



Chapter 2: Existing Retail Water System

Chapter Contents:

- Retail Water Service Area
- Customers
- Land Use
- Water System Facilities
 - Water Treatment Plant
 - Pressure Zones
 - Storage Facilities
 - Pump Stations
 - Emergency Interties

Chapter Highlights:

The San Juan Water District is a community services district created by a vote of the citizens in 1954. Water is provided on a retail basis to customers in the following areas:

- Unincorporated areas of Granite Bay in Placer County,
- The northeast portion of Sacramento County,
- A portion of the City of Roseville, and
- A portion of the City of Folsom.

This chapter describes the District's existing and future retail service area, including customers, historical and projected future population, current and planned land use, service area boundaries, annexed areas, future development, and sphere of influence.

- Service Area = 17 square miles (10,880 acres)
- Population
 - Existing (2004) = 28,984
 - Future (2009) = 29,633
 - Future (2025) = 32,137

Also discussed in this chapter are the District's eight retail pressure zones and existing water facilities, including:

- Sidney N. Peterson Water Treatment Plant,
- Four storage facilities,
- Five pump stations, and
- Emergency interties with neighboring agencies.



Estimated and Projected Acreage for the District's Pressure Zones

| Land Use Designation | 2004, acres | 2004 Percent Built | 2009, acres | 2009 Percent Built | 2025, acres |
|----------------------|--------------|--------------------|--------------|--------------------|--------------|
| ARC-North | 272 | 84 | 301 | 93 | 324 |
| ARC-South | 231 | 87 | 250 | 94 | 266 |
| Bacon | 2,906 | 81 | 3,239 | 90 | 3,597 |
| Crown Point | 267 | 96 | 274 | 98 | 279 |
| Gravity | 1,517 | 84 | 1,663 | 92 | 1,815 |
| Lower Granite Bay | 794 | 82 | 865 | 89 | 968 |
| Upper Granite Bay | 177 | 95 | 181 | 98 | 185 |
| Sierra | 1,154 | 81 | 1,272 | 90 | 1,421 |
| Total | 7,320 | 85 | 8,050 | 91 | 8,860 |

CHAPTER 2. EXISTING RETAIL WATER SYSTEM

This chapter presents information on current (2004) and future (2009 and 2025) land uses in the retail water distribution system service area, historical population served and a summary description of the existing retail water system pressure zones and facilities. Subsequent sections of this Chapter are as follows:

- Retail water service area
- Customers
- Land use
- Water system facilities

RETAIL WATER SERVICE AREA

Location and Boundaries

The District's retail area encompasses approximately 17 square miles (about 10,880 acres) and is located approximately 15 miles northeast of Sacramento at the edge of the foothills of the Sierra Nevada. The retail service area (shown on Figure 2-1) is bounded by the Town of Loomis and City of Rocklin to the north, the City of Folsom and Folsom Lake to the east, the American River to the south, and the Cities of Roseville and Citrus Heights to the west. The retail service area is divided into eight separate pressure (i.e., service) zones due to the variation in elevation across the service area. The eight pressure zones are illustrated on Figure 2-2.

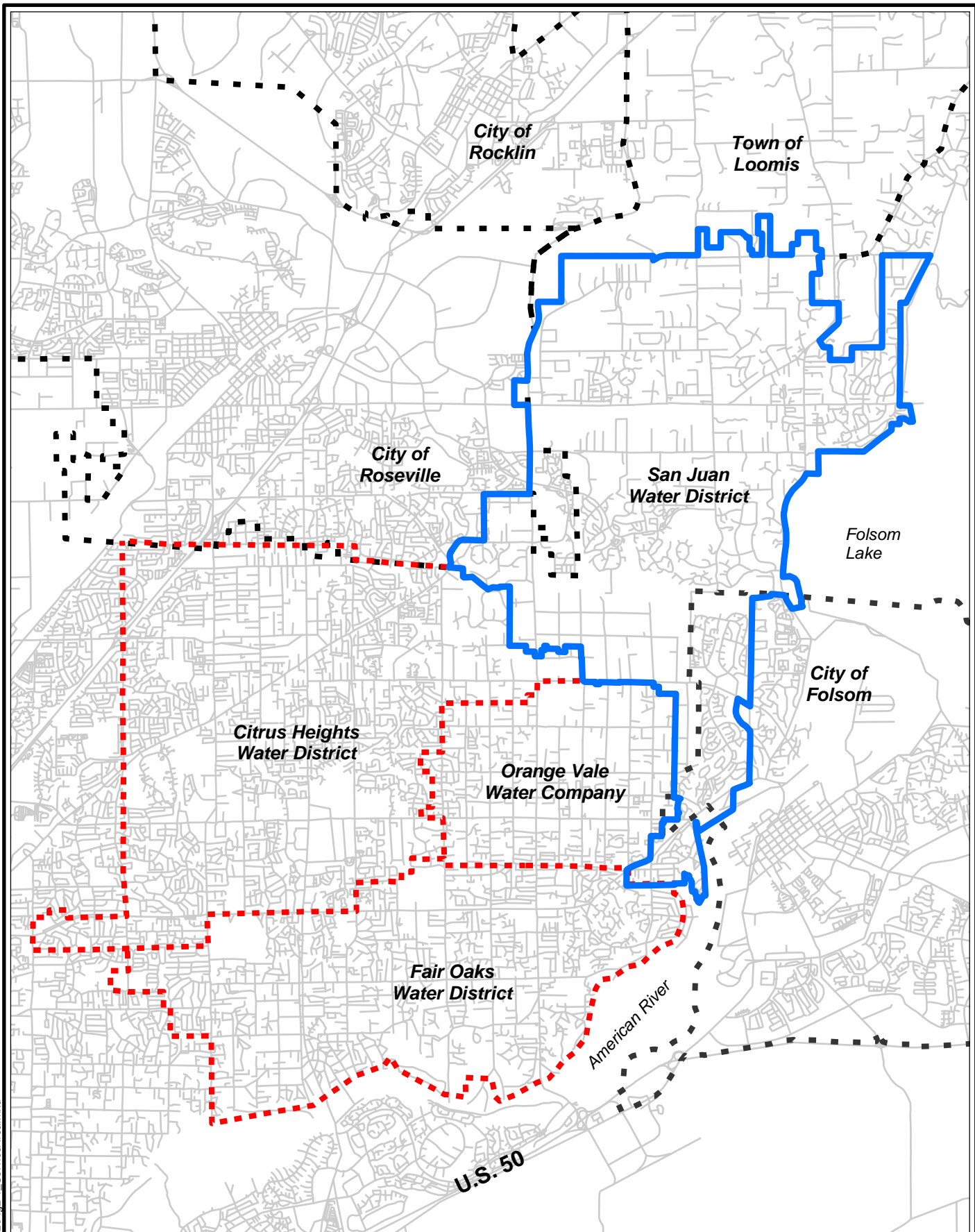
Based on direction received from District staff, it was assumed for the purpose of this Retail Water Master Plan Update, that the service area boundaries of the District retail service area at 2025 buildout will remain the same as the boundaries of the existing District's retail service area. This is primarily due to the fact that the District's existing boundaries border lands that are currently served with water from other retail agencies. District staff have indicated that it is possible that there may be some minor annexations to the north in the future; however, for this Retail Water Master Plan Update, it has been assumed that any future growth in the District's retail service area will predominately be a result of infill of the existing service area.

Topography

The District's retail area generally slopes uphill to the northeast. The area is made up of gently rolling hills cut by four small ravines, with a few ridges scattered throughout. Elevations range from approximately 150 to 600 feet above mean sea level. Figure 2-3 presents the topography of the area.

Geology

Geology of the area is derived from two Soil Conservation Service reports, one describing the portion of the service area within Sacramento County and one describing the portion of the service area within Placer County. Overall, the subsurface is rocky throughout the District and



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LEGEND

- RETAIL SERVICE AREA BOUNDARY
- WHOLESALE SERVICE AREA BOUNDARY
- CITY LIMITS
- ROADS

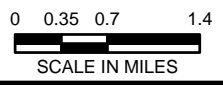
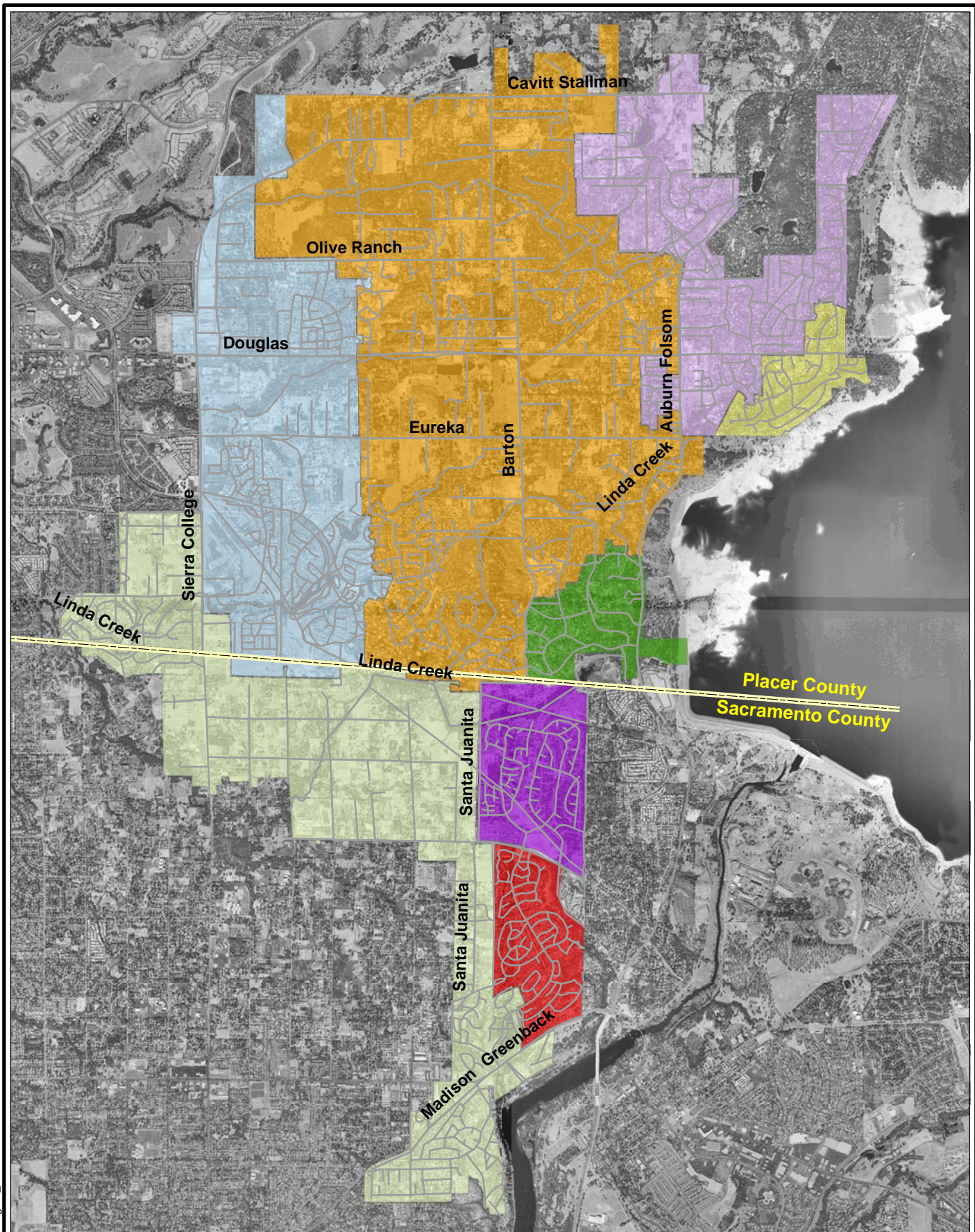


FIGURE 2-1

**San Juan Water District
Retail Water Master Plan
WATER SERVICE
AREA**





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LEGEND

- | | |
|-------------|-------------------|
| COUNTY LINE | CROWN POINT |
| STREETS | GRAVITY |
| ARC NORTH | LOWER GRANITE BAY |
| ARC SOUTH | UPPER GRANITE BAY |
| BACON | SIERRA |

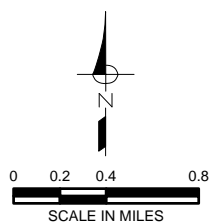
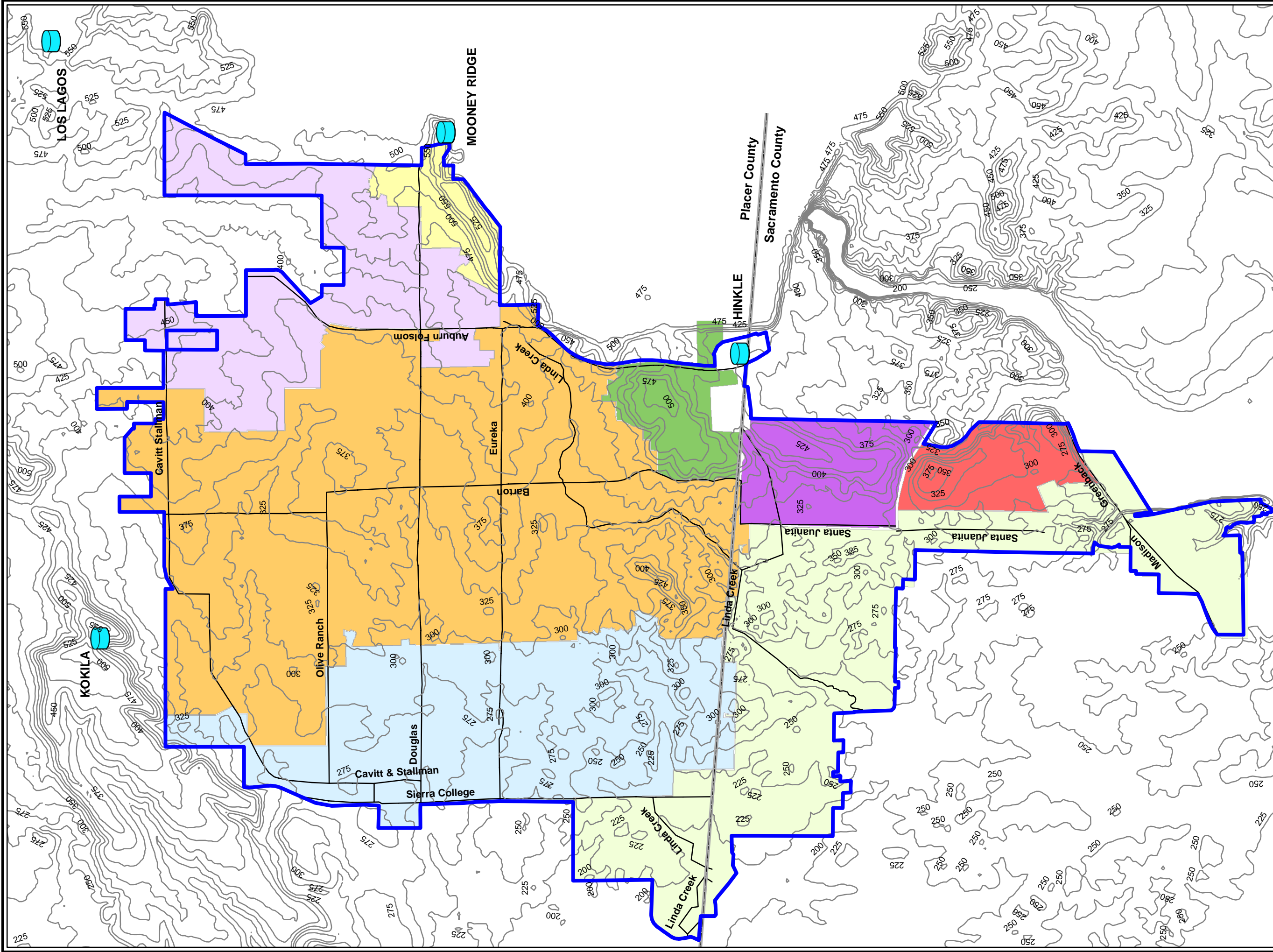


FIGURE 2-2

**San Juan Water District
Retail Water Master Plan
PRESSURE ZONES**





LEGEND

- STORAGE TANK
- SERVICE AREA BOUNDARY
- COUNTY LINE
- ELEVATION LINE
- MAJOR STREETS
- ARC NORTH
- ARC SOUTH
- BACON
- CROWN POINT
- GRAVITY
- LOWER GRANITE BAY
- UPPER GRANITE BAY
- SIERRA

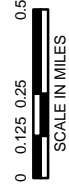


FIGURE 2-3

**San Juan Water District
Retail Water Master Plan**

SERVICE AREA TOPOGRAPHY

contains large boulders, some of which are weathered and rippable (these conditions will be considered when developing costs for the District's recommended CIP, see Chapter 9).

Climate

The District's climate is typical of the Sacramento Valley and Sierra Nevada foothills. The winters are moist with mild temperatures while the summers are hot and dry. The area receives an average of approximately 25 inches of rain each year; more than 80 percent of which falls in the five months from November through March.

The characteristically dry, hot summers result in heavy irrigation water consumption during this period. Demands during the winter are almost exclusively for domestic uses.

CUSTOMERS

Retail and Wholesale Customers

Water is provided on a retail basis to customers in the following areas:

- Unincorporated areas of Granite Bay, Placer County,
- The northeast portion of Sacramento County,
- A portion of the City of Roseville, and
- A portion of North Folsom.

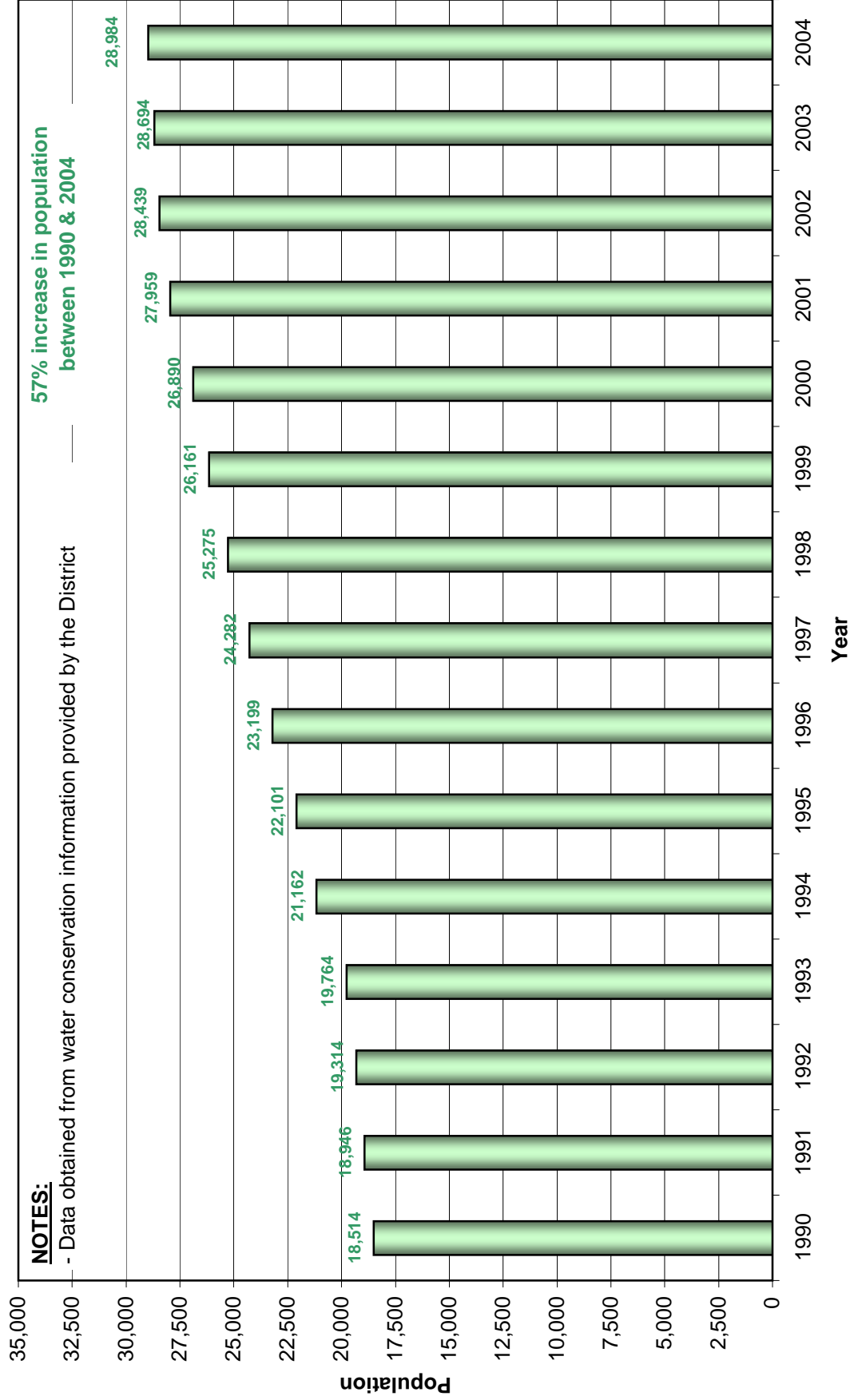
Additionally, the District wholesales water to the following agencies:

- Citrus Heights Water District (CHWD),
- Fair Oaks Water District (FOWD),
- Orange Vale Water Company (OVWC), and
- City of Folsom (north of the American River).

Historical and Projected Population for the District's Retail Service Area

Figure 2-4 illustrates the historical population within the District's retail service area. As shown, the population within the District's retail service area has increased from 18,514 people in 1990 to 28,984 people in 2004. This represents a 57 percent increase over the past 14 years. However, as will be described later in this chapter, the District's retail service area is nearly built out and therefore, it is expected that the population will only increase to 29,633 by 2009 and to 32,137 by 2025. These future population projections were the basis for projecting future water demands on a per capita basis (see Chapter 5).

Figure 2-4. Historical Population for the District's Retail Service Area



LAND USE

The District's retail service area falls within the planning areas of Placer and Sacramento Counties and the Cities of Roseville and Folsom. The Granite Bay Community Plan (adopted by the Placer County Board of Supervisors on May 8, 1989; amended January 23, 1996; currently being updated) and the County of Sacramento General Plan (adopted by the Sacramento County Board of Supervisors on December 15, 1993; currently being updated) contain the land use plan and polices for the District's retail service area.

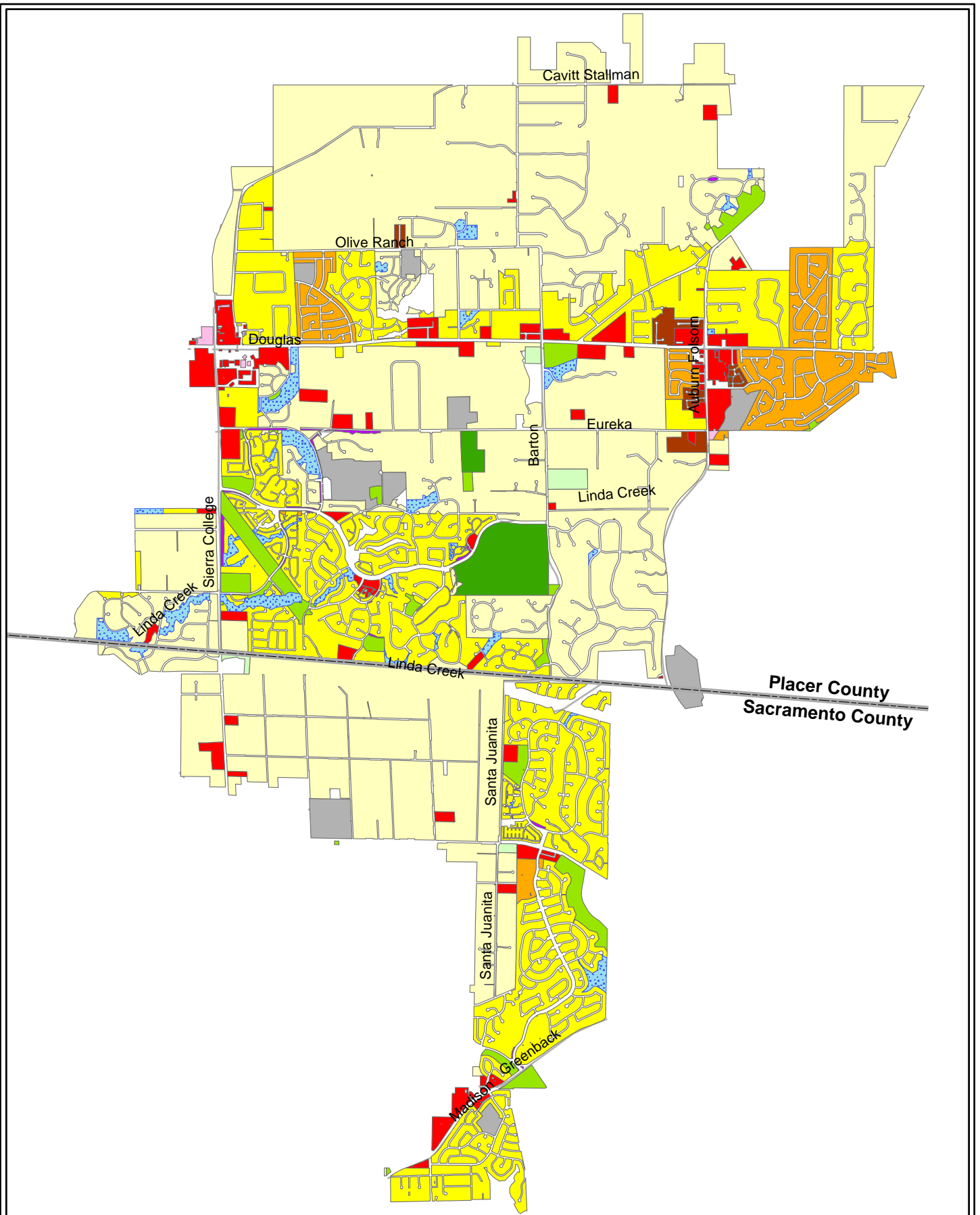
The general land uses for the current District service area and the future sphere of influence area, shown on Figure 2-5, include residential, commercial, professional office, open space and agricultural. Urban conversion of land, which was historically fallow or used for grazing and other agricultural purposes within the District's retail service area, has been occurring rapidly over the last ten years. Large areas are devoted to rural residential and low-density residential uses. These are single-family dwellings located on lots ranging from one-half to five acres. Many of these properties use much of the lot for either irrigated pasture or lawn. Scattered throughout the District are other miscellaneous land uses, primarily commercial and denser residential. The commercial use is primarily for retail shops and professional offices and is located along the main arterial and collector roads (Douglas Boulevard, Auburn-Folsom Road and Sierra College Boulevard). There is no industrial land use in the District.

The Granite Bay Community Plan will be the guiding reference for future development within the Placer County portion of the retail area. Two trends in land development have become clear over the last few years. Throughout the northern portion of the District's retail area, recent developments have featured relatively large lots (one-third to 2.5 acres) with spacious homes and extensive landscaping. The Sacramento County area has seen more traditional and dense development of more modest homes on approximately one-quarter acre lots. While the Sacramento County type developments will be more densely populated, the water consumption in the Placer County type developments may be greater for the same acreage developed because of the high percentage of ground used for landscaping compared to that used for buildings. This is especially true in the Upper and Lower Granite Bay Pressure Zones. These two trends are anticipated to continue. Commercial areas will probably be limited to retail shops and a few professional offices, and will comprise only a small portion of land development.

Existing and Future Land Use

Approximately 8,750 acres of the total area (10,880 acres) or about 85 percent of the land within the District's retail service area is currently developed and receiving water from the District's retail water system. The existing, partially developed (only a portion of entire lot is developed) or vacant parcels total 1,540 acres and are shown on Figure 2-6. It is anticipated that these partially developed or vacant lands will be built out by the year 2025. The remaining 593 acres within the District's retail service area are anticipated to remain undeveloped.

Existing acreage by urban land use type for the District's retail service area is presented in Table 2-1. Table 2-1 presents calculated acreage by urban land use type for the retail service area in 2004, 2009, and 2025. These acreage estimates were used to project water demands using land use based unit demand factors (see Chapter 5).



LEGEND

- County Line
- Open Space/Roads
- Rural Estate
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Business Park
- Commercial
- Institutional
- Parks & Recreation
- Golf Course
- Agricultural
- Median
- Wetlands
- Major Streets

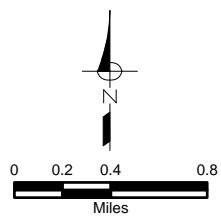
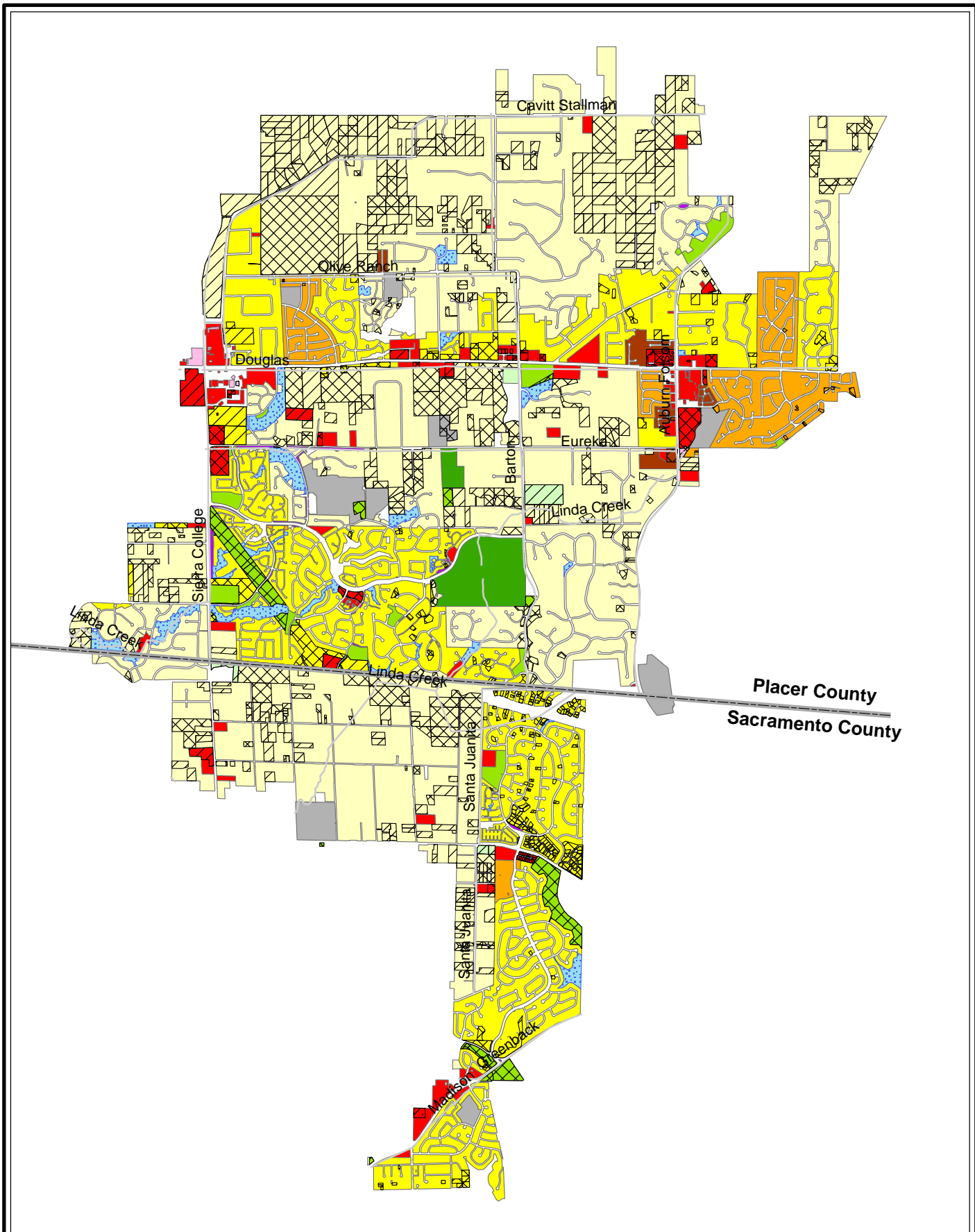


FIGURE 2-5
 San Juan Water District
 Water Master Plan
GENERAL PLAN
 LAND USE AT BUILDOUT



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LEGEND

- | | |
|-------------------------------|----------------------|
| — COUNTY LINE | ■ BUSINESS PARK |
| — MAJOR STREETS | ■ COMMERCIAL |
| ▨ PARTIALLY DEVELOPED PARCELS | ■ INSTITUTIONAL |
| ▩ VACANT PARCELS | ■ PARKS & RECREATION |
| □ Open Space/Roads | ■ GOLF COURSE |
| ■ RURAL ESTATE | ■ AGRICULTURAL |
| ■ LOW DENSITY RESIDENTIAL | ■ MEDIAN |
| ■ MEDIUM DENSITY RESIDENTIAL | ■ WETLANDS |
| ■ HIGH DENSITY RESIDENTIAL | |

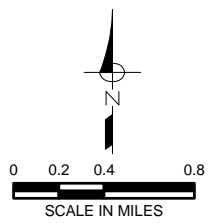


FIGURE 2-6

**San Juan Water District
Retail Water Master Plan**

**EXISTING PARTIALLY DEVELOPED
AND VACANT PARCELS**



Table 2-1. Existing and Projected Urban Land Use Within the District's Retail Service Area^(a,b)

| Land Use Designation | 2004, acres | 2004 Percent Built | 2009 ^(c) , acres | 2009 Percent Built | 2025, acres | 2025 Areas to Remain Undeveloped, acres |
|----------------------------|--------------|--------------------|-----------------------------|--------------------|-----------------------------|---|
| Rural Estate | 2,913 | 77 | 4,451 | 88 | 5,068 | 498 |
| Low Density Residential | 2,013 | 92 | 2,100 | 96 | 2,188 | 45 |
| Medium Density Residential | 380 | 99 | 383 | 99.6 | 384 | 0 |
| High Density Residential | 53 | 93 | 56 | 97.0 | 57 | 0 |
| Business Park | 8 | 82 | 9 | 90 | 10 | 0 |
| Commercial | 264 | 76 | 302 | 87 | 345 | 32 |
| Institutional | 214 | 97 | 218 | 99 | 221 | 0 |
| Parks & Recreation | 117 | 54 | 172 | 80 | 216 | 0 |
| Golf Course | 157 | 100 | 157 | 100 | 157 | 0 |
| Agricultural | 10 | 50 | 11 | 56 | 19 | 18 |
| Median | 21 | 100 | 21 | 100 | 21 | 0 |
| Wetlands | 167 | 100 | 167 | 100 | 167 | 0 |
| Open Space/Streets | 1,432 | 100 | 1,432 | 100 | 1,432 | 0 |
| Total | 8,750 | 85% | 9,480 | 91% | 10,290^(d) | 593 |

- (a) Data obtained from GIS file provided by the District, and only includes existing and projected urban development.
- (b) Assumes that 60 percent of currently vacant parcels will be developed within five years (2009), and remaining 40 percent of currently vacant parcels will be developed by 2025. Assumes 15 percent of partially developed parcels will be developed within 5 years (2009), 50 percent of remaining land available on partially developed parcels will be developed by 2025, and all remaining land will remain undeveloped.
- (c) Assumes that partially built Rural Estate, Low Density Residential, Commercial, and Agricultural parcels are 50 percent, 60 percent, 80 percent, and 80 percent built-out by 2009, respectively.
- (d) Does not include approximately 593 acres that will remain undeveloped.

Urban land use in 2009 and 2025 were projected based on the following planning assumptions provided by the District:

- Vacant Parcels:
 - 60 percent of currently vacant parcels will be developed completely within five years (by 2009)
 - The remaining 40 percent of currently vacant parcels will be completed by 2025.



- Partially Developed Parcels:
 - 15 percent of partially developed parcels will be fully developed within 5 years (by 2009)
 - 2009 development of partially developed parcels will be as follows:
 - ❖ Rural Estate: 50 percent
 - ❖ Low Density Residential: 60 percent
 - ❖ Commercial: 80 percent
 - ❖ Agricultural parcels: 80 percent
 - 50 percent of remaining land available on partially developed parcels will be fully developed by 2025.
- All remaining land (approximately 593 acres) will remain undeveloped.

Using the land use data provided by the District and further queried with WYA’s geographical information system (GIS) (see Figures 2-5 and 2-6), existing and projected urban land use was also calculated for each of the District’s eight pressure zones. As shown in Table 2-2, the Crown Point and Upper Granite Bay Pressure Zones are over 90 percent built out. Table 2-2 also indicates that by 2009, all of the pressure zones will be at or over 89 percent built out, and that a majority of growth in the future will occur in the Bacon, Sierra, and Gravity Pressure Zones.

Table 2-2. Existing and Projected Acreage for the District’s Pressure Zones^(a,b)

| Land Use Designation | 2004, acres | 2004 Percent Built-Out | 2009 ^(c) , acres | 2009 Percent Built-Out | 2025, acres |
|----------------------|----------------------------|------------------------|-----------------------------|------------------------|----------------------------|
| ARC-North | 272 | 84 | 301 | 93 | 324 |
| ARC-South | 231 | 87 | 250 | 94 | 266 |
| Bacon | 2,906 | 81 | 3,239 | 90 | 3,597 |
| Crown Point | 267 | 96 | 274 | 98 | 279 |
| Gravity | 1,517 | 84 | 1,663 | 92 | 1,815 |
| Lower Granite Bay | 794 | 82 | 865 | 89 | 968 |
| Upper Granite Bay | 177 | 95 | 181 | 98 | 185 |
| Sierra | 1,154 | 81 | 1,272 | 90 | 1,421 |
| Total | 7,320^(d) | 85% | 8,050^(d) | 91% | 8,860^(d) |

^(a) Data obtained from GIS files provided by the District, and only includes existing and projected urban development.

^(b) Assumes that 60 percent of currently vacant parcels will be developed within five years (2009) and remaining 40 percent of currently vacant parcels will be developed by 2025. Assumes 15 percent of partially developed parcels will be developed within 5 years (2009), 50 percent of remaining land available on partially developed parcels will be developed by 2025, and all remaining land will remain undeveloped.

^(c) Assumes that partially built Rural Estate, Low Density Residential, Commercial, and Agricultural parcels are 50 percent, 60 percent, 80 percent, and 80 percent built out by 2009, respectively.

^(d) Does not include open space/streets area (1,432 acres) or areas that will remain undeveloped in 2025 (593 acres).



WATER SYSTEM FACILITIES

This section discusses the District’s existing retail water system and facilities, including pressure zones, pipelines, pump stations, and storage facilities. The District’s existing distribution system is shown on Figure 2-7. Figure 2-7 shows existing pump stations and reservoirs, and all pipelines 12 inches in diameter and larger serving the retail area.

Sidney N. Peterson Water Treatment Plant

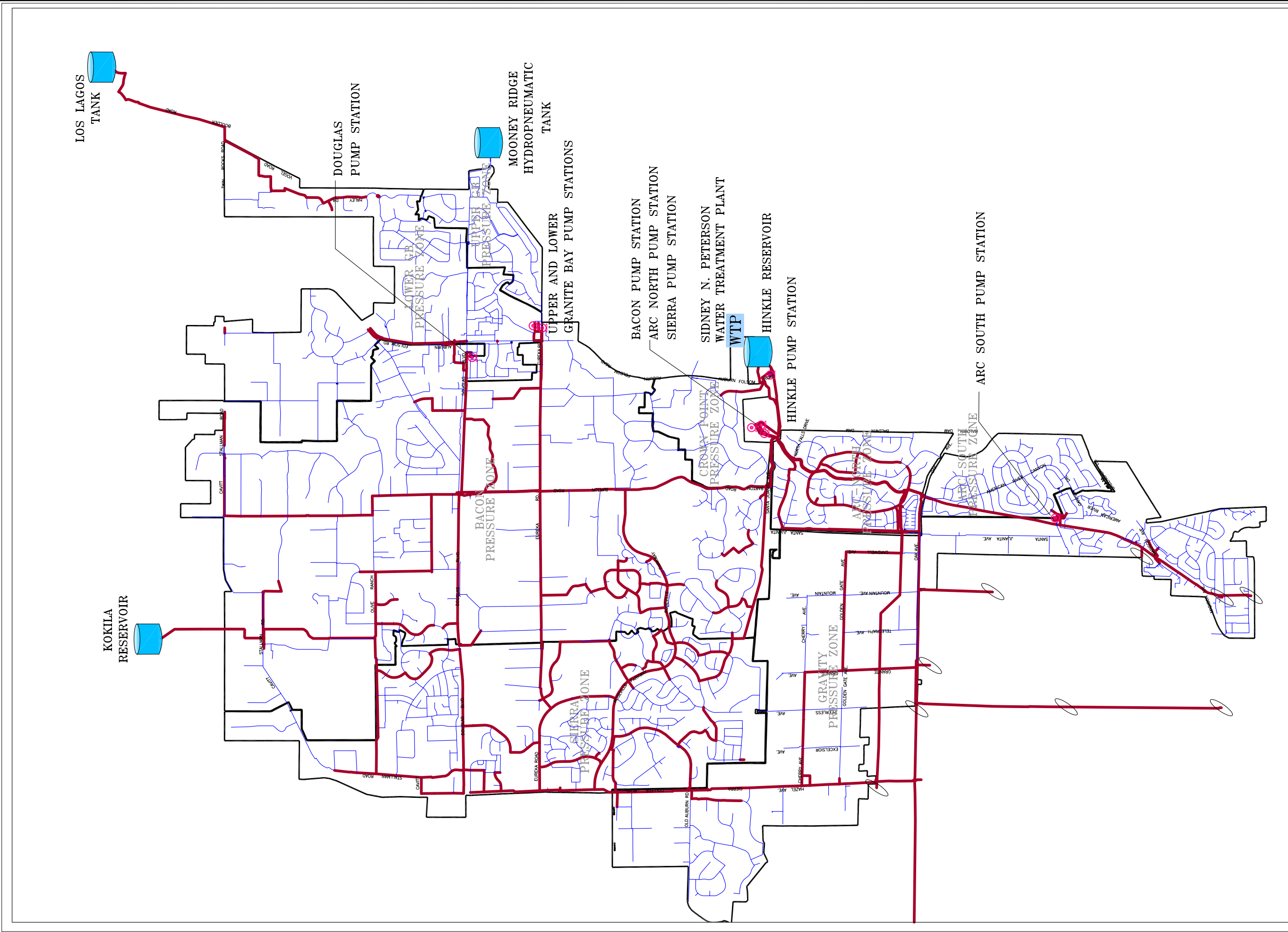
The District’s Sidney N. Peterson Water Treatment Plant (WTP) was designed and constructed in the late 1970’s and early 1980’s and is located in Granite Bay adjacent to the District’s offices on Auburn-Folsom Road. The WTP has a current nominal production capacity of approximately 120 million gallons per day (mgd). The WTP was designed and built in three phases as a conventional treatment plant. The first phase included pretreatment, chemical feed and storage, disinfection, solids handling and an operations building. The second phase involved construction of the Hinkle Reservoir. The third phase included filtration and a backwash recovery system. The WTP produces high quality water, meeting all primary and secondary State and Federal requirements for drinking water. A site plan of the WTP is shown on Figure 2-8.

Distribution System Pressure Zones






Figure 2-2 shows the existing pressure zone boundaries within the District’s service area. Because of the variation in elevation, the District’s retail water distribution system is divided into eight separate pressure, or service, zones (see Figure 2-9). These zones are hydraulically separated so that service can be provided to customers at reasonable pressures. The zones are isolated from each other by normally closed valves, including check valves, providing pressure reducing and pressure sustaining valves. The separate zones avoid the problem of excessive pressures to low areas and insufficient pressures to high areas. Table 2-3 summarizes the approximate service elevation range for each of the District’s eight pressure zones.

Table 2-3. San Juan Water District Pressure Zones

| Pressure Zone | Approximate Service Elevation Range, ft |
|-------------------------------|---|
| American River Canyon – North | 300-440 |
| American River Canyon – South | 260-370 |
| Bacon | 250-400 |
| Crown Point | 400-520 |
| Gravity | 200-350 |
| Lower Granite Bay | 400-470 |
| Upper Granite Bay | 450-600 |
| Sierra | 200-320 |



LEGEND

-  WATER TREATMENT PLANT
-  RESERVOIR
-  WHOLESALE METER
-  PUMP STATION
-  PIPELINE 12" AND LARGER

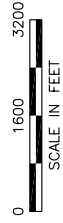


Figure 2-7

San Juan Water District
Retail Water Master Plan
SYSTEM MAP



LEGEND

NO LEGEND

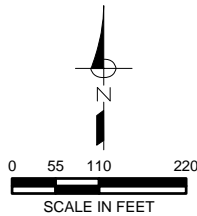


FIGURE 2-8

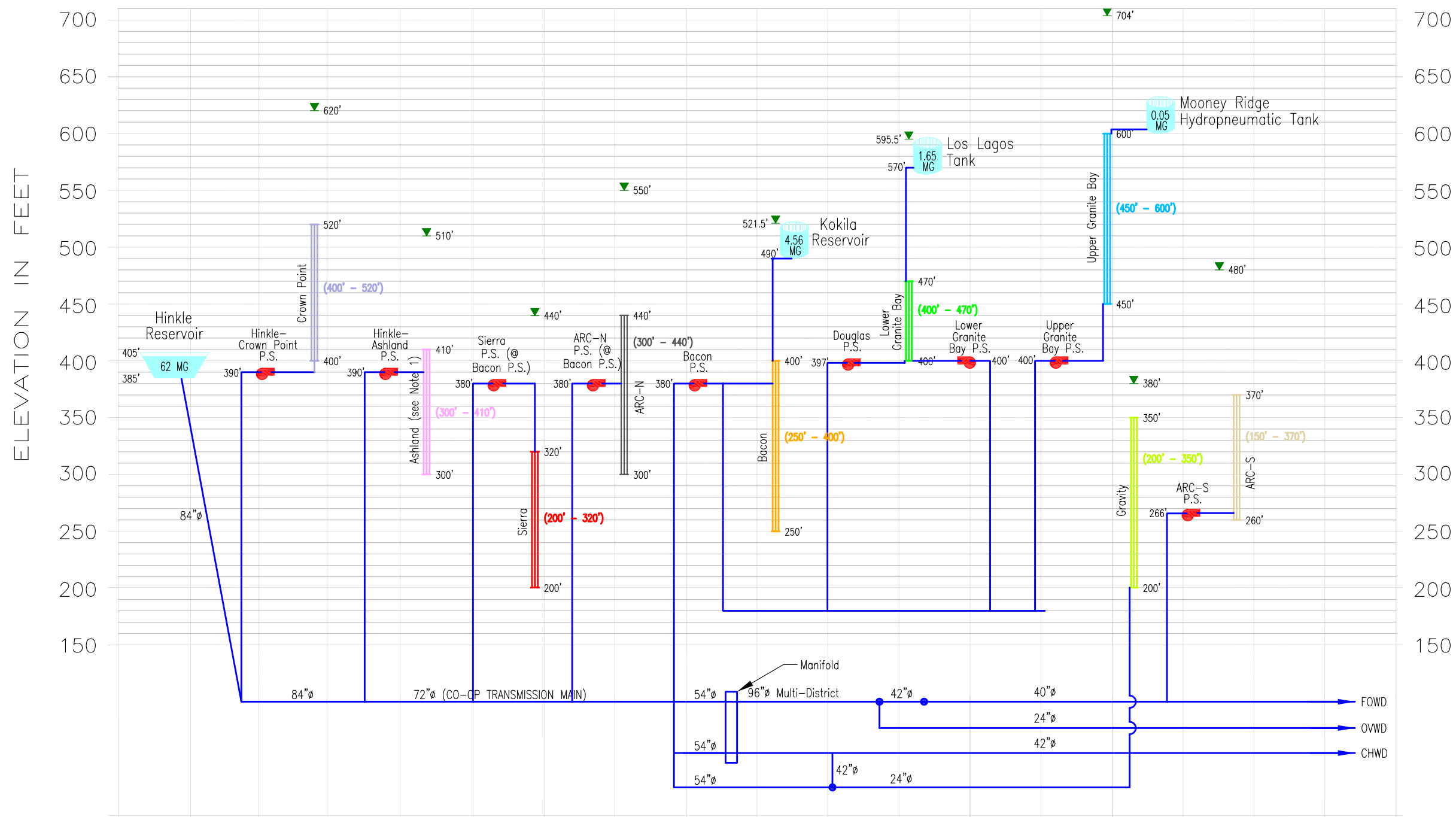
San Juan Water District
Retail Water Master Plan

**SIDNEY N. PETERSON
WATER TREATMENT PLANT**



Figure 2-9

San Juan Water District
Retail Water Master Plan
HYDRAULIC GRADE LINE
SCHEMATIC



NOTES:

1. THE ASHLAND PRESSURE ZONE IS PART OF THE DISTRICT'S WHOLESALE WATER SYSTEM.

LEGEND:

| | |
|--|---|
| | Pipeline w/Diameter |
| | Maximum Hydraulic Elevation of Pressure Zone |
| | Range of Service Elevations for Pressure Zone |
| | Pump Station |
| | Reservoir w/Base & High Water Elevations |
| | Million Gallons |



NOT TO SCALE

American River Canyon North Pressure Zone

The American River Canyon North (ARC-North) Pressure Zone, which is generally north of Oak Avenue, east of Santa Juanita Avenue, south of the Sacramento/Placer County Line, and west of the City of Folsom city limits, was configured in the mid to late 1990s. The ARC-North Pressure Zone was originally part of the District's Bacon Pressure Zone; however, the Bacon Pressure Zone was recommended to be reconfigured into three smaller pressure zones (Bacon, Sierra and ARC-North) in 1995. The ARC-North Pressure Zone wheels water to the ARC-South Pressure Zone during the winter months through a 12-inch diameter valve located near the intersection of Oak Avenue and American River Canyon Drive. The ARC-North Pressure Zone is served from the Hinkle Reservoir through the ARC-North Pump Station that discharges into an 18-inch diameter pipeline. The ARC-North Pressure Zone serves mostly single-family residential development on approximately one-quarter acre sites.

American River Canyon South Pressure Zone

The American River Canyon South (ARC-South) Pressure Zone, which is generally north of Greenback Lane, east of Santa Juanita Avenue, south of Oak Avenue, and west of the City of Folsom city limits, is provided water from the ARC-North Pressure Zone in the winter months (see above) and through the ARC-South Pump Station in the summer months. The ARC-South Pressure Zone is served, during April to November, from the 40-inch diameter Fair Oaks transmission main through the ARC-South Pump Station at Horn Circle. The pump station discharges into two 12-inch diameter pipelines and one 10-inch diameter pipeline. The ARC-South Pressure Zone serves mostly single-family residential development on approximately one-quarter acre sites. The ARC-South Pressure Zone piping network is dense and is made up of mostly 8-inch diameter pipelines.

Bacon Pressure Zone

The Bacon Pressure Zone is the main zone in the northern portion of the District. The general boundaries of this pressure zone are from the Placer County line in the south to the District boundary in the north, and from Auburn-Folsom Road on the east to about a half-mile east of Sierra College Boulevard on the west.

The major pipeline serving the Bacon Pressure Zone is the Rose Springs pipeline. This is a 33-inch diameter pipeline, fed from the Bacon Pump Station at the base of Baldwin Reservoir. It extends west 2,000 feet, then north along Barton Road. At Seven Cedars Place, it reduces to a 30-inch diameter pipeline, and at Eureka Road it splits into three pipelines. From there, a section of 18-inch diameter pipeline runs east and a 12-inch diameter pipeline runs west, both on Eureka Road. An 18-inch diameter steel pipeline and a 16-inch diameter asbestos concrete pipeline run north along Barton Road. The 18-inch diameter steel pipeline south of Princeton Reach is reported to have thick mortar lining with an inside diameter of approximately 16.5 inches. From Princeton Reach, two 18-inch diameter pipelines run north to Douglas Boulevard. Presently, these pipelines are the major transmission lines through the area.

Crown Point Pressure Zone

The Crown Point Pressure Zone encompasses a hilly area just northwest of the WTP. This pressure zone is about one half mile north to south and about two-thirds of a mile east to west, falling north of the Placer County line and east of Barton Road. The area is characterized by single-family residential development on lots of about one-third to one acre. A 14-inch diameter pipeline feeds the area from the Hinkle-Crown Point Pump Station. The pressure zone has very little area left for development. The piping network consists of 8-inch and 10-inch diameter pipelines.

Gravity Pressure Zone

The Gravity Zone serves an area from Lake Natoma in the south to an area in the north generally west of Santa Juanita Avenue, north of Oak Avenue, and running north along Sierra College Boulevard. This pressure zone includes the Cardwell area strip along Sierra College Boulevard, and a portion of the Rollingwood Bluffs area. The Gravity Pressure Zone is characterized by lower density residential development of the ranchette type. Some of these ranchettes include large areas of irrigation.

There are two main pipelines serving the Gravity Pressure Zone. From the east, a 24-inch diameter line carries water from the CHWD 54-inch diameter pipeline west into the Cardwell area. The pipeline quickly necks down to a 16-inch diameter pipeline and branches at Cardwell Avenue to a 16-inch and 8-inch diameter pipeline from which the Cardwell area distribution system begins. On the west side of the pressure zone, a 12-inch diameter pipeline running the length of Sierra College Boulevard begins at Eden Oaks Avenue. This pipeline is fed from the CHWD 42-inch diameter transmission main.

Lower Granite Bay Pressure Zone

The Lower Granite Bay Pressure Zone lies to the east of the Bacon Pressure Zone, and at a higher elevation. This pressure zone is generally east of Auburn-Folsom Road, excluding a ridge near Folsom Lake. Current development in this pressure zone is primarily single family residential with lots ranging from one-quarter to six acres. Most of the pressure zone is already developed, although there is acreage still available for development in the extreme northeast portion of the zone.

A single, 16-inch diameter pipeline currently serves this pressure zone from the Lower Granite Bay Pump Station. In addition, a 10-inch diameter pipeline in Auburn-Folsom Road is currently supplying a reduced pressure area (Lower Granite Bay Reduced) from the Bacon Pressure Zone through a pressure reducing valve. The pressure zone is also served by the Douglas Pump Station during high demand periods. A single, 10-inch diameter pipeline from the Bacon Pressure Zone near Douglas Boulevard and Auburn-Folsom Road to the pressure zone currently supply supplemental flow.

Upper Granite Bay Pressure Zone

The Upper Granite Bay Pressure Zone covers the high ridge near Folsom Lake mentioned above. This pressure zone has a single 10-inch diameter pipeline leading into it from the Granite Bay



Pump Station and a network consisting of 6-inch and 8-inch diameter pipelines beyond that. This pressure zone is relatively small and development within it is single family residential on lots of approximately one-quarter acre. The Upper Granite Bay Pressure Zone is operated at pressures somewhat higher than the Lower Granite Bay Pressure Zone.

Sierra Pressure Zone

The Sierra Pressure Zone (previously the P40 pressure zone), is the main pressure zone on the west side of the District. This pressure zone includes about a one-mile wide strip to the east of Sierra College Boulevard in Placer County. The Gravity Pressure Zone and the District boundary bound it to the west. This pressure zone extends north to Cavitt-Stallman Road and is bounded on the east by the Bacon Pressure Zone. Current development in this pressure zone is primarily single family residential with lots from one quarter to three acres. There is commercial and business park development near the intersections of Douglas Boulevard and Eureka Road, and Douglas Boulevard and Sierra College Boulevard. Most of the pressure zone is already developed, although there is acreage still available for development in the extreme northwest portion of the pressure zone, between Cavitt-Stallman Road and Douglas Boulevard.

Storage Facilities

There are four existing water storage facilities and one hydropneumatic tank currently in operation that serve the District’s retail service area. These storage facilities are shown on Figure 2-7, are summarized in Table 2-4, and are discussed individually below. The reservoirs and tanks are intended to provide storage capacity for the District to meet diurnal demand fluctuations, supply demands during emergency and power outage conditions, and provide fire flow reserve. The reservoirs are generally in good condition and are routinely inspected.

Table 2-4. Existing Treated Water Storage Facilities

| Storage Facility | Capacity, MG | Pressure Zone | Diameter, ft | Floor Elevation, ft | Overflow Elevation, ft |
|----------------------------------|--------------|-------------------|--------------|---------------------|------------------------|
| Hinkle Reservoir ^(a) | 62 | Gravity | Trapezoidal | 385.0 | 405 |
| Kokila Reservoir | 4.56 | Bacon | Trapezoidal | 490 | 521.5 |
| Los Lagos Tank | 1.65 | Lower Granite Bay | 105 | 570 | 595.5 |
| Mooney Ridge Hydropneumatic Tank | 0.05 | Upper Granite Bay | 14 | 600 | -- ^(b) |
| Total Storage in Service | 68.26 | | | | |

^(a) Usable capacity of the Hinkle reservoir is approximately 42.3 MG, and is shared between the District’s Retail System, OVWC, CHWD, FOWD and the City of Folsom (Ashland Pressure Zone). Approximately 11.4 million gallons is estimated to be available to the retail water system.

^(b) Because Mooney Ridge is a hydropneumatic tank, there is no overflow elevation.



Hinkle Reservoir

Hinkle Reservoir has a nominal volume of 62 million gallons (MG). Approximately 42.3 MG is available as usable storage within the reservoir. It is a hypalon-lined and covered storage reservoir located adjacent to the WTP. The reservoir acts as a clearwell for the WTP and also as a storage facility for the District. While the retail area gets some benefit from the reservoir, the reservoir is shared with wholesale customers served by the District. The overflow elevation of Hinkle Reservoir is 405 feet and the working elevation is assumed to be approximately 10 feet below the top. This reservoir provides operational and emergency storage for the Gravity Pressure Zone.

Kokila Reservoir

The Kokila Reservoir serves the Bacon Pressure Zone with approximately 4.56 MG of storage. It is located on a hillside, north of Cavitt-Stallman Road, on the north side of the Bacon Pressure Zone, approximately 0.5 miles north of the District's retail service area boundary. The reservoir was constructed by earth excavation and, like Hinkle Reservoir, has a 45 mil hypalon liner and cover. The Kokila Reservoir bottom is at elevation 490 feet and the normal maximum water surface elevation is 521.5 feet. The reservoir base elevation is only 70 feet higher than the highest water service elevation (420 feet) in the Bacon Pressure Zone. There is a 24-inch diameter ductile iron pipeline leading from the reservoir to the Bacon Pressure Zone. Kokila Reservoir's location, on the far side of the Bacon Pressure Zone from the Bacon Pump Station, makes it ideal for use as an operational storage facility. Its distance from the source, Bacon Pump Station, means that during peak demand periods, both facilities can be supplying water to the system: Bacon Pump Station from the south and Kokila Reservoir from the north.

Los Lagos Tank

Like Kokila Reservoir, Los Lagos Tank is located at the far north end of the pressure zone it is serving. This 1.65 MG steel tank is located in the extreme northeast portion of the District, and supplies water to the Lower Granite Bay Pressure Zone. Los Lagos Tank is a 105-foot diameter steel tank with a base elevation of 570 feet and a normal maximum water surface elevation of 595 feet. The tank is connected to the Lower Granite Bay Pressure Zone distribution system by approximately 2 miles of 12-inch and 14-inch diameter transmission pipeline.

Mooney Ridge Hydropneumatic Tank

The Mooney Ridge Hydropneumatic Tank was constructed to serve a small number of homes above the 600-foot contour on Mooney Ridge. It is a 50,000-gallon pressure vessel, which sits inside the old Mooney Ridge Tank site located in the northeast section of the Upper Granite Bay Pressure Zone. This tank is located on the Beals State Park property, just east of Skyway Lane. The tank serves the Upper Granite Bay Pressure Zone by way of a 1,500 foot long, 6-inch diameter asbestos cement (AC) pipeline and a 6-inch diameter polyvinyl chloride (PVC) pipeline. The tank bottom is at an elevation of approximately 600 feet.



Pump Stations

There are five existing pump stations in the District's retail service area. The pump station locations are shown on Figure 2-7. The purpose of each pump station varies depending on its intended use (e.g., providing maximum day demand flows, filling of storage reservoirs, or providing fire flows). The characteristics of the District's existing pumping facilities are summarized in Table 2-5 and the existing facilities at each station are described below.

Table 2-5. Summary of District's Existing Pumping Facilities

| Pump Station | Service Area | Pump HP | Design Capacity | | | | | Total Station Capacity, gpm/TDH ^(a) | Firm Capacity, gpm/TDH ^(b) |
|------------------------------------|--------------|---------|-----------------|-----------------|-----------------|-----------------|-----------------|--|---------------------------------------|
| | | | Pump 1, gpm/TDH | Pump 2, gpm/TDH | Pump 3, gpm/TDH | Pump 4, gpm/TDH | Pump 5, gpm/TDH | | |
| ARC North ^(c) | ARC North | 75, 100 | 1,000 /175 | 1,000 /175 | 1,000 /175 | 1,600 /175 | 1,600 /175 | 5,200 /175 | 3,600 /175 |
| ARC South | ARC South | 50 | 1,000 /115 | 1,000 /115 | 1,000 /115 | 1,000 /115 | 1,000 /115 | 4,000 /115 | 3,000 /115 |
| Bacon ^(d) | Bacon | 200 | 3,750 /170 | 3,750 /170 | 3,750 /170 | 3,750 /170 | 3,750 /170 | 15,000 /170 | 15,000 /170 |
| Hinkle-Crown Point ^(e) | Crown Point | 60 | 960 /240 | 960 /240 | 960 /240 | 960 /240 | 960 /240 | 3,840 /240 | 2,880 /240 |
| Douglas | Lower GB | 30 | 600 /160 | 600 /160 | | | | 1,200 /160 | 600 /160 |
| Lower Granite Bay | Lower GB | 60 | 1,030 /160 | 1,030 /160 | 1,030 /160 | 1,030 /160 | 1,030 /160 | 4,120 /160 | 3,090 /160 |
| Upper Granite Bay | Upper GB | 40 | 370 /190 | 370 /190 | 370 /190 | 370 /190 | 370 /190 | 1,110 /190 | 740 /190 |
| Sierra | Sierra | 30 | 1,750 /45 | 1,750 /45 | 1,750 /45 | 1,750 /45 | 1,750 /45 | 7,000 /45 | 5,250 /45 |
| Total Pumping Capacity, gpm | | | | | | | | 41,470 /varies | 34,160 /varies |
| Total Pumping Capacity, mgd | | | | | | | | 59.72 /varies | 49.19 /varies |

^(a) Pump capacity based on most recent pump efficiency test unless noted.

^(b) Firm capacity is defined as pumping capacity with largest pump out of service or single pump with available backup power supply.

^(c) Total capacity and firm capacity of ARC North is constrained by inability to operate Pump No. 3 simultaneously with either Pump Nos. 1 or 2.

^(d) Based on current electrical constraints at the Bacon Pump Station, no more than four of the five pumps can be operated simultaneously.

^(e) District is currently constructing the Hinkle-Crown Point Pump Station which will be online in June 2006. The upgrade to this pump station is further discussed in Chapter 7.

Bacon Pump Station

The Bacon Pump Station, located approximately a half mile west of the District's WTP near Baldwin Road, is housed in a cement block building, and is fed from the 72-inch diameter transmission pipeline from Hinkle Reservoir and a 42-inch diameter pipeline off the Cooperative Transmission Pipeline (CTP). The Bacon Pump Station was originally constructed in 1975 and was rehabilitated in 1997. The Bacon Pump Station serves the Bacon Pressure Zone, as well as the two Granite Bay Pressure Zones, the Sierra Pressure Zone and the ARC-North Pressure Zone.

- **Bacon Pressure Zone:** The Bacon Pressure Zone is served by five Byron-Jackson three-stage, vertical turbine units, each capable of delivering 3,750 gpm at a design head of 160 feet. A 200 horsepower (Hp), 1,750 revolutions per minute (rpm) motor drives each pump. The four duty and one standby pumps have a total installed capacity of 18,750 gallons per minute (gpm) and a firm capacity of 15,000 gpm. However, due to existing electrical constraints at the Bacon Pump Station, only four of the five pumps can be operated simultaneously.
- **ARC-North Pressure Zone:** There are five Crane-Deming horizontal split case double suction centrifugal pumps in the ARC-North portion of the Bacon Pump Station. Three are constant speed and two are variable speed. Three are considered duty pumps and two are spare. Three are capable of delivering 1,000 gpm at 175 feet of head, and two are capable of pumping 1,600 gpm at 175 feet of head. Because of operational constraints at the pump station which prevent the simultaneous operation of Pump Number 3 with either Pump Numbers 1 or 2, the total capacity of the pump station is 5,200 gpm and the firm capacity is 3,600 gpm. A 75 Hp, 1,750 rpm motor drives each of the 1,000 gpm pumps and a 100 Hp, 1,750 rpm motor, drives each of the 1,600 gpm pumps.
- **Sierra Pressure Zone:** There are four (three duty and one spare) Byron-Jackson three-stage, vertical turbine units, each capable of delivering 1,750 gpm at 45 feet of head in the Sierra portion of the Bacon Pump Station. The total capacity of the pump station is 7,000 gpm, while the firm capacity is 5,250 gpm. A 30 Hp, 1,750 rpm motor, drives each pump. The two variable speed and two constant speed drive pumps have a total installed design capacity of 5,250 gpm.

There are two 350 kilowatt (kW) generators located on site. During power interruptions, one operates the pumps for the Bacon Pressure Zone and the other one operates the pumps for the ARC-North and Sierra Pressure Zones.

Granite Bay Pump Station

The Granite Bay Pump Station, located approximately 200 feet east of the intersection of Auburn-Folsom Road and Eureka Road, serves both the Lower Granite Bay and Upper Granite Bay Pressure Zones. The pump station equipment and controls are located outdoors within a cement block wall enclosure. The station has seven pumps, all fed from a 16-inch diameter pipeline along Eureka Road, which are supplied by the piping network within the Bacon Pressure Zone. The intake manifold was constructed with two additional stubs available for future pumps. Likewise,

the discharge manifold includes provisions for two extra pumps so that expansion of the pump station can easily be accommodated.

- Lower Granite Bay: The four pumps installed to serve Lower Granite Bay are Crane-Deming horizontal split case pumps, driven by 60 Hp electric motors. Each pump has a design capacity of 1,030 gpm at 160 feet of head. Their total capacity is 4,120 gpm, while their firm capacity is 3,090 gpm. The pumps discharge through a 16-inch diameter manifold into a 12-inch diameter pipeline that goes a short distance up Auburn-Folsom Road, and splits to two 10-inch diameter pipelines.
- Upper Granite Bay: The Upper Granite Bay side of this pump station consists of three similar Crane-Deming horizontal split case centrifugal pumps driven by 40 Hp electric motors. The design condition for these smaller pumps is 370 gpm at 190 feet of head. The total capacity is 1,110 gpm, while the firm capacity is 740 gpm. This side of the station discharges to a single 10-inch diameter pipeline leading into the Upper Granite Bay Pressure Zone.

There is space on the Upper Granite Bay Pressure Zone side to add at least two new pumps of similar size if an existing non-functioning pressure relief control valve is relocated or removed. The Lower Granite Bay Pump Station has space to add at least one new pump of similar size.

There is a 200 kW, 250 kilovolt – ampere (kVA), 277/480 volt, 3-phase, 60-hertz, 1,800-rpm diesel engine standby generator with a 150-gallon, double wall, base-mounted fuel tank located inside the enclosed pump station area. The generator can be manually started in an emergency and can operate two 40 Hp pump motors at constant speed for the Upper Granite Bay Pressure Zone.

There is an intertie between the two pump station discharge pipelines with a gate valve, which is normally closed. A control valve is located on a pipeline intertie between the suction header and discharge pipeline for the Upper Granite Bay Pressure Zone. The control valve has not been used, but was installed to bypass the pumps in case of a power failure to provide water directly from the Bacon Pressure Zone to the Lower and Upper Granite Bay Pressure Zones.

Lower Granite Bay Pressure Zone pumps are operated to maintain a pressure of 107 pounds per square inch (psi) at the pump station. The lead 60-Hp pump motor is operated by a variable frequency drive (VFD) with the other three 60-Hp pump motors operated at constant speed. The constant speed 60-Hp pump motors are started by the Liquitronic IV programmable pump controller each time the lead 60-Hp VFD reaches 100 percent capacity (full speed = 1,750 rpm).

Upper Granite Bay Pressure Zone pumps operate to maintain a pressure of 124 psi at the pump station. The lead 40-Hp pump motor is operated by a VFD, the other two 40-Hp pump motors operate at constant speed. The constant speed 40-Hp pump motors are started by the Liquitronic IV programmable pump controller each time the lead 40-Hp VFD reaches 100 percent capacity (full speed = 1,750 rpm).



Douglas Pump Station

The Douglas Pump Station serves the Lower Granite Bay Pressure Zone and is located near the corner of Auburn-Folsom Road and Douglas Boulevard, in the southwest corner of a commercial business parking lot. The pump equipment and controls are located inside a cement block building. The installation consists of two Crane-Deming centrifugal pumps, close-coupled to 30 Hp U.S. electric motors. Each pump is designed for 600 gpm at 160 feet of head. The total pumping capacity is 1,200 gpm, while the firm pumping capacity is 600 gpm. The suction piping is 12-inch diameter pipeline while the discharge is a 10-inch diameter pipeline.

This station was originally constructed to serve as a fire booster pump station. However, because demands in the Lower Granite Bay Pressure Zone have continued to increase over the past decade, the station is now used to supplement the Lower Granite Bay pumps. The Douglas Pump Station is only used during high water demand periods (summer months). The lead pump is set to turn on at 90 psi and the lag pump is set to turn on at 80 psi. Both pumps are turned off at 108 psi.

There is no space available inside the existing building to add another pump. There is no standby power available at this seasonally-used station.

American River Canyon-South (ARC-South) Pump Station

The ARC-South Pump Station is located east of the intersection of Santa Juanita Avenue and Central Avenue, and serves the southern portion of the American River Canyon subdivision as a separate pressure zone. The pump station is supplied from the 40-inch diameter Fair Oaks transmission pipeline at a suction pressure of approximately 50 psi. This station was constructed in 1978 and consists of four Crane-Deming horizontal split case centrifugal pumps driven by 50-Hp Marathon electric motors. Each pump has a capacity of 1,000 gpm at 120 feet of head. The total pumping capacity is 4,000 gpm, while the firm pump capacity is 3,000 gpm. The pumps are housed within a concrete block building and deliver water into the southern American River Canyon area. Standby power is available at this site using a portable trailer mounted standby generator.

The District has elected to only use the ARC-South Pump Station from April through November, which are high water demand periods. The pump station is shut down during the winter/wet months because the ARC-North Pump Station has the capacity to provide adequate flow and pressure to the pressure zone through the ARC-North Pressure Zone. All that is required to provide flow from the ARC-North Pressure Zone to the ARC-South Pressure Zone is to open one intertie valve.

The ARC-South pumps are operated to maintain a pressure of 100 psi. The lead 50 Hp pump motor is VFD operated, the other three 50-Hp pump motors are operated at constant speed. The Liquitronic IV programmable pump controller starts the constant speed pump motors when the lead VFD pump motor reaches 100 percent capacity (full speed = 1,750 rpm). The controls are such that any of the four 50-Hp pumps can operate as a lead VFD pump or constant speed pump.

Hinkle-Crown Point Pump Station

The Hinkle-Crown Point Pump Station, like the Granite Bay Pump Station, serves two pressure zones. One side of the station serves the Ashland Pressure Zone, a wholesale pump zone entirely within the City of Folsom, and the other side serves the Crown Point Pressure Zone in the retail service area. Hinkle-Crown Point Pump Station also serves Beals Point State Park and provides water needs at the District WTP (e.g., landscape irrigation, chemical feed system, washdown water, chlorine solution, etc.). Hinkle-Ashland Pump Station has three 60-Hp pumps and one 15-Hp pump that serve Ashland Pressure Zone¹.

Construction of an upgraded Hinkle Pump Station began in August 2005 and will be completed in June 2006. On the Hinkle-Crown Point side of the pump station, the installation includes four pumps driven by 100 Hp Motors. The pumps are designed to each produce approximately 960 gpm at 240 feet of lift. The total pumping capacity is 3,840 gpm, while the firm pumping capacity is 2,880 gpm. A 30-inch diameter suction manifold off the 78-inch diameter Hinkle outlet supplies the station. The discharge is a 14-inch diameter line leading directly into the Crown Point Pressure Zone.

The Hinkle-Crown Point Pump Station includes a 277/480 volt, 3-phase, 60-hertz, 1,800-rpm diesel engine standby generator, located adjacent to the pump station area. The generator can be automatically started in an emergency and can operate all duty pumps for each of the two pump stations (Crown Point and Ashland Pressure Zones). The generator includes a Convault fuel tank with a 16-hour diesel supply.

Pipelines

The District's existing distribution system consists of about 200 miles of pipelines, mostly AC pipe, some of which are over 50 years old. Existing distribution pipeline sizes range from 4- to 12-inches in diameter, while larger transmission mains range in size from 16- to 72-inches in diameter. The older pipelines are found in the Gravity Pressure Zone and are primarily constructed of cast iron, welded steel or ductile iron and reinforced concrete materials for mains exceeding 16-inches in diameter. The newer pipelines, found in the Sierra Pressure Zone, are primarily PVC pipes.

Emergency Interties

For emergency purposes, the District maintains a number of emergency interties with neighboring water suppliers to provide for supplies during emergencies. These emergency interties are discussed in Chapter 4 of this Retail Water Master Plan.

¹The Ashland Pressure Zone (City of Folsom) is outside of the District's retail area, and no further mention of this side of the pump station is made in this report.