

CHAPTER 3

LAND USE, POPULATION PROJECTIONS, AND SERVICE AREA CHARACTERISTICS

The City of Woodland is located in both Cowlitz and Clark Counties, about 24 miles north of the City of Vancouver. Located along Interstate 5 at the intersection with State Route 503, the City of Woodland lies directly along the Lewis River and about 2 miles east of the Columbia River.

SEWER SERVICE AREAS

The City of Woodland has its own designated sewer service area. All wastewater is treated at the Woodland Wastewater Treatment Plant (WWTP).

CITY OF WOODLAND

The City of Woodland's current sewer service area includes approximately 2,625 acres within its corporate limits and 2,967 acres within its Urban Growth Area (UGA), as shown on Figure 3-1. The City's sewer service boundary coincides with the UGA. The collection system is primarily conventional gravity sewer systems. The collection system consists of an estimated 129,500 feet of mainline gravity sewers and approximately 16,460 feet of force main with 14 lift stations.

ADJACENT SEWER SERVICE AREAS

There are no adjacent water/sewer systems to the Woodland system. The nearest sewer system to the City is the City of St. Helens, which is directly across the Columbia River.

NATURAL ENVIRONMENT

TOPOGRAPHY

The City of Woodland is located primarily in Cowlitz County, with a small portion located in Clark County. Elevations in Woodland range from 10 feet above sea level in the most westerly portion of the City to nearly 1,000 feet in the hills that provide the northern boundary to the City. Most of the City within the UGA is located within the 20 to 40 feet above sea level range, with a generally flat topography. Slopes are mostly between 0 and 3 percent, with some steeper slopes in areas to the north, naturally draining surface water toward the Lewis River.

Figure 3-2 is a topographic map based on United States Geologic Survey (USGS) showing the varying elevations within the City’s sewer service area.

SOILS AND GEOLOGY

The primary soil types in the City of Woodland are typical of what is found in the floodplains of the Columbia River and its tributary, the Lewis River. These soils are a combination of sand, sandy loam, silt loam, and clay according to the “Soil Survey of Cowlitz County.” In the low-lying elevations of the City, alluvial sediments of the Caples-Clato-Newburg association have been left behind by the two rivers. Drainage is characterized as poor to moderately well drained. Kelso-Minneice-Kalama soils dominate the soils on the hillsides adjacent to the City, and are formed from stream and lake sediments that are moderately well drained. The slopes here range from 0 to 50 percent, and have a low erosion hazard.

A more detailed definition of the types and locations of the soil classifications within the sewer service area is presented on Figure 3-3, based on an NRCS Soil Survey of Clark County, Washington.

CLIMATE

The nearest major weather station in the vicinity of Woodland is located in Scappoose, Oregon, approximately 8 miles from Woodland. Table 3-1 provides precipitation data from this weather station.

TABLE 3-1
Woodland Area Total Precipitation 2004 through 2013 (inches)
(data from Scappoose, Oregon)

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Annual
2004	6.52	5.03	2.46	2.31	2.11	0.83	1.01	2.09	1.65	4.29	2.42	4.32	35.04
2005	2.56	1.28	5.33	3.44	5.79	1.95	0.53	0.53	1.33	3.60	6.63	9.54	42.51
2006	14.57	2.68	4.00	2.12	3.31	0.93	0.30	0.13	1.13	1.23	14.05	7.00	51.45
2007	3.65	4.79	2.82	2.44	1.18	1.39	0.56	0.89	1.51	2.77	4.31	12.12	38.43
2008	6.27	2.47	3.50	1.87	0.73	1.11	0.05	1.03	0.06	2.61	5.14	4.66	29.50
2009	5.39	1.58	3.14	2.45	3.18	0.56	0.04	1.14	1.93	4.35	7.41	5.19	36.36
2010	7.53	5.07	4.49	4.03	4.77	3.07	0.37	0.32	1.66	4.30	7.54	9.28	52.43
2011	4.85	5.22	8.37	3.91	2.89	0.97	1.13	0.05	0.71	2.20	8.30	2.90	41.50
2012	7.34	4.58	9.88	2.98	3.10	3.00	0.11	0.00	0.01	5.96	8.91	9.80	55.67
2013	2.04	1.82	2.59	2.19	3.68	1.57	0.00	0.65	7.11	0.87	3.22	1.34	27.08
Avg.	6.07	3.45	4.66	2.77	3.07	1.54	0.41	0.68	1.71	3.22	6.79	6.62	41.00
Min.	2.04	1.28	2.46	1.87	0.73	0.56	0.00	0.00	0.01	0.87	2.42	1.34	27.08
Max.	14.57	5.22	9.88	4.03	5.79	3.07	1.13	2.09	7.11	5.96	14.05	12.12	55.67

Source: Weather Underground, Scappoose, Oregon.

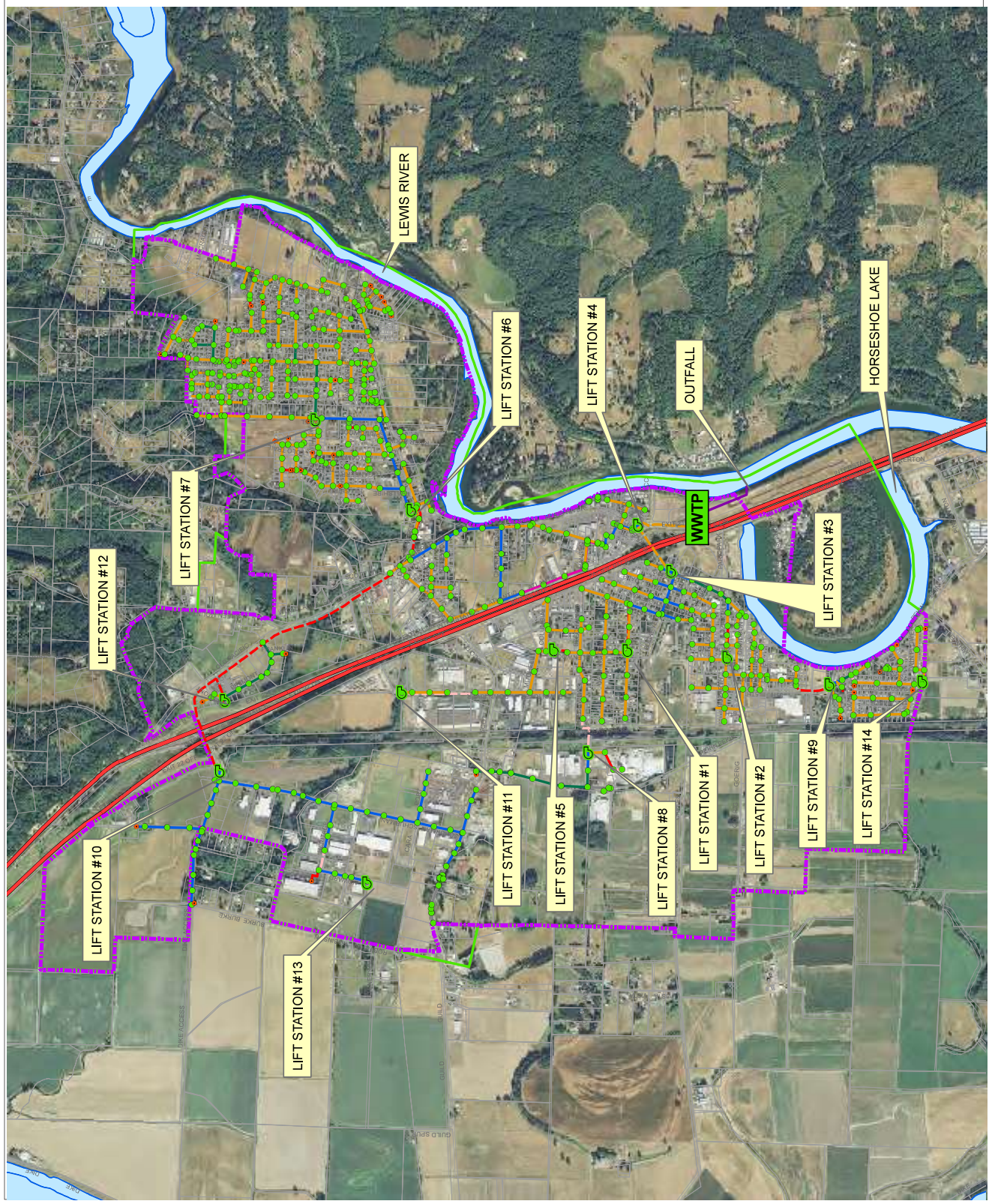


LEGEND:

- CITY LIMITS
- URBAN GROWTH BOUNDARY
- PARCEL
- STREAM
- LIFT STATION
- CLEAN OUT
- MANHOLE
- WWTP WASTEWATER TREATMENT PLANT
- GRAVITY MAIN:
 - 4"
 - 6"
 - 8"
 - 10"
 - 12"
 - 15"
 - 16"
- UNKNOWN DIAMETER
- FORCE MAIN:
 - 4"
 - 6"
 - 8"
 - 12"






ORTHO PHOTO SOURCE: 2008 NAIP

CITY OF WOODLAND
 GENERAL SEWER PLAN
 FIGURE 3-1
 SEWER SYSTEM FACILITIES



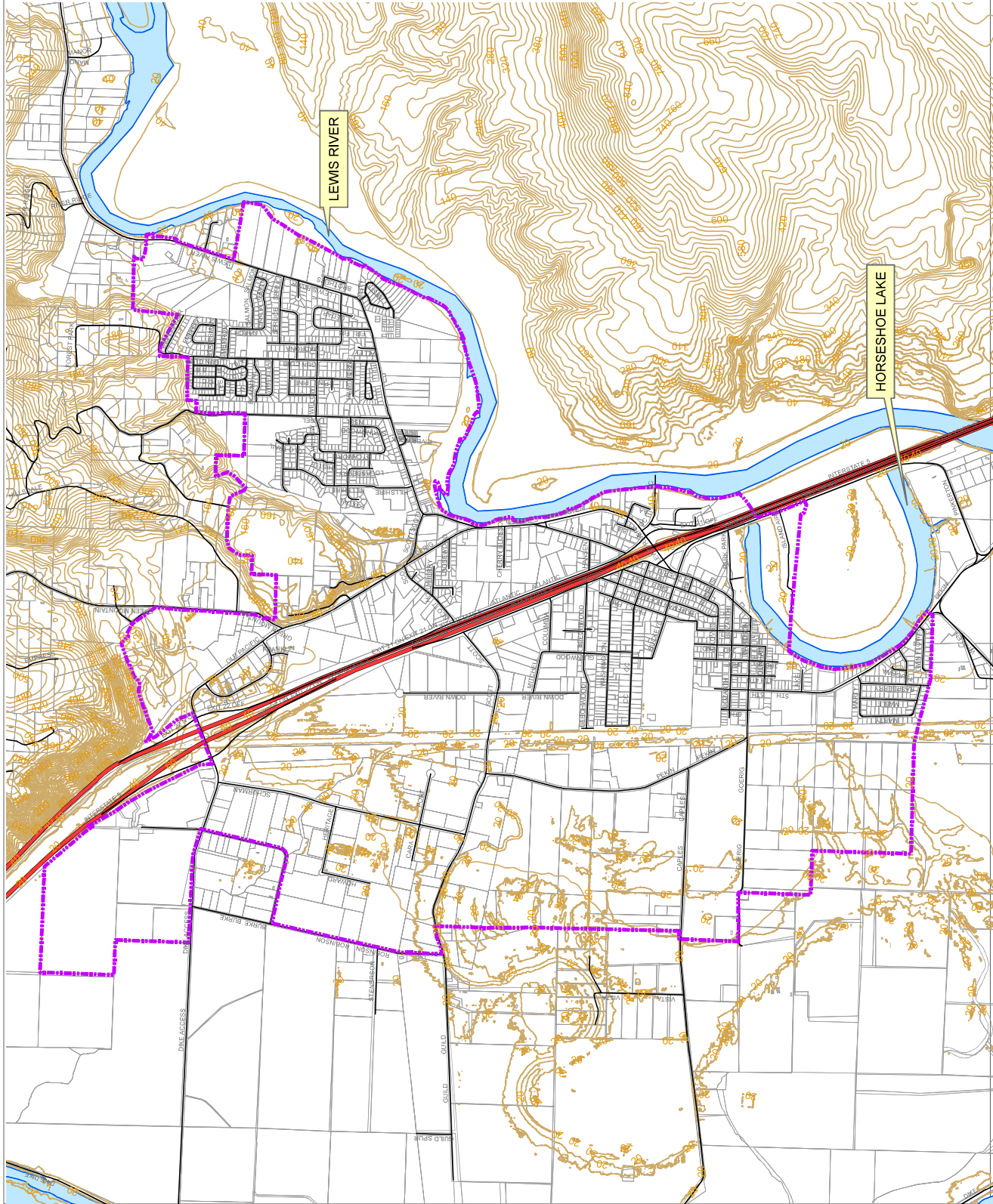


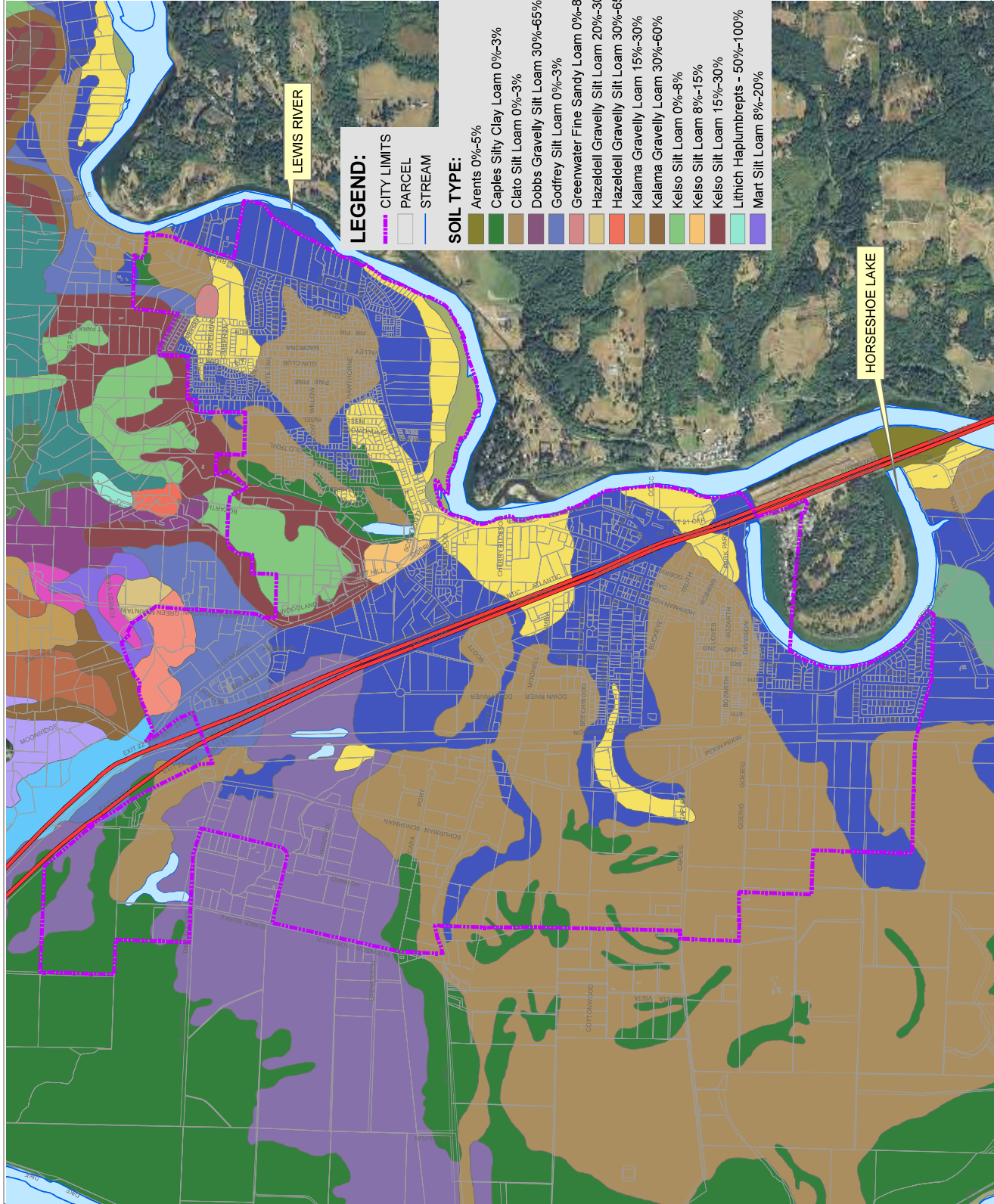
LEGEND:

-  CITY LIMITS
-  PARCEL
-  STREAM
-  ROAD
-  20' CONTOURS - USGS INTERPOLATED

SOURCE: U.S.G.S., J.D.A.R. 2012

CITY OF WOODLAND
GENERAL SEWER PLAN
FIGURE 3-2
TOPOGRAPHIC MAP





LEGEND:
 - CITY LIMITS (purple dashed line)
 - PARCEL (thin gray lines)
 - STREAM (blue line)

SOIL TYPE:

Arents 0%-5%	Mart Silt Loam 20%-30%
Caples Silt Loam 0%-3%	Mart Silt Loam 30%-50%
Clato Silt Loam 0%-3%	Maytown Silt Loam 0%-3%
Dobbs Gravelly Silt Loam 30%-65%	Newberg Fine Sandy Loam 0%-3%
Godfrey Silt Loam 0%-3%	Olequa Silt Loam 8%-20%
Greenwater Fine Sandy Loam 0%-8%	Olympic Silt Loam 8%-20%
Hazeldell Gravelly Silt Loam 20%-30%	Olympic Silt Loam 30%-65%
Hazeldell Gravelly Silt Loam 30%-65%	Pilchuck Loamy Fine Sand 0%-8%
Kalama Gravelly Loam 15%-30%	Pits
Kalama Gravelly Loam 30%-60%	Riverwash
Keiso Silt Loam 0%-8%	Sara Silt Loam 8%-15%
Keiso Silt Loam 8%-15%	Sara Silt Loam 15%-40%
Keiso Silt Loam 15%-30%	Schneider-Rock Outcrop Complex 15%-65%
Lithich Haplumbrepts - 50%-100%	Stella Silt Loam 15%-30%
Mart Silt Loam 8%-20%	Water

ORTHO PHOTO SOURCE: 2008 IMAIP
 SOURCE: USDA NRCS

CITY OF WOODLAND
 GENERAL SEWER PLAN
 FIGURE 3-3
 SOIL SURVEY MAP



Gray & Osborne, Inc.

The precipitation data from the Scappoose weather station is a reasonably accurate representation of the precipitation that Woodland experiences, due to its close proximity to the City. The station experienced a 10-year annual average precipitation of 41 inches. The maximum monthly precipitation for Scappoose over the past 10 years was 14.57 inches and occurred in January 2006. The 10-year minimum annual precipitation at Scappoose is 0.00 inch, seen in August 2012 and July 2013.

SITE SENSITIVE AREAS

The following section summarizes information regarding site-sensitive/critical areas presented in the *City of Woodland Comprehensive Plan Update, 2005*. Critical areas within the sewer service area include those classified as streams and watercourses, wetlands, frequently flooded areas, critical aquifer recharge areas, geologically hazardous areas, and fish and wildlife habitat conservation areas. Title 15.80, Critical Areas Regulation, of the Woodland Municipal Code provides protection to site-sensitive areas. The comprehensive plan states the following, in regard to goals for environmental preservation and conservation:

Ensure the protection of natural and built environments through preservation, conservation, and enhancement.

Policies implemented by the City to meet this goal include encouraging developments to be located away from environmentally sensitive areas, encouraging open space buffers around the banks of the Lewis River and Horseshoe Lake, compliance with SEPA and the Shorelines Management Act, planning and development review, developer incentives for protecting critical areas on site, and coordination with other jurisdictions in the area.

Another critical area goal of the comprehensive plan states the following:

The city will provide for an effective stewardship of the environment, protect critical areas and conserve land, air, water, cultural, and energy resources. The city shall safeguard community-wide environmental conditions and resources because these are systems which depend on each other.

The following plans and regulations were prepared for the protection of the natural environment within Woodland:

- Woodland Comprehensive Plan Update, 2005
- Woodland Critical Areas Regulation Ordinance 1069

The site-sensitive areas within the sewer service area are described further below.

Surface Water

Lakes and streams are classified as sensitive areas due to the variety of plants and animals that they support. The rivers around Woodland are also an important means for transportation and water resources for the City. Woodland's wet climate and sloping terrain provides flows to many streams and creeks. These watercourses drain into the Columbia and Lewis Rivers.

Wetlands

The Growth Management Act defines wetlands as areas that have surface or ground water that supports vegetation typically adapted in saturated soil conditions. Wetlands support valuable and complex ecosystems and consequently, development is severely restricted if not prohibited in most wetlands and buffer areas around the wetland. There are approximately 153 acres within Woodland that are classified as wetlands. Woodland Municipal Code Section 15.08.350 designates wetlands. Figure 3-4 also shows wetland areas within the Woodland UGA.

Frequently Flooded Areas

Flood hazard areas are areas adjacent to lakes, rivers, and streams that are prone to flooding during peak runoff periods. Construction of buildings and other development in these areas is regulated in accordance with flood hazard zoning defined in the Woodland Municipal Code Section 17.30. The Woodland 100-year flood zones (land that has a 1 percent chance of flooding each year) are depicted on Figure 3-5.

Critical Aquifer Recharge Areas

Aquifer recharge areas are areas that have a critical effect on aquifers used for potable water as defined by WAC 365-190-030(2). The City of Woodland draws all of its water from the Lewis River via a Ranney well for treatment at its Water Treatment Plant. (A Ranney well is a well that is directly connected to surface water, in the City's case the Lewis River, by an aquifer. Since the groundwater flows into the Lewis River, critical aquifer recharge areas are important areas to protect.

Geologically Hazardous Areas

Seismic hazard areas are those with low-density soils that are more likely to experience greater damage due to seismic-induced subsidence, liquefaction, or landslides. Seismic hazard areas are regulated mainly with respect to public safety, and with the exception of a severe earthquake, these hazard areas do not impact wastewater facilities. The United States is divided into seismic hazard zones based upon historic documents. These zones range from Category 1 to 4, with 4 representing the highest risk. Western Washington falls into Seismic Zone 3.



LEGEND:

CITY LIMITS

PARCEL

STREAM

WETLAND TYPE:

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Other

Riverine

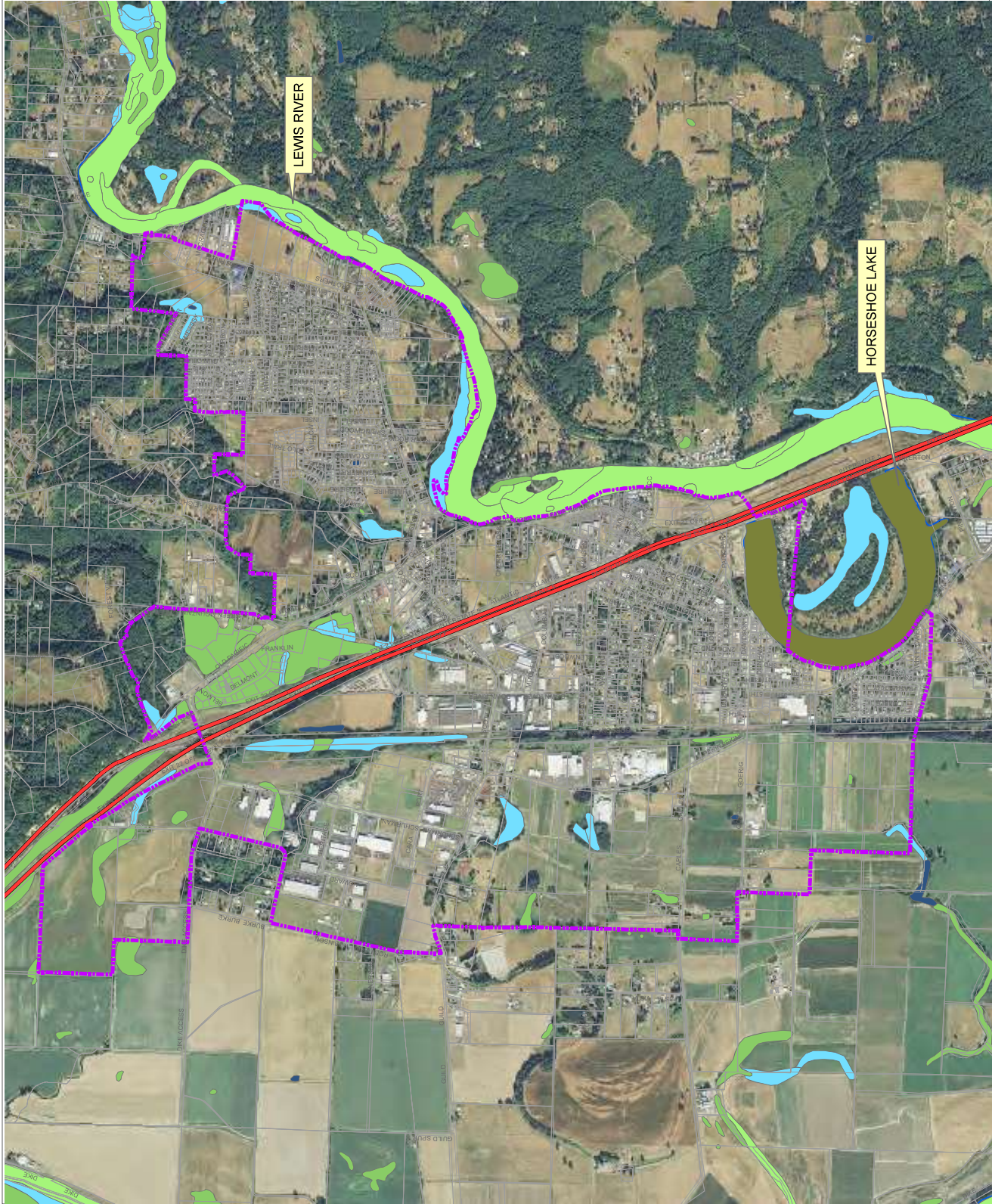
ORTHO PHOTO SOURCE 2009 NMAP
SOURCE 2010 NATIONAL WETLAND INVENTORY U.S. F&W

CITY OF WOODLAND

GENERAL SEWER PLAN
FIGURE 3-4
WETLANDS MAP



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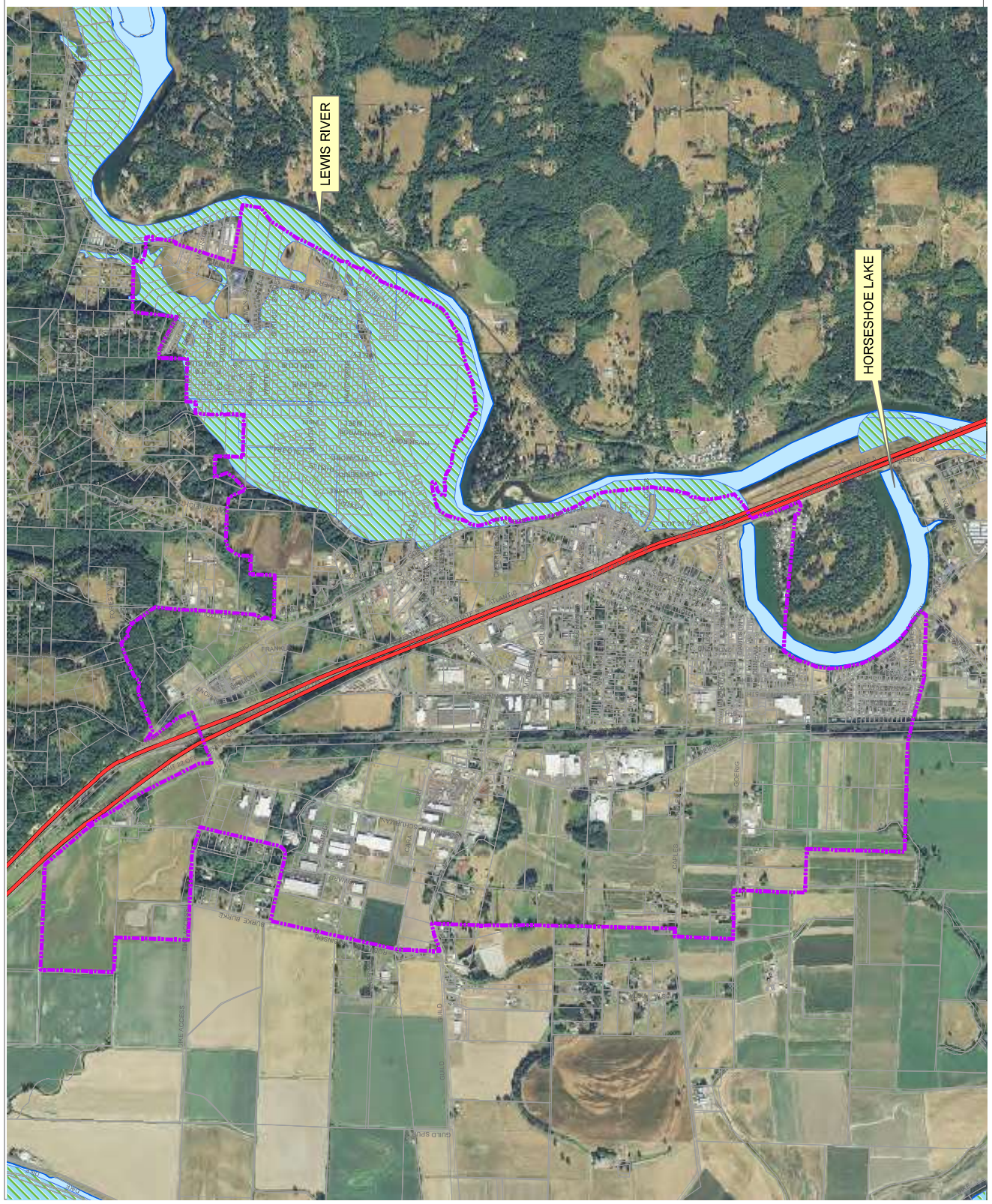


LEGEND:

-  CITY LIMITS
-  PARCEL
-  STREAM
-  FEMA 100 YEAR FLOOD PLAIN

ORTHO PHOTO SOURCE 2008 IMAIP
SOURCE FEMA

CITY OF WOODLAND
GENERAL SEWER PLAN
FIGURE 3-5
FLOOD HAZARD MAP



Erosion and landslide hazard areas are regulated under Section 15.08.610 of the Woodland Municipal Code. Erosion and landslide hazard areas are classified and mapped, and allowed activities are outlined in Section 15.08.

Fish and Wildlife Habitat Conservation Areas

Sensitive fish and wildlife habitat is defined as areas which meet the definition of a “Fish and Wildlife Habitat Critical Area” pursuant to WAC 365-190-080(5) and is essential for maintaining specifically listed species in suitable habitats. Any proposed activity within 300 feet of these areas, including construction related to wastewater collection systems, requires that a habitat assessment be prepared. The waters in the area are home to a number of species of trout and salmon, both year-round and some seasonally. The urban areas contain a variety of small mammals, such as mice, squirrels, skunk, opossum, and raccoon, while the more sparsely populated areas in the hills are occupied by hawks, owls, pheasant, black tail deer, and the rare elk or black bear. At the time of the 2005 Comprehensive Plan Update, the City stated the following:

At this time, the City of Woodland has not classified or designated any fish and wildlife habitat conservation areas. However, the city recognizes that the urban environment is shared with fish and wildlife. The city recognizes that its habitats exists within a regional habitat system and will coordinate the city’s management program with other jurisdictions in the bioregion.

Table 3-2 summarizes the priority anadromous and resident fish species in the Woodland area.

TABLE 3-2

Priority Anadromous and Resident Fish Species⁽¹⁾

Species	Columbia River	Lewis River	Robinson Creek	Burriss Creek
Chinook	✓	✓		✓
Coho	✓	✓	✓	✓
Sockeye	✓			
Steelhead	✓	✓	✓	✓
Bull Trout	✓	✓		
Fall Chum	✓	✓		

Source: WDFW Salmonscape Database.

(1) Checkmark indicates species is present.

WOODLAND WATER SYSTEM

The City of Woodland owns and operates a water system consisting of one Ranney well that is directly connected to the Lewis River, a water treatment plant with pump station, two reservoirs, and a distribution system. Figure 3-6 shows the City of Woodland water facilities.

The water system serves the entire corporate limits and UGA. Service can be provided to any location within the UGA, provided it agrees to annexation prior to service being installed. There are no public or private wells in the City's sewer service area.

The City of Woodland currently has municipal water rights issued by Department of Ecology (Ecology) for a maximum instantaneous withdrawal of 2,800 gallons per minute (gpm) from its well at the Lewis River.

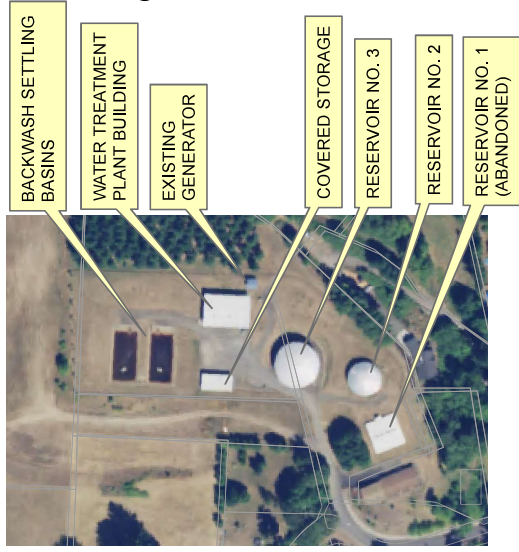
PLANNING PERIOD

In order to provide wastewater services for future growth, the wastewater system is in need of continuous evaluation and improvement. A planning period for the evaluation of the wastewater utility should be long enough to be useful for an extended period of time, but not so long as to be impractical. The planning period for this *2016 Plan* is from 2014 through 2034, coinciding with a 20-year planning interval.

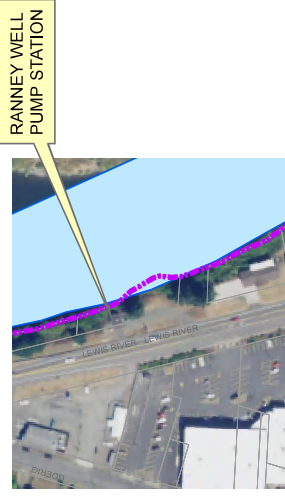
LAND USE, ZONING, AND POPULATION

Table 3-3 shows a summary of existing land use in the City of Woodland compared with land use in 2005. Currently, residential land use makes up about 35 percent of Woodland's total land area, as compared to 24 percent in 2005. Industrial use has increased to 42 percent in 2014 from just 21 percent in 2005. This large increase may have to do with changes in land use designation from agricultural to industrial as agricultural/vacant land has gone down significantly from 44 percent in 2005 to 2 percent in 2014. Figure 3-7 shows the zoning and Figure 3-8 shows the land use within Woodland.

WATER TREATMENT PLANT
SCALE: NTS



RANNEY WELL PUMP STATION
SCALE: NTS

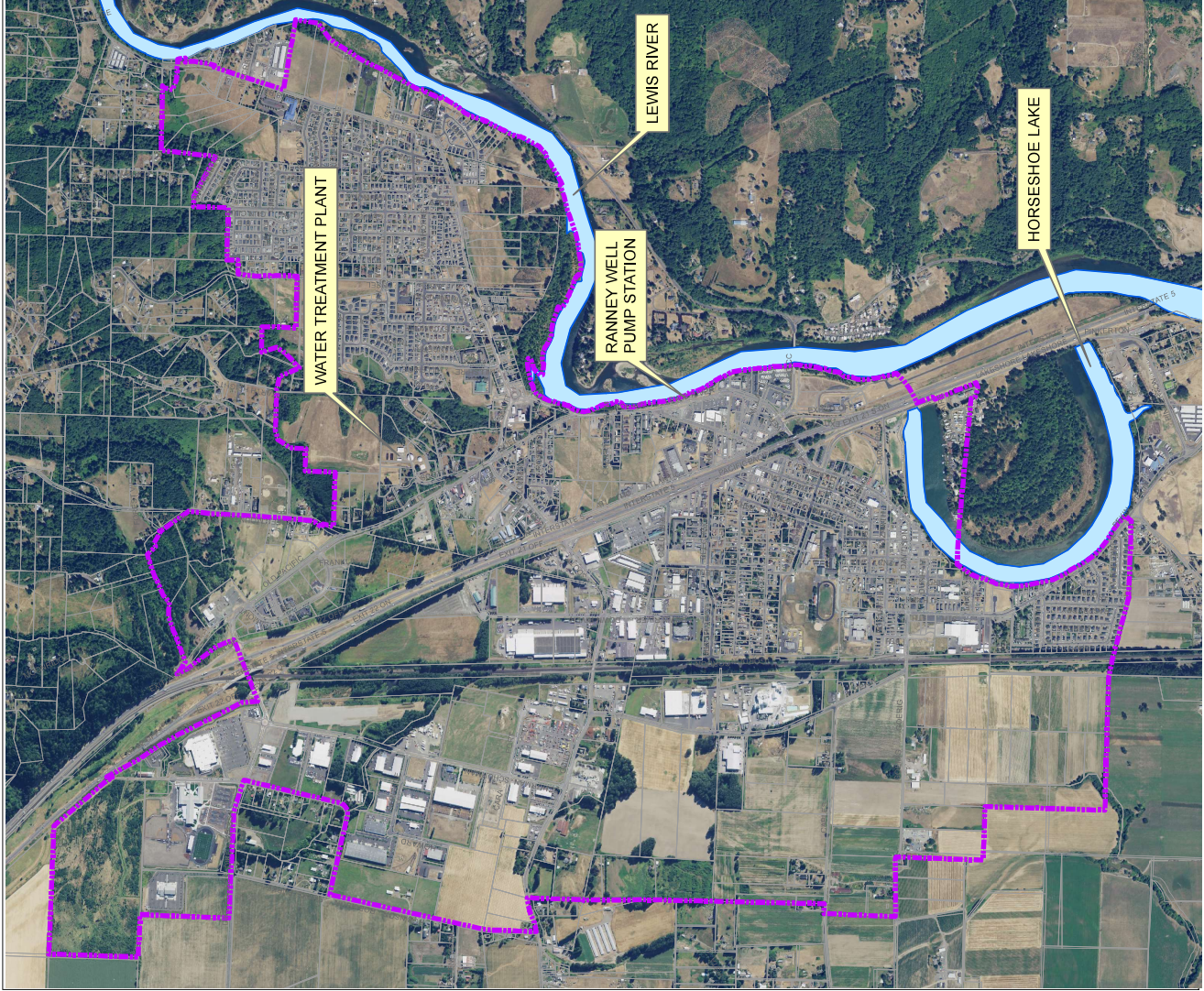


LEGEND:

- CITY LIMITS
- PARCEL
- STREAM

ORTHO PHOTO SOURCE: 2015 NAIP

CITY OF WOODLAND
GENERAL SEWER PLAN
FIGURE 3-6
WATER FACILITIES





LEGEND:

- CITY LIMITS
- PARCEL
- STREAM

ZONE TYPE:

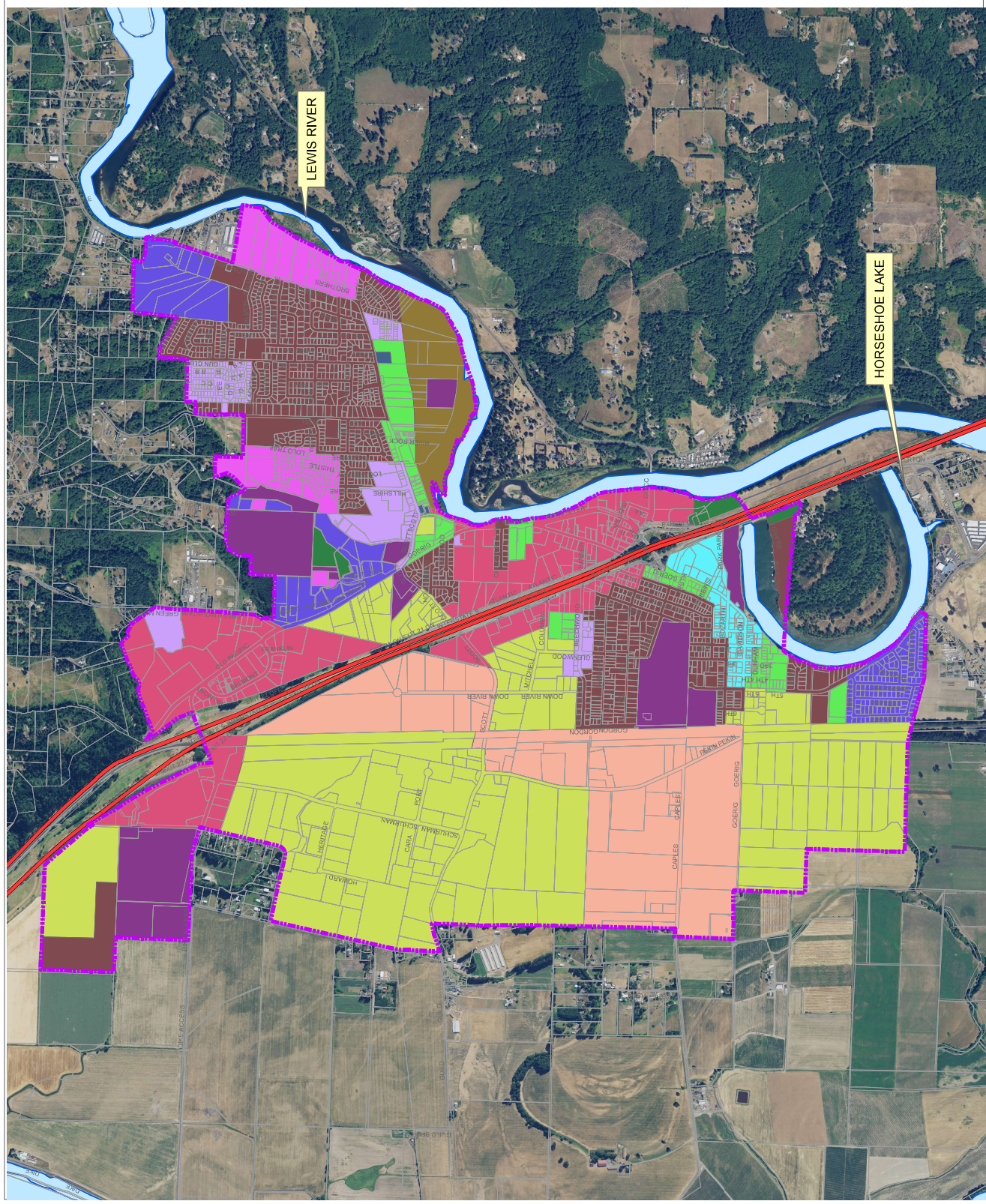
- C-1
- C-2
- C-3
- FW
- HDR
- I-1
- I-2
- LDR-6
- LDR-7.2
- LDR-8.5
- MDR
- P/Q-P/I
- UZ

ORTHO PHOTO SOURCE: 2015 NAIP

CITY OF WOODLAND
 GENERAL SEWER PLAN
 FIGURE 3-7
 ZONING MAP



Gray & Osborne, Inc.





LEGEND:

- CITY LIMITS
- PARCEL
- STREAM

LAND USE TYPE:

- LOW DENSITY RESIDENTIAL
- COMMERCIAL
- LIGHT INDUSTRIAL
- HIGH DENSITY INDUSTRIAL
- HEAVY INDUSTRIAL
- INDUSTRIAL RESERVE
- FLOODWAY AND OPEN SPACE
- PUBLIC/QUASI PUBLIC/INSTITUTIONAL

ORTHO PHOTO SOURCE: 2015 NADP

CITY OF WOODLAND
GENERAL SEWER PLAN
FIGURE 3-8
LAND USE MAP

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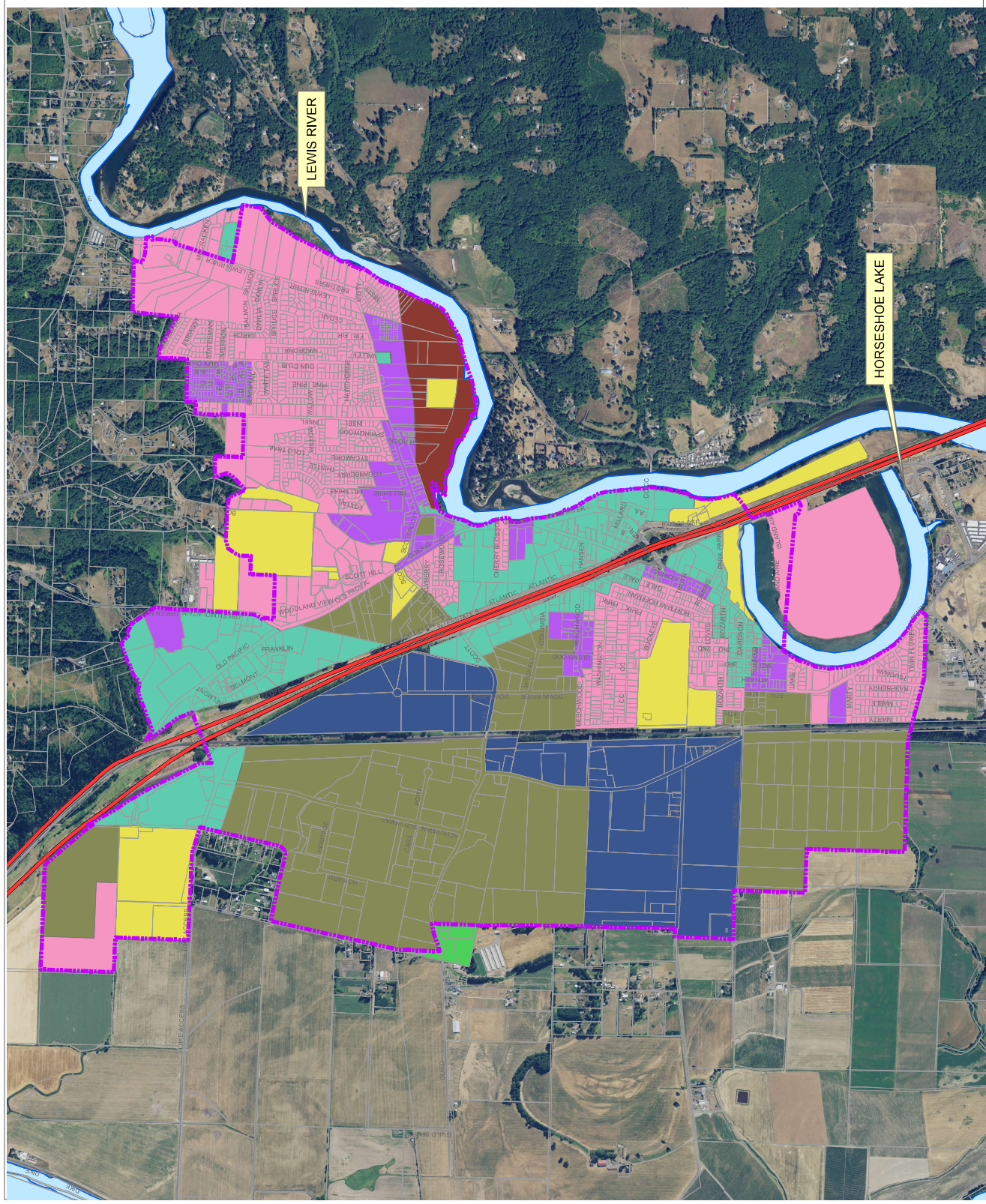


TABLE 3-3**Land Use**

Land Use Designation	2005⁽¹⁾		2014⁽²⁾	
	Area (acres)	Percentage	Area (acres)	Percentage
Single-Family Residential	291	19%	758 ⁽³⁾	29%
Multi-Family Residential	62	5%	151 ⁽⁴⁾	6%
Industrial	251	17%	1,106 ⁽⁵⁾	42%
Public	101	7%	211	8%
Commercial	101	7%	340	13%
Transportation/Utilities	40	3%	-	-
Agricultural/Vacant	660	44%	64 ⁽⁶⁾	2%
Total	1,506	100%	2,630	100%

(1) From City of Woodland 2005 Comprehensive Plan.

(2) From 2014 GIS data.

(3) Designated as Low Density Residential in 2014.

(4) Designated as High Density Residential in 2014.

(5) Includes Heavy Industrial, Light Industrial, and Industrial Reserve categories.

(6) Designated as Floodway/Open Space in 2014.

CURRENT POPULATION

Table 3-4 provides a history of population for Woodland over a 14-year period, 2000 to 2014, based on data from the Washington State Office of Financial Management (OFM). Since the OFM data for housing units is currently available only to 2010, data since then has been projected, using population data to calculate persons per household (pph). In 2010, OFM estimated the total number of housing units in Woodland in Clark County to be 54, and in Cowlitz County to be 2,055. Woodland's 2010 population was estimated to be 5,509. This equates to an average population of 2.6 pph.

TABLE 3-4

Historical Population 2000 to 2013

Year	Population			Growth
	Clark County	Cowlitz County	Total	
2000	92	3,688	3,780	
2001	100	3,747	3,847	1.77%
2002	104	3,839	3,943	2.50%
2003	85	3,989	4,074	3.32%
2004	83	4,089	4,172	2.41%
2005	93	4,327	4,420	5.94%
2006	98	4,772	4,870	10.18%
2007	75	5,067	5,142	5.59%
2008	83	5,278	5,361	4.26%
2009	82	5,351	5,433	1.34%
2010	83	5,426	5,509	1.40%
2011	85	5,465	5,550	0.74%
2012	85	5,505	5,590	0.72%
2013	85	5,540	5,625	0.63%
Average				3.14%

Source: Washington State Office of Financial Management (OFM).
Population estimated as of April 1 of each year.

PROJECTED FUTURE CITY POPULATION

The City of Woodland is currently in the process of completing a new comprehensive plan, which will include establishing a population growth rate for future growth in the City. Based on discussions with the City, on September 2, 2014 City Council voted on a 2035 population of 9,274. This value is based on a buildable lands analysis which predicted that 9,274 would be the buildout population of the current Urban Growth Area (UGA). The UGA is not expected to expand. The City evaluates water/sewer service to properties outside the UGA on a case-by-case basis, but in general does not serve new development outside the UGA. Table 3-5 shows projected population totals for the next 20 years, assuming a growth of 2.349 percent per year.

TABLE 3-5

**Population Projections for City of Woodland
over the 20-Year Planning Period**

Year	Woodland Population⁽¹⁾
2013	5,625
2014 ⁽¹⁾	5,695
2015	5,829
2016	5,966
2017	6,106
2018	6,249
2019	6,396
2020	6,546
2021	6,700
2022	6,857
2023	7,019
2024	7,183
2025	7,352
2026	7,525
2027	7,702
2028	7,883
2029	8,068
2030	8,257
2031	8,451
2032	8,650
2033	8,853
2034	9,061
2035 ⁽²⁾	9,274

- (1) Current population determined by City.
- (2) Buildout population of UCA voted on by City Council, 2.349 percent growth rate.

SEWER CONNECTIONS

Table 3-6 provides an estimate of the average number of sewer connections to the City of Woodland in 2013, based on billing data received from the City.

TABLE 3-6

Average Sewer Service Connections by Customer Class for 2013

Customer Class	2013
Single-Family Residential	1,510
Multi-Family Residential ⁽¹⁾	78
Commercial ⁽²⁾	339
Industrial	7
Total	1,933

- (1) Multi-family connections include apartments, recreational vehicle parks, and mobile home parks.
- (2) Commercial connections also include churches, schools, City accounts, and motels.

INDUSTRIES IN THE SEWER SERVICE AREA

There are several industries that the City of Woodland provides sewer service to that may have an effect on the projected loadings of the sewer plant.

COLUMBIA RIVER CARBONATES

This is the only industrial NPDES permit issued to an industry in Woodland. Columbia River Carbonates discharges wastewater from a limestone processing facility into the City sewer and this discharge is subject to the following limits:

TABLE 3-7

Columbia River Carbonates NPDES Permit Limits

Parameter	Avg. Mo./Max. Day
Oil and Grease (mg/L)	100/100
pH (SU)	5.5 (min.) to 9.0 (max.)
Temperature (degrees F)	150/150

NORTHWEST PET PRODUCTS

Northwest Pet Products is a dog and cat food manufacturing plant located within the corporate limits of Woodland.

PACIFIC SEAFOOD

Pacific Seafood discharges seafood processing wastewater to the City sewer with the following limits:

TABLE 3-8

Pacific Seafood Discharge Permit Limits

Parameter	Avg. Mo./Max. Day
Flow (gpd)	48,000/50,000
Oil and Grease (mg/L)	no limit/100
pH (SU)	5.5 (min.) to 9.0 (max.)
BOD ₅ (mg/L)	705/1,400
TSS (mg/L)	400/400
Salinity (PSU or PSS)	no limit/3

WALT’S WHOLESALE MEATS

Walt’s Wholesale Meats is a food processing plant located within the corporate limits of Woodland. It is located on Perkins Road on the south side of Horseshoe Lake. Walt’s discharges meat processing wastewater (no sanitary wastewater discharges are allowed) to the City sewer that has been pretreated in an aerated pond. Their permit limits for the sewer discharge are as follows:

TABLE 3-9

Walt’s Wholesale Meats Discharge Permit Limits

Parameter	Avg. Month/Max Day
Flow (gpd)	90,000/100,000
Oil and Grease (mg/L)	NA/100
pH (SU)	5.5 to 9.0
BOD ₅ (mg/L)	800/800
TSS (mg/L)	800/800

Other industries that discharge to the wastewater collection system in the City are: Applied Plant Science, Clean Wash Laundromat, Hamilton Materials, and USNR.

