Section 1

# INTRODUCTION

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## 1.1. Background & Need

The City of Junction City is located at the intersection of Highways 99 East and Highway 99 West approximately 15 miles north of Eugene in Lane County, Oregon. The current population of Junction City is approximately 4,900. The City was incorporated in 1872. The past economic activity in Junction City has centered around the agriculture industry and railroad commerce. In recent years the economy of the City has diversified into the light industrial sector. Several recreational vehicle manufacturer's and retailers are located in or around the City as well as a large dairy processor and wood products manufacturer. Significant residential growth has occurred in recent years. Due to the City's close proximity to the Eugene/Springfield area and relatively low cost of living, the possibility for rapid residential growth exists.

The City currently operates the wastewater utility under a NPDES permit issued by the Oregon Department of Environmental Quality (DEQ). The City has been unable to consistently meet the permit requirements. As such, the DEQ and the City entered into a Mutual Agreement Order (MAO). As part of the MAO, the DEQ agreed to allow the City to operate the facilities under relaxed interim permit limits in exchange for a contractual commitment by the City to make improvements to the wastewater facilities.

In accordance with the conditions set forth in the MAO, Southwood Engineering completed a Facilities Plan for the City in October 1998. This Facilities Plan was approved by DEQ in February, 1999. During this planning effort, the Oregon State Department of Corrections (DOC) announced the decision to site a correctional facility within the City's Urban Growth Boundary. The 1998 Facilities Plan therefore included provisions to accommodate a prison with a population of 1,600 inmates and 500 employees. When compared to the total population of the City, the prison would have accounted for approximately 20% of the overall population of the City. Through negotiations with the City, the DOC made it clear that they would be financing their share of the necessary improvements. Since this share was a relatively large portion of the overall project, the City and the DEQ agreed to modify the MAO to coincide with the DOC's schedule for the construction of the prison. In this way, the DOC would decrease the overall financial burden on the City by providing the necessary funds to cover the oversize costs required for the prison. In early 2001, the timeline in the MAO was modified to coincide with the construction of the new prison.

Since that time, the DOC has put the Junction City prison project on hold indefinitely. At the present time, the DOC has no firm date for the construction of the new prison. It was the City's desire to streamline the work effort and construct the new improvements in conjunction with the availability of funds from the DOC. At the present time, the DOC has made no commitment as to when these funds will be allocated. The City and the DEQ recognize that improvements to the City's wastewater facilities are necessary at the present time. The City and the DOC believe that ultimately a prison will be sited in Junction City,

but not within a reasonable time frame relative to the City's current compliance situation. In the summer of 2004, the City decided to move forward with an improvement package designed to serve only the City's needs. During the summer of 2004, the City submitted a request to the DEQ to terminate the existing MAO and develop a new MAO that accurately reflects the current circumstances.

The City procured a funding package in October of 2000 based on the recommendations set forth in the 1998 Facilities Plan. This funding package consisted of a loan from the State of Oregon Economic and Community Development Department (OECDD). In the interim time since this funding package was finalized, interest rates have dropped significantly. As such, it is now in the City's best interest to pursue alternate funding arrangements. Due to regulatory changes, the 1998 Facilities Plan no longer satisfies the requirements of the regulatory or funding agencies. Therefore, in order to procure a new funding package, the City decided to develop a new Facilities Plan. The City authorized Westech Engineering to proceed with the preparation of this Facilities Plan in the August of 2004. This Facilities Plan is intended to meet the current requirements of the regulatory and funding agencies. It also represents current situation in regard to the prison and replaces the 1998 Facilities Plan entirely.

## 1.2. Project Objectives

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

This Wastewater Facilities Plan accomplishes the following specific objectives.

- Protect the public health within the planning area.
- Protect the water quality in the nearby waterways.
- Delineate the boundaries of the major sewer drainage basins within the Planning Area.
- Update the maps of the existing sanitary sewer system based on field data collection and as-built drawings.
- Identify current and future sewer collection system deficiencies on a prioritized basis, particularly in the following areas:
  - Surcharging, bypasses, flow routing capacity
  - Pump station(s) capacity, reliability, auxiliary power
  - I/I concerns
  - Maintenance considerations

- Identify current and future treatment and disposal system deficiencies on a prioritized basis, particularly in the following areas:

  - WWTP capacity — Organic treatment capacity; Hydraulic capacity (flow routing and storage)
  - Effluent disposal — Total Maximum Daily Loads (TMDL); Mixing zone concerns

- Provide an evaluation of the options for correcting these deficiencies with preliminary construction cost estimates for recommended alternatives.

- Provide the City with a Wastewater Facility Plan that addresses concerns of both the City and regulating authorities.

- Provide specific recommendations to the community and City Council for action.

This report does not include a wetland inventory or delineation(s), topographic or aerial surveys, on-site environmental investigations or geotechnical investigations.

## 1.3. Prior Studies and Work

The following is a summary of some of the studies, reports and documents utilized in the preparation of this facilities plan.

- Construction Drawings, Waste Water Stabilization Pond System and Pumping Facilities, City of Junction City, Oregon, by Clark & Groff Engineers Inc., June, 1966.

- Sewerage Facilities Plan, City of Junction City, Oregon, by C & G Engineering, March 1977

- Land Application of Lagoon Effluent, Junction City, Oregon, CH2M Hill Engineers, September 1978

- Sewer & Water Plan, City of Junction City, Oregon ,by Devco Engineering, Inc., April 1982.

- I/I Control Plan, City of Junction City, Oregon, by Westech Engineering, Inc., June 1986.

- Wastewater Irrigation Site Approval Information, Junction City, Oregon, by Cascade Earth Sciences, April 1990

- City of Junction City Comprehensive Plan, City of Junction City, Oregon, March 1994.

- Wastewater Facilities Plan, City of Junction City, Oregon, by Southwood Engineering, October 1998

- Infrastructure Feasibility Report for Industrial Area, City of Junction City, Oregon, by Southwood Engineering, May 1998

- Draft Water System Master Plan, City of Junction City, Oregon, by Southwood Engineering, September 1999

- Draft Water Management and Conservation Plan, City of Junction City Oregon, by Southwood Engineering, November 2000

- City of Junction City A Profile of the Junction City Community, City of Junction City Oregon, by Lane Council of Governments, November 2000

- Junction City Transportation System Plan, City of Junction City, Oregon, by Lane Council of Governments, March 2000.

- Biosolids Management Plan, City of Junction City, Oregon, by Cascade Earth Sciences, Ltd., May 2001

- 2005-2009 Capital Improvement Program, Lane County, Oregon, May 2004.

- Soil Survey of Lane County Area, Oregon, by USDA Soil Conservation Service, September 1987.

- Precipitation-Frequency Atlas of the Western United States (NOAA Atlas 2), Volume X- Oregon, by US Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service.

## 1.4. Scope of Study

The scope of the Wastewater Facilities Plan is intended to comply with the applicable requirements of DEQ and the City. Study area characteristics were identified and included both physical and socioeconomic conditions. Existing population and land use were examined and projected into the future.

The existing wastewater system was investigated. Data was collected on the existing wastewater collection and treatment systems from operating records, conversations with City staff, on-site investigations, maps, as-built records, and other pertinent documentation. Existing facilities were evaluated in terms of location, sizing, capacity, condition, limitations, and performance. Consideration was given to the manner in which existing and proposed facilities could be used in the future as the study area develops to City zone densities.

Typical wastewater characteristics were identified in terms of loads, flows, strength and I/I allowances throughout the year. Future characteristics were projected to establish capacity

requirements. Flows were addressed for both dry period and wet period conditions, and unit design values were established. Future wastewater characteristics were projected.

The basis for planning was established. Applicable regulatory requirements were identified and addressed, including current and future treatment criteria and discharge standards. The design capacity of the City's collection piping, pump stations and treatment plant was examined to determine impacts to present and future operation of wastewater facilities. Alternatives were identified for collection, treatment, and effluent disposal/reuse.

Nonviable options were screened out, and a limited number of selected alternatives were established and evaluated in detail. Finally, a recommended plan was identified that will enable the City to provide wastewater collection and treatment within the study area. This plan includes preliminary design data, capital improvement and operational costs, recommended staging of improvements, a project schedule, and a potential financing plan.

## 1.5. Wastewater Terms and Definitions

An understanding of key wastewater terms and definitions is necessary for an understanding of the discussions in this and subsequent sections. The following does not include all terms used in this report, but will provide a useful glossary for those readers not familiar with wastewater terminology. The different sewage flow classifications are defined in **Section 5**.

- Aerobic - Microorganisms living in the presence of free oxygen, or biological treatment processes that occur in the presence of oxygen.

- Anaerobic - Microorganisms capable of living without the presence of free oxygen, or biological treatment processes that occur in the absence of oxygen.

- Anoxic Denitrification - The process by which nitrate nitrogen is converted biologically to nitrogen gas in the absence of oxygen. This process is also known as anaerobic denitrification.

- Attached Growth Process - A biological treatment process in which the microorganisms responsible for the conversion of the organic matter or other constituents in the wastewater to gases and cell tissue are attached to some inert medium such as rocks, slag, ceramic or plastic materials. Attached growth treatment processes are also known as fixed film processes.

- Biological Treatment Processes - Treatment processes by which the stabilization and decomposition of organic material in sewage is accomplished by living microorganisms. The organic matter is used as a food source for microorganisms, and converted to forms which can either be removed from the waste stream (soluble organics) or are sufficiently stabilized to allow disposal without negatively affecting the environment (insoluble organics).

- Biological Nutrient Removal - The removal of nitrogen and/or phosphorus with biological treatment processes.

- BOD (Biochemical Oxygen Demand) - The amount of oxygen required to biologically stabilize the organic material in sewage by aerobic treatment processes. All references to BOD in this report are to 5-day BOD at 20°C ($BOD_5$).

- Biosolids - Solid and semisolid residuals resulting from wastewater treatment operations. Sludge, a biosolid, must periodically be removed from lagoon based treatment systems.

- Chlorine Residual - The measured residual of chlorine used in disinfecting wastewater. Chlorine residual can exist in two forms; combined or free. The specific form is dependent on the rate of formation, which is controlled by the pH and temperature. A free chlorine residual is the most effective in achieving disinfection.

- Facultative Processes - Biological treatment processes in which the organisms can function in the presence or absence of molecular oxygen.

- Fecal Coliform - Bacteria which are used as an indicator of fecal pollution.

- Industrial Wastes - Wastes produced as a result of manufacturing or processing operations.

- Infiltration/Inflow (I/I) - Groundwater and stormwater which enters the sanitary sewer system.

    - Excessive I/I - Portion of infiltration or inflow which can be removed from the sewerage system through rehabilitation at less cost than continuing to transport or treat that portion of I/I.

    - Infiltration - Water that enters the sewage system from the surrounding soil. Common points of entry include broken pipe and defective joints in pipe and manhole walls. Although generally limited to sewers laid below the normal groundwater level, infiltration also occurs as a result of rain or irrigation water soaking into the ground and entering mains, manholes, or shallow house sewer laterals with defective joints or other faults.

    - Base Infiltration - Water that enters the sanitary sewer system from the surrounding soil during periods of low groundwater levels.

    - Rainfall Induced Infiltration - Additional infiltration which enters the sewerage system during and for several days after a period of rainfall. Rainfall often percolates into sewer ditches, especially ditches with granular backfill, and

establishes a perched water table. This water then infiltrates into faulty sewers and manholes.

- Inflow - Stormwater runoff which enters the sewerage system only during or immediately after rainfall. Points of entry may include connections with roof and area drains, storm drain connections, holes in manhole covers in flooded streets, and manhole cones located in ditch lines and that do not have watertight joints.

- Lagoon (Stabilization Pond) - A shallow basin constructed by excavating the ground and diking, for the purpose of treating raw sewage by storage under conditions that favor natural biological treatment and accompanying bacterial reduction.

- Nitrification - The biological process by which ammonia nitrogen is converted first to nitrite, then to nitrate.

- Denitrification - The biological process by which nitrate is converted to nitrogen and other gaseous end products.

- NPDES - National Pollutant Discharge Elimination System.

- pH - The degree of acidity or alkalinity of waste water, 7.0 being neutral, a lower number being acidic, and a higher number being basic.

- Sanitary Sewage - Waterborne wastes principally derived from the sanitary conveniences of residences, business establishments, and institutions.

- Suspended Growth Process - A biological treatment process in which the microorganisms responsible for the conversion of the organic matter or other constituents in the wastewater to gases and cell tissue are maintained in suspension within the liquid.

- TSS (Total Suspended Solids) - All of the solids in sewage that can be removed by settling or filtration. The quantity of TSS removed during treatment impacts the sizing of sludge handling and disposal processes, as well as the effectiveness of disinfection.

- Wastewater - The total fluid flow in a sewerage system. Wastewater may include sanitary sewage, industrial wastes, and infiltration and inflow (I&I).