE / AUXILLARY GAS STREAM	WDS = WASTE DIGESTED SLUDGE
PUMP	

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WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALTERNATIVE B2
IMPROVE EXISTING WASTEWATER TREATMENT FACILITY

FIGURE
4-1B

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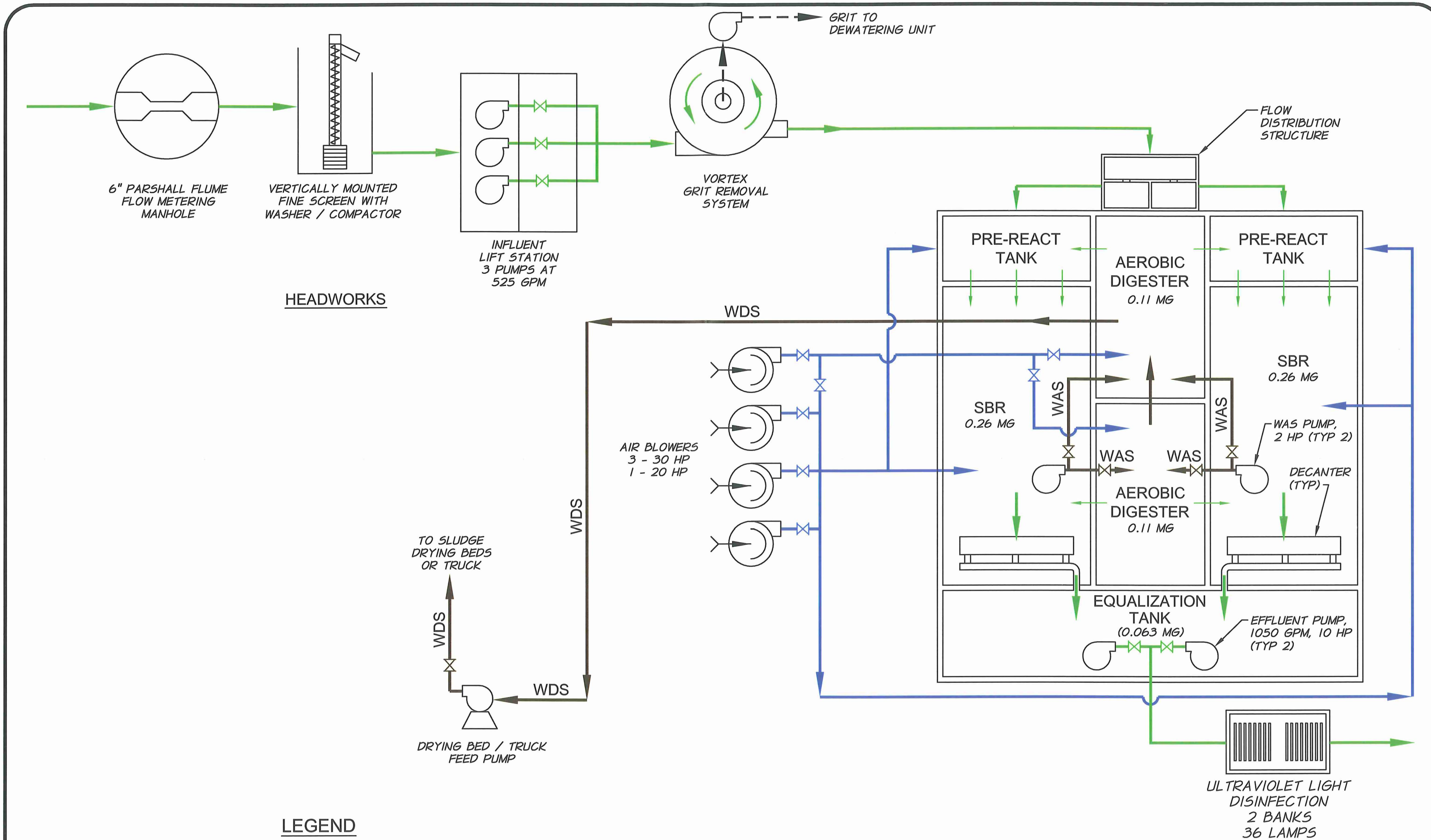

LEGEND

	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
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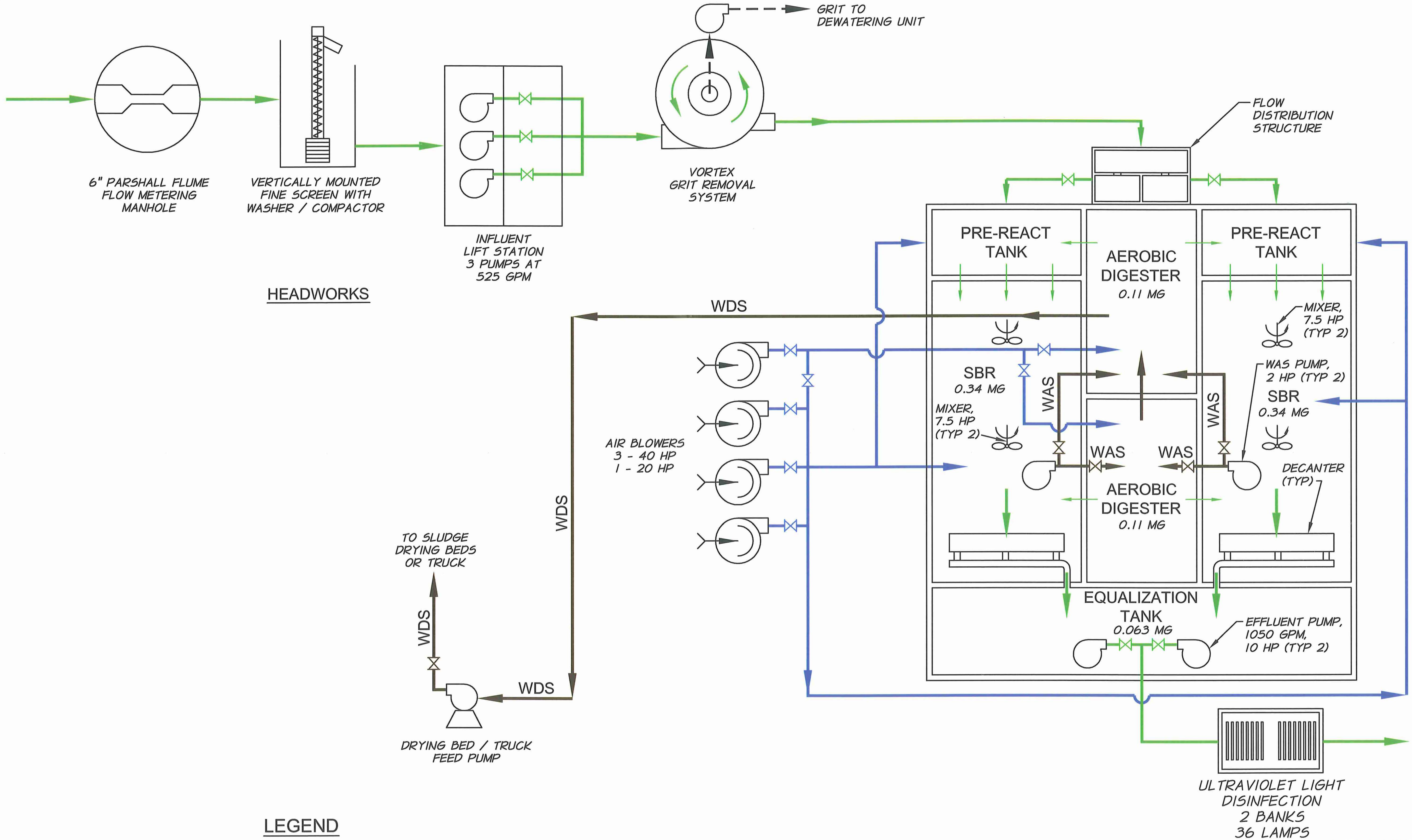
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 1
INTERMITTENT CYCLE SBR -
SCENARIO C1A - BOD_5 / TSS ONLY

FIGURE
4-2



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
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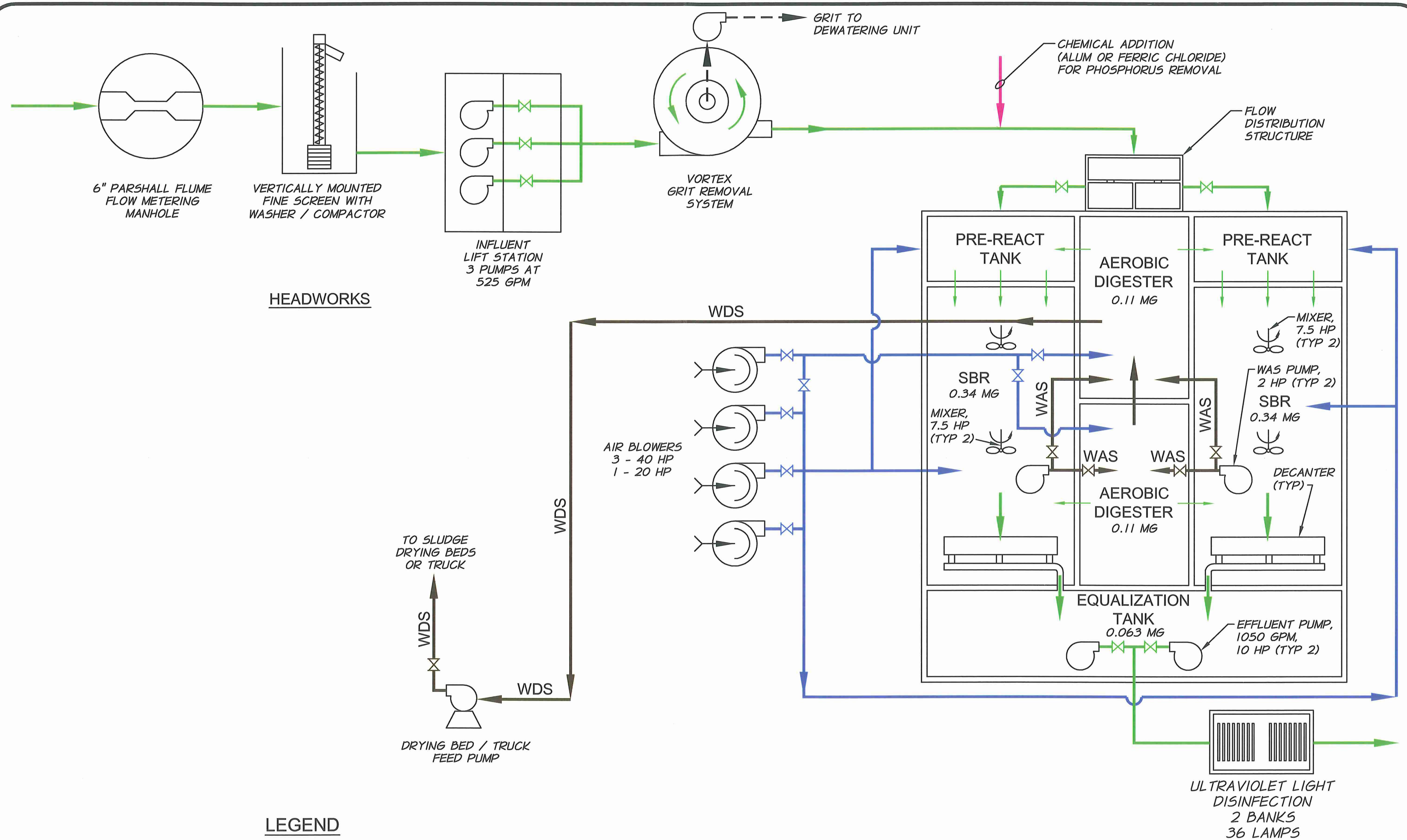
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 1
INTERMITTENT CYCLE SBR
SCENARIO C1B - BNR-NITROGEN REMOVAL

FIGURE
4-3

Q:\JOHNDAY\592-22_WWSystem\dwg\FIG4-X.dwg, 4-3, 10/27/2009 10:35:29 AM, earntz



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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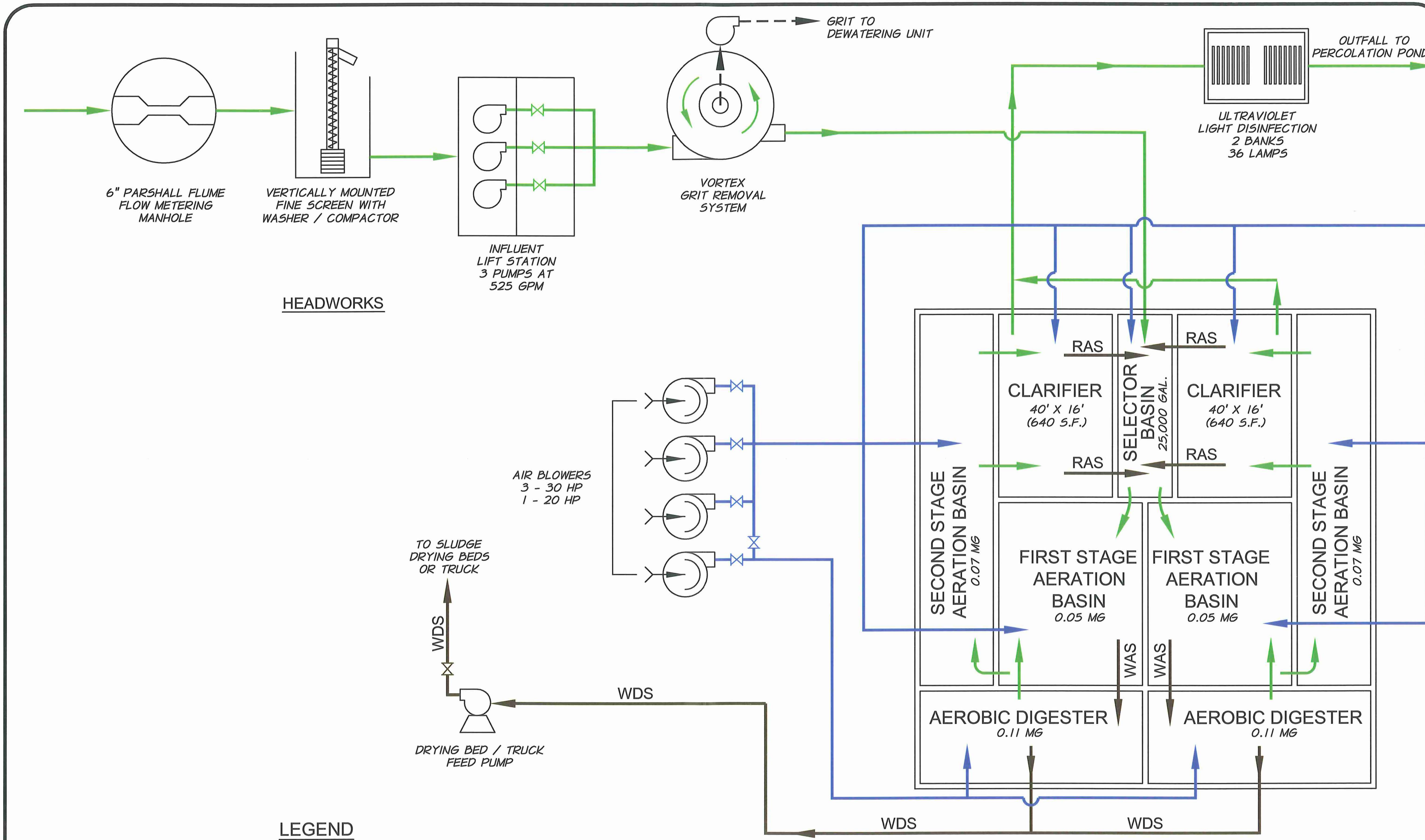
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 1
INTERMITTENT CYCLE SBR - SCENARIO C1C -
BNR - NITROGEN / PHOSPHORUS REMOVAL

FIGURE
4-4

Q:\JOHNDAY\592-22_WWSystem\dwg\FIG4-X.dwg, 4-4, 10/27/2009 10:35:34 AM, earntz



LEGEND

(green line)	LIQUID PROCESS STREAM	⋈	VALVE
(brown line)	SOLIDS PROCESS STREAM	MG	= MILLION GALLONS
(blue line)	AIR STREAM	WDS	= WASTE DIGESTED SLUDGE
	PUMP	WAS	= WASTE ACTIVATED SLUDGE
		RAS	= RETURN ACTIVATED SLUDGE

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WASTEWATER FACILITIES PLAN

PROCESS SCHEMATIC - ALT. C, OPTION 2
MODULAR EXTENDED AERATION -
SCENARIO C2A - BOD$_5$ / TSS ONLY

FIGURE
4-5

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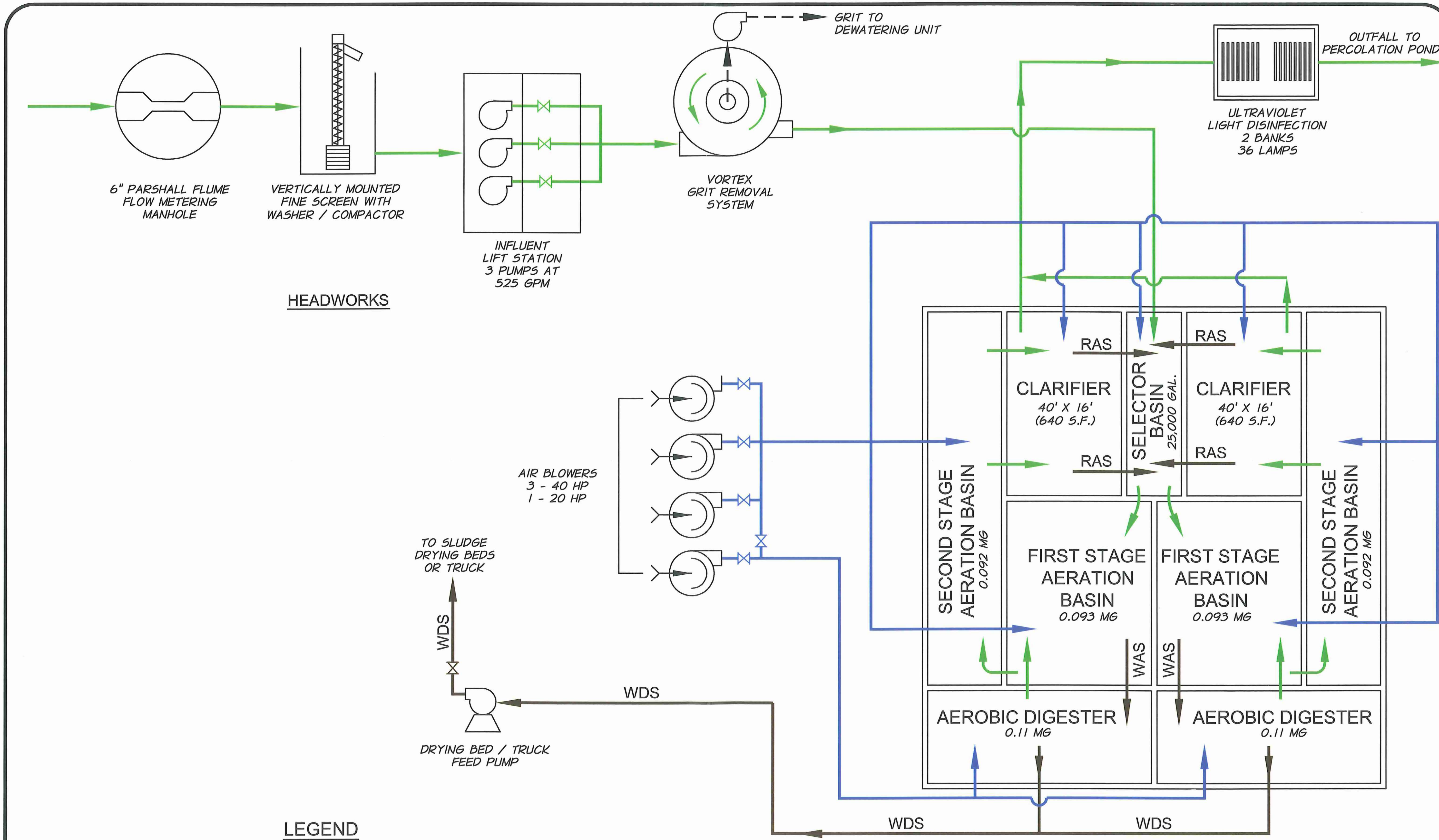

LEGEND

LIQUID PROCESS STREAM	
SOLIDS PROCESS STREAM	
AIR STREAM	
PUMP	

⋈		VALVE
MG	=	MILLION GALLONS
WDS	=	WASTE DIGESTED SLUDGE
WAS	=	WASTE ACTIVATED SLUDGE
RAS	=	RETURN ACTIVATED SLUDGE

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CITY OF
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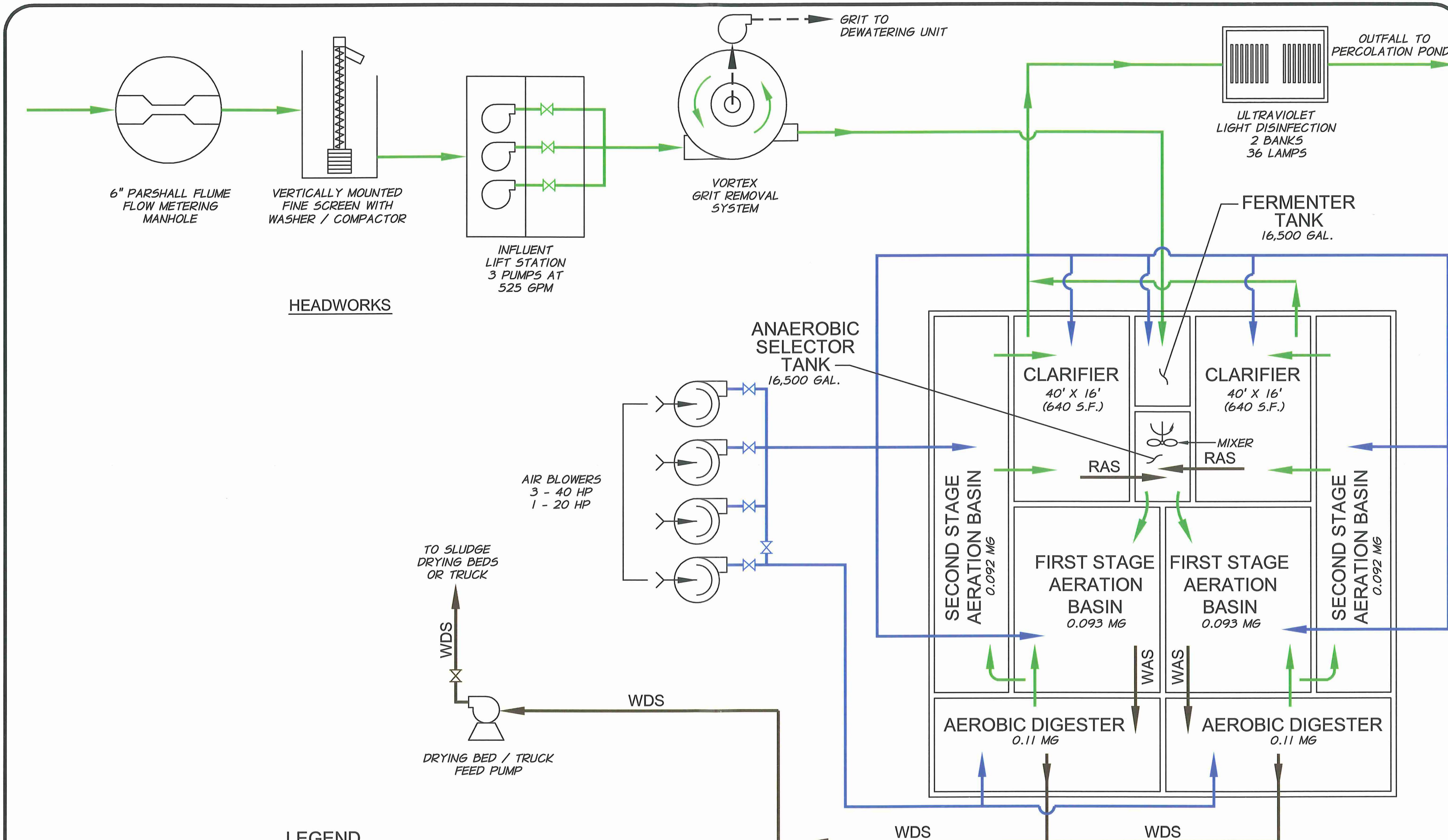
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 2
MODULAR EXTENDED AERATION -
SCENARIO C2B - BNR-NITROGEN REMOVAL

FIGURE
4-6



LEGEND

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

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CITY OF
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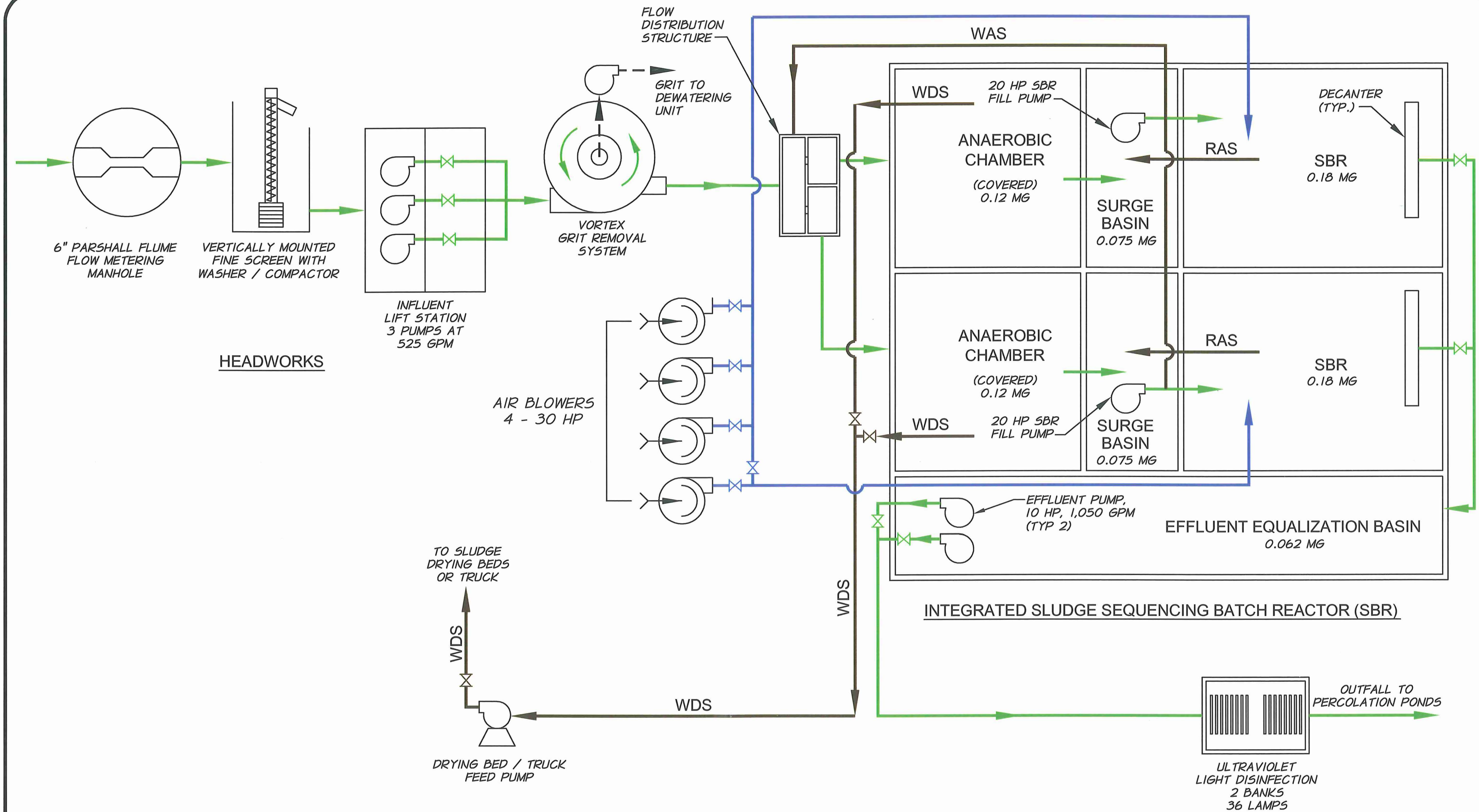
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 2
MODULAR EXTENDED AERATION - SCENARIO C2C
BNR - NITROGEN / PHOSPHORUS REMOVAL

FIGURE 4-7



LEGEND

(green line)	LIQUID PROCESS STREAM	⋈	VALVE
(brown line)	SOLIDS PROCESS STREAM	MG	= MILLION GALLONS
(blue line)	AIR STREAM	WDS	= WASTE DIGESTED SLUDGE
(pump symbol)	PUMP	WAS	= WASTE ACTIVATED SLUDGE
		RAS	= RETURN ACTIVATED SLUDGE

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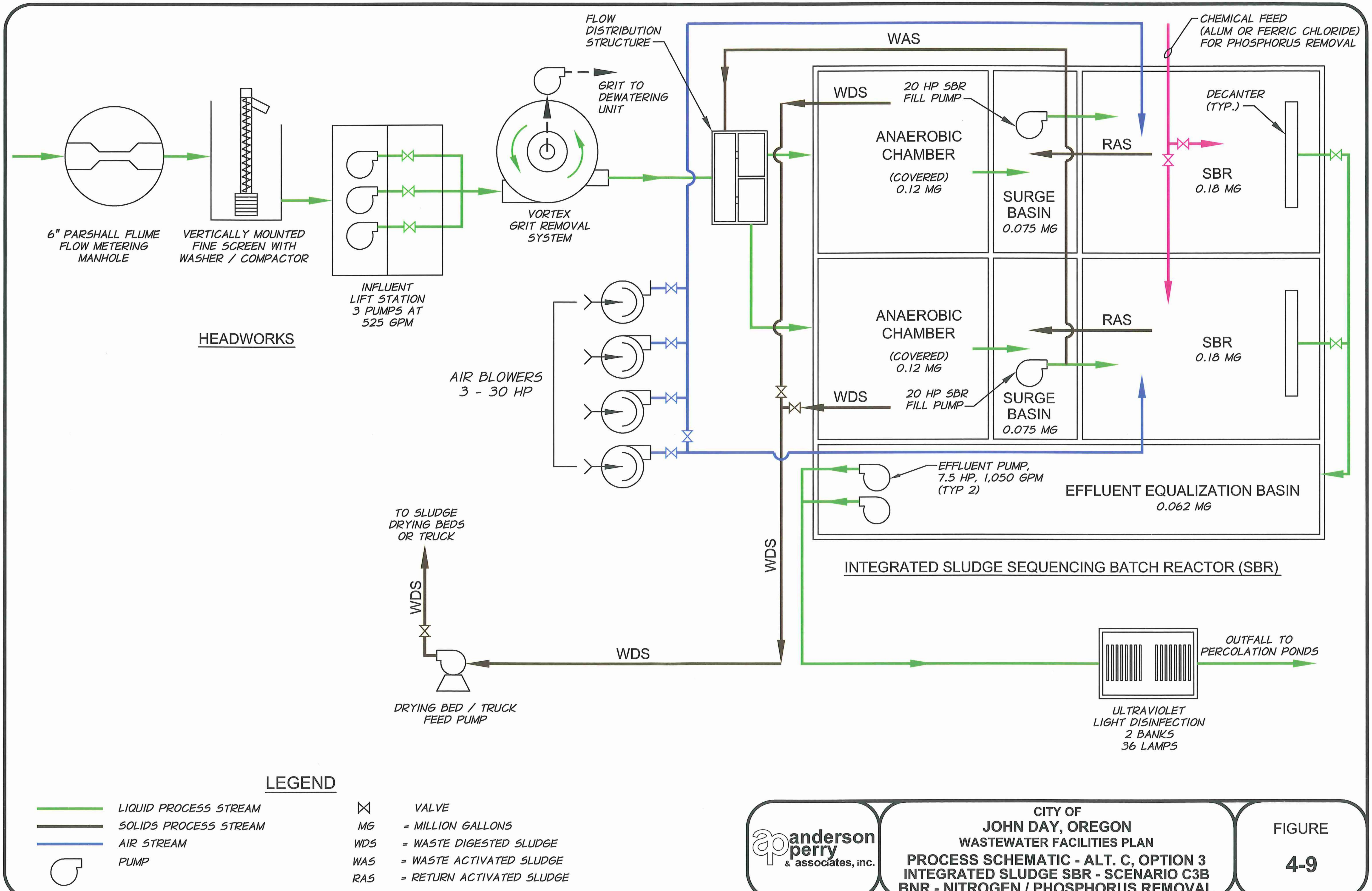
CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 3
INTEGRATED SLUDGE SBR -
SCENARIO C3A - BNR-NITROGEN REMOVAL

FIGURE
4-8

Q:\JOHNDAY\592-22_WWSystem\dwg\FIG4-X.dwg, 4-8, 10/27/2009 10:35:54 AM, earntz



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CITY OF
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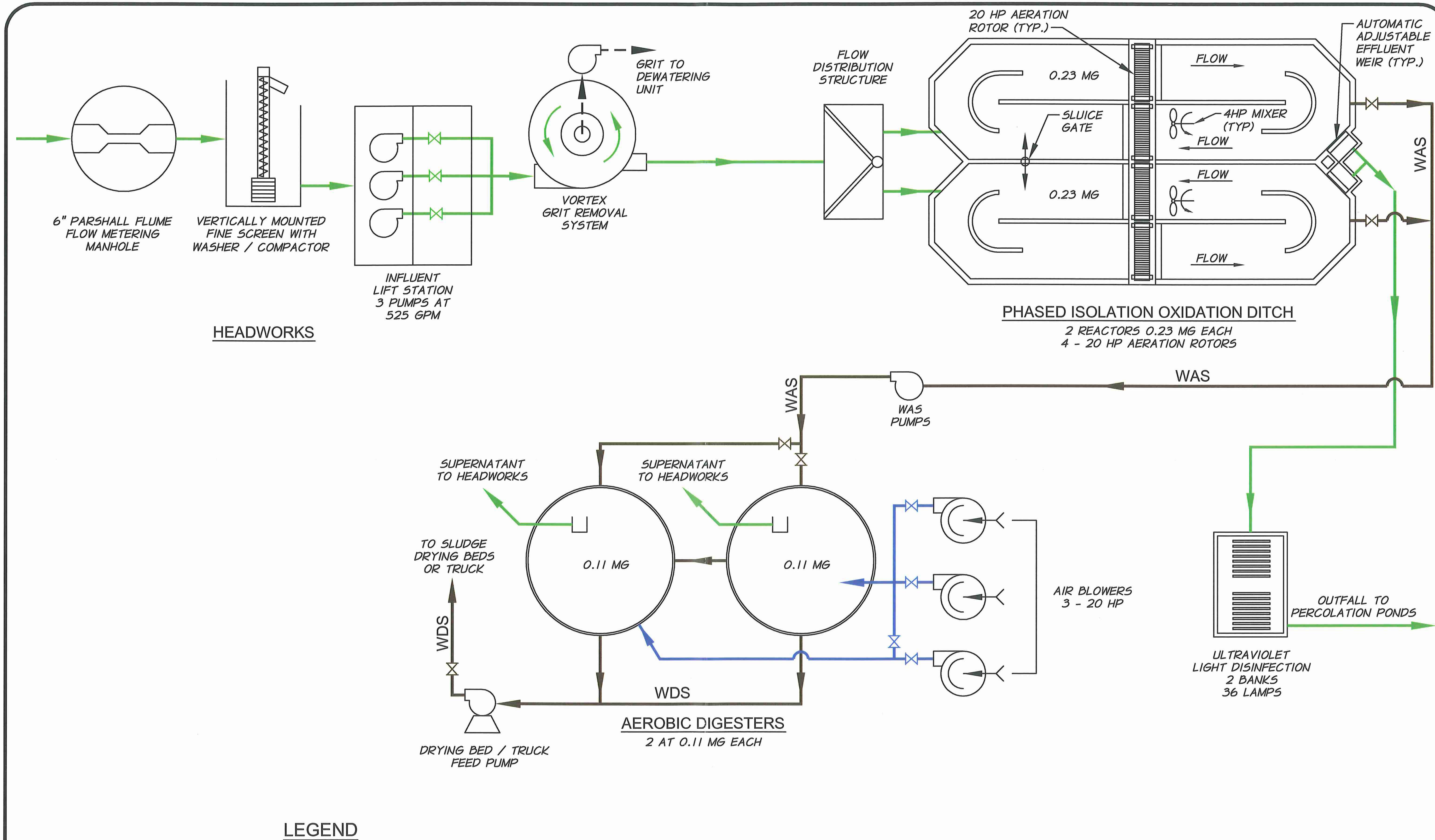
WASTEWATER FACILITIES PLAN

PROCESS SCHEMATIC - ALT. C, OPTION 3
INTEGRATED SLUDGE SBR - SCENARIO C3B
BNR - NITROGEN / PHOSPHORUS REMOVAL

FIGURE 4-9



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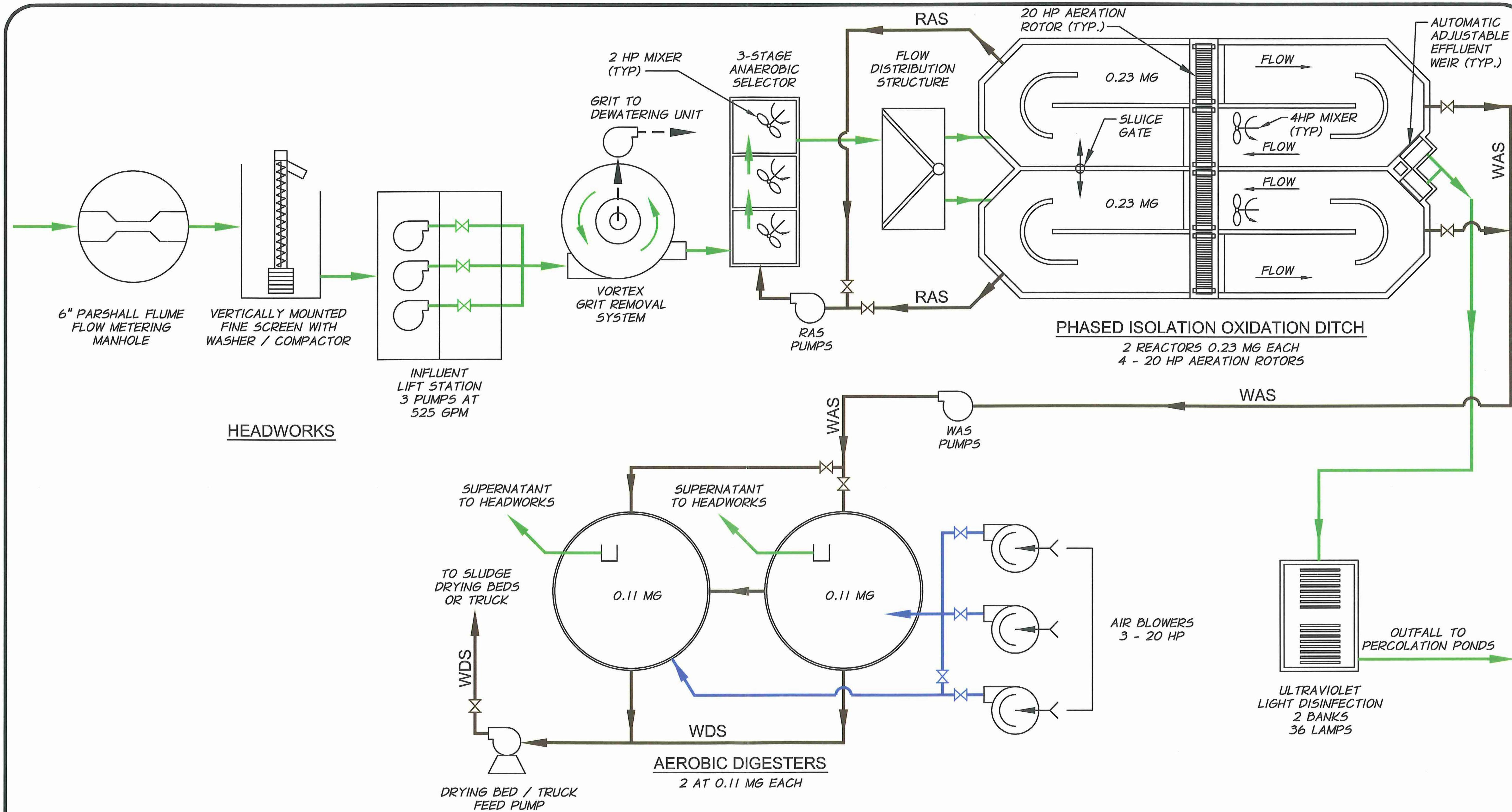
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 4
PHASED ISOLATION OXIDATION DITCH -
SCENARIO C4A - BNR - NITROGEN REMOVAL

FIGURE
4-10



LEGEND

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

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CITY OF
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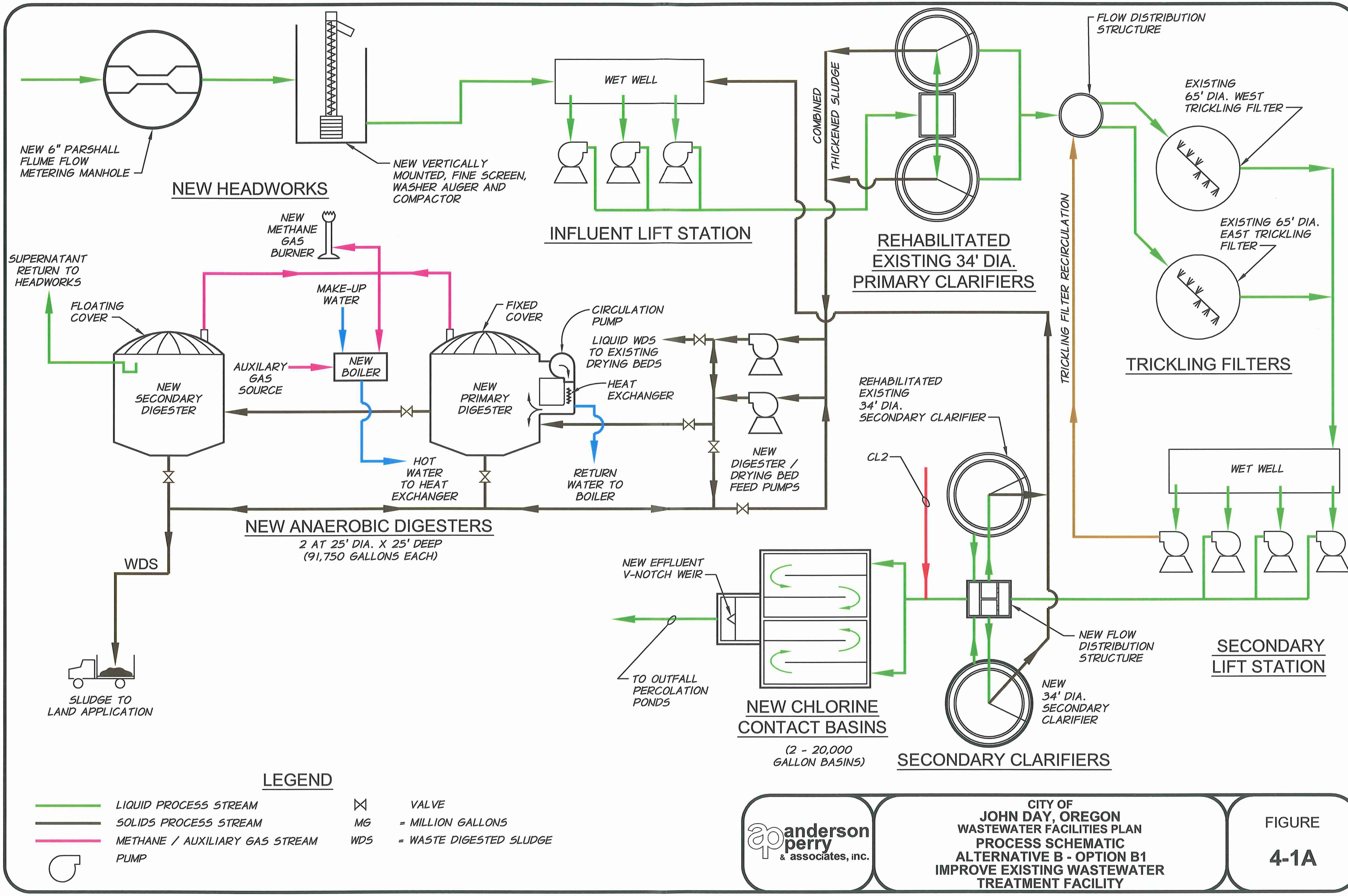
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 4
PHASED ISOLATION OXIDATION DITCH - SCENARIO C3B
BNR - NITROGEN / PHOSPHORUS REMOVAL

FIGURE
4-11

Q:\JOHNDAY\592-22_WWSystem\dwg\FIG4-X.dwg, 4-11, 10/27/2009 10:36:09 AM, earntz



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CITY OF
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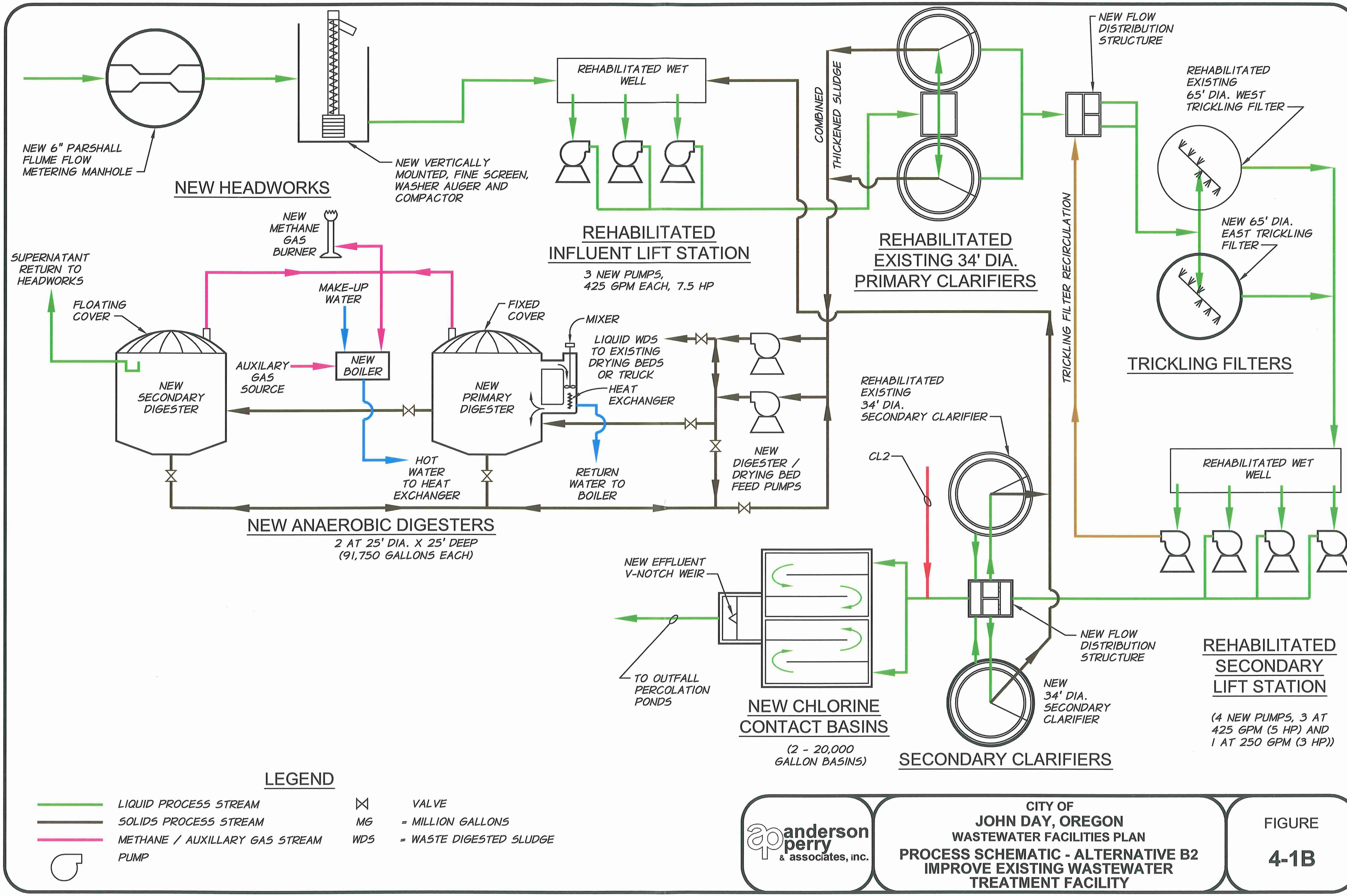
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC
ALTERNATIVE B - OPTION B1
IMPROVE EXISTING WASTEWATER TREATMENT FACILITY

FIGURE
4-1A

Q:\JOHNDAY\592-22_WWSystem\dwg\FIG4-X.dwg, 4-1A, 10/27/2009 10:35:16 AM, earntz



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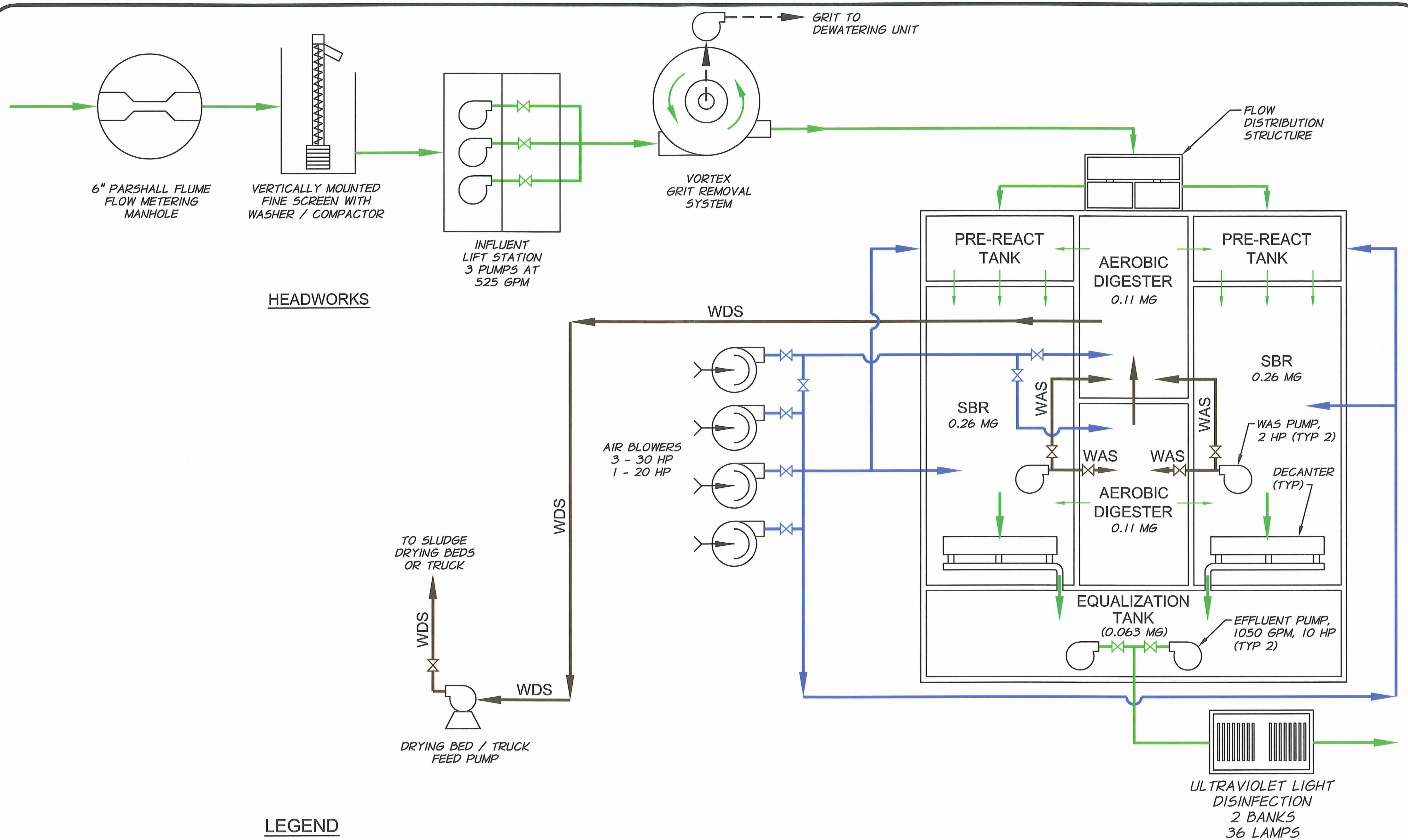

LEGEND

	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
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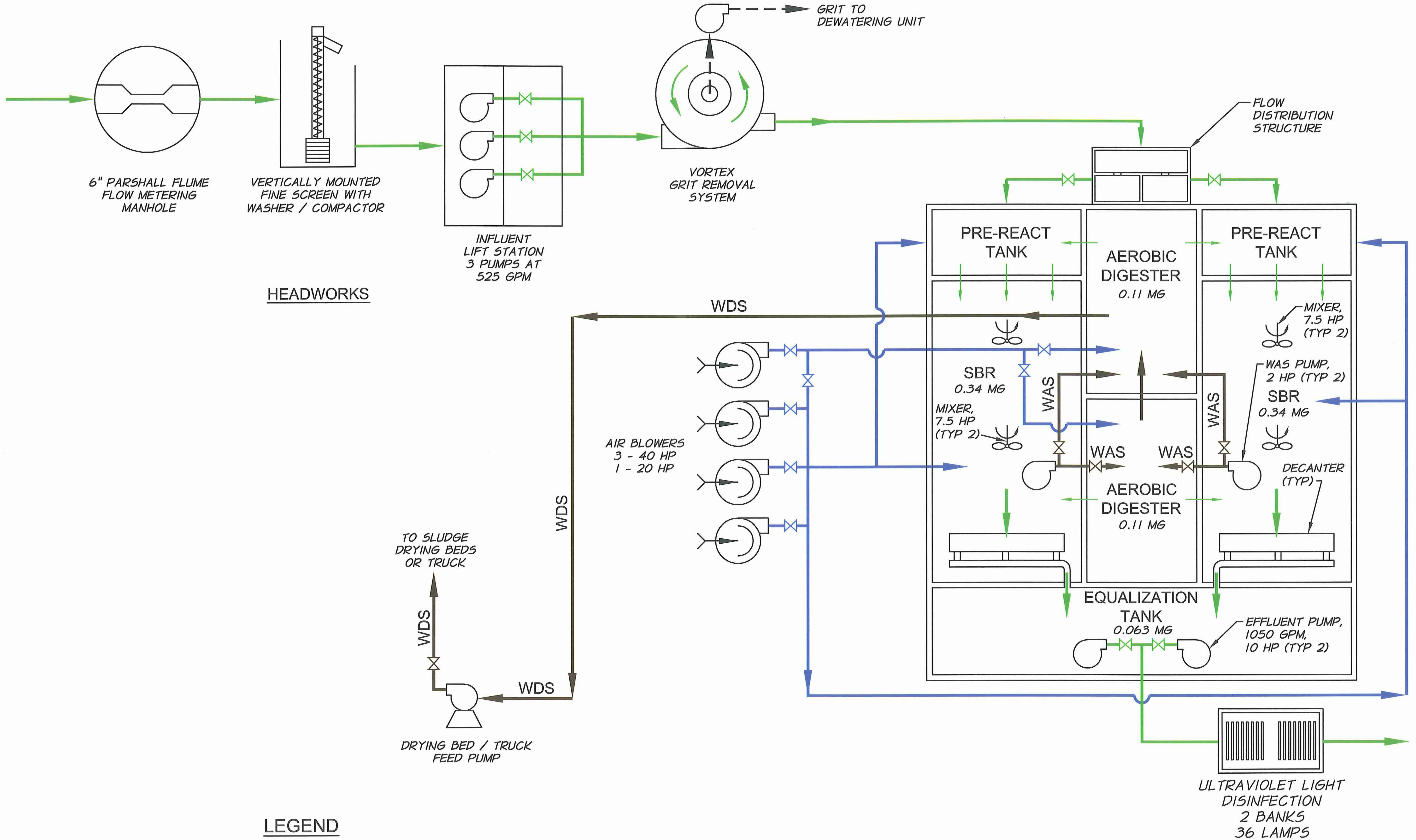
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 1
INTERMITTENT CYCLE SBR -
SCENARIO C1A - BOD_5 / TSS ONLY

FIGURE
4-2

Q:\JOHNDAY\592-22_WWSystem\dwg\FIG4-X.dwg, 4-2, 10/27/2009 10:35:24 AM, earntz



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
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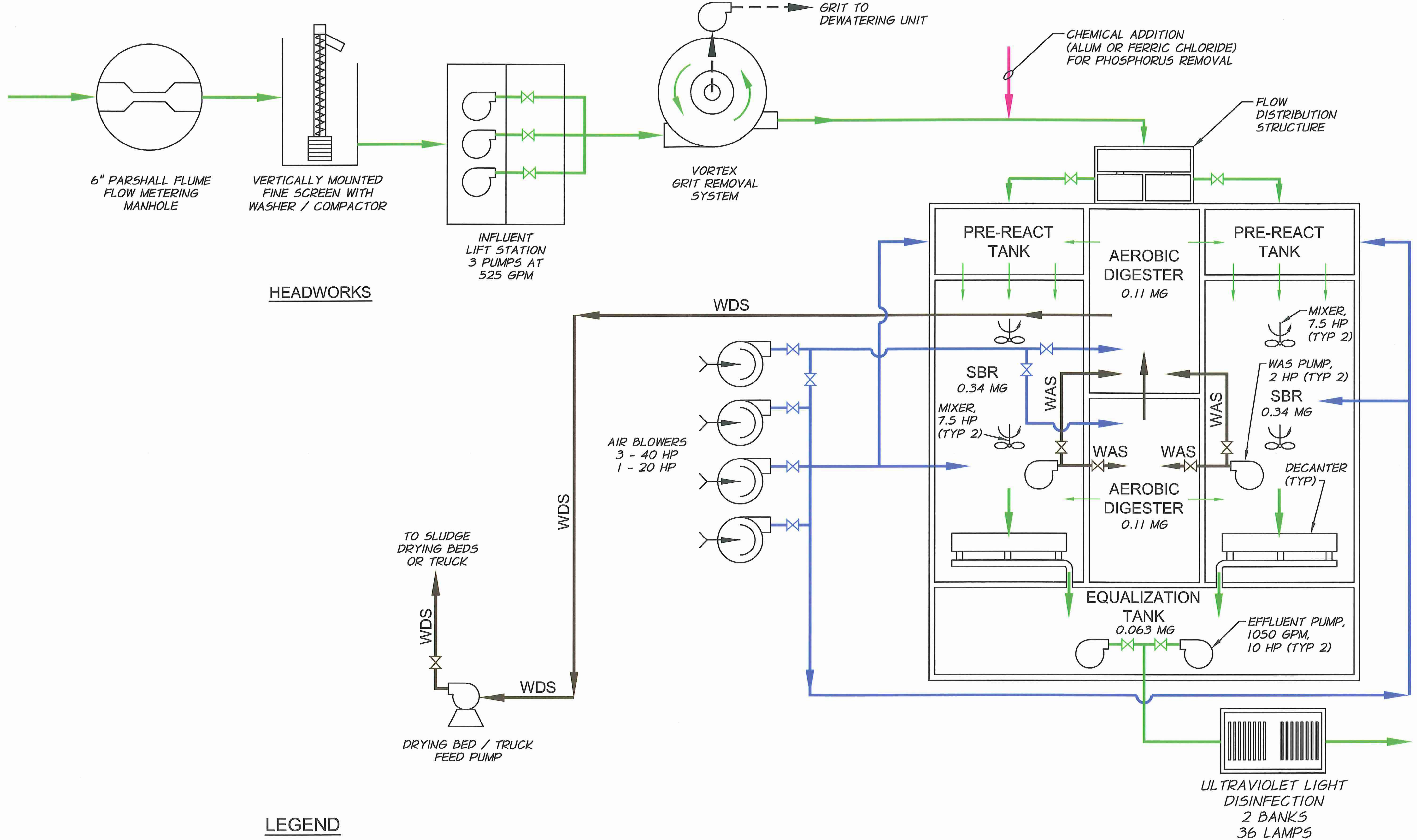
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 1
INTERMITTENT CYCLE SBR
SCENARIO C1B - BNR-NITROGEN REMOVAL

FIGURE
4-3

Q:\JOHNDAY592-22_WWSystem\dwg\FIG4-X.dwg, 4-3, 10/27/2009 10:35:29 AM, earntz



LEGEND

LIQUID PROCESS STREAM
SOLIDS PROCESS STREAM
AIR STREAM
PUMP

VALVE
MG = MILLION GALLONS
WDS = WASTE DIGESTED SLUDGE
WAS = WASTE ACTIVATED SLUDGE

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CITY OF
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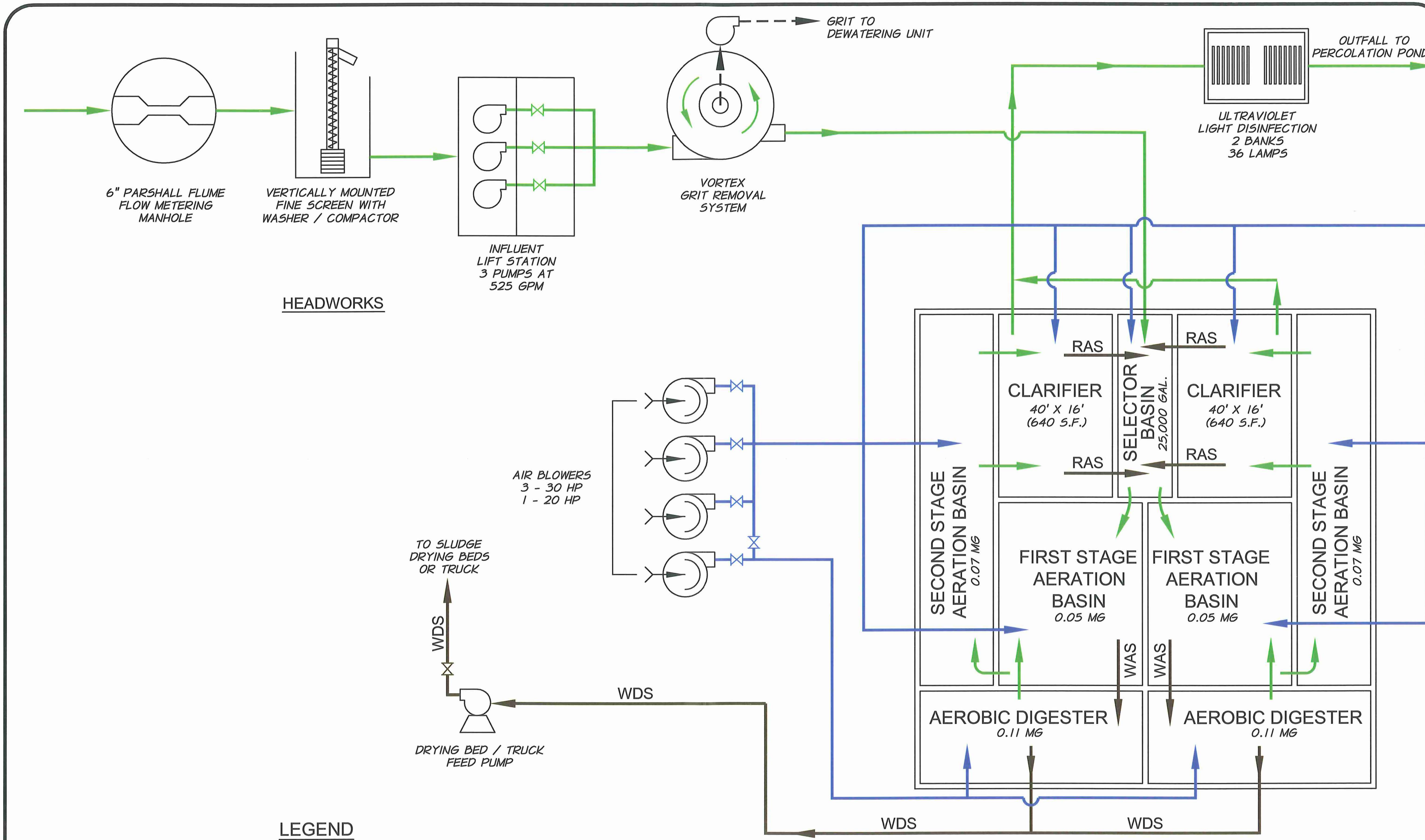
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 1
INTERMITTENT CYCLE SBR - SCENARIO C1C -
BNR - NITROGEN / PHOSPHORUS REMOVAL

FIGURE
4-4



LEGEND

(green line)	LIQUID PROCESS STREAM	⋈	VALVE
(brown line)	SOLIDS PROCESS STREAM	MG	= MILLION GALLONS
(blue line)	AIR STREAM	WDS	= WASTE DIGESTED SLUDGE
(pump symbol)	PUMP	WAS	= WASTE ACTIVATED SLUDGE
		RAS	= RETURN ACTIVATED SLUDGE

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CITY OF
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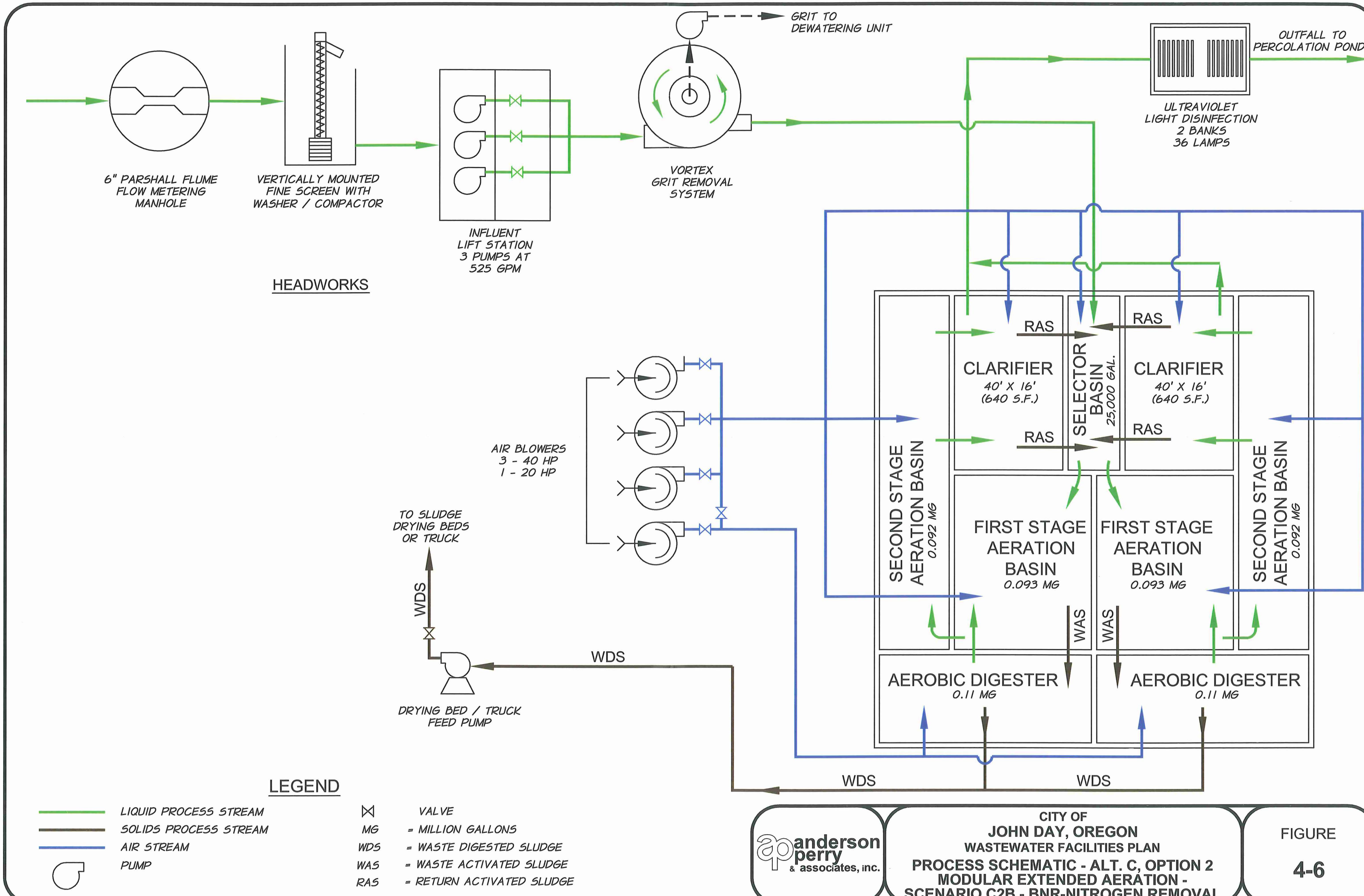
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 2
MODULAR EXTENDED AERATION -
SCENARIO C2A - BOD_5 / TSS ONLY

FIGURE
4-5



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CITY OF
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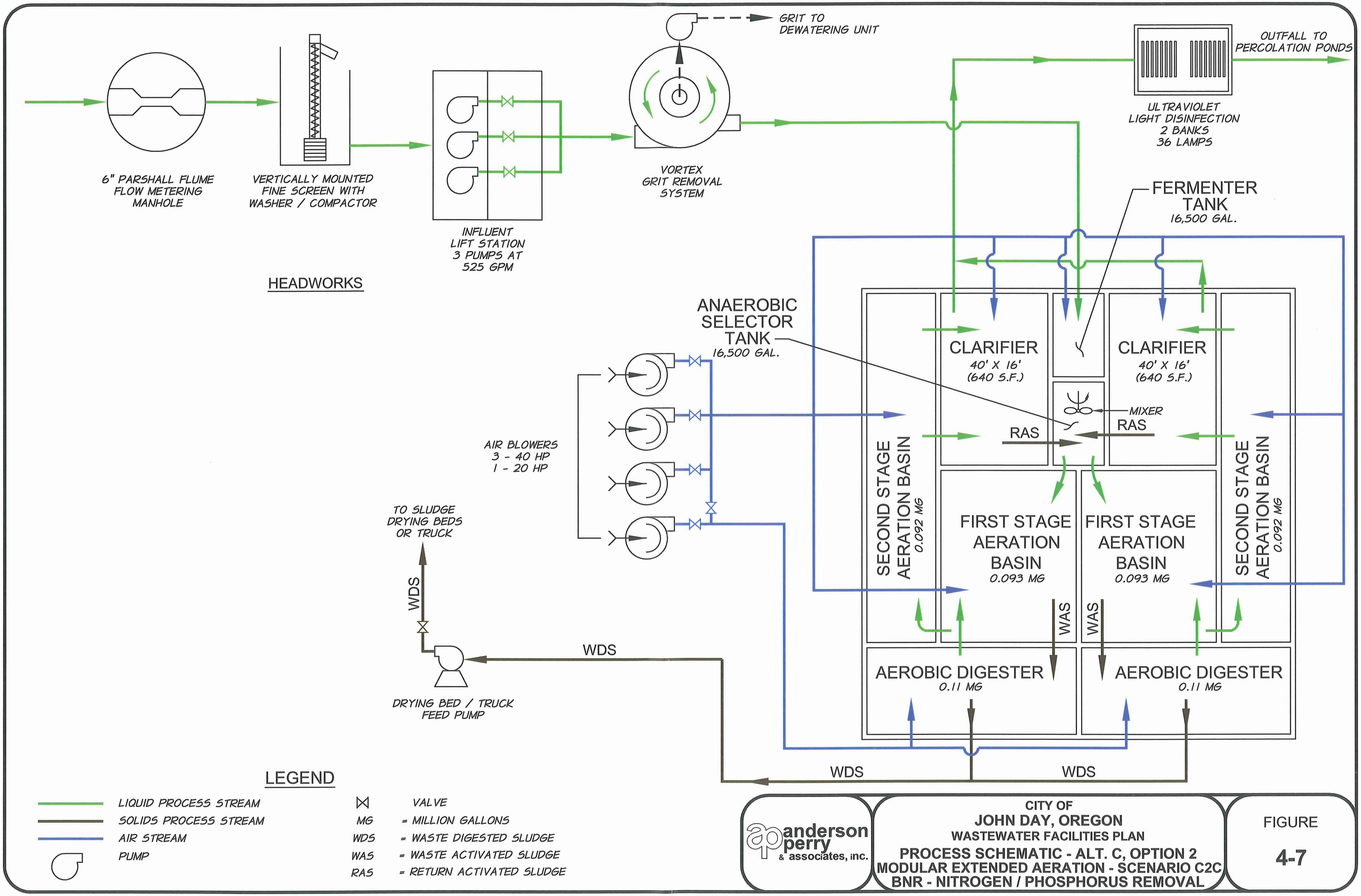
WASTEWATER FACILITIES PLAN

PROCESS SCHEMATIC - ALT. C, OPTION 2
MODULAR EXTENDED AERATION -
SCENARIO C2B - BNR-NITROGEN REMOVAL

FIGURE
4-6



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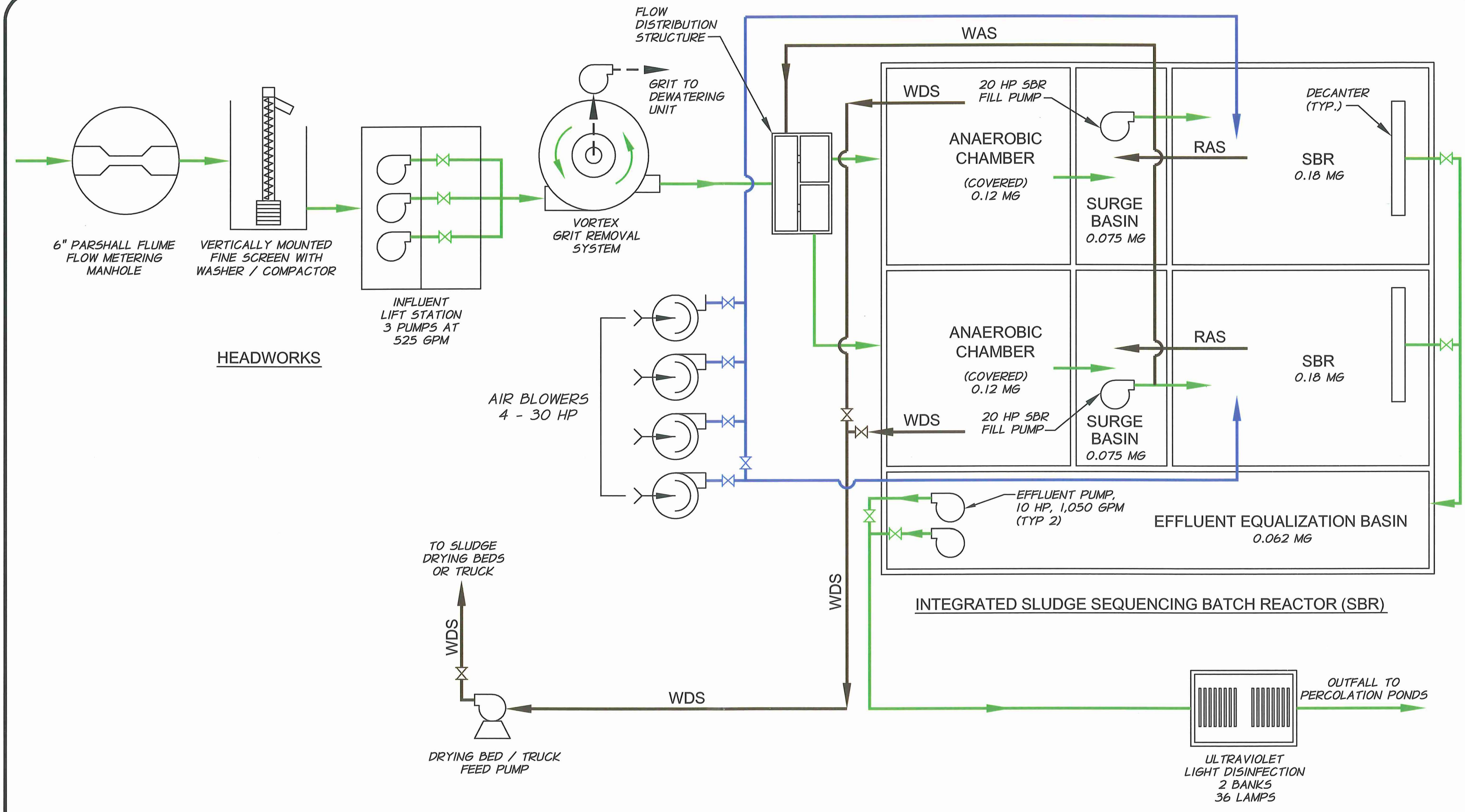

LEGEND

(green line)	LIQUID PROCESS STREAM	⋈	VALVE
(brown line)	SOLIDS PROCESS STREAM	MG	= MILLION GALLONS
(blue line)	AIR STREAM	WDS	= WASTE DIGESTED SLUDGE
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CITY OF
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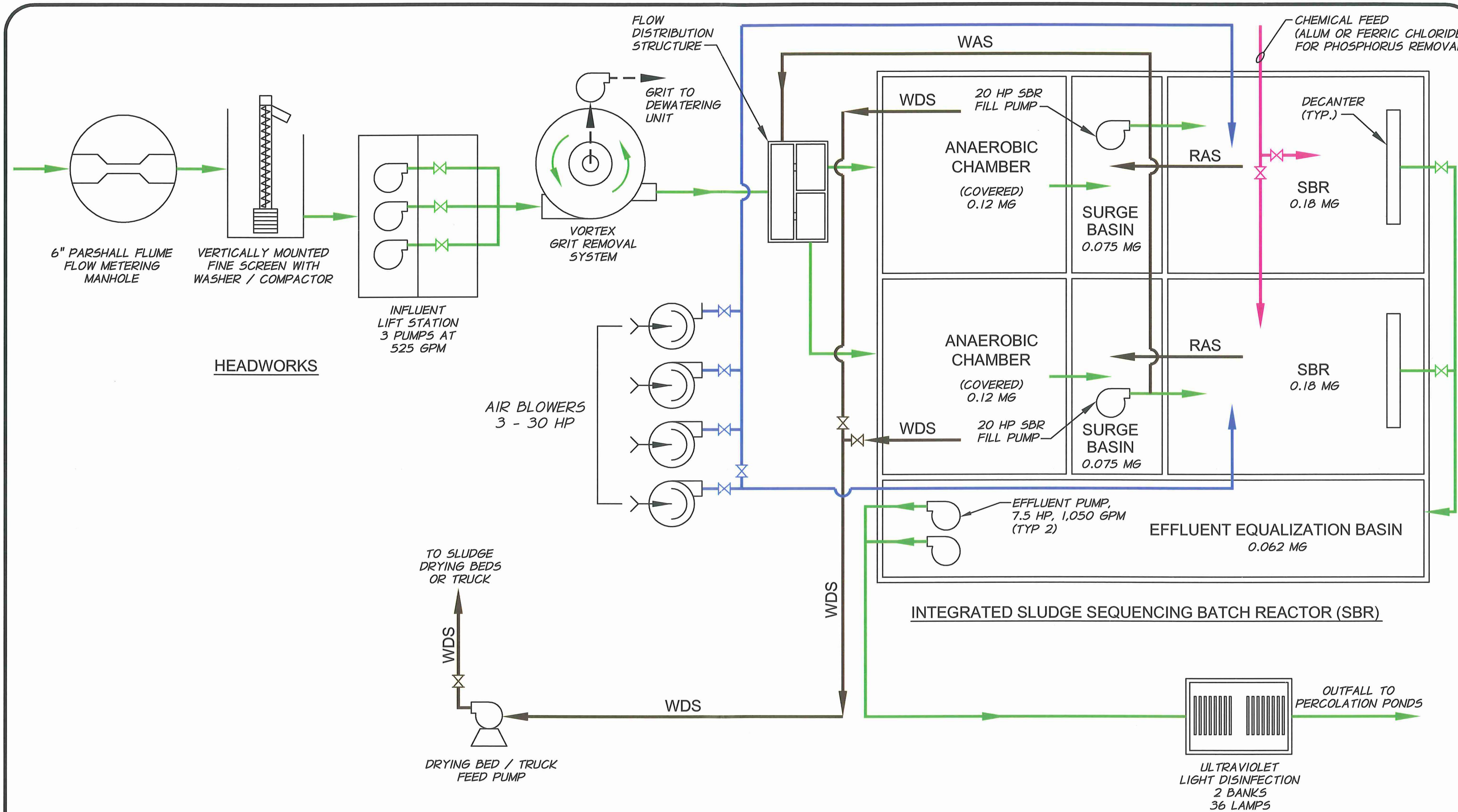
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 3
INTEGRATED SLUDGE SBR -
SCENARIO C3A - BNR-NITROGEN REMOVAL

FIGURE
4-8



LEGEND

LIQUID PROCESS STREAM	VALVE
SOLIDS PROCESS STREAM	MG = MILLION GALLONS
AIR STREAM	WDS = WASTE DIGESTED SLUDGE
PUMP	WAS = WASTE ACTIVATED SLUDGE
	RAS = RETURN ACTIVATED SLUDGE

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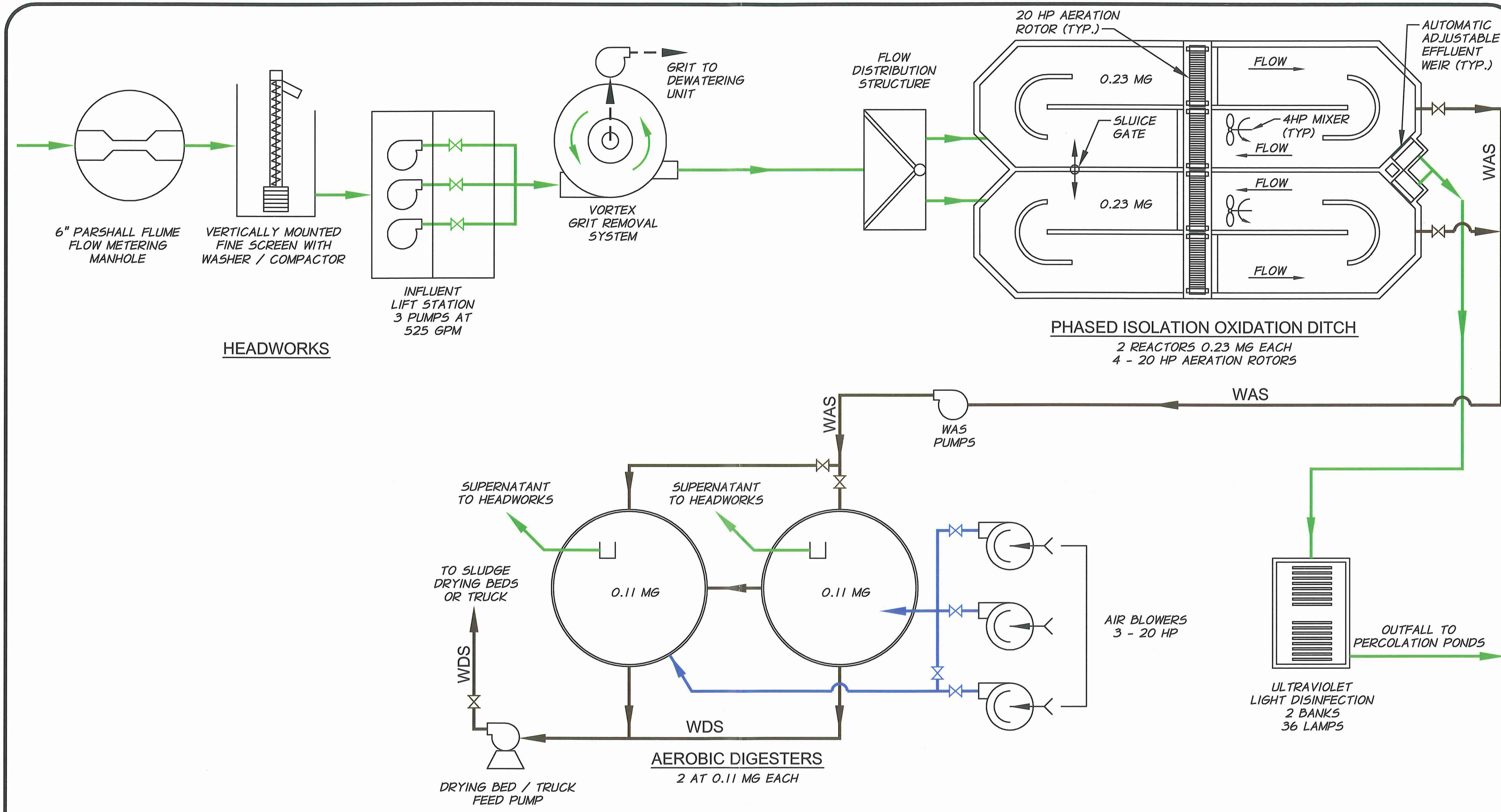
WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 3
INTEGRATED SLUDGE SBR - SCENARIO C3B
BNR - NITROGEN / PHOSPHORUS REMOVAL

FIGURE 4-9

Q:\JOHNDAY\592-22_WWSystem\dwg\FIG4-X.dwg, 4-9, 10/27/2009 10:35:59 AM, eamtz



LEGEND

(green line)	LIQUID PROCESS STREAM	⋈	VALVE
(brown line)	SOLIDS PROCESS STREAM	MG	= MILLION GALLONS
(blue line)	AIR STREAM	WDS	= WASTE DIGESTED SLUDGE
(pump symbol)	PUMP	WAS	= WASTE ACTIVATED SLUDGE

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CITY OF
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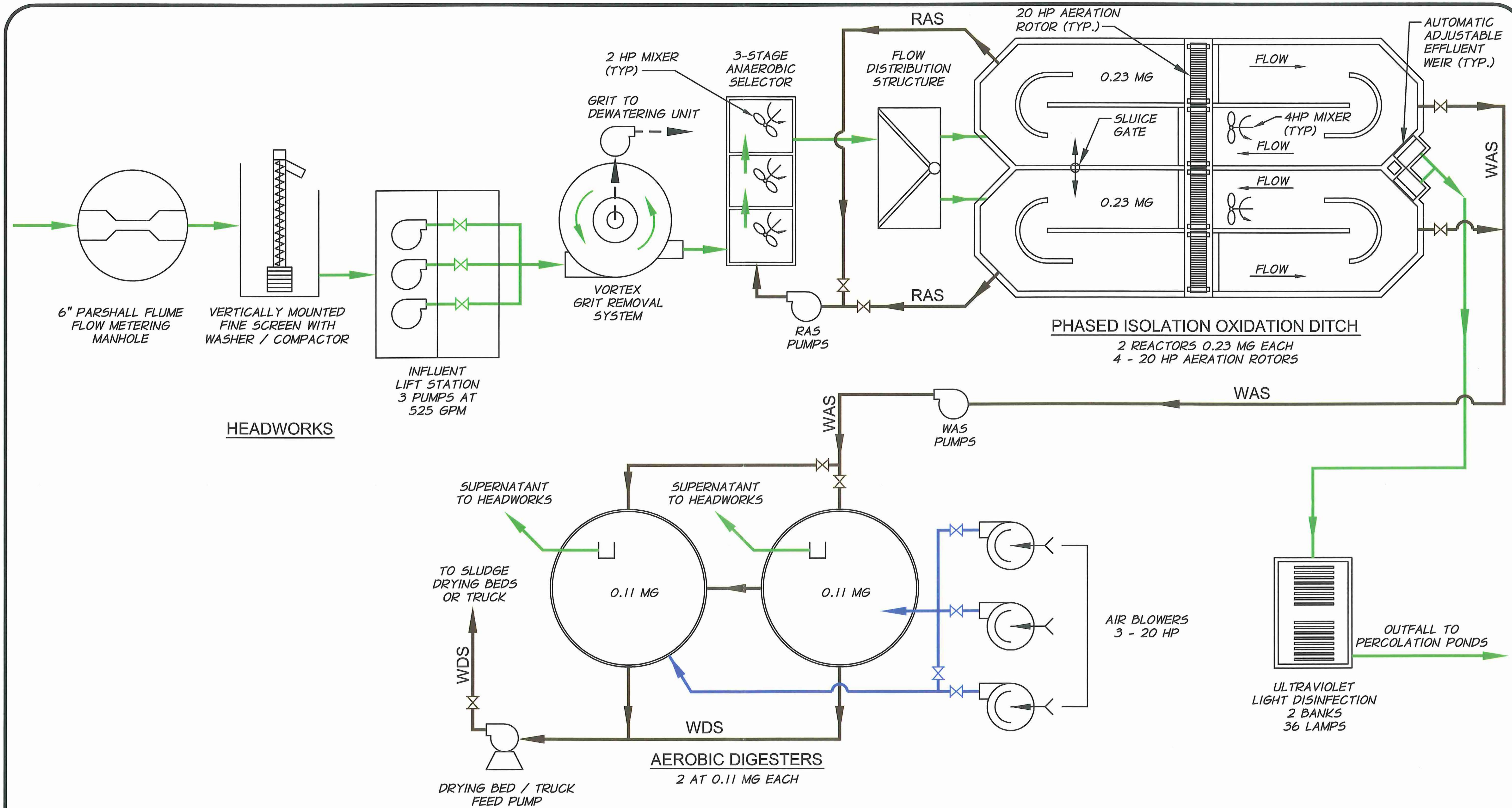
WASTEWATER FACILITIES PLAN

**PROCESS SCHEMATIC - ALT. C, OPTION 4
PHASED ISOLATION OXIDATION DITCH -
SCENARIO C4A - BNR - NITROGEN REMOVAL**

FIGURE
4-10



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
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WASTEWATER FACILITIES PLAN
PROCESS SCHEMATIC - ALT. C, OPTION 4
PHASED ISOLATION OXIDATION DITCH - SCENARIO C3B
BNR - NITROGEN / PHOSPHORUS REMOVAL

FIGURE
4-11

Q:\JOHNDAY\592-22_WWSystem\dwg\FIG4-X.dwg, 4-11, 10/27/2009 10:36:09 AM, earntz

CHAPTER 5

SELECTED IMPROVEMENTS

GENERAL

This chapter of the Wastewater Facilities Plan presents the selected improvement alternatives to meet the 20-year design requirements for wastewater treatment. The improvements were selected from review and evaluation of the alternatives developed in Chapter 4. City staff and the City Council each had a part in the review and selection process. Additionally, the public was given the opportunity to review and comment on a draft Plan that included the selected improvements. Remaining design issues or agency questions can be addressed in a pre-design report or design memorandum submittal.

The selected improvements chosen by the City Council, upon recommendation of the City staff, Public Works Committee, and Engineer, include a new activated sludge mechanical wastewater treatment facility (WWTF) described in Chapter 4.

As discussed in Chapter 4, although five biological treatment process options were presented for consideration under the selected WWTF alternative, the City Council elected not to choose a specific option as part of this Wastewater Facilities Plan. Instead, the City decided to complete a Request for Proposals (RFP) process in order to select the most appropriate treatment process. The RFP process would be completed during the pre-design stage of the project. Once the option is selected by committee, and upon DEQ's approval of the selection (an addendum to this Plan describing the proposed process selected would be submitted to the DEQ for approval), the design would be completed. A preliminary list of items included in an RFP has been provided in this chapter. Furthermore, to develop the necessary funding package, given the City's decision not to select a specific treatment process at this juncture, the proposed budget will be based upon the upper level of the estimated cost range of nitrogen removal scenarios under four of the options (not including the MBR process scenario), or \$8.29 million (2011 costs). Table 5-1 provides a summary of the estimated costs of the selected improvements.

TREATMENT FACILITY IMPROVEMENTS

The selected alternative for treatment of wastewater is the design and construction of a new activated sludge process as described and evaluated in Chapter 4, along with the addition of new components to meet the long-term needs of the City. The selected WWTF improvements recommended for construction by the City of John Day will meet effluent requirements for biochemical oxygen demand (BOD) and total suspended solids (TSS) removal, nitrogen removal (nitrification and denitrification), disinfection and a stabilized digested sludge to meet the state and federal requirements for land application, and will provide a reliable, efficient, and long-life treatment facility. A conceptual site plan of the selected WWTF improvements is shown on Figure 5-1.

The selected alternative will include the following components:

- **New Preliminary Treatment (Headworks)**. New headworks consisting of a fine screening system to remove plastics, rags, etc., a new 6-inch Parshall flume packaged flowmetering manhole to measure influent flows, and a grit chamber to remove grit will be necessary. The fine screening system will include a mechanical vertically-mounted fine screen, screenings washer, and compactor system. The grit removal system will be a vortex-type consisting of a grit removal pumping system and dewatering equipment. To provide protection and prevent freezing of the new headworks equipment (screening and grit dewatering equipment), a new concrete masonry block (CMU) headworks building will be constructed.

- **Influent Lift Station**. Due to the depth of the existing influent gravity sewer, screened wastewater will need to be pumped from the screen unit into the vortex grit removal system. A new influent lift station will need to be constructed to accomplish the required pumping. The lift station, in order to meet DEQ requirements for redundancy and reliability, must have adequate capacity to handle the anticipated design peak hour flow (1.5 MGD) with the largest pump out of service. To meet this requirement, three new submersible pumps, each with a capacity of 525 gpm, would be provided. With three pumps, any one of the pumps could be out of service and the other two would meet the capacity requirement.

- **New Activated Sludge Treatment Process**. A new activated sludge treatment process will be needed to provide the level of treatment necessary to meet the conditions of the City's existing and anticipated future Water Pollution Control Facilities (WPCF) Permit. The treatment process will be selected pre-design through an RFP process. The selected process will form the basis of design for the new WWTF and will be provided with adequate capacity to meet the anticipated flows and loadings through the 20-year planning period.

- **Disinfection System**. Prior to discharge of the treated effluent into percolation ponds, it must be disinfected to inactivate pathogenic microorganisms to acceptable levels as specified in the Permit. To accomplish the needed disinfection, a new UV light disinfection system will be installed in a new concrete channels. A total of 36 low-pressure high-intensity lamps will be installed in the channels. The system will be designed with the required UV intensity to treat the projected peak hour design flow and to allow future installation of an additional bank of 18 lamps, if required. A spare module of lamps will be provided for rapid replacement in the event of a module failure. To provide protection and prevent freezing of the new UV light disinfection equipment, a new CMU building will be constructed.

- **Sludge Handling**. Sludge derived as a result of the treatment process must receive additional treatment to make it acceptable for land application. To provide the required sludge treatment, a minimum of two aerobic digesters with a total combined working capacity of 220,000 gallons will be needed. Air blowers will be required to provide the needed air to maintain the process and accomplish the mixing of the sludge contained in the reactors. The digesters will be equipped with a coarse bubble aeration system to distribute the air within the tanks.

Sludge dewatering is needed in order to provide efficient handling of the waste digested sludge (biosolids). To provide dewatering, the existing sludge drying beds will be maintained and necessary rehabilitation completed on the facility. In addition, provisions will be provided to allow the City to load liquid sludge into a truck for direct hauling and land application of the sludge in a liquid form. This would allow efficient storage and transport of the solids for land application.

- **Yard and Process Piping**. New process piping will be necessary in order to transport raw wastewater from the collection system to the new screening system, to the influent lift station, from the influent lift station to the new grit removal system, to the new biological treatment process, to the clarifiers (if clarifiers are used), to the UV disinfection facilities, and to the effluent outfall. Piping would also be needed for sludge recirculation from the clarifiers (if used) to the aeration basins (activated sludge reactors), and for waste sludge transport to and from the sludge treatment components. Other miscellaneous piping, such as yard piping, will be needed to transport water for wash down and drainage.

- **Electrical, Instrumentation, and Controls**. New electrical, instrumentation, and controls will be required for the new process units. The new instrumentation and controls system is needed to provide accurate sampling, metering, monitoring, and control of the new facilities. The new control system will be computer-based in order to reduce operator time and requirements. The WPCF Permit requires periodic flow paced composite sampling of the influent and effluent. This will be accomplished using automatic composite samplers that take small samples proportionate to the volume of influent and effluent flow over a 24-hour period of time and adds them together to make a composite for testing. Two new composite samplers will be needed to accomplish this task. A new standby electrical generator set and automatic power transfer switch will be needed to allow continued operation of critical components of the system during a power outage.

- **Demolition, Site Work, and Landscaping**. Although not needed to provide space for the new treatment plant, complete demolition of the existing facilities would be desirable for safety and aesthetic reasons. Inclusion of site work (excavation, grading, paving, sidewalks, fencing, etc.) to accommodate the new facility will be provided. To provide an aesthetically pleasing finished plant, landscaping would be desirable.

- **New Operations Building**. For efficient operations of the new facility, a new 1,680 square-foot CMU operations building is proposed. The operations building would include a new laboratory and furnishings, office, Americans with Disabilities (ADA) compliant bathroom, utility room, and control center room. To equip the laboratory, miscellaneous modern laboratory instruments and glassware would be purchased.

- **New Blower/Generator/Electrical Building**. To house the required air blowers, electrical and controls, and standby generator set, a new CMU blower/generator/electrical building would be constructed. The building would be designed to attenuate and minimize noise associated with operation of the blowers and generator.

REQUEST FOR PROPOSAL ITEMS

Following is a preliminary list of items that would be included in an RFP:

- Background and Purpose
- Proposal Requirements/Contents
- Treatment Facility Design Criteria
- Acceptable Process Configurations
- Effluent Quality Requirements
- Proposal Evaluation Criteria and Basis of Selection
- Project Schedule
- Limitations of Owner's Liability
- Price Guarantee Statement
- Process Guarantee Statement

PRE-DESIGN REPORT REQUIREMENTS

Following is a preliminary list of items for the selected improvements that needs to be addressed in a pre-design report:

- Background and Project Purpose
- Review Regulatory, Permitting, and Environmental Requirements
- Review Historical Wastewater Operating Data and Design Criteria
- Review Selected Collection and Treatment Improvements
- Describe the Process Option Selected from the RFP
- Evaluate Equipment Types and Needs, and Recommend Types to Use
- Address Land Use, Property Requirements, and Siting Issues
- Discuss Project Implementation Schedule and Funding Issues

PRELIMINARY ENVIRONMENTAL REVIEW OF THE SELECTED WASTEWATER SYSTEM IMPROVEMENTS

Introduction. This section presents the preliminary environmental review of the selected wastewater system improvements to meet the 20-year design requirements for wastewater treatment. The selected improvements include a new activated sludge mechanical wastewater treatment facility as described in Chapter 4. This is a preliminary environmental review and, as the project is further developed and funding is pursued, a more detailed report will likely be required to meet specific agency requirements.

Land Use/Important Farmland/Formally Classified Lands. As identified in Figure 1-2, the following land use regions have been established within the John Day city limits and the urban growth boundary:

- Airport Approach (A–A)
- Agriculture (AG)
- General Commercial (C-1)
- (County) Commercial General (CG)
- General Industrial (M-1)
- (County) Industrial General (MG)
- Park Reserve (PR)
- General Residential (R-10)
- Limited Residential (R-7)
- (County) Rural Residential (RR)
- (County) Suburban Residential (SR)

The project area is located within the General Industrial (M-1) land use designation within the John Day city limits.

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service Soil Survey of Grant County, Oregon, the following soil types are found within the project area:

- Dumps (10) - soils that consist of tailings from gold dredging.
- Hack loam, 0 to 3 percent slopes (16A) - Class IIe - soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Simas-Day complex, 5 to 40 percent slopes (42E) - Class VII - soils have very severe limitations that make them unsuitable for cultivation.

Floodplains. The City of John Day has developed around the John Day River and Canyon Creek. The 100-year floodplain of the John Day River, in the vicinity of the project area, is illustrated in the Federal Emergency Management Agency 100-year floodplain maps. A small portion of the project area is located in Zone B, and the remainder of the project is located in Zone C. Zone B is defined as areas between the limits of the 100-year flood and the 500-year flood, and Zone C is defined as areas of minimal flooding. None of the elements of the proposed wastewater system improvements are located within the 100-year floodplain of the John Day River.

Wetlands. According to the U.S. Fish and Wildlife Service (USFWS) Wetlands Inventory Map, John Day, Oregon, the following wetlands are present in the project vicinity:

- Davis Creek - PSSC
- Trowbridge Ditch - R4SBCx
- Wetland North of Site - PEMA - Palustrine Emergent Temporarily Flooded
- John Day River - R3UBH - Riverine Upper Perennial Unconsolidated Bottom

Cultural Resources. The John Day area in general is an area of interest to two tribes including the Confederated Tribes of Warm Springs and the Burns-Paiute Tribe.

According to the National Register Information System, four locations within John Day are listed on the National Register of Historic Places. None of these historic resources are located in the project area. Refer to the website at http://www.nr.nps.gov.

Biological Resources. According to the National Marine Fisheries Service and the USFWS, the following species could occur in Grant County:

Threatened:

- Columbia River bull trout (*Salvelinus confluentus*)
- Middle Columbia River steelhead (*Oncorhynchus mykiss*)

Candidate Species:

- Columbia spotted frog (*Rana luteiventris*)

None of the species are known to occur at the project site. The closest known locations of bull trout and steelhead are the John Day River and Canyon Creek.

Water Quality. According to the EPA Office of Groundwater and Drinking Water National Summary of Sole Source Aquifer Designations, the John Day wastewater system does not lie within a sole source aquifer area.

The wastewater collection and treatment system will continue to operate under the WPCF Permit. Completion of the proposed project will have a positive effect on groundwater, as it will reduce potential groundwater contamination.

Air Quality. This type of facility does not emit any particles or chemicals into the air. The EPA will not require any type of permit. The level of odor experienced at the plant would be similar to that of the current facility. In addition, John Day is not located in an area of non-attainment or maintenance for air quality.

Summary. As previously mentioned, this limited environmental review is a brief collection of available information that addresses the Wastewater Facilities Plan environmental review requirements outlined by the USDA Rural Utilities Service in RUS

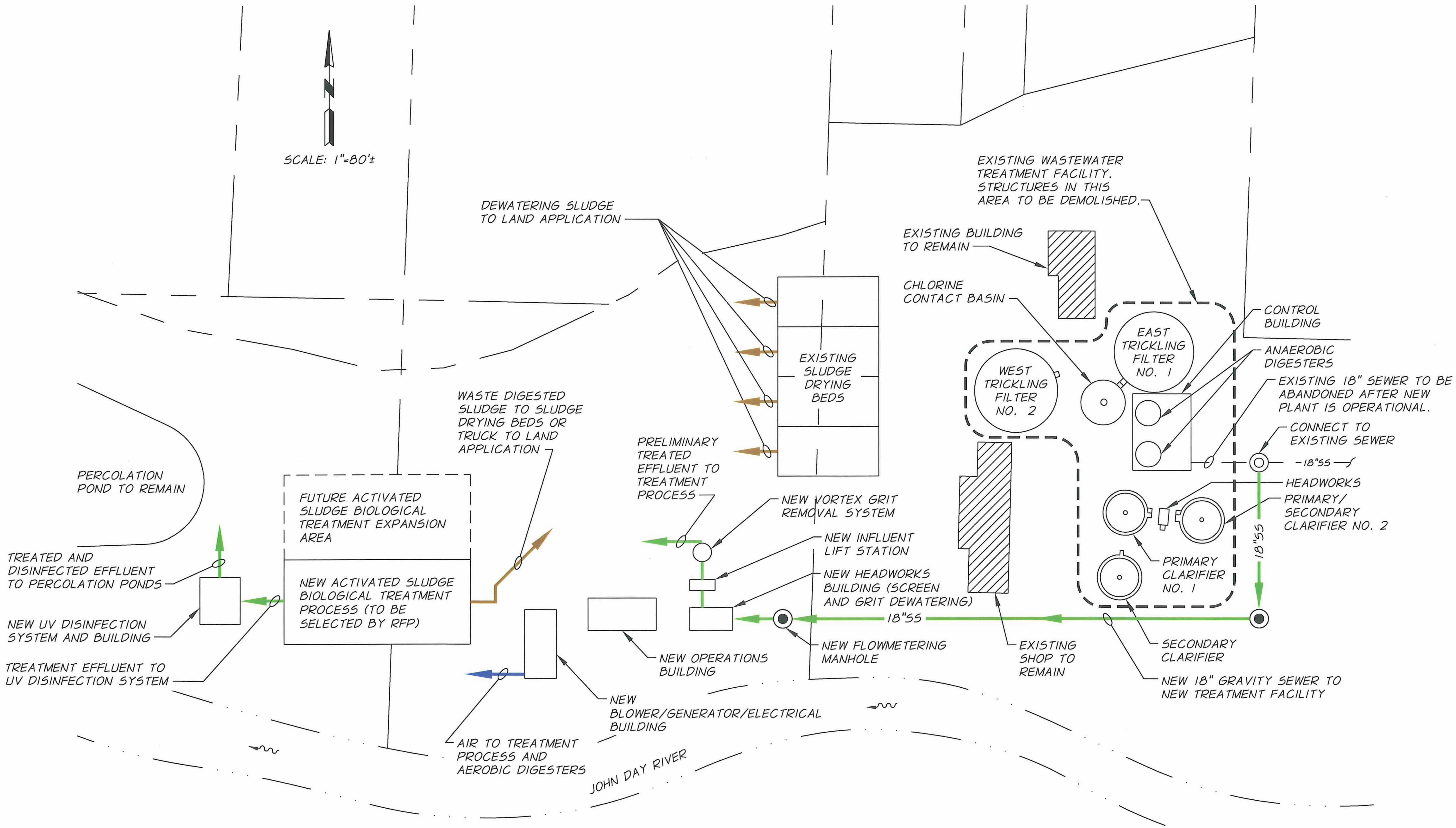
Bulletin 1794A-602. A full environmental report will be completed in conjunction with a funding application should the City decide to pursue funding packages to meet specific agency requirements.

SELECTED IMPROVEMENTS
YEAR 2010 COST ESTIMATE SUMMARY

Item Description	Total Estimated Cost
New Activated Sludge Mechanical Wastewater Treatment Facility - Construction Cost including 10 Percent Construction Contingency	$6,159,000 to $6,480,000
Preliminary, Design, and Construction Engineering	$1,232,000 to $1,296,000
Environmental and Permitting	$45,000
Funding Acquisition	$30,000
Legal and Funding Administration	$45,000
TOTAL ESTIMATED PROJECT COST (2010 DOLLARS)	$7,511,000 to $7,896,000
TOTAL ESTIMATED PROJECT COST (2011 DOLLARS)	$7,886,550 to $8,290,800

Notes:

1. Cost ranges are shown on this summary table because the final selection of an option for the proposed new activated sludge mechanical wastewater treatment facility has not been made. The cost ranges cover Options 1 to 4 (nitrogen removal scenario only) for Alternative C on Table 4-25 in Chapter 4.
2. If project funding is pursued prior to final option selection, it is recommended the highest cost be selected for the total estimated project cost.
3. Inflation was assumed to be 5 percent from 2010 to 2011. If construction occurs later than 2011, the total estimated project cost should be increased as appropriate to account for annual inflation.



LEGEND

- LIQUID STREAM AND FLOW DIRECTION
- SOLID STREAM AND FLOW DIRECTION
- AIR STREAM AND FLOW DIRECTION

NOTE:
THE EXISTING STORAGE BUILDING LOCATED IN THE VICINITY OF THE PROPOSED NEW OPERATIONS BUILDING HAS BEEN ASSUMED TO BE REMOVED TO ACCOMODATE PLACEMENT OF THE NEW BUILDING.

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
SELECTED WASTEWATER SYSTEM IMPROVEMENTS
CONCEPTUAL SITE PLAN

FIGURE
5-1

Q:\JOHNDAY\592-22_WWSystem\dwg\Conceptual_Site_Plan.dwg, Extg Site, 10/27/2009 10:33:25 AM, earntz

CHAPTER 6

PROJECT FINANCING AND IMPLEMENTATION

INTRODUCTION

This chapter of the Wastewater Facilities Plan evaluates the financial status of the City's Sewer Department and outlines alternatives for financing John Day's proposed wastewater system improvements. A summary of state and federal funding programs is presented, including a review of funding options available to the City for the selected wastewater system improvements project. In order to construct the proposed improvements, a financing plan must be developed that is acceptable to the citizens of John Day. Because of the high estimated cost of the improvements, financing resources should include local funding and loan/grant funding, if available.

Although a detailed analysis of the City John Day's current sewer rate structure is beyond the scope of this Facilities Plan, some discussion of the existing rate structure, and current and future sewer system budgets, is included. 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

Operation and maintenance of the existing wastewater system is financed through the City's annual budget. Revenue is obtained primarily from sewer user fees. Sewer rates that were current at the time of this report, and which have been in effect since July 2008, are summarized in the following table.

CITY OF JOHN DAY OF MONTHLY SEWER RATE INFORMATION

Type of User	User Rate
Single Family Unit and Multi Family Units*	$29.00/month
Commercial and Industrial**	Monthly incurred charge: 97 percent of the six winter average monthly incurred water charge plus $2.00 (i.e., total incurred water charges for November, December, January, February, March, and April divided by 6 equals the monthly average of winter incurred charges) or Based Incurred Charges (minimum)***
Schools	$29.00 per month for the first 20 students plus $29.00 per month for each 20 students thereafter based on a count taken in January and September of every year, except during June, July, and August when a $29.00 minimum rate shall be applied.
Commercial Septic Tank or Port-A-Potty Dumping	$0.10/gallon

* Includes, but is not limited to, duplex, triplex, fourplex, and apartments, mobile home Park, and recreational vehicle park.
** The incurred sewer charges per month shall be either the calculated monthly incurred charge or the base incurred charge, whichever is greater as determined each year and will be effective July 1 each year.
*** Base incurred charge (minimums)

a. $32.00 - Service stations, garages, and tire shops.
b. $43.00 - Hotels, motels, trailer or mobile home courts, apartments with four or more units, laundries, food and meat processing, and dairies.
c. $30.50 - All others; per unit.

Since the City of John Day accepts the City of Canyon City's wastewater, Canyon City pays John Day a monthly fee based on its proportionate share of operation, maintenance, and replacement (OM&R) costs and improvements costs for the WWTP.

A copy of the City of John Day's resolution to establish incurred sewer service and incurred connection charges is located in Appendix E.

As of December 2008, the City of John Day had the following number of sewer service accounts that were billed:

CITY OF JOHN DAY SEWER SERVICE ACCOUNTS

Account Type	Total Number of Accounts
Residential (Single or Multi Family Unit)	525
Public	29
Commercial	142
Industrial	4
Government	14
Miscellaneous (Trailer Parks, Apartments, etc.)	15
TOTAL	**729**

The revenue generated from the City's sewer rates, connection fees, and from Canyon City is presented in the following table. Total revenue has increased at an average annual rate of 6.6 percent between 2002 and 2008. The revenue increased by approximately 17.0 percent between 2006 and 2007 due to an increase in user rates. Revenue from Canyon City has increased at an average annual rate of 16.7 percent between 2002 and 2008.

CITY OF JOHN DAY SEWER DEPARTMENT REVENUE

Fiscal Year	Total Revenue from City of John Day Sewer Rates and Connection Fees (Operating Revenue)	Revenue from Canyon City
2002	$256,769	$28,683
2003	$267,066	$28,839
2004	$359,167	$34,968
2005	$307,869	$21,195
2006	$312,216	$42,883
2007	$367,455	$47,914
2008	$359,182	$72,334
2009*	$351,500	$72,334

* Projected revenue is shown for fiscal year 2009.

CURRENT FINANCIAL STATUS

The annual cost of operating and maintaining the John Day sewer system is summarized in Table 6-1. The costs presented were obtained from the City's financial statements and include all costs for the wastewater system, such as OM&R, staff payroll, and existing debt service.

Historical and Projected Budget Trends. Table 6-1 shows that generally over the past five years the City has not been able to meet annual expenditures, particularly in 2007. At that time, the City had a net loss of $46,670 and it appears, based on the adopted budget, that a net loss will be incurred in 2009. This indicates that user rates may need to increase in order to accommodate increasing OM&R expenditures.

A graphical plot of the City of John Day's sewer system budget, showing revenue and expenditures, can be found on Figure 6-1. Generally, by plotting a "trend" line for OM&R expenditures (which includes the reserve fund and capital outlay), future expenditures can be estimated assuming no changes to the sewer system occur. The City's OM&R expenditures have fluctuated over the years from a low of $271,581 in fiscal year 2002 to a high of $443,662 in 2004. The actual OM&R trend line in Table 6-1 shows an average annual increased OM&R expenditure of approximately 6 percent. This amount of annual increase is considered typical for a wastewater treatment system of this type. The trend line in Figure 6-1 shows the 6 percent average annual increase. Assuming a 6 percent increase, the 2011 OM&R expenditures are projected to be approximately $459,000, which should be used in future budgeting.

The City has been budgeting reserve account funds for anticipated sewer system maintenance and replacement costs. However, over the past four years the City has spent more out of its reserve funds than it has put in. This is not good practice, as reserve funds are being depleted. This may be a sign of a wastewater system that has reached its design life and is requiring a large amount of maintenance and replacement equipment. It is recommended that the City continue transferring funds to the utility reserve fund regularly so a reserve fund is created to help with future sewer system expenses and emergencies. Pump replacement, line repairs, lift station work, etc., are items that require funds from time to time.

Existing Debt. The City of John Day took out a loan in fiscal year 2005 to fund the Airport Industrial Park design and construction. The amount borrowed was $1,969,517; however, only 46 percent of the project was related to sewer costs. From this loan, the annual debt service for the sewer fund is approximately $71,200 per year. The loan is scheduled to be paid off during fiscal year 2027-28.

STATE AND FEDERAL LOAN AND GRANT PROGRAMS

A number of state and federal loan and grant programs can provide assistance on municipal improvement projects to Oregon cities. These programs offer various levels of funding aimed at different types of projects. These include programs administered by Rural Development (RD) under the U.S. Department of Agriculture, the U.S. Economic Development Administration (EDA), the Oregon Business Development Department (OBDD), the Oregon Department of Environmental Quality (DEQ), and others. These agencies can provide low-interest loan funding and possibly grant funding for assisting rural communities on public works projects. Most of these agencies will require a significant increase in sewer rates to support a loan for sewer system improvements both as a condition of receiving monies and prior to being considered for grant funds.

U.S. Department of Agriculture, Rural Development program (formerly known as Farmers Home Administration). This agency can provide financial assistance to communities with a population under 10,000 through both loans and direct grants. Under the loan program, the agency purchases the local bonds. 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. Due to past changes in the funding environment and an increased competition for funds, RD now sets a limit on the maximum amount of loan dollars a community can request. Currently the maximum loan amount is 25 percent of the total funding available state-wide, which would result in a maximum project loan in the range of $4,500,000. The interest rate is currently about 4.5 percent with a repayment period of up to 40 years. Application for this type of funding is a fairly lengthy process involving an environmental review process, a detailed engineering report, and a final application.

The agency presently requires communities to establish average residential user costs in the range of $48 to $52 per month before the community qualifies for grant funds. The equivalent monthly 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 affordable and 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 makes the net interest rate a little higher. One of the major benefits of the RD program is that the agency can purchase either revenue or general obligation bonds. These bonds must be purchased for a period of 40 years if grant funding is also received. To be eligible for the funding, the City must be willing to increase its user rates to the average monthly costs required by Rural Development.

Clean Water State Revolving Fund (CWSRF) Loan Program. This program, administered by the DEQ, provides low interest rate loans to public agencies for the planning, design, and construction of water pollution control facilities (e.g., wastewater treatment facilities), 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 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 proceeding signing of the loan agreement. Loans for design and construction currently have an interest rate of about 3.5 percent with repayment over 20 years or 3.2 percent with repayment over 15 years. In addition, fees are assessed to cover program administration costs by the Department. A loan processing fee of 1.5 percent is included in the loan amount, a servicing fee of 0.5 percent of the outstanding balance is added to the interest rate, and a loan reserve equal to 50 percent of the annual debt service is also set aside in a separate fund. This program has low interest rates, and the repayment period is typically 20 years. The CWSRF program appears to be a viable funding source for the City of John Day.

Oregon Business Development Department (OBDD). This state agency administers the ***Water/Wastewater Financing Program***. This program uses Oregon Lottery funds to help municipalities make improvements to their drinking water and wastewater systems. Project eligibility is limited to those projects necessary to ensure compliance with drinking water regulations of the Department of Human Services - Drinking Water Program or other statutes, rules, orders, or permits administered by the DEQ.

Currently, this program requires that the recipient have a monthly residential sewer rate of at least 1.48 percent of the City's 2000 MHI and that the wastewater system improvements project correct a compliance issue (such as permit compliance). By these guidelines, John Day's minimum monthly sewer system cost for each residential connection would need to be $39.41. Funding from this program can be in the form of loans and/or grants. Determination of the final amount of financing available for a specific project, and the loan/grant mix, is based on several factors including the financial strength of the municipality, median household income of the applicant, the existing level of and projected water and sewer rates compared to the local affordable threshold user rate, availability of funds, and more. The current grant eligibility criteria are as follows:

- Less than 100 percent of statewide MHI = maximum $750,000 grant
- Greater than 100 percent of statewide MHI = no grant
- Maximum grant of $10,000 per connection served

Since the City of John Day's MHI is less than the statewide MHI, the City could possibly qualify for grant funds from the water/wastewater program. To qualify for consideration of an OBDD grant, user rates must be at least $39.41 (the City's affordability rate). Loan rates are currently at approximately 4.0 percent under this program and the typical repayment period is 20 years. Because the City of John Day's WWTF is currently operating in compliance, this is not likely a viable funding option.

The OBDD is also responsible for administering the ***Special Public Works Fund Program,*** which is funded by monies from the Oregon Lottery. Loan funds are normally available through this program to be utilized by cities and counties for public utility improvements. Funds can be loaned, for the purpose of improving public facilities, in order to enable the area to be in a position to serve additional commercial and industrial businesses.

The availability of these funds is tied very closely to the need for economic growth and the creation of new jobs or retention of jobs. Grant funds are typically limited to $5,000 per job that is retained or created for a maximum total grant of $500,000. Grant funds cannot be more than 85 percent of the total project cost. Depending on the ability of the City to demonstrate the creation of new family wage jobs or the retention of existing jobs, this funding program is a possible option for the City.

The State of Oregon has developed the ***Oregon Bond Bank***. The OBDD also uses the Bond Bank as the source of loan funds for the Water/Wastewater and Special Public Works Fund programs. Periodically, the State of Oregon sells bonds, using the Bond Bank's credit rating, to finance credit worthy Special Public Works Fund and Water/Wastewater Financing Program loans. The state pays the bonding costs. The current interest rate is around 4.0 percent. Applications for Special Public Works Fund and Water/Wastewater Financing Program loans are automatically considered for financing through the Oregon Bond Bank. This loan source is attractive to small communities because of the lower interest rate and because the local government is not faced with expensive bonding costs.

The ***U.S. Economic Development Administration*** has grant and loan funds similar to those available through the OBDD's Special Public Works Fund Program. 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 improvement projects in areas where new industries were locating or planned to locate in the future. In addition, the agency has a program known as the Public Works Impact Program (PWIP) to fund projects in areas with extremely high rates of unemployment. This program is targeted towards creating additional local construction jobs during construction of the needed improvements, thus 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 will not be in a competitive position to receive funding under these EDA programs.

The OBDD is also responsible for administering the ***Community Development Block Grant (CDBG) Program***. Funding for this program is provided on an annual basis by the U.S. Department of Housing and Urban Development. Projects that qualify under the Public Works category of the CDBG program include municipal wastewater and water system improvement projects that are user-rate dependent. Also, the community and proposed project must be primarily residential in nature. The funds available from this program are limited to $1,500,000 per community or $20,000 per permanent residential connection, whichever is less. Project eligibility is limited to those projects necessary to ensure compliance with water quality statutes, rules, orders, or permits administered by the DEQ. The OBDD considers factors such as the ability of the users to fund the project locally, the urgency of the area's need, the cost in grant dollars per person benefited by the project, and how well the project is targeted toward meeting the national objective of primarily benefiting persons of low to moderate income.

The OBDD, through its CDBG program, funds only water and wastewater improvement projects that have documented compliance issues. The agency does not fund projects that are targeted toward growth related problems. The CDBG program also requires the community to have 51 percent or greater low to moderate income residents. The City of John Day does not have current compliance issues and the City's percentage of low to moderate income residents is approximately 46.9 percent (based on the 2000 Census). Therefore, funding under this program is not an alternative for the City to obtain grant funds for the wastewater system improvements project.

Summary. It appears that more than one funding source is available to the City. In order to qualify for grant funds from RD, the City will need to be willing to raise the monthly residential sewer cost to at least between $48 and $52. Monthly costs may need to be raised higher than this depending on the amount of grant funds, if any, available to 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. 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 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, each residential connection in John Day 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's sewer service accounts, as of December 2008, were analyzed to provide a preliminary ERU determination. The following table summarizes the results of the preliminary ERU analysis.

CITY OF JOHN DAY PRELIMINARY ERU ANALYSIS

Connection Type	Total Number of Connections	Estimated ERUs
Residential (Single or Multi Family Unit)	525	525
Public	29	67
Commercial	142	290
Industrial	4	13
Government	14	15
Miscellaneous (Trailer Parks, Apartments, etc.)	15	250
Total	**729**	**1,160**

Based on the above ERU analysis, the City of John Day has 729 sewer system connections that represent 1,160 ERUs. Most funding agencies will use this type of ERU evaluation as a basis for estimating future yearly revenues and debt capabilities for a city. 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 their wastewater system project. The City of John Day will need both loan and grant funds to complete the wastewater system improvements project discussed in Chapter 5, should the City wish to do so. The analysis presented hereafter for the City's future sewer rate revenue and estimated loan capacity is based on the preliminary determination of 1,160 ERUs, not the current estimate of 729 connections.

LOAN CAPACITY

In order to determine the City's ability to fund a wastewater system improvements project, Tables 6-2, 6-3, and 6-4 were prepared. Several assumptions were made:

1. For Tables 6-2 and 6-3, water user fee revenue is based on the preliminary determination of 1,160 ERUs.

2. For Table 6-2, total OM&R wastewater system expenditures for the fiscal year 2011 were set at $459,000 per year. The fiscal year 2011 was used because this would be the time period in which the project would most likely begin if pursued upon completion of this Facilities Plan. These expenditures may need to be adjusted if the project develops at a later date. The $459,000 figure includes the annual cost of operating the

existing wastewater system, which is estimated to be $429,000 by the fiscal year 2011. An additional $30,000 for an annual contribution to a wastewater reserve fund is also included, for a total of $459,000.

3. Debt service costs for the current wastewater system debt were assumed to be the average payment of approximately $71,200 and are added to the $459,000 above for total wastewater system OM&R plus existing debt payments of $530,200.

4. For Tables 6-3 and 6-4, future debt service was calculated based on typical RD financing (4.5 percent interest for a 40-year repayment period), a typical OBDD loan (4.8 percent interest for a 20-year repayment period), and a CWSRF loan (at 4.0 percent [3.5 percent plus 0.5 percent for service fee] interest for a 20-year repayment period), depending on which financing program is able to assist the City.

5. Table 6-3 shows John Day's loan capacity and total loan capacity. John Day's loan capacity is how much the City has without factoring in any contributions from the City of Canyon City. While Canyon City has paid in the range of 25 percent of costs associated with the WWTP, it is anticipated this may adjust to around 15 percent. Therefore, it was assumed that Canyon City would contribute 15 percent of the project cost. The total loan capacity shown in Table 6-3 considers the combined John Day/Canyon City anticipated loan capacity with 85 percent of monies coming from John Day and 15 percent coming from Canyon City.

It is a requirement of this WWFP to show how high the City would need to raise sewer rates in order to fund a project from strictly loan funds. The data shown on Table 6-3 provide a general idea of the amount of debt the City could afford to service at various average monthly water costs. If the City of John Day were to fund the selected improvement alternative identified in Chapter 5 without any grants and without the City of Canyon City contributing any funds to the project, monthly sewer rates would need to be raised to approximately $64 to $68, depending on the loan source. If the City of Canyon City were to pay for 15 percent of the selected improvement alternative, the City of John Day would need to raise the monthly sewer rate to approximately $56 to $58, depending on the loan source. Fifteen percent was used because this is approximately the percentage of OM&R costs of the City's WWTF anticipated to be paid by the City of Canyon City.

Table 6-4 provides a general idea of the impact to property taxes for varying interest rates and loan amounts if the debt payment is supported only by property taxes. In the same two scenarios discussed in the previous paragraph, the City would need to raise property taxes to approximately $5.50 to $8 per $1,000 assessed value if funding the project on its own and $4.60 to $6.80 if receiving 15 percent of funds from the City of Canyon City.

It is important to note that the estimated loan capacities shown in Table 6-3 are based on the current estimate of 1,160 ERUs. The ERU figures will need to be verified as project funding proceeds. It should be recognized that this is only a very preliminary analysis, and the financial assumptions and figures presented in this Plan should be refined as project implementation proceeds in the future and as agreements are worked out with funding agencies. If the City incurs further debt prior to obtaining loan or grant funds, these figures will need to be adjusted accordingly to reflect the debt payment requirements for the overall City budget.

PROJECT FUNDING

Based on the estimated cost of the John Day wastewater system improvements project, the City will need to obtain a low interest loan coupled with a grant, if available, to fund the desired improvements project. As an improvements project is pursued, it is recommended that the City thoroughly investigate potential funding sources to ensure the best funding package is obtained for the project.

One-Stop Meeting and Project Intake Form. The City of John Day may need to schedule a One-Stop Meeting in Salem where representatives of major funding agencies would meet with the City to discuss the project and funding needs and identify the funding program best suited for the project. To avoid requiring City representatives to travel to Salem, OBDD now allows scheduling One-Stop Meetings via a conference call. Although this is an option, it does not allow the City to meet face to face with funding agencies and discuss the project as effectively as a sit-down meeting. After the One-Stop Meeting, the City may be requested to submit a "Project Intake Form" that outlines the City's project including the needs, project requirements, affected area, estimated project cost, time frame, schedule, etc. OBDD evaluates the project based on information presented on the Intake Form to determine the best funding program suited to the project. OBDD may then invite the City to submit a funding application for the particular funding program identified by OBDD. It would be wise to consult with OBDD and, as necessary, complete and submit an Intake Form to OBDD to initiate OBDD review of potential funding for the project. The Intake Form can be submitted at any time.

LOCAL FINANCING

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. Rural Development requires a city to obtain authorization to incur debt. There are generally two options the 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 Council action authorizing the sale of revenue bonds, if the City Charter allows. If citizens 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 Rural Development program accepts either revenue bonds or general obligation bonds. Bonding is not required for the CWSRF program. 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 John Day begins the process of obtaining bonding authority for the proposed wastewater system improvements. It would be wise for the City to consult with their City Charter and attorney to see if additional debt for the wastewater system can be assumed.

PROJECT IMPLEMENTATION

The following action items and implementation steps need to be made by the City of John Day if they desire to implement a wastewater system improvements project. The steps outlined are general in nature and include the major steps that need to be undertaken.

Action Items

1. Formally adopt the Wastewater Facilities Plan.

2. Consult with funding agencies to ensure the best funding package is obtained for the project.

3. Prepare funding applications for the wastewater system improvements project.

4. Decide how to obtain the authorization to incur debt for the wastewater system improvements project. Once decided (revenue bond or general obligation bond), a bond attorney should be consulted and the appropriate resolution paperwork should be prepared and considered for implementation.

5. Hold public information meetings to inform its citizens of the needs and scope of the project, to answer questions, and to generate support for a potential sewer rate increase.

IMPLEMENTATION STEPS

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

	ITEM	COMPLETION DATE
1.	Adopt the Wastewater Facilities Plan.	Spring 2010
2.	Initiate funding discussions with funding agencies.	Spring 2010
3.	Consult with funding agencies as necessary and complete and submit the applications as necessary.	Spring 2010
4.	File with County Clerk for November election if election for a revenue bond or general obligation bond is desired.	By September 2010
5.	Hold public information meetings.	Summer 2010
6.	Hold bond election (if election desired/ required).	November 2010
7.	Finalize project funding.	Fall 2010
8.	Initiate design.	Fall 2010
9.	Complete project design.	Summer/Fall 2011
10.	Bid and award construction contract.	Fall/Winter 2011
11.	Start project construction.	Winter 2011/Spring 2012
12.	Complete project construction.	Winter 2012/Spring 2013
13.	Close out project.	Spring 2013

The key to implementing part or all of the John Day wastewater system improvements project, as outlined in this chapter, is the ability of the City to acquire a low-interest loan coupled with grant funding. 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. Depending on the scope of improvements, the City will need to plan on average user costs being increased to at least $48 to $52 per month, or annual property taxes increasing by approximately $6 to $8 per $1,000 of tax assessed value (or some combination of the two), in order to obtain the loan and grant funds required to complete the project. Rates may be higher than this depending on the amount of grant funds available. Participation from Canyon City is vital for the ability of John Day to fund the selected alternative discussed in Chapter 5.

Wastewater system improvements as outlined in this Wastewater Facilities Plan will provide the City with a reliable, quality wastewater system that would meet the needs of the City for many years to come. The new system will be easier to operate, will be able to provide nitrate treatment, and will also require less maintenance.

CITY OF JOHN DAY, OREGON
HISTORICAL SEWER AND JOINT SEWER FUND SUMMARY
FISCAL YEARS 2002 THROUGH 2009

Fiscal Year	Operating Revenue	From Canyon City	Non-Operating Revenue	Transfers to Reserve	Materials & Services	Capital Outlay (Equipment)	Personnel Services	Employee Benefits	Total OM&R Expenditures	Debt Services	Total Expenditures	Net Income Gain/(Loss)
2002	$256,769	$28,683	$6,680	$29,600	$80,540	$1,409	$114,096	$45,936	$271,581	$0	$271,581	$ 20,551
2003	$267,066	$28,839	$4,154	$29,600	$77,343	$21,665	$122,205	$48,670	$299,483	$0	$299,483	$ 576
2004	$359,167	$34,968	$2,972	$29,600	$88,000	$127,255	$140,719	$58,088	$443,662	$0	$443,662	$ (46,555)
2005*	$307,869	$21,195	$2,208	($22,364)	$110,656	$25,537	$140,612	$63,151	$317,592	$0	$317,592	$ 13,680
2006	$312,216	$42,883	$28,721	$4,600	$104,977	$29,004	$178,182	$83,924	$400,687	$0	$400,687	$ (16,867)
2007	$367,455	$47,914	$7,252	$10,360	$117,084	$16,137	$171,602	$83,953	$399,136	$70,155	$469,291	$ (46,670)
2008	$359,182	$72,344	$4,849	$11,100	$101,059	$47,362	$149,854	$75,484	$384,859	$70,155	$455,014	$ (18,639)
2009**	$351,500	$72,344	$5,000	$11,100	$146,540	$79,202	$181,670	$97,512	$516,024	$71,155	$587,179	$ (158,335)

* In 2005 the City received a loan of approximately $809,190 to pay for wastewater facilities in a new industrial park. This loan is not included as it is not a typical OM&R expense.

** 2009 values were taken from the City of John Day's adopted budget.

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
HISTORICAL SEWER FUND SUMMARY

TABLE
6-1

CITY OF JOHN DAY, OREGON
PRELIMINARY SEWER RATE ANALYSIS - AVAILABLE REVENUE FOR DEBT SERVICES
FISCAL YEAR 2011

Average Monthly Cost[1]	Revenue[2]	Canyon City Revenue[3]	Expenditures			Revenue Available for Debt Service
			Estimated OM&R Costs[4]	Existing Loan Payments	Total Expenditures	
$48	$668,160	$72,000	$459,000	$71,200	$530,200	$209,960
$50	$696,000	$72,000	$459,000	$71,200	$530,200	$237,800
$52	$723,840	$72,000	$459,000	$71,200	$530,200	$265,640
$54	$751,680	$72,000	$459,000	$71,200	$530,200	$293,480
$56	$779,520	$72,000	$459,000	$71,200	$530,200	$321,320
$58	$807,360	$72,000	$459,000	$71,200	$530,200	$349,160
$60	$835,200	$72,000	$459,000	$71,200	$530,200	$377,000
$62	$863,040	$72,000	$459,000	$71,200	$530,200	$404,840
$64	$890,880	$72,000	$459,000	$71,200	$530,200	$432,680
$66	$918,720	$72,000	$459,000	$71,200	$530,200	$460,520
$68	$946,560	$72,000	$459,000	$71,200	$530,200	$488,360

[1] The monthly rate per Equivalent Residential Unit (ERU). Currently the City has 729 accounts and 1,160 ERUs.

[2] Assumes 1,160 ERUs for John Day.

[3] Based on increases in revenue generated from Canyon City from 2002 to 2008.

[4] OM&R = Operations, maintenance, and replacement. Projected fiscal year 2011 OM&R costs.

CWSRF = Clean Water State Revolving Fund
OBDD = Oregon Business Development Department
RD = Rural Development

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILIITES PLAN
PRELIMINARY SEWER RATE ANALYSIS
AVAILABLE REVENUE

TABLE
6-2

CITY OF JOHN DAY, OREGON
PRELIMINARY SEWER RATE ANALYSIS - LOAN CAPACITY
FISCAL YEAR 2011

Average Monthly Cost[2]	Revenue Available for Debt Service[3]	City of John Day Loan Capacity			Total Loan Capacity[1]		
		Typical CWSRF Loan Capacity[4]	Typical OBDD Loan Capacity[5]	Typical RD 40-year Loan Capacity[6]	Typical CWSRF Loan Capacity	Typical OBDD Loan Capacity	Typical RD 40-year Loan Capacity
$48	$209,960	$2,853,000	$2,662,000	$3,864,000	$3,356,000	$3,132,000	$4,546,000
$50	$237,800	$3,232,000	$3,014,000	$4,376,000	$3,802,000	$3,546,000	$5,148,000
$52	$265,640	$3,610,000	$3,367,000	$4,888,000	$4,247,000	$3,961,000	$5,751,000
$54	$293,480	$3,988,000	$3,720,000	$5,400,000	$4,692,000	$4,376,000	$6,353,000
$56	$321,320	$4,367,000	$4,073,000	$5,913,000	$5,138,000	$4,792,000	$6,956,000
$58	$349,160	$4,745,000	$4,426,000	$6,425,000	$5,582,000	$5,207,000	$7,559,000
$60	$377,000	$5,124,000	$4,779,000	$6,937,000	$6,028,000	$5,622,000	$8,161,000
$62	$404,840	$5,502,000	$5,132,000	$7,450,000	$6,473,000	$6,038,000	$8,765,000
$64	$432,680	$5,880,000	$5,485,000	$7,962,000	$6,918,000	$6,453,000	$9,367,000
$66	$460,520	$6,259,000	$5,838,000	$8,474,000	$7,364,000	$6,868,000	$9,969,000
$68	$488,360	$6,637,000	$6,191,000	$8,987,000	$7,808,000	$7,284,000	$10,573,000

1 Increase in John Day's loan capacity assuming that Canyon City will pay 15 percent of the project costs. Values rounded to nearest $1,000.

2 The monthly rate per Equivalent Residential Unit (ERU). Currently the City has 729 accounts and 1,160 ERUs.

3 See Table 6-2 for calculation of revenue available for debt service.

4 Assumed loan funding at 4 percent for 20 years. Actual loan interest rates could vary. Values rounded to nearest $1,000.

5 Assumed loan funding at 4.8 percent for 20 years. Actual loan interest rates could vary. Values rounded to nearest $1,000.

6 Assumed loan funding at 4.5 percent for 40 years. Estimated loan capacity does not include a 10 percent reserve requirement because the City's bonding authority is a general obligation bond. Actual loan interest rates could vary. Values rounded to nearest $1,000.

CWSRF = Clean Water State Revolving Fund
OBDD = Oregon Business Development Department
RD = Rural Development

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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILIITES PLAN
PRELIMINARY SEWER RATE ANALYSIS FOR LOAN CAPACITY

TABLE 6-3

CITY OF JOHN DAY - WASTEWATER BONDING CAPACITY
PRELIMINARY PROPERTY TAX ANALYSIS
2010-11 BUDGET YEAR

Typical RD Loan

Loan Amount	Interest Rate[1]	Loan Period	Estimated Annual Payment	Estimated Annual Tax Rate Increase per $1,000[2]	Estimated Tax Increase for a $100,000 Home	
					Monthly	Annual
$3,000,000	4.5%	40 Yrs	$163,030	$2.07	$17.25	$207.00
$4,000,000	4.5%	40 Yrs	$217,370	$2.76	$23.00	$276.00
$5,000,000	4.5%	40 Yrs	$271,720	$3.45	$28.75	$345.00
$6,000,000	4.5%	40 Yrs	$326,060	$4.14	$34.50	$414.00

Typical OBDD Loan

Loan Amount	Interest Rate[1]	Loan Period	Estimated Annual Payment	Estimated Annual Tax Rate Increase per $1,000[2]	Estimated Tax Increase for a $100,000 Home	
					Monthly	Annual
$3,000,000	4.8%	20 Yrs	$236,660	$3.00	$25.00	$300.00
$4,000,000	4.8%	20 Yrs	$315,550	$4.00	$33.33	$400.00
$5,000,000	4.8%	20 Yrs	$394,440	$5.00	$41.67	$500.00
$6,000,000	4.8%	20 Yrs	$473,320	$6.00	$50.00	$600.00

Typical CWSRF Loan

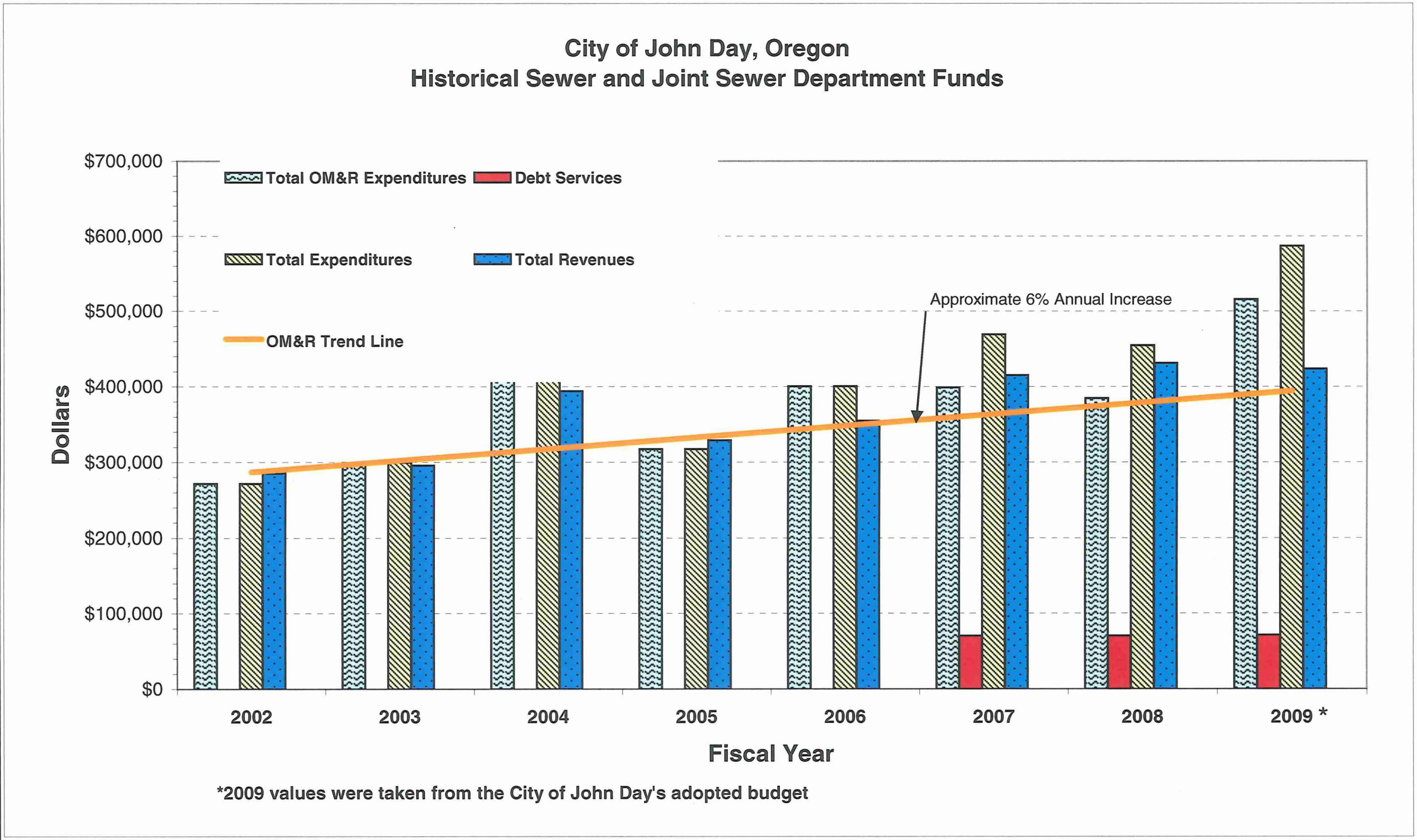
Loan Amount	Interest Rate[1]	Loan Period	Estimated Annual Payment	Estimated Annual Tax Rate Increase per $1,000[2]	Estimated Tax Increase for a $100,000 Home	
					Monthly	Annual
$3,000,000	4.0%	20 Yrs	$220,750	$2.80	$23.33	$280.00
$4,000,000	4.0%	20 Yrs	$294,330	$3.73	$31.08	$373.00
$5,000,000	4.0%	20 Yrs	$367,910	$4.67	$38.92	$467.00
$6,000,000	4.0%	20 Yrs	$441,500	$5.60	$46.67	$560.00

[1] Actual loan interest rates could vary.

[2] The annual tax rate increase is based on the City of John Day's 2007-08 assessed valuation of $78,825,099. 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 here.

OBDD = Oregon Business Development Department

CWSRF = Clean Water State Revolving Fund



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CITY OF
JOHN DAY, OREGON
WASTEWATER FACILITIES PLAN
HISTORICAL SEWER
DEPARTMENT FUNDS

FIGURE
6-1

APPENDIX A
Existing WPCF Permit

WATER POLLUTION CONTROL FACILITIES PERMIT

Department of Environmental Quality
700 S.E. Emigrant, Suite 330, Pendleton, OR 97801
Telephone: (541) 276-4063

Issued pursuant to ORS 468B.050

ISSUED TO:

City of John Day
450 East Main
John Day, OR 97845

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Domestic Wastewater	001	Evaporation and Percolation Ponds
Biosolids	002	Land Application

PLANT TYPE AND LOCATION:

Trickling Filter and
Four Percolation Ponds
John Day, Oregon

RECEIVING SYSTEM INFORMATION:

Basin: John Day
Sub-Basin: Upper John Day
Hydro Code: 26=-JOHN 248.0 A
County: Grant

Treatment System Class: III
Collection System Class: II

Nearest surface stream that would receive waste if facility were to discharge: John Day at RM 248.0

Issued in response to Application No. 989386 received April 26, 2000.

This permit is issued based on the land use findings in the permit record.

Barbara D. Sellars, Water Quality Manager
Eastern Region

March 29, 2002
Date

PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to construct, install, modify, or operate a wastewater collection, treatment, control and disposal system in conformance with all the requirements, limitations, and conditions set forth in the attached schedules as follows:

Unless specifically authorized by this permit, by another NPDES or WPCF permit, or by Oregon Administrative Rule, any other direct or indirect discharge to waters of the state is prohibited, including discharge to an underground injection control system.

SCHEDULE A

Waste Discharge Limitations not to be Exceeded after Permit Issuance.

1. The City of John Day is authorized to operate a trickling filter treatment facility with effluent disinfection and disposal through evaporation and percolation using four slow sand filter percolation ponds. The approved average dry weather design flow for the facility is 0.60 MGD.

2. All wastewater shall be managed and disposed in a manner that will prevent:

   a. A violation of Groundwater Quality Protection Rules (OAR 340-040); and

   b. A violation of any permit-specific groundwater concentration limits, established pursuant to OAR 340-040-0030, which have been subsequently incorporated into the permit.

3. Outfall Number 001 (Evaporation and Percolation Ponds)

   a. No discharge to state waters is permitted. All treated wastewater shall be treated, disinfected, and disposed in four slow sand filter percolation ponds. Raw or inadequately treated sewage shall not be discharged to the percolation ponds. The percolation ponds shall be operated as follows:

      (1) The ponds shall not be allowed to overflow;

      (2) Effluent shall be discharged into the ponds so that all ponds receive approximately the same quantity of treated effluent per unit area of pond;

      (3) If an organic mat reduces the seepage from the pond bottoms, the organic matter shall be removed and the pond bottom disked lightly to restore seepage and prevent overfilling; and

      (4) Adverse impact on existing or potential beneficial uses of groundwater is not allowed.

   b. Wastewater effluent from the trickling filter treatment plant shall be disinfected to maintain a minimum daily average chlorine residual of 1.0 mg/l on a monthly basis.

   c. The BOD5 percent removal efficiency for the trickling filter treatment plant shall not be less than 85% monthly average.

4. Outfall Number 002 (Biosolids Land Application and Management)

   a. Biosolids land application and management will comply with Oregon biosolids rules and guidelines including OAR 340-050 and all other applicable statutes, rules, and federal regulations.

   b. Prior to land application, the biosolids shall meet one of the vector attraction reduction standards required under 40CFR 503.33(a)(1).

   c. Prior to land application, the biosolids shall meet one of the three pathogen reduction standards required under 40CFR 503.32(b).

d. Public access to field sites shall be restricted for at least 12 months after biosolids land spreading has ceased.

e. A 50-feet minimum (300-feet minimum if biosolids gun application is used) setback shall be maintained between biosolids application areas and all highways, public roadways, and property lines.

f. Land application activities shall be conducted in accordance with the approved biosolids management plan.

5. The Department may reopen this permit, if necessary, to include groundwater parameters, concentration limits, and compliance points based on groundwater monitoring or other information.

SCHEDULE B

1. Minimum Monitoring and Reporting Requirements
(unless otherwise approved in writing by the Department)

a. Influent

Item or Parameter	Minimum Frequency	Type of Sample
pH	3/Week	Grab
BOD5	2/Week	Composite 1/
TSS	2/Week	Composite 1/

b. Outfall Number 001 (Evaporation and Percolation Ponds)

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Totalizer
Flow Meter Calibration	1 per 5 Years	Verification
BOD5	2/Week	Composite 1/
TSS	2/Week	Composite 1/
pH	3/Week	Grab
Quantity Chlorine Used	Daily	Measurement
Chlorine Residual	Daily	Grab
TKN	Quarterly	Grab
NO_2+NO_3-N	Quarterly	Grab
Total Dissolved Solids	Quarterly	Grab
Average Percent Removed (BOD5 and TSS)	Monthly	Calculation

c. Outfall 002 (Biosolids Land Application)

Item or Parameter	Minimum Frequency	Type of Sample
Biosolids Analyses including: Total solids (%dry weight) Volatile solids (% dry weight) pH (standard units) Biosolids nitrogen for: NH4-N; NO3-N; & TKN (% dry weight) Total phosphorus (% dry weight) Potassium (% dry weight) Biosolids trace pollutants for: As, Cd, Cu, Hg, Mo, Ni, Pb, Se, & Zn (measured as total in mg/kg)	Annually	Composite sample to be representative of the product to be land applied from the digester (See Note 3/)

Item or Parameter	Minimum Frequency	Type of Sample
Record of % volatile solids reduction accomplished through digestion	Monthly	Calculation (See note 4/)
Record of locations Where biosolids are applied on each DEQ authorized land application site. (Site location maps are to be maintained at the treatment facility for review upon request by DEQ)	Each occurrence	Date, quantity (dry tons, gallons/cubic yards), and locations where biosolids were applied, recorded on site location map.

d. Groundwater Monitoring Resampling Requirements

If monitoring indicates that a concentration limit has been exceeded at a compliance point, the permittee shall notify the Department within 10 days and shall immediately resample the monitoring well. The results of both sampling events shall be reported to the Department within 10 days of receipt of the laboratory data.

If monitoring indicates a significant increase (increase or decrease for pH) in the value of a parameter monitored, the permittee shall immediately resample unless otherwise approved in writing by the Department. If the resampling confirms a change in water quality, the permittee shall:

(1) Report the results to the Department within 10 days of receipt of the laboratory data; and

(2) Prepare and submit to the Department within 30 days a plan for developing a preliminary assessment unless another time schedule is approved by the Department.

Notes: 1/ Composite samples shall consist of no less than 6 samples collected over a 24-hour period and apportioned according to the volume of flow at the time of sampling.

2/ Composite samples shall consist of at least 6 samples collected over an 8-hour period, between 6 a.m. and 6 p.m., and apportioned according to the volume of flow at the time of sampling.

Composite samples from the drying beds shall consist of blending equal fractions of grab samples taken from the center of four or more like-sized units resulting from an imaginary grid of each section of the drying beds being harvested. The grab samples taken from the center of each grid shall include the entire depth of sludge in the area sampled. Samples shall be composited and mixed in equal portions. The sampling locations should be spaced to get samples from all parts of the drying beds.

Composite samples from the digester withdrawal line shall consist of at least six aliquots of equal volume collected over the daily scheduled hauling period and combined.

Inorganic pollutant monitoring shall be conducted according to **Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,** Second edition (1982) with Updates I and II and third Edition (1986) with Revision I.

4/ Calculation of the % volatile solids reduction is to be based on comparison of a representative sample of total and volatile solids entering the digester (a weighted blend of the primary and secondary clarifier solids) and a representative composite sample of solids exiting the digester withdrawal line (as defined in Note 3/ above).

2. Reporting Procedures

Monitoring results shall be reported on approved forms. The reporting period is the calendar month. Reports must be submitted to the Department's Eastern Region Pendleton Office by the 15th day of the following month.

State monitoring reports shall identify the name, certificate classification and grade level of each principal operator designated by the permittee as responsible for supervising the wastewater collection and treatment systems during the reporting period. Monitoring reports shall also identify each system classification as found on page one of this permit.

Monitoring reports shall also include a record of all applicable equipment breakdowns and bypassing.

3. Biosolids Reporting

An annual biosolids report shall be submitted to the Department by February 19 of each year that describes solids handling activities for the previous year and includes, but is not limited to, the required information outlined in OAR 340-050-0035(6)(a) – (e).

4. Groundwater Reopener

Upon Department approval of the Groundwater Monitoring Plan as required in Schedule C of this permit, the Department may reopen this permit, if necessary, to include the following groundwater monitoring requirements: parameters, sampling methodologies, sampling frequencies, and background, detection, and compliance monitoring wells. Upon Department approval of the Groundwater Monitoring Plan, groundwater monitoring shall be conducted in accordance with the approved plan until this permit is renewed or modified to include specific monitoring requirements.

SCHEDULE C

Compliance Conditions and Schedules

1. By no later than twelve (12) months from the date of issuance of this permit, the permittee shall submit a groundwater monitoring plan for Department review and approval. After written approval of the groundwater monitoring plan, the permittee shall implement the plan and begin groundwater monitoring.

2. Within six (6) months after the collection of nine sets of groundwater quality and level data, the permittee shall submit a report analyzing the data. The report shall include a determination of background groundwater quality, existing or potential impacts, and background and compliance wells. Based on the results of the report, the permittee shall either: 1) propose permit specific concentration limit(s); or 2) apply for a concentration limit variance. Upon approval of the concentration limit(s) or granting of the concentration limit variance, the permit will be modified to include the permit specific concentration limit(s).

   The need for ongoing groundwater monitoring, and/or treatment disposal system improvements will be evaluated by the Department. Should the data indicate that the discharge to groundwater poses a significant threat, corrective actions and/or additional monitoring requirements shall be incorporated into the permit by addendum.

3. The permittee is expected to meet the compliance dates which have been established in this schedule. Either prior to or no later than 14 days following any lapsed compliance date, the permittee shall submit to the Department a notice of compliance or noncompliance with the established schedule. The Director or his authorized representative may revise a schedule of compliance if he determines good and valid cause resulting from events over which the permittee has little or no control.

SCHEDULE D

Special Conditions

1. An adequate contingency plan for prevention and handling of spills and unplanned discharges shall be in force at all times. A continuing program of employee orientation and education shall be maintained to ensure awareness of the necessity of good in-plant control and quick and proper action in the event of a spill or accident.

2. All biosolids shall be managed in accordance with the current, Department approved biosolids management plan and the site authorization letters issued by the Department. The permittee shall update the current biosolids management plan and submit it to the Department for review and approval by no later than nine (9) months after permit issuance. The permittee shall provide opportunity for comments on the draft plan for at least 30 days through public notice and shall incorporate revisions as needed prior to submittal to the Department. Any changes in solids management activities that significantly differ from the operations specified under the approved plan require the prior written approval of the Department. When appropriate, the permittee shall submit any necessary revisions to the current biosolids management plan for Department review and approval.

   All new biosolids application sites shall meet the site selection criteria set forth in OAR 340-050-0070. The currently approved site is located in Grant County. No new public notice is required for the continued use of the currently approved site. Property owners adjacent to any newly approved application sites shall be notified, in writing or by any method approved by the Department, of the proposed activity prior to the start of application. For proposed new application sites that are deemed by the Department to be sensitive with respect to residential housing, runoff potential or threat to groundwater, an opportunity for public comment shall be provided in accordance with OAR 340-050-0030.

3. The permittee shall comply with Oregon Administrative Rules (OAR), Chapter 340, Division 049, "Regulations Pertaining To Certification of Wastewater System Operator Personnel" and accordingly:

   a. The permittee shall have its wastewater system supervised by one or more operators who are certified in a classification and grade level (equal to or greater) that corresponds with the classification (collection and /or treatment) of the system to be supervised as specified on page one of this permit. The permittee may contract for part-time supervision in accordance with OAR 340-049-0015(3) and 340-049-0070.

Note: A "supervisor" is defined as the person exercising authority for establishing and executing the specific practice and procedures of operating the system in accordance with the policies of the permittee and requirements of the waste discharge permit. "Supervise" means responsible for the technical operation of a system, which may affect its performance or the quality of the effluent produced. Supervisors are not required to be on-site at all times.

   b. The permittee's wastewater system may not be without supervision (as required by Special Condition 3 a. above) for more than thirty (30) days. During this period, and at any time that the supervisor is not available to respond on-site (i.e. vacation, sick leave or off-call), the permittee must make available another person who is certified in the proper classification and at grade level I or higher.

c. The permittee is responsible for ensuring the wastewater system has a properly certified supervisor available at all times to respond on-site at the request of the permittee and to any other operator.

d. The permittee shall notify the Department of Environmental Quality in writing within thirty (30) days of replacement or redesignation of certified operators responsible for supervising wastewater system operation. The notice shall be filed with the Water Quality Division, Operator Certification Program (811 SW Sixth, Portland, OR 97204). This requirement is in addition to the reporting requirements contained under Schedule B of this permit

e. Upon written request, the Department 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 justification for the time needed, a schedule for recruiting and hiring, the date the system supervisor availability ceased and the name of the alternate system supervisor(s) as required by 3 b. above.

4. The permittee shall notify the DEQ Eastern Region, Pendleton Office, (541) 276-4063, in accordance with the response times noted in the General Conditions of this permit, of any malfunction so corrective action can be coordinated between the permittee and the Department.

5. The permittee shall manage and maintain all groundwater monitoring wells as follows:

   a. The permittee shall protect and maintain each groundwater monitoring well so that samples collected are representative of actual conditions.

   b. All monitoring well abandonments, replacements, repairs, and installations must be conducted in accordance with the Water Resources Department Oregon Administrative Rules, Chapter 690, Division 240, and with the Department's guidance "Groundwater Monitoring Well Drilling, Construction, and Decommissioning", dated August 22, 1992. All monitoring well abandonments, replacements, repairs, and installations must be documented in a report prepared by an Oregon registered geologist.

   c. If a monitoring well becomes damaged or inoperable, the permittee shall notify the Department in writing within 14 days of when the permittee becomes aware of the circumstances. The written report shall describe: what problem has occurred, the remedial measures that have been or will be taken to correct the problem, and the measures taken to prevent the recurrence of damage or inoperation. The Department may require the replacement of inoperable monitoring wells.

   d. Prior to installation of new or replacement monitoring wells, the placement or design must be approved in writing by the Department. Well logs and a well completion report shall be submitted to the Department within 30 days of installation of the well. The report shall include a survey drawing showing the location of all monitoring wells, disposal sites, and water bodies.

   e. Prior to abandonment of existing wells deemed unsuitable for groundwater monitoring, an abandonment plan must be submitted to the Department for review and approval.

6. The Department may reopen the permit, if necessary, to include new or revised monitoring and reporting requirements, compliance conditions and schedules, and special conditions.

SCHEDULE F

General Conditions

SECTION A. STANDARD CONDITIONS

1. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws, or regulations.

2. Liability

The Department of Environmental Quality, its officers, agents, or employees shall not sustain any liability on account of the issuance of this permit or on account of the construction or maintenance of facilities because of this permit.

3. Permit Actions

After notice by the Department, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including but not limited to the following:

a. Violation of any term or condition of this permit, any applicable rule or statute, or any order of the Commission;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts.

4. Transfer of Permit

This permit shall not be transferred to a third party without prior written approval from the Department. Such approval may be granted by the Department where the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of this permit and the rules of the Commission. A transfer application and filing fee must be submitted to the Department.

5. Permit Fees

The permittee shall pay the fees required to be filed with this permit application and to be paid annually for permit compliance determination as outlined in the Oregon Administrative Rules.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times maintain in good working order and properly operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

2. Standard Operation and Maintenance

All waste collection, control, treatment, and disposal facilities shall be operated in a manner consistent with the following:

a. At all times, all facilities shall be operated as efficiently as possible and in a manner which will prevent discharges, health hazards, and nuisance conditions.

b. All screenings, grit, and sludge shall be disposed of in a manner approved by the Department such as to prevent any pollutant from such materials from reaching any waters of the state, creating a public health hazard, or causing a nuisance condition.

c. Bypassing of untreated waste is generally prohibited. No bypassing shall occur without prior written permission from the Department except where unavoidable to prevent loss of life, personal injury, or severe property damage.

3. Noncompliance and Notification Procedures

In the event the permittee is unable to comply with all the conditions of this permit because of surfacing sewage, a breakdown of equipment or facilities, an accident caused by human error or negligence, or any other cause such as an act of nature, the permittee shall:

a. Immediately take action to stop, contain, and clean up the unauthorized discharges and correct the problem.

b. Immediately notify the Department's Regional office, so that an investigation can be made to evaluate the impact and the corrective actions taken and determine additional action that must be taken.

c. Within 5 days of the time the permittee becomes aware of the circumstances, the permittee shall submit to the Department a detailed written report describing the breakdown, the actual quantity and quality of resulting waste discharges, corrective action taken, steps taken to prevent a recurrence, and any other pertinent information.

Compliance with these requirements does not relieve the permittee from responsibility to maintain continuous compliance with the conditions of this permit or the resulting liability for failure to comply.

4. Wastewater System Personnel

The permittee shall provide an adequate operating staff which is duly qualified to carry out the operation, maintenance, and monitoring requirements to assure continuous compliance with the conditions of this permit.

SECTION C. MONITORING AND RECORDS

1. Inspection and Entry

The permittee shall, at all reasonable times, allow authorized representatives of the Department of Environmental Quality to:

a. Enter upon the permittee's premises where a waste source or disposal system is located or where any records are required to be kept under the terms and conditions of this permit;

b. Have access to and copy any records required to be kept under the terms and conditions of this permit;

c. Inspect any treatment or disposal system, practices, operations, monitoring equipment, or monitoring method regulated or required by this permit; or

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.

2. Averaging of Measurements

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean, except for bacteria which shall be averaged as specified in the permit.

3. Monitoring Procedures

Monitoring must be conducted according to test procedures specified in the most recent edition of **Standard Methods for the Examination of Water and Wastewater**, unless other test procedures have been approved in writing by the Department and specified in this permit.

4. Retention of Records

The permittee shall retain records of all monitoring and maintenance information, including all calibrations, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. The Director may extend this period at any time.

SECTION D. REPORTING REQUIREMENTS

1. Plan Submittal

Pursuant to Oregon Revised Statute 468B.055, unless specifically exempted by rule, no construction, installation or modification of disposal systems, treatment works, or sewerage systems shall be commenced until plans and specifications are submitted to and approved in writing by the Department. All construction, installation or modification shall be in strict conformance with the Department's written approval of the plans.

2. Change in Discharge

Whenever a facility expansion, production increase, or process modification is anticipated which will result in a change in the character of pollutants to be discharged or which will result in a new or increased discharge that will exceed the conditions of this permit, a new application must be submitted together with the necessary reports, plans, and specifications for the proposed changes. No change shall be made until plans have been approved and a new permit or permit modification has been issued.

3. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified by the official applicant of record (owner) or authorized designee.

SECTION E. DEFINITIONS

1. BOD_5 means five-day biochemical oxygen demand.
2. TSS means total suspended solids.
3. FC means fecal coliform bacteria.
4. NH_3-N means Ammonia Nitrogen.
5. NO_3-N means Nitrate Nitrogen.
6. NO_2-N means Nitrite Nitrogen.
7. TKN means Total Kjeldahl Nitrogen.
8. Cl means Chloride.
9. TN means Total Nitrogen.
10. mg/L means milligrams per liter.
11. ug/L means micrograms per liter.
12. kg means kilograms.
13. GPD means gallons per day.
14. MGD means million gallons per day.
15. The term "bacteria" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and E. coli bacteria.
16. Total residual chlorine means combined chlorine forms plus free residual chlorine.
17. Grab sample means an individual discrete sample collected over a period of time not to exceed 15 minutes.
18. Composite sample means a combination of samples collected, generally at equal intervals over a 24-hour period, and apportioned according to the volume of flow at the time of sampling.
19. Week means a calendar week of Sunday through Saturday.
20. Month means a calendar month.
21. Quarter means January through March, April through June, July through September, or October through December.

APPENDIX B
Excerpts from A Plain English Guide to the EPA Part 503 Biosolids Rule

Chapter 2

Land Application of Biosolids

What Is Land Application?

Land application is the application of biosolids to land to either condition the soil or to fertilize crops or other vegetation grown in the soil. Nearly half of the biosolids production in the United States is currently being used beneficially to improve soils. This guidance document categorizes the types of land that benefit from the application of biosolids (see Figure 2-1) as follows:

- agricultural land, forests, and reclamation sites—collectively called ***nonpublic contact sites*** (areas not frequently visited by the public); and
- public parks, plant nurseries, roadsides, golf courses, lawns, and home gardens—collectively called ***public contact sites*** (areas where people are likely to come into contact with biosolids applied to land). The Part 503 rule, however, does not regard lawns and home gardens as public contact sites, and fewer types of biosolids may be land applied to these sites (i.e., CPLR biosolids are not permitted on lawns and home gardens given the considerable difficulty of tracking cumulative levels of metals in biosolids applied to such sites).

Biosolids can be either applied to land in ***bulk*** or sold or given away in ***bags or other containers*** for land application (see Figure 2-2). The term ***biosolids in bulk*** refers to biosolids that are marketed or given to manufacturers of products that contain biosolids. The term ***biosolids in bags*** generally refers to biosolids in amounts that are bagged and generally marketed for use on smaller units of land such as lawns and home gardens.

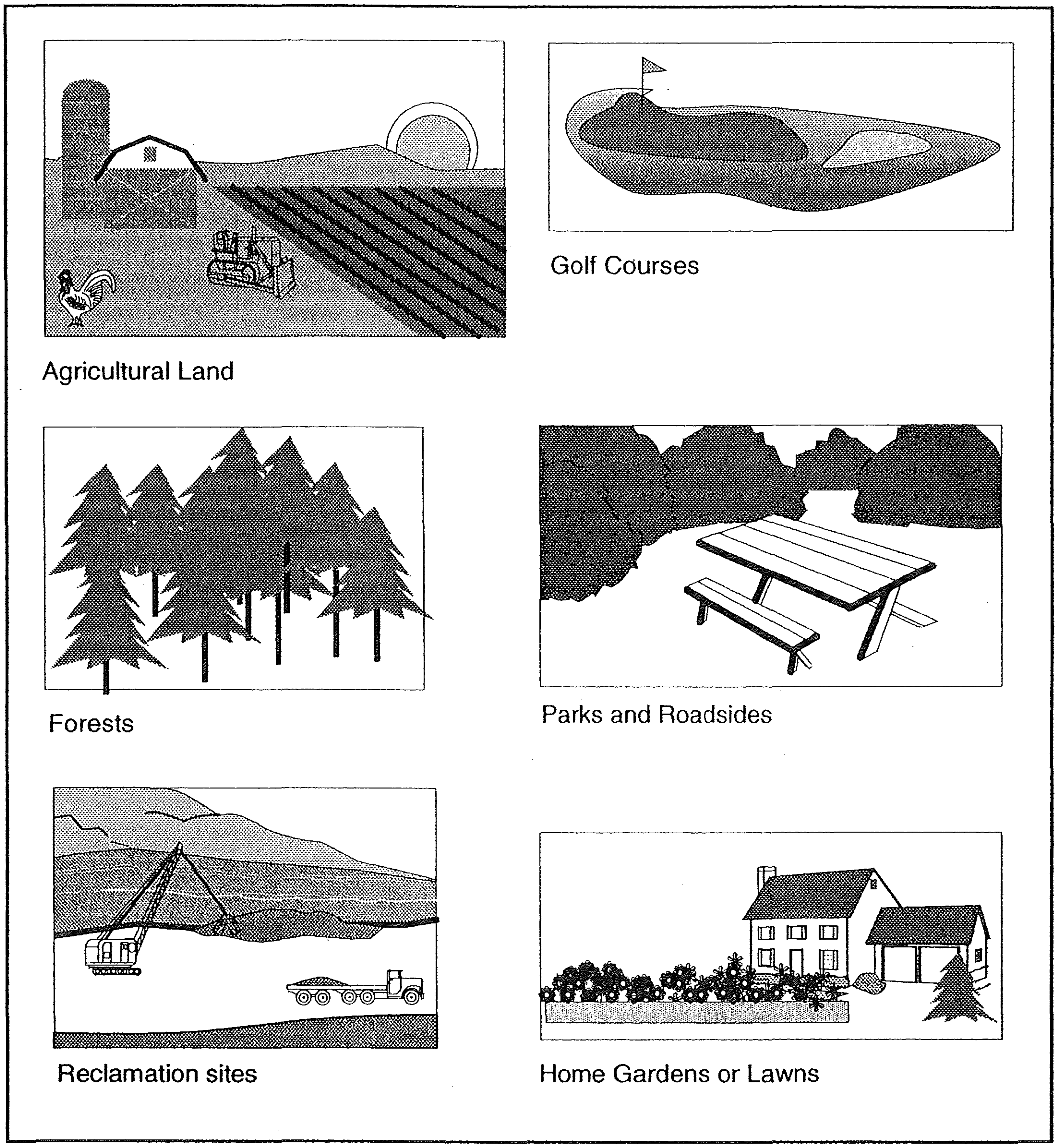


Figure 2-1. Biosolids can be beneficially land applied on agricultural land, forest land, reclamation sites, golf courses, public parks, roadsides, plant nurseries, and lawns and home gardens.

The term ***other containers*** is defined in the Part 503 rule as open or closed receptacles (e.g., buckets, boxes, or cartons) or vehicles with a load capacity of one metric ton or less. (Most pickup trucks as well as trailers pulled by an automobile would meet the regulatory definition of other containers.)

Biosolids are generally land applied using one of several techniques. The biosolids may be sprayed or spread on the soil surface and left on the surface (e.g., on pastures, range and forest land, or lawn). They also may be tilled (incorporated) into the soil after being surface applied or injected

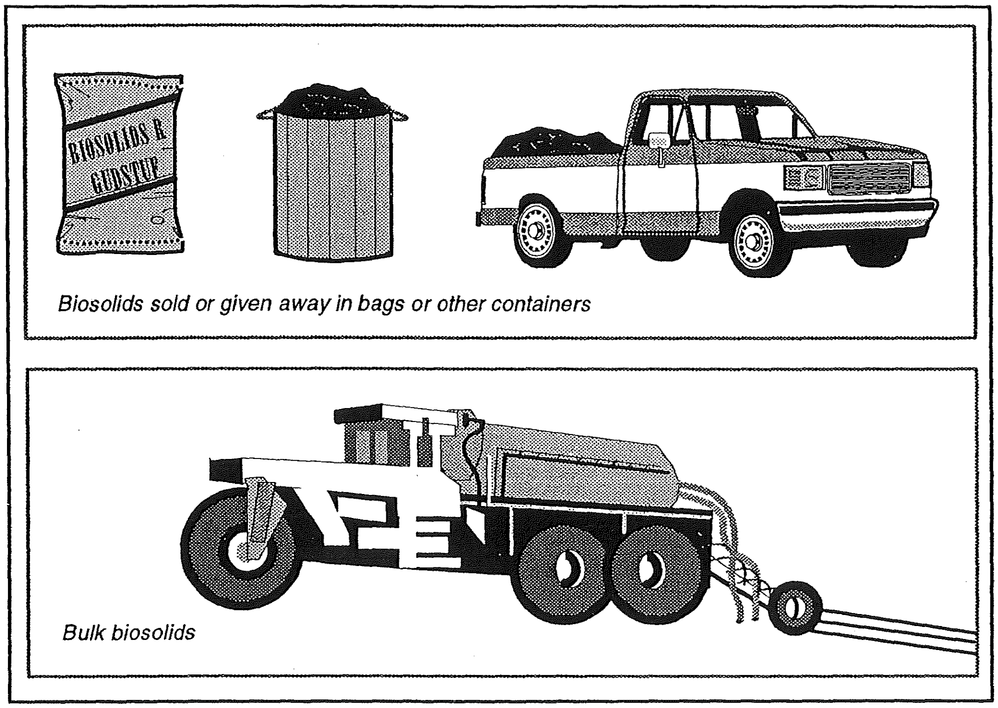


Figure 2-2. For application to the land, biosolids can be sold or given away in bags, in other containers, or they can be land applied in bulk form.

directly below the surface for producing row crops or other vegetation and for establishing lawns.

Biosolids in a liquid state can be applied using tractors, tank wagons, irrigation systems, or special application vehicles. Dewatered biosolids are typically applied to land using equipment similar to that used for applying limestone, animal manures, or commercial fertilizers. Both liquid and dewatered biosolids are applied to land with or without subsequent incorporation into the soil.

Because biosolids are typically treated before being land applied, their use poses a low degree of risk. This chapter discusses approaches for meeting the requirements of the Part 503 rule for the land application of biosolids.

The practice of growing crops or grazing animals on a biosolids surface disposal site, another form of beneficial use, is discussed in Chapter 3. This guidance document refers to this practice as ***dedicated beneficial use.*** A permitting authority can allow crops to be grown on a surface disposal site and marketed or grazed if the owner/operator of the site shows that site-specific management practices are being used that will ensure protection of public health and the environment from any reasonably anticipated adverse effects of certain pollutants that can be present in biosolids.

Spreading finished biosolids product on Walt Disney World tree farm in Orlando, Florida.

To Whom the Land Application Requirements Apply

Different provisions of the Part 503 rule apply to the ***preparer*** and the ***applier*** of biosolids. The ***preparer*** of biosolids is defined as a person who either ***generates*** biosolids during the treatment of domestic sewage in a treatment works or who ***derives*** a material from biosolids (i.e., changes the quality of the biosolids prepared by a generator). Examples of materials derived from biosolids include biosolids treated by composting, pelletizing, or drying (to kill pathogens and reduce attractiveness to vectors), and mixtures of biosolids with other materials (e.g., biosolids blended with soil or fertilizer, which will usually lower pollutant concentrations). The ***applier*** is defined as the person who applies the biosolids to land. The responsibilities of preparers and appliers of biosolids under the Part 503 rule are summarized in Figure 2-8.

Landowners and leaseholders also have certain responsibilities. These are discussed at the end of this chapter.

Land Application Requirements

Biosolids applied to the land must meet risk-based pollutant limits specified in Part 503. Operational standards to control disease-causing organisms called pathogens and to reduce the attraction of vectors (e.g., flies, mosquitoes, and other potential disease-carrying organisms) to the biosolids must also be met. In addition, there are general requirements, management practices, and frequency of monitoring, recordkeeping, and reporting requirements that must be met. Each of these land application requirements is discussed below.

Pollutant Limits, Pathogen and Vector Attraction Reduction Requirements

1 All biosolids applied to the land must meet ***the ceiling concentrations for pollutants,*** listed in the first column of Table 2-1. The ceiling concentrations are the maximum concentration limits for 10 heavy metal

TABLE 2-1
Pollutant Limits

Pollutant	Ceiling Concentration Limits for All Biosolids Applied to Land (milligrams per kilogram)[a]	Pollutant Concentration Limits for EQ and PC Biosolids (milligrams per kilogram)[a]	Cumulative Pollutant Loading Rate Limits for CPLR Biosolids (kilograms per hectare)	Annual Pollutant Loading Rate Limits for APLR Biosolids (kilograms per hectare per 365-day period)
Arsenic	75	41	41	2.0
Cadmium	85	39	39	1.9
Chromium	3,000	1,200	3,000	150
Copper	4,300	1,500	1,500	75
Lead	840	300	300	15
Mercury	57	17	17	0.85
Molybdenum[b]	75	—	—	—
Nickel	420	420	420	21
Selenium	100	36	100	5.0
Zinc	7,500	2,800	2,800	140
Applies to:	All biosolids that are land applied	Bulk biosolids and bagged biosolids[c]	Bulk biosolids	Bagged biosolids[c]
From Part 503	Table 1, Section 503.13	Table 3, Section 503.13	Table 2, Section 503.13	Table 4, Section 503.13

[a] Dry-weight basis

[b] As a result of the February 25, 1994, Amendment to the rule, the limits for molybdenum were deleted from the Part 503 rule pending EPA reconsideration.

[c] Bagged biosolids are sold or given away in a bag or other container.

pollutants in biosolids; specifically, arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc. If a limit for any one of the pollutants is exceeded, the biosolids cannot be applied to the land until such time that the ceiling concentration limits are no longer exceeded. The ceiling concentrations for pollutants are included in Part 503 to prevent the land application of biosolids with the highest levels of pollutants and to encourage pretreatment efforts that will result in lower levels of pollutants.

2 Biosolids applied to the land must also meet either pollutant concentration limits, cumulative pollutant loading rate limits, or annual pollutant loading rate limits for these same heavy metals.

3 Either ***Class A or Class B pathogen requirements*** (summarized in Table 2-5) ***and site restrictions*** (Figure 2-4) must be met before the biosolids can be land applied; the two classes differ depending on the level of pathogen reduction that has been obtained.

4 Finally, 1 of 10 options specified in Part 503 and summarized in Table 2-6 to achieve ***vector attraction reduction*** must be met when biosolids are applied to the land.

Options for Meeting Land Application Requirements

This guidance document groups the Part 503 requirements into four options for meeting pollutant limits and pathogen and vector attraction reduction operational standards when biosolids are applied to the land. The options include:

- the Exceptional Quality (EQ) Option
- the Pollutant Concentration (PC) Option
- the Cumulative Pollutant Loading Rate (CPLR) Option
- the Annual Pollutant Loading Rate (APLR) Option

It is very important to realize that each option is equally protective of public health and the environment; that is, EQ, PC, CPLR, and APLR biosolids used in accordance with the Part 503 rule are equally safe. This safety is ensured by the combination of pollutant limits and management practices imposed by each option.

Whichever option is chosen, at a minimum, the ceiling concentrations for pollutants (listed in Table 2-1) and the frequency of monitoring, reporting, and recordkeeping requirements (see Tables 2-7 and 2-8) must be met. The four options are summarized in Table 2-2, illustrated in Figure 2-3, and discussed in detail below.

Depending on the land application option under consideration, site restrictions (Figure 2-4), general requirements (Figure 2-8), and management practices (Figure 2-9) also apply. These additional restrictions,

TABLE 2-2
Options for Meeting Pollutant Limits and Pathogen and Vector Attraction Reduction Requirements for Land Application

Option*	Pollutant Limits	Pathogen Requirements	Vector Attraction Reduction Requirements
"Exceptional Quality" (EQ) Biosolids	Bulk or bagged biosolids meet pollutant concentration limits in Table 2-1	Any 1 of the Class A requirements in Table 2-5	Any 1 of the requirements in options 1 through 8 in Table 2-6
"Pollutant Concentration" (PC) Biosolids	Bulk biosolids meet pollutant concentration limits in Table 2-1	Any 1 of the Class B requirements in Table 2-5 and Figure 2-4	Any 1 of the 10 requirements in Table 2-6
		Any 1 of the Class A requirements in Table 2-5	Requirements 9 or 10 in Table 2-6
"Cumulative Pollutant Loading Rate" (CPLR) Biosolids	Bulk biosolids applied subject to cumulative pollutant loading rate (CPLR) limits in Table 2-1	Any 1 of the Class A or Class B requirements in Table 2-5 and Figure 2-4	Any 1 of the 10 requirements in Table 2-6
"Annual Pollutant Loading Rate" (APLR) Biosolids	Bagged biosolids applied subject to annual pollutant loading rate (APLR) limits in Table 2-1	Any 1 of the Class A requirements in Table 2-5	Any 1 of the first 8 requirements in Table 2-6

* Each of these options also requires that the biosolids meet the ceiling concentrations for pollutants listed in Table 2-1, and that the frequency of monitoring requirements in Table 2-7 and recordkeeping and reporting requirements in Table 2-8 be met. In addition, the general requirements in Figure 2-8 and the management practices in Figure 2-9 have to be met when biosolids are land applied (except for EQ biosolids).

requirements, and practices are summarized in Tables 2-3 and 2-4 and discussed in greater detail at the end of this chapter.

Rather than presenting the four options in the order described in the Part 503 rule, this document presents them in order of increasing regulatory requirements. Table 2-3 graphically displays the level of required regulatory control for each option. The types of land onto which these different biosolids may be applied are listed in Table 2-4.

Option 1: Exceptional Quality (EQ) Biosolids

For biosolids to qualify under the EQ option, the following requirements must be met:

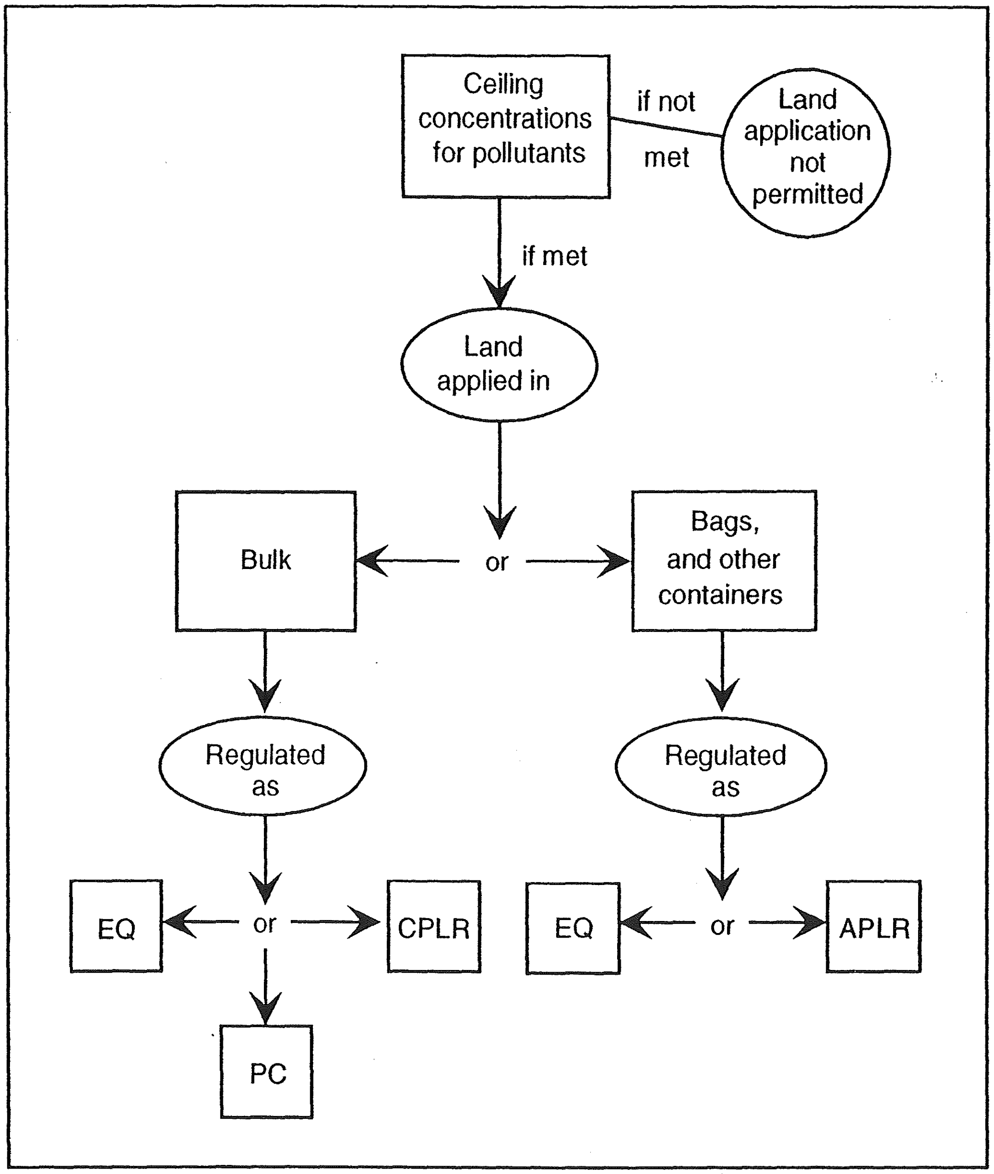
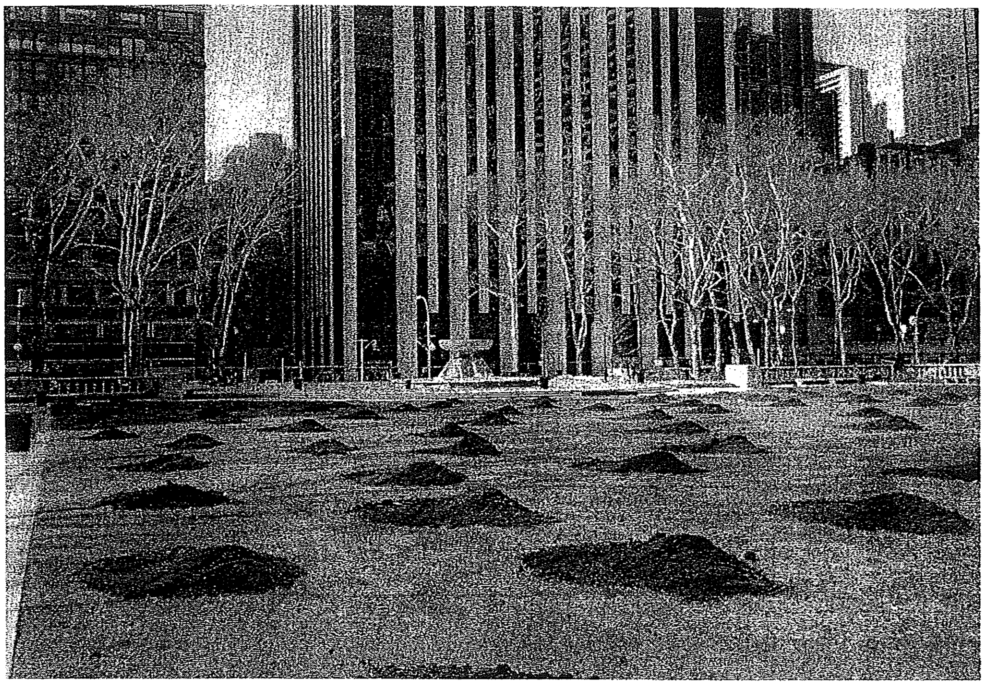


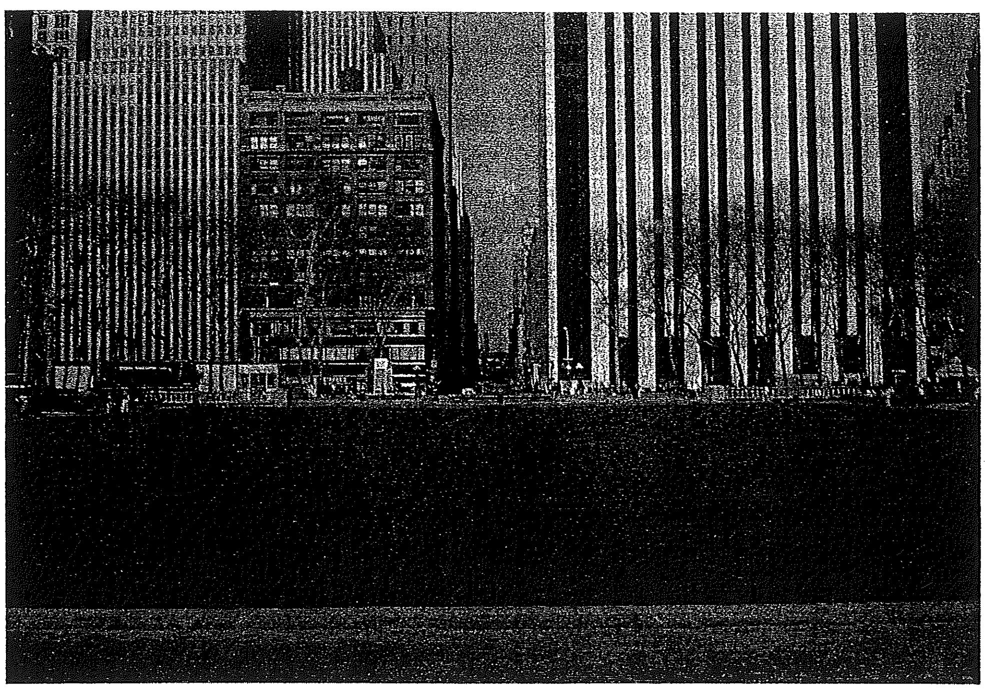
Figure 2-3. Options for meeting certain Part 503 land application requirements

- The ceiling concentrations for pollutants in Table 2-1 may not be exceeded.
- The pollutant concentration limits in Table 2-1 may not be exceeded.
- One of the Class A pathogen requirements in Table 2-5 must be met.
- One of the first eight vector attraction reduction options in Table 2-6 must be achieved.

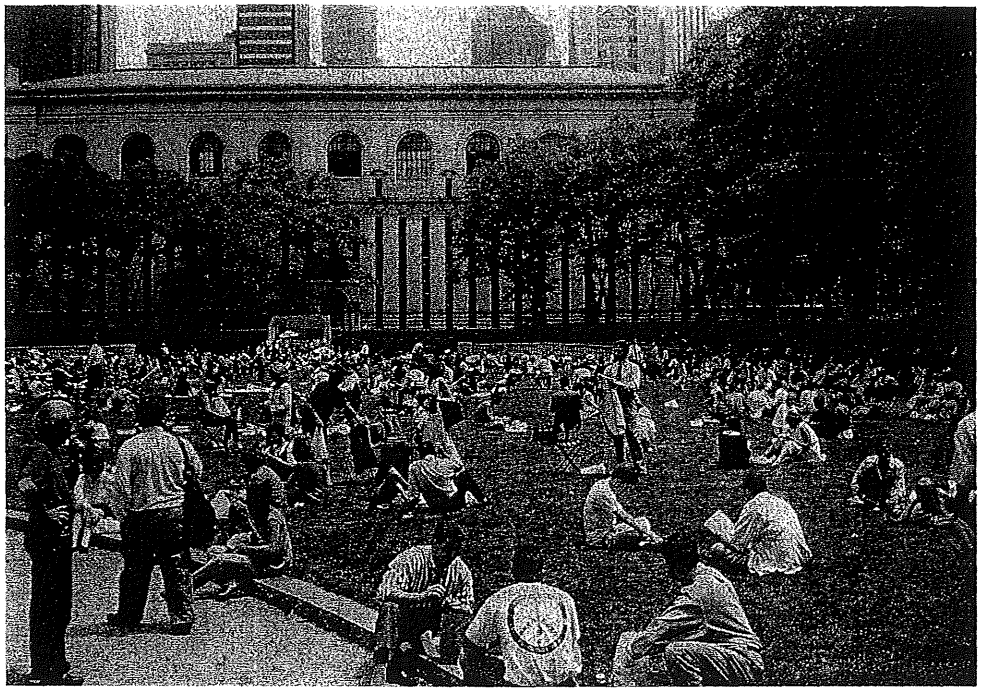
Methods that typically achieve the pathogen and vector attraction reduction requirements and allow biosolids to meet EQ requirements include alkaline stabilization, composting, and heat drying. The Part 503 frequency of



Use of biosolids on parkland in Manhattan, New York. *Biosolids compost is piled on barren site to be spread for soil conditioning.*



Use of biosolids on parkland in Manhattan, New York (continued). *One month after spreading of biosolids, the turf is vigorously established.*



Use of biosolids on parkland in Manhattan, New York (continued). Different view showing public enjoying the park.

monitoring, recordkeeping, and reporting requirements (see Tables 2-7 and 2-8) also must be met for EQ biosolids.

Once biosolids meet EQ requirements, they are not subject to the land application general requirements and management practices in Part 503, with one possible exception—if the Regional Administrator or the State Director determines, on a case-by-case basis, that such requirements are necessary to protect public health and the environment (this exception applies only to bulk biosolids). Once biosolids have been established as meeting EQ requirements, whether in bulk form or in bags or other containers, they can generally be applied as freely as any other fertilizer or soil amendment to any type of land. While not required by the Part 503 rule, EQ biosolids should be applied at a rate that does not exceed the agronomic rate that supplies the nitrogen needs of the plants being grown, just as for any other commercial fertilizer or soil amending material that contains nitrogen.

Option 2: Pollutant Concentration (PC) Biosolids

To qualify under the PC option, biosolids must meet several requirements, including:

- The ceiling concentration for pollutants in Table 2-1 may not be exceeded.

TABLE 2-3
Summary of Regulatory Requirements for Different Types of Biosolids

<table>
<tr><th>Type of Biosolids and Class of Pathogens</th><th>Meet Ceiling Concentration for Pollutants</th><th>Meet Pollutant Concentration Limits</th><th>Site Restrictions</th><th>General Requirements and Management Practices</th><th>Track Added Pollutants</th></tr>
<tr><td>EQ
Bag or Bulk
Class A</td><td>Yes</td><td>Yes</td><td colspan="3">No</td></tr>
<tr><td>PC
Bulk Only
Class A[a]</td><td>Yes</td><td>Yes</td><td>No</td><td>Yes</td><td>No</td></tr>
<tr><td>PC
Bulk Only
Class B</td><td>Yes</td><td>Yes</td><td colspan="2">Yes</td><td>No</td></tr>
<tr><td>CPLR
Bulk Only
Class A</td><td>Yes</td><td>No</td><td>No</td><td colspan="2">Yes</td></tr>
<tr><td>CPLR
Bulk Only
Class B</td><td>Yes</td><td>No</td><td colspan="3">Yes</td></tr>
<tr><td>APLR
Bag Only
Class A</td><td>Yes</td><td>No</td><td>No</td><td>Yes[b]</td><td>Yes[c]</td></tr>
</table>

[a] Biosolids meeting Class A pathogen reduction requirements but following options 9 or 10 vector attraction reduction requirements are also considered PC biosolids.

[b] The only general and management practice requirement that must be met is a labeling requirement.

[c] The amount of biosolids that can be applied to a site during the year must be consistent with the annual whole sludge application rate (AWSAR) for the biosolids that does not cause any of the ALPRs to be exceeded.

Note: See Chapter Two text for explanation of biosolids types.

- The pollutant concentration limits in Table 2-1 may not be exceeded (same requirement as for EQ biosolids, discussed above).
- One of three Class B pathogen requirements must be met (see Table 2-5), as well as Class B site restrictions (see Figures 2-4 and 2-5).
- One of 10 vector attraction reduction options must be achieved (see Table 2-6).
- Frequency of monitoring (see Table 2-7), as well as recordkeeping and reporting requirements (see Table 2-8) must be met.

TABLE 2-4
Types of Land onto Which Different Types of Biosolids May Be Applied

Biosolids Option	Pathogen Class	VAR[a] Options	Type of Land	Other Restrictions
EQ	A	1-8	All[b]	None
PC	A	9 or 10	All except lawn and home gardens[c]	Management practices
	B	1-10	All except lawn and home gardens[c]	Management practices and site restrictions
CPLR	A	1-10	All except lawn and home garden[d]	Management practices
	B	1-10	All except lawn and home garden[c,d]	Management practices and site restrictions
APLR	A	1-8	All, but most likely lawns and home gardens	Labeling management practice

[a] VAR means vector attraction reduction.

[b] Agricultural land, forest, reclamation sites, and lawns and home gardens.

[c] It is not possible to impose site restrictions on lawns and home gardens.

[d] It is not possible to track cumulative additions of pollutants on lawns and home gardens.

- Applicable site restrictions, general requirements, and management practices must be met (summarized in Tables 2-3 and 2-4 and listed in Figures 2-4, 2-8, and 2-9).

Class A biosolids meeting vector attraction reduction requirements 9 and 10 in Table 2-6 are another type of biosolids material that would fit in the PC category.

Thus, PC biosolids must meet more requirements than EQ biosolids, but are subject to fewer requirements than CPLR biosolids. Currently, the majority of biosolids in the United States could be characterized as PC biosolids, as defined in this guidance document.

Option 3: Cumulative Pollutant Loading Rate (CPLR) Biosolids

The third option for meeting land application requirements allows bulk biosolids that do not meet the pollutant concentration limits in Table 2-1 to

TABLE 2-5
Summary of Class A and Class B Pathogen Reduction Requirements

CLASS A

In addition to meeting the requirements in one of the six alternatives listed below, fecal coliform or *Salmonella* sp. bacteria levels must meet specific density requirements at the time of biosolids use or disposal or when prepared for sale or give-away (see Chapter Five of this guidance)

Alternative 1: Thermally Treated Biosolids

Use one of four time-temperature regimens

Alternative 2: Biosolids Treated in a High pH-High Temperature Process

Specifies pH, temperature, and air-drying requirements

Alternative 3: For Biosolids Treated in Other Processes

Demonstrate that the process can reduce enteric viruses and viable helminth ova. Maintain operating conditions used in the demonstration

Alternative 4: Biosolids Treated in Unknown Processes

Demonstration of the process is unnecessary. Instead, test for pathogens—*Salmonella* sp. or fecal coliform bacteria, enteric viruses, and viable helminth ova—at the time the biosolids are used or disposed of or are prepared for sale or give-away

Alternative 5: Use of PFRP

Biosolids are treated in one of the Processes to Further Reduce Pathogens (PFRP) (see Table 5-4)

Alternative 6: Use of a Process Equivalent to PFRP

Biosolids are treated in a process equivalent to one of the PFRPs, as determined by the permitting authority

CLASS B

The requirements in one of the three alternatives below must be met

Alternative 1: Monitoring of Indicator Organisms

Test for fecal coliform density as an indicator for all pathogens at the time of biosolids use or disposal

Alternative 2: Use of PSRP

Biosolids are treated in one of the Processes to Significantly Reduce Pathogens (PSRP) (see Table 5-7)

Alternative 3: Use of Processes Equivalent to PSRP

Biosolids are treated in a process equivalent to one of the PSRPs, as determined by the permitting authority

Note: Details of each alternative for meeting the requirements for Class A and Class B designations are provided in Chapter Five.

TABLE 2-6
Summary of Vector Attraction Reduction Options

Requirements in one of the following options must be met:

Option 1:	Reduce the mass of volatile solids by a minimum of 38 percent
Option 2:	Demonstrate vector attraction reduction with additional anaerobic digestion in a bench-scale unit
Option 3:	Demonstrate vector attraction reduction with additional aerobic digestion in a bench-scale unit
Option 4:	Meet a specific oxygen uptake rate for aerobically treated biosolids
Option 5:	Use aerobic processes at greater than 40°C (average temperatures 45°C) for 14 days or longer (e.g., during biosolids composting)
Option 6:	Add alkaline materials to raise the pH under specified conditions
Option 7:	Reduce moisture content of biosolids that do not contain unstabilized solids from other than primary treatment to at least 75 percent solids
Option 8:	Reduce moisture content of biosolids with unstabilized solids to at least 90 percent
Option 9:	Inject biosolids beneath the soil surface within a specified time, depending on the level of pathogen treatment
Option 10:	Incorporate biosolids applied to or placed on the land surface within specified time periods after application to or placement on the land surface.

Note: Details of each vector attraction reduction option are provided in Chapter Five.

FIGURE 2-4
Restrictions for the Harvesting of Crops and Turf, Grazing of Animals, and Public Access on Sites Where Class B Biosolids Are Applied

Restrictions for the harvesting of crops* and turf:

1. Food crops, feed crops, and fiber crops, whose edible parts do not touch the surface of the soil, shall not be harvested until *30 days* after biosolids application.
2. Food crops with harvested parts that touch the biosolids/soil mixture and are totally above ground shall not be harvested until *14 months* after application of biosolids.
3. Food crops with harvested parts below the land surface where biosolids remain on the land surface for 4 months or longer prior to incorporation into the soil shall not be harvested until *20 months* after biosolids application.
4. Food crops with harvested parts below the land surface where biosolids remain on the land surface for less than 4 months prior to incorporation shall not be harvested until *38 months* after biosolids application.
5. Turf grown on land where biosolids are applied shall not be harvested until *1 year* after application of the biosolids when the harvested turf is placed on either land with a high potential for public exposure or a lawn, unless otherwise specified by the permitting authority.

Restriction for the grazing of animals:

1. Animals shall not be grazed on land until *30 days* after application of biosolids to the land.

Restrictions for public contact:

1. Access to land with a high potential for public exposure, such as a park or ballfield, is restricted for *1 year* after biosolids application. Examples of restricted access include posting with no trespassing signs, and fencing.
2. Access to land with a low potential for public exposure (e.g., private farmland) is restricted for *30 days* after biosolids application. An example of restricted access is remoteness.

* Examples of crops impacted by Class B pathogen requirements are listed in Figure 2-5.

be land applied as safely as EQ and PC biosolids. To qualify as CPLR biosolids, the following requirements must be met:

- The ceiling concentrations for pollutants in Table 2-1 may not be exceeded.
- Cumulative Pollutant Loading Rates (CPLRs) listed in Table 2-1 may be not be exceeded.

FIGURE 2-5
Examples of Crops Impacted by Site Restrictions for Class B Biosolids

Harvested Parts That:		
Usually Do Not Touch the Soil/Biosolids Mixture	**Usually Touch the Soil/Biosolids Mixture**	**Are Below the Soil/Biosolids Mixture**
Peaches	Melons	Potatoes
Apples	Strawberries	Yams
Oranges	Eggplant	Sweet Potatoes
Grapefruit	Squash	Rutabaga
Corn	Tomatoes	Peanuts
Wheat	Cucumbers	Onions
Oats	Celery	Leeks
Barley	Cabbage	Radishes
Cotton	Lettuce	Turnips
Soybeans		Beets

- Either the Class A or Class B pathogen requirements in Table 2-5 must be met.
- One of the 10 vector attraction reduction options in Table 2-6 must be met.
- Frequency of monitoring (see Table 2-7), as well as recordkeeping and reporting requirements (see Table 2-8) must be met.
- Applicable site restrictions, general requirements, and management practices must be met (summarized in Tables 2-3 and 2-4 and listed in Figures 2-4, 2-8, and 2-9).

The CPLR is the maximum amount of regulated pollutants in biosolids that can be applied to a site considering all biosolids applications made after July 20, 1993. When the CPLR for any one of the 10 heavy metals listed in Table 2-1 is reached at a site, no additional bulk biosolids, subject to the CPLR limits, may be applied to the site.

Option 4: Annual Pollutant Loading Rate (APLR) Biosolids

The fourth option only applies to biosolids that are sold or given away in a bag or other container for application to land. Under this option, the following requirements must be met:

- The ceiling concentrations for pollutants in Table 2-1 may not be exceeded.

- The Annual Pollutant Loading Rates (APLRs) listed in Table 2-1 may not be exceeded.
- The Class A pathogen requirements in Table 2-5 must be met.
- One of the first eight vector attraction reduction options in Table 2-6 must be met.
- The frequency of monitoring as well as recordkeeping and reporting requirements in Tables 2-7 and 2-8 must be met.
- Applicable site restrictions, general requirements, and management practices must be met (summarized in Tables 2-3 and 2-4 and listed in Figures 2-4, 2-8, and 2-9).

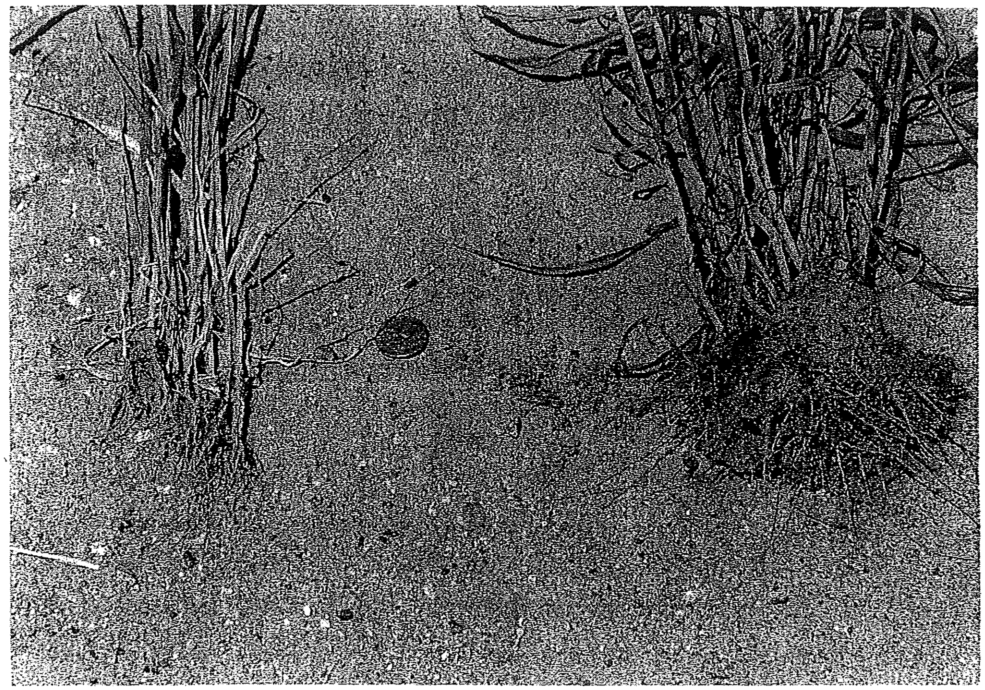
An APLR is the maximum amount of regulated pollutants in biosolids that can be applied to a site in any 1 year. APLRs rather than CPLRs are used for biosolids sold or given away in a bag or other container because tracking the amount of pollutants applied in biosolids is not feasible in this situation.

A labeling requirement for bagged or containerized APLR biosolids is discussed in Figure 2-9. To meet the labeling requirement, the preparer of biosolids must calculate the amount of biosolids that can be applied to a site during the year so that none of the APLRs are exceeded. This amount of biosolids is referred to as the annual whole sludge application rate (AWSAR). The AWSAR can be determined once the pollutant concentrations in the biosolids are known. The procedure for determining the AWSAR is explained in Figure 2-6. The AWSAR must be calculated for each of the 10 metals listed in Table 2-1, and the lowest AWSAR for the 10 metals is the allowable AWSAR for the biosolids. The AWSAR on the required label or information sheet has to be equal to or less than the AWSAR calculated using the procedure in Figure 2-6.

While not required by the Part 503 rule, it would also be good practice to provide information about the nitrogen content of the biosolids as well as the AWSAR on the label or information sheet that accompanies the biosolids. Figure 2-7 shows calculations that can be useful for determining how much nitrogen is being applied to land relative to the AWSAR and the nitrogen requirements of the plants being grown.

General Requirements and Management Practices

The Part 503 general requirements and management practices must be met for all but EQ biosolids. The specific general requirements and kinds of management practices that apply to each type of biosolids are given in Figures 2-8 and 2-9, respectively. Several of the management practices are singled out for a bit more discussion below.



Grain growing in sandy soil without (left) and with (right) anaerobically digested biosolids in Yuma, Arizona.

Biosolids are applied on a semi-arid rangeland demonstration study site in Rio Puerco, New Mexico.

FIGURE 2-6
Procedure To Determine the Annual Whole Sludge (Biosolids) Application Rate for Biosolids Sold or Given Away in a Bag or Other Container

1. Analyze a sample of the biosolids to determine the concentration of each of the 10 regulated metals in the biosolids.
2. Using the pollutant concentrations from Step 1 and the APLRs from Table 2-1, calculate an AWSAR for each pollutant using equation (1) below:

$$AWSAR = \frac{APLR}{C \cdot 0.001} \text{ where:}$$

$AWSAR$ = Annual whole sludge (biosolids) application rate (dry metric tons of biosolids/hectare/year)

$APLR$ = Annual pollutant loading rate (in Table 2-1) (kg of pollutant/ha/yr)

C = Pollutant concentration (mg of pollutant/kg of biosolids, dry weight)

0.001 = A conversion factor

3. The AWSAR for the biosolids is the lowest AWSAR calculated for each pollutant in Step 2.

Example:

1. Biosolids to be applied to land are analyzed for each of the 10 metals regulated in Part 503. Analysis of the biosolids indicates the pollutant concentration in the second column of the table below.
2. Using these test results and the APLR for each pollutant from Table 2-1, the AWSAR for all the pollutants are calculated as shown in the fourth column of the table below.
3. The AWSAR for the biosolids is the *lowest* AWSAR calculated for all 10 metals. In our example, the lowest AWSAR is for copper at 20 metric tons of biosolids/hectare/year. Therefore, the controlling AWSAR to be used for the biosolids is 20 metric tons per hectare/year. The 20 metric tons of biosolids/hectare is the same as 410 pounds of biosolids/1,000 square feet (20 metric tons × 2,205 lb per metric ton/107,600 square feet per hectare). The AWSAR on the label or information sheet would have to be equal to or less than 410 pounds per 1,000 square feet.

Metal	Biosolids Concentrations (milligrams/kilogram)	APLR* (kilograms/ hectare/year)	AWSAR = APLR / Conc. in Biosolids (0.001) = metric tons/hectare
Arsenic	10	2.0	2 / (10 x 0.001) = 200
Cadmium	10	1.9	1.9 / (10 x 0.001) = 190
Chromium	1,000	150	150 / (1,000 x 0.001) = 150
Copper	3,750	75	75 / (3,750 x 0.001) = 20
[illegible]	150	15	15 / (150 x 0.001) = 100
[illegible]	2	0.85	0.85 / (2 x 0.001) = 425
Nickel	100	21	21 / (100 x 0.001) = 210
Selenium	15	5.0	5 / (15 x 0.001) = 333
Zinc	2,000	140	140 / (2,000 x 0.001) = 70

* Annual Pollutant Loading Rate from Table 2-1 of this guide and Table 4 of the Part 503 rule.

FIGURE 2-7
Procedure for the Applier To Determine the Amount of Nitrogen Provided by the AWSAR Relative to the Agronomic Rate

In Figure 2-6, the AWSAR for the biosolids in the example calculation was determined to be 410 pounds of biosolids per 1,000 square feet of land. If biosolids were to be placed on a lawn that has a nitrogen requirement of about 200 pounds* of available nitrogen per acre per year, the following steps would determine the amount of nitrogen provided by the AWSAR relative to the agronomic rate if the AWSAR was used:

1. The nitrogen content of the biosolids indicated on the label is 1 percent total nitrogen and 0.4 percent available nitrogen the first year.
2. The AWSAR is 410 pounds of biosolids per 1,000 square feet, which is 17,860 pounds of biosolids per acre:

$$\frac{410\text{ lb}}{1{,}000\text{ sq ft}} \times \frac{43{,}560\text{ sq ft}}{\text{acre}} \times 0.001 = \frac{17{,}860\text{ lb}}{\text{acre}}$$

3. The available nitrogen from the biosolids is 71 pounds per acre:

$$\frac{17{,}860\text{ lb biosolids}}{\text{acre}} \times .004 = \frac{71\text{ lb}}{\text{acre}}$$

4. Since the biosolids application will only provide 71 pounds of the total 200 pounds of nitrogen required, in this case the AWSAR for the biosolids will not cause the agronomic rate for nitrogen to be exceeded and an additional 129 pounds per acre of nitrogen would be needed from some other source to supply the total nitrogen requirement of the lawn.

*Assumptions about crop nitrogen requirement, biosolids nitrogen content, and percent of that nitrogen that is available are for illustrative purposes only.

TABLE 2-7
Frequency of Monitoring for Pollutants, Pathogen Densities, and Vector Attraction Reduction

Amounts of Biosolids* (metric tons per 365-day period)	Amount of Biosolids (English tons)		Frequency
	Avg. per day	per 365 days	
Greater than zero but less than 290	>0 to <0.85	>0 to <320	Once per year
Equal to or greater than 290 but less than 1,500	0.85 to <4.5	320 to <1,650	Once per quarter (4 times per year)
Equal to or greater than 1,500 but less than 15,000	4.5 to <45	1,650 to <16,500	Once per 60 days (6 times per year)
Equal to or greater than 15,000	≥45	≥16,500	Once per month (12 times per year)

* Either the amount of bulk biosolids applied to the land or the amount of biosolids received by a person who prepares biosolids for sale or give-away in a bag or other container for application to the land (dry-weight basis).

FIGURE 2-8
Part 503 Land Application General Requirements

For EQ Biosolids

None (unless set by EPA or State permitting authority on a case-by-case basis for bulk biosolids to protect public health and the environment).

For PC and CPLR Biosolids

The ***preparer**** must notify and provide information necessary to comply with the Part 503 land application requirements to the person who applies bulk biosolids to the land.

The ***preparer*** who provides biosolids to another person who further prepares the biosolids for application to the land must provide this person with notification and information necessary to comply with the Part 503 land application requirements.

The ***preparer*** must provide written notification of the total nitrogen concentration (as N on a dry-weight basis) in bulk biosolids to the applier of the biosolids to agricultural land, forests, public contact sites, or reclamation sites.

The ***applier*** of biosolids must obtain information necessary to comply with the Part 503 land application requirements, apply biosolids to the land in accordance with the Part 503 land application requirements, and provide notice and necessary information to the owner or leaseholder of the land on which biosolids are applied.

Out of State Use

The ***preparer*** must provide written notification (prior to the initial application of the bulk biosolids by the applier) to the permitting authority in the State where biosolids are proposed to be land applied when bulk biosolids are generated in one State and transferred to another State for application to the land. The notification must include:

- the location (either street address or latitude and longitude) of each land application site;
- the approximate time period the bulk biosolids will be applied to the site;
- the name, address, telephone number, and National Pollutant Discharge Elimination System (NPDES) permit number for both the preparer and the applier of the bulk biosolids; and
- additional information or permits in both States, if required by the permitting authority.

Additional Requirements for CPLR Biosolids

The ***applier*** must notify the permitting authority in the State where bulk biosolids are to be applied prior to the initial application of the biosolids. This is a one-time notice requirement for each land application site each time there is a new applier. The notice must include:

- the location (either street address or latitude and longitude) of the land application site; and
- the name, address, telephone number, and NPDES permit number (if appropriate) of the person who will apply the bulk biosolids.

The ***applier*** must obtain records (if available) from the previous applier, landowner, or permitting authority that indicate the amount of each CPLR pollutant in biosolids that have been applied to the site since July 20, 1993. In addition:

- when these records are available, the ***applier*** must use this information to determine the additional amount of each pollutant that can be applied to the site in accordance with the CPLRs in Table 2-1;
- the ***applier*** must keep the previous records and also record the additional **amount of each pollutant he or she is applying to the site**; and
- when records of past known CPLR applications since July 20, 1993, are not available, biosolids meeting CPLRs cannot be applied to that site. However, EQ or PC biosolids could be applied.

If biosolids meeting CPLRs have not been applied to the site in excess of the limit since July 20, 1993, the CPLR limit for each pollutant in Table 2-1 will determine the maximum amount of each pollutant that can be applied in biosolids if:

- all applicable management practices are followed; and
- the applier keeps a record of the amount of each pollutant in biosolids applied to any given site.

The ***applier*** must not apply additional biosolids under the cumulative pollutant loading concept to a site where any of the CPLRs have been reached.

* The preparer is either the person who generates the biosolids or the person who derives a material from biosolids.

FIGURE 2-9
Part 503 Land Application Management Practice Requirements

For EQ Biosolids

None (unless established by EPA or the State permitting authority on a case-by-case basis for bulk biosolids to protect public health and the environment).

For PC and CPLR Biosolids

These types of biosolids cannot be applied to flooded, frozen, or snow-covered agricultural land, forests, public contact sites, or reclamation sites in such a way that the biosolids enter a wetland or other waters of the United States (as defined in 40 CFR Part 122.2, which generally includes tidal waters, interstate and intrastate waters, tributaries, the territorial sea, and wetlands adjacent to these waters), except as provided in a permit issued pursuant to Section 402 (NPDES permit) or Section 404 (Dredge and Fill Permit) of the Clean Water Act, as amended.

These types of biosolids cannot be applied to agricultural land, forests, or reclamation sites that are 10 meters or less from U.S. waters, unless otherwise specified by the permitting authority.

If applied to agricultural lands, forests, or public contact sites, these types of biosolids must be applied at a rate that is equal to or less than the agronomic rate for nitrogen for the crop to be grown. Biosolids applied to reclamation sites may exceed the agronomic rate for nitrogen as specified by the permitting authority.

These types of biosolids must not harm or contribute to the harm of a threatened or endangered species or result in the destruction or adverse modification of the species' critical habitat when applied to the land. Threatened or endangered species and their critical habitats are listed in Section 4 of the Endangered Species Act. Critical habitat is defined as any place where a threatened or endangered species lives and grows during any stage of its life cycle. Any direct or indirect action (or the result of any direct or indirect action) in a critical habitat that diminishes the likelihood of survival and recovery of a listed species is considered destruction or adverse modification of a critical habitat.

For APLR Biosolids

A label must be affixed to the bag or other container, or an information sheet must be provided to the person who receives APLR biosolids in other containers. At a minimum, the label or information sheet must contain the following information:

- the name and address of the person who prepared the biosolids for sale or giveaway in a bag or other container;
- a statement that prohibits application of the biosolids to the land except in accordance with the instructions on the label or information sheet;
- an AWSAR (see Figure 2-6) for the biosolids that do not cause the APLRs to be exceeded; and
- the nitrogen content.

There is no labeling requirement for EQ biosolids sold or given away in a bag or other container.

Endangered Species

The Part 503 rule prohibits the application of bulk biosolids to land if it is likely to adversely affect endangered or threatened species or their designated critical habitat. Any direct or indirect action that reduces the likelihood of survival and recovery of an endangered or threatened species is considered an "adverse effect." Critical habitat is any place where an endangered or threatened species lives and grows during its life cycle. The U.S. Department of Interior, Fish and Wildlife Service (FWS) publishes a list of endangered and threatened species at 50 CFR 17.11 and 17.12.

Practices that involve applying biosolids to lands (subjected to normal tillage, cropping, and grazing practices, or mining, forestry, and other activities that by their nature are associated with turning the soil and affecting vegetation) are not likely to result in any increase in negative impacts on endangered species and in fact may be beneficial given the nutritive and soil-building properties of biosolids. It is the responsibility of the land applier, however, to determine if the application of biosolids might cause an adverse effect on an endangered species or its critical habitat. Moreover, the Part 503 rule requires the land applier to certify (Figure 2-10) that the applicable management practices have been met, including the requirement concerning endangered species, and that records are kept indicating how the applicable management practices have been met.

One recommended step for making the threatened and endangered species determination is to contact the FWS Endangered Species Protection Program in Washington, DC (703-358-2171), or one of the FWS Field Offices, listed in Appendix C, for more information about the general area being considered for land application. State fish and game departments also can be contacted for specific state requirements.

Flooded, Frozen, or Snow-Covered Land

Application of biosolids to flooded, frozen, or snow-covered land is not prohibited by the Part 503 rule. Appliers must ensure, however, that biosolids applied to such land does not enter surface waters or wetlands unless specifically authorized by a permit issued under Sections 402 or 404 of the Clean Water Act (CWA). Some common runoff controls include slope restrictions, buffer zones/filter strips, tillage to create a roughened soil surface, crop residue or vegetation, berms, dikes, silt fences, diversions, siltation basins, and terraces.

Distance to U.S. Waters

Bulk biosolids may not be applied within 10 meters (33 feet) of any waters of the United States (e.g., intermittent following streams, creeks, rivers, wetlands, or lakes) unless otherwise specified by the permitting authority. Permitting authorities can allow exceptions to this requirement if the application of biosolids is expected to enhance the local environment. For example, biosolids application may help revegetate a stream bank and otherwise minimize erosion. Approval of such biosolids application could be given via letters of authorization under Section 308 of the CWA, a settlement agreement, or a permit.

Agronomic Rate

The ***agronomic rate*** for biosolids application is a rate that is designed to provide the amount of nitrogen needed by a crop or vegetation to attain a desired yield while minimizing the amount of nitrogen that will pass below the root zone of the crop or vegetation to the ground water. Crop-available nitrogen in biosolids that is applied in excess of the agronomic rate could result in nitrate contamination of the ground water. The Part 503 rule requires that the rate of land application for bulk biosolids be equal to or less than the agronomic rate, except in the case of a reclamation site where a different rate of application is allowed by the permitting authority. Approval could be given via letters of authorization under Section 308 of the CWA, a settlement agreement, or a permit.

Although the preparer is required to supply the land applier with information on the nitrogen content of the biosolids, the land applier is responsible for determining that the biosolids are applied at a rate that does not exceed the agronomic rate for that site. Procedures for the design of the agronomic rate differ depending on such factors as the total and available nitrogen content of the biosolids, nitrogen losses, nitrogen from sources other than biosolids (including estimates or measurements of available nitrogen already present in the soil), and the requirements for the expected yield of crop or vegetation. Assistance in designing the agronomic rate should be obtained from a knowledgeable person, such as the local extension agent or the soil testing department at the Land Grant University in each state. (A sample calculation of the nitrogen supplied by biosolids based on the AWSAR is provided in Figure 2-7.)

Frequency of Monitoring Requirements

Pollutants, pathogen densities, and vector attraction reduction must be monitored when biosolids are applied to the land. This monitoring ensures that pollutant limits and pathogen and vector attraction reduction requirements are being met. Chapter Six describes the sampling and analytical procedures to be followed. The required frequency of monitoring is 1, 4, 6, or 12 times per year, depending on the number of metric tons (mt) (dry-weight basis) of biosolids used or disposed in that year. This frequency is presented in Table 2-7. Frequency of monitoring requirements must be met regardless of which option is chosen for meeting pollutant limits and pathogen and vector attraction reduction requirements, with the exception of Class B pathogen Alternative 2.

TABLE 2-8
Recordkeeping and Reporting Requirements

Type of Biosolids	Records That Must Be Kept	Person Responsible for Recordkeeping		Records That Must Be Reported[a]
		Preparer	Applier	
EQ Biosolids	Pollutant concentrations	✓		✓
	Pathogen reduction certification and description	✓		✓
	Vector attraction reduction certification and description	✓		✓
PC Biosolids	Pollutant concentrations	✓		✓
	Management practice certification and description		✓	
	Site restriction certification and description (where Class B pathogen requirements are met)		✓	
	Pathogen reduction certification and description	✓		✓
	Vector attraction reduction certification and description	✓	✓[b]	✓
CPLR Biosolids	Pollutant concentrations	✓		✓
	Management practice certification and description		✓	
	Site restriction certification and description (if Class B pathogen requirements are met)		✓	
	Pathogen reduction certification and description	✓		✓
	Vector attraction reduction certification and description	✓	✓[b]	✓
	Other information: — Certification and description of information gathered (information from the previous applier, landowner, or permitting authority regarding the existing cumulative pollutant load at the site from previous biosolids applications) — Site location — Number of hectares — Amount of biosolids applied — Cumulative amount of pollutant applied (including previous amounts) — Date of application		✓	✓[d]
APLR Biosolids	Pollutant concentrations	✓		✓
	Management practice certification and description	✓		✓
	Pathogen reduction certification and description	✓		✓
	Vector attraction reduction certification and description	✓		✓
	The AWSAR for the biosolids	✓		✓

[a] Reporting responsibilities are only for POTWs with a design flow rate equal to or greater than 1 mgd, POTWs that serve a population of 10,000 or greater, and Class I sludge management facilities.

[b] The preparer certifies and describes vector åttraction reduction methods other than injection and incorporation of biosolids into the soil. The applier certifies and describes injection or incorporation of biosolids into the soil.

[c] Records that certify and describe injection or incorporation of biosolids into the soil do not have to be reported.

[d] Some of this information has to be reported only when 90 percent or more of any of the CPLRs is reached at a site.

Recordkeeping and Reporting Requirements

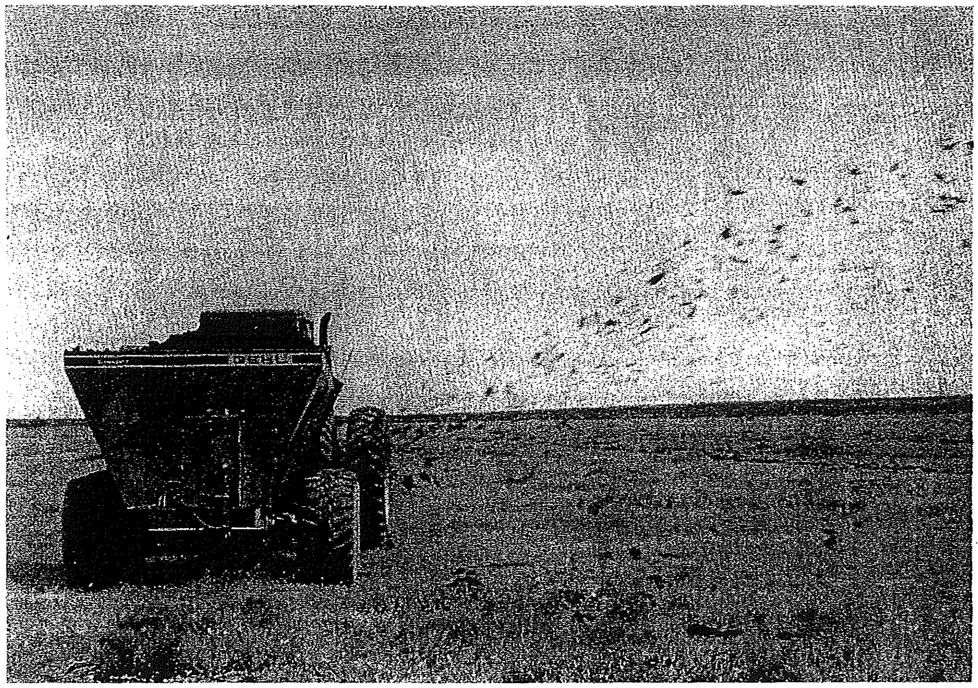
Part 503 requires that certain records be kept by the person who ***prepares*** biosolids for application to the land and the person who ***applies*** biosolids to the land. The recordkeeping and reporting requirements are summarized in Table 2-8. Some of the records that must be kept when biosolids are applied to the land include statements certifying whether certain land application requirements are met. The general certification statement that must be used is provided as Figure 2-10. This statement certifies that, among other things, the land applier and his or her employees are qualified to gather information and perform tasks as required by the Part 503 rule.

The certifier should periodically check the performance of his or her employees to verify that the Part 503 requirements are being met. Then, when a Federal or State inspector checks the employee's logs, office records, and performance in the field, the inspector should find that the required management practices are being followed and that any applicable pathogen and vector attraction reduction requirements, including associated crop harvesting, animal grazing, and site access restrictions, are being met. The inspector also should find that all other necessary records and requirements listed in Table 2-8 are in order. Even if the preparer/applier is not required to report this information, he or she must keep these records for 5 years, or indefinitely for cumulative amounts of pollutants added to any site by CPLR biosolids. These required records may be requested for review at any time by the permitting or enforcement authority.

FIGURE 2-10
Certification Statement Required for Recordkeeping

"I certify under penalty of law, that the *[insert each of the following requirements that are met: Class A or Class B pathogen requirements, vector attraction reduction requirements, management practices, site restrictions, requirements to obtain information]* in *[insert the appropriate section number/s in Part 503 for each requirement met]* have/have not been met. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the requirements have been met. I am aware that there are significant penalties for false certification, including the possibility of fine and imprisonment."

Signature ________________________ Date ________________



Top-flinging applicator spreads dewatered biosolids from a New York City wastewater treatment works onto a site in Texas.

Anaerobically digested biosolids from Los Angeles are injected into the soil in California.

Some facilities are not subject to any Part 503 reporting requirements. However, all Class I treatment works, treatment works serving a population of 10,000 or more, and treatment works with a 1 mgd or greater design flow (as described in the first chapter of this guidance) have reporting responsibilities. Each year, facilities with reporting requirements must submit some of the information contained in their records (according to Table 2-8). The information must be submitted every February 19th to the permitting authority (either EPA or a State with an EPA-approved biosolids management program).

Domestic Septage

Part 503 imposes separate requirements for domestic septage applied to agricultural land, forest, or a reclamation site (i.e., nonpublic-contact sites). The "simplified rule" for application of domestic septage to such sites is explained in ***Domestic Septage Regulatory Guidance: A Guide to the EPA 503 Rule.*** If domestic septage is applied to public contact sites or home lawns and gardens, the same requirements must be met as for bulk biosolids applied to the land (i.e., general requirements, pollutant limits, pathogen and vector attraction reduction requirements, management practices, frequency of monitoring requirements, and recordkeeping and reporting requirements).

Landowner and Leaseholder Responsibilities

If the landowner or leaseholder is also the land applier of the biosolids, that person must follow the applicable provisions of the Part 503 rule for land appliers as described in this chapter. If the land-applying operation is of sufficient size or concern to the permitting authority, the landowner or leaseholder applier might also be required to obtain a permit for the land application activities.

If the landowner or leaseholder is not the land applier (e.g., the applier is a contractor or biosolids generator/preparer), the landowner or leaseholder might wish to obtain certain information and maintain certain records even though not required by the Part 503 rule. For example, he or she might wish to keep records on information that Part 503 requires the land applier to give to the landowner or leaseholder for any site where cropping or grazing restrictions apply.

Additional information that the landowner or leaseholder should obtain from the biosolids preparer and/or land applier is the nutritive value (i.e., the amount of each available nutrient such as nitrogen, potassium, phosphorus, and lime being applied), so that he or she will not over-apply any supplemental fertilizers. Also, if biosolids are being applied to the land in accordance with the CPLR concept, it would be prudent for the landowner or leaseholder to make sure that he or she is given and retains information on the cumulative totals of pollutants that have been added to each parcel of land so that more CPLR biosolids can be applied each year until the cumulative limits for CPLR biosolids have been reached.

The landowner or leaseholder might wish to obtain assurances via an agreement that any biosolids being land applied are of an appropriate quality and have been sufficiently prepared and that the application procedures used meet the requirements of the Part 503 rule. One possible agreement between the landowner or leaseholder and land applier might be:

Contractor agrees to indemnify, defend, and hold harmless [Landowner/Leaseholder] from and against any and all claims, suits, actions, demands, losses, costs, liabilities, and expenses (including remediation costs and reasonable attorney's fees) to the extent such losses result from: (1) Contractor's or Generator/Preparer's violation of applicable laws or regulations in effect at the time of biosolids application; or (2) the negligence or willful misconduct of Contractor in delivery and application of biosolids to the undersigned Landowner/ Leaseholders' property. In the event this indemnification is enforced against the Contractor for a violation of law by a Generator/Preparer, Landowner/Leaseholder agrees to assign and subrogate to Contractor its claim against Generator/ Preparer. This indemnification shall survive termination of this Agreement until the expiration of any applicable statutes of limitations. Landowner/Leaseholder shall promptly notify Contractor in the event of a third-party claim and Contractor shall have the right to provide and oversee the defense of such claim and enter into any settlement of such claim at its discretion (holding the Landowner/Leaseholder harmless). Landowner/Leaseholder agrees to fully cooperate with Contractor in the defense against any third-party claim.

Liability Issues and Enforcement Oversight

Remember that the Part 503 rule is self-implementing and that its provisions must be followed whether or not a permit is issued. Remember also that State rules, which may be different from and more stringent than the Part 503 rule, may also apply.

EPA's Part 503 rule concerning the use or disposal of biosolids includes enforcement measures regarding the proper testing and application of biosolids. Landowners (including their lenders) and leaseholders who use biosolids beneficially as a fertilizer substitute or soil conditioner in accordance with EPA's Part 503 rule are protected from liability under the Superfund legislation (Comprehensive Environmental Response, Compensation and Liability Act—CERCLA) (see 58 *Federal Register* 9262, February 19, 1993) as well as any enforcement action from EPA under the Part 503 rule. Where the Federal requirements are not followed, appliers of biosolids are vulnerable to EPA enforcement actions or citizen-initiated suits and can be required to remediate any problems for which they are found liable.

There is concern that if for some reason the application of biosolids to farmland might result in damage to crops, livestock, or the land itself, a farmer or the farmer's lender may be exposed to significant financial loss. There is also concern about possible future loss that might occur if unanticipated hazards from previous biosolids use are discovered. While there are no guarantees, past experience with agronomic use of biosolids is very reassuring. Where biosolids have been applied in accordance with Federal and State regulations, problems have been rare and virtually the same as those that have occurred from normal farming practices. Available research indicates that the agronomic use of high-quality biosolids is sustainable.

EPA oversight of land application practices includes a program for administering permits and for monitoring, reporting, and inspecting. As with wastewater discharge standards and requirements, preparers and land appliers are required to keep detailed records and Class I biosolids management facilities must self-report on their activities during the preceding calendar year by February 19th. As described in Table 2-8, the reports must include information on biosolids quality. In the case of CPLR biosolids, a field-by-field analysis of the site activity must also be reported, including information on management practices and on the cumulative application of metals. Hence, EPA will know the quality of the biosolids and where they are going, in accordance with EPA Part 503 requirements.

EPA will not rely solely on the word of the regulated community. The Agency will conduct routine sampling and inspections of these facilities. If discrepancies are identified, enforcement actions will be taken. Enforcement actions can include fines of up to $25,000 per day per violation, injunctive relief, or criminal imprisonment.

EPA shares the concern regarding the potential for harm from the misapplication of biosolids (i.e., not in accordance with general or management practices) or the failure to meet quality or treatment requirements. Notwithstanding, EPA believes that the Part 503 rule is protective and that most land application activities will be in compliance with its requirements.

Common Questions and Answers

Q: EPA has an enforcement strategy that focuses on EQ biosolids first and then addresses biosolids meeting more burdensome requirements. Why?

A: Biosolids that meet the EQ criteria are exempt from further consideration (i.e., management practices or tracking requirements) under the rule. This means that EQ biosolids may be used to supply plant nutrients and to condition soils, such as commercial fertilizers and other soil amending products, after meeting the EQ criteria. If biosolids that are claimed as EQ do not meet these requirements, then it is not possible to know if the untracked non-EQ biosolids are being used in accordance with other applicable provisions of the Part 503 rule and there could be a potential for adverse environmental and public health impacts. Therefore, it is crucial, from a public health and environment standpoint, to ensure that biosolids truly meet these EQ requirements. That is why EPA chose to focus first on EQ biosolids.

Q: The Part 503 rule states that its requirements apply to any person who prepares [biosolids], applies [biosolids] to land, fires [biosolids] in an incinerator, or owns or operates a surface disposal site. The Part 503 rule defines a person as an individual, association, partnership, corporation, municipality, or a State or Federal agency or an agent or employee thereof. EQ biosolids are not subject to general requirements or management practices. If the biosolids are distributed as EQ and later found not to be EQ, will all the individuals who apply the biosolids to land be considered to have violated the Part 503 rule? Who is ultimately responsible?

A: The generator and/or preparer, and possibly in some unique cases the land applier, would be liable. Whom EPA targets for enforcement action would depend on the specifics of the situation. It is highly unlikely that EPA would target any individual user or land applier of such alleged EQ biosolids material. In many cases, the user or land applier might not even know that he or she was using a biosolids product.

Q: What happens to sites that reach the CPLR? Can you ever reuse or repermit that site?

A: Once a site reaches the CPLR, that site can no longer have biosolids subject to the CPLR concept applied to it. You could, however, continue to apply biosolids that meet the EQ or PC requirements.

Q: If EQ or PC biosolids are land applied, do you need to keep records of cumulative application rates? If non-EQ or non-PC biosolids are subsequently applied to the same land, do you have to consider the pollutants land applied in the EQ or PC biosolids?

A: Part 503 does not require land appliers to keep track of the cumulative amounts of pollutants in EQ or PC biosolids that are applied to a particular parcel of land. The applier of any biosolids that are subject to CPLRs are not required by Part 503 to consider the pollutant loadings already applied to the same parcel of land from EQ or PC biosolids.

Q: When biosolids from a Class I facility are land applied, exactly what information must be reported regarding biosolids pollutant levels and pathogen and vector attraction reduction?

A: On February 19 of each year, the preparer and land applier, as applicable, would be required to submit on the previous year the following information to the permitting authority:

- the concentration in biosolids of each pollutant listed in Table 2-1 of this guidance;
- the appropriate certification statement indicating the Class A and B pathogen reduction and vector attraction reduction options used; and
- a description of how the preparer/applier is meeting the requirements of the pathogen and vector attraction reduction options chosen. In general, the preparer/applier would not need to report the actual data collected on pathogens or related to vector attraction reduction; however, the preparer/applier would need to describe how the required limiting numbers have been met or exceeded and how required operating parameters have been maintained. In addition, the preparer/applier must retain the actual data collected for a minimum of 5 years and have it available for inspection by authorized permitting or regulatory authorities when requested. Pollutant loading rate information must be kept indefinitely for CPLR biosolids on a site-by-site basis.

Q: If biosolids are applied to land in accordance with the requirements of the Part 503 rule, would the landowner, leaseholder, mortgage lender, land applier, or generator/preparer be liable under CERCLA for the cost of any cleanup of soil or water contamination or loss of crops?

A: No. Application of sewage sludge for a beneficial purpose in compliance with the Part 503 rule would not give rise to CERCLA liability.

Q: Does EPA believe there is an environmental or public health problem related to the beneficial use of biosolids in accordance with the Part 503 rule?

A: It is EPA's long-standing position that the beneficial application of biosolids to provide crop nutrients or to condition the soil is not only safe but good public policy, so long as preparers and land appliers comply with all applicable requirements of the Part 503 rule. Among other things, those requirements address the quality of biosolids allowed for land application, the rates of application of biosolids under various circumstances, and monitoring. Beneficial use of biosolids reclaims a wastewater residual, converting it into a resource that is recycled to land. EPA's position on biosolids use is based on extensive research involving hundreds of successful land application projects over the past 25 years.

Chapter 5

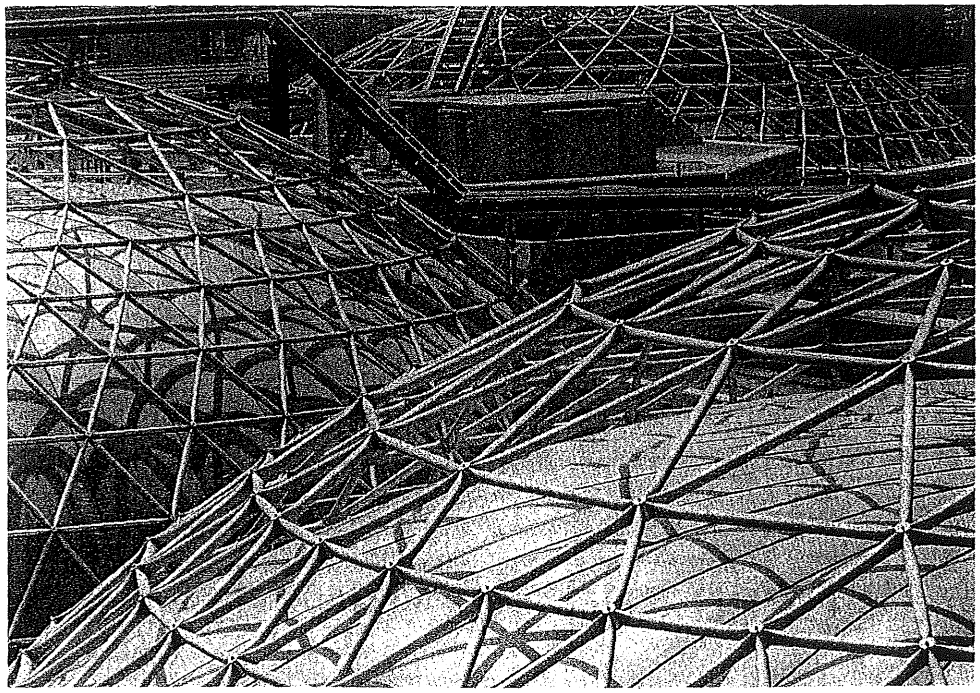
Pathogen and Vector Attraction Reduction Requirements

Why Are There Pathogen and Vector Attraction Reduction Requirements?

Pathogens are disease-causing organisms, such as certain bacteria, viruses, and parasites. Vectors are organisms, such as rodents and insects, that can spread disease by carrying and transferring pathogens. Subpart D of the Part 503 rule covers alternatives for reducing pathogens in biosolids (including domestic septage), as well as options for reducing the potential for biosolids to attract vectors.

The Subpart D alternatives concern the designation of biosolids as "Class A" or "Class B" in regard to pathogens. These classifications indicate the density (numbers/unit mass) of pathogens in biosolids where applicable. The requirements for land application or surface disposal of biosolids vary depending on the class of pathogen reduction achieved. Biosolids have to meet applicable requirements for both pathogen and vector attraction reduction to be in compliance with the rule.

This chapter describes the pathogen alternatives and vector attraction reduction options in the Part 503 rule. For more detail, the reader is referred to an EPA publication entitled, ***Control of Pathogens and Vector Attraction in Sewage Sludge*** (EPA/625/R-92/013), December 1992.



Anaerobic digesters in Columbus, Ohio, reduce pathogens and vector attraction to produce Class B biosolids.

To Whom Do These Requirements Apply?

The pathogen and vector attraction reduction requirements in Subpart D of the Part 503 rule apply to biosolids, including domestic septage, and their application to or placement on the land for beneficial use or disposal. Domestic septage applied to nonpublic contact sites (i.e., agricultural land, forests, and reclamation sites) is covered by a simplified portion of the rule that is explained in a separate EPA guidance document (***Domestic Septage Regulatory Guidance: A Guide to the EPA 503 Rule,*** EPA/832-B-92-005).

Depending on how biosolids are used or disposed and which pathogen alternative and vector attraction reduction option are relied on, compliance with the pathogen and vector attraction requirements of Subpart D is the responsibility of persons who:

- generate biosolids that are either land applied or surface disposed;
- derive a material from biosolids that are either land applied or surface disposed;
- apply biosolids to the land;
- place biosolids on a surface disposal site; and
- own or operate a surface disposal site.

Pathogen Reduction Alternatives

The Part 503 pathogen reduction alternatives ensure that pathogen levels in biosolids are reduced to levels considered safe for the biosolids to be land applied or surface disposed. Subpart D includes criteria to classify biosolids as Class A or Class B with respect to pathogens. These classifications are based on the level of pathogens present in biosolids that are used or disposed.

If pathogens (*Salmonella* sp. bacteria, enteric viruses, and viable helminth ova) are below detectable levels, the biosolids meet the Class A designation. Biosolids are designated Class B if pathogens are detectable but have been reduced to levels that do not pose a threat to public health and the environment as long as actions are taken to prevent exposure to the biosolids after their use or disposal. When Class B biosolids are land applied, certain restrictions must be met at the application site; other requirements have to be met when Class B biosolids are surface disposed. The land application restrictions allow natural processes to further reduce pathogens in the biosolids before the public has access to the site. In general, Class A corresponds to the existing 40 CFR Part 257 "Process to Further Reduce Pathogens (PFRP)" designation, and Class B roughly corresponds to the existing 40 CFR Part 257 "Process to Significantly Reduce Pathogens (PSRP)" designation. There are several important differences in approach between the existing Part 257 and the new Part 503 requirements for pathogen and vector attraction reduction:

1 Whereas Part 257 required the use of specifically listed or approved treatment technologies to treat biosolids, the Part 503 rule provides flexibility in how the pathogen and vector attraction reduction requirements are met. The pathogen reduction requirements of the Part 503 rule can be met either by:

—using certain specified technologies to treat the biosolids as before, or

—showing that the quality of the biosolids meets certain performance results.

2 The Part 503 rule requires either pathogen or pathogen indicator measurements for all Class A alternatives and pathogen indicator measurements for the first of the three Class B alternatives.

3 The Part 503 rule separates pathogen reduction requirements from vector attraction reduction requirements, as follows:

—The Class A and B designations refer only to the reductions achieved in pathogens.

—Vector attraction reduction is governed by a separate set of requirements described in a later section of this chapter.

—There is, however, still a requirement that both pathogen and vector attraction reduction requirements be met, and for Class A biosolids the pathogen reduction requirements must be met before or at the same time as most of the vector attraction reduction requirements, thereby minimizing the potential for regrowth of pathogenic bacteria.

Class A Pathogen Requirements

The Part 503 rule lists six alternatives for treating biosolids so they can be classified Class A with respect to pathogens. These alternatives are summarized in Table 5-1 and are discussed in detail below. Any one of these six alternatives may be met for the biosolids to be deemed Class A. Two of these alternatives follow closely with 40 CFR Part 257 pathogen requirements by allowing use of PFRPs and equivalent technologies.

TABLE 5-1
Summary of the Six Alternatives for Meeting Class A Pathogen Requirements

In addition to meeting the requirements in one of the six alternatives listed below, the requirements in Table 5-2 must be met for all six Class A alternatives.

Alternative 1: Thermally Treated Biosolids

Biosolids must be subjected to one of four time-temperature regimes.

Alternative 2: Biosolids Treated in a High pH-High Temperature Process

Biosolids must meet specific pH, temperature, and air-drying requirements.

Alternative 3: Biosolids Treated in Other Processes

Demonstrate that the process can reduce enteric viruses and viable helminth ova. Maintain operating conditions used in the demonstration after pathogen reduction demonstration is completed.

Alternative 4: Biosolids Treated in Unknown Processes

Biosolids must be tested for pathogens—*Salmonella* sp. or fecal coliform bacteria, enteric viruses, and viable helminth ova—at the time the biosolids are used or disposed, or, in certain situations, prepared for use or disposal.

Alternative 5: Biosolids Treated in a PFRP

Biosolids must be treated in one of the Processes to Further Reduce Pathogens (PFRP) (see Table 5-4).

Alternative 6: Biosolids Treated in a Process Equivalent to a PFRP

Biosolids must be treated in a process equivalent to one of the PFRPs, as determined by the permitting authority.

Table 5-2 lists several requirements that must be met for all six of the Class A alternatives. Perhaps the most significant of the requirements is to avoid regrowth of bacteria as indicated by the results of a fecal coliform or *Salmonella* test.

Alternative 1 for Meeting Class A: Thermally Treated Biosolids

This alternative applies when specific thermal heating procedures are used to reduce pathogens. Equations are used to determine the length of heating time at a given temperature needed to obtain Class A pathogen reduction (i.e., reduce the pathogen content to below detectable levels). The equations take into consideration the solid-liquid nature of the biosolids being heated, along with the particle size and how particles are brought into contact with the heat. The equations also take into consideration that the internal structure of the mixture can inhibit mixing. For example, a safety factor is included in the equation for Regime C (see Table 5-3) that adds more time for heating because less information is available about operational parameters that could influence the degree of pathogen destruction per unit of heat input. The rule identifies and provides equations for four different acceptable heating regimes.

The minimum indicated boundary conditions (i.e., solids content, mixing with the heat source, time of heating, and operating temperature) are given

TABLE 5-2
Pathogen Requirements for All Class A Alternatives

The following requirements must be met for ***all*** six Class A pathogen alternatives.

Either:

- the density of fecal coliform in the biosolids must be less than 1,000 most probable numbers (MPN) per gram total solids (dry-weight basis),

or

- the density of *Salmonella* sp. bacteria in the biosolids must be less than 3 MPN per 4 grams of total solids (dry-weight basis).

Either of these requirements must be met at one of the following times:

— when the biosolids are used or disposed;

— when the biosolids are prepared for sale or give-away in a bag or other container for land application; or

— when the biosolids or derived materials are prepared to meet the requirements for EQ biosolids (see Chapter 2).

Pathogen reduction must take place before or at the same time as vector attraction reduction, except when the pH adjustment, percent solids vector attraction, injection, or incorporation options are met.

below for each of the four thermal heating regimes. Any one of these four thermal heating regimes may be used. The equation specified for a particular heating regime is then used to calculate the actual time and temperature for operating the system within the boundaries of the applicable regime. In addition to the requirements for each regime, the requirements in Table 5-2 must be met.

The four regimes are listed in Table 5-3; some example calculations follow.

Example 1: Biosolids contain 10 percent solids and are heated with a biosolids dryer at 55°C. What is the required minimum time for achieving Class A pathogen status? The minimum time would be 63 hours if the operator followed Regime A in Table 5-3. Under Regime A the temperature cannot be lower than 50°C or the time shorter than 20 minutes.

$$Time = \frac{131{,}700{,}000}{10^{0.14\,(temperature)}} = \frac{131{,}700{,}000}{10^{0.14\,(55)}} = \frac{131{,}700{,}000}{50{,}118{,}723} = 2.6 \; days \; [63 \; hours]$$

TABLE 5-3
The Four Time-Temperature Regimes for Class A Pathogen Reduction Under Alternative 1

Regime	Applies to:	Requirement	Time-Temperature Relationship*
A	Biosolids with 7% solids or greater (except those covered by Regime B)	Temperature of biosolids must be 50°C or higher for 20 minutes or longer	$D = \frac{131{,}700{,}000}{10^{0.14t}}$ (Equation 2 of Section 503.32)
B	Biosolids with 7% solids or greater in the form of small particles and heated by contact with either warmed gases or an immiscible liquid	Temperature of biosolids must be 50°C or higher for 15 seconds or longer	$D = \frac{131{,}700{,}000}{10^{0.14t}}$
C	Biosolids with less than 7% solids	Heated for at least 15 seconds but less than 30 minutes	$D = \frac{131{,}700{,}000}{10^{0.14t}}$
D	Biosolids with less than 7% solids	Temperature of sludge is 50°C or higher with at least 30 minutes or longer contact time	$D = \frac{50{,}070{,}000}{10^{0.14t}}$ (Equation 3 of Section 503.32)

* D = time in days; t = temperature in degrees Celsius.

Example 2: Biosolids contain 10 percent solids and are treated in a biosolids dryer for about 1.5 minutes (0.001 day). What is the required minimum temperature? The minimum temperature to achieve Class A pathogen status would be 79°C if the operator followed Regime B in Table 5-3. Under this regime, the temperature cannot be lower than 50°C or the time shorter than 15 seconds and the biosolids must be in the form of small particles (e.g., from a steam drier) in intimate contact with the drying unit. Otherwise, Regime A would apply.

$$Time = \frac{131{,}700{,}000}{10^{0.14\,(temperature)}} = 0.001$$

$$0.001\ [10^{0.14\,(temp)}] = 131{,}700{,}000$$

$$Temperature = 79^{o}C$$

Alternative 2 for Meeting Class A: Biosolids Treated in a High pH–High Temperature Process

This alternative describes conditions of a specific temperature–pH process that is effective in reducing pathogens to below detectable levels. The process conditions required by the regulation are:

- elevating the pH to greater than 12 (measured at 25°C) for 72 hours or longer;
- maintaining the temperature above 52°C for at least 12 hours during the period that the pH is greater than 12;
- air drying to over 50 percent solids after the 72-hour period of elevated pH; and
- meeting all the requirements in Table 5-2.

Alternative 3 for Meeting Class A: Biosolids Treated in Other Known Processes

This alternative requires comprehensive monitoring of enteric viruses and viable helminth ova during each monitoring episode until demonstration has shown that the process achieves adequate reduction of pathogens. The presence of enteric viruses and viable helminth ova have to be shown in the biosolids prior to pathogen treatment to document the effectiveness of the treatment process.

The tests and requirements are:

- Once shown to be present prior to treatment, the density of enteric viruses in the biosolids after pathogen treatment must be less than 1 plaque- forming unit (PFU) per 4 grams of total solids (dry-weight basis).

- Likewise, the density of viable helminth ova in the biosolids after pathogen treatment must be less than 1 per 4 grams of total solids (dry-weight basis).
- All the requirements in Table 5-2 must be met.

Acceptable pathogen testing procedures are given in Chapter 6 and in the document ***Control of Pathogens and Vector Attraction in Sewage Sludge*** noted earlier in this chapter.

Alternative 3 is useful for demonstrating that a new process fully meets Class A pathogen requirements under the tested set of operating parameters. Subsequent testing for enteric viruses and viable helminth ova is unnecessary whenever the tested set of operating parameters has been met. It is important to realize that the tested set of operating parameters may have included ranges of values.

If no enteric viruses or viable helminth ova are present before treatment, then the tested batch of biosolids can be considered Class A. The tests, however, must be repeated during each subsequent monitoring episode until:

- pathogens are detected before the process and demonstrated to have been reduced to below detectable levels after the process, or
- after 2 years of testing with no detection of pathogens before the process, the permitting authority modifies the monitoring requirements for enteric viruses and viable helminth ova. (The permitting authority may choose not to modify the monitoring requirements, but if it does, in no case could the monitoring frequency for enteric viruses and viable helminth ova be less than once per year.)

Once the process has been demonstrated to process achieve the required pathogen reduction, the process must be operated under the same conditions that were used during the demonstration.

As already mentioned, monitoring for fecal coliform or *Salmonella* sp. bacteria is always required in accordance with the requirements listed in Table 5-2.

Alternative 4 for Meeting Class A: Biosolids Treated in Unknown Processes

This alternative is used in situations where:

- a biosolids treatment process is unknown, or
- the biosolids were treated in a process operating under less-stringent conditions than those under which the biosolids could qualify as Class A under any of the other alternatives.

This alternative requires that the biosolids be analyzed for *Salmonella* sp. bacteria, enteric viruses, and viable helminth ova at each of the following times:

- when the biosolids (or materials derived from biosolids) are used or disposed;
- when biosolids are prepared for sale or for give-away in a bag or other container for application to the land; or
- when the biosolids are prepared to meet the EQ requirements (see Chapter 2).

As in Alternative 3, the required test results for this alternative are:

- The density of viruses in the biosolids must be less than 1 PFU per 4 grams of total solids (dry-weight basis).
- The density of viable helminth ova in the biosolids must be less than 1 per 4 grams of total solids (dry-weight basis).
- All the requirements in Table 5-2 must be met.

Although biosolids must meet the same pathogen test results as in Alternative 3, Alternative 4 requires testing of each batch of the biosolids that is used or disposed, rather than just monitoring the operating parameters, after the demonstration that the process reduces pathogens.

Alternative 5 for Meeting Class A: Biosolids Treated in a PFRP

Alternative 5 provides continuity with the 40 CFR Part 257 regulation. This alternative states that biosolids are considered to be Class A if:

- they are treated in one of the PFRPs listed in Table 5-4, and
- all requirements in Table 5-2 are met.

To meet these requirements, the biosolids treatment processes must be operated according to the conditions listed in Table 5-4. This list is very similar to the list of PFRP technologies in 40 CFR Part 257, with two major differences:

- All requirements related to vector attraction reduction have been removed (see the vector attraction reduction requirements discussed later in this chapter).
- The three processes listed in Part 257 that are PFRP only if combined with a PSRP (gamma ray irradiation, high-energy irradiation, and pasteurization) are PFRPs under Part 503.

Under this alternative, treatment processes classified under 40 CFR Part 257 can continue to be operated; however, microbiological monitoring (as described in Table 5-2) must now be performed to ensure that pathogen density levels are below detection limits and that pathogen regrowth has not resulted in detectable levels being present at the time of use or disposal.

TABLE 5-4
Processes to Further Reduce Pathogens (PFRPs) Listed in Appendix B of 40 CFR Part 503

1. Composting

Using either the within-vessel composting method or the static aerated pile composting method, the temperature of the biosolids is maintained at 55^oC or higher for 3 days.

Using the windrow composting method, the temperature of the biosolids is maintained at 55^oC or higher for 15 days or longer. During the period when the compost is maintained at 55^oC or higher, the windrow is turned a minimum of five times.

2. Heat Drying

Biosolids are dried by direct or indirect contact with hot gases to reduce the moisture content of the biosolids to 10 percent or lower. Either the temperature of the biosolids particles exceeds 80^oC or the wet bulb temperature of the gas in contact with the biosolids as the biosolids leave the dryer exceeds 80^oC.

3. Heat Treatment

Liquid biosolids are heated to a temperature of 180^oC or higher for 30 minutes.

4. Thermophilic Aerobic Digestion

Liquid biosolids are agitated with air or oxygen to maintain aerobic conditions, and the mean cell residence time of the biosolids is 10 days at 55^o to 60^oC.

5. Beta Ray Irradiation

Biosolids are irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (ca. 20^oC).

6. Gamma Ray Irradiation

Biosolids are irradiated with gamma rays from certain isotopes, such as Cobalt 60 and Cesium 137, at room temperature (ca. 20^oC).

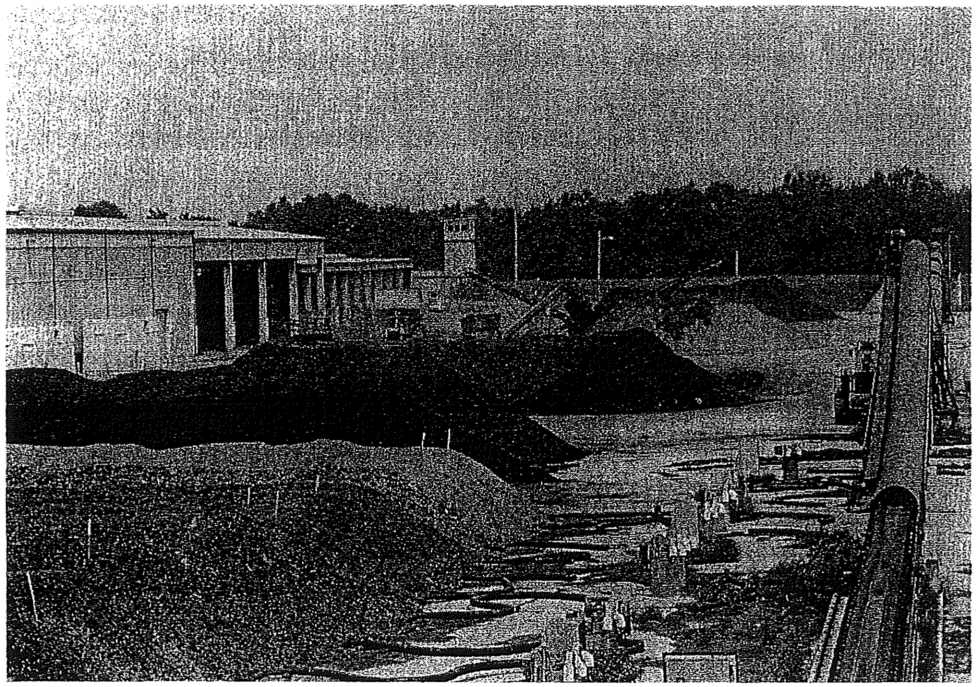
7. Pasteurization

The temperature of the biosolids is maintained at 70^oC or higher for 30 minutes or longer.

Alternative 6 for Meeting Class A: Biosolids Treated in a Process Equivalent to a PFRP

Under Alternative 6, biosolids are considered to be Class A if:

- they are treated by any process determined to be equivalent to a PFRP by the permitting authority, and
- all requirements in Table 5-2 are met.



Composting can eliminate pathogens in biosolids (Columbus, Ohio).

The Part 503 rule gives the permitting authority responsibility for determining equivalency. To be equivalent, a treatment process must be able *to* ***consistently reduce*** pathogens to levels comparable to the reduction achieved by listed PFRPs. The process must be equivalent in its ability to achieve Class A status with respect to enteric viruses and viable helminth ova as long as it is operated under the same conditions that produced the required reductions.

Equivalency determinations can be made both on a site-specific and a national basis. A site-specific equivalency determination only pertains to one particular operation run at one location under the specified conditions. It cannot be assumed to apply to the same process performed at a different location, or for any modification of the process. A process that is able to consistently produce the required pathogen reductions at different locations across the country, however, may qualify for a recommendation of national equivalency (i.e., a recommendation that the process will likely be equivalent wherever it is operated in the United States).

The EPA's Pathogen Equivalency Committee (PEC) is available as a resource to provide recommendations on equivalency determinations to the permitting authority and guidance to the regulated community. See ***Control of Pathogens and Vector Attraction in Sewage Sludge*** (noted earlier in this chapter) for more details about the PEC.

Class B Pathogen Requirements

Class B pathogen requirements can be met using one of three alternatives, as listed in Table 5-5 and described below. Unlike a Class A biosolids, in which pathogens are at levels below detectable limits, Class B biosolids may contain some pathogens. For this reason, the Class B requirements for land application of biosolids also include site restrictions that prevent crop harvesting, animal grazing, and public access for a certain period of time until environmental conditions have further reduced pathogens. The land application site restrictions for Class B biosolids are summarized in Table 5-6. Management practices rather than site restrictions prevent exposure to the pathogens in biosolids for surface disposed Class B biosolids.

Alternative 1 for Meeting Class B: The Monitoring of Indicator Organisms

Alternative 1 requires that seven samples of treated biosolids be collected shortly before biosolids use or disposal, ***and*** that the geometric mean fecal coliform density of these samples be less than 2 million colony-forming units (CFU) or most probable number (MPN) per gram of biosolids (dry-weight basis). EPA suggests that these seven samples be collected over a 2-week period. This approach uses fecal coliform density as an indicator of the average density of bacterial and viral pathogens. Acceptable pathogen testing procedures are given in Chapter 6.

EPA recommends that seven samples be taken over the 2-week period preceding use or disposal because the test methods used to determine fecal coliform density (membrane filter methods and the multiple tube dilution method) have poor precision and biosolids quality can vary. Using at least seven samples should provide a sufficiently representative sampling of the biosolids.

TABLE 5-5
Summary of the Three Alternatives for Meeting Class B Pathogen Requirements

Alternative 1: The Monitoring of Indicator Organisms

Test for fecal coliform density as an indicator for all pathogens. The geometric mean of seven samples shall be less than 2 million MPNs per gram per total solids or less than 2 million CFUs per gram of total solids at the time of use or disposal.

Alternative 2: Biosolids Treated in a PSRP

Biosolids must be treated in one of the Processes to Significantly Reduce Pathogens (PSRP) (see Table 5-7).

Alternative 3: Biosolids Treated in a Process Equivalent to a PSRP

Biosolids must be treated in a process equivalent to one of the PSRPs, as determined by the permitting authority.

TABLE 5-6
Site Restrictions for Class B Biosolids Applied to the Land

Food Crops with Harvested Parts That Touch the Biosolids/Soil Mixture

Food crops with harvested parts that touch the biosolids/soil mixture and are totally above the land surface shall not be harvested for 14 months after application of biosolids.

Food Crops with Harvested Parts Below the Land Surface

Food crops with harvested parts below the surface of the land shall not be harvested for 20 months after application of biosolids when the biosolids remain on the land surface for 4 months or longer prior to incorporation into the soil.

Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of biosolids when the biosolids remain on the land surface for less than 4 months prior to incorporation into the soil.

Food Crops with Harvested Parts That Do Not Touch the Biosolids/Soil Mixture, Feed Crops, and Fiber Crops

Food crops with harvested parts that do not touch the biosolids/soil mixture, feed crops, and fiber crops shall not be harvested for 30 days after application of biosolids.

Animal Grazing

Animals shall not be grazed on the land for 30 days after application of biosolids.

Turf Growing

Turf grown on land where biosolids are applied shall not be harvested for 1 year after application of the biosolids when the harvested turf is placed on either land with a high potential for public exposure or a lawn, unless otherwise specified by the permitting authority.

Public Access

Public access to land with a high potential for public exposure shall be restricted for 1 year after application of biosolids.

Public access to land with a low potential for public exposure shall be restricted for 30 days after application of biosolids.

Alternative 2 for Meeting Class B: Biosolids Treated in a PSRP

Class B Alternative 2 provides continuity with the 40 CFR Part 257 regulation. Under this alternative, biosolids are considered to be Class B if they are treated in one of the PSRPs listed in Table 5-7. The listed processes are similar to the PSRPs listed in the Part 257 regulation, except that all conditions related to reduction of vector attraction have been removed.

TABLE 5-7
Processes to Significantly Reduce Pathogens (PSRPs) Listed in Appendix B of 40 CFR Part 503

1. Aerobic Digestion

Biosolids are agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 40 days at $20^{o}C$ and 60 days at $15^{o}C$.

2. Air Drying

Biosolids are dried on sand beds or on paved or unpaved basins. The biosolids dry for a minimum of 3 months. During 2 of the 3 months, the ambient average daily temperature is above $0^{o}C$.

3. Anaerobic Digestion

Biosolids are treated in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at $35^{o}C$ to $55^{o}C$ and 60 days at $20^{o}C$.

4. Composting

Using either the within-vessel, static aerated pile, or windrow composting methods, the temperature of the biosolids is raised to $40^{o}C$ or higher and maintained for 5 days. For 4 hours during the 5-day period, the temperature in the compost pile exceeds $55^{o}C$.

5. Lime Stabilization

Sufficient lime is added to the biosolids to raise the pH of the biosolids to 12 after 2 hours of contact.

Under this alternative, biosolids treated in processes included in 40 CFR Part 257 are Class B with respect to pathogens. Unlike the comparable Class A requirement, this alternative does not require microbiological monitoring for regrowth of fecal coliform or *Salmonella* sp. bacteria.

Alternative 3 for Meeting Class B: Biosolids Treated in a Process Equivalent to a PSRP

The Part 257 regulation allowed the biosolids to be treated in a process determined to be *equivalent to* a PSRP. Under Alternative 3, biosolids treated by any process determined to be equivalent to a PSRP by the permitting authority are considered to be Class B biosolids.

Part 503 gives the permitting authority responsibility for determining equivalency. The EPA Pathogen Equivalency Committee is available as a resource to provide recommendations on equivalency determinations to the permitting authorities. As with Class A, the Class B equivalency determination can be made on either a site-specific or a national basis. See ***Control of Pathogens and Vector Attraction in Sewage Sludge*** (noted earlier in this chapter) for more details about the PEC.

Requirements for Reducing Vector Attraction

The pathogens in biosolids pose a disease risk when they are brought into contact with humans or other susceptible hosts (plant or animal). Vectors, which include flies, mosquitoes, fleas, rodents, and birds, can transmit pathogens to humans and other hosts physically through contact or biologically by playing a specific role in the life cycle of the pathogen. Reducing the attractiveness of biosolids to vectors reduces the potential for transmitting diseases from pathogens in biosolids.

The Part 503 rule contains 12 options, which are summarized in Table 5-8 and described below, for demonstrating reduced vector attraction for biosolids. (Note: Option 12 only applies to domestic septage.) These requirements are designed to either reduce the attractiveness of biosolids to vectors (Options 1 through 8 and Option 12) or prevent vectors from coming in contact with the biosolids (Options 9 through 11).

TABLE 5-8
Summary of Options for Meeting Vector Attraction Reduction

Option 1:	Meet 38 percent reduction in volatile solids content.
Option 2:	Demonstrate vector attraction reduction with additional anaerobic digestion in a bench-scale unit.
Option 3:	Demonstrate vector attraction reduction with additional aerobic digestion in a bench-scale unit.
Option 4:	Meet a specific oxygen uptake rate for aerobically digested biosolids.
Option 5:	Use aerobic processes at greater than 40^{o}C for 14 days or longer.
Option 6:	Alkali addition under specified conditions.
Option 7:	Dry biosolids with no unstabilized solids to at least 75 percent solids.
Option 8:	Dry biosolids with unstabilized solids to at least 90 percent solids.
Option 9:	Inject biosolids beneath the soil surface.
Option 10:	Incorporate biosolids into the soil within 6 hours of application to or placement on the land.
Option 11:	Cover biosolids placed on a surface disposal site with soil or other material at the end of each operating day. (Note: Only for surface disposal.)
Option 12:	Alkaline treatment of domestic septage to pH 12 or above for 30 minutes without adding more alkaline material.

Open-air windrow composting operation near Los Angeles, California.

Option 1: Reduction in Volatile Solids Content

Under this option, vector attraction is reduced if the mass of volatile solids in the biosolids is reduced by at least 38 percent during the treatment of the biosolids. This percentage is the amount of volatile solids reduction that is attained by anaerobic or aerobic digestion plus any additional volatile solids reduction that occurs before the biosolids leave the treatment works, such as through processing in drying beds or lagoons, or by composting.

Option 2: Additional Digestion of Anaerobically Digested Biosolids

Frequently, biosolids have been recycled through the biological wastewater treatment section of a treatment works or have resided for long periods of time in the wastewater collection system. During this time, they undergo substantial biological degradation. If the biosolids are subsequently treated by anaerobic digestion for a period of time, they are adequately reduced in vector attraction. Because they will have entered the digester already partially stabilized, however, the volatile solids reduction after treatment is frequently less than 38 percent.

Under these circumstances, the 38 percent reduction required by Option 1 might not be possible. Option 2 allows the operator to demonstrate vector attraction reduction by testing a portion of the previously digested biosolids in a bench-scale unit in the laboratory. Vector attraction reduction is demonstrated if after anaerobic digestion of the biosolids for an additional 40 days at a temperature between 30° and 37°C, the volatile solids in the biosolids are reduced by less than 17 percent from the beginning to the end of the bench test.

Option 3: Additional Digestion of Aerobically Digested Biosolids

This option is appropriate for aerobically digested biosolids that cannot meet the 38 percent volatile solids reduction required by Option 1. This includes biosolids from extended aeration plants, where the minimum residence time of biosolids leaving the wastewater treatment processes section generally exceeds 20 days. In these cases, the biosolids will already have been substantially degraded biologically prior to aerobic digestion.

Under this option, aerobically digested biosolids with 2 percent or less solids are considered to have achieved vector attraction reduction if, in the laboratory after 30 days of aerobic digestion in a batch test at 20^{o}C, volatile solids are reduced by less than 15 percent. This test is only applicable to liquid aerobically digested biosolids.

Option 4: Specific Oxygen Uptake Rate (SOUR) for Aerobically Digested Biosolids

Frequently, aerobically digested biosolids are circulated through the aerobic biological wastewater treatment process for as long as 30 days. In these cases, the biosolids entering the aerobic digester are already partially digested, which makes it difficult to demonstrate the 38 percent reduction required by Option 1.

The specific oxygen uptake rate (SOUR) is the mass of oxygen consumed per unit time per unit mass of total solids (dry-weight basis) in the biosolids. Reduction in vector attraction can be demonstrated if the SOUR of the biosolids that are used or disposed, determined at 20^{o}C, is equal to or less than 1.5 milligrams of oxygen per hour per gram of total biosolids (dry-weight basis). This test is based on the fact that if the biosolids consume very little oxygen, their value as a food source for microorganisms is very low and therefore microorganisms are unlikely to be attracted to them. Other temperatures can be used for this test, provided the results are corrected to a 20^{o}C basis. This test is only applicable to liquid aerobic biosolids withdrawn from an aerobic process.

Option 5: Aerobic Processes at Greater Than 40^{o}C

This option applies primarily to composted biosolids that also contain partially decomposed organic bulking agents. The biosolids must be aerobically treated for 14 days or longer, during which time the temperature always must be over 40^{o}C and the average temperature must be higher than 45^{o}C.

This option can be applied to other aerobic processes, such as aerobic digestion, but Options 3 and 4 are likely to be easier to meet for the other aerobic processes.

Option 6: Addition of Alkaline Material

Biosolids are considered to be adequately reduced in vector attraction if sufficient alkaline material is added to achieve the following:

- raise the pH to at least 12, measured at 25°C, and without the addition of more alkaline material, maintain a pH of at least 12 for 2 hours; and
- maintain a pH of at least 11.5 without addition of more alkaline material for an additional 22 hours.

The conditions required under this option are designed to ensure that the biosolids can be stored for at least several days at the treatment works, transported, and then used or disposed without the pH falling to the point where putrefaction occurs and vectors are attracted.

Option 7: Moisture Reduction of Biosolids Containing No Unstabilized Solids

Under this option, vector attraction is considered to be reduced if the biosolids do not contain unstabilized solids generated during primary treatment and if the solids content of the biosolids is at least 75 percent before the biosolids are mixed with other materials. Thus, the reduction must be achieved by removing water, not by adding inert materials.

It is important that the biosolids not contain unstabilized solids because the partially degraded food scraps likely to be present in such biosolids would attract birds, some mammals, and possibly insects, even if the solids content of the biosolids exceeded 75 percent.

Option 8: Moisture Reduction of Biosolids Containing Unstabilized Solids

The ability of any biosolids to attract vectors is considered to be adequately reduced if the solids content of the biosolids is increased to 90 percent or greater, regardless of whether this increase was for biosolids from primary treatment. The solids increase should be achieved by removal of water and not by dilution with inert solids. Drying to this extent severely limits biological activity and strips off or decomposes the volatile compounds that attract vectors.

The way dried biosolids are handled, including their storage before use or disposal, can create or prevent vector attraction. If dried biosolids are exposed to high humidity, the outer surface of the biosolids will gain in moisture content and possibly attract vectors. This should be properly guarded against.

Option 9: Biosolids Injection

Vector attraction reduction can be demonstrated by injecting the biosolids below the ground surface. Under this option, no significant amount of biosolids can be present on the land surface within 1 hour of injection, and if the biosolids are Class A with respect to pathogens, they must be injected within 8 hours after discharge from the pathogen-reducing process.

The reason for this special consideration for Class A biosolids (assuming vector attraction has not been reduced by some other means) is that pathogens could regrow and Class A biosolids have no site restrictions to provide crop, grazing, and access protection.

Injection of biosolids beneath the soil places a barrier of earth between the biosolids and vectors. The soil removes water from the biosolids, which reduces the mobility and odor of the biosolids. Odor is usually present at the site during the injection process but quickly dissipates when injection is complete.

Option 10: Incorporation of Biosolids into the Soil

Under this option, biosolids must be incorporated into the soil within 6 hours of application to or placement on the land. Incorporation is accomplished by plowing or some other means of mixing the biosolids into the soil. If the biosolids are Class A with respect to pathogens, the time between processing and application or placement must not exceed 8 hours—the same as for injection under Option 9.

Option 11: Covering Biosolids

Under this option, biosolids placed on a surface disposal site must be covered with soil or other material at the end of each operating day. Daily covering reduces vector attraction by creating a physical barrier between the biosolids and vectors. Covering also helps meet pathogen requirements by allowing environmental conditions to reduce pathogens.

Option 12: Alkaline Treatment for Domestic Septage

This option pertains only to vector attraction reduction for domestic septage. Under this option, the pH of domestic septage must be raised to at least 12 and remain at pH 12 or above for a minimum of 30 minutes during which no additional alkaline material may be added.

Common Questions and Answers

Q: Are there any labs certified to perform the necessary pathogen tests?

A: Yes, and the correct analytical methods for pathogens are referenced in Part 503.

Q: For Class A pathogen Alternatives 1 and 2 (which use high temperatures to eliminate pathogens), is it necessary to verify the reduced level of viruses or helminth ova?

A: No.

Q: How often does a permittee have to show compliance with the vector attraction reduction requirements?

A: Compliance has to be shown at the same frequency as pollutant monitoring when vector attraction reduction Options 1 through 8 are met.

Q: Vector attraction reduction Options 2 and 3, which involve additional anaerobic or aerobic digestion, are tied to Option 1, which requires a specified reduction in volatile solids. Is it necessary to fail Option 1 before going on to Options 2 and 3?

A: Failure is not essential. The additional digestion approaches specified in Option 2 for biosolids treated anaerobically and Option 3 for biosolids treated aerobically can be followed without regard to the Option 1 volatile solids reduction requirements.

Q: Does the regulation address odor?

A: Not specifically. Volatile solids are a surrogate. No EPA standards address odor. Odor may be covered under State or local nuisance laws or under air regulations. Odor also may be covered as a special requirement under State or local public health and general welfare provisions.

Q: Are both Class A or B biosolids, in regard to pathogens, protective of public health and the environment, even though biosolids with Class B pathogen status may still contain pathogens and biosolids with Class A status do not?

A: Biosolids with either Class A or Class B pathogen status are protective of human health and the environment because of the added site restrictions and management practices that are required for biosolids with Class B pathogen status, which may contain pathogens. Stated as a generally correct rule of thumb:

Class A $\cong$ Class B + Site Restrictions + Management Practices.

APPENDIX C
Current DEQ-approved Sludge Management Plan

CITY OF JOHN DAY
BIOSOLIDS PLAN
UPDATE
2002

AUGUST , 2002

BIOSOLIDS DISPOSAL PERMIT UPDATE

CITY OF JOHN DAY STP

This is an overall description of the operation of the City of John Day Sewage treatment plant. The City of John Day STP is a trickling filter facility followed by a set of four Percolation/ evaporation ponds. The plant consists of two primary clarifiers operated in tandem, two trickle filters also operated in tandem, a secondary clarifier, a chlorine contact basin (an old clarifier that has been converted to a contact chamber), three Raw sewage pumps and four secondary lift pumps. a primary and secondary anaerobic digester, and three positive displacement sludge pumps. This combination of physical and biological processes is designed to remove at least 85% of the primary pollutants in the influent flow.

Raw sewage enters the plant raw sewage sump in the SE corner of the control building at approximately 13 ft below ground level. From this point it is lifted some 23 ft vertically to the headworks building which contains comminution and grit removal equipment. The grit is settled out at this point and removed by a grit pump / cyclone combination and goes through the comminutor and a Bar screen. The flow is then diverted to the two primary clarifiers, where the drop in velocity allows the major portion of the solids to settle out. The liquid phase is taken off over a sawtooth weir at the outer periphery of the clarifier. The liquid phase then flows by gravity to the trickle filters where the clarified influent is spread by distributors over rock beds where the pollutants and nutrients are removed by organisms growing on the rocks.

The wastewater flows down through the rock bed and is collected by an underdrain system that channels it back to the Secondary lift sump under the floor of the control building. The waste flow is then pumped to the secondary clarifier (a partial amount is pumped back to the trickle filter for recirculation.). The settling that takes place in the secondary clarifier is continuously wasted back to the raw sewage wetwell. The effluent flows over the weirs and is chlorinated on its way to the chlorine contact basin. From the chlorine contact basin, the effluent flows through the metering pit and on into the percolation ponds where it is allowed to percolate into the groundwater and evaporate into the air.

- The raw sludge/ Biosolids (Settleable and floatable solids) that are removed by the treatment process in the primary clarifiers are pumped to the primary anaerobic digester at the rate of approximately 1200 gallons per day. In the anaerobic digester the sludge/biosolids is heated to 97 degrees C +/- 2 degrees and mixed thoroughly. The volume of the Primary digester (*37,400 gallons*) allows the biosolids to remain for approximately 30 days before being pumped off the bottom of the primary digester to the secondary digester at roughly the same rate as raw biosolids are added to the Primary, and allowed to settle and separate into a liquid and solid phase. The volume of the secondary digester (*47,124 gallons*) allows the biosolids to continue to digest and settle for approximately 39 days before removal.. The liquid phase is drawn off to the RS wetwell, and the solids are removed from the bottom in 5-6000 gallon lots to

In case of process failure. the digesters hold a total of 84,524 gallons of Biosolids (Primary digester 37,400 gal. and Secondary digester 47,124 gals.), filling the drying beds to the two foot level would hold 75,00 + gallons, enough to empty one digester and partially empty the other. The remaining biosolids could be hauled to the land application site, and disced under as it was applied.

A spill during transport can be cleaned up with a front end loader, and hauled off in a dump truck. Mixing sand with the spilled liquid to facilitate handling in a semi-solid state. The remaining biosolids would be mixed with lime to neutralize an sanitize it. The spill then could be hauled to the land application site, and spread and tilled into the soil.

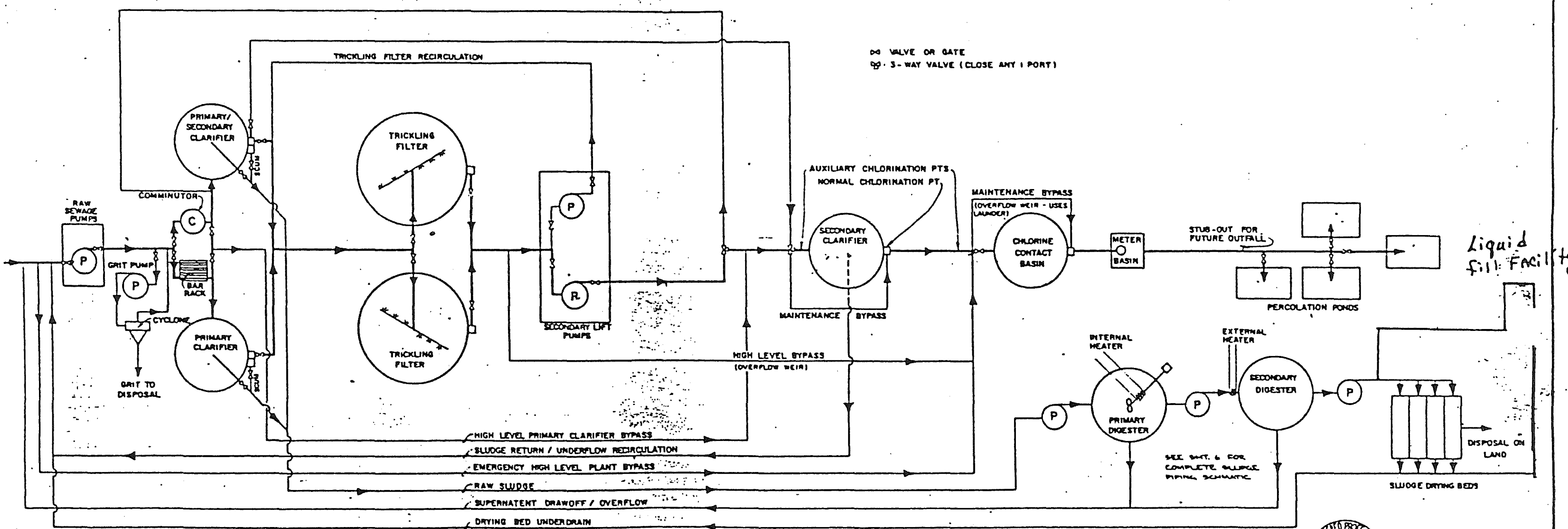
The land application site is on the Elliott ranch in the Marysville- Dog Creek area South East of John Day (see attached area and soil maps.). We have a land use compatability statement from The Grant County Planner from 1988 allowing us to use this area for biosolids application, which is attached. Also find attached a letter from the DEQ Eastern Region approving the sites.

The maps detailing the soils on the sites are also attached, and a copy of the Grant County, Oregon, Central Part Soil Survey for your information concerning the soils involved.

Due to the large amount of area involved. soil tests have not been done in the past, however plans are being made to start a testing program on the soil areas that have had Biosolids applied to them. We will start this program in 2002. The amount applied to each site is recorded and reported to the DEQ each year in the annual report, along with the application rates. The biosolids applied is the only supplemental soil nutrients applied to the property. (See attached copies of past annual reports)

INDEX OF DRAWINGS

PLANT FLOW SCHEMATIC



DESIGN CRITERIA

POPULATION	DESIGN FLOW	RAW SEWAGE PUMPS	PRIMARY CLARIFIERS	TRICKLING FILTERS	SECONDARY LIFT PUMPS	SECONDARY CLARIFIER	CHLORINE CONTACT BASIN	PERCOLATION PONDS	SLUDGE DIGESTION
...R)	MAX. DAILY 600,000 GPD PEAK 900,000 GPD	1 - 300 GPM W/ ELECTRIC MOTOR 2 - 500 GPM W/ ELECTRIC MOTORS 1 - 700 GPM ENGINE DRIVEN EMERGENCY PUMP	2 - 34 FT DIAM x 10FT SWD PERIFERAL FEED (2nd UNIT CAN FUNCTION AS SECONDARY CLARIFIER) OVERFLOW RATE AT DESIGN FLOW & ONE CLARIFIER: 600 GAL / SF / DAY	2 - 65 FT DIAM x 6 FT ROCK DEPTH NATIVE ROCK MEDIA MIN FLOW RATE: 300 GPM EA. MAX FLOW RATE: 850 GPM EA. MAX RECIRC RATE: 900 GPM	2 - 300 GPM 2 - 800 GPM	1 - 34 FT DIAM x 10FT SWD PERIPERAL FEED	1 - 30FT DIAM. x 5FT SWD & MECHANICAL SCRAPER TOTAL VOLUME = 28,000 GAL DETENTION TIME = 67 MIN AT 600,000 GPD FLOW RATE	4 - 1.5 ACRE PONDS 12" IMPORTED SAND BOTTOM DESIGN PERCOLATION RATE = 3 IN/ DAY	PRIMARY DIGESTER HEATED & MIXED. 20 FT DIAM. x 15.5 FT SWD. VOLUME = 5000 CF SECONDARY DIGESTER & GAS-HOLDER COVER 20 FT DIAM x 20 FT SWD. VOL. = 6300 CF DRYING BEDS: 4 BEDS, 1250 S.F. EACH

CITY OF JOHN DAY
SEWERAGE SYSTEM PHASE 2
INDEX / DESIGN CRITERIA

AS SHOWN | 1978

ANDERSON · PERRY & ASSOCIATES, INC.
LA GRANDE & ENTERPRISE, OREGON

2

DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND USE COMPATIBILITY STATEMENT REQUIREMENTS

FOR

AIR CONTAMINANT DISCHARGE PERMITS (ACDP)

INDIRECT SOURCE PERMITS (AIR)

STEP 1 SEWAGE FACILITIES PLANS REQUESTING GRANTS AND LOANS REQUIRING DEQ APPROVALS

SEWERAGE AND WASTEWATER INDUSTRIAL CONSTRUCTION PLANS

SOLID WASTE PERMITS AND LETTERS OF AUTHORIZATION

HAZARDOUS WASTE COLLECTION, TREATMENT AND DISPOSAL LICENSES

WATER POLLUTION CONTROL FACILITY PERMITS (WPCF)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMITS (NPDES)

NOTICES OF INTENT TO CONSTRUCT FOR AIR CONTAMINANT SOURCES AND CONFINED ANIMAL FEEDING OR HOLDING OPERATIONS (NC)

A Statement of Compatibility with applicable local comprehensive land use plans and Statewide Planning Goals is required for new or expanded facilities/sites. The local statement must certify that proposals are compatible with LCDC-Acknowledged local comprehensive land use plans and implementing ordinances, or Statewide Planning Goals. The Department prefers that its Land Use Compatibility Statement form be used, however, it will accept an equivalent statement in lieu of the form.

In urbanizing areas between city limits and urban growth boundaries, applicants must provide evidence of both city and county concurrence as to the land use compatibility of the proposal. This evidence must be:

1. Sign-off by both jurisdictions on DEQ's Land Use Compatibility Statement form, or

2. A copy of the city/county management agreement included in the Urban Area Plan acknowledged by LCDC, or

3. A written statement covering the applicant's proposal.

If DEQ receives a negative local Statement of Compatibility, an application for a permit or approval will generally not be considered complete. DEQ would then expect the applicant to work with the local jurisdiction to obtain the needed plan or zone change, conditional use permit, variance, or other modification to produce compatibility with the Acknowledged Plan and ordinances or the Statewide Planning Goals.

Applicants must submit a completed Statement of Compatibility or an approved equivalent along with their application or request.

MJ93.AD-3
10/84

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality
EASTERN REGION
700 SE EMIGRANT, SUITE 330, PENDLETON, OREGON 97801 PHONE (503) 276-4063

March 7, 1988

RECEIVED
MAR 8 1988
CITY OF JOHN DAY

City of John Day
Attn: Bill Morris, STP Operator
240 South Canyon Boulevard
John Day, Oregon 97845

Re: WQ-- Grant County
City of John Day
WPCF #100364/ File #43569

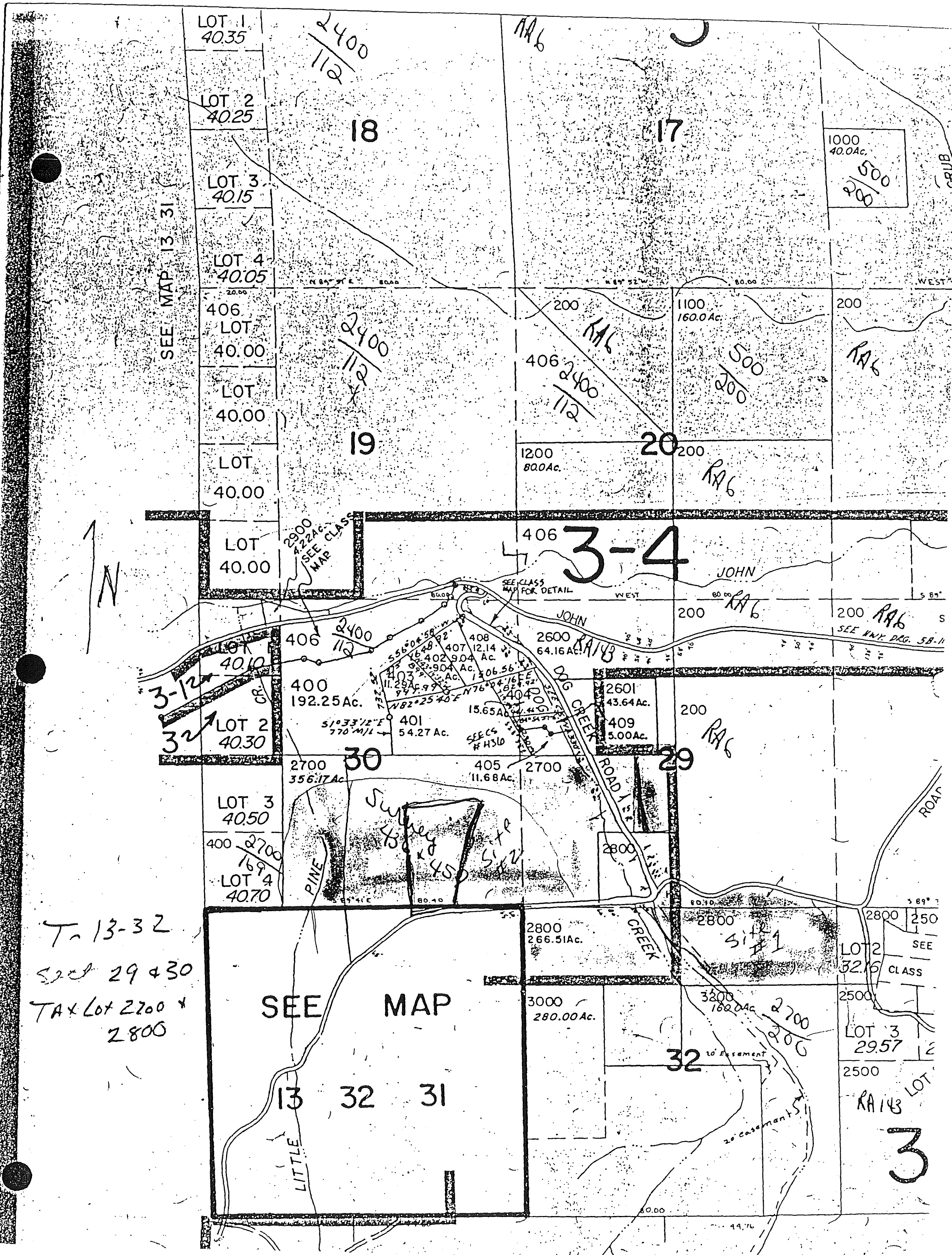
Dear Bill:

The sludge management plan that includes proposed sludge disposal sites for the city of John Day has been received. The following sites are approved for application of digested sewage sludge:

T13S-R31-S36;	Tax Lot (portion of) 4900
T13S-R32-S30;	Tax Lot (portion of) 2700
T13S-R32-S29 & 32;	Tax Lot (portion of) 2800
T13S-R32-S29;	Tax Lot (portion of) 2700

This approval is subject to the criteria detailed in OAR chapter 340, Division 50; your approved sludge management plan; and the following conditions:

1. If other sources of nitrogen are used, the sludge application rate must be reduced so that commercial nitrogen plus sludge nitrogen does not exceed the Agronomic Loading Rate of this site;
2. A minimum setback of 50 feet shall maintained from all road frontages, surface waterways, and residential property lines;
3. A minimum setback of 200 feet shall be maintained from all wells, springs, and other water sources;
4. A 30 day fallow period following the application of sludge is mandatory prior to grazing livestock on the site or feeding of harvested crops to animals;
5. Sludge shall not be applied on areas with slopes exceeding 12%
6. Sludge shall be applied evenly and thinly in a manner that will prevent ponding and runoff; and,



LOT 1 40.35
LOT 2 40.25
LOT 3 40.15
LOT 4 40.05
406 LOT 40.00
LOT 40.00
LOT 40.00
LOT 40.00
SEE MAP 13 31
18
17
19
20
29
30
32
1000 40.0Ac.
1100 160.0Ac.
1200 80.0Ac.
200
406
2400 112
500 200
RA6
3-4
JOHN
SEE CLASS MAP FOR DETAIL
2900 4.22Ac. SEE CLASS MAP
2600 64.16Ac.
RA143
400 192.25 Ac.
401 54.27 Ac.
402 9.04 Ac.
407 9.04 Ac.
408 12.14 Ac.
403 11.29 Ac.
404 15.65 Ac.
405 11.68 Ac.
2601 43.64 Ac.
409 5.00Ac.
DOG CREEK ROAD
2700 356.17Ac.
2800 266.51Ac.
3000 280.00Ac.
3200 160.0Ac.
LOT 2 40.30
LOT 3 40.50
LOT 4 40.70
LOT 2 32.16
LOT 3 29.57
2500
2800
SEE CLASS
3-12
32
N
PINE
LITTLE
CREEK
SEE MAP
13 32 31
20' Easement
Site #1
Site #2
T-13-32
Sec 29 & 30
Tax Lot 2700 & 2800

APPENDIX D
Monitoring Wells Data and Site Map

Table 2. Water-Quality Data near the John Day Wastewater Percolation Ponds

Well	Depth to Water from TOC (ft)	Water Elevation (NGVD29)	Temp (oC)	Field Conductance (uS/cm)	Field pH	TDS (c) (mg/L)	COD (mg/L)	Q	Ammonia (mg/L)	Q	Nitrate as N (mg/L)	Q	Total Kjeldahl Nitrogen (mg/L)	Q	Total Phos-phorus as P (mg/L)	Q	E. Coli (#/100 ml)
DEQ Guidance Levels (a)	—	—	—	—	6.5-8.5	500	—		—		—		—		—		—
and Reference Levels (b)	—	—	—	—	—	—	—		—		10		—		—		—
MW-2	TOC =	3051.11	ft above msl (NGVD 1929)														
22-Mar-07	9.65	3041.46	8.1	539	7.56	373	—		0.01	U	0.73		0.86		5.88		0
21-Jun-07	9.66	3041.45	19.8	593	6.75	368	—		0.10		0.43		0.89		5.95		1
20-Sep-07	9.64	3041.47	20.6	627	7.55	435	—		0.07		0.99		1.06		—		0
10-Dec-07	9.58	3041.53	7.8	639	7.46	400	—		0.02		4.47		0.56		2.97		0
MW-5	TOC =	3050.3	ft above msl (NGVD 1929)														
18-Dec-03	7.10	3043.20	6.7	539	7.32	360	26		0.24		14.3		1.61		1.02		0
15-Mar-04	6.84	3043.46	7.2	210	7.03	98	5	U	0.01	U	0.20		0.18		0.77		6.4
29-Jun-04	7.00	3043.30	15.5	575	6.90	353	12		0.03		0.12		0.64		1.19		0
22-Sep-04	7.40	3042.90	18.4	613	6.85	—	9		0.08		0.33		0.56		1.49		0
15-Dec-04	7.10	3043.20	11.4	297	6.65	135	7		0.01	U	0.35		0.26		2.96		3
23-Mar-05	7.10	3043.20	7.8	613	6.84	393	20		0.13		0.24		0.59		3.91		0
21-Jun-05	7.10	3043.20	14.1	582	6.90	368	34		0.01	U	0.34		0.48		3.52		1.0
29-Sep-05	6.9	3043.40	18.5	606	6.80	368	16		0.04		0.97		0.58		5.44		0
27-Dec-05	6.96	3043.34	6.7	455	7.70	220	11		0.01	U	1.48		0.40		1.38		25.4
22-Mar-06	—	—	7.3	445	7.39	368	—		0.01	U	0.96		0.44		1.93		0
20-Jun-06	6.49	3043.81	13.8	446	6.86	260	—		0.01	U	0.27		0.50		1.69		2.0
21-Sep-06	6.94	3043.36	17.2	562	6.73	340	—		0.08		0.36		0.45		3.92		8
13-Dec-06	6.57	3043.73	10.6	606	7.33	365	—		0.02		7.90		0.59		3.50		0
22-Mar-07	6.57	3043.73	6.6	249	7.62	188	—		0.01	U	0.29		0.25		2.50		0
21-Jun-07	6.71	3043.59	13.9	508	6.75	310	—		0.04		0.10	U	0.63		3.54		0
20-Sep-07	7.35	3042.95	17.4	645	—	448	—		0.09		0.10	U	0.81		—		0
10-Dec-07	6.75	3043.55	9.9	629	7.63	385	—		0.03		0.24		0.40		3.52		0
20-Mar-08	6.49	3043.81	5.7	310	7.40	195	—		—		0.56		0.30		2.19		0
19-Jun-08	6.50	3043.80	10.7	324	7.25	238	—		—		0.10	U	0.26		0.74		0
11-Sep-08	7.06	3043.24	17.9	695	7.29	458	—		—		0.10	U	1.09		4.37		0
20-Nov-08	7.38	3042.92	13.7	654	7.38	423	—		—		0.10	U	0.89		6.42		0
MW-6	TOC =	3051.10	ft above msl (NGVD 1929)														
18-Dec-03	10.54	3040.56	5.5	594	7.01	355	20		0.60		13.0		1.76		1.18		0
15-Mar-04	10.32	3040.78	7.9	598	6.98	310	19		0.19		0.48		0.99		1.06		0
29-Jun-04	10.68	3040.42	18.6	603	6.96	388	14		0.05		1.77		0.99		1.26		0
22-Sep-04	10.95	3040.15	14.9	565	6.97	—	9		0.81		0.10	U	1.18		1.31		0
15-Dec-04	10.55	3040.55	7.5	673	6.66	375	20		0.01	U	17.0		0.85		2.92		0
23-Mar-05	10.75	3040.35	7.7	605	6.81	398	19		0.09		0.66		0.64		3.84		0
21-Jun-05	10.67	3040.43	15.4	618	6.95	393	17		0.01	U	1.61		0.71		3.96		0
29-Sep-05	10.80	3040.30	16.0	640	6.74	383	21		0.08		6.55		1.05		4.66		2.0
27-Dec-05	10.61	3040.49	5.6	633	7.29	358	18		0.47		8.80		1.40		1.03		1.0
22-Mar-06	10.75	3040.35	6.8	564	7.25	413	—		0.01	U	1.46		0.62		3.08		0
20-Jun-06	10.46	3040.64	16.0	548	6.92	340	—		0.02		1.03		0.55		3.92		1.0
21-Sep-06	10.85	3040.25	16.1	613	6.81	365	—		0.08		0.74		0.56		4.93		3
13-Dec-06	10.35	3040.75	6.4	630	7.29	400	—		0.50		12.5		1.68		4.57		0
22-Mar-07	10.50	3040.60	7.9	555	7.38	368	—		0.01	U	0.57		0.77		6.24		0
21-Jun-07	10.79	3040.31	15.9	582	6.65	323	—		0.04		0.41		0.66		4.49		1
20-Sep-07	11.07	3040.03	17.4	623	7.21	448	—		0.17		0.10	U	0.76		—		0
10-Dec-07	10.90	3040.20	10.3	675	7.29	425	—		0.07		3.95		0.57		3.41		0
20-Mar-08	10.41	3040.69	6.7	589	7.27	353	—		—		2.42		0.83		4.89		0
19-Jun-08	10.48	3040.62	13.8	510	7.15	363	—		—		0.90		0.57		0.77		0
11-Sep-08	11.21	3039.89	17.0	652	7.10	433	—		—		0.10	U	0.78		3.97		0
20-Nov-08	11.40	3039.70	14.4	612	7.30	395	—		—		0.35		0.51		4.44		0
MW-6 Duplicate																	
15-Dec-04	—	—	—	—	—	383	15		0.01		16.5		0.64		3.07		0
23-Mar-05	—	—	—	—	—	410	19		0.13		0.65		0.62		3.79		0
21-Jun-05	—	—	—	—	—	390	26		0.02		1.63		0.96		4.08		0
29-Sep-05	—	—	—	—	—	368	22		0.05		6.54		1.02		4.64		0
27-Dec-05	—	—	—	—	—	—	—		—		—		—		—		—
22-Mar-06	—	—	—	—	—	463	—		0.01	U	1.46		0.63		2.98		0
20-Jun-06	—	—	—	—	—	323	—		0.02		1.04		0.55		3.88		1.0
21-Sep-06	—	—	—	—	—	360	—		0.07		0.80		0.56		4.89		7
13-Dec-06	—	—	—	—	—	403	—		0.49		12.60		2.51		4.45		0
22-Mar-07	—	—	—	—	—	493	—		0.01	U	0.58		0.74		6.24		0
21-Jun-07	—	—	—	—	—	340	—		0.04		0.43		0.67		4.70		0
20-Sep-07	—	—	—	—	—	443	—		0.19		0.10	U	0.81		—		0
10-Dec-07	—	—	—	—	—	418	—		0.07		4.00		0.60		3.43		0
20-Mar-08	—	—	—	—	—	358	—		—		2.44		0.60		4.92		0
19-Jun-08	—	—	—	—	—	360	—		—		0.91		0.61		0.79		0
11-Sep-08	—	—	—	—	—	445	—		—		0.10	U	0.62		4.03		0
20-Nov-08	—	—	—	—	—	398	—		—		0.35		0.51		4.56		0
MW-7	TOC =	3060.50	ft above msl (NGVD 1929)														
18-Dec-03	8.35	3052.15	12.5	460	7.38	208	8		0.31		0.81		0.64		0.153		0
15-Mar-04	8.13	3052.37	9.7	355	7.18	163	5	U	0.27		0.43		0.54		0.073		0
29-Jun-04	8.38	3052.12	11.9	444	7.11	238	11		0.37		0.10	U	0.57		0.096		3.1
22-Sep-04	8.38	3052.12	15.0	551	6.70	—	9		0.47		0.15		0.66		0.104		0
15-Dec-04	8.02	3052.48	12.6	479	8.05	223	10		0.32		0.62		0.83		0.246		13.7
23-Mar-05	8.70	3051.80	9.3	429	7.25	260	5		0.27		0.14		0.39		0.26		0
21-Jun-05	7.98	3052.52	11.5	480	7.17	268	7		0.23		0.60		0.42		0.18		0
29-Sep-05	7.4	3053.10	14.5	500	7.16	253	5	U	0.41		0.10	U	0.55		0.142		0
27-Dec-05	8.42	3052.08	11.9	518	7.08	255	11		0.21		0.44		0.36		0.38		2.0
22-Mar-06	8.90	3051.60	9.6	415	7.71	323	—		0.22		0.39		1.00		0.071		0
20-Jun-06	8.07	3052.43	13.7	396	7.11	203	—		0.31		0.48		0.49		0.085		0
21-Sep-06	9.08	3051.42	13.4	460	6.75	245	—		0.35		0.10	U	0.40		0.148		0
13-Dec-06	8.04	3052.46	12.1	473	7.54	253	—		0.27		0.39		0.47		0.152		0
22-Mar-07	8.00	3052.50	9.4	430	7.85	253	—		0.17		0.45		0.44		0.114		0
21-Jun-07	7.85	3052.65	11.4	431	7.20	200	—		0.23		0.57		0.35		0.232		1
20-Sep-07	8.88	3051.62	13.0	465	7.86	285	—		0.32		0.10	U	0.48		—		0
10-Dec-07	8.07	3052.43	11.2	553	7.92	293	—		0.25		2.01		0.42		0.072		0
20-Mar-08	7.70	3052.80	9.4	438	7.57	233	—		—		0.61		0.41		0.095		0
19-Jun-08	7.96	3052.54	10.5	441	7.51	283	—		—		0.46		0.31		0.095		0
11-Sep-08	9.85	3050.65	12.5	457	7.68	255	—		—		0.10	U	0.46		0.157		0
20-Nov-08	8.11	3052.39	12.2	515	7.57	303	—		—		1.03		0.43		0.095		0
SW-5																	
22-Sep-04	—	3043.27	15.3	130	7.75	—	—		—		—		—		—		—
15-Dec-04	—	3043.76	3.8	175	—	88.6	—		—		—		—		—		—
23-Mar-05	—	3043.52	6.9	166	9.06	76.2	—		—		—		—		—		—
21-Jun-05	—	3043.53	18.7	212	8.08	106	—		—		—		—		—		—
29-Sep-05	—	3042.85	9.7	222	7.56	—	—		—		—		—		—		—
27-Dec-05	—	3044.04	5.9	114	7.92	87	—		—		—		—		—		—
22-Mar-06	—	3043.54	7.8	184	8.44	87.5	—		—		—		—		—		—
20-Jun-06	—	3044.01	13.7	149	8.00	—	—		—		—		—		—		—
21-Sep-06	—	3043.57	13.3	194	7.35	—	—		—		—		—		—		—
13-Dec-06	—	3043.81	5.7	183	8.65	88	—		—		—		—		—		—
22-Mar-07	—	3044.06	6.5	125	8.03	44	—		—		—		—		—		—
21-Jun-07	—	3043.07	16.5	218	7.83	108	—		—		—		—		—		—
20-Sep-07	—	3042.53	11.4	183	8.03	77	—		—		—		—		—		—
10-Dec-07	—	3043.37	2.4	188	7.50	93	—		—		—		—		—		—
20-Mar-08	—	3044.20	4.6	167	8.31	81	—		—		—		—		—		—
19-Jun-08	—	3044.02	14.8	147	8.46	73	—		—		—		—		—		—
11-Sep-08	—	3042.74	15.8	201	8.53	100	—		—		—		—		—		—
20-Nov-08	—	3043.18	4.2	168	8.33	84	—		—		—		—		—		—

Notes:

a) DEQ Groundwater Quality Guidance Levels from Table 3 of OAR 340-40-020. Sept, 1991. All guidance levels except for TDS are for total (unfiltered) concentrations unless otherwise specified by the Dept.

b) DEQ Groundwater Quality Reference Levels from Table 1 of OAR 340-40-020. Sept, 1991. All reference levels are for total (unfiltered) concentrations unless otherwise specified by the Dept.

c) TDS concentrations are from the laboratory, except for those from SW-5 which are field measurements.

Qualifiers:

U - Not detected at indicated reporting limit.

Abbreviations:

COD - Chemical oxygen demand

DEQ - Oregon Department of Environmental Quality

MPN - Most probable number

NGVD - National Geodetic Vertical Datum

TDS - Total dissolved solids

TOC - Top of casing

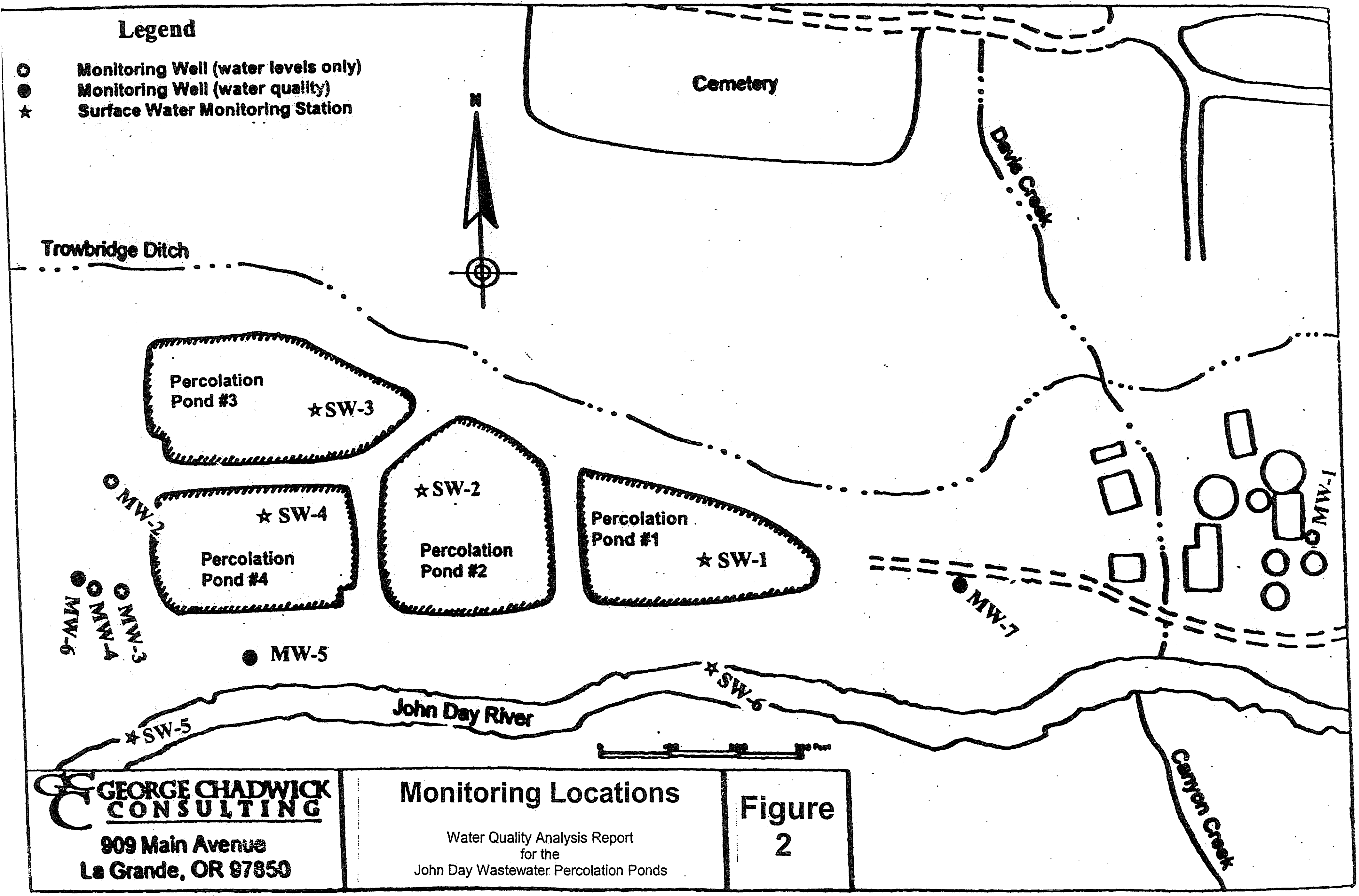
Table 1. Water-level Data near the John Day Wastewater Percolation Ponds

Date	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7	
	TOC = 3061.99		TOC = 3051.11		TOC = 3052.13		TOC = 3052.33		TOC = 3050.3		TOC = 3051.10		TOC = 3060.50	
	Depth from TOC (ft)	Elevation (NGVD29)	Depth from TOC (ft)	Elevation (NGVD29)	Depth from TOC (ft)	Elevation (NGVD29)	Depth from TOC (ft)	Elevation (NGVD29)	Depth from TOC (ft)	Elevation (NGVD29)	Depth from TOC (ft)	Elevation (NGVD29)	Depth from TOC (ft)	Elevation (NGVD29)
2-Dec-97	8.46	3053.53	9.85	3041.26	11.04	3041.09	11.41	3040.92	6.48	3043.82	—	—	—	—
5-Mar-98	8.47	3053.52	9.70	3041.41	10.94	3041.19	11.35	3040.98	6.18	3044.12	—	—	—	—
19-Mar-98	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27-Mar-98	—	—	—	—	10.75	3041.38	11.41	3040.92	—	—	—	—	—	—
12-May-98	7.00	3054.99	9.36	3041.75	10.53	3041.60	10.81	3041.52	5.84	3044.46	—	—	—	—
26-May-98	6.05	3055.94	8.31	3042.80	8.88	3043.25	9.10	3043.23	5.51	3044.79	—	—	—	—
16-Jun-98	7.33	3054.66	9.51	3041.60	10.62	3041.51	10.90	3041.43	5.97	3044.33	—	—	—	—
21-Jul-98	6.85	3055.14	9.53	3041.58	11.22	3040.91	11.65	3040.68	6.52	3043.78	—	—	—	—
11-Aug-98	9.20	3052.79	9.47	3041.64	11.31	3040.82	11.77	3040.56	6.77	3043.53	—	—	—	—
28-Sep-98	8.54	3053.45	9.66	3041.45	11.21	3040.92	11.51	3040.82	6.59	3043.71	—	—	—	—
28-Oct-98	8.98	3053.01	9.62	3041.49	10.88	3041.25	11.24	3041.09	6.41	3043.89	—	—	—	—
6-Jan-99	9.10	3052.89	9.71	3041.40	11.08	3041.05	11.49	3040.84	6.19	3044.11	—	—	—	—
18-Dec-03	9.31	3052.68	9.60	3041.51	11.00	3041.13	11.53	3040.80	7.10	3043.20	10.54	3040.56	8.35	3052.15
15-Mar-04	8.00	3053.99	9.70	3041.41	11.04	3041.09	11.49	3040.84	6.84	3043.46	10.32	3040.78	8.13	3052.37
29-Jun-04	8.68	3053.31	9.72	3041.39	11.35	3040.78	11.84	3040.49	7.00	3043.30	10.68	3040.42	8.38	3052.12
22-Sep-04	8.45	3053.54	9.60	3041.51	11.55	3040.58	12.16	3040.17	7.40	3042.90	10.95	3040.15	8.38	3052.12
15-Dec-04	8.82	3053.17	9.55	3041.56	11.25	3040.88	11.75	3040.58	7.10	3043.20	10.55	3040.55	8.02	3052.48
23-Mar-05	9.30	3052.69	9.75	3041.36	11.45	3040.68	11.98	3040.35	7.10	3043.20	10.75	3040.35	8.70	3051.80
21-Jun-05	8.18	3053.81	9.71	3041.40	11.40	3040.73	11.87	3040.46	7.10	3043.20	10.67	3040.43	7.98	3052.52
29-Sep-05	8.60	3053.39	10.0	3041.11	11.2	3040.93	12.0	3040.33	6.90	3043.40	10.80	3040.30	7.4	3053.10
27-Dec-05	8.54	3053.45	9.81	3041.30	—	—	—	—	6.96	3043.34	10.61	3040.49	8.42	3052.08
22-Mar-06	9.10	3052.89	9.80	3041.31	11.35	3040.78	12.30	3040.03	—	—	11.30	3039.80	8.90	3051.60
20-Jun-06	8.10	3053.89	9.60	3041.51	11.15	3040.98	11.65	3040.68	6.49	3043.81	10.46	3040.64	8.07	3052.43
21-Sep-06	8.55	3053.44	9.48	3041.63	12.32	3039.81	12.14	3040.19	6.94	3043.36	10.85	3040.25	9.08	3051.42
13-Dec-06	9.11	3052.88	9.59	3041.52	10.98	3041.15	11.49	3040.84	6.57	3043.73	10.35	3040.75	8.04	3052.46
22-Mar-07	8.10	3053.89	9.65	3041.46	11.15	3040.98	11.68	3040.65	6.57	3043.73	10.50	3040.60	8.00	3052.50
21-Jun-07	8.62	3053.37	9.66	3041.45	11.35	3040.78	12.00	3040.33	6.71	3043.59	10.79	3040.31	7.85	3052.65
20-Sep-07	9.05	3052.94	9.64	3041.47	11.56	3040.57	12.28	3040.05	7.35	3042.95	11.07	3040.03	8.88	3051.62
10-Dec-07	9.30	3052.69	9.58	3041.53	11.47	3040.66	12.03	3040.30	6.75	3043.55	10.90	3040.20	8.07	3052.43
20-Mar-08	8.45	3053.54	9.52	3041.59	11.08	3041.05	11.60	3040.73	6.49	3043.81	10.41	3040.69	7.70	3052.80
19-Jun-08	7.68	3054.31	9.52	3041.59	11.21	3040.92	11.67	3040.66	6.50	3043.80	10.48	3040.62	7.96	3052.54
11-Sep-08	9.50	3052.49	9.55	3041.56	11.75	3040.38	12.31	3040.02	7.06	3043.24	11.21	3039.89	9.85	3050.65
20-Nov-08	9.12	3052.87	9.63	3041.48	11.63	3040.50	12.31	3040.02	7.38	3042.92	11.40	3039.70	8.11	3052.39

Note: The 2003 4th quarter water level measurement for MW-1 was taken on 12/29/03, not 12/18/03.

Date	SW-1 (Perc. Pond #1)		SW-2 (Perc. Pond #2)		SW-3 (Perc. Pond #3)		SW-4 (Perc. Pond #4)		SW-5 (John Day River)		SW-6 (John Day River)	
	MP = 3050.63		MP = 3047.68		MP = 3046.55		MP = 3046.59		MP = 3049.54		MP = 3055.77	
	Staff Gauge Reading (ft)	Elevation (NGVD29)	Staff Gauge Reading (ft)	Elevation (NGVD29)	Staff Gauge Reading (ft)	Elevation (NGVD29)	Staff Gauge Reading (ft)	Elevation (NGVD29)	Distance below MP (ft)	Elevation (NGVD29)	Distance below MP (ft)	Elevation (NGVD29)
2-Dec-97	Probably Dry		Probably Dry		Probably Dry		Prob. Trace			3043.50		3046.02
5-Mar-98		3051.08		3048.38	Dry	<3046.55	Dry	<3046.59		3043.73		3046.34
19-Mar-98		—		—		—		—		3043.90		3046.72
12-May-98	Trace	<3050.63		3050.50	Dry	<3046.55	Dry	<3046.59		3044.86		3049.08
26-May-98		—		3051.33		—		—		3045.68		3049.27
16-Jun-98	Trace			3050.76	Dry	<3046.55	Dry	<3046.59		—		—
21-Jul-98	Dry	<3050.63	Trace	<3047.68	Trace	<3046.55	Dry	<3046.59		—		—
11-Aug-98	Dry	<3050.63	Dry	<3047.68	Trace	<3046.55	Dry	<3046.59		3043.21		3045.43
28-Sep-98	Dry	<3050.63	Dry	<3047.68		3046.56	Dry	<3046.59		—		—
28-Oct-98	Dry	<3050.63	Trace	<3047.68	Dry	<3046.55	Trace	<3046.59		—		—
6-Jan-99		3050.64	Trace	<3047.68	Dry	<3046.55	Dry	<3046.59		—		—
18-Dec-03	Dry	<3050.63	Dry	<3047.68	Dry	<3046.55	0.10	3046.69	5.93	3043.61	9.56	3046.21
15-Mar-04	0.30	3050.93	0.45	3048.13	Dry	<3046.55	Dry	<3046.59	5.00	3044.54	8.20	3047.57
29-Jun-04	Dry	<3050.63	2.80	3050.48	Dry	<3046.55	Dry	<3046.59	6.00	3043.54	9.58	3046.19
22-Sep-04	Dry	<3050.63	Dry	<3047.68	0.26	3046.81	Dry	<3046.59	6.27	3043.27	9.78	3045.99
15-Dec-04	Dry	<3050.63	Dry	<3047.68	Trace	<3046.55	Trace	<3046.59	5.78	3043.76	9.30	3046.47
23-Mar-05	0.40	3051.03	0.60	3048.28	Dry	<3046.55	Dry	<3046.59	6.02	3043.52	9.51	3046.26
21-Jun-05	Dry	<3050.63	3.00	3050.68	Dry	<3046.55	Dry	<3046.59	6.01	3043.53	9.84	3045.93
29-Sep-05	Dry	<3050.63	Dry	<3047.68	Dry	<3046.55	Trace	<3046.59	6.69	3042.85	9.47	3046.30
27-Dec-05	Dry	<3050.63	Dry	<3047.68	Dry	<3046.55	Trace	<3046.59	5.50	3044.04	8.30	3047.47
22-Mar-06	0.70	3051.33	0.40	3048.08	Dry	<3046.55	Dry	<3046.59	6.00	3043.54	8.86	3046.91
20-Jun-06	Dry	<3050.63	2.88	3050.56	Dry	<3046.55	Dry	<3046.59	5.53	3044.01	8.77	3047.00
21-Sep-06	Dry	<3050.63	Dry	<3047.68	0.38	3046.93	Dry	<3046.59	5.97	3043.57	9.72	3046.05
13-Dec-06	Dry	<3050.63	Trace	<3047.68	Dry	<3046.55	0.03	3046.62	5.73	3043.81	9.01	3046.76
22-Mar-07	~0.7	~3051.33	~0.4	~3048.08	Dry	<3046.55	Dry	<3046.59	5.48	3044.06	8.51	3047.26
21-Jun-07									6.47	3043.07	9.79	3045.98
20-Sep-07	0.48	3051.11	0.99	3048.67	0.07	3046.62	Dry	<3046.59	7.01	3042.53	10.20	3045.57
10-Dec-07	0.57	3051.20	1.51	3049.19	0.06	3046.61	Dry	<3046.59	6.17	3043.37	9.40	3046.37
20-Mar-08	0.64	3051.27	1.90	3049.58	0.05	3046.60	Dry	<3046.59	5.34	3044.20	8.58	3047.19
19-Jun-08	0.78	3051.41	1.62	3049.30	0.97	3047.52	Dry	<3046.59	5.52	3044.02	8.49	3047.28
11-Sep-08	0.67	3051.30	1.04	3048.72	0.18	3046.73	Dry	<3046.59	6.80	3042.74	10.14	3045.63
20-Nov-08	0.67	3051.30	1.18	3048.86	0.18	3046.73	Dry	<3046.59	6.36	3043.18	9.57	3046.20

Note: Shading signifies water was being discharged into the pond when the measurement was made



GEORGE CHADWICK CONSULTING
909 Main Avenue
La Grande, OR 97850

Monitoring Locations

Water Quality Analysis Report
for the
John Day Wastewater Percolation Ponds

Figure
2

APPENDIX E
City's Resolution to Establish Incurred Sewer Service and Incurred Connection Charges

RESOLUTION 08-624-15

A RESOLUTION TO ESTABLISH INCURRED SEWER SERVICE AND INCURRED CONNECTION CHARGES

WHEREAS, Title 7, Chapter 5 of the City Code of the City of John Day provides that monthly sewer service incurred charges and sewer connection incurred charges be set by the City Council by Resolution, and

WHEREAS, the City Council has determined that because of increased cost of installation, repair, operation and maintenance of the City's sewer system, that the City of John Day requires additional revenues for the Sewer Fund, the present incurred charges as set are inadequate and should be adjusted.

WHEREAS, the City has entered into a sewage service agreement with Canyon City and said agreement requires Canyon City to pay a monthly fee and treatment plant fund fee.

WHEREAS, the City has entered into an Intergovernmental Agreement with Grant County and the charges for selling water to Grant County Road Department must be established.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of John Day, that all sewer users, whether persons, firms or corporations in the City of John Day or out of the city limits of the City of John Day, who now have sewer services or whose premises abut streets on which sewer service, whether or not actually connected to the sewer, shall be charged the following monthly sewer incurred charges and incurred connection charges as applicable effective July 1, 2008.

I. SEWER USER CHARGES: Sewer user charges shall be as follows:

A. Single Family unit, and multi-family units such as, but not limited to, Duplex, Triplex, Fourplex, Apartments, Mobile Home Park, and Recreational Vehicle Park have the following incurred charges: $29.00 per month for each living unit.

B. All other including commercial and industrial sewer users:

The incurred sewer charges per month shall be either the calculated MONTHLY INCURRED CHARGE (1 below) or the BASE INCURRED CHARGE (2 below) whichever is greater as determined each year and will be effective July 1 each year.

1. MONTHLY-INCURRED CHARGE: 97% of the six months winter average monthly-incurred water charge plus $2.00. (the monthly winter average is calculated as follows: total incurred water charges for Nov., Dec., Jan., Feb., Mar., & Apr. divided by 6 = avg. monthly winter incurred charge.)

2. BASE INCURRED CHARGE (minimums):

a. Service stations, garages & tire shops
$32.00

b. Hotels, motels, trailer or mobile home courts, apartments with four (4) or more
units, laundries, food & meat processing dairies
$43.00

c. All others - per unit
$30.50

C. Schools

INCURRED CHARGE: $29.00 per month for the first 20 students plus $29.00 per month for each 20 students thereafter at a count taken in January and September of each year, except during June, July and August when a $29.00 minimum rate shall apply.

D. Commercial Septic Tank or Port-A-Potty Dumping

INCURRED CHARGE: The rate for commercial dumping shall be $.10 per gallon. Arrangements shall be made with the City prior to any dumping into any portion of the City's collection system.

II. SEWER CONNECTION INCURRED CHARGES

Connection charges shall consist of the actual costs for labor, materials, rental charge for equipment and/or vehicles used including mileage rate as set forth as allowed by Internal Revenue Service for tax purposes. The City will estimate the costs for connection prior to start of installation. Any excess deposit will be refunded or any additional actual costs will be paid forth with.

III. OUTSIDE CITY INCURRED CHARGES

Sewer incurred charges for all services outside the city limits shall be double the incurred charges provided herein except as otherwise provided for herein. Connection charges shall be at actual cost. This is not to be construed as obligating the City to provide service outside the City; rather this just sets the incurred charges that are applicable if feasible to connect a requester as determined by the City.

IV. CANYON CITY SEWERAGE SERVICES AGREEMENT

John Day and Canyon City agree to share the costs of labor, materials, and capital expenditures related to the annual operation, maintenance and improvements of the Sewage Treatment Plant and Sewage Works which include but are not limited to sludge disposal system, and related treatment facilities from Point of Delivery to the Sewage Treatment Plant and Sewage Works. To accomplish this, the parties shall incur the following charges, fees and responsibilities:

Monthly Fee. Canyon City shall pay a monthly fee to John Day on the 15th day of each month for its proportionate share of operation and maintenance costs and improvement costs associated with the Sewage Treatment Plant as noted in the Joint Sewer Plant Fund. Said fee is a flow-based fee which shall be based on Canyon City's proportionate share of said operations and maintenance costs and improvement costs. John Day shall measure the actual discharge of the sewage from the Canyon City sewage collection system by using a flow meter located at the Point of Delivery. The monthly payment for Canyon City's percentage of total flows that is metered at the Point of Delivery to the Sewage Treatment Plant will be based upon the previous year's data as follows:

Cost allocation for the operation, maintenance and improvement of the Sewage Treatment Plant from the Point of Delivery to the Sewage Treatment Plant will be based on total actual yearly sewage flows. John Day and Canyon City will pay its respective percentage of total flows based on the previous year's data collected at the end of each calendar year. The calculation will be figured on flows measured at the Point of Delivery for Canyon City that figure will be subtracted from the total flow measured at the Point of Entry to the Sewer Treatment Plant to give the'sewage flow for John Day as per Intergovernmental Agreement by and between the City of John Day, Oregon and the Town of Canyon City, Oregon. John Day – Canyon City Sewerage Services Agreement.

V. Treatment Plant Equipment Fund Fee. The parties shall pay its proportionate share of the annual installment of $15,000 to the Treatment Plant Equipment Fund to be evaluated on an annual basis. John Day and Canyon City proportionate share of said payment is based on each party's proportionate share calculation and payment as determined above. This fund will be used for capital expenditures on the jointly used facilities as per Intergovernmental Agreement by and between the City of John Day, Oregon and the Town of Canyon City, Oregon. John Day – Canyon City Sewerage Services Agreement.

VI. Grant County Intergovernmental Agreement (Grant County Road Department)

In exchange for the completion of the bowling alley lift station upgrade, the City by resolution will establish for the County at the time of completion of required work herein, one monthly sewer user rate for one service line connection to the City sewer main line installed herein by the County at the rate of $28 per month for 35 years ending on July 31, 2041. After July 31, 2041 at said location, the County shall pay the City's out of City monthly rate for sewer use; if still outside the City at the time.

4

VII. REVIEW OF INCURRED CHARGES

Sewer incurred charges will be reviewed annually and revised periodically to reflect actual operating and maintenance costs of the treatment system and plant.

WHEREAS, there are other resolutions in conflict with this resolution:

NOW, THEREFORE, BE IT RESOLVED that all resolutions in conflict herewith are hereby repealed.

PASSED AND ADOPTED by the City Council of the City of John Day, Oregon, thi 24th day of June, 2008

Bob Quinton

Bob Quinton, Mayor

APPENDIX F
Television Inspection Observation Reports

Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observation Report with Still Images

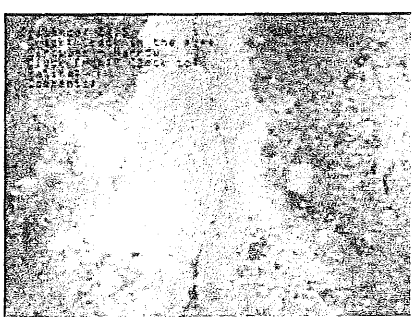
Mainline ID:	Project Name:	Start date/time:	Weather:	Operator:
Johnday/28-3/28-2	09' City of John Day	5/22/2009 10:59:31 AM	Warm	Shaun Grover

Upstream node:	Depth US:	Downstream node:	Depth DS:	Asset length:	Extra:
28-3		28-2		239.0	

Comments
Track #1 Flow 5%

Observations

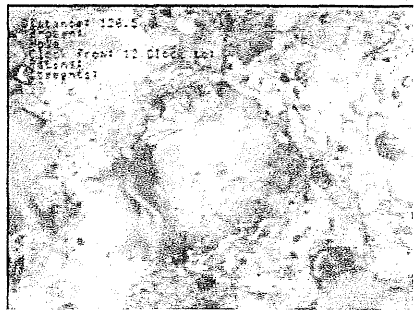
Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
8.0		START WITH FLOW	No	/		
21.1		Lateral Tap Conn.	No	10 /		
27.1		Lateral Tap Conn.	No	1 /		
45.9	3.1	Pipe Type	No	/		PVC
46.5		Lateral Tap Conn.	No	2 /		
54.5		Crack	No	/	Circular - Narrow	



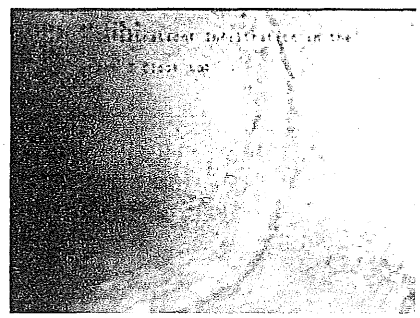
Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
65.4	9.9	Sag	No	/	Medium	
83.6		Lateral Tap Conn.	No	2 /		
126.5		Broken	No	12 /	Hole	

Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

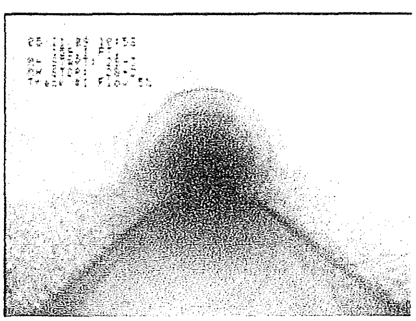
Observations

Distance	Length	Code	Reversed	Clock Pos.	Severity	Comment
135.5		Joint - Infiltration	No	3 /	Medium	Fixed 9-29-09

141.9		Lateral Tap Conn.	No	10 /		
152.8		Lateral Tap Conn.	No	2 /		
156.4	4.6	Sag	No	/	Light	

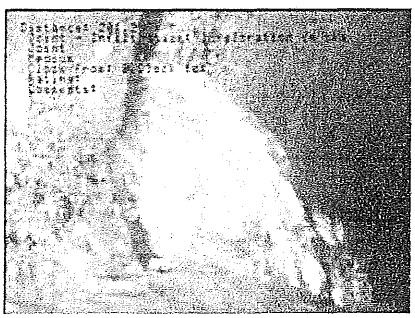


164.4		Joint - Infiltration	No	8 /	Medium	Fixed 9-29-09
167.0		Joint - Infiltration	No	4 / 7	Medium	Fixed 9-29-09
174.8		Joint - Infiltration	No	9 /	Medium	Fixed 9-29-09

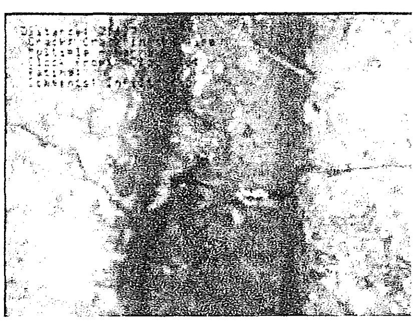
Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
180.1		Joint - Infiltration	No	8 /	Medium	Fixed 9-28-09
185.4		Joint - Infiltration	No	3 /	Medium	Fixed 9-28-09
197.3		Lateral Tap Conn.	No	12 /		
198.6		Joint - Infiltration	No	8 /	Medium	Fixed 9-28-09
200.4		Lateral Tap Conn.	No	2 / R		Possible Heavy Fixed 3-17-10
201.2		Joint - Infiltration	No	8 /	Severe	Fixed 9-28-09



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
206.5		Joint - Infiltration	No	8 /	Light	Fixed 3-17-10
211.7	0.4	Crack	No	/	Multiple - Narrow	Infiltration



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
239.0		STOP	No	/		

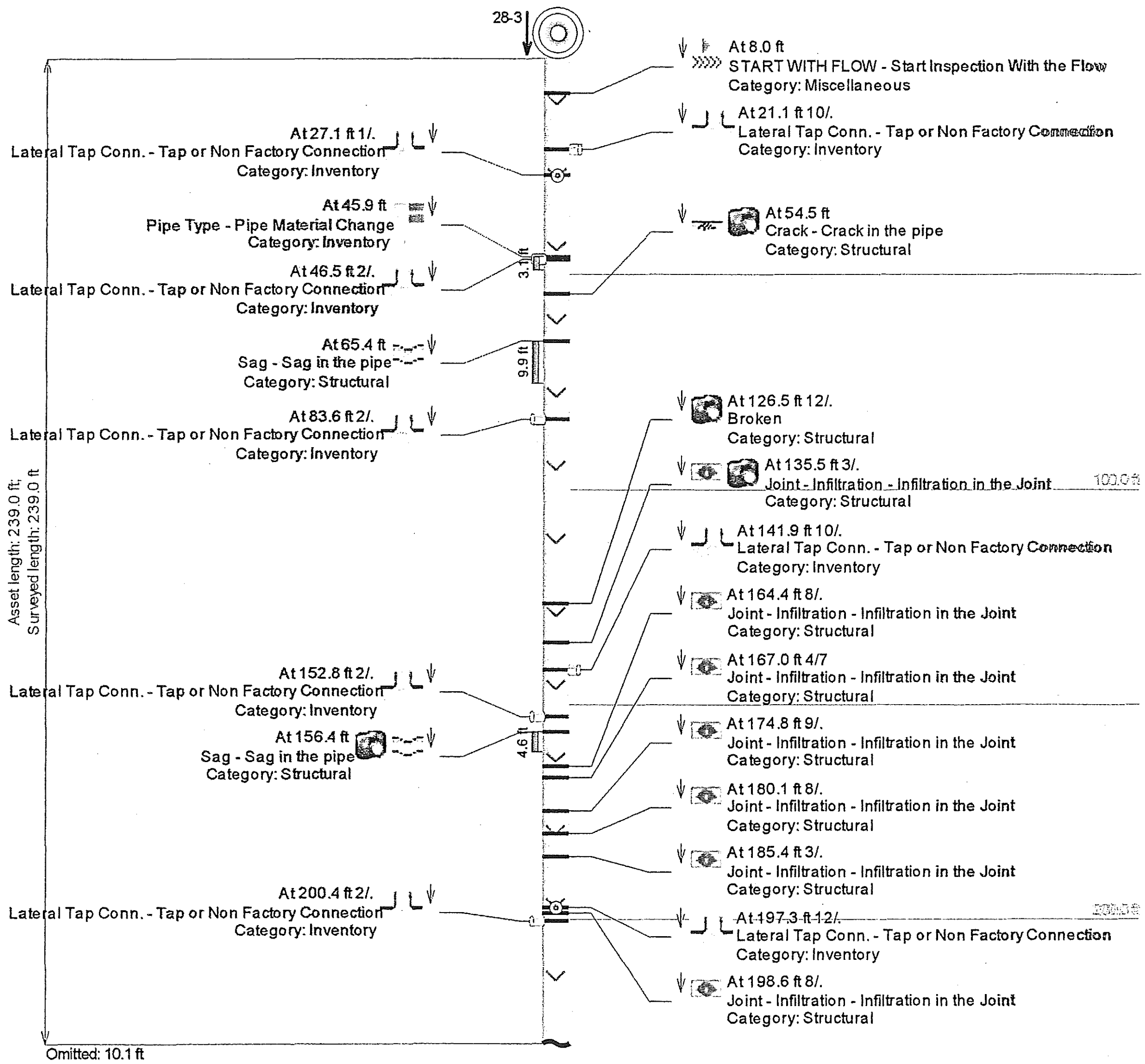
Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

TV Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/28-3/28-2	John Day	Elm St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	8	8	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	239.0	Warm	

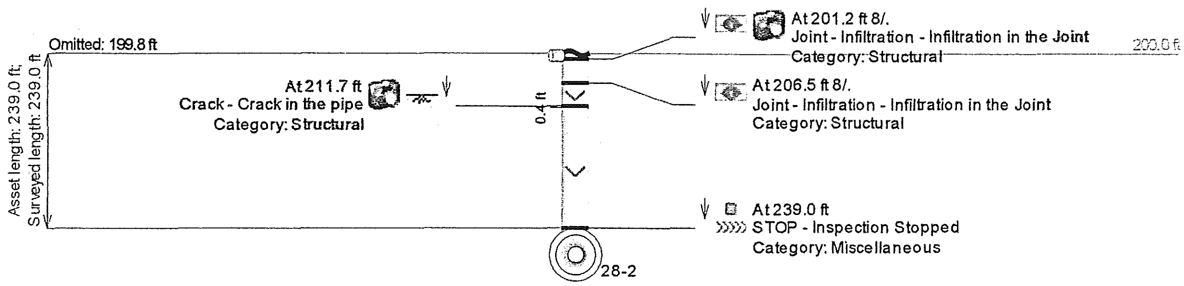


Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/28-3/28-2	John Day	Elm St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	8	8	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	239.0	Warm	



Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Pipeline Inspection Services Inc. 941-9424 941-9421

Observation Report with Still Images

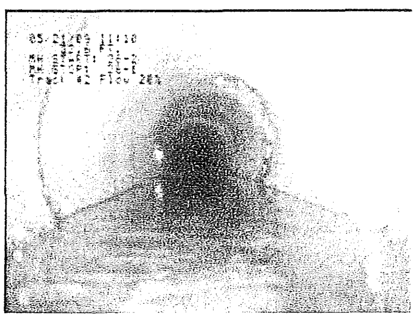
Mainline ID:	Project Name:	Start date/time:	Weather:	Operator:
Johnday/28-2/28-1	09' City of John Day	5/22/2009 11:19:47 AM	Warm	Shaun Grover

Upstream node:	Depth US:	Downstream node:	Depth DS:	Asset length:	Extra:
28-2		28-1		267.9	

Comments
Track #2 Flow 20%

Observations

Distance	Length	Code	Reversed	Clock Pos.	Severity	Comment
0.0		START WITH FLOW	No	/		
24.4		Lateral Tap Conn.	No	2 /		
31.0	5.3	Joint - Infiltration	No	/	Medium	Fixed 9-29-09

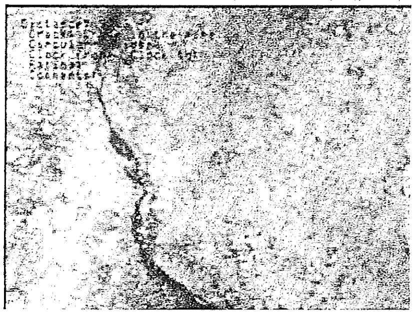



33.7 - Fixed 9-29-09
36.3 - Fixed 9-29-09

Distance	Length	Code	Reversed	Clock Pos.	Severity	Comment
35.4		Lateral Tap Conn.	No	2 /		
62.0		Lateral Tap Conn.	No	12 /	Top tapp L. South light	Fixed 3-18-10
62.7		Joint - Infiltration	No	8 /	Medium	Fixed 9-29-09
71.4		Lateral Tap Conn.	No	9 /	L plugged light	Fixed 3-18-10
83.3		Crack	No	/	Circular - Wider	

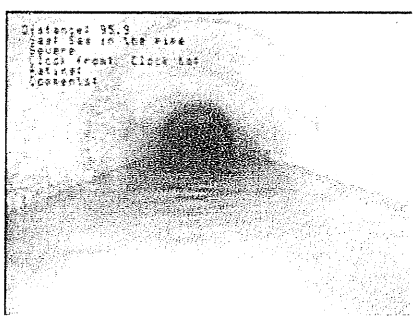
Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observations



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
85.2		Lateral Tap Conn.	No	2 /	R Light	Fixed 3-19-10
92.3		Infiltration	No	/	Light	Circular Crack

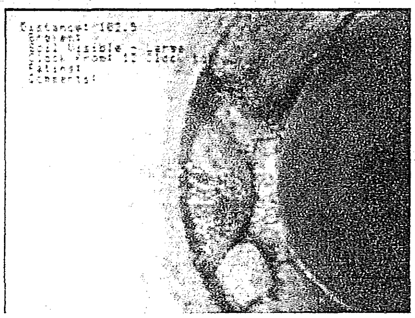
Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
95.9	17.1	Sag	No	/	Severe	



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
100.9		Lateral Tap Conn.	No	12 /		
102.5		Broken	No	12 /	Soil Visible - Large	Fixed

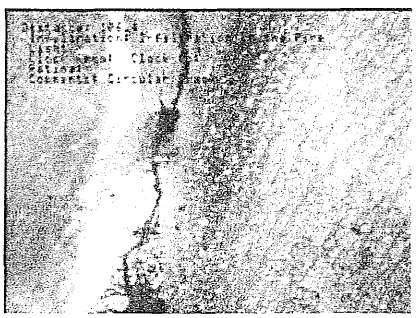
Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observations



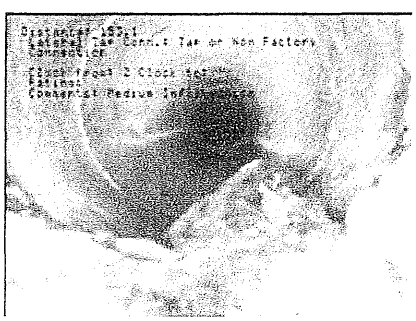
Fixed 9-29-09 4' CIPP.

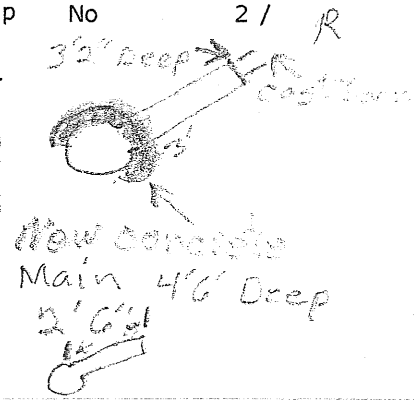
Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
106.4		Infiltration	No	/	Light	Circular Crack



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
113.0		Joint - Infiltration	No	/	Light	
131.4	10.4	Sag	No	/	Medium	
153.1		Lateral Tap Conn.	No	2 /	R	Medium Infiltration

Bottom of Tap





Fixed 3-19-10

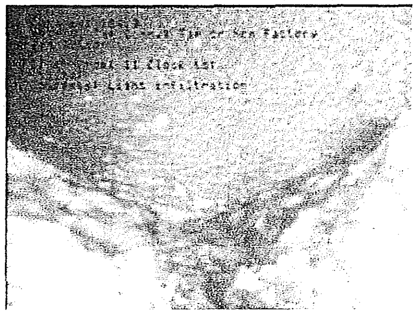
Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
184.9		Lateral Tap Conn.	No	11 /		Light infiltration

Fixed 3-22-10

Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
221.9		Lateral Tap Conn.	No	12 /		
245.6		Lateral Tap Conn.	No	12 /		Light Infiltration Fixed 3-22-10

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
264.5		Infiltration	No	/	Light	Fixed 3-22-10
267.9		STOP	No	/		

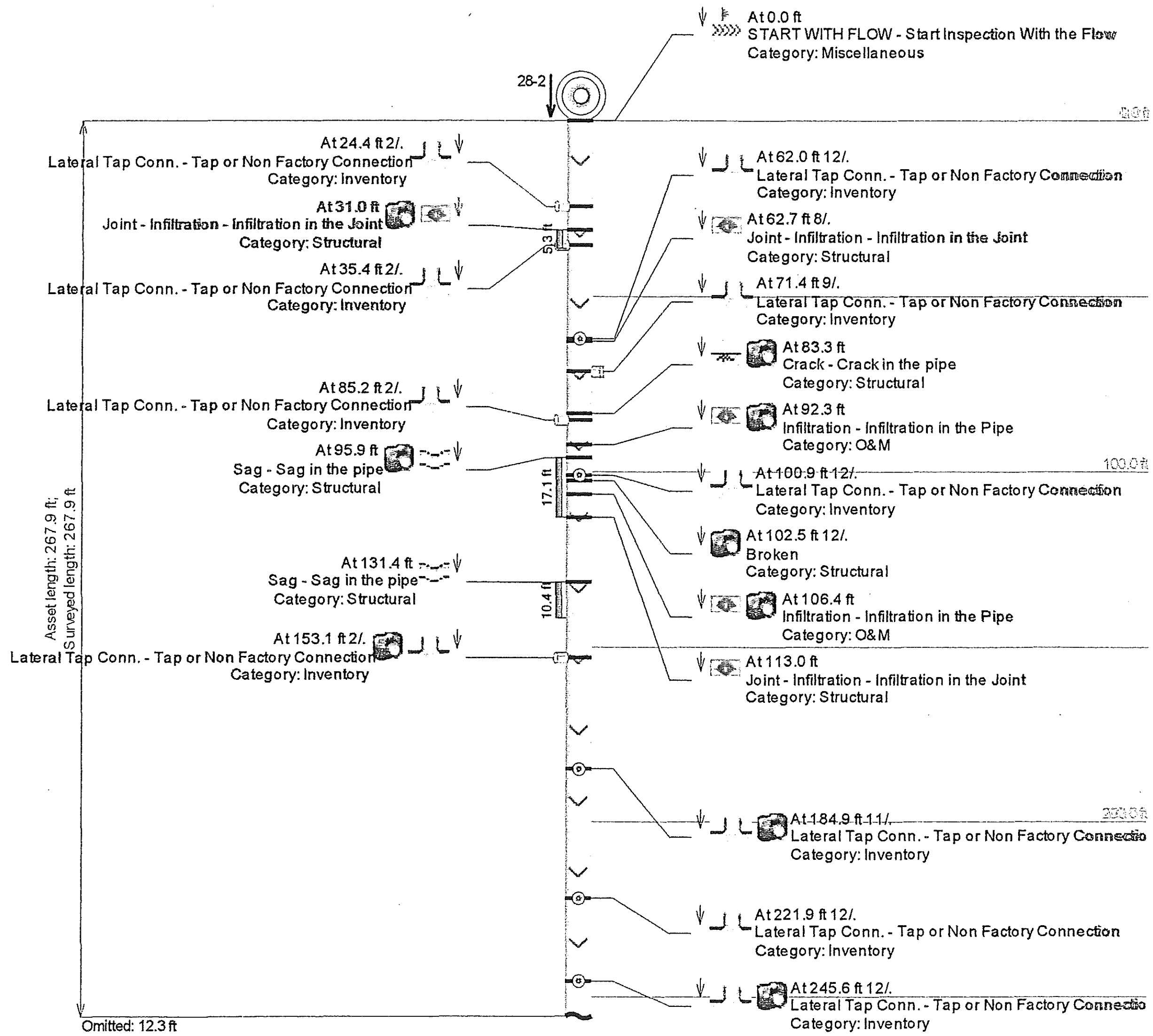
Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

TV Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/28-2/28-1	John Day	Elm St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	8	8	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	267.9	Warm	

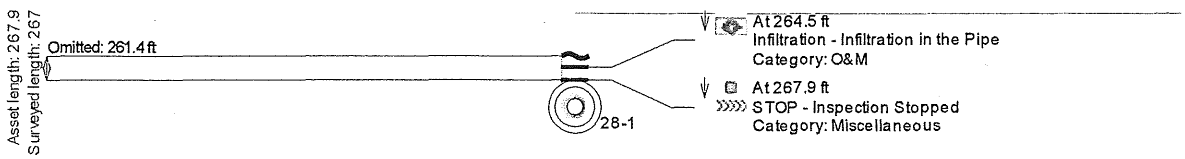


Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/28-2/28-1	John Day	Elm St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	8	8	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	267.9	Warm	



Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observation Report with Still Images

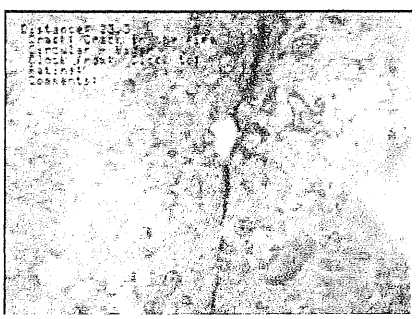
Mainline ID:	Project Name:	Start date/time:	Weather:	Operator:
Johnday/20-4/20-3	09' City of John Day	5/22/2009 11:51:09 AM	Warm	Shaun Grover

Upstream node:	Depth US:	Downstream node:	Depth DS:	Asset length:	Extra:
20-4		20-3		247.2	

Comments
Track #3 Flow 15%

Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
8.0		START WITH FLOW	No	/		
23.3		Crack	No	/	Circular - Wider	



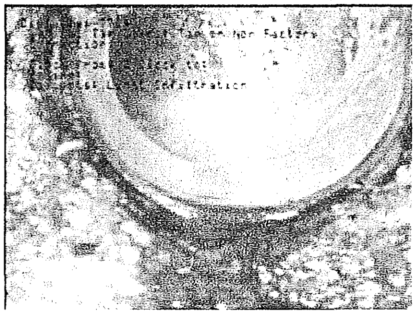
Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
76.3		Lateral Abandoned - Unsealed	No	10 /		
77.1		Lateral Tap Conn.	No	2 /		Light Infiltration

Fixed 3-23-10
Concrete all of Tap

Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

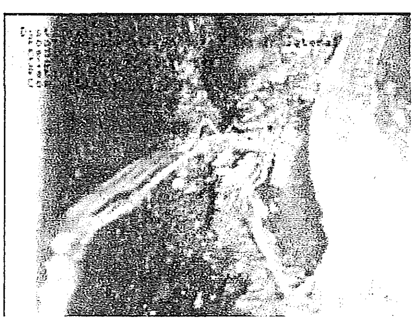
Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment



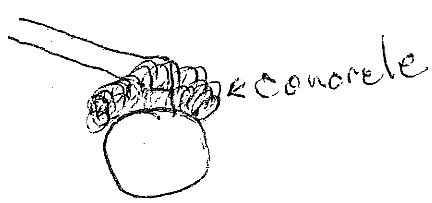
Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
79.4		Lateral Abandoned - Unsealed	No	2 /		Capped
146.0		Crack	No	/	Circular - Narrow	
164.2		Grease	No	/	Light	

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
169.3		Root-in-Lateral	No	12 /	Medium	



Top up & west

Fixed 3-23-10



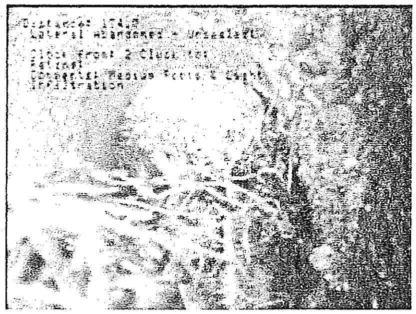
Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
171.4		Lateral Abandoned - Unsealed	No	10 /		Roots in Lateral Fixed 3-24-10
174.7 172'		Lateral Abandoned - Unsealed	No	2 /	plugged	Medium Roots & Light Infiltration 3-24-10

cut off Bell of Y and Pluged with 4" mechenical plug. concreted Y and around main
3/4" water service for 231 is above tap at 3'

Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment



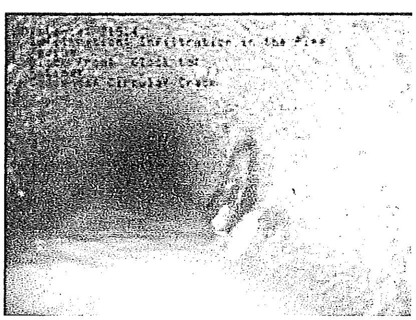
Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
176.9	175'	Lateral Tap Conn.	No	2 /		Roots & Light Infiltration

Right pulled Roots From around Tap and concreted OrangeBurg pipe To East

231? 3-25-10

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
200.2		Joint - Infiltration	No	/	Light	
219.4		Infiltration	No	/	Medium	Circular Crack

Fixed 9-30-09



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
220.7		Root-in-Lateral	No	2 /	~~Light~~	
231.0		Joint - Infiltration	No	/	Medium	Fixed 9-30-09
244.0		Infiltration	No	/	Medium	Circular Crack Fixed 9-30-09

Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observations

Distance	Length	Code	Reversed	Clock Pos.	Severity	Comment
247.2		STOP	No	/		

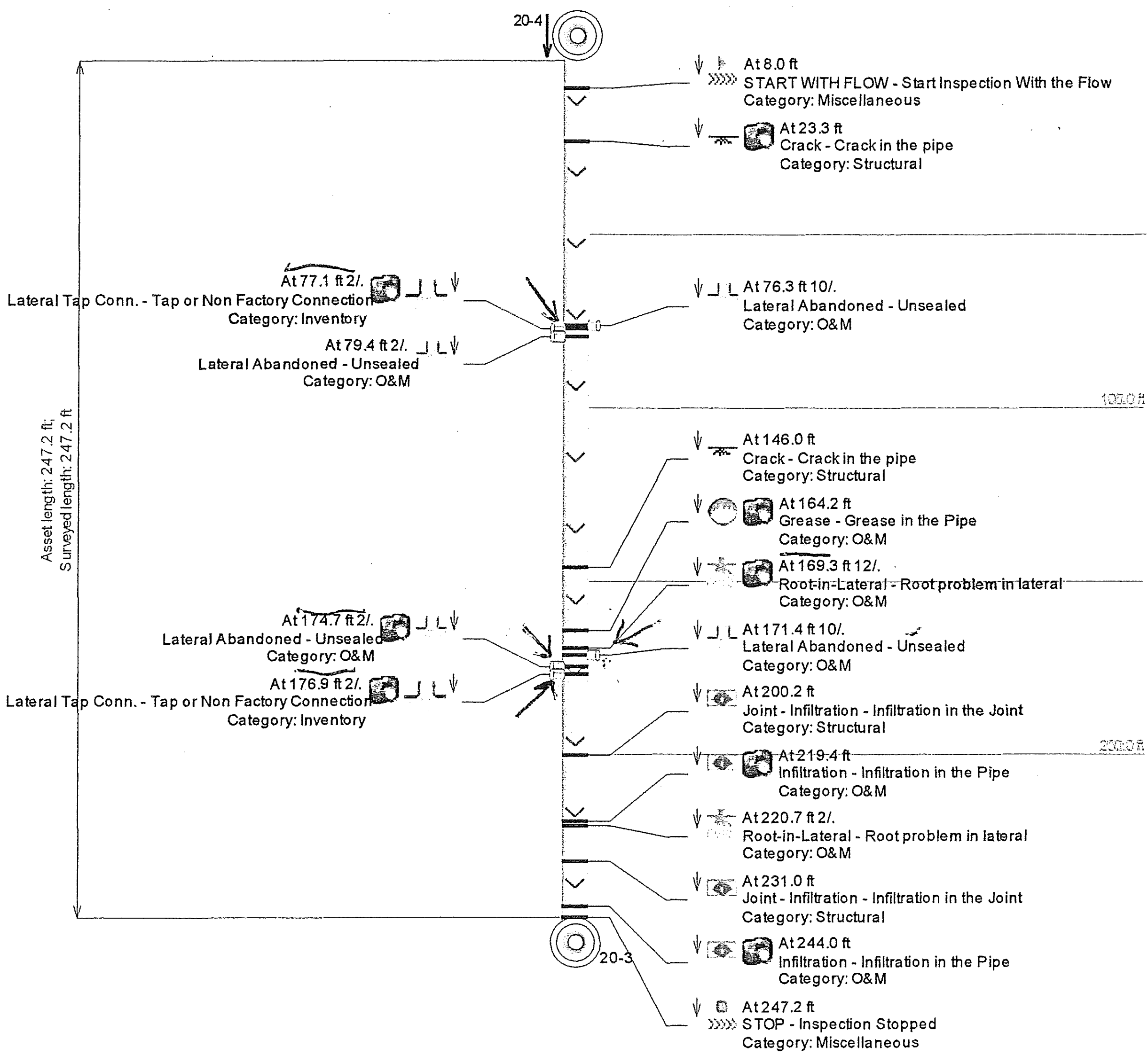
Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

TV Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/20-4/20-3	John Day	Dayton St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	8	8	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	247.2	Warm	



Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Pipeline Inspection Services Inc. 941-9424 941-9421

Observation Report with Still Images

Mainline ID:	Project Name:	Start date/time:	Weather:	Operator:
Johnday/20-3/27-1	09' City of John Day	5/22/2009 12:09:10 PM	Warm	Shaun Grover

Upstream node:	Depth US:	Downstream node:	Depth DS:	Asset length:	Extra:
20-3		20-2		158.4	

Comments
Track #4 Flow 25%

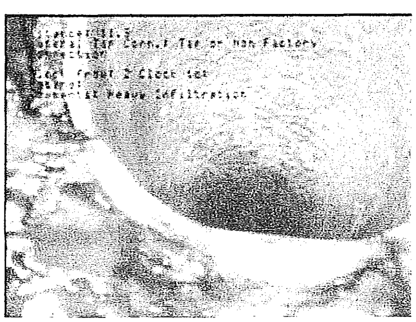
Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
0.0		START WITH FLOW	No	/		
10.4		Broken	No	2 /	Hole	

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
11.9		Lateral Tap Conn.	No	2 /		Heavy Infiltration

R

Fixed 3-24-10

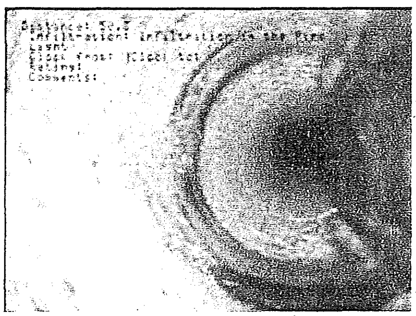


Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
12.7		Crack	No	/	Circular - Narrow	

Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
16.1		Lateral Abandoned - Unsealed	No	2 /		Capped Fixed 3-25-10
32.6		Joint - Infiltration	No	/	Light	
36.5		Broken	No	12 /	Hole	
50.3		Infiltration	No	/	Light	



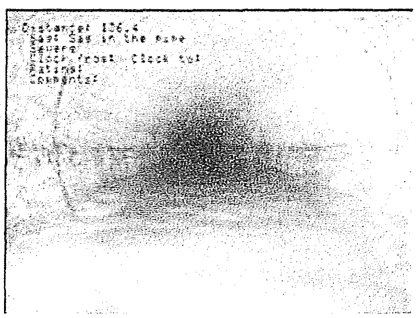
Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
58.1		Lateral Abandoned - Unsealed	No	2 /		Capped
59.5		Joint - Infiltration	No	/	Light	
60.9		Lateral Abandoned - Unsealed	No	10 /		Light Infiltration Fixed 3-25-10
75.2	5.2	Joint - Infiltration	No	/	Light	
88.9		Lateral Tap Conn.	No	12 /		
92.7		Lateral Abandoned - Unsealed	No	11 /		Light Infiltartion Fixed 3-26-10
101.1		Joint - Infiltration	No	/	Light	
108.2		Lateral Tap Conn.	No	2 /	R	Possible Infiltration Fixed 3-25-10

Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observations

Distance	Length	Code	Reversed	Clock Pos.	Severity	Comment

Distance	Length	Code	Reversed	Clock Pos.	Severity	Comment
119.5	10.7	Joint - Infiltration	No	/	Light	
136.4	22.0	Sag	No	/	Severe	



Distance	Length	Code	Reversed	Clock Pos.	Severity	Comment
143.9		Infiltration	No	/	Light	
149.5		Lateral Tap Conn.	No	10 /	Top	Medium Infiltration [illegible] Fixed 3-26-10
156.3		Infiltration	No	/	Light	
158.4		STOP	No	/		

Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

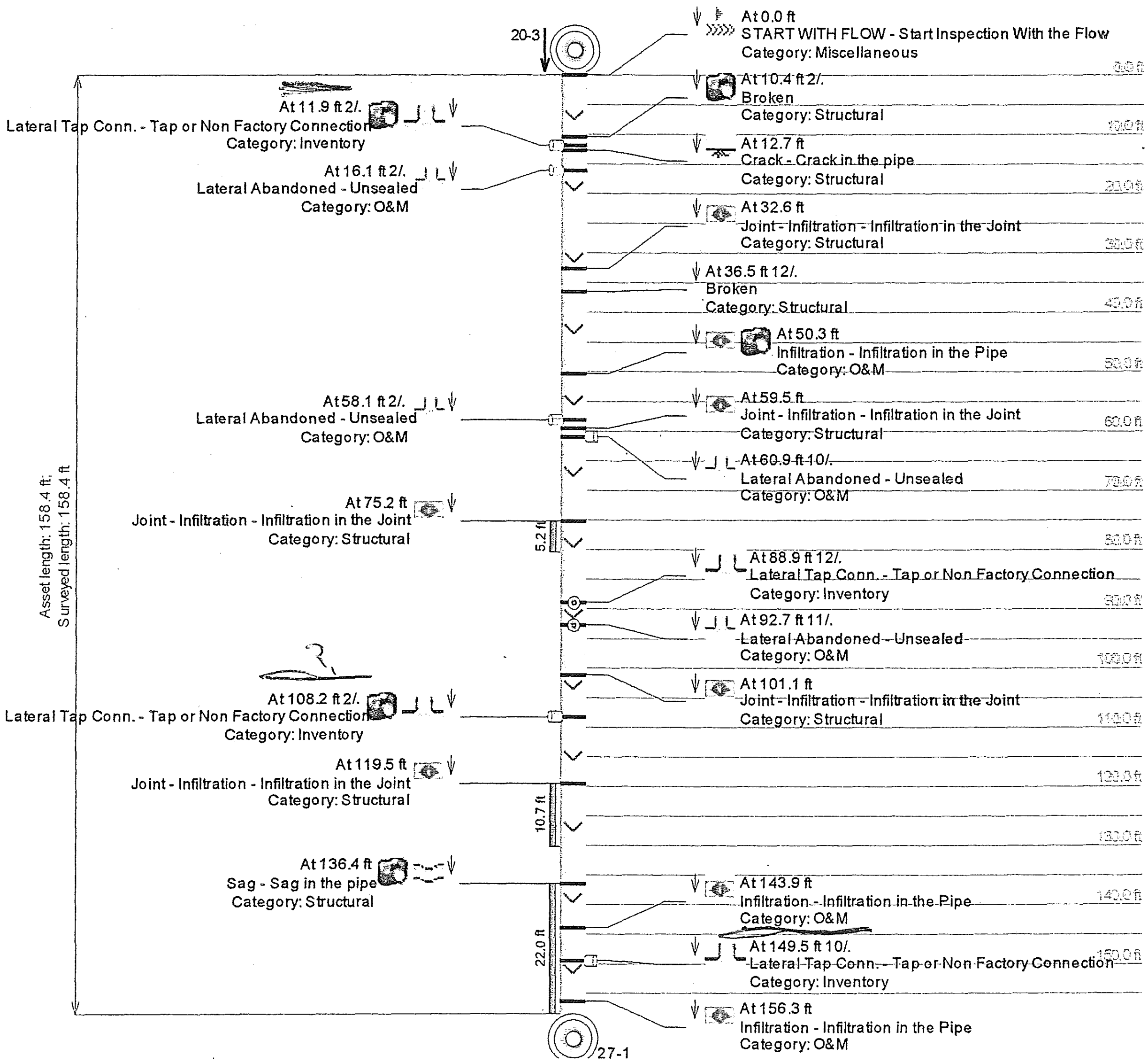
Pipeline Inspection Services Inc.
941-9424
941-9421

TV Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/20-3/20-2	John Day	Dayton St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	8	8	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	158.4	Warm	

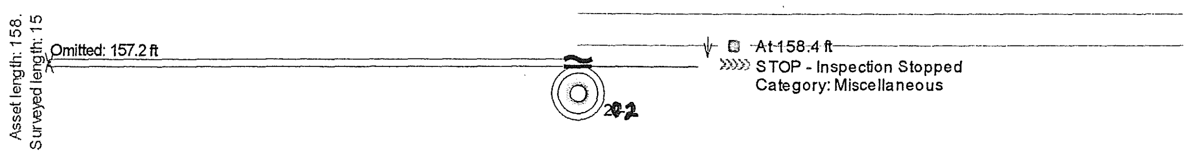


Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/20-3/20-2	John Day	Dayton St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	8	8	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	158.4	Warm	



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Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observation Report with Still Images

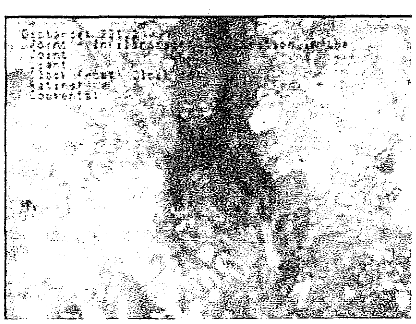
Mainline ID:	Project Name:	Start date/time:	Weather:	Operator:
Johnday/1-11/1-10	09' City of John Day	5/22/2009 12:34:13 PM	Warm	Shaun Grover

Upstream node:	Depth US:	Downstream node:	Depth DS:	Asset length:	Extra:
1-11		1-10		341.4	

Comments
Track #5 Flow 25%

Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
8.0		START WITH FLOW	No	/		
89.2		Lateral Tap Conn.	No	9 /		
92.1		Lateral Abandoned - Unsealed	No	10 /		Capped
125.7		Lateral Tap Conn.	No	3 /		
160.8		Lateral Tap Conn.	No	9 /		
185.1		Lateral Tap Conn.	No	2 /		
201.3		Lateral Abandoned - Unsealed	No	10 /		Capped
221.2		Joint - Infiltration	No	/	Light	



Fixed 9-30-09

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
228.7		Lateral Abandoned -	No	2 /		Capped With Infiltration

Pipeline Inspection Services
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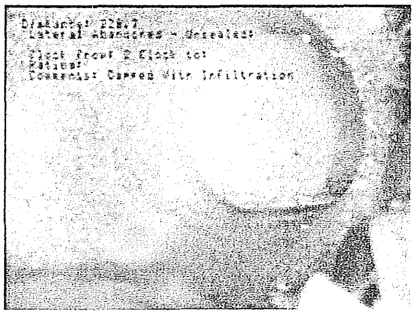
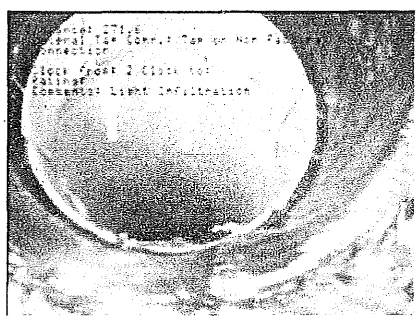
Observations

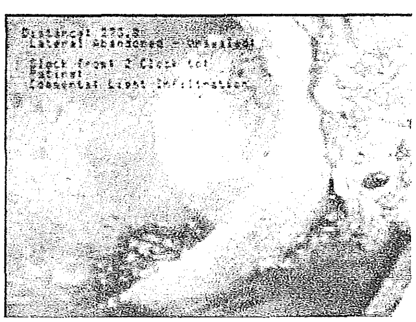
Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
		Unsealed				



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
239.1		Joint - Infiltration	No	/	Medium	Fixed 9-30-09
253.0		Lateral Tap Conn.	No	10 /		
255.1		Lateral Tap Conn.	No	10 /		
269.1		Joint - Infiltration	No	/	Light	Fixed 9-30-09
271.6		Lateral Tap Conn.	No	2 /		Light Infiltration



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
273.8		Lateral Abandoned - Unsealed	No	2 /		Light Infiltration



Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
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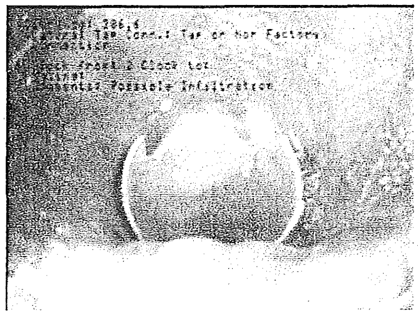
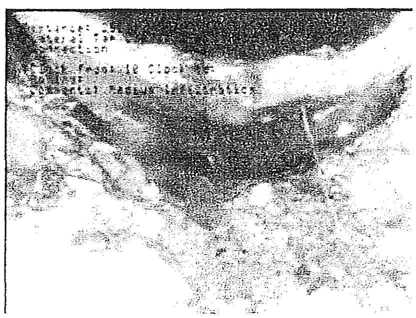
Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
286.6		Lateral Tap Conn.	No	2 /		Possible Infiltration



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
290.6		Lateral Tap Conn.	No	10 /		Medium Infiltration



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
291.7		Lateral Abandoned - Unsealed	No	10 /		Capped
327.8		Lateral Abandoned - Unsealed	No	10 /		Capped
330.7		Lateral Abandoned - Unsealed	No	2 /		Capped
341.4		STOP	No	/		

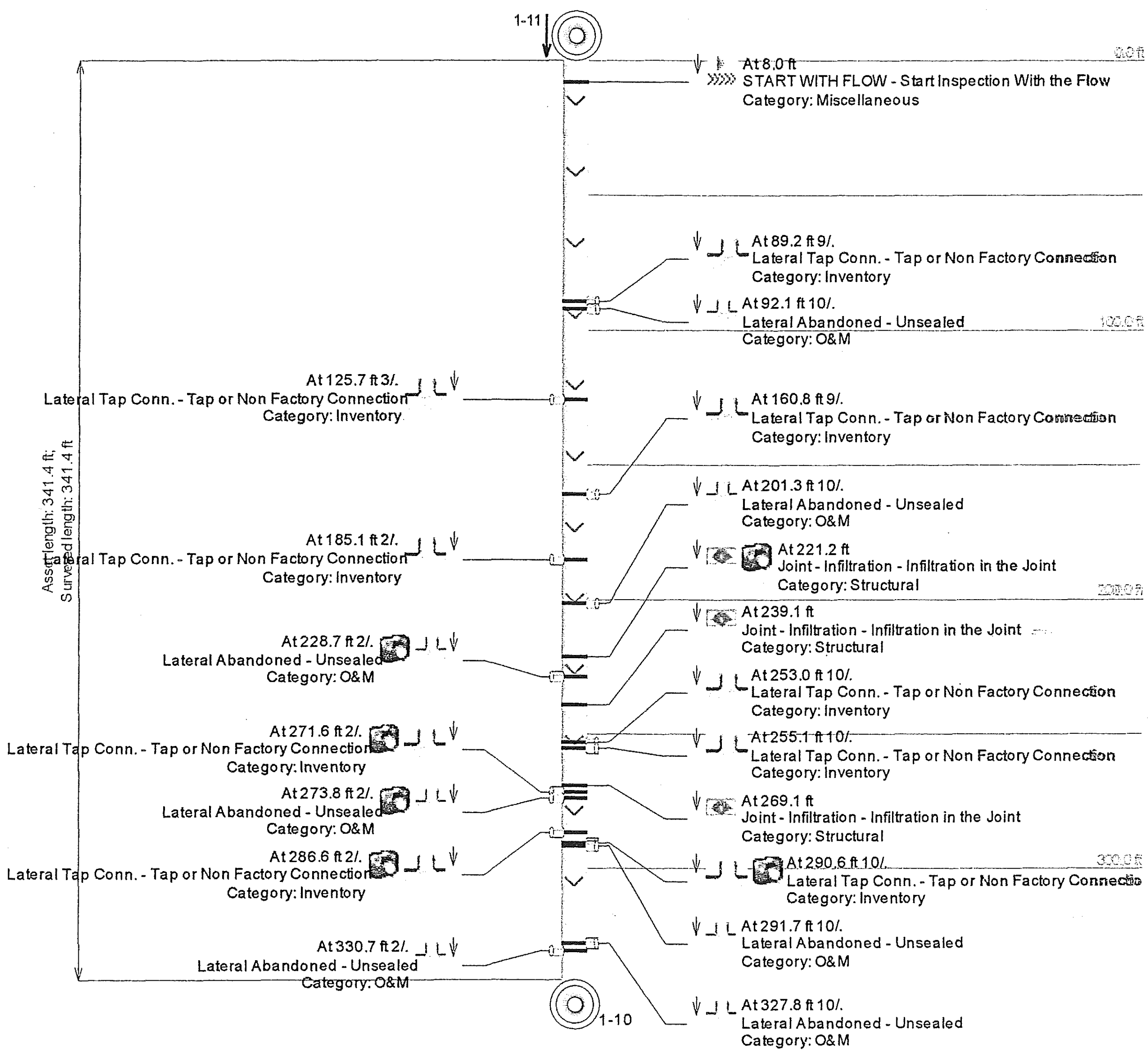
Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

TV Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/1-11/1-10	John Day	Canyon St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	8	8	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	341.4	Warm	

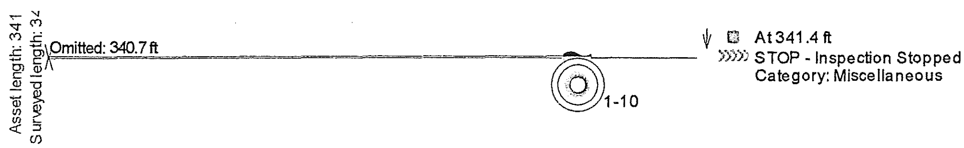


Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/1-11/1-10	John Day	Canyon St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	8	8	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	341.4	Warm	



Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observation Report with Still Images

Mainline ID:	Project Name:	Start date/time:	Weather:	Operator:
Johnday/27-2/27-1	09' City of John Day	5/22/2009 1:03:48 PM	Warm	Shaun Grover

Upstream node:	Depth US:	Downstream node:	Depth DS:	Asset length:	Extra:
27-2		27-1		237.0	

Comments
Track #6 Flow 30%

Observations

Distance	Length	Code	Reversed	Clock Pos.	Severity	Comment
0.0		Other	No	/		Infiltration In MH 27-2 around base
8.0		START WITH FLOW	No	/		
234.6		Joint - Infiltration	No	/	Light	
237.0		STOP	No	/		

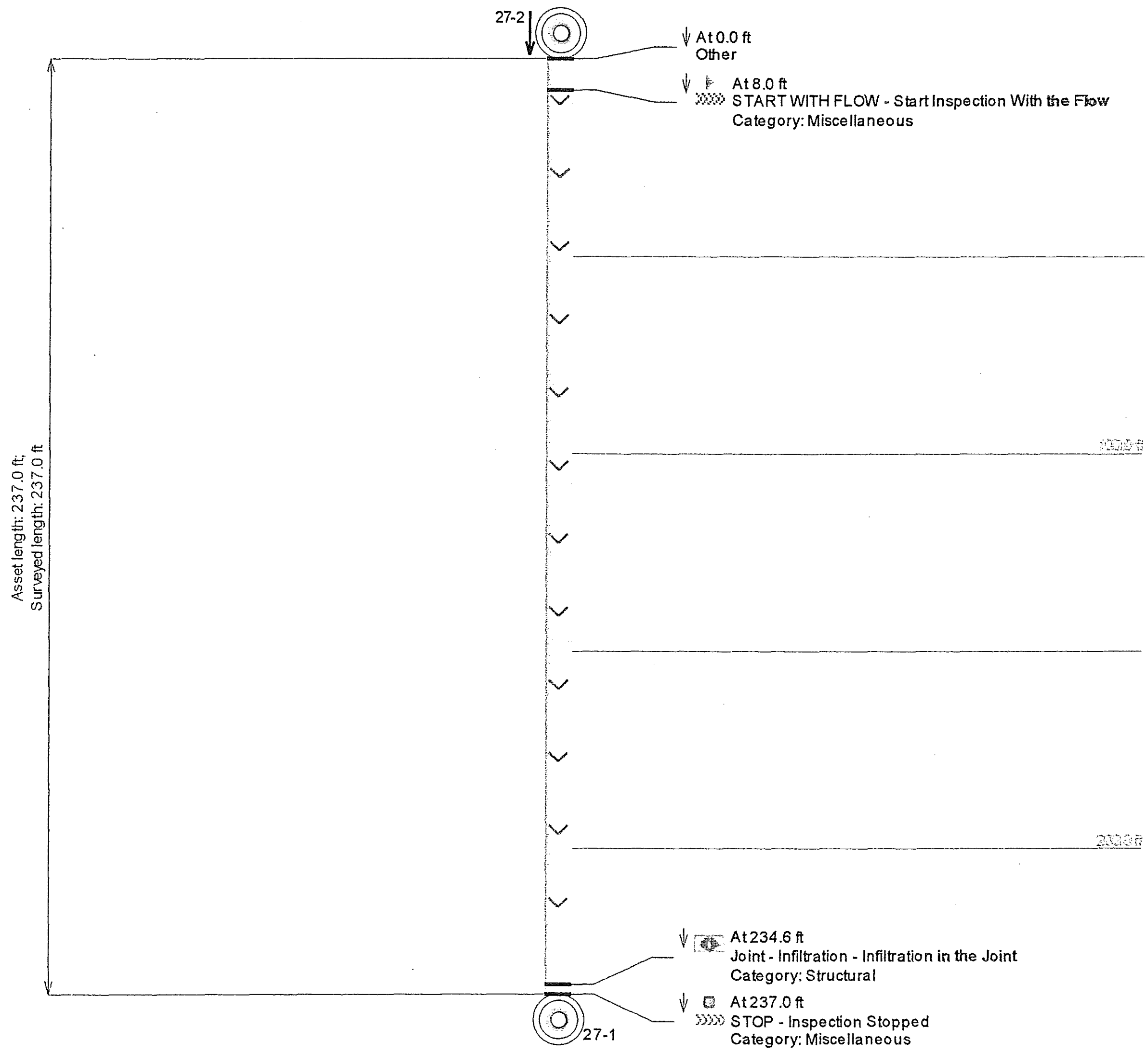
Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

TV Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/27-2/27-1	John Day	N.E. 3rd St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	8	8	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	237.0	Warm	



Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observation Report with Still Images

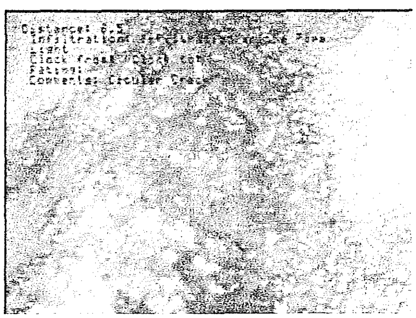
Mainline ID:	Project Name:	Start date/time:	Weather:	Operator:
Johnday/27-1/20-2	09' City of John Day	5/22/2009 1:13:16 PM	Warm	Shaun Grover

Upstream node:	Depth US:	Downstream node:	Depth DS:	Asset length:	Extra:
27-1		20-2		36.9	

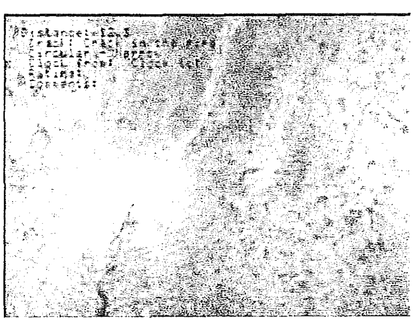
Comments
Track #7 Flow 30%

Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
2.0		START WITH FLOW	No	/		
2.7		Joint - Infiltration	No	/	Light	
6.5		Infiltration	No	/	Light	Cicular Crack



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
12.3		Crack	No	/	Circular - Narrow	



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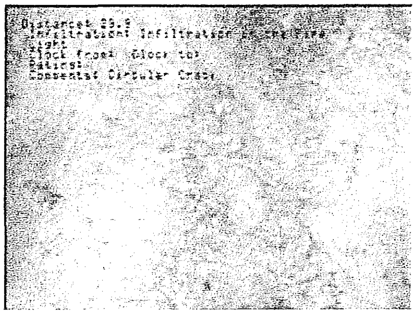
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
29.9		Infiltration	No	/	Light	Circular Crack



36.9		STOP	No	/		

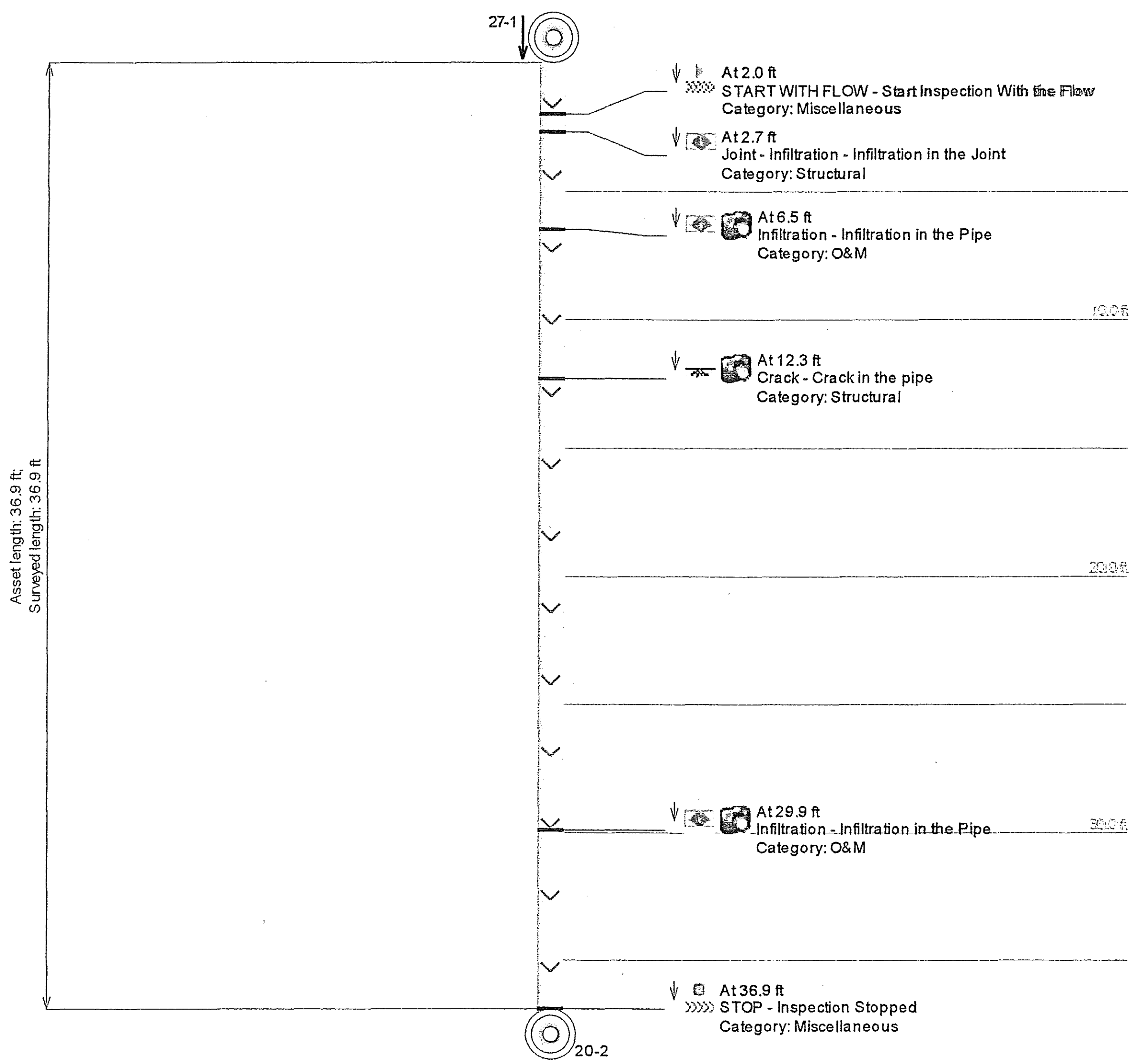
Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

TV Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/27-1/20-2	John Day	N.E. 3rd St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	8	8	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	36.9	Warm	



Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

Pipeline Inspection Services Inc.
941-9424
941-9421

Observation Report with Still Images

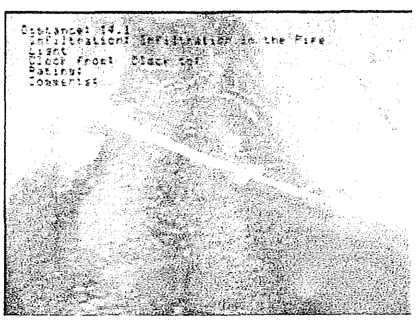
Mainline ID:	Project Name:	Start date/time:	Weather:	Operator:
Johnday/20-2/20-1	09' City of John Day	5/22/2009 1:26:07 PM	Warm	Shaun Grover

Upstream node:	Depth US:	Downstream node:	Depth DS:	Asset length:	Extra:
20-2		20-1		150.0	

Comments
Track #8 Flow 30%

Observations

Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
8.0		START WITH FLOW	No	/		
13.3		Joint - Infiltration	No	/	Light	
14.1		Infiltration	No	/	Light	



Distance	Length	Code	Reversed	Clock Pos	Severity	Comment
22.0		Lateral Abandoned - Unsealed	No	10 /		Capped
41.2		Joint - Infiltration	No	/	Light	
85.6		Joint - Infiltration	No	/	Light	
91.1		Cannot Continue	No	/		Camera will not pass Debris.
91.1		STOP	No	/		

Pipeline Inspection Services
4423 E. Powerline Rd.
Nampa ID, 83687
Darin Barnes 208-941-9421
Scott Wendling 208-941-9424

TV Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
09' City of John Day	Johnday/20-2/20-1	John Day	N.E. 3rd St.

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:
5/22/2009	10	10	Concrete	Asphalt

Direction:	SurveyedFootage:	Weather:	MediaLabel
Downstream	91.1	Warm