# SECTION 2
# WATER REQUIREMENTS

This section presents existing and projected future water demands for the City of Grants Pass's (City's) water service area.

## Service Area

The water service area is the specific area within which direct water service is currently available. For cities that provide water service to their residents, the area is typically the city limits and can be expected to grow in the future as property is annexed within the Urban Growth Boundary (UGB) and as the UGB is expanded. A description of the existing and future service area boundaries used for the analyses follows. Service area boundaries are illustrated on **Figure 2-1** at the end of this section.

### *Existing*

The City's existing water service area includes all existing water customers within the Grants Pass city limits and a small area of unincorporated Josephine County five miles north of the City between Merlin and Interstate 5 referred to as the North Valley. A number of developed properties within the city limits are supplied drinking water by private groundwater wells and do not receive City water. These properties are not included in the existing service area.

### *Future*

The future water service area includes the entire area within the city limits and UGB as well as North Valley. Future North Valley customers are described in more detail later in this section. For the purposes of this Water Distribution System Master Plan (WDSMP) it is assumed that existing developed properties within the UGB which are supplied by private wells will not be included in the water system service area through the 20-year planning horizon. These properties are assumed to connect to the City water system beyond the 20-year planning horizon and are included in the future service area at saturation development. These assumptions regarding private well customers facilitate long-term planning for future water system capacity. They are not intended to establish a City policy for these customers. For this analysis, it is assumed that all new development within the UGB will receive City water service.

Future water service expansion areas are divided between existing and proposed future pressure zones based on ground elevations and a service pressure range of 35 to 80 pounds per square inch (psi). Grants Pass's existing and proposed future pressure zones are illustrated on **Figure 2-2** at the end of this section and discussed in further detail in **Section 4**.

## Planning Period

The planning period for this WDSMP is 20 years, through the year 2036, consistent with Oregon Administrative Rule (OAR) requirements for Water System Master Plans (OAR 333-061). Although not required for regulatory approval, water demand projections are also provided for a 30-year window consistent with the City's comprehensive planning process.

Some planning and facility sizing efforts within this WDSMP will use estimates of water demands at saturation development. Saturation development occurs when all the vacant, developable land within the planning area has been developed to the maximum zoning density with some practical allowance for in-fill of existing developed properties. For the purposes of this WDSMP, saturation development is assumed to occur at 30 years. Typically, if substantial water system improvements are required beyond the 20-year planning period in order to accommodate water demands at saturation development, staging is recommended for facilities where incremental expansion is feasible and practical.

## Current Water Demand

Water demand refers to all water required by the system including residential, commercial, industrial and institutional uses. Demands are described using three water use metrics, average daily demand (ADD), maximum day demand (MDD) and peak hour demand (PHD), in gallons per unit of time such as gallons per day (gpd) or million gallons per day (mgd). ADD is the total annual water volume used system-wide divided by 365 days per year. MDD is the largest 24-hour water volume for a given year. In western Oregon, MDD usually occurs each year between July 1st and September 30th. This timeframe is referred to as the peak season. PHD is estimated as the largest hour of demand on the maximum water use day.

Water demand can be calculated using either water consumption or water production data. Water consumption data is taken from the City's customer billing records and includes all revenue metered uses. Water production is measured as the water supplied to the distribution system from the City's Water Treatment Plant (WTP) plus the water volume supplied from distribution storage. Water production includes unaccounted-for water including water loss and unmetered, non-revenue uses, such as, hydrant flushing.

For the purposes of this WDSMP, water production data is used to calculate total water demand in order to account for unmetered water uses. 2014 customer consumption and billing records are used to distribute demands throughout the water system hydraulic model, discussed in **Section 4**, and to estimate water demand distribution among the City's pressure zones.

The historical ratios of MDD:ADD and PHD:MDD are used to estimate future maximum day and peak hour demands. Based on historical system-wide demands, the ratio of MDD:ADD is approximately 2.1. The ratio of PHD:MDD is approximately 1.7 consistent with similar regional water providers. Due to inconsistent or unavailable historical flow data

from the City's other constant pressure pump stations, the ratio of PHD:MDD is estimated based on historical flow data from the New Hope Pump Station. **Table 2-1** summarizes the City's current system-wide water demand based on water production data.

**Table 2-1**
**Current Water Demand Summary**

| Year | ADD (mgd) | MDD (mgd) |
|---|---|---|
| 2009 | 5.55 | 12.27 |
| 2010 | 5.17 | 11.96 |
| 2011 | 4.99 | 10.12 |
| 2012 | 5.28 | 11.10 |
| 2013 | 5.38 | 11.44 |
| 2014 | 5.51 | 11.24 |

***Water Demand by Pressure Zone***

As described in Section 1, water systems are divided into pressure zones in order to provide adequate service pressure to customers at different elevations. Each pressure zone is served by specific facilities, such as, reservoirs or pump stations and related piping which supply pressure to customers. In order to assess the adequacy of these facilities, it is necessary to estimate demand in each pressure zone. Current water demand based on WTP production and stored water volume data presented in **Table 2-1** is distributed between the City's pressure zones based on metered water consumption from 2014 billing records. Current water demand by pressure zone is summarized in **Table 2-2**.

**Table 2-2**
**Current (2014) Water Demand by Pressure Zone**

| Pressure Zone | ADD (mgd) | MDD (mgd) | Percentage of Total Demand |
|---|---|---|---|
| 1 | 3.81 | 7.77 | 69.11% |
| 2 | 0.64 | 1.31 | 11.67% |
| 2A | 0.22 | 0.46 | 4.05% |
| 2HK | 0.01 | 0.02 | 0.19% |
| 2HT | 0.01 | 0.02 | 0.14% |
| 2MW | 0.07 | 0.14 | 1.26% |
| 2NH | 0.07 | 0.15 | 1.34% |
| 3 | 0.55 | 1.12 | 9.93% |
| 3MW | 0.001 | 0.001 | 0.01% |
| 3P | 0.01 | 0.01 | 0.13% |
| 3S | 0.01 | 0.01 | 0.13% |
| 3WX | 0.003 | 0.01 | 0.06% |
| 4[1] | 0.06 | 0.12 | 1.08% |
| 4LR | 0.02 | 0.05 | 0.44% |
| NV | 0.03 | 0.05 | 0.47% |
| **Total** | **5.51** | **11.24** | **100%** |

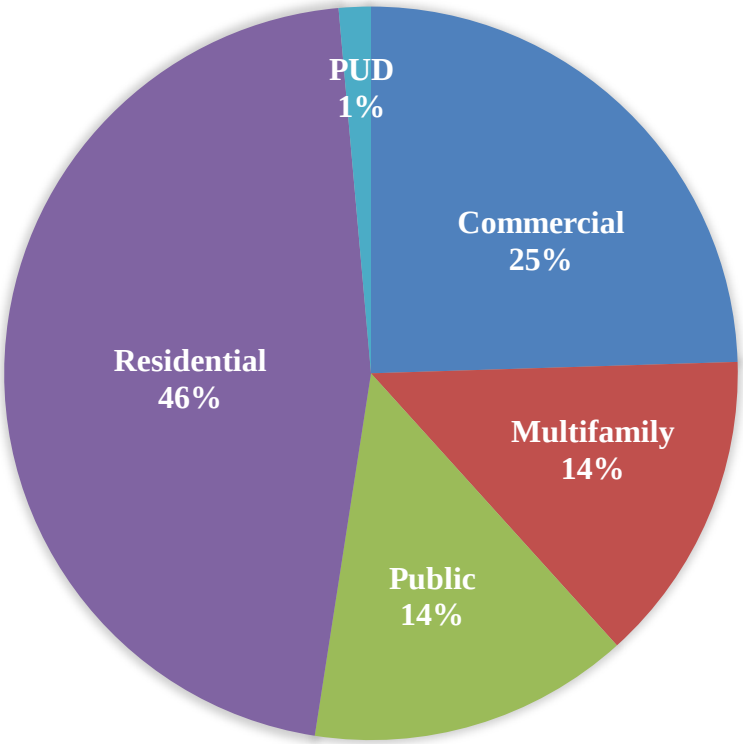
***Note:***
1. *Pressure zone 4 demands include small demand for Zone 3B along Beacon Drive which is served through a PRV from Hefley Pump Station.*

### *Water Consumption by Customer Type*

Current water consumption by rate class or customer type from the City's billing records is used to correlate water demand to land use type for future demand projections. The City's water utility billing records maintain five rate classes; Residential, Multifamily, Commercial, Public and Residential Planned Unit Development (PUD). PUD customers serve several homes from a single master meter connection to City distribution mains. Current water consumption by rate class is based on 2014 City water billing data as illustrated in **Figure 2-3**.

In addition to the rate class, the City also uses a service type indicator which is either domestic water service, irrigation service or standby. Standby meters are intended to be used only in an emergency. Grants Pass's irrigation consumption serves both residential and non-residential properties. The total water consumption for all service types is used to estimate future water demands by customer type.

**Figure 2-3**
**Current Annual Water Consumption by Customer Type**




***Equivalent Residential Units (ERUs)***

The Grants Pass water system serves single-family residential customers as well as commercial customers and multifamily housing developments. Single-family residential water services generally have a consistent daily and seasonal pattern of water use or demand. Water demands for multifamily residences, commercial and industrial users may vary from service to service depending on the density of multifamily developments or the type of commercial enterprise. In order to establish a common measure of water demand growth for all customer types, the water needs of non-residential and multifamily residential customers are represented by comparing their water use volume to the average single-family residential unit water use. The number of single-family residential units that could be served by the water demand of these other types of customers is referred to as a number of "equivalent residential units" (ERUs).

ERUs differ from actual metered water service connections in that they relate all water customers to an equivalent number of representative single-family residential customers based on typical annual consumption. ERUs calculated here are specific to estimating future water demand and are not the same as dwelling units used in housing studies or comprehensive planning to forecast future population.

*Average Daily Water Demand per ERU*

ADD per ERU is calculated from City billing records as the 2014 average daily consumption by single-family residential customers divided by the number of single-family residential meter records. As previously discussed, average daily consumption reflects both domestic and irrigation water use. Current ADD per ERU is approximately 322 gallons per day (gpd/ERU) as summarized in **Table 2-3**. For the purposes of this analysis, ADD per ERU is assumed to remain constant in the future.

**Table 2-3**
**ADD per ERU**

| | |
|---|---|
| 2014 Residential[1] Water Consumption (gallons) | 919,861,976 |
| Residential Consumption ADD (gallons) | 2,520,170 |
| No. of Single-Family Residential Customers | 7,836 |
| **ADD per ERU (gpd/ERU)** | **322** |

*Notes:*
1. *Residential consumption and number of customers includes all meters with 2014 billing records and a rate class of "R" excluding PUDs and condominium developments with common open space.*

Planned Unit Developments

Although many of the customers served through PUD master meters are residing in developments of single-family attached or detached homes like condominiums and mobile home parks, the water consumption of these developments more closely resembles customers in the Multifamily water rate class. Existing Grants Pass PUDs incorporate common green space or community facilities which are served by the City water system similar to existing multifamily developments within the City. For the purposes of this analysis, water consumption by customers in PUDs and condominiums are included in the Multifamily customer type.

*ERUs per Acre*

Future ADD projections are based on the anticipated number of ERUs per acre for each land use category and the number of developable acres in each category from the City's *Comprehensive Plan 2014 Update*. Single-family residential ERUs per acre are estimated based on the average demand per acre for existing residential customers in the Low Density and Moderate Density Residential land use categories.

ERUs per acre for multifamily, PUD and non-residential developments in the City's water service area are estimated based on 2014 water billing records for existing customers, parcel area associated with each of these billing records and a demand per ERU of 322 gpd. Estimated ERUs per acre are summarized in **Table 2-4**.

**Table 2-4**
**ERUs per Acre**

| Land Use Category | Comprehensive Plan Designation and City Zoning | ERUs per acre |
|---|---|---|
| Low Density Residential | LR: R-1-12, R-1-10, R-1-8 | 4.2 |
| Moderate Density Residential | MR: R-1-6, R-2 | 5.4 |
| MultiFamily (PUD) | Moderate-High and High Density Residential (HR & HRR): R-3, R-3-1, R-3-2, R-4, R-4-1, R-4-2, R-5 | 6.9 |
| Commercial | Neighborhood Commercial (NC), River Tourist Commercial (RTC), General Commercial (GC), Central Business District (CBD) | 6.0 |
| Employment (Industrial) | Business Park (BP), Industrial Park (IP), Industrial (I) | 3.3 |
| Parks | - | 6.0 |

## Future Water Demand Projections

Estimates of future growth and related water demand are developed using the best available information for the City's service area including geographic information system (GIS) data, the Population Research Center's (PRC's) June 2015 *Coordinated Population Forecast for Josephine County*, buildable lands inventory from the City's *Comprehensive Plan 2014 Update* and current water demand data presented earlier in this section. Future system-wide water demands are forecast at 10-years, 20-years and at saturation development. For the purposes of this WDSMP, saturation development is assumed to occur at 30 years.

Estimated water demands at saturation development are used to size recommended transmission and distribution improvements to accommodate ultimate capacity needs. Future MDD is projected from estimated future ADD based on the current average ratio of MDD:ADD, also referred to as a peaking factor. From current water demand data shown in **Table 2-1**, the MDD:ADD peaking factor for the Grants Pass system is approximately 2.1. Future PHD is similarly projected from future MDD, the PHD:MDD peaking factor is approximately 1.7.

Forecast demands are allocated to existing and proposed future pressure zones based on the ground elevations in water service expansion areas and a service pressure range of 35 to 80 psi. Existing and proposed pressure zone boundaries for the study area are illustrated on **Figure 2-2** at the end of this section. Projected demands are summarized in **Table 2-7** at the end of this section.

***Within UGB***

*10-Year Water Demand Projection*

Water demand at 10 years is forecast based on anticipated growth rates for the Grants Pass UGB published in the PRC's *June 2015 Population Forecast for Josephine County*. As shown in **Figure 2-3**, the majority of water use within the City's service area is by residential customers thus short-term water demand growth may be reasonably estimated based on projected population growth rates.

The PRC's *June 2015 Population Forecast for Josephine County* shows a projected annual average growth rate of 1.5 percent for the Grants Pass UGB through 2035. Projected 10-year water demands are assumed to be distributed to existing pressure zones based on the percentage of existing demand in each zone as presented in **Table 2-2**.

*20-Year and Saturation (30-Year) Water Demand Projections*

The Grants Pass *Comprehensive Plan 2014 Update* Figure 5-2 includes an inventory of developable acreage within the UGB and Urban Reserve Areas (URA) for residential and non-residential land use categories at 20 and 30 years. Water demand growth at 20 years and saturation development (30 years) is projected based on this developable acreage and the ERUs per acre presented in **Table 2-3**. Projected 20- and 30-year water demands are distributed to existing and proposed future pressure zones based on GIS mapping of buildable lands, the 2014 UGB expansion and URAs.

<u>Private Well Customers</u>

It is assumed that residents within the UGB currently served by private wells or small private water systems will continue to receive water outside the City system through 20 years. All new development within the UGB is assumed to be served by the City water system with no newly developed properties being served by private wells. Water demand forecasts at saturation development (30 years) assume that all existing private customers will be connected to the City water system.

These assumptions regarding private well customers facilitate long-term planning for future water system capacity, they are not intended to establish a City policy for these potential customers. Water demands for residents currently served by private wells and water systems are estimated based on the number of ERUs per acre for each development type as shown in **Table 2-3**. Existing developed properties within the City's water service area that are not

currently served by the City's water system are estimated to contribute approximately 1.3 mgd to average daily demands at saturation development.

***Rogue Community College***

Rogue Community College's (RCC) 80-acre Redwood Campus is located in the southwestern corner of the Grants Pass UGB. The campus is currently supplied through a private water distribution system with a dedicated groundwater source, treatment and finished water storage reservoirs. RCC's Redwood Campus includes approximately 30 developed acres including one and two-story classroom buildings, a gymnasium, irrigated sports fields and café.

For the purposes of this analysis, it is assumed that RCC may receive water service from the City within the 30-year planning horizon. Potential RCC water demand is estimated as 30 acres at approximately 6.0 ERUs per acre consistent with average demand per acre for existing commercial development in Grants Pass.

***North Valley***

The City currently serves three groups of customers within the North Valley water service area:

1. North Valley Industrial Area (NVIA)
2. Merlin Landfill area
3. Paradise Ranch

It is anticipated that the City will continue to serve existing customers and some growth in these three areas as well as a portion of the 2014 UGB expansion north of the existing North Valley Reservoir.

*NVIA*

The NVIA was the catalyst for construction of Reservoir 15 by Josephine County and creation of the North Valley Pressure Zone when the City assumed ownership and management of the reservoir. The ultimate ADD for the NVIA's 90-acre water service area was estimated at 40,000 gpd (0.04 mgd) in the 1982 *NVIA Water and Wastewater Analysis Phase 1*. This build-out estimate is based on approximately 80 acres of industrial development at approximately 500 gpd/acre (1.6 ERUs/acre). The remaining 10 acres are assumed to be devoted to right-of-way consistent with existing roadways within the NVIA.

The 1982 study assumed future industrial development in this area would have low water demand characteristics. Current billing records for customers in the NVIA indicate ADD/acre is well below 500 gpd/acre. For the purposes of this analysis, it is assumed that NVIA ADD will increase by a total of 0.01 mgd in 10-years, 0.02 mgd in 20-years and reach an ultimate demand of 0.04 mgd at 30-years consistent with the 1982 study.

*Merlin Landfill Area*

In the 1990s, the Merlin Landfill in the North Valley area was determined to be a potential source of groundwater contamination. Part of the mitigation strategy for this potential contamination was to discontinue pumping at identified private wells adjacent to the landfill along Merlin Road. The City currently supplies water to these private well owners.

Of the 75 properties eligible to connect to the City water system due to potential contamination, 48 properties are currently connected. For the purposes of this analysis, it is assumed that, of the remaining 27 properties, four will remain undeveloped and 23 will be connected to the City water system within 30 years, with 11 connected within 10 years and 17 at 20 years. Existing land development in this area is primarily rural residential. Based on 2014 water meter records for this area, it is assumed that each property connected will demand approximately 2 ERUs (ADD of 644 gpd) of water.

Fire service in the North Valley area is provided by the Rural/Metro Fire Department. The City does not provide water for fire suppression on the north side Merlin Road where there are no City fire hydrants. Fire hydrants and capacity for fire suppression is provided on the landfill property.

*Paradise Ranch*

Paradise Ranch Resort, located on the west side of Monument Drive near the North Valley High School, was designed to be a destination resort with overnight accommodations, restaurants, convention and entertainment facilities as well as residential home sites. In 2005, the resort developer established agreements with the City for municipal water service to supply all domestic demands on the resort property as well as limited interruptible golf course irrigation and water for fire protection. Water system facilities connecting the resort to the City's existing distribution system were constructed by the resort developer to meet City standards. Due to developer financial issues, resort construction was halted in 2010. Currently, the City does not provide water to any active services on the Paradise Ranch property.

The 2004 technical memorandum *Paradise Ranch – Water System Extension Alternative Analysis* (West Yost) estimated MDD for Paradise Ranch based on anticipated development. ADD for Paradise Ranch is calculated based on a peaking factor of 2.2 documented in this 2004 tech memo. Paradise Ranch demand estimates are summarized in **Table 2-5**. The timeline for any future development at Paradise Ranch is currently unknown. For the purposes of this analysis it is assumed that the golf course water demand will be fully developed within 10 years along with half of the commercial and residential demand. The remaining estimated water demand is assumed to be fully developed within 20 years.

**Table 2-5**
**Paradise Ranch Future Water Demand**

| Paradise Ranch Development Type | 10-Year | | 20- & 30-Year (saturation) | |
|---|---|---|---|---|
| | ADD (mgd) | MDD (mgd) | ADD (mgd) | MDD (mgd) |
| Residential Home Sites | 0.03 | 0.06 | 0.05 | 0.12 |
| Commercial Facilities | 0.03 | 0.06 | 0.06 | 0.13 |
| Golf Course | 0.59 | 1.30 | 0.59 | 1.30 |
| **TOTAL** | **0.65** | **1.42** | **0.70** | **1.55** |

Future Monument Drive Customers

As part of the Monument Drive 16-inch diameter main construction, tee fittings were included at cross streets to facilitate potential future City water customers along the line south of Paradise Ranch. The 2004 technical memorandum *Paradise Ranch – Water System Extension Alternative Analysis* (West Yost) established estimated demands for these potential customers which are not included in this analysis.

*North Valley Service Area Summary*

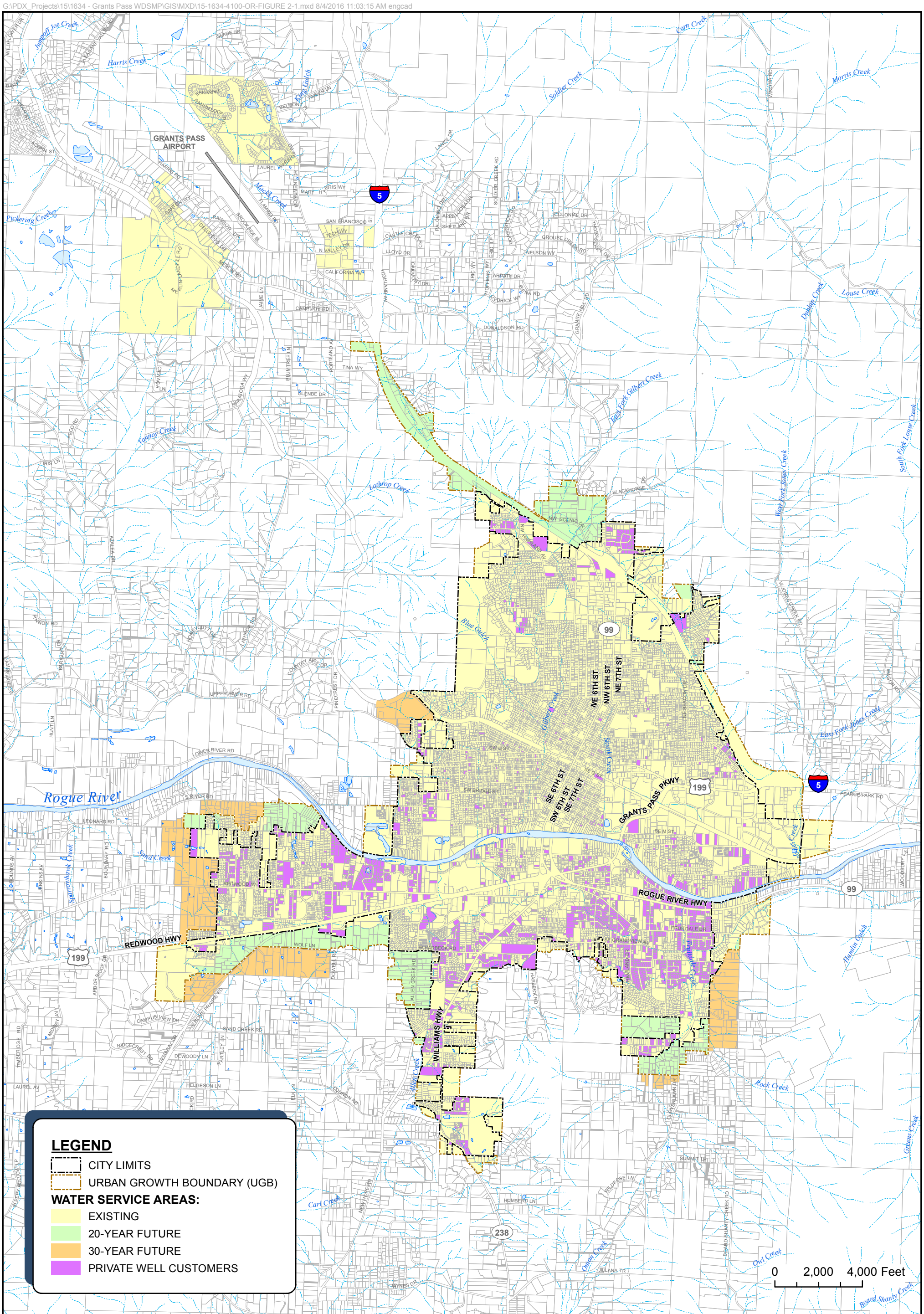
Current and estimated future water demands for the North Valley Area are summarized in **Table 2-6**.

**Table 2-6**
**North Valley Water Demand**

| North Valley Sub-Area | Current | | 10-year | | 20-year | | 30-year | |
|---|---|---|---|---|---|---|---|---|
| | ADD (mgd) | MDD (mgd) | ADD (mgd) | MDD (mgd) | ADD (mgd) | MDD (mgd) | ADD (mgd) | MDD (mgd) |
| NVIA | 0.001 | 0.0021 | 0.011 | 0.0231 | 0.021 | 0.0441 | 0.041 | 0.0861 |
| Merlin Landfill | 0.029 | 0.048 | 0.055 | 0.115 | 0.059 | 0.124 | 0.063 | 0.132 |
| Paradise Ranch | - | - | 0.65 | 1.42 | 0.70 | 1.55 | 0.70 | 1.55 |
| 2014 UGB Expansion | - | - | - | - | 0.027 | 0.056 | 0.027 | 0.056 |
| **TOTAL** | **0.03** | **0.05** | **0.72** | **1.56** | **0.81** | **1.77** | **0.83** | **1.82** |

**Table 2-7**
**Future Water Demand by Pressure Zone**

| Pressure Zone | 10-Year | | | | 20-Year | | | | Saturation (30-Year) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ERUs | ADD | MDD | PHD | ERUs | ADD | MDD | PHD | ERUs | ADD | MDD | PHD |
| 1 | 14,068 | 4.53 | 9.51 | 16.17 | 16,894 | 5.44 | 11.42 | 19.41 | 22,112 | 7.12 | 14.95 | 25.42 |
| 1RR | - | - | - | - | - | - | - | - | 12 | 0.004 | 0.01 | 0.02 |
| 2 | 2,360 | 0.76 | 1.60 | 2.72 | 2,484 | 0.80 | 1.68 | 2.86 | 2,547 | 0.82 | 1.72 | 2.92 |
| 2A | 839 | 0.27 | 0.57 | 0.97 | 839 | 0.27 | 0.57 | 0.97 | 839 | 0.27 | 0.57 | 0.97 |
| 2FD | - | - | - | - | 62 | 0.02 | 0.04 | 0.07 | 62 | 0.02 | 0.04 | 0.07 |
| 2HK | 31 | 0.01 | 0.02 | 0.03 | 31 | 0.01 | 0.02 | 0.03 | 62 | 0.02 | 0.04 | 0.07 |
| 2HT | 31 | 0.01 | 0.02 | 0.03 | 62 | 0.02 | 0.04 | 0.07 | 62 | 0.02 | 0.04 | 0.07 |
| 2MW | 248 | 0.08 | 0.17 | 0.29 | 745 | 0.24 | 0.50 | 0.85 | 1,087 | 0.35 | 0.74 | 1.26 |
| 2NH | 280 | 0.09 | 0.19 | 0.32 | 714 | 0.23 | 0.48 | 0.82 | 901 | 0.29 | 0.61 | 1.04 |
| 2SW | - | - | - | - | 12 | 0.004 | 0.01 | 0.02 | 12 | 0.004 | 0.01 | 0.02 |
| 3 | 2,019 | 0.65 | 1.37 | 2.33 | 2,329 | 0.75 | 1.58 | 2.69 | 2,578 | 0.83 | 1.74 | 2.96 |
| 3BG | - | - | - | - | 217 | 0.07 | 0.15 | 0.26 | 217 | 0.07 | 0.15 | 0.26 |
| 3MW | 3 | 0.001 | 0.002 | 0.003 | 127 | 0.04 | 0.09 | 0.15 | 127 | 0.04 | 0.09 | 0.15 |
| 3P | 31 | 0.01 | 0.02 | 0.03 | 31 | 0.01 | 0.02 | 0.03 | 31 | 0.01 | 0.02 | 0.03 |
| 3S | 31 | 0.01 | 0.02 | 0.03 | 31 | 0.01 | 0.02 | 0.03 | 31 | 0.01 | 0.02 | 0.03 |
| 3SE | - | - | - | - | 6 | 0.002 | 0.004 | 0.007 | 224 | 0.07 | 0.15 | 0.26 |
| 3WX | 12 | 0.004 | 0.01 | 0.02 | 12 | 0.004 | 0.01 | 0.02 | 12 | 0.004 | 0.01 | 0.02 |
| 4 | 217 | 0.07 | 0.15 | 0.26 | 404 | 0.13 | 0.27 | 0.46 | 497 | 0.16 | 0.34 | 0.58 |
| 4GH | - | - | - | - | 12 | 0.004 | 0.01 | 0.02 | 12 | 0.004 | 0.01 | 0.02 |
| 4LR | 93 | 0.03 | 0.06 | 0.10 | 217 | 0.07 | 0.15 | 0.26 | 217 | 0.07 | 0.15 | 0.26 |
| 4N | - | - | - | - | 93 | 0.03 | 0.06 | 0.10 | 93 | 0.03 | 0.06 | 0.10 |
| 4V | - | - | - | - | 31 | 0.01 | 0.02 | 0.03 | 31 | 0.01 | 0.02 | 0.03 |
| NV | 2,236 | 0.72 | 1.56 | 2.65 | 2,516 | 0.81 | 1.77 | 3.01 | 2,578 | 0.83 | 1.82 | 3.09 |
| RCC | - | - | - | - | - | - | - | - | 186 | 0.06 | 0.13 | 0.22 |
| **Total** | **22,499** | **7.25** | **15.27** | **25.95** | **27,869** | **8.98** | **18.91** | **32.17** | **34,530** | **11.12** | **23.44** | **39.87** |

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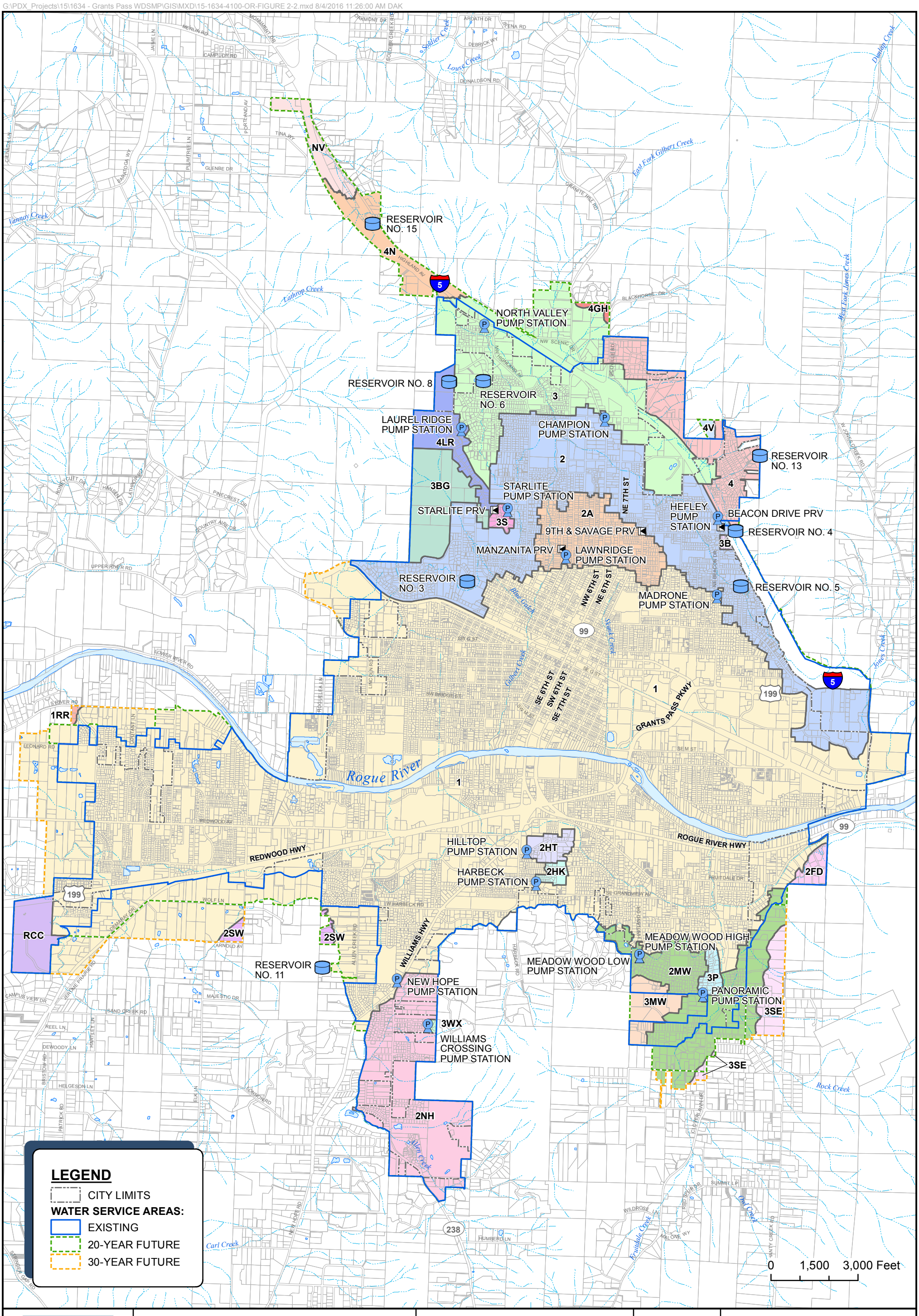
**Water Distribution System Master Plan**

**Figure 2-1**
**Existing and Future Water Service Areas**

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**Water Distribution System Master Plan**

**Figure 2-2**
**Existing and Proposed Pressure Zones**