CHAPTER 2

Planning Information

Chapter 2 – **Planning Information**

2.1 Planning Area

The City's UGA and Master Plan (year 2065) Service Areas are presented in **Figure 2-1**. The UGA was established by the City's Planning Department and Citizen Advisory Committee as part of planning activities undertaken to meet the requirements of the State of Washington Urban Growth Management Act (GMA). The current UGA was adopted by the Benton County Commissioners in 2005. The Master Plan Service Area anticipates the development over the next 50 years in the Badger South area toward Interstate 82 and Interstate 182 in the southwest, and reclamation of former 300 Area land in the Hanford Area to the north.

2.2 Service Area

The current Service Area Boundary (commensurate with the UGA) is presented on **Figure 2-1** and represents the area that the existing system of interceptor sewers, trunk sewers, collection system, and pumping stations effectively serve.

Development within the City currently trends toward the south, being limited on the east by the City of Kennewick, the west by the City of West Richland, and the north by the Hanford Area. Future development is expected to continue a south and northwest directional trend. The City's current infrastructure maintenance, rehabilitation and replacement program will help to encourage build-out of the developed territory in the City's interior. Future population increases are anticipated to be significant in the south service area with the addition of the Badger South residential development.

2.2.1 Onsite Sewer Systems

The Benton Franklin Health District (BFHD) has primary responsibility for permitting and policing the residential and small flow commercial dischargers using onsite sewer systems within the City's UGA.

The City's Sewer User Ordinance mandates that residents within the City limits connect to the public sewer system when service is available. In practice, this has only been enforced by requiring the property owner to connect in the event of onsite sewer system failure. Enforcement procedures for onsite sewer system failure are under the jurisdiction of the BFHD. In the event of an onsite sewer system failure, the BFHD Health Officer has the discretion to mandate either hook-up to the public system or onsite sewer system repair or replacement.

The current Service Area and the UGA include only a few small areas in the southern portions of the City where onsite sewer systems are currently the primary means of wastewater disposal. These areas are typically low density developments which predate the southerly expansion of the City's corporate boundaries. An estimated 700 people currently utilize septic tanks and drain fields as a method to dispose of their wastewater.

City of Richland
2015 General Sewer Plan

Figure 2-1
Service Area Boundaries

Wastewater Treatment Plant

Water Treatment Plant

GEORGE WASHINGTON WAY
STEVENS DR
SAINT ST
JADWIN AVE
MCMURRAY ST
WILLIAMS BLVD
THAYER DR
WELLSIAN WAY
AARON DR
WRIGHT AVE
LEE BLVD
DUPORTAIL ST
BY-PASS HWY
VAN GIESEN ST
QUEENSGATE DR
KENNEDY RD
DUPORTAIL ST
I-182
HORN RAPIDS RD
BATTELLE BLVD
KINGSGATE WAY
TWIN BRIDGES RD
SR 240
FOWLER ST
TAPTELL DR
COLUMBIA PARK TRL
SR 240
BELLERIVE DR
GAGE BLVD
BROADMOOR ST
LESLIE RD
ENGLEWOOD DR
KEENE RD
WESTCLIFFE BLVD
SHOCKLEY RD
RACHEL RD
REATA RD
I-82

Legend

- City Limits
- UGA
- 50-yr Planning
- Interstate/Highway
- Major Streets
- Rail Road Track
- Irrigation Canal/Pipeline
- Columbia River
- Yakima River
- City Lift Stations

0 6,000 12,000 Feet

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2.3 Service Area Characteristics

2.3.1 Topography

Richland is situated in a river valley between two hill plateaus. The Columbia River forms the City's eastern boundary. The Yakima River runs along the City's western boundary and then east through the City and into the Columbia River. Because Richland is within a river valley, it is relatively flat in the central and north parts of the City. South of the Yakima River, elevations increase significantly (around Badger Mountain).

2.3.2 Climate

The climate of the area is semiarid, characterized by low annual precipitation and large inter-seasonal temperature variations. Strong winds from the west and southwest occur throughout the year and are responsible for localized soil movement and excessive evapotranspiration rates in summer. Annual precipitation seldom exceeds ten inches, with much of the total arriving with summer thunderstorms, which can cause flooding and severe erosion. The recent (2009 - 2013) climatological information for the City is summarized in **Table 2-1**.

Table 2-1 – Climatological Data

Year	Average Temperature (°F)	High Temperature (°F)	Low Temperature (°F)	Rainfall (in)
2009	65	105	5	6.2
2010	65	101	5	9.2
2011	64	97	14	5.0
2012	66	105	17	11.3
2013	68	108	13	7.3
2014	64	104	6	5.0

2.3.3 Geology

The geology of the Service Area relates to the long history of volcanic activity, which has influenced the Columbia Basin. At the surface is a layer of unconsolidated alluvial and glaciofluvial materials ranging in depth from 0 to 120 feet. The depth of this overburden generally does not exceed 30 feet within the Richland Sewer Service Area. The overburden rests on a thick series of basaltic strata known as the Columbia River basalts, each of which may consist of many distinct basalt flows. These basalts are interbedded with two major and many minor sedimentary strata. The uppermost basalt unit, the Saddle Mountain basalt, crops out in places where the overburden thins in the upper elevations of the Richland planning area. The Saddle Mountain basalt ranges in thickness from 125 to 625 feet, but it is typically about 250 feet thick. It may be interbedded with many sedimentary strata, some of which are up to 50 feet thick. The Saddle Mountain basalt is separated from the Wanapum basalt by the Mabton Interbed. The Mabton Interbed is composed of clay and siltstone and ranges in thickness from 10 to 75 feet, with a typical thickness of 45 feet. The Wanapum basalt ranges in thickness from 600 to 1200 feet, with a typical thickness of 800 feet. Interbedding sedimentary strata are insignificant in the Wanapum basalt. The Vantage sandstone interbed, averaging about 25 feet in thickness, separates the Wanapum basalt from the underlying Grande Ronde basalt. The Grande Ronde basalt has a typical thickness of 5,000 feet, but may range from 2,000 to 12,000 feet thick. The

Grande Ronde basalt contains almost no interbedding sedimentary strata. Under the Grande Ronde basalt lies additional basalt groups, the Pre-Yakima and the Pre-Columbia River basalts.

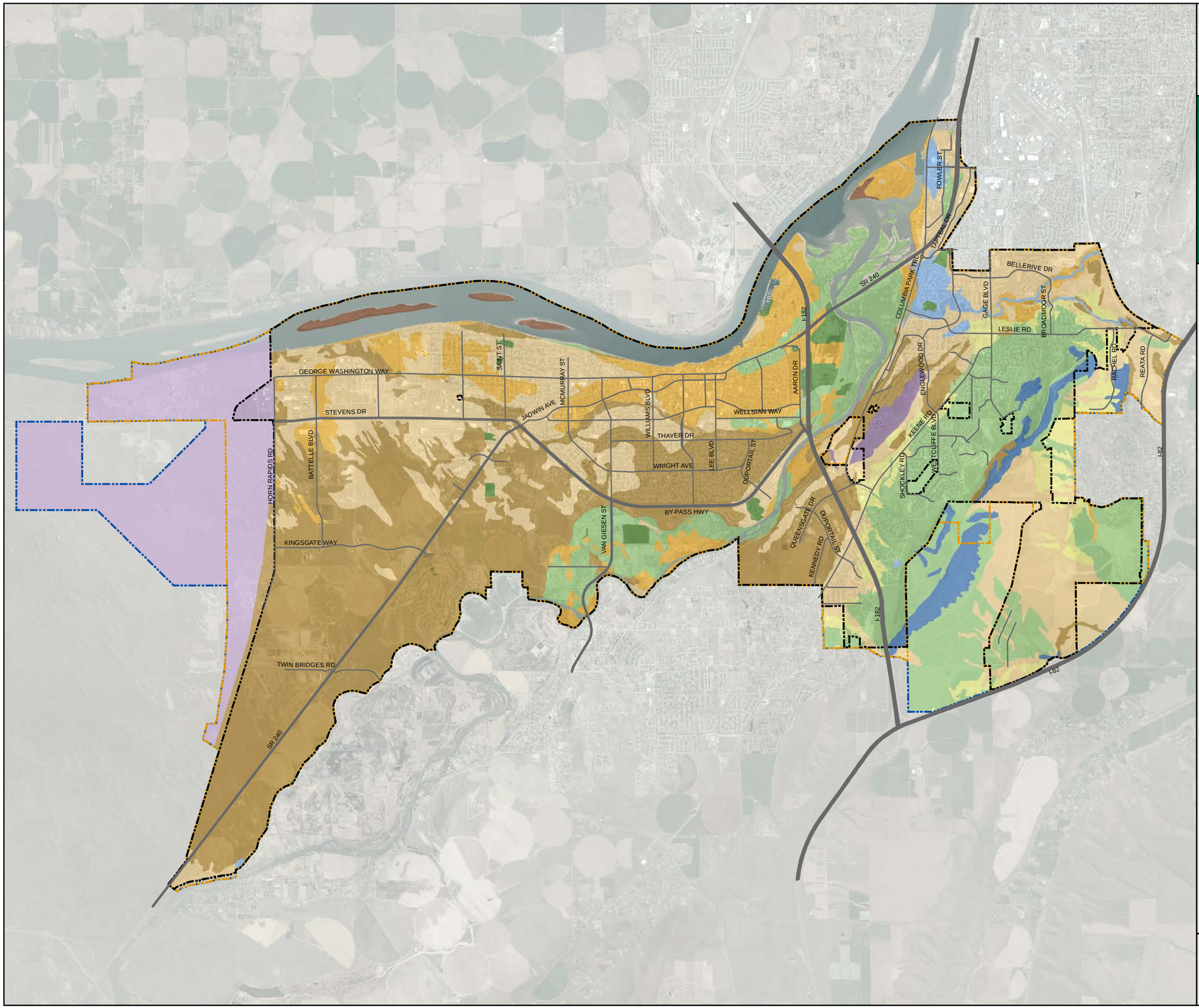
Locally significant hydrogeologic units occur in the Saddle Mountain and Wanapum basalts, in the Mabton Interbed, and in the overburden where its depth is sufficient.

2.3.4 Soils

The soils in and around Richland are classified by the U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS). Most of the Richland area soils are classified as being silt and sandy loam. **Figure 2-2** depicts the types of soils within the City's sewer service area. The soils are generally well draining.

City of Richland
2015 General Sewer Plan

Figure 2-2
Soils



Legend

- City Limits
- UGA
- 50-yr Planning
- Interstate/Highway
- Major Streets

Soil Type

- Fine Sandy Loam
- Gravel Pits
- Loamy Fine Sand
- Loamy Sand
- Rock Loamy Fine Sand
- Silt Loam
- Stony Fine Sandy Loam
- Very Fine Sandy Loam
- Very Stony Silt Loam
- Riverwash
- No Digital Data Available

Notes:
1. Soil Type is based on Soil Survey Geographic (SSURGO) database for Benton County, by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) Publication dated 09-03-2014.

0 6,000 12,000 Feet

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2.4 Irrigation Districts

Separate irrigation water is only provided for the part of the City that is south of the Yakima River. Those north of the river use City water for irrigation – with a few minor exceptions. There are small irrigation systems serving the following areas:

- Columbia Point: A pump station on the Columbia River provides irrigation to the Columbia Point Golf Course and some multi-family housing units adjacent to the golf course.
- Horn Rapids: A pump station on the Columbia River that serves the Horn Rapids Golf Course, a residential subdivision, sports complex, ORV Park, Landfill, and some farmlands.
- Research District: Two wells owned by the City that serves some commercial and light industrial areas.
- Richland School District: A well located on the grounds of Carmichael Middle School which serves the middle school and adjacent Richland High School.
- Willowbrook: A City owned well located in Claybell Park that provides irrigation to a park and residential subdivision.

In the south, the irrigation network consists of three quasi-municipal agencies: the Badger Mountain Irrigation District (BMID), the Columbia Irrigation District (CID) and the Kennewick Irrigation District (KID). All three maintain separate systems and service areas but each deliver untreated Yakima River water through open and closed conduits to agricultural and residential customers. The extent of this service is generally limited by elevation, as the irrigation systems were designed for gravity operation; however some BMID service areas are served by elevated storage tanks filled by booster pump stations. **Figure 2-3** shows the extent and areas of influence of the three irrigation systems in relation to the City of Richland's utility service area.

2.5 Domestic Water System

The City owns and operates a water system that serves the City of Richland and developments outside of the incorporated area but within the UGA.

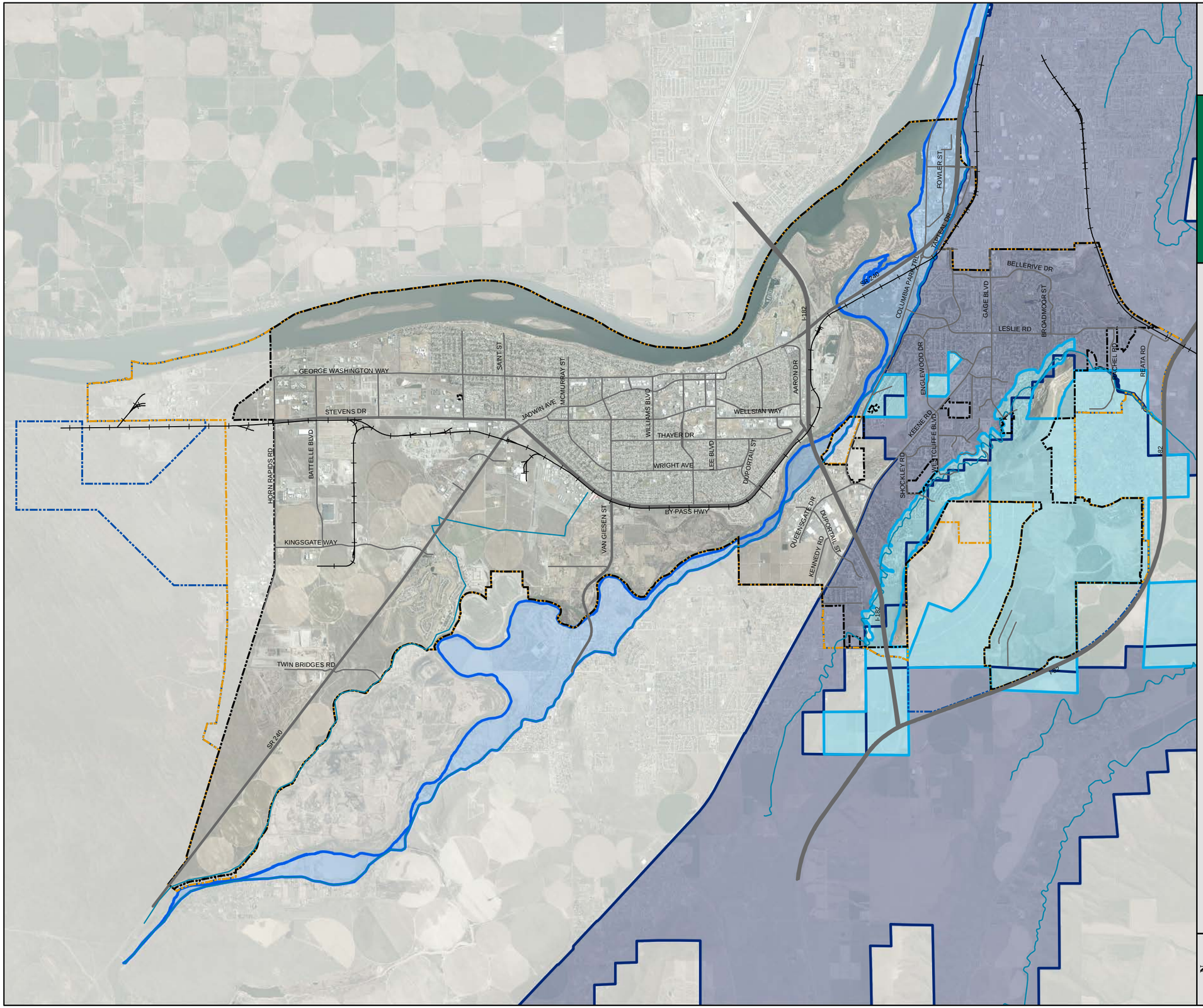
The main source of Richland's drinking water is the Columbia River from which water is pumped to the water treatment facility on Saint Street. The treatment facility is rated to produce up to 36 million gallons per day (mgd) and is supplemented by groundwater wells. The City water system includes:

- Fifteen reservoir sites including the WTP clearwell
- Seven active chlorination points
- Twelve booster pump stations
- Three emergency interties with neighboring systems
- Seven pressure zones
- Five well sites for City water supply

The main water system features are depicted in **Figure 2-4**.

City of Richland
2015 General Sewer Plan

Figure 2-3
Irrigation Districts



Legend

- City Limits
- UGA
- 50-yr Planning
- Interstate/Highway
- Major Streets
- Rail Road Track
- Irrigation Canal/Pipeline

District

- Badger Mountain Irrigation District
- Columbia Irrigation District
- Kennewick Irrigation District

0 6,000 12,000 Feet

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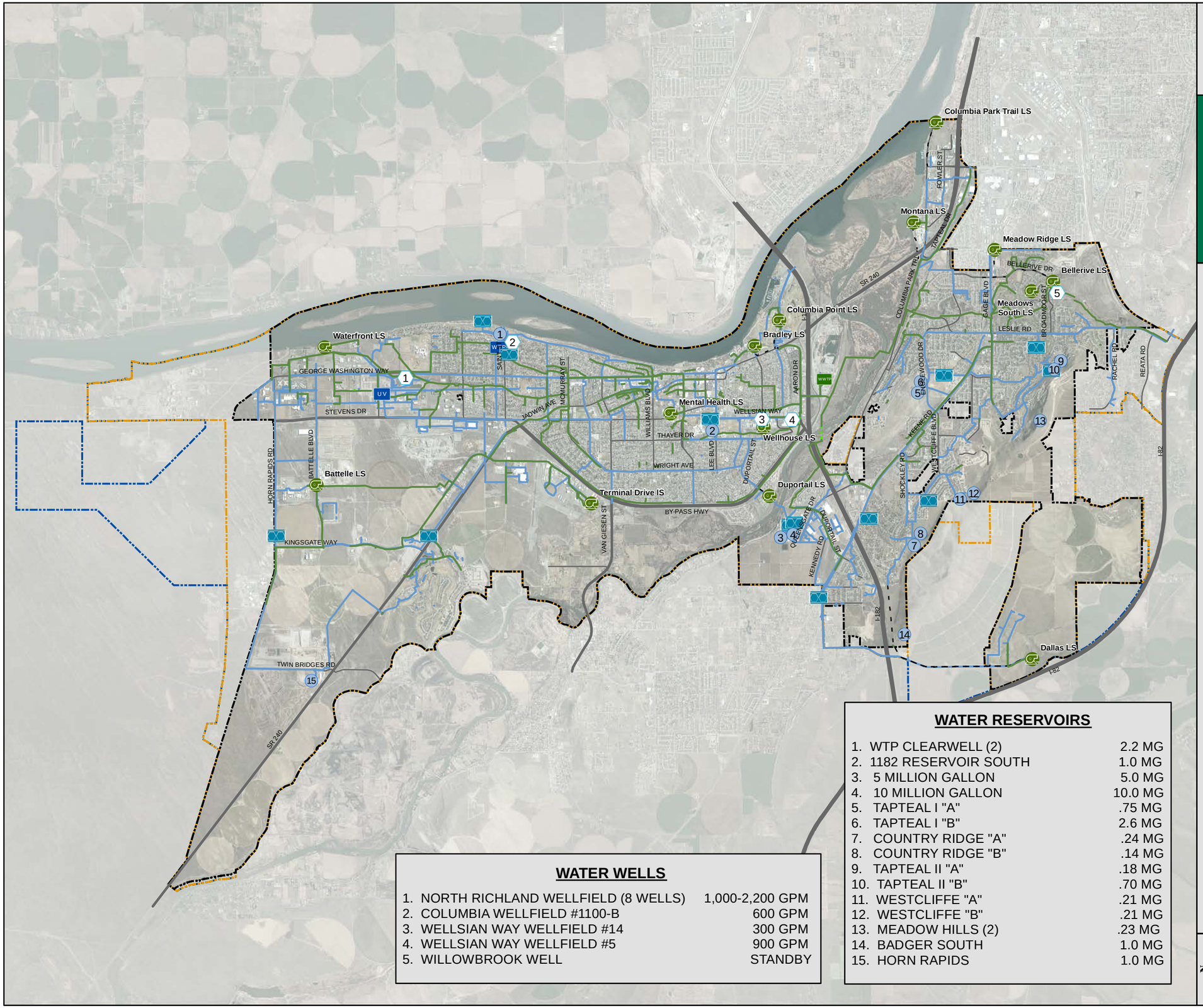
City of Richland
2015 General Sewer Plan

Figure 2-4
Water and Sewer Mainlines



WATER WELLS

1.	NORTH RICHLAND WELLFIELD (8 WELLS)	1,000-2,200 GPM
2.	COLUMBIA WELLFIELD #1100-B	600 GPM
3.	WELLSIAN WAY WELLFIELD #14	300 GPM
4.	WELLSIAN WAY WELLFIELD #5	900 GPM
5.	WILLOWBROOK WELL	STANDBY

WATER RESERVOIRS

1.	WTP CLEARWELL (2)	2.2 MG
2.	1182 RESERVOIR SOUTH	1.0 MG
3.	5 MILLION GALLON	5.0 MG
4.	10 MILLION GALLON	10.0 MG
5.	TAPTEAL I "A"	.75 MG
6.	TAPTEAL I "B"	2.6 MG
7.	COUNTRY RIDGE "A"	.24 MG
8.	COUNTRY RIDGE "B"	.14 MG
9.	TAPTEAL II "A"	.18 MG
10.	TAPTEAL II "B"	.70 MG
11.	WESTCLIFFE "A"	.21 MG
12.	WESTCLIFFE "B"	.21 MG
13.	MEADOW HILLS (2)	.23 MG
14.	BADGER SOUTH	1.0 MG
15.	HORN RAPIDS	1.0 MG

Legend

- City Limits
- UGA
- 50-yr Planning
- Interstate/Highway
- Major Streets
- Water Main (10" and Larger)
- Sewer Main (10" and Larger)
- Inverted Sewer Siphon
- Sewer Forcemain
- Well
- Water Reservoir
- Water Booster Pump
- UV Treatment Facility
- Water Treatment Plant
- Wastewater Treatment Plant
- City Lift Stations

0 6,000 12,000 Feet

N E S W

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2.6 Water Reclamation and Reuse

Water reclamation and reuse is a concept gaining considerable recognition in Washington as both a water supply option and a treated wastewater discharge alternative. Reclaimed water can provide an alternative water source for non-potable applications that would otherwise be limited by traditional water supplies. Wastewater effluent reuse can also provide opportunities for an overall decrease in pollution and the ability to meet more stringent water quality requirements when it reduces or removes treated wastewater discharges to sensitive surface waters.

The City's 2010 Water System Plan provides a discussion on Washington State standards and regulations for water reclamation and reuse. As noted in the Water System Plan, the City has a water use efficiency program that is expected to reduce water usage – which will in turn produce some reductions in sewer flows to the WWTP.

Large land areas for agricultural use are located greater than five miles from the WWTP site and the land is either currently not irrigated or is irrigated with untreated surface water delivered from local irrigation districts. Although substituting WWTP effluent for untreated surface water for irrigation would result in a reduction of water diverted from the Columbia River, the restrictions to crop production, public access limitations, and estimated cost of transport and pumping of water would make this alternative infeasible.

2.7 Zoning/Land Use

The Future Land Use Map is presented in **Figure 2-5** and is based on the City of Richland Comprehensive Plan. Within the land use districts, reserve areas are provided to facilitate the orderly expansion of the City's residential, commercial, and industrial base. An analysis of the current utilization of the land use districts in relation to the existing Sewer Service Area and UGA is presented in **Table 2-2**.

Table 2-2 – Land Use Analysis

Land Use	Developed [a] (acres)	Developed (%)	Undeveloped (acres)	Undeveloped (%)	Total (acres)
High Density Residential [b]	435.50	82	94.00	18	529.50
Medium Density Residential [c]	1,187.60	81	271.60	19	1,459.20
Low Density Residential [d]	3,652.20	69	1,648.10	31	5,300.30
Badger Mountain South [e]	1,795.00	68	858.00	32	2,653.00
Commercial	1,882.50	36	3,416.30	64	5,298.80
Industrial	2,246.60	32	4,820.70	68	7,067.30
Open Space/Agricultural	632.50	61	408.70	39	1,041.20
Public Facilities	5,489.00	100	0.00	0	5,489.00
Rights of Way	4.50	0	1,426.50	100	1,431.00
TOTAL	**17,325.40**	**57**	**12,943.90**	**43**	**30,269.30**

[a] *A parcel is developed if it has an addressed structure on it or if it is completely paved.*

[b] *15 units/acre assumed*

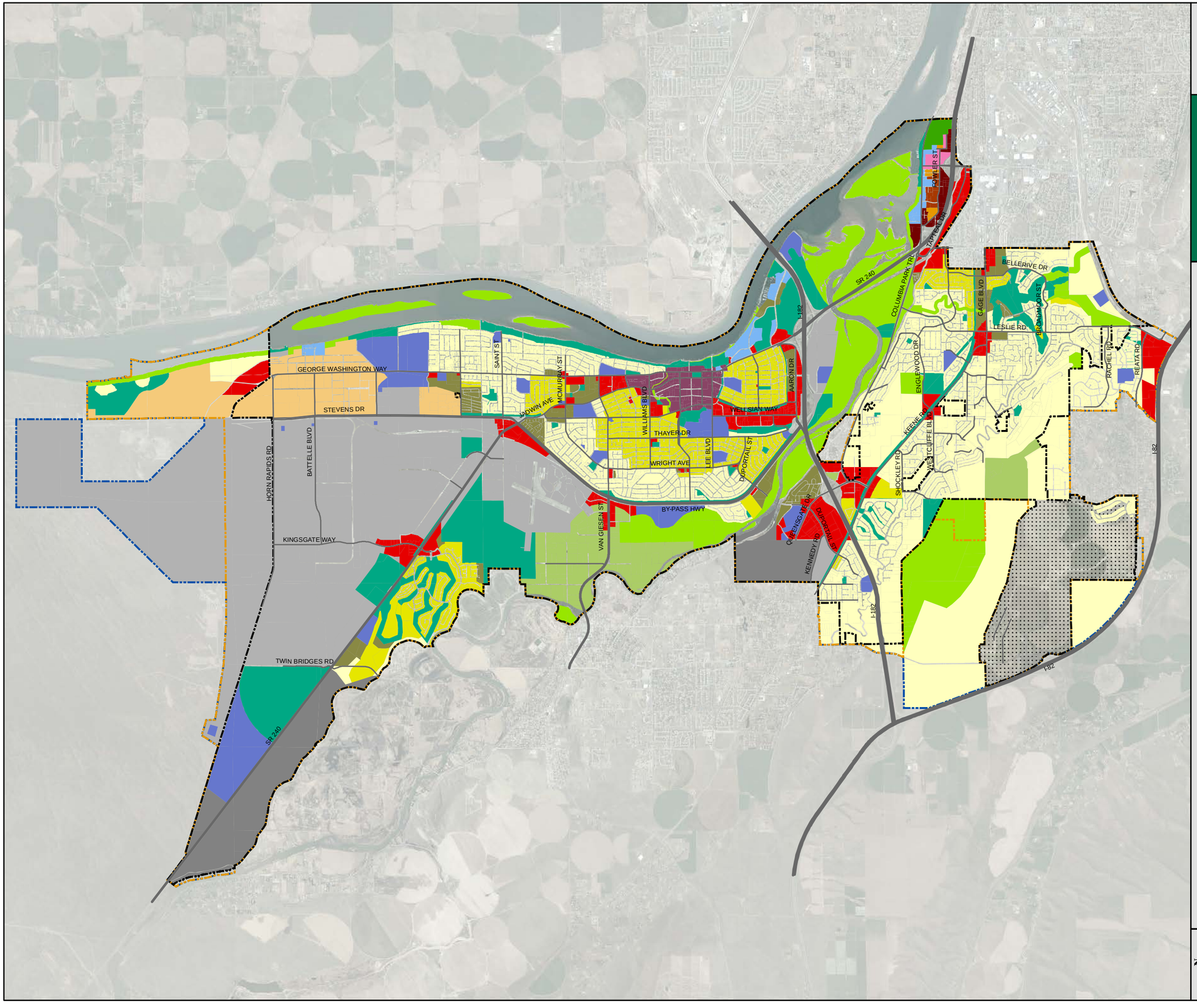
[c] *8 units/acre assumed*

[d] *3.5 units/acre assumed*

[e] *Density varies by development*

City of Richland
2015 General Sewer Plan

Figure 2-5
Land Use



Legend

- City Limits
- UGA
- 50-yr Planning
- Interstate/Highway
- Major Streets

Land Use Type

- Agriculture
- Commercial
- Business/Research Park
- Business Commerce
- General Commercial
- Retail Regional
- Commercial Recreation
- Multifamily Residential Office
- Central Buisness District
- Industrial
- Public Facility
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Waterfront
- Natural Open Space
- Developed Open Space
- Urban Reserve
- Badger Mountain South

0 6,000 12,000 Feet

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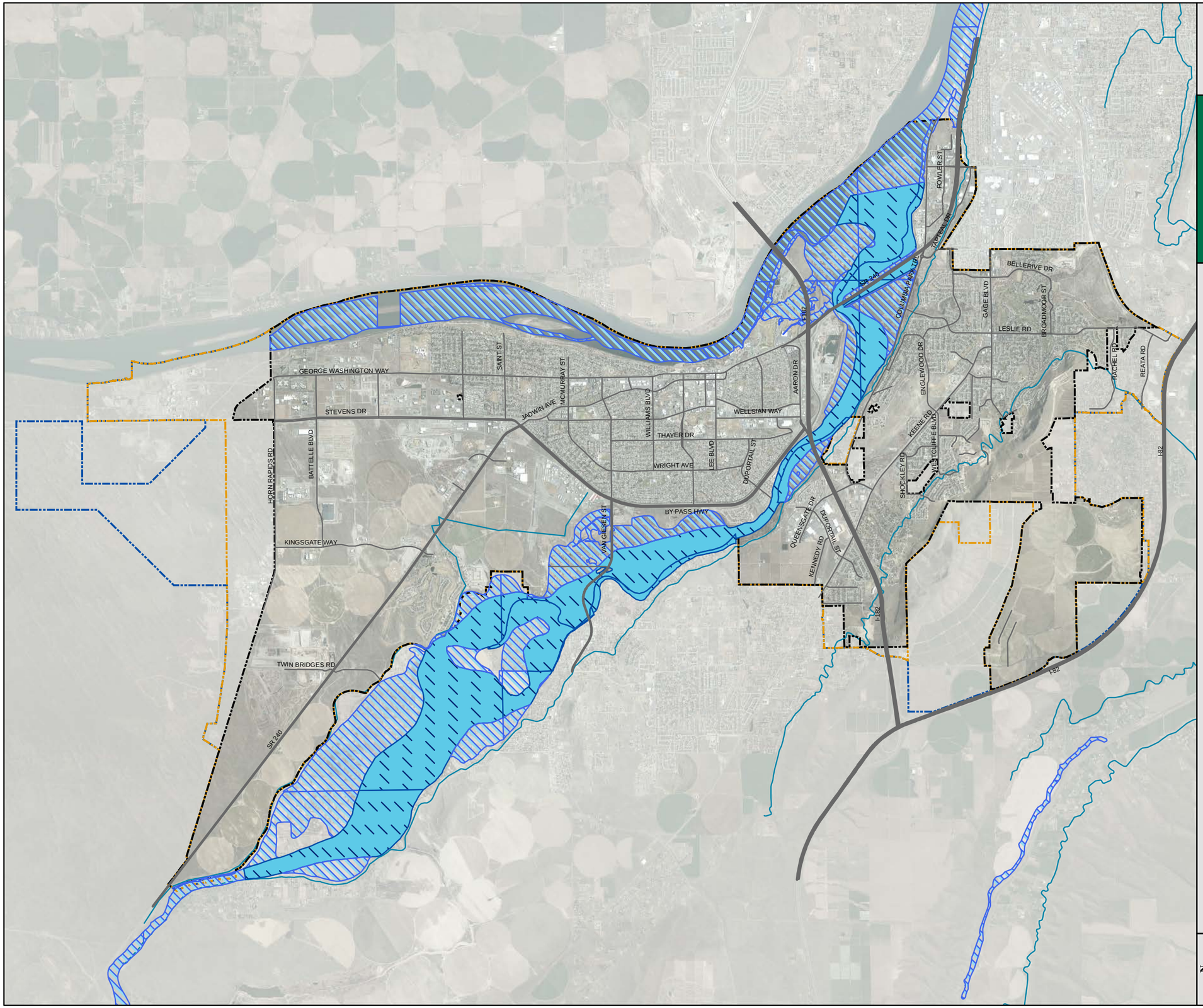
City of Richland
2015 General Sewer Plan

Figure 2-6
FEMA Flood Areas



Legend

- City Limits
- UGA
- 50-yr Planning
- Interstate/Highway
- Major Streets
- Irrigation Canal/Pipeline

Flood Areas

- 100-yr Floodplain
- Floodway

Notes:
1. Flood Data is derived from the Flood Insurance Rate Maps (FIRM) published by the Federal Emergency Management Agency (FEMA).The FIRM is the basis for floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP).

0 6,000 12,000 Feet

Date: Apr 1, 2016

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2.8 FEMA Floodway Mapping

The Federal Emergency Management Agency (FEMA), under the National Flood Insurance Program (NFIP), issued Floodway (Flood Boundary and Floodway) Maps and Flood Insurance Rate Maps (FIRM) for Richland in 1982. Subsequently, FEMA restudied and issued revised FIRM maps for select areas within the City in 1984. **Figure 2-6** illustrates the approximate boundary of 100 year flood areas in Richland. In general, sewage facilities constructed within the 100 year flood area must be protected. There are two existing sewage facilities located within the 100 year flood area in the form of two siphon crossings.

2.9 Service Area Policies

Service area policies of the Sewer Utility are defined in Title 17 of the Richland Municipal Code (RMC). This includes provisions for use of the sewer system, prohibited discharges to the public facilities, requirements for pretreatment, general standards for building sewers, general standards for public sewer construction, connection charges and monthly user charges, and requirements for compliance with the Uniform Plumbing Code.

Under paragraph 17.12, all buildings are required to connect to the public sewer system if available within 300' of the owner's property line. Under the current RMC, if a public sewer line is not available to a property (i.e. not located within 300' of the owner's property line), the owner may be allowed to construct a septic tank and drainfield in accordance with rules and regulations of the Benton Franklin Health District.

2.9.1 Wastewater Service Rates

Sewer user charges have been established for the Sewer Utility under Title 17 of the RMC. Under paragraph 17.56.010, residential and multifamily residences are charged monthly rates of $25.60 and $12.40, respectively. Multifamily customers also pay a consumption charge for sewer that is based upon water consumption.

Under paragraph 17.56.020, all non-residential customers are charged monthly rates of $61.50 including a charge of $2.15 per 100 cubic feet of volume as measured at the water service meter.

These monthly sewer service charges apply to all residences and commercial establishments within the City having a sewer on the premise or within 300 feet of the property line, regardless of whether connection to the sewer system has been made.

The monthly sewer rates for sewer furnished to out-of-city customers include a 50% surcharge.

2.9.2 Wastewater Service Connection Fees

Connection fees have been established for the Sewer Utility under paragraph 17.56 of the RMC. Sewer treatment, lift station, interceptor facilities and frontage charges are assessed and collected as a condition precedent to providing sewer service connections based on the water meter size as shown in **Table 2-3**.

Table 2-3 – Connection Fee Charges

Size of Water Meter	Facilities Assessment	Frontage Charge
¾"	$1,995	$15/LF
1"	$1,995	$15/LF
1 ½"	$6,643	$15/LF
2"	$10,633	$15/LF
3"	$19,950	$15/LF
4"	By Contract	$15/LF
6"	By Contract	By Contract

2.10 Growth Management Act Compliance

The Growth Management Act (GMA) was enacted in 1990, and amended in 1991, 1996, and 1997 to ensure coordinated, planned urban growth. The major emphasis is to manage "urban growth" including the type of growth, its intensity, its location, and its demands for utilities and services. Under the GMA, the fastest growing counties in the State (and the cities within them) are required to plan to manage growth. Several other counties, including Benton County and the cities within Benton County, have also opted to plan under the Act.

Comprehensive Plans prepared under the GMA must accommodate a 20-year growth projection. The GMA requires the establishment of "Urban Growth Areas" in order to help guide urban growth into areas that are most appropriate and to reduce urban sprawl. The GMA also requires designation and protection of agricultural lands, forest lands, mineral resource lands, and critical areas. Critical areas include wetlands, critical aquifer recharge areas that provide drinking water, fish and wildlife conservation areas, frequently flooded areas, and geologically hazardous areas.

The City has completed a Comprehensive Land Use Plan under the GMA and is in full compliance with all regulatory mandates. The City's most recent Comprehensive Plan Update was completed in 2012. This update was conducted as required by GMA to prepare periodic updates. The City has made minor annual amendments to the plan, with the most recent one occurring in 2014.

This General Sewer Plan represents a complementary implementation plan to the Comprehensive Land Use Plan. Significant capital investments will be required for the City to achieve the objectives identified in the Comprehensive Land Use plan. The ability to properly manage wastewater is essential to future residential development and to attract new commerce and industry.

2.11 Population

The City's 2015 population estimate for the incorporated area is 53,054. This population is estimated based on a Washington State Office of Financial Management (OFM) Benton County population estimate which was updated in April 2014. The 2010 US Census data indicates that there are 2.42 people per single-family residential home.

The County's most recent Comprehensive Plan estimates a population of 76,533 for the incorporated area by the year 2035. This estimate yields an estimated growth rate of 1.85 percent per year over the next 20 years.

Population projections are shown in **Table 2-4**. These population projections are based on the successful implementation of the City's Growth Management Plan.

Table 2-4 – Population Projections

Year	Service Area Population
2015	53,054
2035	76,533

2.12 Badger Mountain Area Master Planning

South of Badger Mountain is a large planned residential and commercial development known as Badger South. It is the source of the majority of the projected sanitary sewer flow for the area of Richland south of the Yakima River. The Badger South development and vicinity area are shown on **Figure 2-7**. Several sewer planning efforts for this area have been undertaken over the past 15 years. The following is a brief summary of studies completed in 2001, 2004, 2006, and 2010 for the development of the area south of Badger Mountain. The purpose of this summary is to document the history in regards to sewer service concepts for this planned area and to provide background that is applicable to the discussion in the Committed Model and Master Plan Model sections.

2001 Feasibility Study for Wastewater Facilities

This study prepared by J-U-B looked at the planning level feasibility for providing sanitary sewer service to the proposed Badger Mountain Project. In 2001, a lower density of residential development was planned and included a golf course as part of the development. The Study evaluated several different wastewater treatment and disposal options including: onsite sewer systems, evaporation ponds, lagoons, and conventional activated sludge plant. The Study also evaluated connection to the City of Richland sanitary sewer collection system by connecting to an interceptor planned to be extended south from Meadow Springs approximately 2 miles east of the project site (Leslie interceptor). The Study identified three feasible ways to connect to this future sewer trunk:

1. Rachel Road: A lift station would pump sewage via a force main along Clover Road to the top of Rachel Road and then a gravity collection system would follow Rachel Road. A significant amount of pavement restoration, traffic control, and construction impacts to residences were noted as key issues.
2. Canyon Route: A lift station could be avoided if a gravity sewer interceptor was constructed through the canyon that passes through the El Rancho Reata development to Leslie Road. The presence of shallow bedrock was identified as a key issue that would require further evaluation.
3. Bermuda/Reata Road: A lift station would be required to pump sewage to the high point near the Bermuda/Reata Road intersection. The alignment would follow Reata Road east to Leslie Road and then north to Rachel/Leslie Road intersection. The route is not very direct and pavement restoration, traffic control, and construction impacts to residents were identified as key issues.

An alternative point of connection to the Richland sewer system was also identified as the interceptor on Gage Boulevard. This fourth option would follow the alignment of a new road planned to be constructed from Gage Boulevard southwest over the ridge to the Badger Mountain development. A lift station would still be required; however, the pavement restoration, traffic control, and disruption to residences would be minimized.

Because the study area was not part of the City's UGA at the time, the connections to the City system were dropped from further consideration. However, it was noted that connection to a municipal system was the least costly option and the development was encouraged to continue to pursue the possibility of annexing the area in to the City UGA.

2004 General Sewer Plan

The General Sewer Plan update prepared by Brown & Caldwell evaluated four alternative locations for routing flows from the planned Badger Mountain development into the City's collection system. The planning level flows for the development at the time amounted to a total average daily flow of approximately 1.5 million gallons per day (mgd). The four collection system alternatives evaluated were:

1. Willowbrook Basin: This was essentially the Rachel Road alternative that was identified in the J-U-B Study. A lift station would pump flows through a force main along Clover Road and then gravity flow through an interceptor along Rachel Road. Several existing pipes were identified as needing to be upsized for this alternative.
2. West Gage Basin: This was essentially the fourth alternative identified in the J-U-B Study. A new lift station would pump flows over the ridge to the north of the Badger Mountain development and into the trunk on Gage Boulevard. Several existing pipes were identified as needing to be upsized for this alternative.
3. Dallas Road: This alternative considered a lift station that would pump flows around Badger Mountain to the northwest and connect to the City's system in the Country Estates development. Several existing pipes were identified as needing to be upsized for this alternative.
4. Reata Road: This was essentially the third alternative identified in the J-U-B Study. This alternative considered a lift station that would pump flows south and east along Reata Road and connect to the future Bellerive Lift Station. Several existing pipes were identified as needing to be upsized for this alternative.

The General Sewer Plan provided planning level cost estimates and identified the Dallas Road alternative as the least costly alternative. However, it was noted that the City would be required to correct several existing system deficiencies and this option increases the City's operations and maintenance costs – which were not accounted for in the analysis. The General Sewer Plan also evaluated a fifth alternative – a satellite Membrane Bioreactor (MBR) Reclamation plant. This alternative would provide a remote, modular wastewater treatment plant that would provide highly treated water for reuse. It was identified that a use, such as a golf course or playfields, would need to be found for the reuse water in order for this option to be feasible. In addition, further evaluation would need to account for energy, O & M costs, and effluent disposal.

2006 Badger Mountain/Valley View UGA Expansion Capital Facilities Plan

This study prepared by J-U-B looked at capital facilities impacts of expanding the City of Richland UGA boundary to incorporate the proposed Badger Mountain development area. The plan identified two distinct drainage basins in the planning area – the West Basin and the East Basin and identified that a lift station would be needed for each drainage basin. The sanitary sewer plan identified sewer flows from the West Basin that would be pumped northwest through the Country Heights development (alternative 3 identified in the 2004 General Sewer Plan). The East Basin would be pumped via a lift station over the ridge to the north to Meadow Hills Drive and into the interceptor on Gage Boulevard (alternative 2 from the 2004 General Sewer Plan).

2010 Badger Mountain Sub-Area Plan

This study prepared by PacWest Engineering developed the master plan for the Badger Mountain development which had become part of the City's UGA at that time. The Plan evaluated three alternatives:

1. West Basin to Country Ridge, East Basin and Wilson Basin to Meadow Hills.
2. West Basin, East Basin, and Wilson Basin all to Meadow Hills.

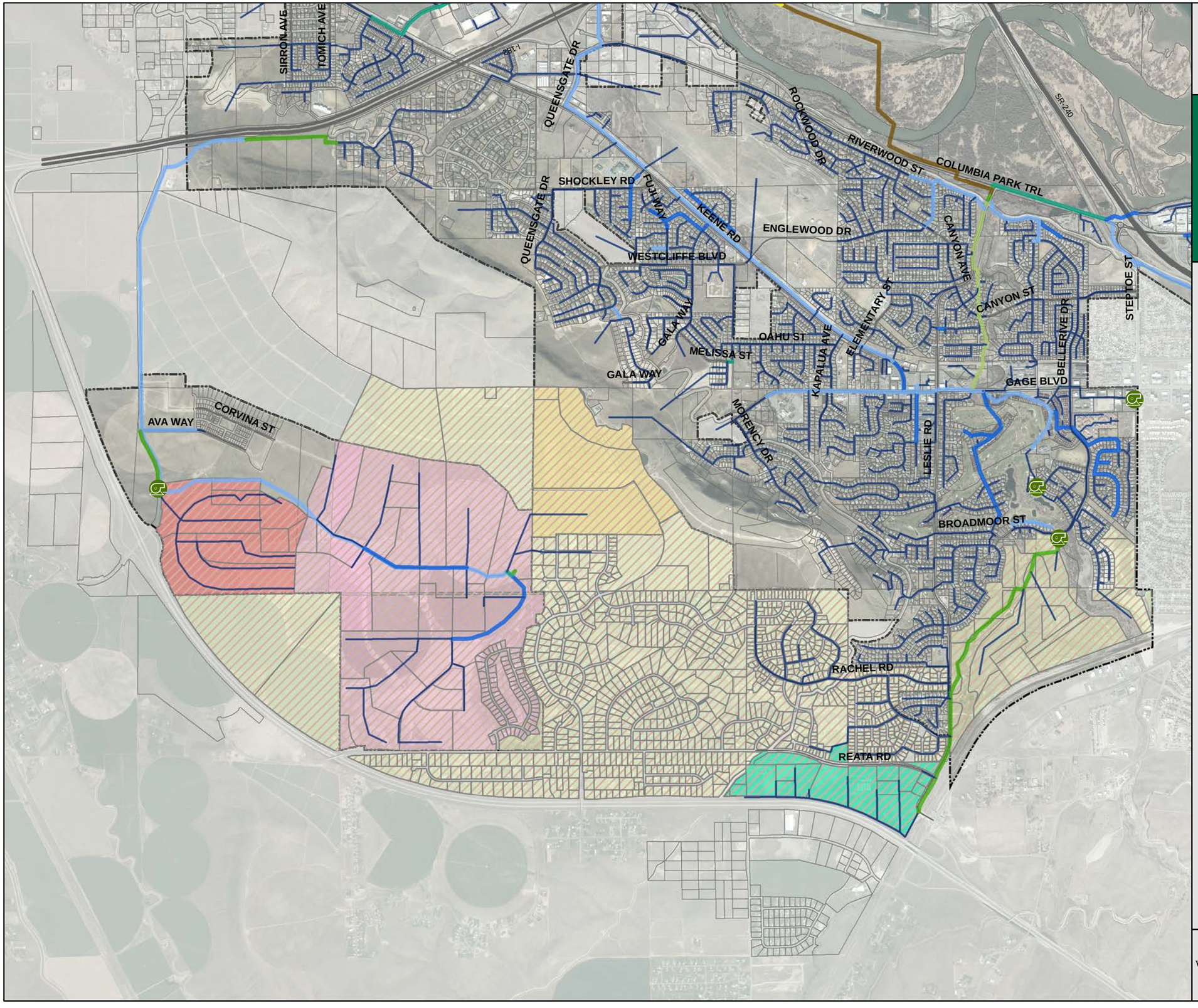
3. West Basin and East Basin to Country Ridge, and Wilson Basin to Meadow Hills.

Preliminary cost estimates indicated that option 3 was the least cost alternative. However, the costs did not take into the account the relatively high operations and maintenance costs that would be incurred by the City to operate two new, large, regional lift stations. Moreover, the construction cost estimates for the lift stations also appear to be low. Nonetheless, this is the current approved plan for providing sewer service to this area.

This concept as identified in the 2010 Sub-Area Plan has been incorporated into the hydraulic modeling scenarios that are later discussed in this Chapter. There are several off-site improvement projects that will be necessary upon buildout of the Badger Mountain Area – as discussed in subsequent sections.

City of Richland
2015 General Sewer Plan

Figure 2-7
Badger Mountain Study Area



Legend

- City Limits
- Interstate/Highway
- Major Streets
- City Lift Stations
- Annexation Area
- East-Badger South Dev.
- Part of West-Badger South Dev.
- Wilson Area
- Bellerive LS Basin

Pipe Size (in)

- Collector
- 10
- 12
- 15
- 18
- 21
- 24
- 27
- 30
- 36
- 42
- 54

0 2,500 5,000 Feet

N W E S

Date: Apr 25, 2016

J·U·B ENGINEERS, INC.