Clean Water Services

West Basin Facilities Plan

Basis of Planning Executive Summary

FINAL

February 2014

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EXECUTIVE SUMMARY

1.0 PURPOSE

The primary purpose of the Basis of Planning task is to establish a common planning basis that provides a consistent framework for evaluating the conveyance and treatment systems under their individual planning efforts. The Basis of Planning defined the project goals and criteria, study area characteristics, and identified permitting and regulatory requirements that could impact the type and/or timeframe of the recommended improvements.

2.0 PROJECT GOALS AND CRITERIA

Project goals, planning objectives, and alternative evaluation criteria were developed working with District staff prior to the development of alternatives and their evaluation. Based on the discussions, the planning year for alternatives comparison is 2035. In addition to evaluating alternatives for their ability to meet the District's anticipated needs in 2035, it was agreed that the planning team should also evaluate the alternatives using build-out population and loadings. Although alternatives were primarily compared and evaluated based upon their cost to meet 2035 conditions, the build-out analysis helped in determining whether decisions for meeting anticipated 2035 conditions might result in stranded investments or abandonment of facilities as the District continued to grow beyond the planning year.

2.1 Planning Goals

The goals and planning objectives for the project are:

1. Be consistent with, and advance strategies to improve, overall watershed health (i.e. Water Supply Project, Watershed based Permit).
2. Be flexible and provide a framework for successful long-term implementation decisions.
3. Meet all applicable regulatory requirements.
4. Be a vision for the future.
5. Be accepted by internal and external stakeholders, elected officials, and the public.
6. Be cost-effective.

2.2 Evaluation Criteria

The alternatives were evaluated using both economic and non-economic evaluation criteria. These criteria were adopted by the planning team to make sure that the recommended alternatives were consistent with the public values and project goals.

The economic evaluation of alternatives was based on present worth analysis which included initial capital cost, and operation and maintenance costs over the planning period. The non-economic evaluation criteria were identified and adopted by the District and consultant planning team. They are:

- Ease of Operation.
- Environmentally Beneficial.
- Flexibility.
- Public Acceptance.
- Compatible with Other District Programs and Initiatives.

3.0 STUDY AREA CHARACTERISTICS

3.1 Existing District Boundary and Sewer Basins

The existing District Boundary and Sewer Basins are shown in Figure 1. The western portion of the District is defined by the Rock Creek, Hillsboro, and Forest Grove WWTF Basins, and is called the “West Basin.” The basin delineations were developed by the District and were based on sewershed contour data; properties outside of the basin flow by gravity away from the District. The West Basin sewer service area includes approximately 36,000 acres and serves areas of Washington County and the Cities of Hillsboro, Forest Grove, Cornelius, North Plains, Banks, Gaston, and some portions of Beaverton and Portland.

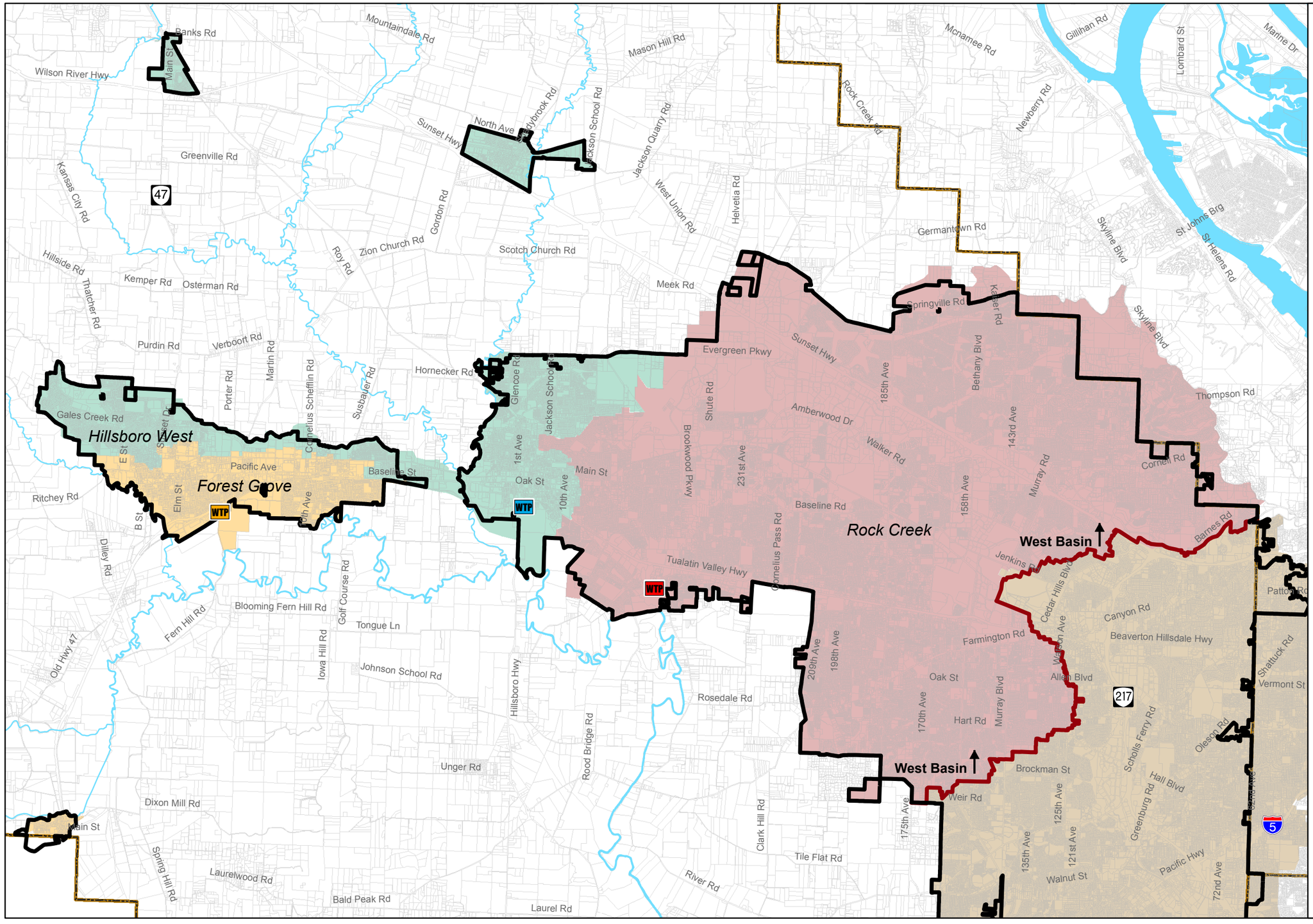

Figure 1
West Basin Service Areas
West Basin Facilities Plan
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3.1.1 Land Use

Land use is important for understanding the location and quantity of wastewater flows and loads. This WBFP uses the current land use provided by Metro's "taxlot" data. Figures 2 through 4 present the current land use for the Forest Grove, Hillsboro, and Rock Creek service areas, respectively.

3.1.2 West Basin Service Area Population

Population data was used to help develop per capita flows and pollutant loadings for each West Basin treatment facility. The per capita flows and loadings were then used to help project future flows and loadings based upon projected population growth

Service area population estimates used in this plan were based on the 2010 Census data, which provides the 2010 population for each census block. The 2010 Census Blocks are shown in Figure 5. The majority of these blocks coincide with city boundaries. In some areas, the census blocks overlap city and District boundaries. To estimate the population in these areas, a ratio is applied to the overall block population based on the ratio of taxlots in the boundary versus taxlots outside of the boundary. Table 1 presents the 2010 population estimates for each West Basin service area.

Table 1 Current Population per WWTF Basin
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	Forest Grove WWTF Basin	Hillsboro WWTF Basin	Rock Creek WWTF Basin
2010 Population	21,031	38,873	250,338(1)

Notes:
(1) This total does not include an additional 6,872 people that are estimated to be outside of the current District Boundary, but inside the current Rock Creek WWTF Basin, as shown in Figure 3.

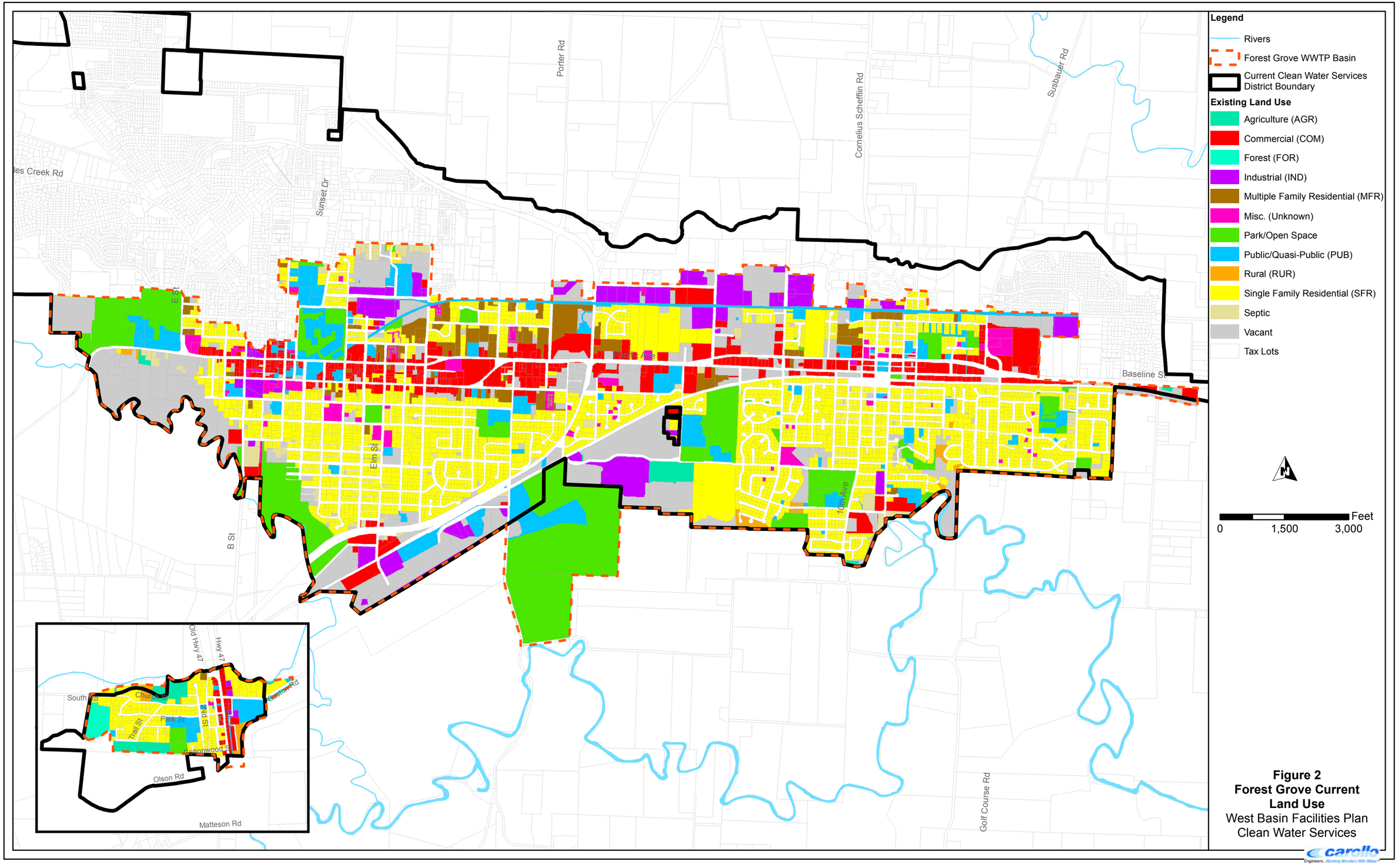

Figure 2
Forest Grove Current Land Use
West Basin Facilities Plan
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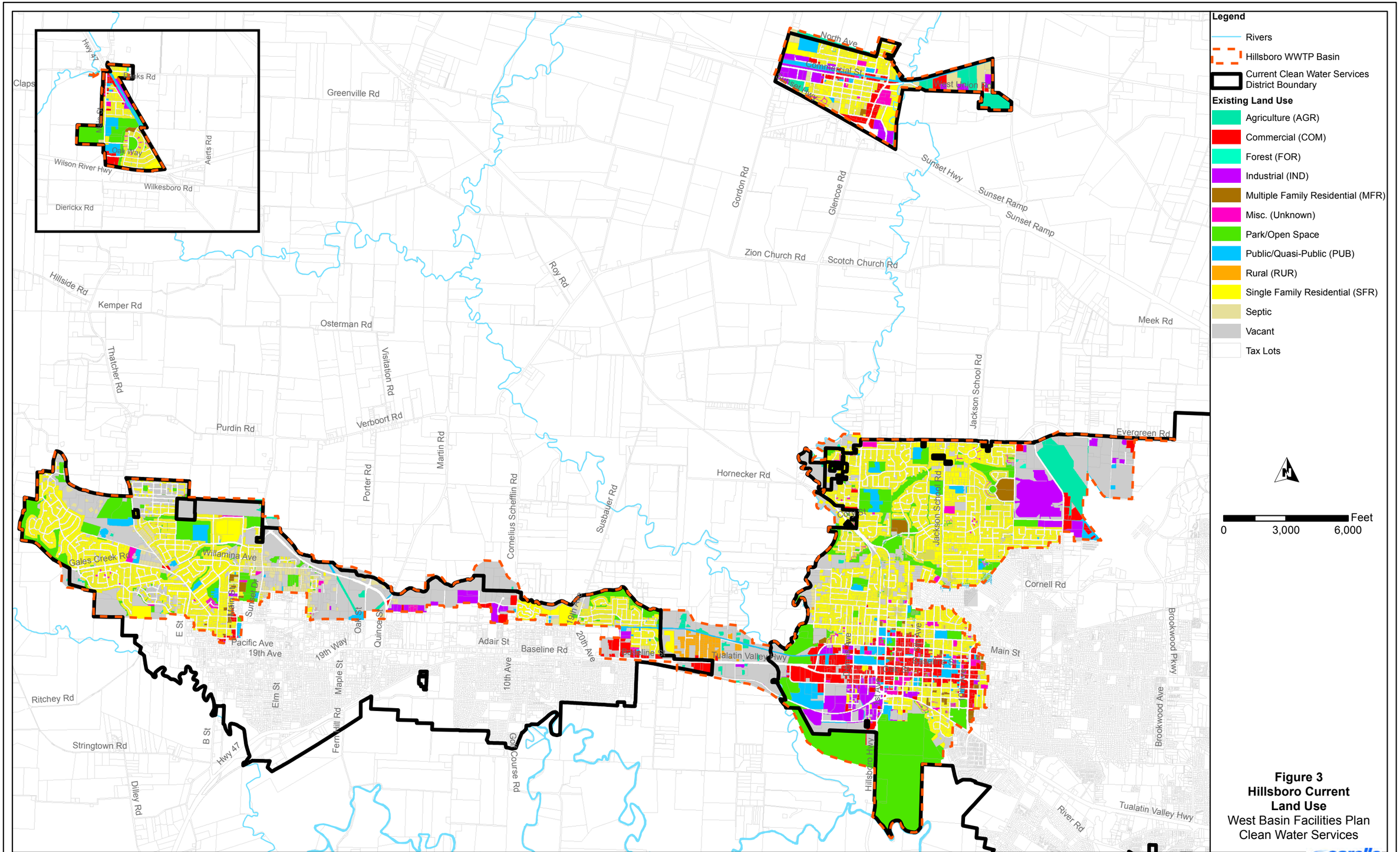

Figure 3
Hillsboro Current Land Use
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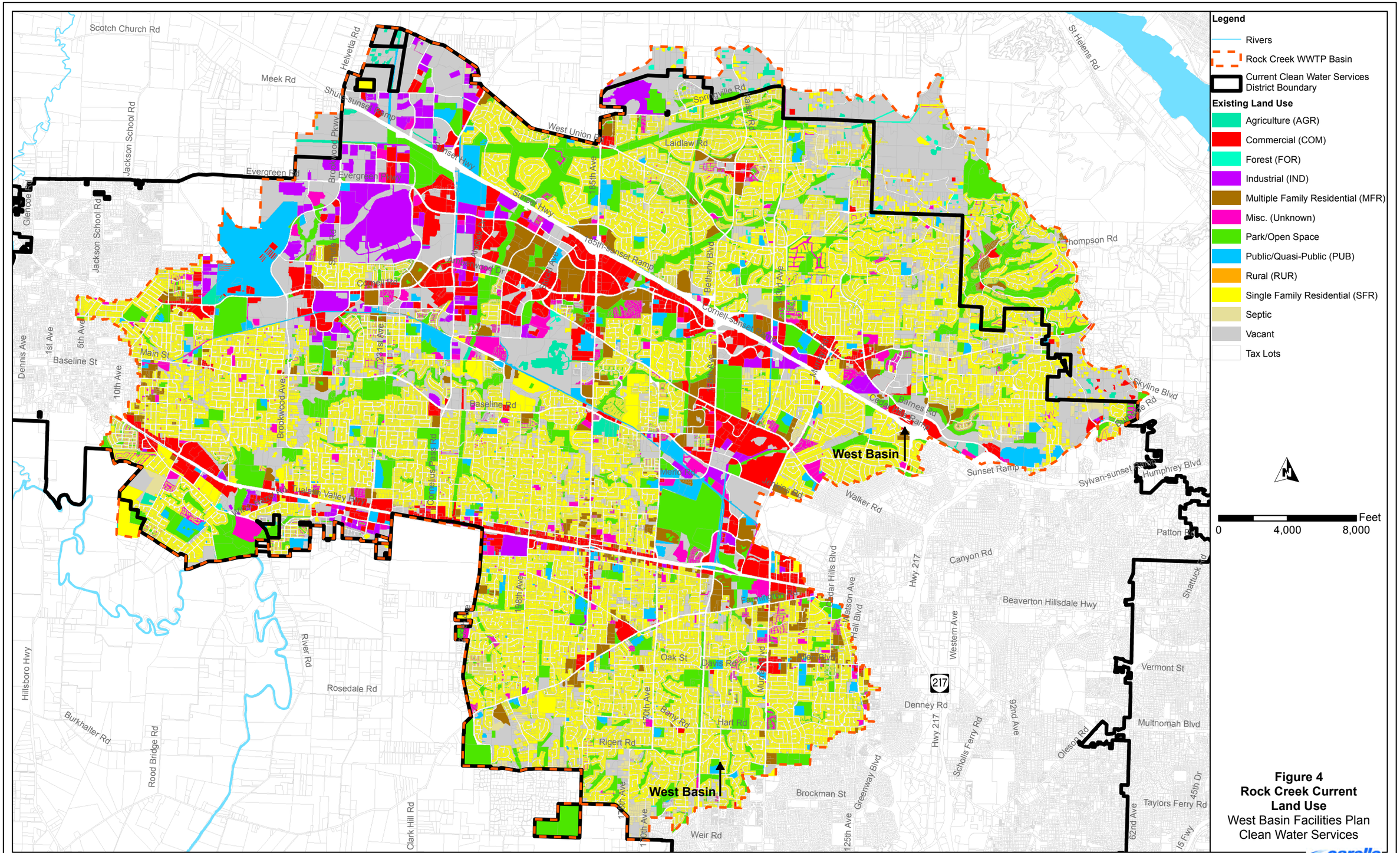

Figure 4
Rock Creek Current Land Use
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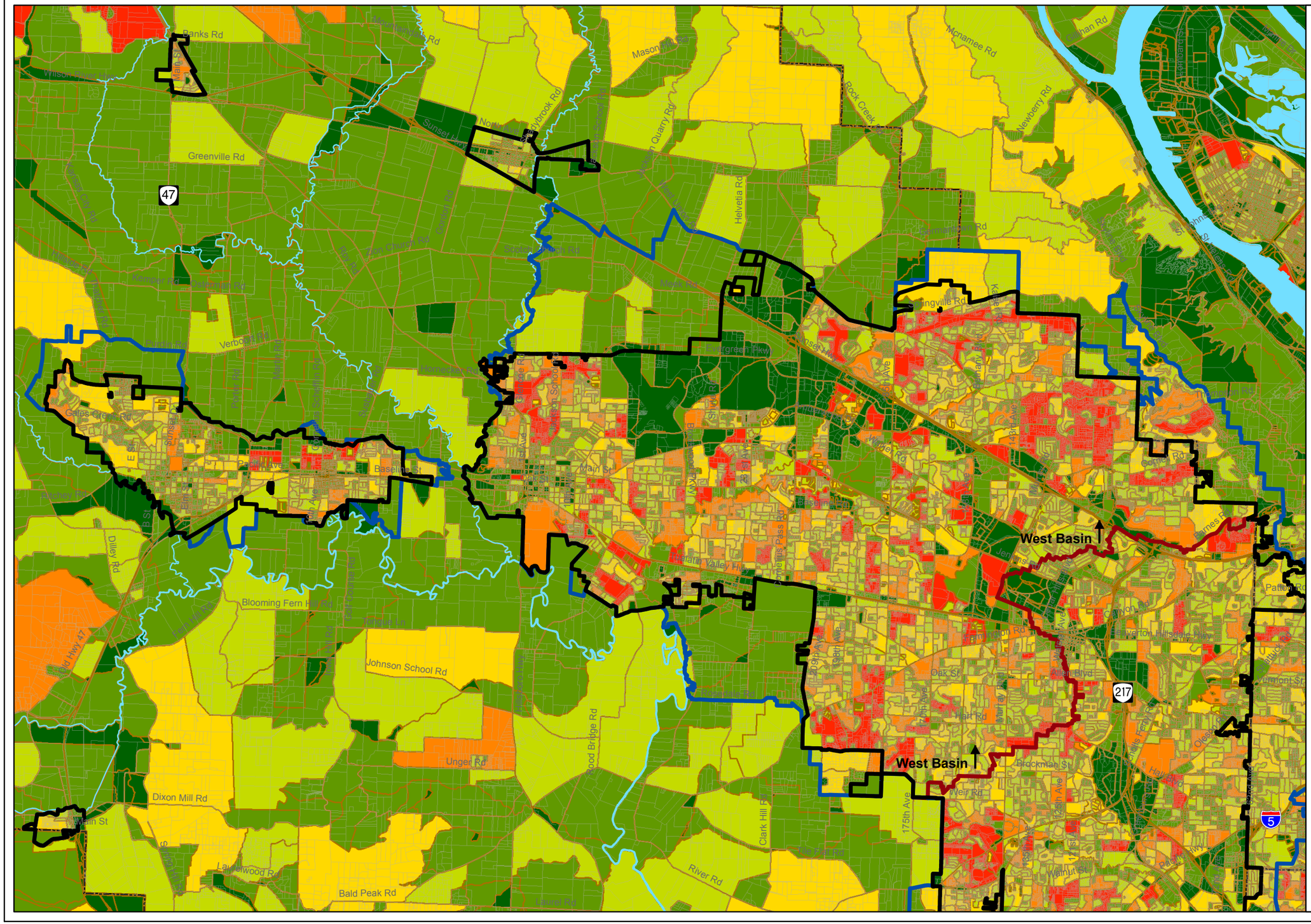

Figure 5
Population Census Blocks
West Basin Facilities Plan
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Engineers...Working Wonders With Water

3.1.3 Wet Industry

The District tracks wastewater flows and loads from high-flow industrial customers, commonly called “Wet Industries.” The current and projected wet industry flows were added to the current and projected flows in each basin.

3.2 Future Service Area

The WBFP Update provides an updated look at the future District service area so that decisions can be made regarding long-term infrastructure needs and treatment requirements for each West Basin treatment facility. Assumptions about the future service area are discussed below, including the future district boundary, areas of expansion, land use, population, and wet industrial flows.

3.2.1 Future District Boundary

Two future growth scenarios were considered: the 2035 District Boundary, and the Build-out District Boundary.

By the year 2035, it is assumed that the District Boundary will extend to serve all properties within the Urban Growth Boundary (UGB). The UGB delineates where development is expected to occur in the next twenty years, according to current regional planning assumptions. The current UGB is shown on Figure 8 as a dashed black line.

Figure 6 also presents the “Assumed Build-out District Boundary” (shown in blue). This boundary represents all areas within the UGB and the adopted Urban Reserves adjacent to the member Cities. The UGB, combined with the Urban Reserves, delineates the locations where development is expected to occur in the next 40 to 50 years. It is assumed, that at build-out, the District will eventually serve all developed properties in these areas.

3.2.2 Future Land Use

Future land use assumptions were used to project the quantity and location of future flows. For areas within the UGB, future land use has been established by each City’s comprehensive planning efforts. Outside the UGB, future developed land use has not been established and assumptions on the number of households and businesses were made to develop wastewater flow projections. This methodology is outlined in TM 1.2.

Future land use for each West Basin service area are shown in Figures 7 through 9.

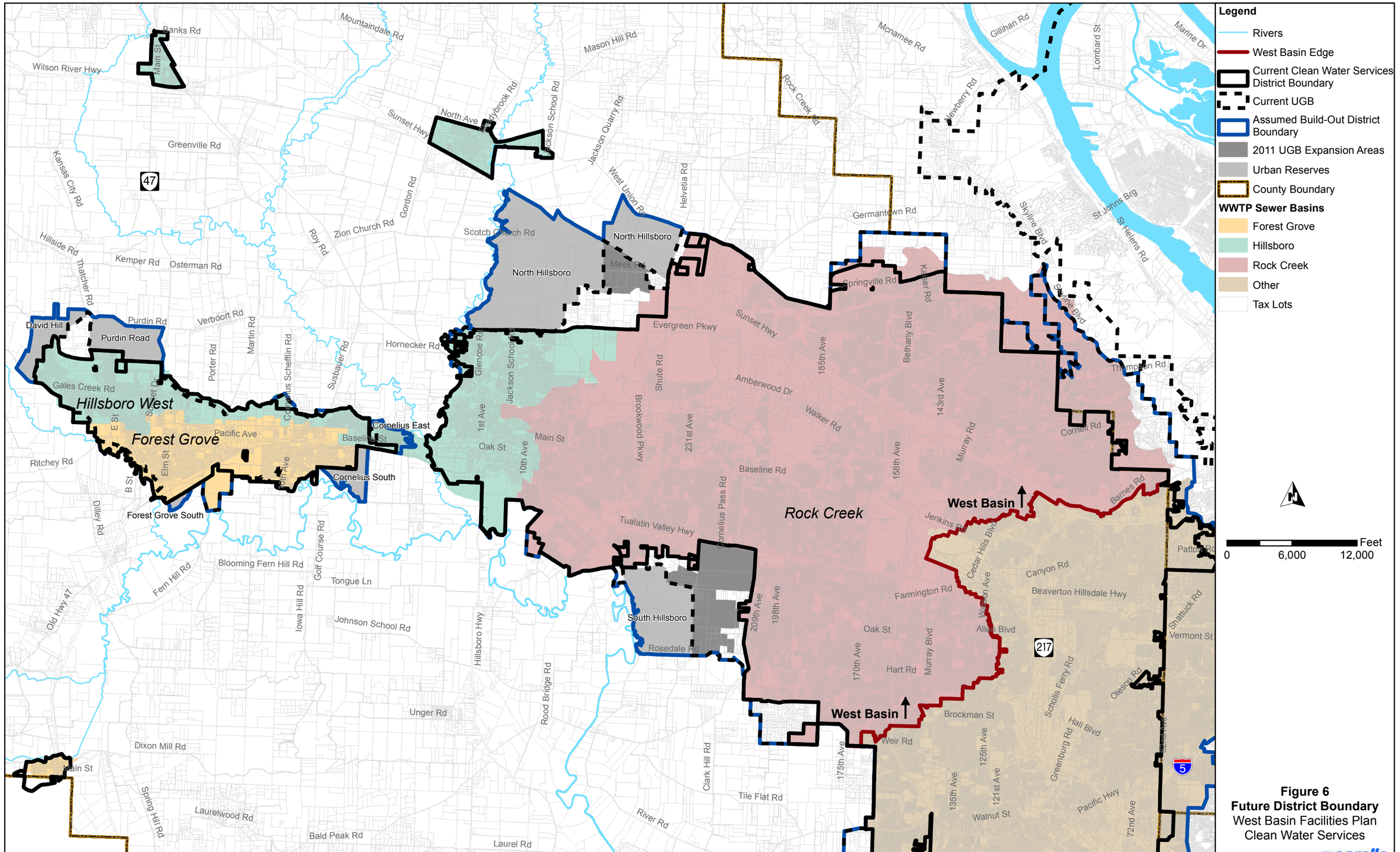

Figure 6
Future District Boundary
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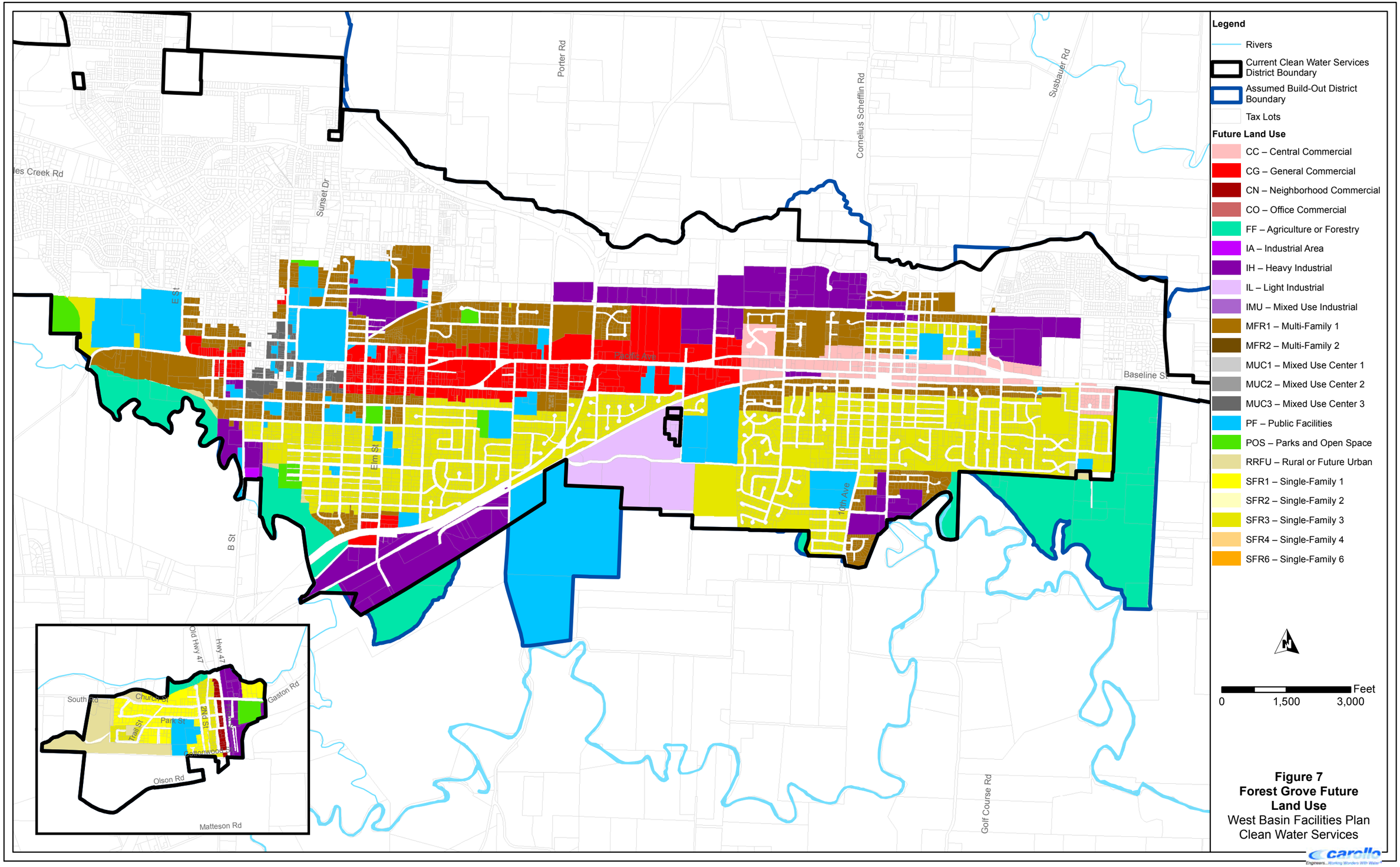

Figure 7
Forest Grove Future Land Use
West Basin Facilities Plan
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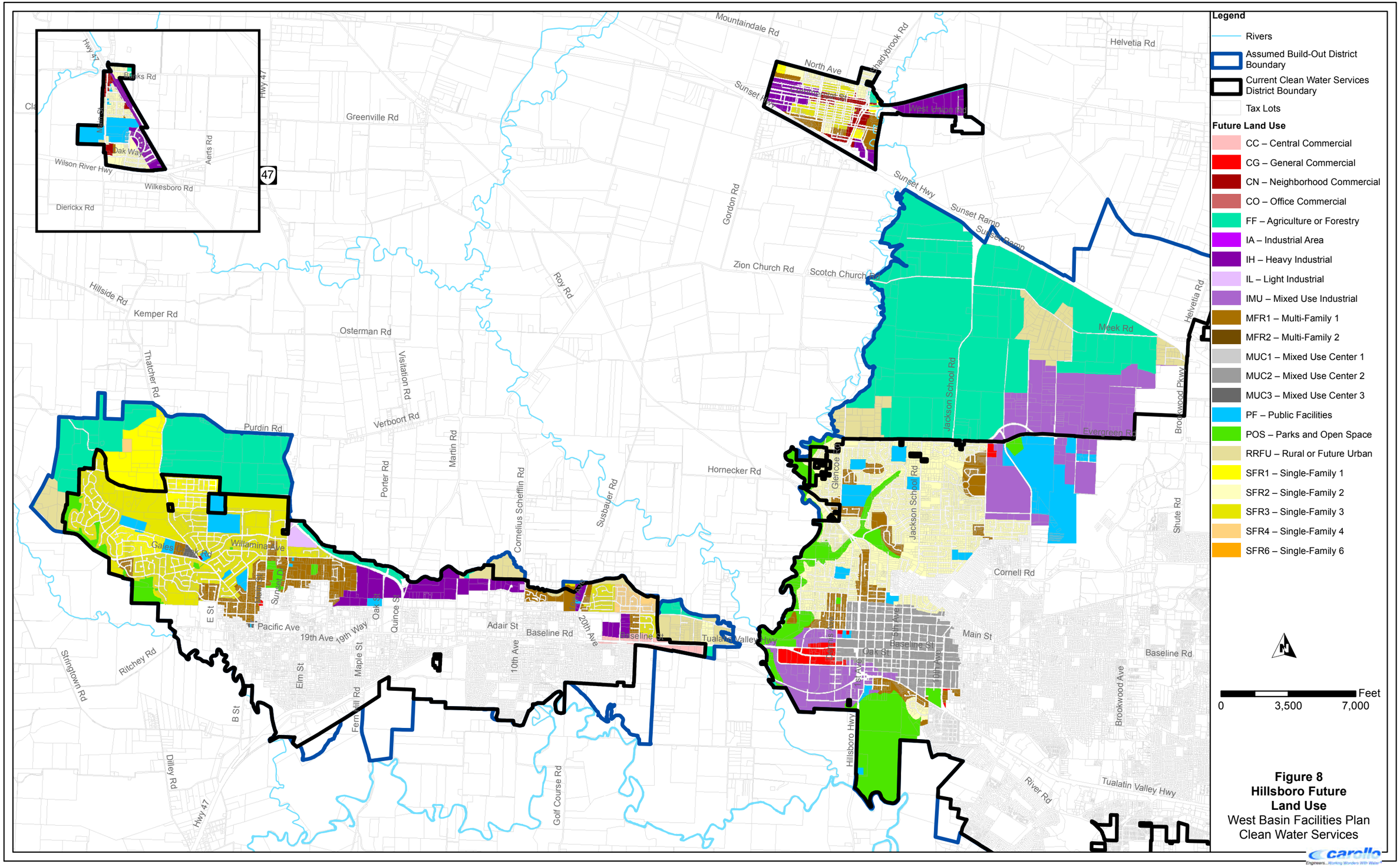

Figure 8
Hillsboro Future Land Use
West Basin Facilities Plan
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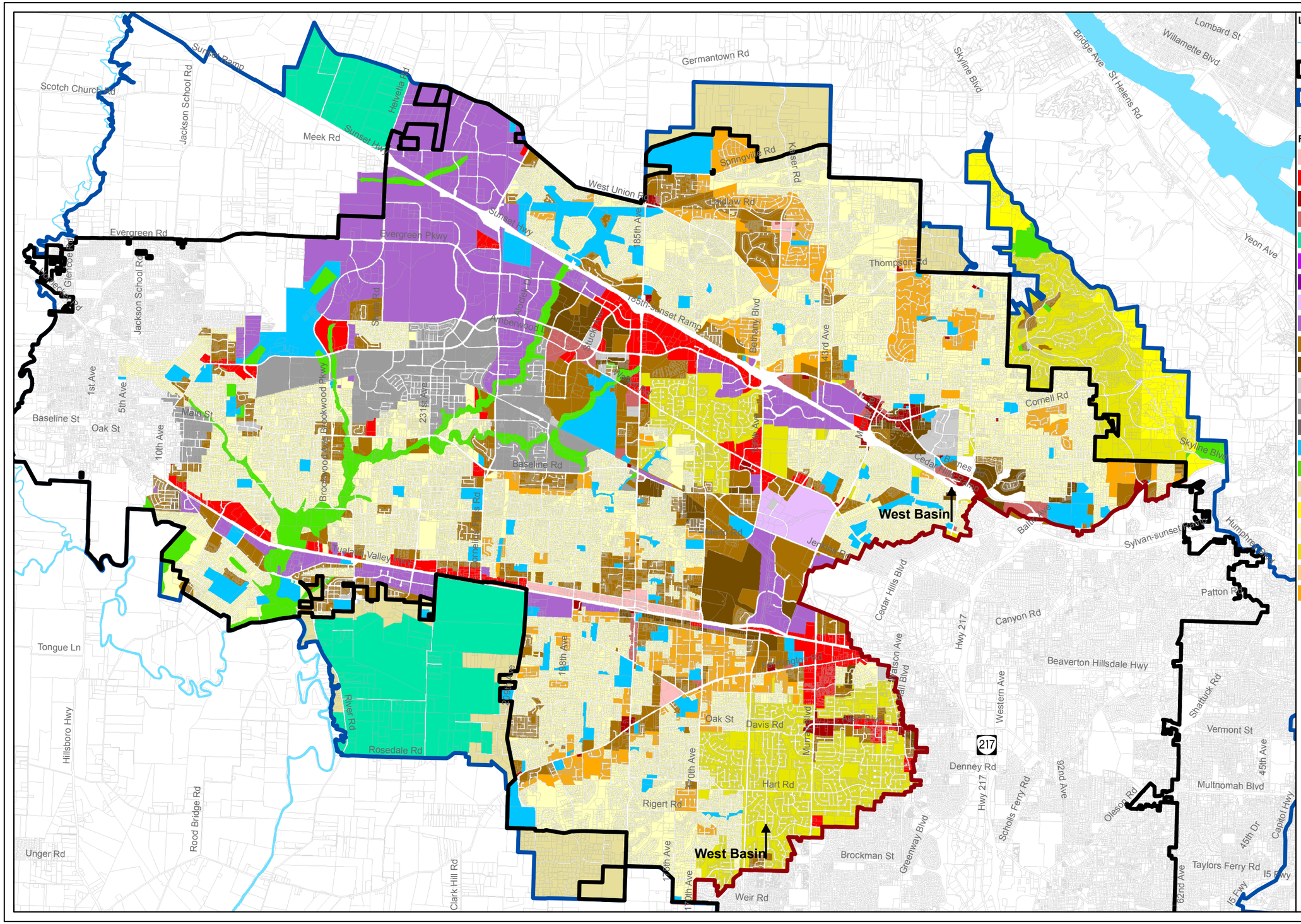

Figure 9
Rock Creek Future Land Use
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Two build-out scenarios were developed and evaluated. These two scenarios are called "Existing Development and Infill" and "Full Development." For Existing Development and Infill, it is assumed that currently vacant and underutilized properties will develop according to the Comprehensive Plan, but currently developed properties will not change. For Full Development, it is assumed that all properties develop or redevelop consistent with the densities and uses established in the Comprehensive Plan.

3.2.3 Rate of Growth within Service Area

Rates of growth in the number of households were derived from current and projected TAZ data. Figure 10 presents the TAZ overlapped on the District. Metro provided the projected number of households in 2035 for each TAZ. In some cases, the Cities had differing assumptions for the 2035 number of households per TAZ. In these cases, the City's assumptions were used.

The rate of growth is estimated as the 2035 number of households minus the current number of households (2010), divided by 25 years. The average rates of growth for the WWTP Basins are shown in Table 2.

Table 2 Rates of Growth
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	Forest Grove	Hillsboro	Rock Creek
2010 Households[(1)]	5,635	12,859	96,679
2035 Households - Metro	7,455	17,755	134,115
2035 Households - Cities	7,455	17,527	128,970
Growth Rate per Year – Metro[(2)]	**1.29%**	**1.52%**	**1.55%**
Growth Rate per Year – Cities[(2)]	**1.29%**	**1.45%**	**1.34%**
Growth Rate per Year – Average	**1.29%**	**1.49%**	**1.44%**

Notes:
1) Based on Metro's households per Transportation Analysis Zone (TAZ).
2) Increase in households over 25 years (2035 – 2010) divided by current households.

3.2.4 Future Population

The 2035 and build-out population projections were based on number of households. The population projections based on number of households used the weighted average household size of 2.8.

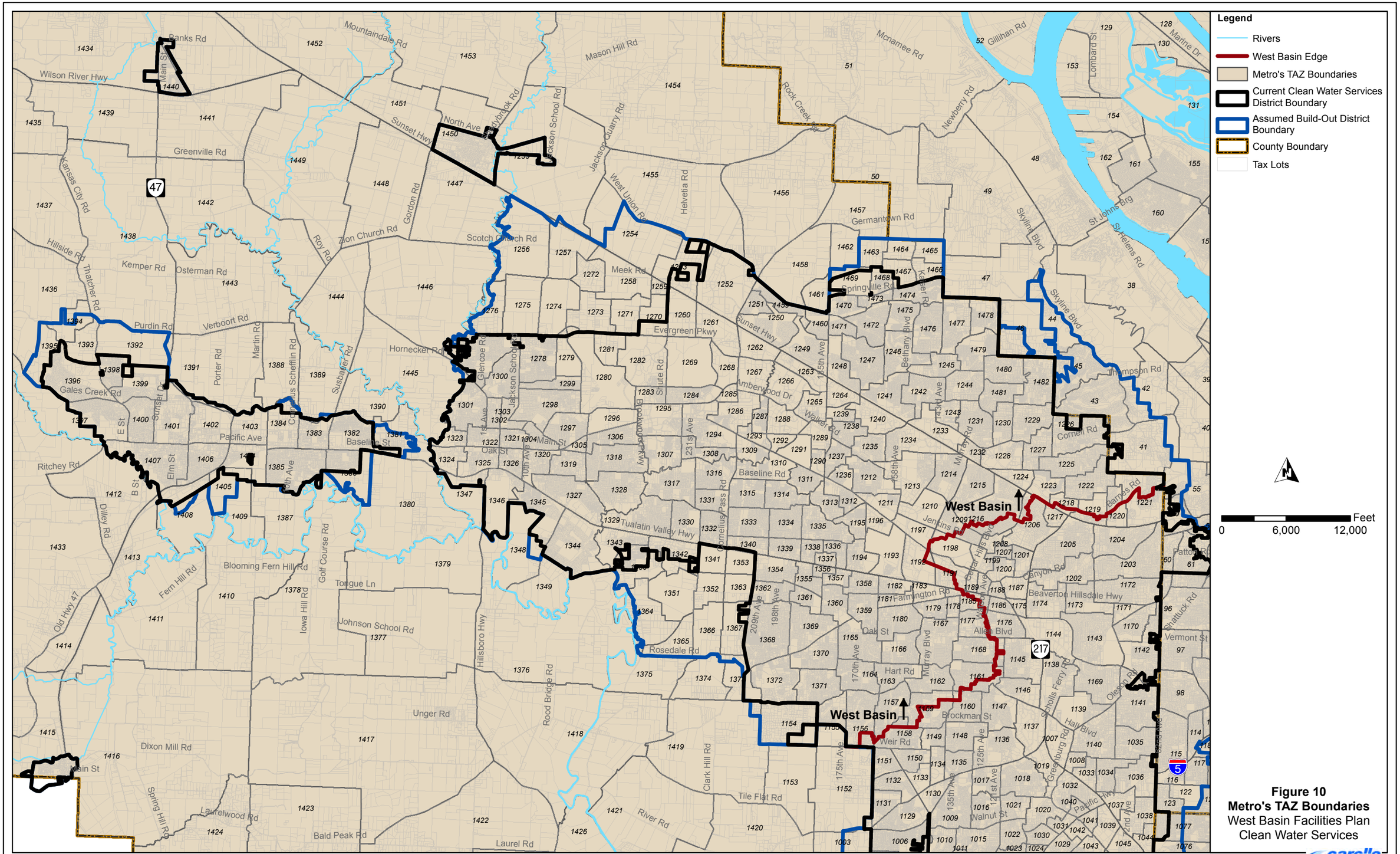

Figure 10
Metro's TAZ Boundaries
West Basin Facilities Plan
Clean Water Services

4.0 PERMITTING AND REGULATORY

It is anticipated that discharge requirements for the District's treatment facilities will evolve throughout the planning period as necessary to protect water quality in the Tualatin River and to protect established beneficial uses.

The objective of this task is to identify current and future regulatory requirements that could impact the type and/or timeframe of the recommended improvements in the conveyance system and at the Rock Creek, Forest Grove, and Hillsboro plants.

4.1 Potential Permitting and Regulatory Issues

Working with District staff, the planning team identified and prioritized regulatory issues that could have a significant impact on District facilities and operations through the planning period. The regulatory issues considered by the planning team include:

4.1.1 Revised Ammonia Criteria

Ammonia is present in treated effluent discharged from the District's facilities. Unionized ammonia is toxic to fish and invertebrates. The concentration of unionized ammonia is dependent upon effluent concentrations, mixing, pH and temperature. Water quality criteria have been developed to protect sensitive salmonid species. In 2013, the ammonia criteria were revised by the USEPA to protect threatened and endangered fresh water mussel species, which are sensitive to low concentrations of ammonia at certain life stages.

4.1.2 Technology Based Nutrient Limits

Secondary treatment is currently defined in terms of BOD, Total Suspended Solids and pH concentrations in the effluent.

There has been interest by some states and by national environmental groups to redefine "secondary treatment" as established by the 1970 Clean Water Act and 40 CFR to include limitations for nutrients – specifically phosphorus and nitrogen. Environmental groups have petitioned US EPA to adopt nutrient limits. To date, USEPA has rejected those petitions.

4.1.3 Temperature

Cool stream temperatures are important to the survival and successful reproduction of salmonids. The Oregon Department of Environmental Quality (DEQ) has worked with the Oregon Department of Fish and Wildlife to identify seasonal timing and location of salmonid spawning, rearing, and passage for waters of the state, including the Tualatin River. DEQ has adopted a temperature standard to protect these activities.

Although the District's wastewater treatment plants contribute little or no heat to the effluent, human activities throughout the service areas result in discharged wastewater having a thermal

load that when combined with streamflows and riparian impacts in the Tualatin, could result in exceedances of established numerical criteria.

In addition to the numerical criteria, which are bioolgically-based, in 2005 DEQ adopted narrative criteria that allowed usage of less stringent criteria when DEQ establishes that the natural thermal potential is higher than the biologically-based criteria. The narrative criteria were found in the Oregon Administrative Rules as follows:

"OAR 340-041-0028(8): Natural Conditions Criteria. Where the department determines that the natural thermal potential of all or a portion of a water body exceeds the biologically-based criteria in section (4) of this rule, the natural thermal potential temperatures supersede the biologically-based criteria, and are deemed to be the applicable temperature criteria for that water body."

"OAR 340-041-0007(2): Where a less stringent natural condition of a water of the State exceeds the numeric criteria set out in this Division, the natural condition supersedes the numeric criteria and becomes the standard for that water body…."

In August 2013, in response to a federal court ruling, USEPA rejected Oregon's narrative temperature criteria and the concept that criteria established to meet the natural thermal potential could supersede the established biologically-based critieria.

DEQ developed, and USEPA approved, a Temperature TMDL on the Tualatin subbasin in 2001. This TMDL allocated thermal load and established best management practices for temperature management in the Tualatin subbasin.

The Tualatin Temperature TMDL was to be revised in 2012 to meet the new 2005 temperature standard which included the narrative temperature criteria which are now disallowed. As a result of the uncertainty about the status of Oregon's narrative criteria, the revision to the Tualatin Temperature TMDL was not included in the 2012 revisions.

The District's approach to temperature management and attainment of NPDES permit limits to meet the load allocations established in the 2001 Temperature TMDL has been to utilize flow management and improved riparian shading to offset the thermal load from the treatment plants. At this point, with the uncertainty surrounding DEQ's regulatory approach to temperature and development of temperature TMDLs, it is unknown what thermal load limits may be included in future NPDES permits and whether additional offsets or temperature reductions may be required.

4.1.4 Wet Weather Flow Management and Treatment

Flows increase throughout the District's collection system as a result of infiltration and inflow of stormwater and groundwater into the separate sanitary sewer system. These high flows dictate the required conveyance capacity of the District's sewers and pump stations, and impact the capacity of the District's treatment facilities. The inability to convey and treat high wet weather related flows could result in sanitary sewer overflows and potentially impact surface water quality and public health.

After decades of effort and initiatives, USEPA has yet to develop a coherent regulatory approach to wet weather flow management and treatment. Since 2009, NPDES permits issued by DEQ prohibit sanitary sewer overflows, regardless of the magnitude, frequency, or duration of the storm event causing an overflow. However, the Department may exercise enforcement discretion regarding overflow events. In exercising its enforcement discretion, the Department may consider various factors, including the adequacy of the conveyance system's capacity and the magnitude, duration and return frequency of storm events.

The District has historically planned its collection system capital improvements to prevent sanitary sewer overflows for storms smaller than the five-year, 24-hour winter season storm, and the 10-year, 24-hour summer season storm, as defined in the Oregon Administrative Rules. The District's approach has been multifaceted and focused on improving collection system monitoring and maintenance, rehabilitating and replacing pipes to reduce infiltration and inflow, and providing additional conveyance capacity in the system.

High wet weather flows also impact the three West Basin treatment facilities. The District must treat the higher volumes of wastewater so that NPDES permit limits are met at all times.

4.1.5 Human Health Criteria

In 2011, Oregon adopted, and the USEPA approved, new human health criteria and standards. The new standards include three significant revisions:

- Revised human health criteria for 113 toxic pollutants based on a per-capita fish consumption rate of 175 grams per day (equivalent to 23 eight-ounce fish meals per month)
- A revised variance provision for situations where a city or business operating under a water quality permit cannot meet discharge limits for a pollutant
- A new site-specific background pollutant criteria provision that will be used to account for background pollutants under certain circumstances.

The revised standards address EPA's June 2010 disapproval of DEQ's previous human health standards based on a fish consumption rate of 17.5 grams per day. EPA disapproved those criteria because they did not protect populations in Oregon who are known to eat more fish.

Because the new criteria are based on both water consumption and fish consumption and since some toxins bioaccumulate in the food chain, human health criteria may be significantly more stringent than water quality criteria to protect aquatic species.

The District has screened for the toxic pollutants in Oregon's human health criteria and has established that a few of the criteria have the potential to be exceeded in the Tualatin River.

4.1.6 Priority Persistent Pollutants

Senate Bill 737, passed in 2007, directed DEQ to identify persistent pollutants, assess their presence in Oregon's municipal wastewater treatment plants, and explore ways to reduce those pollutants.

DEQ worked with Oregon's 52 largest municipal wastewater treatment facilities to sample treated effluent (effluent discharged to land or Oregon waterways) for 117 of the 118 persistent priority pollutants. Municipalities with levels of these pollutants over threshold levels set by DEQ are required to develop pollution reduction plans. The data showed that the pollution reduction measures currently in place are working to keep the majority of persistent pollutants out of municipal wastewater. Wastewater from municipal treatment plants is not a significant source of most persistent pollutants.

Most of the listed pollutants were not observed at measurable levels in wastewater effluent. Of the 117 pollutants tested, only five pollutants occurred above the threshold levels set by DEQ. Only five municipalities must develop pollutant reduction plans under SB 737, for arsenic, a naturally occurring metal (Klamath Falls and Ontario), for beta-sitosterol, a plant-based sterol (Oak Lodge and Hermiston) and for pyrene, a polycyclic aromatic hydrocarbon associated with combustion (City of Portland Columbia Blvd WWTP).

Two naturally occurring byproducts of human (and animal) digestion, cholesterol and coprostanol--both on the list of priority pollutants--were present in all sampled wastewater treatment plant effluent. DEQ suspended reduction plan requirements for those pollutants because of limited information about toxicity and lack of feasible municipal pollution prevention activities or cost-effective treatment options.

4.1.7 Greenhouse Gases

The Rock Creek AWWTF has an Air Contaminant Discharge Permit (ACDP) for the engine generators burning digester gas. This permit was renewed in 2008. Exceeding the ACDP limits could result in the facility being moved to a Title V permitting scenario, with more rigorous monitoring and reporting requirements.

Certain facilities that hold an ACDP or Title V operating permit (under OAR Chapter 340 Divisions 216 and 218, respectively) are required to report greenhouse gas emissions to DEQ. At this time, emissions from flared digester gas along with fugitive emissions at municipal wastewater treatment facilities are not reported and are not included in determining whether a facility meets the reporting threshold.

It is anticipated that the District will likely have to report fugitive emissions and flared digester gas emissions at some point in the planning period (by 2035), but it is not expected that emission controls on these emissions will be required. It is anticipated that any new engine generators will have clean burn technology with lower NOx emissions.

4.1.8 Biosolids Treatment and Reuse

The District currently processes all of the West Basin solids at the Rock Creek AWWTF Rock Creek produces a Class B produce that is either sent to local farms during the summer or are hauled further to Madison Ranch in eastern Oregon. Nationally, there have been some trends that have impacted biosolids application and agonomic reuse. These include:

- Limitations on biosolids application for biosolids that are not "local."
- Agronomic application rates that are dependent upon both nitrogen loading and phosphorus loading. Most states, including Oregon, regulate biosolids application rates based upon nitrogen loading. Some states, concerned about surface runoff contaminated by phosphorus, now use phosphorus loading rates, which are typically more restrictive.
- Greater acceptance by the public and farmers of a Class A product.

The Rock Creek facility removes phosphorus from the liquid stream but recovers the phosphorus as a concentrated fertilizer. This reduces the phosphorus in the biosolids. In addition, the Madison Ranch is isolated and well insulated from public pressures that could impact continued acceptance of the District's product.

It was agreed that producing a Class A product is unlikely to be a regulatory driver during the planning period. Space planning for the Rock Creek AWWTF should consider the contingency that Class A biosolids production may be required in the future.

4.2 Priority Regulatory Issues

After discussion of these potential regulatory issues with District staff, it was agreed that "white papers" should be developed for the following regulatory issues having the highest priority, i.e. those have the greatest potential to impact necessary capital improvements or significant process changes:

- Human Health Criteria.
- Revised Ammonia Criteria.
- Wet Weather Flow Management.

Based on the analysis and recommendations within the white papers, it is not anticipated that any of these will drive capital projects at the treatment facilities or in the collection system in the near term.