

The City has the type of soils commonly found for cities located on a floodplain of the Columbia River and one of its tributaries. According to the "Soil Survey of Cowlitz County," these soils are a combination of sand, sandy loam, silt loam, and clay, which have been deposited by the Columbia and Lewis Rivers. The "Soil Survey" indicates that most of the area is suitable for septic tanks if flooding does not occur. The "Soil Survey" also indicates that the bedrock is greater than five feet deep in all cases and well logs from the area show that bedrock is usually greater than 50 feet below ground surface.

### Climate

The climate in the Woodland area is typical of the Pacific Northwest west of the Cascade Mountains. Summers are cool and dry. Winters are wet and cloudy, but mild.

Mean annual temperatures range from 41 to 61 degrees Fahrenheit. The lowest temperature on record for the area measured (in the City of Longview) is 1 degree; the highest is 105 degrees. From June to September afternoon temperatures are usually between 70 and 80 degrees Fahrenheit, with highs above 90 degrees, and lows dropping below 50 degrees. Winter month temperatures average between 35 and 45 degrees, with freezing temperatures occurring on 50 to 80 nights during the year. Generally, the frost-free season lasts approximately 160 days per year.

Average annual precipitation from rain is about 45 inches, most of which normally falls between October and March. Rainfall extremes have fluctuated from an annual low of 28 inches to a high of about 60 inches. November, December, and January are the months of highest rainfall. Snowfall is light. Depths average about 8 inches and rarely stays on the ground for more than a week.

### Air Quality

There is virtually no information available regarding air quality in the Woodland area. The closest air quality station is located in Longview, WA. This indicates that there are no chronic problems to warrant investigation by the Southwest Washington Air Pollution Control Authority or the Department of Ecology. There has not been any development in or around the community that causes long-term adverse impacts to the air shed. There have been occasional

odor problems associated with a pet food plant that recently located in Woodland, as well as, a pulp mill located across the Columbia River in Oregon.

### Surface Waters

The Lewis River is the primary surface water resource in the Woodland area. Draining from Mt. Adams through a series of 3 dams, it offers residents of the area a variety of functions: it is the City's water source, is used extensively for recreation, and aesthetically enhances the community. The Columbia River lies to the west of the City. The Lewis River flows into the Columbia River south of the City. The Columbia River serves as a major waterway for recreation, fishing, and transportation.

Local streams include Robinson Creek, a tributary of the Lewis River, and Burris Creek, which drains into the Columbia River. These natural drainage systems carry rainstorm runoff, and run through the City or through the UGA.

Horseshoe Lake was once an ox-bow (or bend) of Lewis River, but was sealed off from it in 1940 when Public Service Highway 1 (now Interstate 5) was constructed. Horseshoe Lake is currently managed by the City and the Washington State Department of Transportation.

### Flood Plains

Much of Woodland and the surrounding area has historically been subjected to flooding. However, the only area potentially subject to flooding now is a portion of Woodland east of Interstate 5. Much of the land east of I-5 was removed from the floodplain several years ago by the Federal Emergency Management Administration after the licenses for the dams, upstream along the Lewis River, were revised to include flood control functions. Buildings in the area subject to flooding, must be constructed one foot above elevations as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map. The WWTP is protected by a dike constructed up to an elevation of approximately 35 feet. The 10 year, 50 year, 100 year, and 500 year flood elevations at the WWTP are 23.8 feet, 28.8 feet, 30.8 feet, and 35.4 feet, respectively, at Lewis River river mile 6.4, as published by the City of Woodland Flood Insurance Study (FEMA September, 1985). The City of Woodland is also currently working on a Comprehensive Flood Hazard and Drainage Management Plan.

### Wetlands and Shorelines

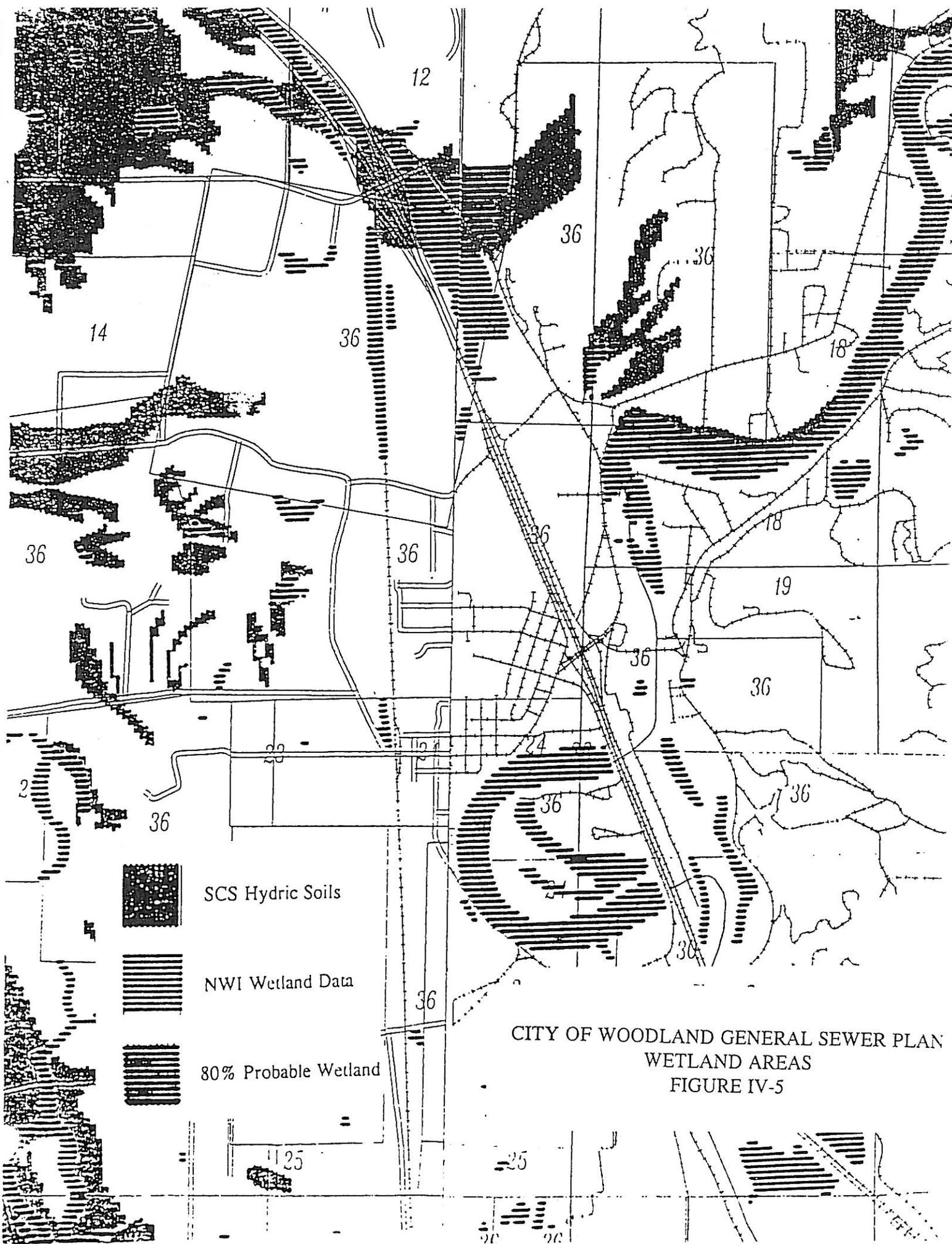
Wetlands in the area that have been identified are listed in DOE's National Wetlands Inventory (NWI) maps. Potential future wetlands are identified through future studies, and site-specific development evaluations. A reasonable approximation of future wetlands can be obtained through hydric soils data. Figure IV-5 shows identified wetlands taken from NWI maps and probable wetlands through Soil Conservation Service's hydric soil maps.

The City's wetlands are part of a regional network of wetlands serving a variety of ecological and human functions. Some of the wetlands are integral parts of the City's stormwater system. Some of the wetlands provide important open space areas for the public. The City's wetlands program includes provisions for acquisition of certain high value wetlands, restoration of degraded wetlands, use of innovative land use techniques to minimize development impacts to wetlands, and control of development density around key wetlands.

### Groundwater

The ground water is recharged by precipitation and surface waters through infiltration and percolation. The aquifer in the City of Woodland area is mostly unconfined; thus, it is important to ensure the aquifer is not polluted from ground water recharge areas. The area's soils which are predominantly sand, sandy-loams, and silty-loams have fairly high percolation rates.

In 1976, the City of Woodland installed four monitoring wells to measure the fluctuation of groundwater level throughout the year. City workers collected data on these wells once a week from April 1976 through February 1978. Groundwater elevations collected from the wells were included in Appendix B of the City of Woodland General Sewer Plan (1992). Referring to that data, the low water elevations occur from approximately 5 to 7 feet in elevation (14 to 27 feet below the ground surface), and high water elevations occur from 14 to 16 feet in elevation (7 to 15 feet below the ground surface). This fluctuation in groundwater elevation is largely influenced by the amount of recent precipitation due to its well-drained soils.



CITY OF WOODLAND GENERAL SEWER PLAN  
 WETLAND AREAS  
 FIGURE IV-5

The location of the monitoring wells and the general location of water wells within the planning area are provided in Figure IV-6 (located as a map insert at the end of this report). These locations are to the nearest ¼ / ¼ section as identified on Water Well Reports filed with DOE. Most of the wells outside the area served by the City are domestic wells, however, several of the wells lying west of the railroad tracks are used for irrigation of land. (Note: Figure IV-6 also shows the existing Woodland Water System).

### **Fish and Wildlife, Threatened and Engendered Species**

Much of the cleared and developed areas in Woodland once supported large stands of native old-growth fir, cedar, and hemlock and associated understory growth of brush and ferns. Conversions of the land to agriculture, residential, commercial, and industrial uses has eliminated much of this type of vegetation but has brought about the introduction of a variety of both native and non-native species of trees and shrubs such as: noble firs, blue spruce, fruit trees, maples, cypress, a variety of pines, rhododendrons, roses, beech trees, birches, and poplars.

The more sparsely developed uplands and rural areas support the more native, yet second growth Douglas fir, western hemlock, spruce, western red cedar, willow, alder, Oregon maple, and vine maple. The understory is typically a dense tangle of salal, ferns, salmonberry, huckleberry, dogwood, blackberry, devils club, Oregon Grape, mosses, and lichens. Once cultivated fields and pastures are vegetated by thick grasses such as meadow fescue along with moss, lichens, ferns, scattered stands of fir, and Oregon white oak. Scotch broom, thistles, and tansy ragwort have invaded some of these open areas.

The Woodland area also provides habitats for a variety of fish and wildlife. The more developed portions of Woodland are residence to, or visited by, a variety of birdlife which are typically found in lowland areas of the Pacific Northwest. The types of species, and their numbers, are too numerous to list here and usually vary from season to season. The Woodland area is in the Pacific Flyway, and the Ridgefield National Wildlife Refuge is located in Clark County just southwest of Woodland. Migratory birds use the 2,200 acre wildlife refuge for resting and foraging and are known to visit the roughly 8,000 acres of Woodland Bottoms that lie just west of the City. Past planning efforts established the Urban Growth Boundary to limit

development conserving surrounding areas for agricultural uses. It is anticipated that the preservation of wetlands and buffer areas, as well as, use of open space within the development will mitigate any impact caused by development.

The urbanized areas also contain a variety of small mammals such as mice, ground squirrels, moles, shrews, rats, skunk, opossum, and raccoon. The more sparsely developed lands surrounding the Woodland area provide habitat to, or visited by, a greater variety of birds and mammals such as: hawks, owls, ravens, water fowl, pheasant, grouse, black tail deer, and occasional elk, black bear, or coyote.

The rivers and streams provide habitat for year-round and seasonal fish species including rainbow, cutthroat, and Dolly Vardon trout, smallmouth bass, whitefish, steelhead trout (summer and winter runs), and the anadromous species of salmon. The Columbia River and the Lewis River area known for their productive runs of smelt, steelhead, and salmon, from which Woodland residents and visitors receive much recreational and commercial benefit.

### **Historical and Cultural Resources**

A letter has been submitted to the State Archaeologist to determine if there are any known historical or archaeological resources within the project site (See Appendix D). At the time of this report, the planning area has not been professionally surveyed for the presence of archaeological and cultural resources. Since there is a potential for unrecorded archaeological resources, the State Archaeologist recommends that individual projects have a professional archaeological survey conducted. Before any construction, the historical records will need to be revisited to ensure other sites have not been added to the records. If any construction activities encounter archaeological finds, construction will need to be suspended and the State Archeology Office shall be notified.

### **Adjacent Wastewater Facilities**

The closest domestic and/or industrial wastewater facilities within twenty miles of the general plan area are within the Columbia River topographical drainage basin. The closest municipal facilities arranged by locality, are: 1) La Center, which discharges into the South Fork of the

Lewis River; 2) Ridgefield, Vancouver West Side, Salmon Creek, Kalama, and the Cowlitz Central Plant, which all discharge into the Columbia River; and in Oregon, 3) the communities of Scappoose, St. Helens, and Rainier, which also discharge into the Columbia River. The industrial facilities are: Weyerhaeuser, Longview Fibre, Kalama Chemical, and BHP who discharge into the Columbia River. None of these facilities are suitably located to be considered as a regional WWTP.

### **EXISTING WATER SYSTEM**

The City of Woodland's water supply system is comprised of the following components: a Ranney well and pump station located on the Lewis River; an 8 inch raw water transmission main to the reservoirs; two reservoirs located to the north with overflow elevations of 182 feet; and the distribution system. In 1968, the City of Woodland had the Ranney well and pump station constructed on the Lewis River. Water drawn from the Ranney well is pumped through an 8 inch raw water transmission main to the reservoirs. The reservoirs have a combined storage capacity of 1,600,000 gallons. The City is in the process of constructing a new 2 MGD treatment plant, expandable to 3 MGD and a new 12-inch raw water main. The plant will be a package upflow clarifier and multi media filtration process. Backwash water will be settled in two lagoons and pumped back down to the river through the existing 8-inch raw water main. The water distribution system is a single pressure zone, mostly comprised of 6 to 12 inch water lines. Figure IV-6 (located as a map insert at the end of this report) shows the location of the Ranney well and pump station, transmission line, and the water distribution system.

From the Woodland Water System Plan (WSP) Update of October 1995, the water system serves a 1995 population of about 2,963 persons with approximately 945 customers. Of that, there are about 716 residential customers using an average of about 80 gpcd. The recommended conservation program in the WSP is a 10% reduction in water use during the 20-year planning period. In 1997, the City adopted a commodity charge that nearly doubled the charge for water use above 600 cubic feet per month for a residential connection.