Chapter 2

Natural Systems Element

I. INTRODUCTION

PURPOSE

The Natural Systems Element describes the natural, physical, and biological environment in terms of the opportunities and limitations it presents for growth and development. It incorporates those aspects of the Growth Management Act, including land use element requirements, relating to the natural environment. It identifies the area's resource lands and critical areas, and explains how they will be protected.

GROWTH MANAGEMENT ACT REQUIREMENTS

The Washington Growth Management Act (GMA) does not require a Natural Systems Element in the Comprehensive Plan, but does set a number of requirements with regard to the physical environment. These requirements include:

- Identification, designation and conservation of resource lands.
- Identification, designation and protection of critical areas.
- Provisions for the protection of the quality and quantity of groundwater used for public water supplies.
- Where applicable, a review of drainage, flooding and storm water run-off in the area covered by the plan and nearby jurisdictions, and guidance for corrective actions to mitigate or cleanse those discharges that pollute the waters of the state.

In the context of GMA, resource lands are those agricultural, forest, and mineral lands not already characterized by urban growth that have long-term commercial significance for the production of agricultural products, timber or for the extraction of minerals. Agricultural land and forest land located within an urban growth area shall not be designated as a resource land of long-term commercial significance unless the jurisdiction has enacted a program authorizing transfer or purchase of development rights.

As used within the GMA, critical areas include: a) wetlands; b) critical aquifer recharge areas used for potable water; c) fish and wildlife habitat conservation areas; d) frequently flooded areas; and e) geologically hazardous areas. Geologically hazardous areas include areas susceptible to erosion, sliding, earthquake or other geologic events which pose significant hazards or limitations to the use of land.

APPLICABLE COUNTY-WIDE PLANNING POLICIES

The Yakima County-wide Planning Policies are not specifically required by the Growth Management Act to address the physical character of the land or natural resource and critical areas. None the less, several of the County-wide Planning Policies do specifically address natural resource issues. The following County-wide Planning Policies apply to discussion on the natural systems element.

1. When determining land requirements for urban growth areas, allowance will be made for greenbelt and open space areas and for protection of wildlife habitat and other environmentally

sensitive areas. [RCW 36.70A.110(2)] (County-wide Planning Policy: A.3.7.)

2. Encourage economic growth within the capacities of the region's natural resources, public services and public facilities.

> a. Identify current and potential physical and fiscal capacities for municipal and private water systems, wastewater treatment plants, roadways and other infrastructure systems.
>
> b. Identify economic opportunities that strengthen and diversify the county's economy while maintaining the integrity of our natural environment. (G.3.1.)

3. Special districts, adjacent counties, state agencies, the tribal government and federal agencies will be invited to participate in comprehensive planning and development activities that may affect them, including the establishment and revision of urban growth areas; allocation of forecasted population; regional transportation, capital facility, housing and utility plans; and policies that may affect natural resources. (I.3.)

RELATIONSHIP TO OTHER ELEMENTS OR LAND USES

The physical environment is closely tied to both economic development and land use. In an area where the economy is based on the productive use of land for agriculture, the land resource must be conserved to assure continued economic viability of the area. At the same time, land is needed for housing and economic development, including sites suitable for industries related to agriculture. Prevailing winds, flood potential, and soil types make some areas more suitable than others for various land uses. Land use planning needs to allow for protection of critical areas such as wetlands and wildlife habitat.

II. EXISTING CONDITIONS

This section of the comprehensive plan document analyzes natural conditions which are present in the area, and particularly which may be either hazardous to development or impose limitations which can only be overcome with costly engineering and building techniques. The purpose of this analysis is to identify areas where development would be less efficient and economical, as opposed to areas where development could occur that would be more compatible with the natural environment.

Best Available Science

The protection of natural systems within the corporate limits of the City of Zillah will be based on the best available science. The City of Zillah will weigh the most current scientific information from agencies, scientific consultants and published sources to determine the values and functions of natural systems existing in or near the City. The City will base protection of critical areas upon evaluation of this best available science along with scientific studies made available by proponents and opponents of projects in determining how best to protect natural and critical areas. The City of Zillah adopts Yakima
County's review of best available science as a basis for decisions to support protections required by the Critical Area Ordinance and Shoreline Mater Program.

Earth

Physiography

The City of Zillah and its urban growth area are located in Yakima County, approximately 20 miles southeast of the city of Yakima. The lands surrounding the City of Zillah and its associated UGA are primarily irrigated agricultural lands. These lands are irrigated from a system of canals and ditches.

Geology

The geologic setting of the Yakima Valley is mostly due to volcanic activity of the tertiary period that occurred in the Cascade Mountains and the Columbia Basin.

During the Miocene epoch (12-26 million years ago), basalts originating from large fissures in the earth's crust, situated in southeastern Washington, flowed westward covering the Columbia Basin and eventually lapping the eastern slope of the Cascade Mountains. Volcanic activity in the Cascade Mountains caused the overlaying of these basalts with the light colored, pumiceous sandstone and conglomerates that make up the Ellensburg Formation.

After the Ellensburg Formation, compressional forces pushed the Yakima basalts and overlying sediments into a series of parallel east-west ridges now referred to as Ahtanum, Manastash, Toppenish, Umptanum and Yakima Ridges, Cleman and Saddle Mountains, and the Rattlesnake and Horse Heaven Hills. These ridges were slow to form, enabling the Yakima River to cut gaps as the basalt uplifted. These water gaps are now known as the Selah Gap, through Yakima Ridge to the north, and the Union Gap through Ahtanum Ridge to the south.

The Quaternary Period, primarily the Pleistocene Epoch, saw continued volcanic activity in the Cascades, as well as extensive glacial erosion. Glaciers flowed down the Yakima, Naches and Tieton River Valleys, filling both the Upper and Lower Yakima Valleys with glacial sedimentary deposits. This glacial action has contributed largely to the Valley's existing drainage pattern.

However, not all drainage changes in the area were due to glaciation. Both the Columbia and the Yakima Rivers have left an impressive record of their wanderings over the area. During the tertiary period, the Columbia River skirted across the basin area strewing sand, pebbles, and volcanic debris. It is believed that Satus Pass was once the outlet of the Columbia River until subsequent uplifting of the land forced the river east to its present location. The Yakima River, however, was able to maintain its course, eventually cutting through Selah and Union Gap.

Today, the surface geology of the Zillah area consists mainly of unconfined young valley fill including unconsolidated alluvium and the upper part of the Ellensburg Formation of the Miocene age. The young valley fill is made up of silt, sand, gravel, and cemented gravel, and reaches a maximum thickness of about 500 feet near Wapato, although the thicknesses range typically from 50 to 250 feet.

Seismic Hazard

All of Washington State is subject to some degree of risk from seismic events. The U.S. Geological Survey (USGS) produces shaking hazard maps, which depict the level of earthquake shaking that have a 10% chance of being exceeded in a 50 year period. The numbers are expressed in as a percentage of *g,* or the acceleration of a falling object due to gravity, and range from 0 %*g* (lowest hazard) to 32 %*g* (highest hazard). The City of Zillah's %*g* is approximately eight. Western Washington ranges from 25 to 30 %*g*, while eastern Washington ranges from six to nine %*g*.

Volcanic Hazard

The sources of volcanic hazards within the Zillah area are composite volcanoes of the Cascade Range such as Mt. St. Helens and Mt. Rainier. Potential hazards from an eruption of a composite volcano include mudflows, floods, and tephra (airborne volcanic ash or rock debris). Of these, only tephra from a Mt. St. Helens eruption has an identified potential to affect the area. Of the five principal volcanoes in Washington State, only Mt. St. Helens has experienced major tephra eruptions in the past 13,000 years.

Mt. St. Helens has had at least eight large-scale eruptions during that time. During the May 18, 1980 major eruption of Mt. St. Helens, from one to five millimeters of tephra was deposited in the area.

Tephra ejected during another major volcanic eruption of Mt. St. Helens could fall on the Zillah area, depending on the wind direction at the time of the eruption. It is likely that the size of the tephra would be very fine-grained (ash) and cooled because of the distance to Mt. St. Helens. The ash deposit could be up to five centimeters thick and would pose a low potential hazard to human life and health. Injury to humans occurs when ash-contaminated air is inhaled. Property damage occurs from the abrasiveness of ash and resulting impacts on machinery. An ash fall in Zillah could result in a temporary shutdown of operations, but is not likely to significantly damage the facilities.
Mt. Adams is dormant, not extinct, and it is still potentially active. Future eruptions from Mt. Adams will probably follow patterns set by previous events and will thus be flank lava flows of andesite or basalt.

Since the interior of the main cone is little more than a pile of fragmented lava and hydrothermally-altered rock, there is a potential for very large landslides and other debris flows, but with little chance of affecting the City of Zillah.

Soils
Major Soil Types within the Zillah UGA

Twenty different soil types occur in Zillah and its UGA. Most of the city is dominated by Warden silt loam, 8 to 15 percent slopes It is well drained with very slow to rapid runoff and moderate permeability. Warden soil forms in loess over lacustrine or glaciolacustrine deposits. Warden silt loam is well suited to home development. The primary crops grown in this soil include corn, grain, grapes, hops, mint, peas, and tree fruit. The soil is also well suited to growing legumes and grasses for hay, pasture, and seed.

Esquatzel silt loam, with slopes ranging from zero to two percent, dominates much of the UGA and also falls partly into the west side of the city. Esquatzel soils are very deep and well drained, forming in gravelly alluvium with a surface mixture of loess. Esquatzel soils Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission. While the soil is generally well suited to home development, The primary crops grown in this soil include corn, grain, grapes, hops, mint, peas, and tree fruit. The soil is also well suited to growing grasses and legumes for hay, pasture, and seed.

Figure 2.1 City of Zillah and UGA Soils Map

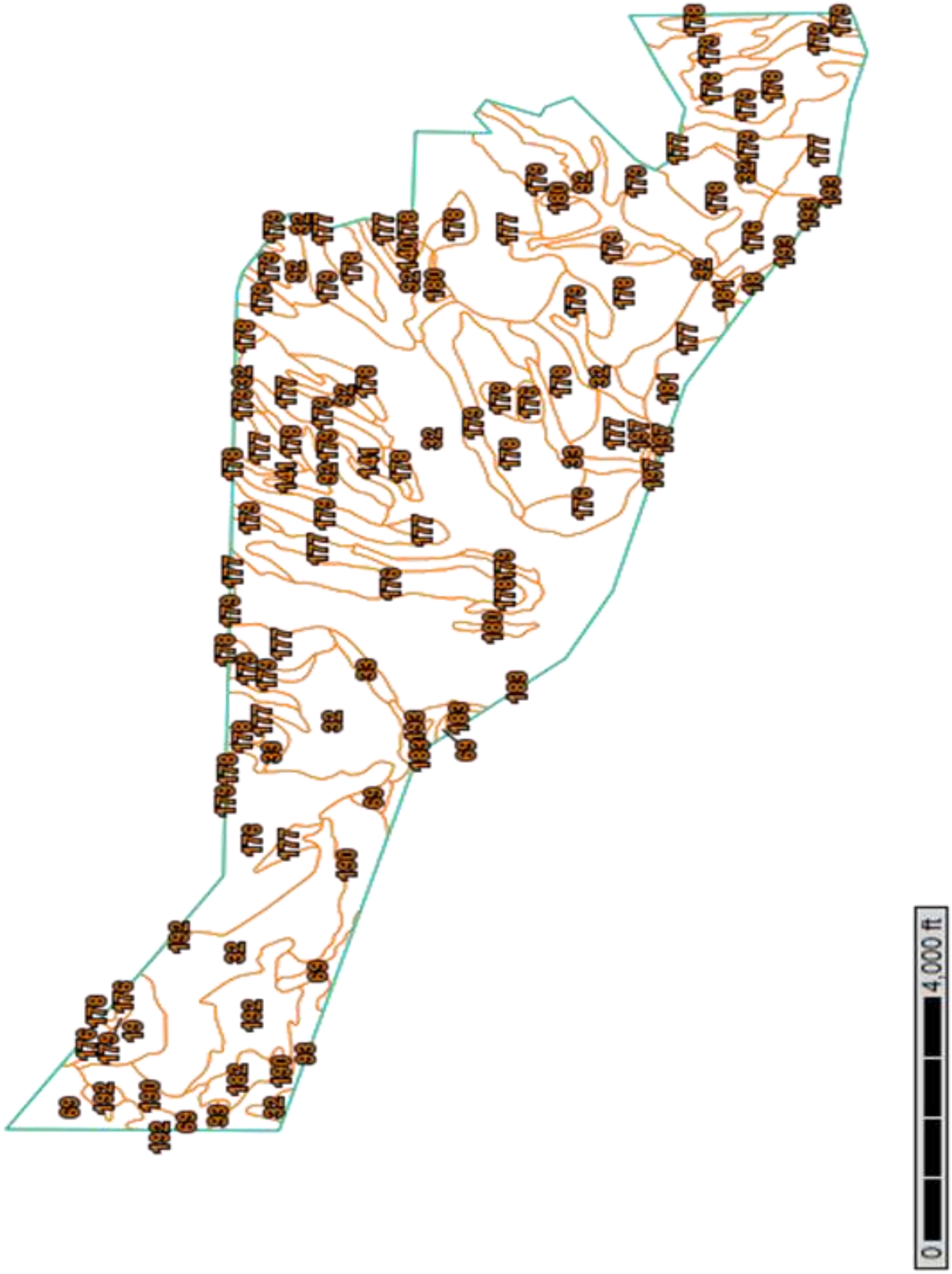


Table 1.1. City of Zillah and UGA Soils Type Limitations

Yakima County Area, Washington (WA677)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
18	Cleman very fine sandy loam, 0 to 2 percent slopes	3.3	0.2%
19	Cleman very fine sandy loam, 2 to 5 percent slopes	20.5	1.1%
32	Esquatzel silt loam, 0 to 2 percent slopes	499.3	26.4%
33	Esquatzel silt loam, 2 to 5 percent slopes	29.2	1.5%
69	Logy silt loam, 0 to 2 percent slopes	38.0	2.0%
92	Outlook silt loam	76.4	4.0%
93	Pits	2.3	0.1%
140	Sinloc silt loam, 2 to 5 percent slopes	1.0	0.1%
141	Sinloc silt loam, 5 to 8 percent slopes	16.2	0.9%
176	Warden silt loam, 0 to 2 percent slopes	175.9	9.3%
177	Warden silt loam, 2 to 5 percent slopes	258.2	13.7%
178	Warden silt loam, 5 to 8 percent slopes	280.1	14.8%
179	Warden silt loam, 8 to 15 percent slopes	305.9	16.2%
180	Warden silt loam, 15 to 30 percent slopes	9.2	0.5%
181	Weirman sandy loam, channeled	22.6	1.2%
182	Weirman fine sandy loam	11.1	0.6%
183	Weirman gravelly fine sandy loam	4.2	0.2%
190	Yakima silt loam	70.3	3.7%
192	Zillah silt loam	48.8	2.6%
193	Zillah silt loam, channeled	13.8	0.7%
197	Water	1.5	0.1%
Totals for Area of Interest		**1,888.0**	**100.0%**

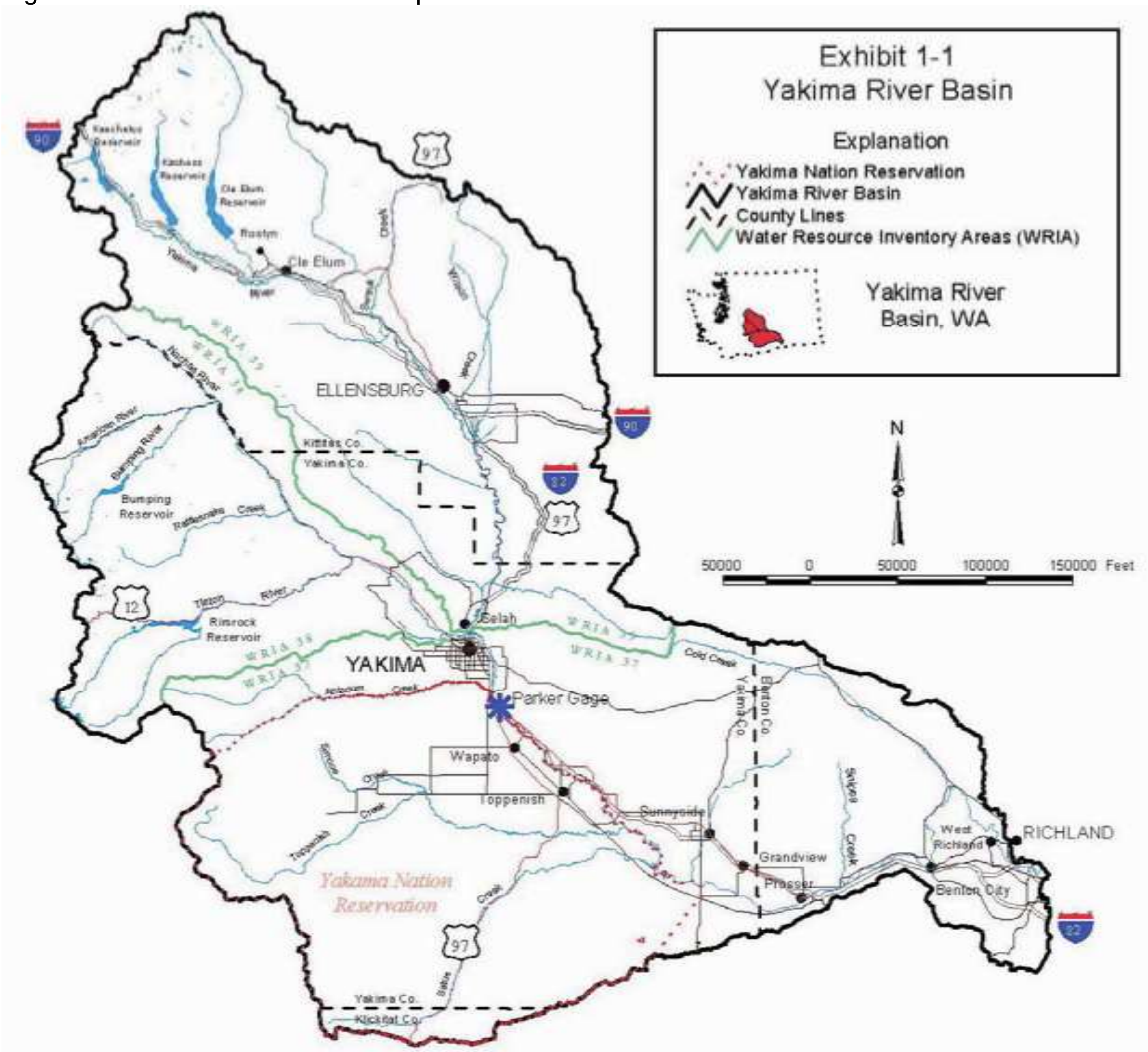
Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
18—Cleman very fine sandy loam, 0 to 2 percent slopes							
Cleman	100	Not limited		Not limited		Not limited	

19—Cleman very fine sandy loam, 2 to 5 percent slopes							
Cleman	100	Not limited		Not limited		Somewhat limited	
						Slope	0.01
32—Esquatzel silt loam, 0 to 2 percent slopes							
Esquatzel	100	Not limited		Not limited		Not limited	
33—Esquatzel silt loam, 2 to 5 percent slopes							
Esquatzel	100	Not limited		Not limited		Not limited	
69—Logy silt loam, 0 to 2 percent slopes							
Logy	95	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
92—Outlook silt loam							
Outlook, drained	90	Not limited		Very limited		Not limited	
				Depth to saturated zone	1.00		
93—Pits							
Pits	100	Not rated		Not rated		Not rated	
140—Sinloc silt loam, 2 to 5 percent slopes							
Sinloc, drained	90	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.07	Depth to saturated zone	1.00	Depth to saturated zone	0.07
		Subsidence risk	0.01	Subsidence risk	0.01	Slope	0.01
						Subsidence risk	0.01
141—Sinloc silt loam, 5 to 8 percent slopes							
Sinloc, drained	95	Somewhat limited		Very limited		Somewhat limited	

		Depth to saturated zone	0.07	Depth to saturated zone	1.00	Slope	0.88
		Subsidence risk	0.01	Subsidence risk	0.01	Depth to saturated zone	0.07
						Subsidence risk	0.01
176—Warden silt loam, 0 to 2 percent slopes							
Warden	100	Not limited		Not limited		Not limited	
177—Warden silt loam, 2 to 5 percent slopes							
Warden	100	Not limited		Not limited		Somewhat limited	
						Slope	0.01
178—Warden silt loam, 5 to 8 percent slopes							
Warden	100	Not limited		Not limited		Somewhat limited	
						Slope	0.88
179—Warden silt loam, 8 to 15 percent slopes							
Warden	100	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
180—Warden silt loam, 15 to 30 percent slopes							
Warden	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
181—Weirman sandy loam, channeled							
Weirman	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.61		
182—Weirman fine sandy loam							
Weirman	95	Not limited		Not limited		Not limited	

183—Weirman gravelly fine sandy loam							
Weirman	95	Not limited		Not limited		Not limited	
190—Yakima silt loam							
Yakima	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
192—Zillah silt loam							
Zillah	100	Not limited		Somewhat limited		Not limited	
				Depth to saturated zone	0.95		
193—Zillah silt loam, channeled							
Zillah	95	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
197—Water							
Water	100	Not rated		Not rated		Not rated	

Figure 2.2. Yakima River Basin Map



Source: Yakima River Basin Watershed Management Plan - Yakima Basin Water Resources Agency

GROUNDWATER

Groundwater is generally available throughout the Zillah area. It can be found at both deep and shallow depths. Washington State Department of Ecology has been extensively involved in groundwater research over the past few years and is currently mapping the availability and quality of groundwater throughout the county.

Geologic materials that are able to store and transmit groundwater are called aquifers. Groundwater occurs within the unconsolidated surficial deposits in most of the major stream and river valleys in the Yakima Basin. The primary groundwater resources of the Yakima River Basin are aquifers associated with the Columbia River Basalt Group, including basalt aquifers such as the Saddle Mountains, Wanapum, and Grande Ronde Formations; and sedimentary deposits such as the Ellensburg Formation.

The city is supplied water through three primary source wells which are important in managing water resources in the Lower Yakima River Basin Watershed. Pumping groundwater from some aquifers at some locations may reduce flows in surface waters. This reduction in flow may affect fish and other aquatic resources, or may impair senior water rights. In other cases, pumping groundwater may have little effect on surface waters, or may have effects that are delayed in time or occur at locations far from the well.

Groundwater conditions are generally unconfined (at atmospheric pressure) and influenced (hydraulically connected) by water levels in nearby streams, lakes, or rivers. Where surface water is diverted and applied to irrigated lands, some of the water may percolate down into underlying aquifers and raise the water table.

CRITICAL AQUIFER RECHARGE AREAS

Critical aquifer recharge areas are lands where: a) precipitation and surface water recharge the ground water; b) the ground water is particularly vulnerable to contamination from existing land use activities; and c) the ground water is a source of drinking water.

The Lower Yakima Valley has three types of aquifers that are found at different depths. The shallow and middle-depth aquifers are common sources of drinking water for private wells. The deep aquifer is a common source of drinking water for municipal wells.

The shallow aquifer contains unconsolidated or slightly cemented stream alluvium, glacial deposits, and windblown materials. According to one study, some of these deposits have been partly dissected and occur as benches and terraces. The thickness may exceed 500 feet at some places. The recharge area for this aquifer is from surface waters and irrigation water.

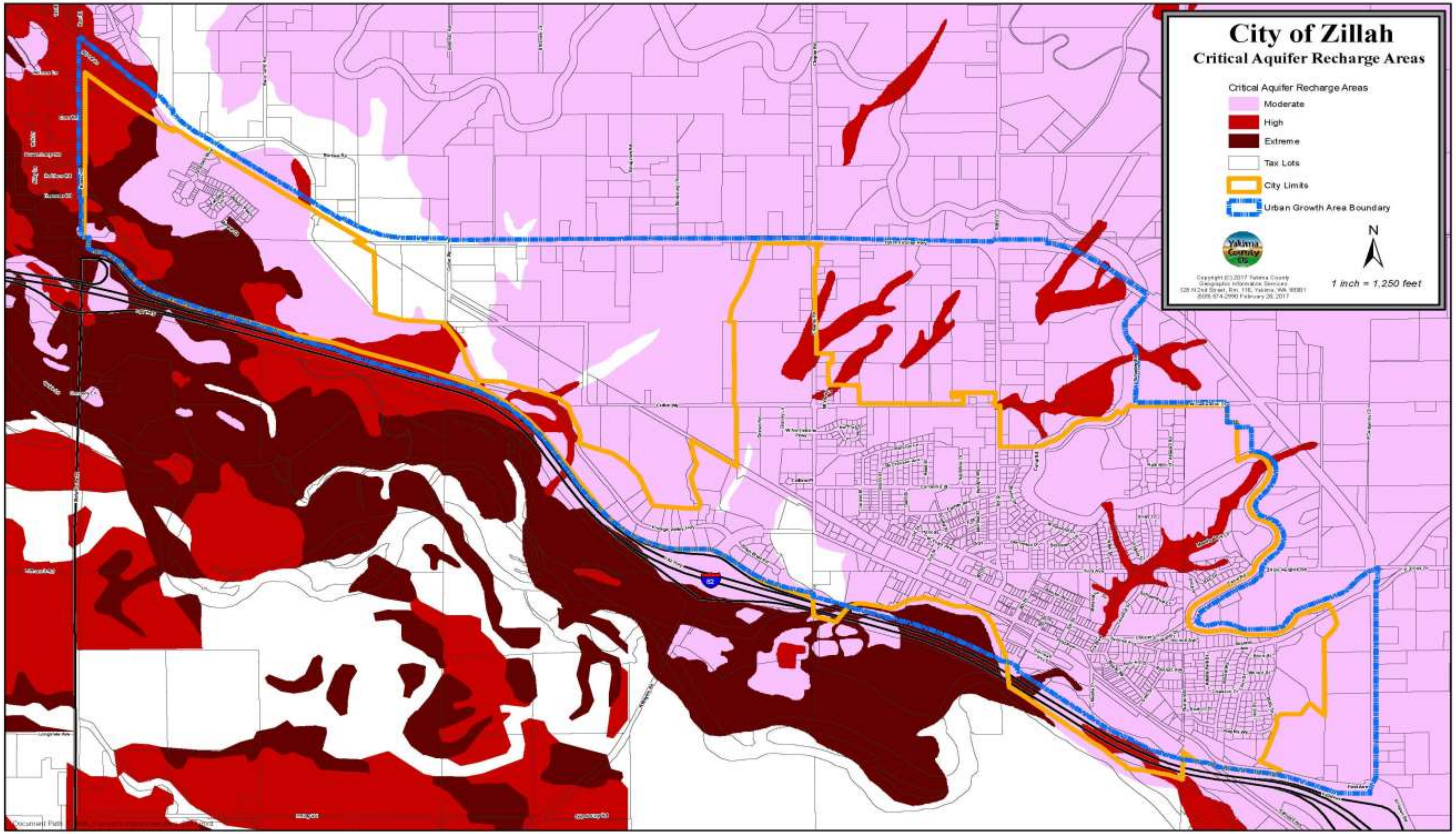
The middle-depth aquifer is in lightly cemented, well-sorted sand and gravel of volcanic origin. The primary recharge area for this aquifer is the Cascade Range and its eastside foothills.

The deep aquifer is in relatively thin layers of gravel, silt, clay, soil and other sediments that are between well-defined lava flows of Yakima basalt. The primary recharge for this aquifer is also the Cascade Range and its eastside foothills.

The likelihood that water will infiltrate and pass through the surface materials to recharge the underlying aquifer system (recharge potential) is dependent on a number of relatively static physical conditions. These conditions include soil permeability, surficial geological materials, depth to water and topography.

In general, the aquifers in the Yakima River Basin are recharged by precipitation, infiltration of surface water, irrigation water, seepage losses from ditches, canals and rivers, and upward migration of water from lower aquifers. Groundwater discharges into rivers, lakes and streams, or through evapotranspiration, pumping, and upward flow of water into the shallower aquifers. All of the Zillah area and its UGA has a moderate to high aquifer recharge potential with a couple areas as extreme.

Figure 2.3 City of Zillah- Critical Aquifer Recharge Areas



Groundwater Quality

The Washington State Department of Ecology estimates that for shallow well use, the size of lots should be greater than two acres. Deeper wells would help a great deal to prevent these problems, but the added cost of well drilling and lack of state legislation requiring it (except for community wells) have prevented this from occurring.

Water quality considerations vary for these different uses. For example, the quality of groundwater in the Yakima Basin is rarely a limitation if the water is used for agricultural purposes. However, groundwater quality must be much higher for drinking water purposes, and in some cases requires treatment to meet state and federal drinking water standards.

Groundwater is the main source of drinking water supplies in the Yakima River Basin, both for public water supplies, and individual domestic wells. With the exception of the Cities of Yakima and Cle Elum, all of the cities and unincorporated communities rely on groundwater for their indoor, domestic water supplies. Degradation of groundwater quality can pose public health threats, raise the cost of treating municipal supplies, and potentially force abandonment or limit the use of supplies.

The State's groundwater criteria serve as a baseline and reference to establish trends in water quality conditions. The State's regulation in WAC 173-200, or as it may be amended, establishes the criteria for all groundwater, based on the premise that it may be used for drinking water. In addition, the federal government has established National Primary Drinking Water Standards, which apply to water supplies delivered to the public by the public water systems.

A Watershed Assessment performed by the Yakima Basin Water Resources Agency (YBWRA) in 2003 noted that groundwater quality can be affected by a wide variety of activities which introduce pollutants into the subsurface. Key parameters relative to drinking water supplies include fecal indicator bacteria, nutrients such as nitrate, and organic chemicals such as pesticides and industrial chemicals. Regulatory agencies across the U.S. have identified the categories of sources listed below:

- Natural contamination/dissolved salts and minerals (including arsenic and radon, which are the subjects of current regulatory activity at the federal level).
- Point source contamination at the wellhead.
- Septic systems.
- Leaking underground storage tanks.
- Application of fertilizers or pesticides.
- Application of manure to agricultural lands or gardens.
- Chemical or fuel spills.
- Leaching from landfills.
- Burial or dumping of wastes.

Each of these sources is likely to be present in some degree within the Yakima River Basin. Groundwater quality problems such as elevated levels of nitrates occur in the Yakima River Basin in locales where the following two conditions are present: 1) there is relatively dense development that is not served by public sewer systems, and 2) there is a shallow water table. In addition, elevated nitrate levels may occur in areas where irrigated agriculture is present in combination with a shallow water table.

Yakima County does not actively track groundwater quality, and groundwater quality monitoring is not occurring on a regional basis within the Yakima River Basin. Where localized problems have been identified, monitoring activities have sometimes been implemented. In the absence of more comprehensive, long-term monitoring data, trends are unlikely to be quantifiable. In addition, if certain parameters have received little attention, they may pose a threat to drinking water supplies that goes undetected. This may be a limitation for watershed planning in terms of determining a safe and reliable water supply for municipal and domestic purposes.

Large and medium-sized public water systems have the ability to monitor, manage and protect the quality of their groundwater supplies. However, small water systems and individual households relying on their own wells for drinking water with shallow and/or unprotected groundwater supplies, are more susceptible to groundwater contamination than deep groundwater supplies such as the City of Zillah. The USGS compiled well depth information for Yakima, Kittitas, and Benton Counties, and found that 50% of all wells were less than 151 feet deep. According to the YBWRA, wells in the Lower Yakima Valley, including Zillah, tend to be shallow, with a depth of 51 to 250 feet.

Surface Water

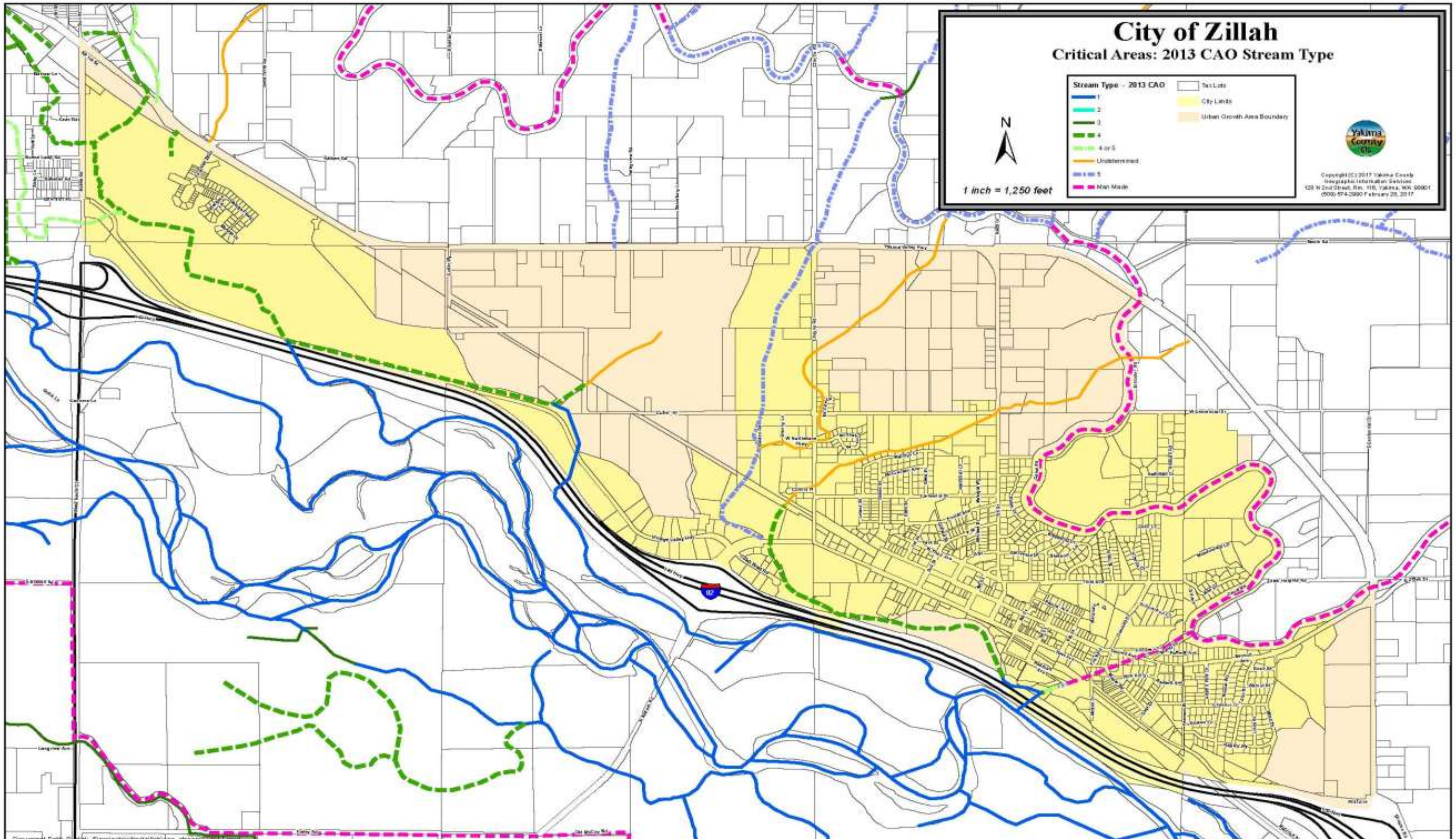
The Yakima River basin occupies approximately 6,150 square miles. Its headwaters are situated along the crest of the Cascade Range. The mainstream Yakima River is joined by a number of tributaries and flows generally southeast until it joins the Columbia River. For a map of the Yakima River Basin see Figure 2.2 above.

Throughout the Basin precipitation is seasonal, with approximately 60 to 80 percent of annual precipitation occurring from October to March. Much of this precipitation falls as snow during the winter months and becomes stored in the Cascade Range as snow pack. As a result, runoff in the Yakima River Basin exhibits a pronounced spike from April to June, with lower levels of runoff occurring during the remaining months of the year.

There are a couple of streams that occur within Zillah or its UGA (Figure 2.4). There is one perennial section of Type 1 stream located in the southwest area of Zillah. There are two areas that have Yakima County designated Type 4 water bodies each associated to irrigation facilities that require protection because they contribute important functional properties to the environment, such as groundwater recharge or wildlife habitat support. The city also has a county designated Type 5 stream. Since the streams occur within the City of Zillah or its UGA, it is a consideration for the City of Zillah when considering flood control and water quality measures.

On December 18, 2007 Yakima County adopted an updated SMP and Critical Areas Ordinance (CAO). Multiple municipalities throughout Yakima County used Yakima County's SMP and CAO as a template for their own local CAO. This approach provided some regional consistency in implementing a comprehensive CAO throughout the Yakima Valley. The Zillah CAO contains criteria for classifying water bodies and their associated buffer widths for each classification.

Figure 2.4 City of Zillah and Zillah UGA streams



Source: Yakima County GIS

AIR QUALITY

Zillah's air quality is generally satisfactory. There are no significant industrial emission sources within the city. Only a moderate level of particulate rising from natural fugitive dust plus that produced from surrounding farming activity, causes any concern and that is at most sporadic in nature.

FISH AND WILDLIFE HABITAT AREAS

Fish and wildlife habitat areas are defined as lands managed to maintain wildlife species in habitats suitable for their natural geographic distribution. The riverine environment of the Yakima River and adjacent shorelands provides habitat for several species of fish, birds and animals.

That part of the City lying southwest of I-82 adjacent to the Yakima River is designated as a fish and wildlife habitat area. This area is also designated as an environmentally sensitive area under the City's CAO, SMP, and SEPA Ordinances. There is no established access to these properties, at this time. Regulation of the area will be controlled by Shoreline Management Regulations (adopted by reference including goals and policies) and the State Environmental Policy Act (SEPA).

FLOOD HAZARD AREAS

Flooding can have significant impact on the use of land and poses the greatest threat to urban density development. It will generally occur in one of the following manners, but may be a combination of any or all:

(1) The overflow of rivers and streams. This is the most obvious and hazardous form of flooding.

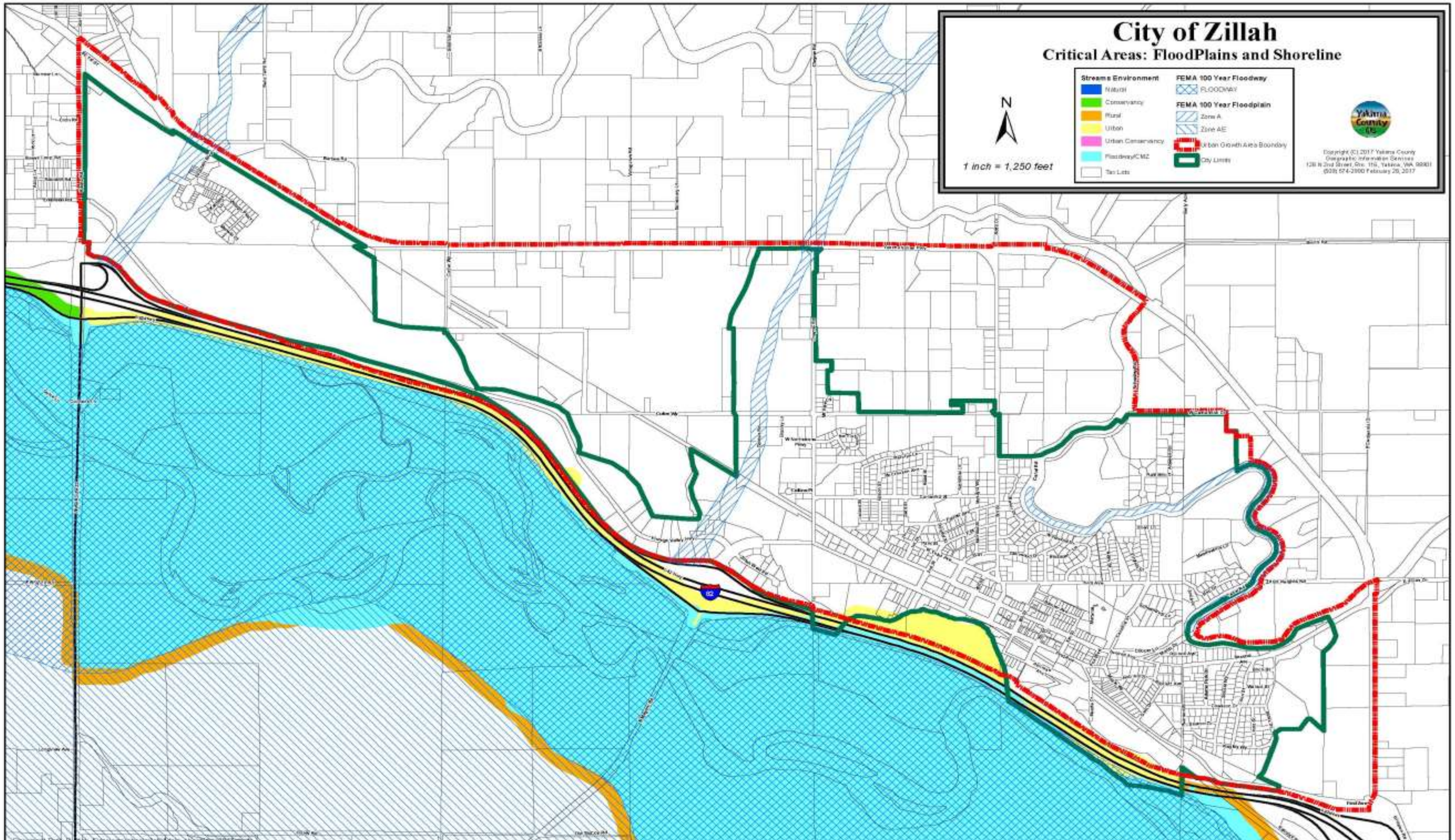
(2) Flash flooding. This occurs mainly in the gullies of slope areas.

(3) Standing water. This can occur from heavy rainfall or quick snowmelt over a relatively short period of time.

The Zillah area, in the past, has demonstrated all three types of flooding. The Yakima River has frequently overflowed in the vicinity of Zillah prior to Interstate 82's construction. The design and construction of I-82 through Zillah has eliminated much of the flood hazard from the river. The freeway is designed as a 100 year flood control dike. The culverts have flap gates to protect against return flows of flood backwater. The only culvert that does not have a flap gate is the one near the undeveloped park. Therefore, the park site will continue to experience some flooding, but will not be a threat to any existing development (the treatment plant is flood-proofed). Flash-type flooding may occur, to a minor extent, due to the rolling topography of the area. Proper drainage area left undeveloped will reduce much of this potential problem. Standing water will be a nuisance, at times, in the low spots of the Zillah area. Proper drainage facilities are the most important items to consider in this event.

Overall, in order to minimize the public and private costs associated with flood damage, it is desirable to develop flood management policies that are coordinated between Zillah and Yakima County. The floodplain as depicted by the Federal Emergency Management Agency (FEMA) is designated as a flood hazard area within Zillah. This area is shown in Figure 2.5 below. The floodplain area is also designated as an environmentally sensitive area under the City's CAO, SMP, and SEPA Ordinances.

Figure 2.5 City of Zillah and Zillah UGA- FEMA Floodplains and Shorelines



Source: Yakima County Shoreline Master Program and FEMA Floodplain FIRM Maps- adopted November, 2009

GEOLOGICALLY HAZARDOUS AREAS

Geologically hazardous areas either have experienced or are likely to experience severe damage from erosion, sliding, earthquake, or other geologic events and pose a significant hazard to human life and property. Within the City of Zillah, "steep slope areas" and "unstable slopes" are most likely to present this type of hazard.

Steep slope areas are those lands within the City that have slopes greater than 15%. Unstable slopes are those areas which include any slope with a combination of slopes greater than 15% and contain: a) areas having impermeable soils frequently interbedded with granular soils; b) areas having springs or ground water seepage or any area which has had recent or historical slide activity and/or has unstable slope conditions; or c) any area that is potentially unstable as a result of factors such as rapid stream incision, stream bank erosion or undercutting by wave action.

The embankment separating the Yakima River bottomland from the upper terrace of the City is designated as a geologically hazardous area. This area is shown in Figure 2.6. Since the completion of I-82, there has been little further undercutting or deterioration of the embankment area. The embankment/bluff area has also been designated as an environmentally sensitive area under the City's CAO and SEPA Ordinances.

WETLANDS

Wetlands provide a broad spectrum of natural and physical functions. Freshwater wetlands have flood storage capacity, serve as groundwater recharge areas, and tend to moderate flow regimes of associated drainages. Wetlands also work to remove suspended solids from water, absorb and recycle mineral and organic constituents, and otherwise contribute to improved water quality. Biological functions include food chain production, general habitat, nesting, spawning, rearing, and resting sites for aquatic and land species.

Efficiency of wetland functions can be broadly described according to wetland type. Primary productivity is low to moderate in streams and drainages and moderate to high in marshes and swamps. Relative export efficiency of nutrients is generally rated high for perennial riverine marshes, seasonally flooded riverine swamps, and overflow systems; moderate for freshwater wetlands adjacent to or linked to intermittently inland swamps and bogs, and freshwater wetlands adjacent to or linked to ephemeral riverine systems.

Many wetlands such as swamps, wet meadows, and riverine- and drainage-related wetlands, serve as groundwater discharge/recharge zones. Hydrologically isolated wetlands do not provide those functions unless linked to the groundwater system. Assessing water purification capabilities for wetlands is complicated, but in general, those wetlands with greater vegetative cover and an optimal ratio of aerated water surface to total wetland size have the most value.

In the City of Zillah’s CAO, adopted on November 1, 2010, wetlands are rated based on categories that reflect the functions and values of each wetland. Wetland categories are based on the criteria provided in the Washington State Wetland Rating System for Eastern Washington, revised March 2007. These categories are summarized as follows:

• Type I wetlands: Those that represent a unique or rare wetland type, are more sensitive to disturbance than most wetlands, are relatively undisturbed, contain ecological attributes that are impossible or too difficult to replace within a human lifetime, and provide a high level of functions.

Generally, these wetlands are not common and make up a small percentage of the wetlands within Yakima County.

• Type II wetlands: Are difficult, though not impossible, to replace, and provide high levels of some functions. These wetlands occur more commonly than Type I wetlands, but still need a relatively high level of protection.

• Type III wetlands: Those wetlands that are often smaller, less diverse and/or more isolated from other natural resources in the landscape than Type II wetlands.

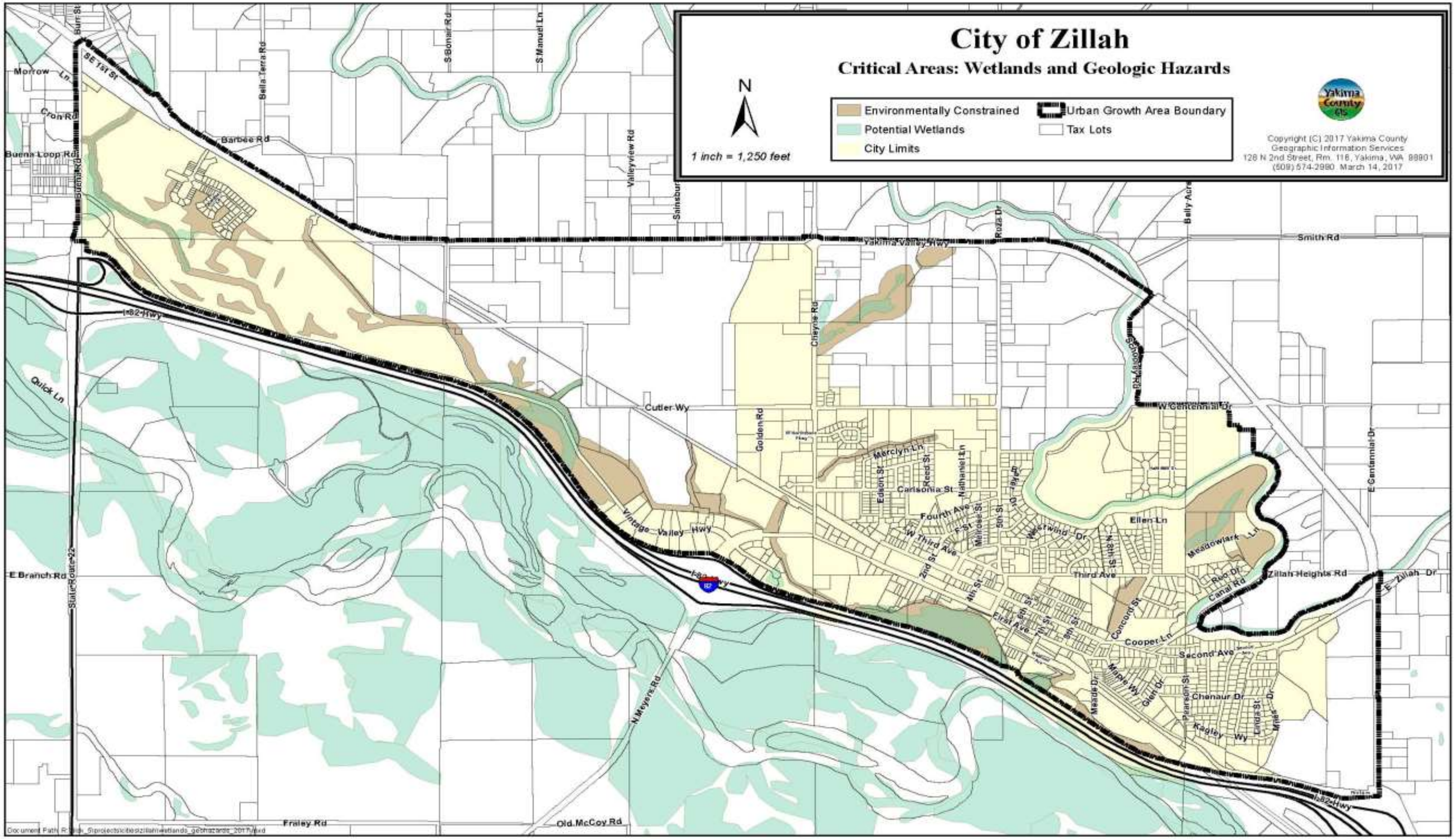
• Type IV wetlands: Those wetlands that have the lowest levels of functions, scoring less than 30 points in the Eastern Washington Wetland Rating System, and are often heavily disturbed. These are wetlands that should be able to be replaced, and in some cases improved. These wetlands may provide some important functions, and also need to be protected.

Several wetland areas exist within the City of Zillah according to the National Wetlands Inventory. These wetlands fall into two main categories: a) vegetation along intermittent streams; and b) the ponds between the bluff and the Yakima River. Some wetland areas have been greatly modified by man's influence or have been created by seepage from the existing network of canals and ditches.

Areas such as the Sunnyside Canal are identified as wetlands on the National Wetlands Inventory but are clearly intentionally created and artificial as opposed to natural. The City of Zillah has not designated these intentionally created and artificial structures as wetlands.

Designated wetland areas within the City of Zillah are shown on Figure 2.6. These areas are also designated as environmentally sensitive areas under the City's CAO and SEPA Ordinance.

Figure 2.6. Designated Critical Areas within the City of Zillah and Zillah UGA



III. GOALS AND POLICIES

Natural System Goal #1: Promote the conservation of natural resources and the protection of environmentally sensitive areas.

Natural System Policy #1.1: The City shall, in partnership with Yakima County and neighboring jurisdictions, update the County-wide critical areas and Shoreline Master Plan regulations.

a. These regulations shall be based on the best available science and may provide special consideration to conservation or protection measures necessary to preserve or enhance anadromous fisheries.

Natural System Policy #1.2: The City may consider development proposals for density/intensity incentives for protecting critical areas on-site.

Natural Systems Policy #1.3: The City will work with the Yakima Regional Clean Air Authority to regulate activities that affect air quality.

Natural Systems Policy #1.4: The City Development Regulations should be revised to require that all construction and development activities include the preparation and implementation of a dust and erosion control plan.

Natural Systems Policy #1.5: Ensure that lot sizes in areas lacking public sewer service are large enough to accommodate individual septic systems and reserve drain fields, if necessary, without cumulative degradation of water quality.

Natural Systems Policy #1.6: New development should be required to connect to the City sewer system in accordance with the provisions of Ordinance 1046 as it now exists or is subsequently amended.

Natural Systems Policy #1.7: Support efforts of the US Consolidated Farm Service Agency to encourage improved farming practices which will minimize run-off from farmlands and subsequent degradation of surface water by fertilizers, insecticides, sedimentation, etc.

Natural Systems Goal #2: Minimize the potential for damage to life and property by restricting development in areas with severe natural hazards.

Natural Systems Policy #2.1: Implement the Federal Flood Insurance Program.

Natural Systems Policy #2.2: Recognize I-82 as a 100-year flood control dike.

Natural Systems Policy #2.3: No development shall occur on land determined to be contaminated until mediation has been completed.

Natural Systems Policy #2.4: The City will utilize the *Eastern Washington Storm Water Manual* prepared by the Department of Ecology as the basis to update the City's Storm Water Regulations.

Natural Systems Policy #2.5: The City shall utilize the wetlands rating criteria provided in the *Washington State Wetland Rating System in Eastern Washington,* revised March 2007, or as subsequently updated and adopted by the City.

Natural Systems Policy #2.6: The City shall minimize impervious surfaces and regulate hazardous uses in critical aquifer recharge areas and wellhead areas.

Goals and Policies for the Regional Shoreline Master Program and the City of Zillah Critical Areas Ordinance are adopted by reference and incorporated into this element.