CHAPTER 2

STUDY AREA CHARACTERISTICS

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A review of the City of Lebanon's natural and socioeconomic background is an initial step in the process of developing a comprehensive wastewater facilities plan. Information of interest regarding the natural environment includes characteristics of the local topography, geology, soils, climate, and water resources. Important aspects of the socioeconomic environment include local land uses, population, and growth projections. These unique characteristics provide the context within which the City of Lebanon can effectively evaluate various alternative strategies for long-term management of the community's wastewater.

STUDY AREA LOCATION

The City of Lebanon is situated on the eastern edge of the central Willamette Valley in Western Oregon. The South Santiam River and the foothills of the Cascade Mountains are located immediately to the east of the City, while the plain of the Willamette Valley extends to the north, south, and west. Located to the east of Interstate 5, the City is twenty miles east of Corvallis and approximately 80 miles south of Portland. A vicinity map showing the City's location is included as Figure 2-1.

The study area for the wastewater facilities plan includes land within the City of Lebanon's urban growth boundary (UGB). The UGB boundary for the City is illustrated in Figure 2-2 along with the current city limits. The city limits roughly define the portion of the study area that is currently served by the City's wastewater collection and treatment system. This area currently encompasses approximately 3,800 acres of land while the overall UGB service area encompasses approximately 6,500 acres. The overall service area could expand in the future if additional land is annexed into the UGB.

PHYSICAL ENVIRONMENT

The physical environment includes the topography, geology, soils, and climate of the region. This section presents a brief overview of these physical characteristics as they relate to wastewater facilities planning. The topography, geology, and soils of a region can have a significant effect on the design and construction of wastewater collection and treatment systems. Climatic characteristics such as precipitation and temperature influence the amount of wastewater flow entering the system and the potential for temperature impacts from discharges to the South Santiam River.

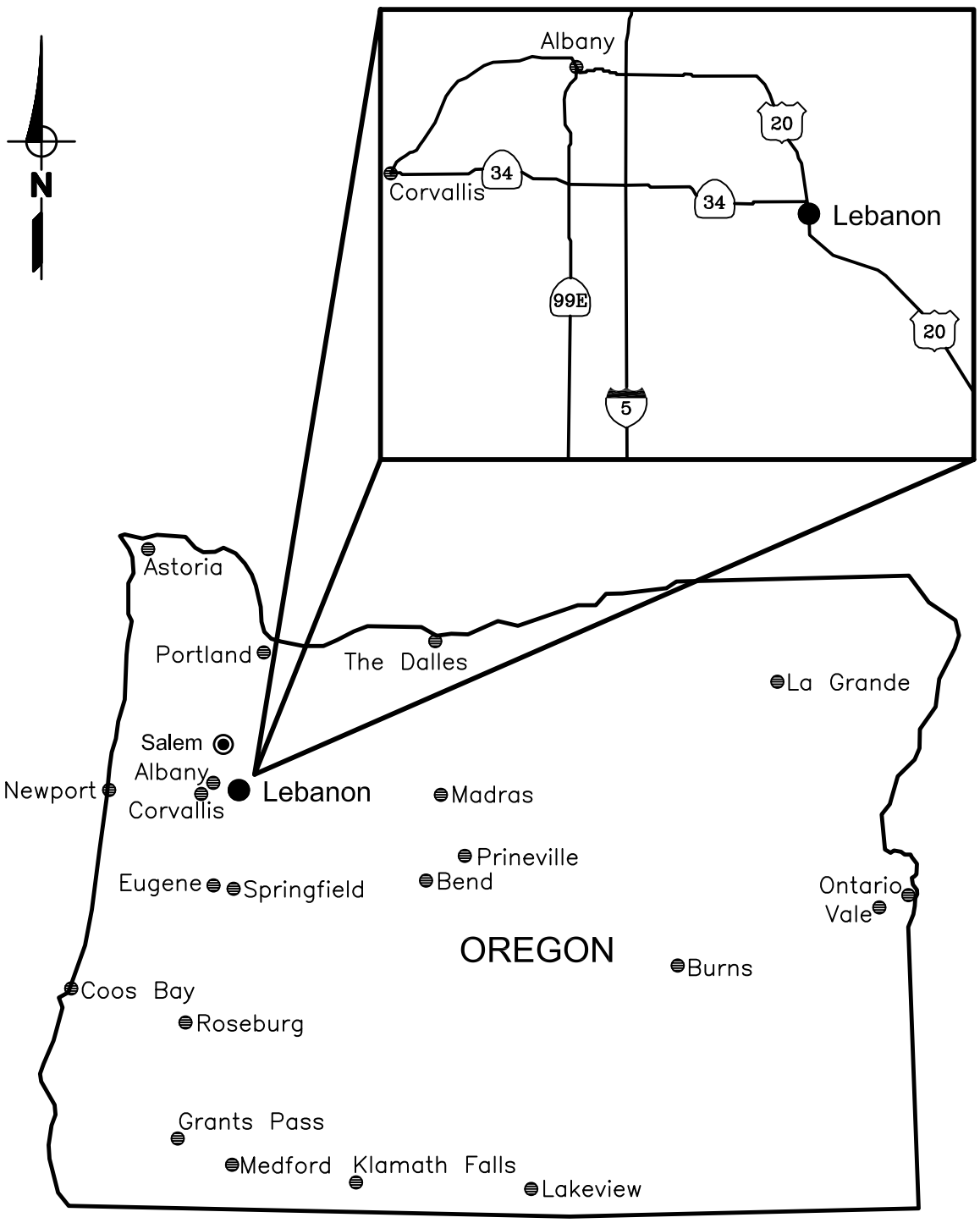

Figure 2-1

CITY OF LEBANON

VICINITY MAP

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Topography

The dominant topographic features in the vicinity of the City of Lebanon are the Willamette Valley, the foothills of the Cascade Mountains, and the South Santiam River. The majority of the City is located to the west of the South Santiam River where the terrain is characterized by the relatively flat slopes of the Willamette Valley. As illustrated in Figure 2-2, the river runs along the east side of town and flows to the north, reflecting the general grade of the land. Elevations fall from approximately 380 feet on the south side of town to approximately 330 feet on the north side of town. Since the community is approximately two miles long from north to south, this elevation drop indicates an average slope of approximately 0.5 percent.

Elevations rise immediately to the east of Lebanon as rugged foothills begin building toward the volcanic peaks of Cascade Range. Ridgeway Butte, located just across the South Santiam River on the eastern fringe of the Lebanon UGB, has a summit elevation of 1,200 feet.

Geology and Soils

Lebanon is along the converging alluvial plains of the South Santiam River and the Willamette River. The near surface geology and soils of the area are therefore dominated by alluvial deposits. The area is underlain by the Rowland formation, a coarse gravel and sand mixture up to 150 feet deep, which represents glacial outwash from the Cascades that was flushed into the valley by the South Santiam River. Beneath this formation are sand, gravel, and bluish clay overbank deposits of the ancient Willamette River from when its channel passed along the eastern edge of the valley.

Findings from geotechnical investigations during the 1977 improvements at the Lebanon wastewater treatment plant site are consistent with the geological history of the area. Test hole and test pit logs indicate that there are typically a few feet of brown sandy silt at the surface on top of approximately 20 feet of brown sandy gravel. The gravel is then underlain by interchanging layers of sand and silt to a depth of at least 55 feet.

Additional evaluation of soils were conducted for project Walden and are reported in “Project Walden Hydrologic Assessment, City of Lebanon” dated March 5, 2004. This assessment was conducted to test the feasibility of discharging treated effluent on the site for rapid infiltration and subsurface discharge. The site was determined to be suitable for this application.

Climate

The study area is characterized by a temperate climate. The summers are fairly warm, but hot days are infrequent. Winters are cool with occasional periods of freezing, but snow is not common. Rainfall is extremely light in the summer when dry spells often last for several weeks. Rain is frequent for the remainder of the year, with the greatest rainfall occurring in the late fall and winter.

The nearest official climate station is located twenty miles to the west of Lebanon in Corvallis. According to a comparison of historical rainfall measurements from the Lebanon Wastewater Treatment Plant and the Corvallis Climate Station, the differences between the two locations are minor. Therefore, the Corvallis station data are used to characterize the study area. Table 2-1

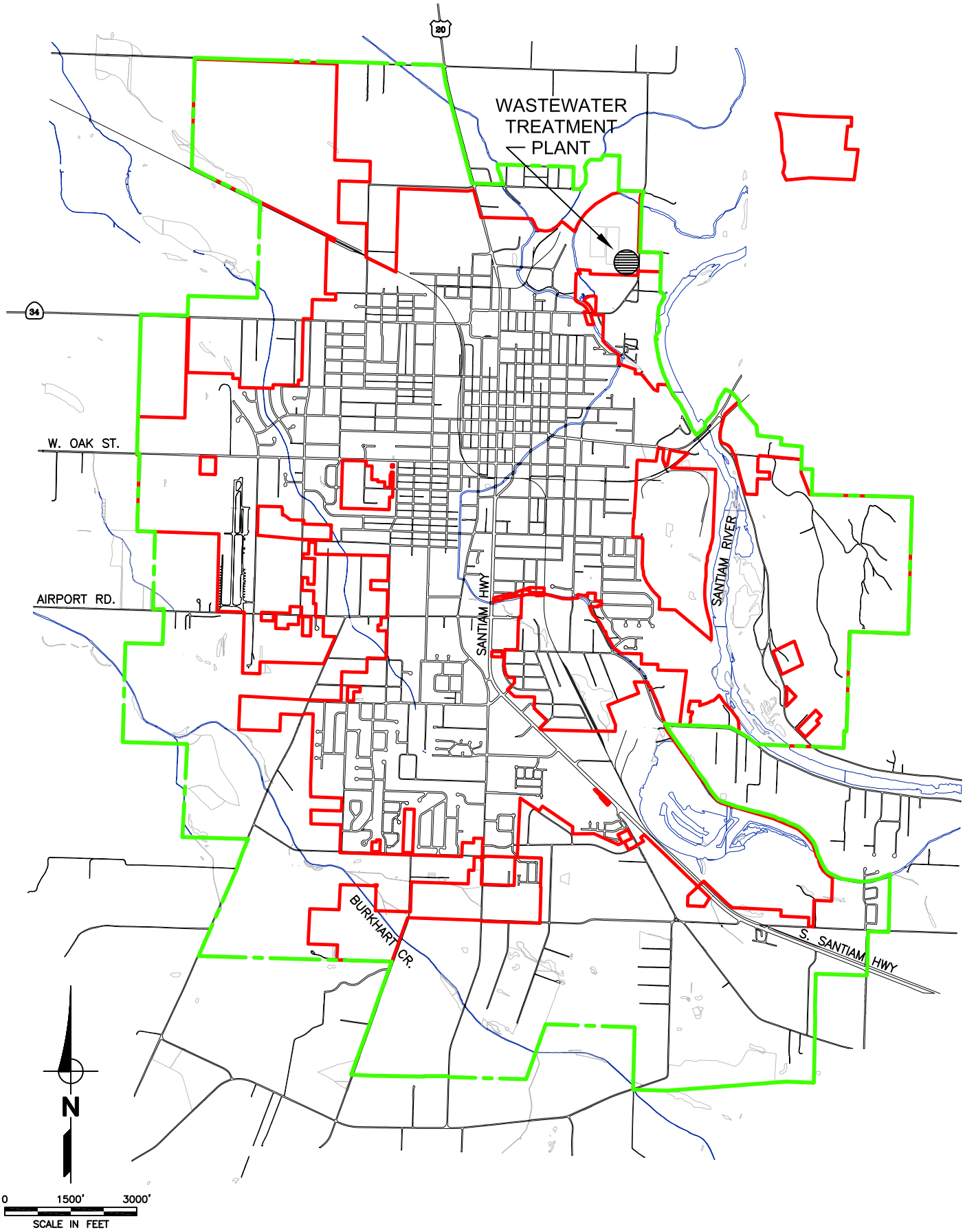

Figure 2-2

CITY OF LEBANON

FACILITIES PLAN STUDY AREA

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provides a summary of important climate data for the study area. From 1961 to 1990, mean annual precipitation at the Corvallis station was 42.71 inches. Nearly 80 percent of the annual precipitation occurs during the 6-month period from November through April. Snowfall averages less than 6 inches per year and tends to represent a minor percentage of the annual precipitation. The mean annual temperature at the Corvallis station from 1961 to 1990 was 52 degrees Fahrenheit. The mean maximum temperature during July and August was just over 80 degrees and the mean minimum temperature during December and January was just under 40 degrees. Figure 2-3 illustrates the variation in monthly average precipitation over the course of the year. Figure 2-4 shows the historical variation in annual precipitation over the past twenty four years.

Table 2-1. Climatic Summary for Lebanon, 1961 - 1990[a]

Month	Temperature, °F			Precipitation, inches		Evaporation in inches
	Mean, maximum	Mean, minimum	Mean	Mean	Extreme 24 hour[b]	
January	45.5	33.0	39.3	6.82	4.28	--
February	50.4	35.1	42.7	5.04	2.76	--
March	54.9	37.0	46.0	4.55	1.90	1.97
April	59.5	39.2	49.3	2.56	1.83	3.09
May	66.1	43.1	54.6	1.95	1.58	4.74
June	73.1	48.6	60.9	1.23	1.33	6.18
July	80.2	51.0	65.6	0.52	1.26	7.92
August	81.1	51.3	66.2	0.87	1.48	7.31
September	75.4	47.8	61.6	1.51	2.18	5.21
October	64.3	41.7	53.0	3.11	1.81	2.41
November	52.3	38.0	45.1	6.82	2.68	--
December	45.6	33.9	39.7	7.72	2.87	--
Annual	62.4	41.6	52.0	42.71	4.28	38.82

[a]Monthly means and extremes as reported by the Oregon Climate Service.
[b]Highest recorded single day rainfall.

SOCIOECONOMIC ENVIRONMENT

To a large extent, Lebanon's population growth and land use patterns will dictate flows and loads to the wastewater treatment system. The current population and projected population growth within the service area are the key parameters in projecting future sewage flows and loads. These projections are used to assess the adequacy of existing infrastructure and develop design criteria for future treatment and reuse systems.

The planning period for this study is 20 years. Therefore, projections are provided for the year 2024.

Figure 2-3. Monthly Average Precipitation

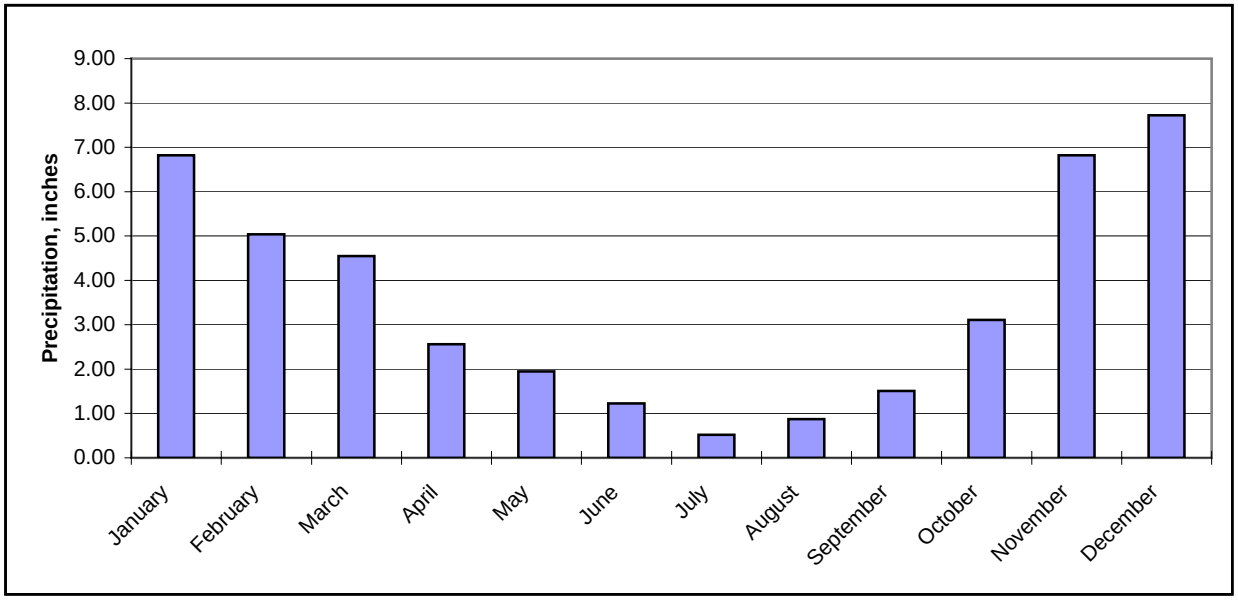
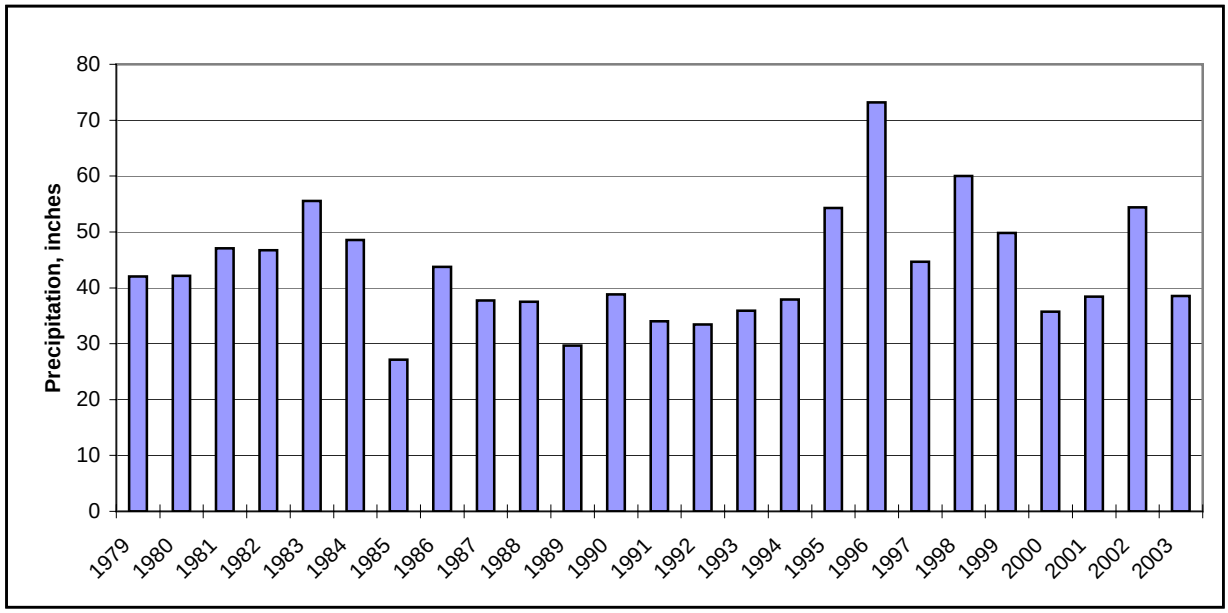


Figure 2-4. Historical Annual Precipitation

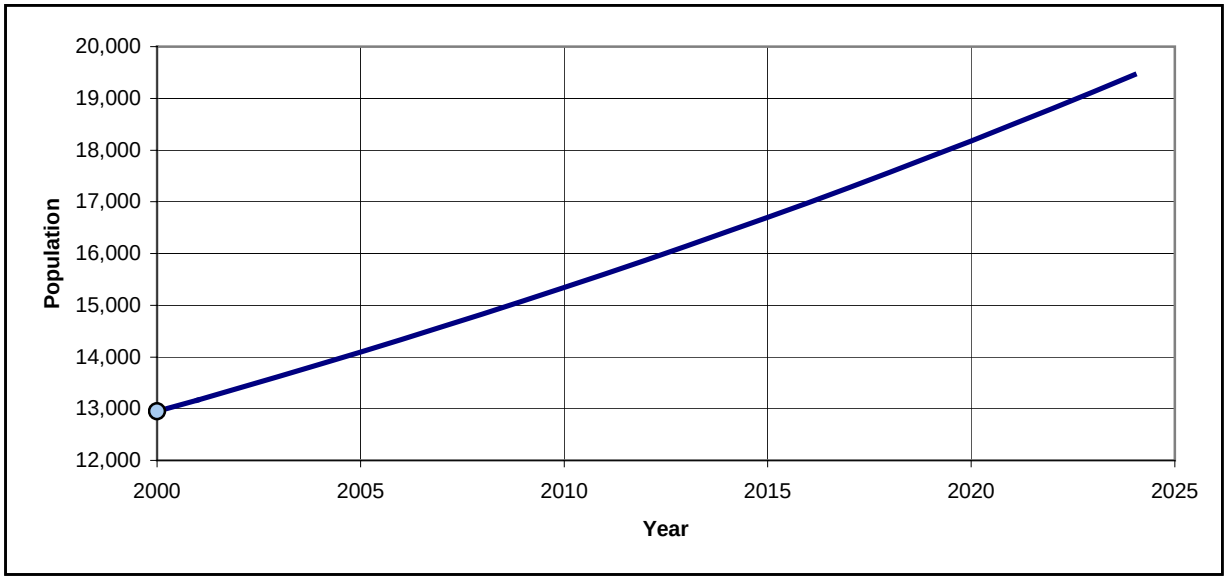


Population Projections

According to the 2000 U.S. Census, Lebanon had a population of 12,950 persons in that year. This Census data refers to the number of people living within Lebanon's city limits. The certified

coordinated population growth rate[1] for Lebanon is 1.71 percent per year. At this rate of population growth, the 2000 Census population for Lebanon will increase to approximately 19,450 by the year 2024. Figure 2-5 illustrates the anticipated population growth from 2000 to 2024. This population projection is used later in this study to project year 2024 wastewater flows and loads.

Figure 2-5. Lebanon Population Projections



Land Use

Land use in Lebanon consists of a typical mix of urban development. Table 2-2 identifies the acreage associated with each of the primary land use categories for properties within the city limits and urban growth area. As with most communities, the residential land use category dominates with over 50 percent of the total developed acreage. The vast majority of the developed properties within the city limits are currently served by the City's wastewater collection system. Review of recent data indicates that approximately 29% of the land within the city limits is vacant or open. Therefore, the existing developed acreage is approximately 2,700 acres. Later in the study, this information is used to calculate a wastewater generation rate per acre.

[1] In accordance with HB 2709 (1995) that amended ORS 195 (e.g., 195.036, 195.025), all jurisdictions in Oregon have adopted population forecasts that involved coordination between counties and their cities. In 1999 the Linn County population forecast became official for the County and all jurisdictions within Linn County. The forecast for Lebanon was for the year 2020, and utilized a population growth rate for the City of 1.71% per year, and assumed a starting point of an estimated 1997 population figure. This facilities plan utilizes a planning horizon to 2024 but still uses the adopted population growth rate.

Along with lands inside the city limits, there is an additional inventory of land within the urban growth area that will become eligible for wastewater service upon annexation to the City. Figure 2-6 illustrates these land use designations on the study area map. This information will form the basis for the calculation of build-out wastewater flows.

Table 2-2. Land Use Designations within the City Limits and Urban Growth Boundary

Zoning Map & Comp Plan Map Designations & Other	Net Total Acres	Percentage of Total (City or UGA)	Percentage of UGB
ESTIMATED ACREAGE INSIDE CITY LIMITS[a]			
Commercial Subtotal[b]	165	4%	3%
Residential Subtotal[b]	1,808	48%	28%
Industrial Subtotal[b]	740	20%	11%
Mixed Use[b]	269	7%	4%
Public and Semi-Public Facilities Located Inside the City Zones	208	6%	3%
ROWS (& Water Bodies) Inside City Limits	566	15%	9%
City Total	3,756	100%	58%
ESTIMATED ACREAGE INSIDE URBAN GROWTH AREA (UGA)			
Commercial Subtotal[c]	6	0%	0%
Mixed-density Residential and Single-Family Residential Subtotal[b]	1,573	57%	24%
General Industrial and Light Industrial Subtotal[b]	611	22%	9%
Special Development District (Mixed Use)[b]	239	9%	4%
Public and Semi-Public Facilities Located Inside UGA CP Categories	95	3%	1%
ROWS (& Water Bodies) Inside Urban Growth Area	234	9%	4%
UGA Total (Difference in City and UGB GIS Polygons)	2,758	100.00%	42%
ESTIMATED ACREAGE INSIDE URBAN GROWTH BOUNDARY (UGB)			
Commercial Total[b]	171		3%
Residential Total[b]	3,381		52%
Industrial Total[b]	1,350		21%
Mixed Use Total[b]	508		8%
Public and Semi-Public Facilities Total[b]	304		5%
ROWS & Water Bodies	800		12%
Urban Growth Boundary	6,514		100%

[a]City Limits does NOT include the Transfer Station

[b]Net Total Acres = Gross Total Minus Public Facilities (e.g., Schools, Parks, Cemeteries), Right of Ways, & Water Bodies

[c]GIS data lists 6.03 more Commercially Zoned acres inside City Limits (168.12) than listed for total UGB 162.09) – 2.96 acres of CB is developed in the Public Facilities Category, hence net difference is 3.07 acres. The 5.54 acres listed on line 14 is the actual GIS Calculation for Commercial properties in the UGA rather than the difference between Zoning and Comp Plan Designation acreage as with the other UGA Comp Plan Designations.

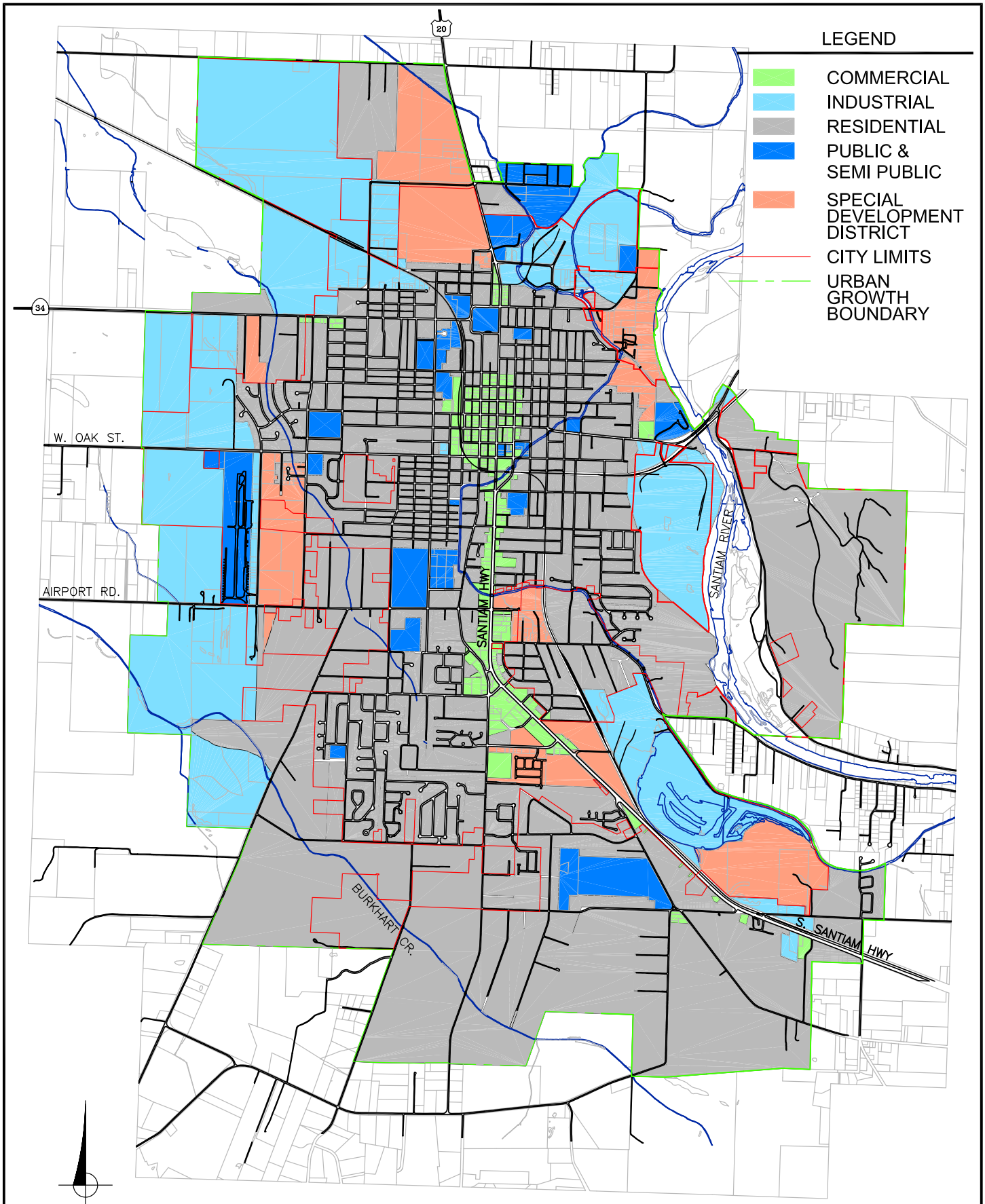


Figure 2-6

CITY OF LEBANON

LAND USE DESIGNATIONS

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