Section 6. INFRASTRUCTURE REQUIREMENTS

THIS SECTION CONTAINS THREE SEPARATE SUB-SECTIONS THAT DESCRIBE IN SIGNIFICANT DETAIL THE WATER INFRASTRUCTURE REQUIREMENTS FOR EACH OF THE THREE WATER SERVICE AREAS (I.E., NORTH SERVICE AREA (NSA), CENTRAL SERVICE AREA (CSA), AND SOUTH SERVICE AREA (SSA)). EACH SERVICE AREA'S DESCRIPTION BEGINS WITH A MAJOR FACILITIES MAP INDICATING THE LOCATION OF MAJOR WATER TREATMENT FACILITIES AND TRANSMISSION MAINS (T-MAINS). FOLLOWING THE MAJOR FACILITIES MAP ARE SMALLER SCALE MAPS OF THE SERVICE AREA THAT DETAIL THE INFRASTRUCTURE IN TERMS OF PIPE SIZES, TYPE AND LOCATION OF VALVES, TREATMENT AND STORAGE REQUIREMENTS, AND DESCRIPTIONS OF HOW EACH OF THE SIGNIFICANT ISSUES IDENTIFIED IN THE TABLES IN ***SECTION 2*** *ARE ADDRESSED RELATIVE TO THE DESIGN OF THE WATER SYSTEM. FOR EACH "NEW" WATER TREATMENT PLANT OR STORAGE RESERVOIR SITE, A SCHEMATIC IS PROVIDED IN DETAILING PUMP SPECIFICATIONS, STORAGE RESERVOIR CAPACITIES, AND OTHER RELATED INFORMATION. THIS INFORMATION ALONG WITH THE PIPE AND VALVE INFORMATION CAN BE FOUND IN* ***APPENDIX D.***

6.1 Overall System Description and Map

Looking at the build out model results shown in **Figure 4-1**, the larger water facilities and configuration of T-mains are identified. The pertinent information from this figure is the location of the Vineyard SWTP relative to the groundwater WTP's and the connections with the City for the Wheeling Agreement and the POU service area. The raw water network that carries Sacramento River water to the Vineyard SWTP is represented also, showing the approximate alignment and size of the large raw water conveyance system to be constructed through FRWA. This figure represents the final configuration that needs to be constructed to operate the system and achieve the goals of the SCWA PSA in the WFA and in the WSMP. In wet years, treated surface water from the Vineyard SWTP is produced and pushed out into the larger transmission grid of which approximately 60% of the capacity serves the NSA, 30% serves the CSA, and 10% serves the SSA. In order to move large quantities of surface water into the system, groundwater facilities will need to be operated in a manner that reduces the "hydraulic barrier" effect to allow the surface water to move freely north and south. An example of this will be shown **Section 7**.

If the capacity of the entire system is viewed at build out, there is **100** MGD of surface water capacity from the Vineyard SWTP, **19** MGD of surface water capacity in the POU area, **11** MGD of surface water capacity through the Franklin Intertie, and **127** MGD of groundwater capacity. If the total supply capacity of **257** MGD is compared to a maximum day water demand (minus recycled water demands) of **211.15** MGD (see **Table 3-4**) there is approximately **20**% of redundancy in the water system. This redundancy in water supply capacity is the amount of groundwater capacity needed to provide reliable water supplies in the critical years when surface water cutbacks occur.

If the groundwater and surface water capacity for the entire Zone 40 service area were plotted over time with 2030 as the planning horizon (Note: 2050 is used for build out in the financial analysis), **Figure 6-1** would be the result. Under a dry or critical year water year scenarios, the capacity plotted over time is as shown in **Figure 6-2.** This figure illustrates the need for redundancy for dry year conditions with the demand curve at 15 percent conservation at or near the water capacity in 2030.

Figure 6-1. Zone 40 Water Supply Sources and Demand in Normal and Wet Years

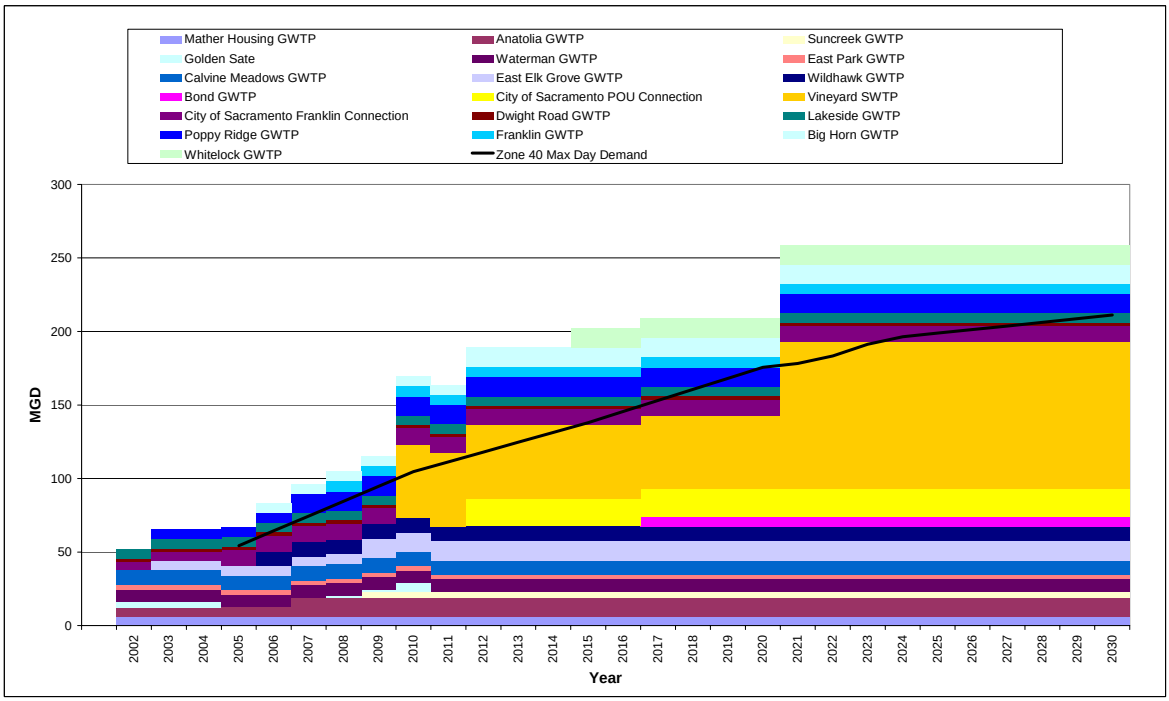
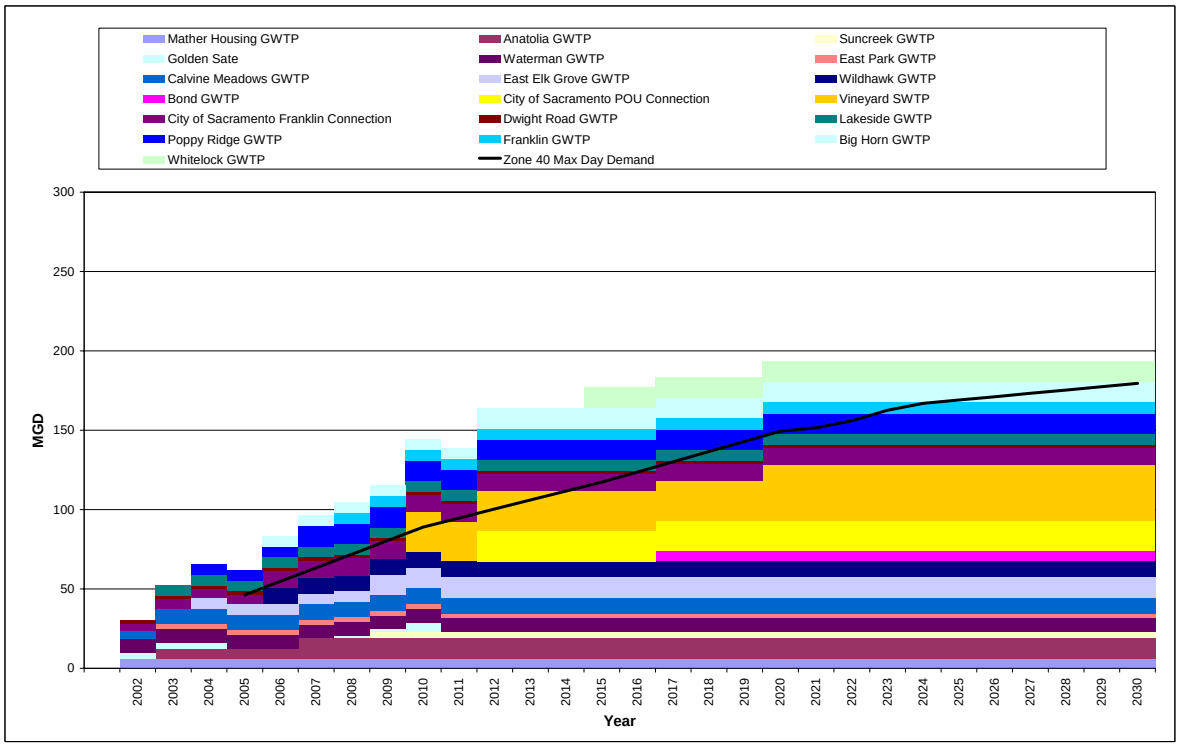


Figure 6-2. Zone 40 Water Supply Sources and Demand in Dry and Critical Years (w/ 15 Percent Water Conservation)



6.2 NSA Infrastructure Requirements

This section describes the infrastructure requirements for the NSA water system. The section gives a general overview of physical constraints and challenges of moving water into and within this service area, followed by solution strategies for the design and operation of the water system in the NSA. Detailed description of the proposed facilities including facility type, quantity, phasing, and function is presented afterward.

6.2.1 Constraints in Designing NSA Water System

A general description of water supply issues and obligations in the NSA was presented previously in **Section 2.2.1**. This section summarizes the major constraints and challenges in designing a water system for the NSA:

- **Significant variation in ground surface elevations** – the NSA has rolling terrain ranging in elevation from approximately 110 feet above mean sea level (msl) in the Mather service area in the west to approximately 250 feet msl in the North Douglas service area in the northeast. This great variation in ground elevation coupled with a relatively strict system operating pressure range discussed below necessitates multiple stages of pump stations and multiple pressure zones within the NSA system.
- **Limited accessibility to groundwater –** groundwater contamination as a result of past disposal practices of rocket fuel and other organic carbon based solvents by Aerojet and Boeing, and the United States Air Force limit the accessibility to groundwater in the NSA area. Ultimately, a majority of water supply will need to be surface water and replacement water out of the Vineyard SWTP located at Florin Road and Vineyard Road in the CSA. The portion of water supply that is groundwater comes from the off-site Excelsior Well Field located near Excelsior Road and Elder Creek Road, the Mather Housing wells and groundwater WTP, and the future Suncreek Satellite groundwater WTP. The location of the Vineyard SWTP and Excelsior Well Field water supply sources require high energy pump stations (or well pump and motor) and large diameter long length transmission pipelines to deliver raw groundwater to the NSA. Future surface water supplies will be through another large diameter parallel transmission pipeline that conveys treated surface water to storage tanks located in NSA.
- **Relatively narrow system operating pressure range** – As described in **Section 5.5.4.1**, SCWA's maximum operating pressure goal in transmission pipelines is 75 psi, and the minimum operating pressure goal is 40 psi. Based on the significant change in ground surface elevations in the NSA, it is not feasible to operate the entire NSA water system within one pressure zone and meet the maximum and minimum operating pressure goals.
- **Accommodation of replacement water supplies –** Since the Replacement Water Supply Project is integrated with the Vineyard SWTP, the NSA water system should be sized to accommodate replacement water supply needs of Golden State

adjacent to the NSA and needs in SCWA Zone 41's Sunrise Corridor. The detailed description about replacement water supply agreement was presented in **Section 2.2.1.1**. Since the exact amount of replacement water supply capacity to Golden State has not been determined, this WSIP assumes that they will require up to the maximum of 10,200 AF/year on a annual Municipal and Industrial (M&I) pattern (i.e., delivery changes throughout the year whereas the remediated groundwater is discharged at a steady rate 24 hours a day 7 days a week). The significance of this is that Golden State requires maximum day capacity in the Zone 40 treatment and distribution system that is already challenged in terms of available and affordable capacity to NSA.

6.2.2 Overview of NSA Water System

The NSA water system is designed to provide a cost effective solution to convey, store, and distribute water supplies throughout the NSA given the constraints described above. Large dedicated pipelines and booster pumps are designed to convey water from off-site sources into the NSA. Unlike other service areas where supply sources lie within the service area, the NSA will rely upon receiving water from predominantly off-site sources and use storage tanks as if they were a supply source and not simply a peaking and fireflow facility. This translates into smaller diameter conveyance pipelines from CSA to NSA and larger storage capacity in the NSA versus other service areas. The number of storage tanks proposed is to provide: 1) sufficient storage to meet the maximum day and peak hour demand of the NSA, 2) make maximum day water available to Golden State, and 3) increase the water supply reliability under unexpected or unplanned shutdowns of the various water supply components.

A number of pressures zones are designed within the NSA to ensure that system pressures can be maintained within the desired operating range. Operating strategies and guidelines are designed according to each pressure zone to provide reliable water supplies to the NSA water system customers. **Figure 6-3** and **Figure 6-4** shows water treatment facilities, the T-main network layout, storage tanks with proposed site locations and storage capacities, and various valves. Check valves and PRVs are used for the purpose

of pressure zone separation in the NSA. **Figure 6-4** highlights the primary conveyance routes and points of service (i.e., terminal tank locations and wholesale service areas).

Additional planning information about the facility requirements for the NSA water system will be provided in the following sections. Some initial design parameters for the facilities can be found in the facility maps and AutoCAD drawings included in **Appendix D Infrastructure Workbook**. The various design parameters indicated throughout this document should be confirmed once a system is under design to verify that conditions have not changed or if there is better information available. The system operation will be discussed in **Section 7 Conjunctive Use Operations**.

6.2.3 Pressure Zones in NSA Water System

Seven pressure zones are needed at build out of the NSA to achieve the following:

- Provide a clear hydraulic path of water movement through the system,
- Fill the many storage tanks located throughout the system,
- Ensure reliable water supply to Zone 40's wholesale areas, Westborough, and Golden State, and
- Maintain acceptable system operating pressures.

The delineation of each pressure zone is shown in **Figure 6-5** and described briefly below:

Pressure Zone 1 – represents the central portion of NSA including the Zone 41 portion of the Rio Del Oro development area. Ground elevations in this pressure zone range from 150 ~ 200 feet msl.

Pressure Zone 2 – represents the Mather and Sunrise Corridor System. Ground elevations in this pressure zone range from 80 ~ 150 feet msl.

Pressure Zone 3 – represents the service area south of Kiefer Boulevard plus the adjacent triangle-shaped area north of Kiefer Boulevard. Ground elevations in this pressure zone range from 115 ~ 150 feet msl.

Pressure Zone 4 – represents the Westborough area. It is one of the external wholesale areas of Zone 40 which has a separate water distribution system that will be the retail responsibility of another water purveyor, yet to be determined. Water will be conveyed to storage tanks located along White Rock Road that will be, in effect, the pressure zone boundary of the Westborough system.

Pressure Zone 5 – represents the Cal-Am franchise area. Same as Pressure Zone 4, it is considered as a separate pressure zone because it is one of the wholesale areas of Zone 40 and it has a separate water distribution system (with the exception of emergency interties at mutually beneficial locations). Storage tanks will be used to isolate the Cal-Am service area from the Zone 41 retail service area. These tanks will be constructed by Cal-Am since they will serve only the Cal-Am franchise area.

Pressure Zone 6 – represents the east portion of the NSA. Ground elevations in this pressure zone range from 200 ~ 250 feet msl.

Pressure Zone 7 – represents the Mather new growth area. Ground elevations in this pressure zone range from 120 ~ 150 feet msl.

Figure 6-3. NSA Infrastructure Map

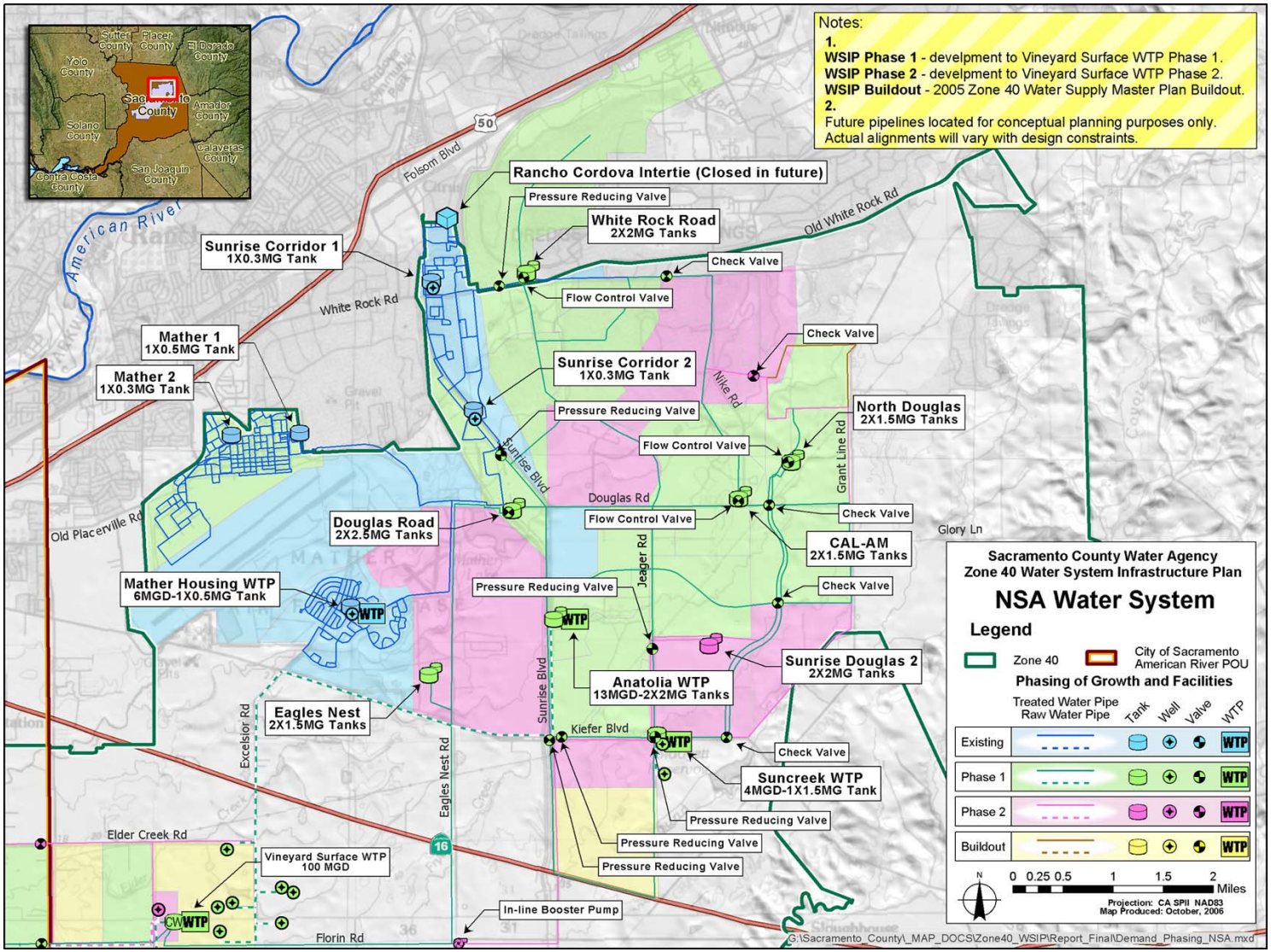


Figure 6-4. NSA Major Pipelines

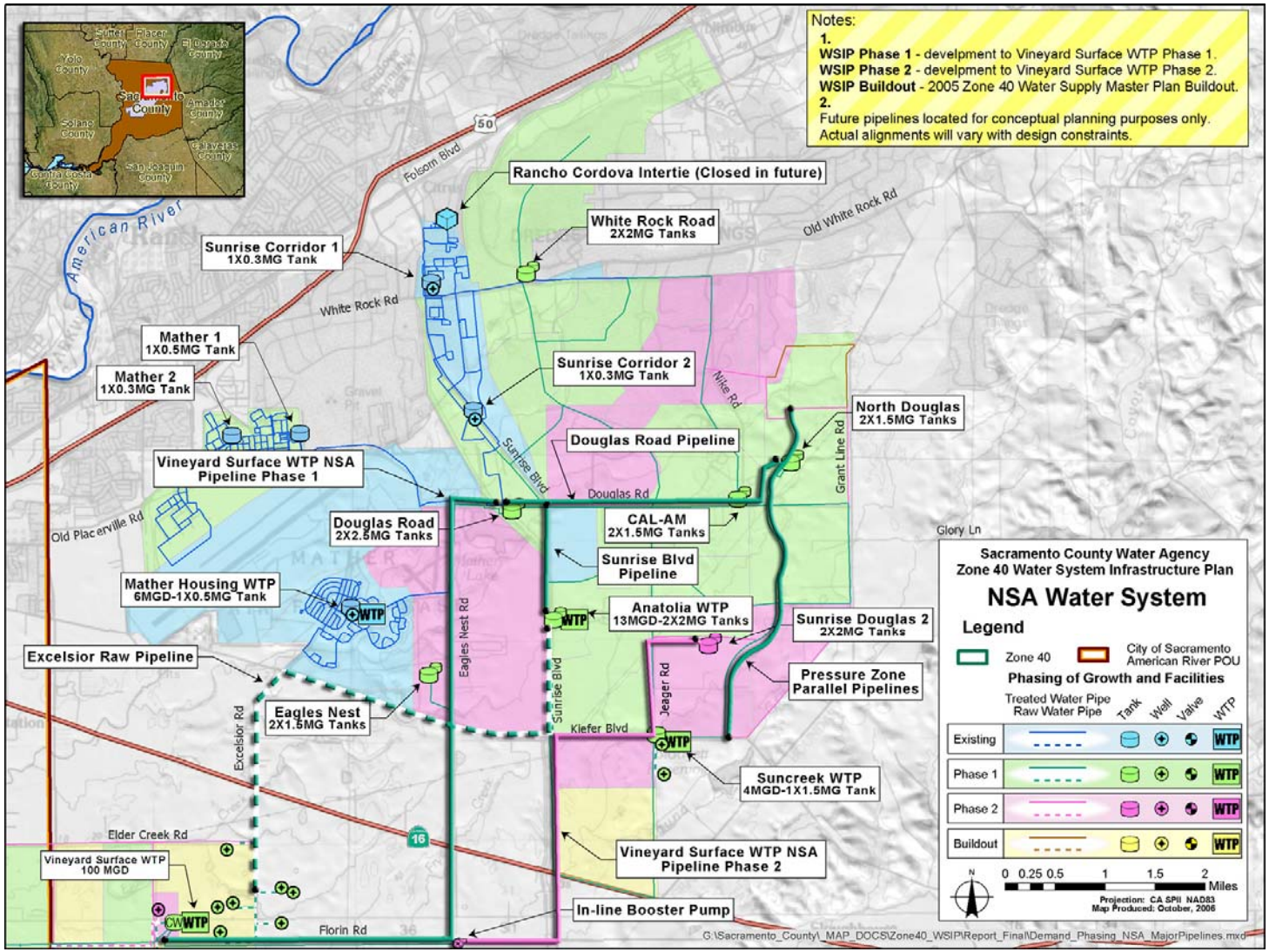
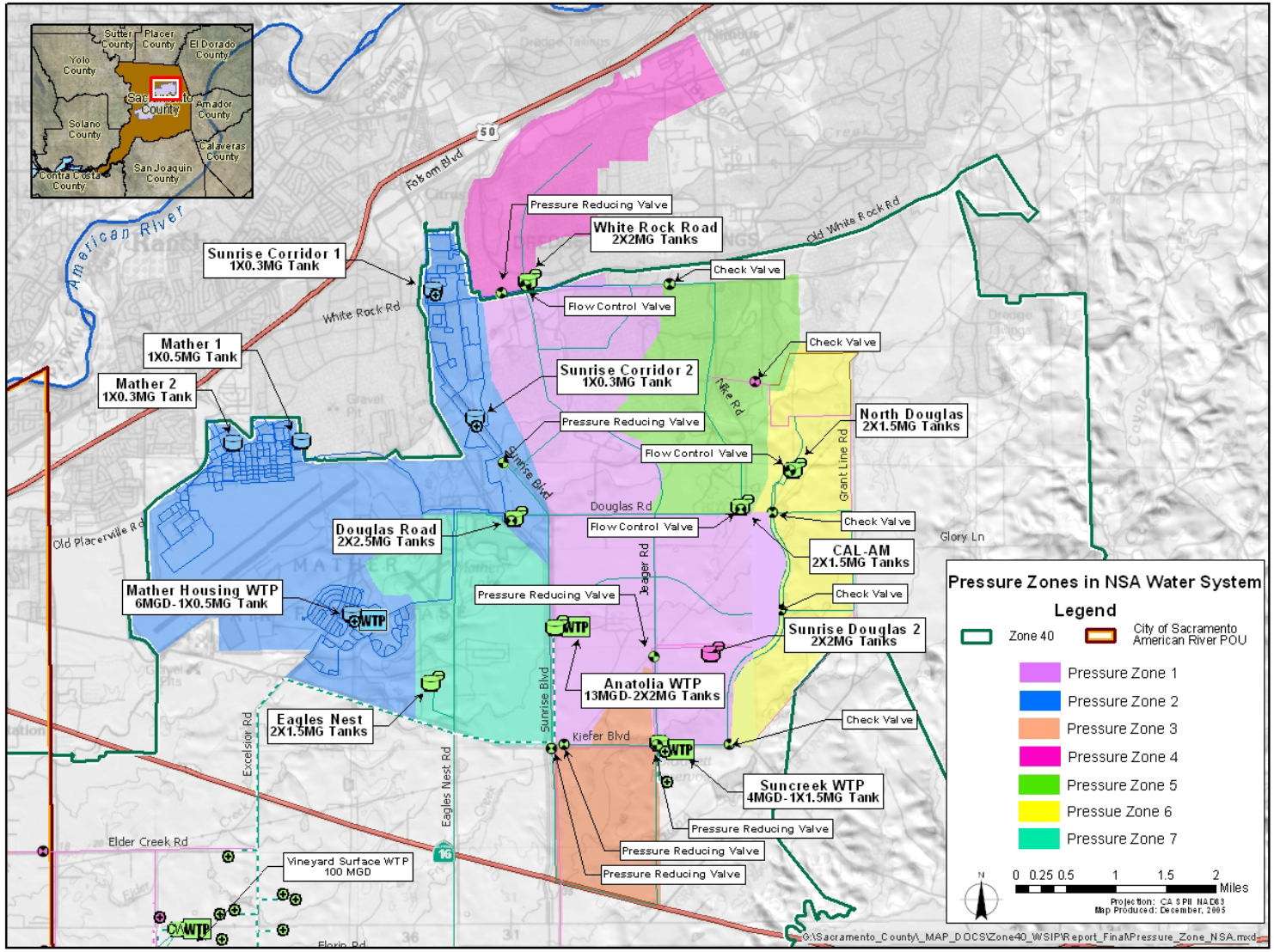


Figure 6-5. Pressure Zones Delineation in NSA



6.2.4 Facility Requirements

This section focuses on the design considerations and phasing of construction for major water facilities within the NSA.

6.2.4.1 NSA Water Treatment Plants

Mather Housing and the first phase of the Anatolia WTP (this WTP may show up as a future facility in some maps because it was under construction while the WSIP was being prepared) are two existing sources of water supply in the NSA. These groundwater WTPs along with the 1,000 gpm Rancho Cordova intertie with Golden State meet the water demands in the existing Mather and Sunrise Corridor system and the new growth areas of the Sunridge Specific Plan.

One additional groundwater WTP is proposed in the NSA: the Suncreek WTP. The ultimate design capacity of the Anatolia WTP is 13 MGD and will treat groundwater from seven off-site groundwater wells near Excelsior Road between Elder Creek and Florin Roads (Excelsior Well Field). The Anatolia WTP is located east of Sunrise Blvd and south of Douglas Road in the Anatolia development area. The first phase of the Anatolia WTP with 6.5 MGD treatment capacity and with three Excelsior wells started service in 2005 to support the initial new growth area of the Sunridge Specific Plan in the NSA. The completion of the Anatolia WTP is projected to take place before the first phase of the Vineyard SWTP.

The Suncreek WTP is shown as being located near Kiefer and Jaeger Roads. The design capacity of the Suncreek WTP is 4 MGD with two to three groundwater wells. The purpose of the Suncreek WTP is to provide necessary water supply to provide water to the Pressure Zone 3 thereby allowing more water from Vineyard SWTP and Anatolia WTP to move north to fill the specified storage requirements north of Douglas Road. Suncreek may also be needed to meet growth in the NSA before the Vineyard SWTP is online. Once the Vineyard SWTP is online, operations may dictate that the Suncreek WTP be used only in the summer months as a peaking and backup facility. **Table 6-1**

summarizes the location, design capacity, phasing, and purpose for the Anatolia and Suncreek WTPs.

Table 6-1. Groundwater Treatment Plants in NSA

Groundwater Water Treatment Plant	Capacity (MGD)	Location	Number of Wells	Purpose	Phase
Mather Housing	6	Mather	2	Provide water to Mather/Sunrise Corridor System	Existing
Anatolia	13	East of Sunrise Blvd in Anatolia	7[a]	Provide water to Sunridge Specific Plan Area	Phase 1[b]
Suncreek	4	Near Kiefer and Jaeger Roads	3[c]	Water supply to Pressure Zone 3 of the NSA	Phase 1[d]
Total	**23**				

Notes:
a. Seven off-site wells located along Excelsior Road between Florin and Elder Creek Roads.
b. 6.5 MGD treatment capacity and three off-site wells have been constructed; the Anatolia WTP is expected to expand to its full capacity before the Vineyard SWTP is brought online.
c. Three wells are proposed at the vicinity of the Suncreek WTP (one well will serve as a backup supply to the WTP).
d. The timing of construction of the Suncreek WTP is dependent upon the pace of development in the NSA before the Vineyard SWTP is online in 2010/11.

6.2.4.2 NSA Storage Tanks

Storage tanks are pivotal to ensuring reliable water supplies, maintaining acceptable system pressures, and providing sufficient storage for meeting maximum day water demands, peak hour water demands, and emergency conditions within the NSA water system. For these reasons, a number of storage tanks are proposed in the NSA water system: Anatolia (2x2MG), Douglas Road (2x2.5MG), Sunrise Douglas 2 (2x2MG), White Rock Road (2x2MG), North Douglas (2x1.5 MG), Suncreek (1x1.5 MG), and Eagles Nest (2x1.5 MG) storage tanks (see **Figure 6-3)**. The Cal-Am Storage Tanks are assumed for the Cal-Am franchise area, a wholesale customer to Zone 40. The tanks are included for modeling purposes and to properly size the transmission facilities. In this WSIP, the assumption is that the Cal-Am Tanks and a portion of the White Rock Road

storage tanks that serve Westborough and Golden State will be constructed by others and not by Zone 40.

Due to the location of the Vineyard SWTP relative to the NSA, the water from the Vineyard SWTP clear well fills the Douglas Road Tanks and Sunrise Douglas 2 Tanks through large dedicated pipelines first and then water is subsequently pumped out from these storage tanks to meet the water demands of the NSA water system at acceptable pressures. The NSA will rely heavily on the water supply from the Vineyard SWTP in the build out condition to meet the water demands in Rio Del Oro, Westborough, and other areas outside of the Sunridge Specific Plan Area that is served by the Anatolia WTP. In addition, the Vineyard SWTP will provide the large replacement water supply obligation to Golden State. Therefore, the Douglas Road Tanks and the Sunrise Douglas 2 Tanks play a very important role in moving the Vineyard SWTP water to the areas described above. The Douglas Road Tanks are proposed for construction during WSIP Phase 1 (i.e., first phase of the Vineyard SWTP), and the Sunrise Douglas 2 storage tanks during WSIP Phase 2 (i.e., second phase of the Vineyard SWTP).

The Anatolia WTP Tanks store the treated water from the Anatolia WTP and can also fill from the treated water system, if needed, to store surface water from the Vineyard SWTP. This water is then pumped out mostly to meet the seasonal and diurnal demand of the Sunridge Specific Plan Area. Prior to the Vineyard SWTP becoming operational, part of the water out of the Anatolia WTP Tanks will feed the North Douglas Tanks to meet the water demand of Sunrise Douglas area in Pressure Zone 6. In the build out condition, the water from other storage tanks (Douglas Road, Sunrise Douglas 2, and Suncreek storage tanks) will contribute to pushing water up the hill to the North Douglas Tanks and distribution system to meet the full demand of Pressure Zone 6. The Anatolia WTP Tanks were constructed with the first phase of the Anatolia GWTP in 2005.

The White Rock Road Tanks are designed to provide peaking to Rio Del Oro and increase the reliability of delivering water to Westborough and Golden State. The Eagles Nest Tanks provide peaking to the Mather new growth areas, and the Suncreek WTP Tank provide peaking for the treated water from the Suncreek WTP and potentially water

from the Vineyard SWTP (in off-peak months). The Suncreek WTP Tank is expected to be constructed during WSIP Phase 1. **Table 6-2** summarizes the capacity, location, purpose, and phasing for the NSA storage tanks.

Table 6-2. Storage Tanks in NSA

Storage Tanks	Capacity (Number of Tanks X Volume in MG)	Location	Purpose	WSIP Phase
Mather Housing	1x0.5	South of the Mather Airport	Provide peaking for the treated water from the Mather Housing GWTP	Existing
Mather 1	1x0.5	North of the Mather Airport	Peaking facility	
Mather 2	1x0.3	North of the Mather Airport	Peaking facility	
Sunrise Corridor 1	1x0.3	Sunrise Blvd near Mechanical Dr	Out of service, may be used under emergency conditions	
Sunrise Corridor 2	1x0.3	Sunrise Blvd near White Rock Road	Out of service, may be used under emergency conditions	
Anatolia WTP	2x2	Same as Anatolia WTP	Provide peaking for the treated water from Anatolia WTP and distribute into the	Phase 1
North Douglas	2x1.5	North Douglas	Fed by water system in Pressure Zone 1 and then provide water supply for	
Douglas Road	2x2.5	Douglas Road East of Sunrise Blvd	Store water from the Vineyard SWTP and distribute to the NSA including providing replacement water supply to Golden State	
White Rock Road	2x2	White Rock Road	Provide peaking to Rio Del Oro and increase the reliability to provide water to Westborough and Golden State (replacement water supply).	
Suncreek WTP	1x1.5	Same as Suncreek WTP	Provide peaking for the treated water from the Suncreek WTP	
Eagles Nest	2x1.5	Mathew New Growth Area	Provide peaking for the Mather New Growth Area	
Sunrise Douglas 2	2x2	East of Jaeger Road and North of Kiefer Blvd	Store water from the Vineyard SWTP and distribute to the NSA	Phase 2
Total	**26.4**			

6.2.4.3 NSA Major Pipelines

Figure 6-4 provides a graphic depiction of the pipeline layout and phasing in the NSA water system. The sizes of the pipelines are shown in the maps included in **Appendix D Infrastructure Workbook**. The pipelines follow the alignment of existing and proposed roads as much as possible. When the road alignment information is not available, it follows the political boundary of general/community/specific plan areas. The pipeline sizes are determined so that the flow velocity in the pipe is less than the maximum flow requirement of 5 ft/sec, and at the same time keeping pressures within 40 psi to 75 psi range.

Table 6-3 and **Figure 6-4** show a number of pipelines that are of special importance. These pipelines are listed individually not only to emphasize their importance to the NSA water system but also to provide financial timing and pre-design information for future funding, design and construction. Other proposed pipelines in NSA are summarized in **Table 6-4**.

Table 6-3. Proposed Major Pipelines in NSA with Special Importance

Pipelines	Alignment	Purpose	Diameter (inch)	Length (feet)	Phase
Excelsior Raw Pipeline[a]	Excelsior well site → Excelsior Road → Kiefer Road → Sunrise Blvd → Anatolia GWTP	Raw water pipeline to deliver groundwater from Excelsior wells to the Anatolia GWTP for treatment	30	34,000	Phase 1
Vineyard SWTP NSA Pipeline Phase 1	Vineyard SWTP → Florin Road → Eagles Nest Road → Douglas Road → Douglas Road Storage Tanks	Dedicate pipe to deliver water from the Vineyard SWTP to fill Douglas Road Storage Tanks	66	15,200	
			54	12,500	
			48	10,900	
			42	3,500	
			Subtotal	42,100	
Douglas Road Pipeline[b]	Douglas Road	"Backbone" pipeline from west to east, and fill the North Douglas Storage Tanks	42	13,800	
Pressure Zone Parallel Pipelines	Boundary of Pressure Zones 1 and 6	Define the boundary of Pressure Zone 6	24	19,500	
			30	5,700	
Vineyard SWTP NSA Pipeline Phase 2	Florin and Eagles Nest Roads → Florin Road → Sunrise Blvd → Kiefer Road → Jaeger Road → Future Road to Sunrise Douglas 2 Storage Tanks	Dedicate pipeline to deliver water from the Vineyard SWTP to fill Sunrise Douglas 2 Storage Tanks	30	30,500	Phase 2
Total				**145,600**	

Notes:

a. Excelsior raw water pipeline has been constructed.
b. Douglas Road pipeline has been partially constructed.

Table 6-4. Other Proposed Major Pipelines in NSA

WSIP Phase	Diameter (inches)	Length (feet)
Phase 1	16	49,300
	18	1,130
	24	39,300
	30	9,900
	36	19,400
Subtotal		**119,030**
Phase 2	16	29,800
Subtotal		**29,800**
Total		**148,830**

Note: Pipelines in Cal-Am and Westborough wholesale area are not included in the table.

6.2.4.4 NSA Booster Pumps

The quantity, major design parameters and phasing for proposed booster pumps are shown in the detailed AutoCAD drawings in **Appendix D Infrastructure Workbook**.

6.2.4.5 NSA Valves

Numerous valves are proposed in the NSA water system including PRVs, flow control valves (FCVs) and Check Valves (CVs). **Table 6-5** summarizes the valve type, location, setting, phase, and purpose for all proposed valves in the NSA.

Table 6-5. Proposed Valves in NSA

Valve Type	Location	Setting	Purpose	WSIP Phase
PRVs	Sunrise Blvd north of Douglas Road	55 psi	Define boundary between Pressure Zone 1 and Zone 2	Phase 1
	White Rock Road	55 psi		
	Sunrise Blvd south of Kiefer Road	60 psi	Define boundary between Pressure Zone 1 and Zone 3	
	Kiefer Road east of Sunrise Blvd	53 psi		
	Jaeger Road north of Kiefer Road	46 psi		
	Kiefer Road east of Jaeger Road	60 psi		
FCVs	Douglas Road Storage Tanks	17,000 gpm	Control flow rate filling the Douglas Road Storage Tanks	Phase 1
	White Rock Road Storage Tanks	5,500 gpm	Control flow rate filling White Rock Storage Tanks	
	North Douglas Storage Tanks	6,950 gpm	Control flow rate filling North Douglas Storage Tanks	
	Sunrise Douglas 2 Storage Tanks	12,860 gpm	Control flow rate filling the Sunrise Douglas 2 Storage Tanks	Phase 2
CVs	Douglas Road	-	Allow one-directional flow from Pressure Zone 1 to Zone 6	Phase 1
	Kiefer Blvd	-		
	Americanos Blvd Between Douglas Road and Kiefer Blvd.	-		

6.3 CSA Infrastructure Requirements

This section describes the infrastructure requirements for the CSA water system. The section gives a general overview of physical constraints and challenges developing groundwater supplies and moving surface water into this service area, followed by solution strategies for the design and operation of the water system in the CSA. Detailed descriptions of the proposed facilities including facility type, quantity, phasing, and function are presented afterward.

6.3.1 Constraints in Designing CSA Water System

A general description of water supply issues and obligations in the CSA was presented previously in **Section 2.2.2**. This section summarizes the major constraints and challenges in the design of a water system for the CSA:

Implementing Zone 40's conjunctive use program – Unlike NSA, the CSA has a greater availability of groundwater and the total capacity of groundwater treatment plants is close to the total demand needed at build out. Once the Vineyard SWTP is operational, some of these groundwater treatment plants may be seasonally shut down to maximize the use of surface water from the Vineyard SWTP. Under certain favorable conditions (i.e., wet months of wet years), it is possible to shut down all the groundwater treatment plants in the CSA and use 100% surface water. Conversely, there are certain extreme stressed conditions (i.e., extended reverse flow events in the Sacramento River requiring shut down of the FRWA diversion) when it is possible that there is no surface water available to the CSA and all the groundwater treatment plants are in operation to meet water demands in CSA as well as a portion of water demands in NSA via the clear well of the Vineyard SWTP. Most of time, the CSA will be supplied with partially surface water and partially groundwater. As discussed in **Section 4.3.2 Use of Mini CALSIM for Zone 40**, a set of flexible operational strategies with regard to how to appropriately operate the groundwater treatment plants to achieve the conjunctive use goal is necessary. Also, it requires that the CSA water distribution system be designed to accommodate numerous operational scenarios.

Integrating with other service areas – The Zone 40 water system is an integrated system with the Vineyard SWTP being the most important component of the Zone 40 conjunctive use program. The Vineyard SWTP is also the component that reaches out to the three service areas in Zone 40 to provide as much surface water as possible given the right conditions. The Vineyard SWTP needs to have sufficient reliability to ensure a water supply to meet a large percent of the NSA demand, and at the same time needs to make surface water available to the CSA and SSA to implement the conjunctive use program. Therefore, the water distribution system should be designed with this operational constraint to ensure a proper water allocation for the three service areas.

Interconnections between service areas - The connection that the CSA will have with the SSA and the NSA is an important aspect of designing the CSA water system to maximize the use of surface water. In the case of connecting the CSA with the SSA, there will be a tendency for water in the CSA to migrate to the lower elevations in the SSA. This natural tendency is tempered with PRVs and FCVs to be able to regulate the flow so the NSA has sufficient supplies from the Vineyard SWTP. In the design of the connectivity between the CSA and SSA, provisions were made to allow up to 10 MGD of surface water from the Vineyard SWTP under maximum day conditions to move to the SSA. In addition, the design accounts for the need to move water from the SSA to the CSA under certain circumstances.

Foremost is the concern of high pressures occurring in the SSA as a result of connecting with the CSA. If not kept in check through the above mentioned valves, high pressures will exceed SCWA's maximum operating pressure goal, and may suppress booster pumps station in the SSA from operating correctly.

POU area water supply and phasing – A portion of the CSA is located within the City's POU thus providing access to an additional source of surface water pending a contract agreement with the City for the wholesale purchase of the water. Interim deliveries of groundwater to the POU area will be necessary as development will begin prior to construction of the larger pipeline that will connect the Zone 40 system with the City's Florin Reservoir located north of Florin Road along Elk Grove Florin Road. This

pipeline is referred to in the WSIP and the WSMP as the POU pipeline. As part of the Florin Vineyard Community Plan development, a smaller connection to the City's water distribution system will be made along Elder Creek Road prior to the POU pipeline construction to provide an initial volume of POU water and serve as a backup supply to either the City or Zone 41. Once POU water is introduced, the POU water will be confined in the POU area through a series of check valves.

Wholesale of water to FRCD/EGWS – another design element within CSA is the need for Zone 40 to provide water to FRCD/EGWS on a wholesale basis. In other areas of Zone 40 where there is a wholesale/retail relationship with another water purveyor, the points of connection are very clear to avoid confusion and to allow for measurement of water usage by both agencies. In the case of the FRCD/EGWS, there are already numerous connection points to the Zone 40 system and there is a need for Zone 40 to move water through the FRCD/EGWS retail area to serve adjacent Zone 41 service areas. This makes having a single point of connection difficult. Zone 40 is interested at some point in time in being able to meter the water usage but realizes that to accomplish this there would need to be numerous metering stations and, in some instances where there is single connection off of a Zone 40 T-main, there may be no other solution than to simply read the customer's metered usage. Regardless, the design of the future CSA facilities takes into account the possibility for future metering at high volume points of connection but does not go so far as to say where the metering stations will be located.

6.3.2 Overview of CSA Water System

Figure 6-6 and **Figure 6-7** shows the surface water and groundwater WTPs, the T-main network layout, the storage tanks located where potential property exists that can be purchased by Zone 40, and the valves that are needed for the purpose of pressure zone separation in the CSA and the isolation of the POU area. The Vineyard SWTP is located in the northeast portion of the CSA on Florin Road near the future extension of Vineyard Road. As shown in **Figure 6-7**, from the Vineyard SWTP to the south end of the CSA, a backbone T-main consisting of pipelines with larger diameters follows the alignment of Florin Road to the west, then Bradshaw Road to the south, then turns west at Bond Road,

and then south at Waterman Road to Grant Line Road, and then continues south on Grant Line Road to State Highway 99. The backbone pipeline distributes the surface water to the greatest extent throughout the CSA and brings the surface water to SSA when system operations provide for communication between the two service areas.

Additional information about the facility requirements for the CSA water system is provided in the following sections, and design parameters at a planning level for the facilities can be found in the facility maps and AutoCAD drawings included in **Appendix D Infrastructure Workbook**.

6.3.2.1 Vineyard SWTP Design

The development of the WSIP was conducted at the same time as the design of the Vineyard SWTP allowing both documents to communicate to each other. Because of this, there is a sufficient level of detail in the modeling of the Vineyard SWTP in the WSIP to provide the design parameters for the Vineyard SWTP. The Vineyard SWTP clear well is designed with two separate discharge pipelines: one is dedicated for the NSA that runs east on Florin Road and then north on Eagles Nest Road to fill the storage tanks in the NSA; the other pipeline is dedicated for the CSA and is essentially the beginning point of the CSA T-main backbone described above. Each discharge pipeline is equipped with a separate set of booster pumps with different design parameters. The separation is necessary to account for the elevation differences between the two service areas. The NSA pipeline from the Vineyard SWTP will have to be of a higher pressure to move water up the hill, so to speak. Whereas, the CSA pipeline is essentially tied into the larger CSA distribution network and is at a service level of pressure. For this reason, the clear well is used for peaking in the CSA but not in the NSA. The NSA is to receive water at a constant rate of flow and pressure to fill the storage tanks that will be used for maximum day and peak hour demands. This separation at the clear well also ensures the proper water allocation from the Vineyard SWTP for both service areas and allows for the clearwell to serve as a conduit if groundwater from CSA is needed to meet demands in NSA.

6.3.2.2 Pressure Zones

A pressure zone is located in the Sheldon Road area near State Highway 99 to help the integration of the CSA and SSA. FCVs are proposed at the Sheldon Road, Elk Grove Blvd, and Grant Line Road connections to control the water flow rate between the two service areas. A pressure reducing and flow control valve already exists at the Bond/Laguna Blvd connection.

The POU area will also operate in a separate pressure zone once the POU water is in service. The POU area is isolated to confine POU water within the POU area. The check valves will allow Zone 40 water within the zone if additional supplies are needed at any time. Both the Sheldon Road and POU pressure zones will be discussed in the following section.

Figure 6-6. CSA Infrastructure Map

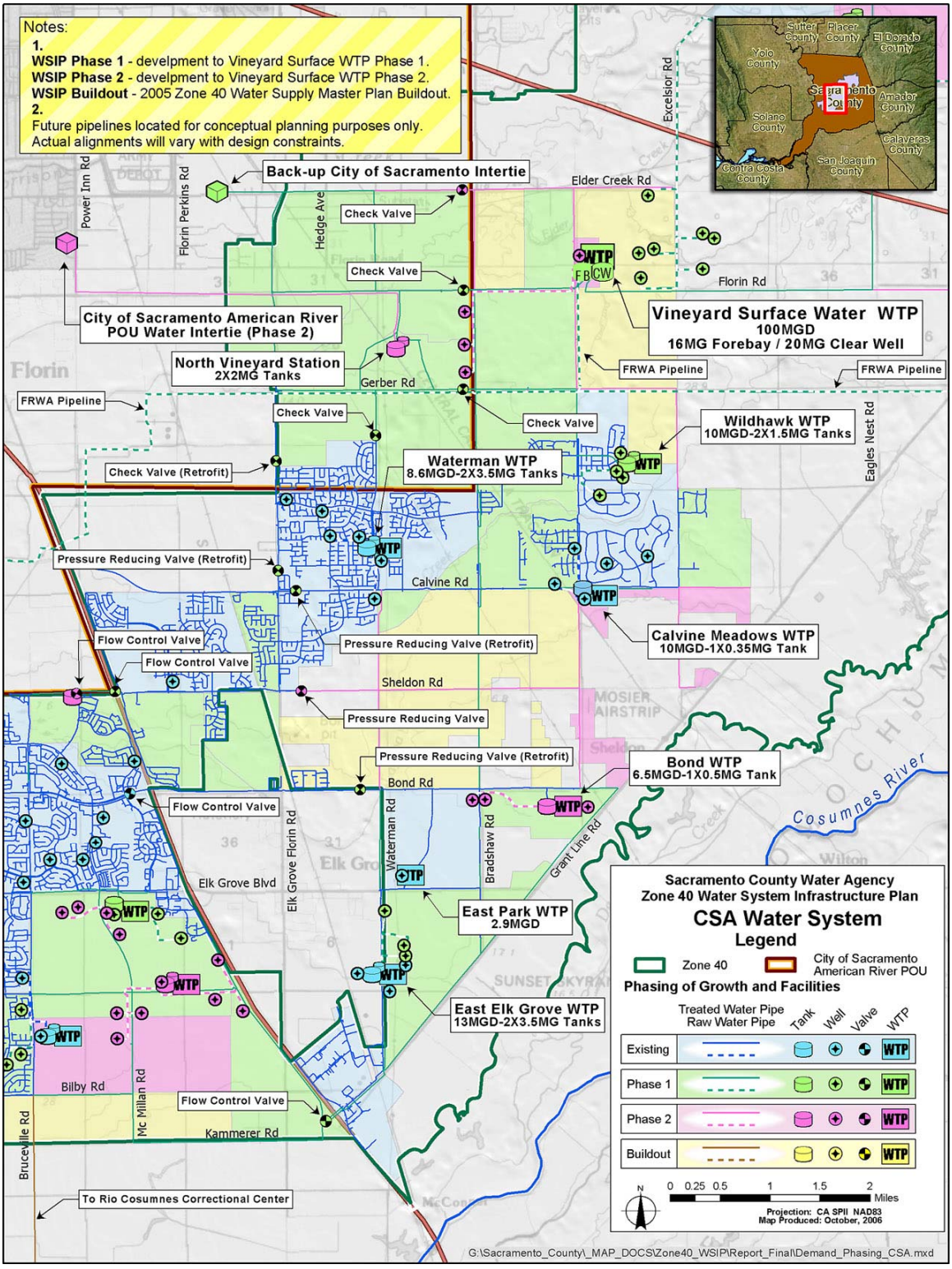
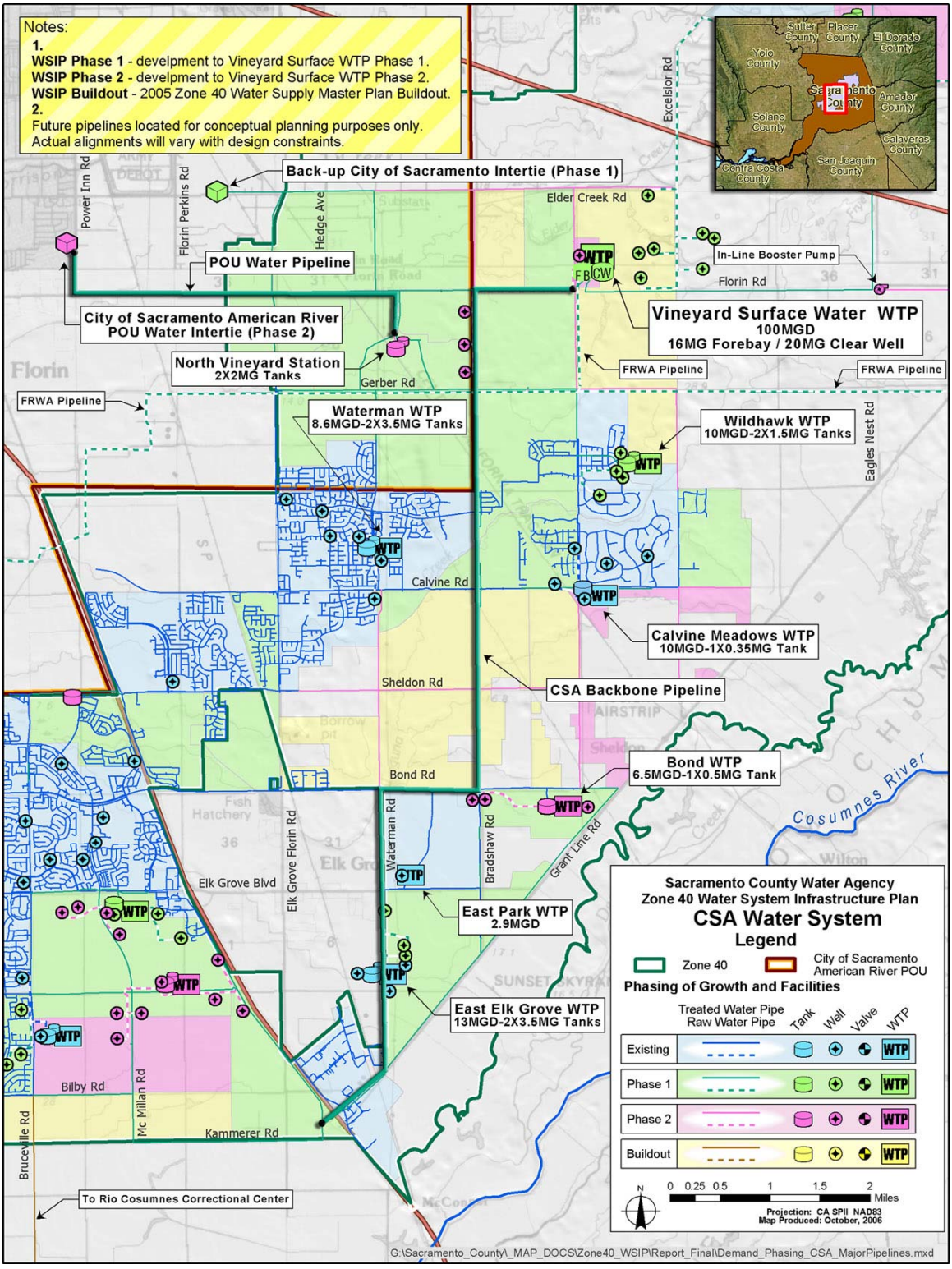


Figure 6-7. CSA Major Pipelines Map

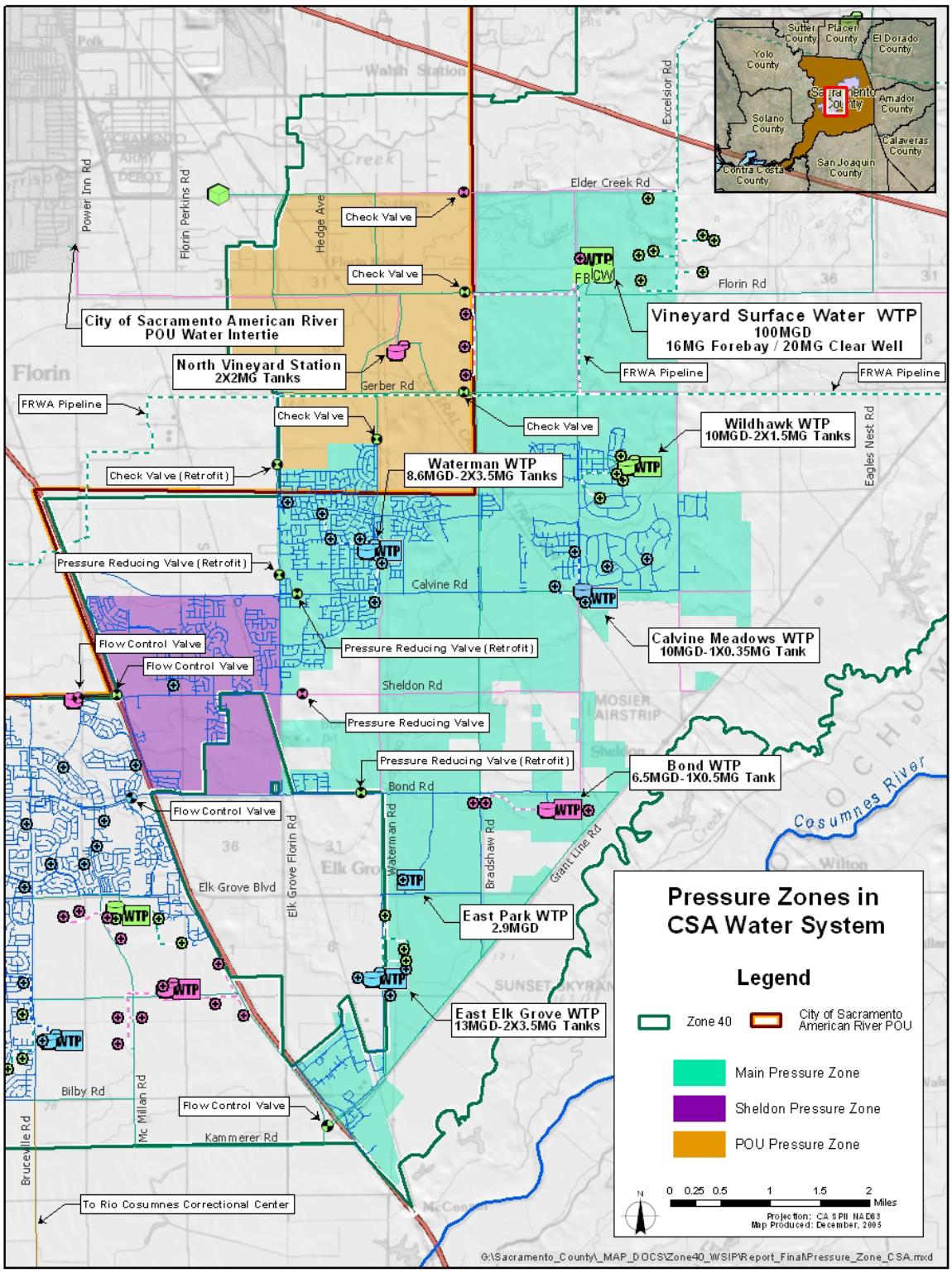


6.3.3 Pressure Zones in CSA Water System

This section describes the pressures zones in the CSA water system. The constraints in designing the CSA water system necessitate the division of pressure zones. Three pressure zones are needed under build out conditions: Main Pressure Zone, Sheldon Road Pressure Zone, and the POU Pressure Zone. The delineation of each pressure zone is shown in **Figure 6-8** and described briefly below:

- **Main Pressure Zone –** represents the main area in the CSA. All groundwater treatment plants and the Vineyard SWTP are located in the Main Pressure Zone. Ground elevations in this pressure zone range from 40 ~ 80 feet msl.
- **Sheldon Road Pressure Zone –** represents the area west of Elk Grove Florin Road to State Highway 99 and adjacent to the SSA. Ground elevations in this pressure zone range from 30 ~ 40 feet msl. Without PRVs to isolate this area, pressures can exceed design criteria in this area after the Vineyard SWTP is online. Through a series of modeling iterations, a conclusion was made that it is necessary to reduce pressures in this area by creating a separate pressure zone. The added benefit of this pressure reduction is the ability to connect with the SSA system and move water in both directions across State Highway 99. Such pressure reducing measures are not required for the Grant Line Road connection because headloss in the pipeline down to Grant Line Road reduce pressures to within the design criteria.
- **POU Pressure Zone –** includes North Vineyard Station Specific Plan area (NVSSP) west of Bradshaw Road and the entire Florin-Vineyard Community Plan (FVCP) area. This pressure zone is established because of the need to confine the POU water to the areas of Zone 40 within the POU and to establish a clean separation for measurement of how much water is being used.

Figure 6-8. Pressure Zones Delineation in CSA



6.3.4 Facility Requirements

This section describes facilities required to treat, store, convey, and distribute water in the CSA. The section also discusses the design considerations and phasing of construction for major facilities: water treatment plants, groundwater wells, storage tanks, pipelines, booster pumps, and valves.

6.3.4.1 CSA Water Treatment Plants

Currently, the water supply needs for the CSA depend completely on groundwater. Groundwater from wells is either treated in a number of existing groundwater treatment plants, treated at the well site, or are directly connected to the distribution system with only disinfection. Existing groundwater treatment plants include Waterman, East Park, East Elk Grove, and Calvine Meadows WTPs. East Park is a single well WTP whereas the others have anywhere from 3 to 6 wells. Country Creek and Sheldon wells are existing wells that directly tie into the distribution system. East Elk Grove and Calvine Meadows WTPs are expected to expand in later phases.

The proposed groundwater treatment plants include Wildhawk (currently under construction) and Bond WTPs. The Waterman and Wildhawk WTPs will become two major water supply sources for the interim development phases for the NVSSP and FVCP until the POU Pipeline is in operation. The capacity, location, number of wells and construction phase of these groundwater treatment plants are summarized in **Table 6-6**.

The total design capacity of the Vineyard SWTP is 100 MGD and the construction will take place in two phases. The first phase is being driven by the need to have a surface water treatment plant soon after the completion of the FRWA project in 2009. The second phase will be constructed when water demands require the additional increment of capacity. Each phase of the Vineyard SWTP will add 50 MGD of treatment capacity to the overall Zone 40 system. For purposes of design, the capacity of the Vineyard SWTP is split amongst the NSA, CSA, and SSA using 60 percent, 30 percent, and 10 percent, respectively, as a rule of thumb.

Aquifer Storage and Recovery

Four groundwater wells are proposed for the Aquifer Storage Recovery (ASR) program as indicated in **Table 6-6**. The use of ASR is a relatively new concept to increase the water supplies in an area or the reliability of existing supplies. The concept makes use of shoulder capacity (i.e., off-peak capacity in low demand months) in a surface water system that can be used to direct water to injection wells and force water into the underlying aquifer until a dry hydrologic period when the water is needed. In addition, these wells become a source of emergency backup to the Vineyard SWTP in the event that the FRWA diversion has to be shut down for an extended period of time. This can occur due to reverse flow conditions in the Sacramento River or because of surface water diversion cut-backs during dry years. The design and implementation of the ASR concept requires further study, which is beyond the scope of the WSIP.

Table 6-6. Water Treatment Plants in CSA

Groundwater Treatment Plant	Capacity (MGD)	Location	Number of Wells[a]	WSIP Phase
Waterman	8.6	Waterman Road north of Calvine Road	6	Existing
East Park	2.9	East Park	1	
East Elk Grove	13	Waterman Road in East Elk Grove	7	6.5 MGD and 3 wells (Existing) + 6.5 MGD and 4 wells (Phase 1)
Calvine Meadows	10	Calvine Road near Vineyard Road	4	5 MGD and 2 wells (Existing) + 5 MGD and 2 wells (Phase 2)
Wildhawk	10	South of Gerber near Vineyard Road	4	Phase 1[b]
Bond	6.5	South Bond Road near Vineyard Road	3	Phase 2
Total	**51**		**25**	
Surface Water Treatment Plant	**Capacity (MGD)**	**Location**	**Number of Wells**	**WSIP Phase**
Vineyard SWTP	100	Near Florin and Vineyard Roads	4[c]	50 MGD (Phase 1) + 50 MGD (Phase 2)

Notes:
a. Wells supplying groundwater for treatment at groundwater treatment plants.
b. Wildhawk GWTP is under construction at the time of this document being prepared
c. These are possible ASR wells proposed in the North Vineyard Station Specific Plan (3 wells) plus one well in the vicinity of the Vineyard SWTP.

6.3.4.2 CSA Storage Tanks

Table 6-7 summarizes the capacity, location, purpose, and construction phase for all the storage tanks in the CSA. Most of the storage tanks are used to provide storage of groundwater for peaking from each of the respective groundwater treatment plants. Every tank, however, has the ability to fill off of system pressures using water that is in the distribution system at the time. For instance, an aggressive use of surface water might have operations in a mode where all tanks are filled with surface water during the off peak periods rather than using groundwater. The drawback to this scenario is making

sure that wells are exercised sufficiently throughout the year so they can be turned on at moments notice if surface water supplies drop off or demands become greater.

The exception to the above storage tanks is the North Vineyard Station Storage Tanks which will operate differently before and after the POU Pipeline project is brought online. Ultimately, the storage tanks will be fed constantly with POU water from the City's water system through a dedicated low-head pipeline, the water then will be pumped out from the storage tanks to provide sufficient pressure to meet the demands of the POU area. Before the POU water is available, however, the POU area will rely on groundwater from the Waterman and Wildhawk WTPs, a smaller connection with the City's distribution system along Elder Creek, and potentially surface water from the Vineyard SWTP. The storage tanks operate in a fill-and-empty mode, that is, the storage tanks fill with water from the Zone 40 distribution system during low demand hours, and the water is pumped back into the system during peak demand hours.

6.3.4.3 CSA Major Pipelines

Figure 6-7 provides a graphic depiction of the pipeline layout and phasing in the CSA water system. The sizes of the pipelines are shown in the maps included in **Appendix D Infrastructure Workbook**. The pipelines follow the alignment of existing and proposed roads. The pipeline sizes are determined so that the flow velocity in the pipe is less than the maximum flow requirement of 5 ft/sec, and at the same time keeping pressures within a 40 psi to 75 psi range.

Table 6-7. Storage Tanks in CSA

Storage Tanks	Capacity (MG)	Location	Purpose	WSIP Phase
Waterman	2x3.5	Same as Waterman GWTP	Provide peaking for the treated water from Waterman GWTP	Existing
Calvine Meadows	1x0.35	Same as Calvine GWTP	Provide peaking for the treated water from Calvine Meadows GWTP	
East Elk Grove	2x3.5	Same as East Elk Grove GWTP	Provide peaking for the treated water from East Elk Grove GWTP	
Wildhawk	2x1.5	Same as Wildhawk GWTP	Provide peaking for the treated water from Wildhawk GWTP	Phase 1
North Vineyard Station	2x2	Near Hanfield Drive in NVSSP area	Operate in fill-and-empty pattern before POU water is made available. Provide storage and peaking for POU water.	
Bond	1x0.5	Same as Bond GWTP	Provide peaking for the treated water from the Bond GWTP	Phase 2
Total	**21.85**			

Table 6-8 and **Figure 6-7** show a number of pipelines that are of special importance. These pipelines are listed individually not only to emphasize their importance to the CSA water system but also to provide pre-design information for future design and construction. Other proposed pipelines in CSA are summarized in **Table 6-9**.

Table 6-8. Proposed Major Pipelines in CSA with Special Importance

Pipelines	Alignment	Purpose	Diameter (inch)	Length (feet)	WSIP Phase
CSA Backbone Pipeline	Vineyard SWTP → Florin Road → Bradshaw Road → Bond Road → Waterman Road → Grant Line Road → HWY99	Pipelines with larger diameters throughout the CSA to distribute surface water to the greatest extent	60	5,330	Phase 1
			48[a]	15,850	
			30	4,000	
			24[b]	29,550	
Subtotal				**54,730**	
POU Water Pipeline	Florin Reservoir → Power Inn Road → Florin Road → North Vineyard Station Storage Tanks	Dedicate transmission line to convey POU water to feed North Vineyard Station Storage Tanks	36	22,630	Phase 2
Total				**77,360**	

Notes:

a. Existing pipe segments in Bradshaw between Gerber and Calvine Roads are enlarged to achieve 48" diameter pipe conveyance capacity by installing new paralleling pipes.
b. Existing pipe segments in Waterman and Grant Line Roads are enlarged to achieve 24" diameter pipe conveyance capacity by installing new paralleling pipes.

Table 6-9. Other Proposed Major Pipelines in CSA

WSIP Phase	Diameter (inch)	Length (feet)
Phase 1	36	2,700
	30	2,000
	24	25,860
	18	3,980
	16	32,800
Subtotal		**67,340**
Phase 2	24	19,340
	18	19,280
	16	47,160
Subtotal		**85,780**
Total		**153,120**

6.3.4.4 CSA Booster Pumps

The quantity, major design parameters, and phasing for proposed booster pumps are shown in the detailed AutoCAD drawings in **Appendix D Infrastructure Workbook**.

6.3.4.5 CSA Valves

Numerous valves are proposed in the CSA water system including PRV, FCV, and CVs. PRVs are use to reduce the pressure in the Sheldon Road Pressure Zone. FCVs are installed at the connections between CSA and SSA to control the flow rate of water moving between two service areas. Check valves are proposed at the boundary of the POU area. These check valves remain closed after POU water is introduced to ensure it is used only in the POU area. These check valves are set to allow water from the Zone 40 distribution to meet the demand of interim phases of developments in this area. **Table 6-10** summarizes the valve type, location, setting, phase, and purpose for all proposed valves in the CSA.

Table 6-10. Proposed Valves in CSA

Valve Type	Location	Setting	Purpose	WSIP Phase
PRVs	Elk Grove Florin Road north of Calvine	55 psi	Reduce pressures in Sheldon Pressure Zone for the connections between CSA and SSA at Sheldon Road and Elk Grove Blvd without causing unacceptable pressures in Sheldon Pressure Zone and the SSA	Phase 1 a
	Calvine Road east of Elk Grove Florin	55 psi		
	Bond Road east of Elk Grove Florin	55 psi		
	Sheldon Road east of Elk Grove Florin	55 psi		Phase 2
FCVs	Sheldon Road and HWY 99	2,000 gpm	Limit the flow rate of water moving between CSA and SSA	Phase 1 a
	Laguna Blvd and HWY 99	2,000 gpm		
	Grant Line Road and HWY 99	6,000 gpm		
CVs	West of Bradshaw Road on Florin and Gerber Roads	-	Isolate the POU Pressure Zone to limit the use of POU water only the POU area	Phase 1 a
	South edge of the FVCP area on Elk Grove Florin and Waterman Roads	-		
	Elder Creek west of Bradshaw	-		Phase 2

Note:
a. Retrofitting effort may be needed if valves are to be installed on existing pipes.

6.4 SSA Infrastructure Requirements

This section describes the infrastructure requirements for the SSA water system. The section gives a general overview of physical constraints and challenges of moving water into and within this service area, followed by solution strategies for the design and operation of the water system. Detailed description of the proposed facilities including facility type, quantity, phasing, and function is presented afterward.

6.4.1 Constraints in Designing SSA Water System

A general description of water supply issues and obligations in the SSA was presented previously in **Section 2.2.3** (Page 2-15). This section reiterates some of the major constraints and challenges in designing a water system for the SSA:

Phasing out of service wells that are above the MCL for arsenic - A number of groundwater wells in the Laguna area of the SSA pump directly into the distribution system with only disinfection. The new federal EPA MCL of 10 ug/l for arsenic concentrations in public water systems became effective January 2006. Many of the direct feed wells within SSA have arsenic concentrations above 10 ug/l and will need to be taken out of the service. The WSIP reflects this requirement and shows the wells that will be taken off-line. The wells may be abandoned, used as a monitoring well, or placed into a standby status for fire protection. For purposes of the WSIP all high arsenic wells are assumed to be replaced with new groundwater wells with the water being treated in an off-site centralized groundwater treatment plant that will reduce arsenic to below the MCL. The timing of these well replacements should be coordinated with DHS to meet the new standard in timely manner without sacrificing capacity within the system.

Dedicated Capacity the City through the Franklin Connection – A small but important portion of the water supply for SSA consists of surface water from an existing connection with the City that can wheel up to 11 MGD of SCWA's "Fazio" contract water (assumed 10,000 AF/year). The delivery of this water through the City's water treatment and distribution is currently not considered to be firm and may be subject to

cutback or complete shut down if the City cannot meet their own pressure requirements near the intertie location. The water is wheeled at a steady rate because it is pumped into the SSA water distribution system through an in-line booster pump station. In order to achieve Zone 40's conjunctive use goal, agreements are being pursued to firm up the 11 MGD supply and facility improvements have and should continue to be made to fully utilize the Wheeling Agreement water. One important improvement constructed recently is a dedicated pipeline from the intertie to the Dwight Road storage tank. This essentially provides a reservoir that can take the water at anytime the reservoir elevation is below a set point.

Recycled Water – Use of recycled water is discussed at some length in **Section 4.2.2.3**. The WSIP assumes that the Phase 1 and Phase 2 Recycled water programs will continue forward as planned, so very little mention of the required facilities is mentioned in this section other than shared facilities such as a well that might provide non-potable water during certain times of the year.

Service to Rio Cosumnes Correctional Facility (RCCC) – late in the development of the WSIP the question was asked as to whether the SSA could provide water to the RCCC. The question stemmed from the need to look at alternative sources of water supply due to high arsenic concentrations in the raw groundwater currently feeding the RCCC facility. Even though this water is being treated, arsenic concentrations are unstable and the discharge waste after treatment is high in arsenic. The concept introduced in the WSIP is extending a single pipeline down Bruceville Road to serve the facility. The findings of the evaluation was that the water system could handle the additional water demand, however, it would require that the Franklin Intertie connection be a firm dedicated supply of water.

6.4.2 Overview of SSA Water System

Figure 6-9 and **Figure 6-10** shows the water treatment facilities, T-main network layout, storage tanks located at their respective proposed sites, and the groundwater wells to be

decommissioned due to high arsenic concentrations. Since development is close to build out in Laguna, Laguna West, Lakeside, and Laguna Stonelake, the required pipelines and other facilities in these areas have already been constructed. Proposed facilities are mostly located south of Elk Grove Blvd including Big Horn, Franklin, and Whitelock WTPs, and Poppy Ridge WTP expansion. Major pipelines are proposed in Whitelock Road, Big Horn Blvd, West Stockton Blvd, and other major roads.

As a result of the dedicated pipeline from the Franklin Intertie to the Dwight Road Storage Tanks, the tanks essentially become surface water storage tanks to provide peaking water to SSA so that the surface water can be used to the greatest extent possible as part of Zone 40's conjunctive use program.

Unlike NSA and CSA, the SSA water system operates within one pressure zone. Ground elevations for the SSA range approximately 10 ~ 40 ft msl. To provide a sense of how much development can be served by the Franklin Intertie (given that it is a firm source of supply), one possible surface water and groundwater use zone delineation for the SSA is shown in **Figure 6-11**. In reality there is no fixed boundary between the surface water and groundwater use zones and the groundwater use zone can receive surface water from the CSA as well. The boundary shown is for illustrative purposes only and subject to change depending upon the system demand and operations.

The SSA water system should emphasize maximum use of Franklin Intertie water first. In lower demand seasons, some of the groundwater treatment plants can be temporarily shut down or only used for peaking. The design and operation of groundwater treatment plants should avoid creating high pressures that would prevent the surface water from being pumped out from the Dwight Road Storage Tanks and fed down through the system to the south.

Information about the facility requirements for the SSA water system will be provided in following sections, and design parameters at a planning level for the facilities can be found in the facility maps and AutoCAD drawings included in **Appendix D Infrastructure Workbook**.

6.4.3 Pressure Zones in SSA Water System

The SSA Water system operates in one single pressure zone. It connects to the CSA water system at three points of connections along HWY 99 at Sheldon Road, Laguna Blvd, and Grant Line Road.

Figure 6-9. SSA Infrastructure Map

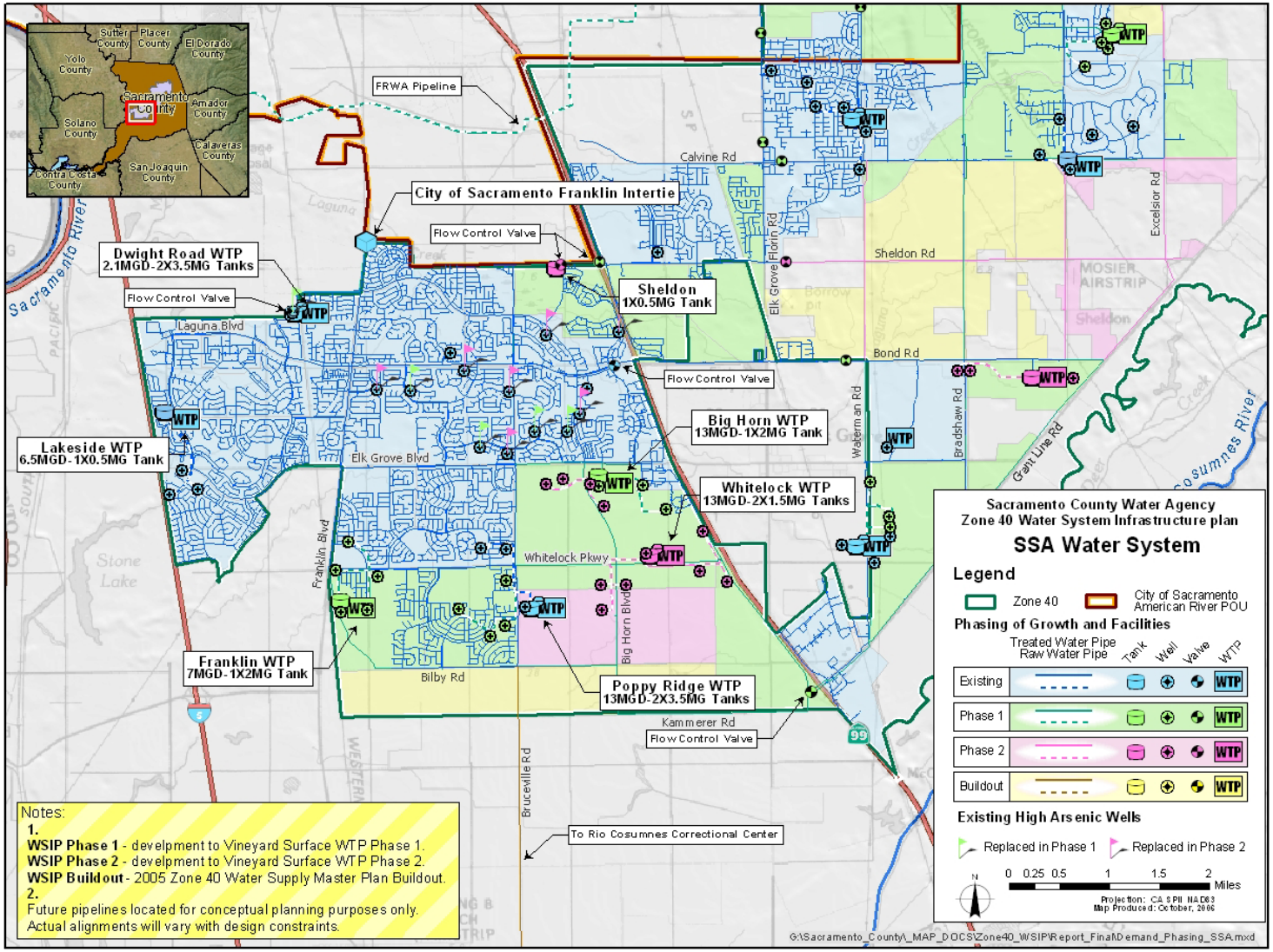


Figure 6-10. SSA Major Pipelines Map

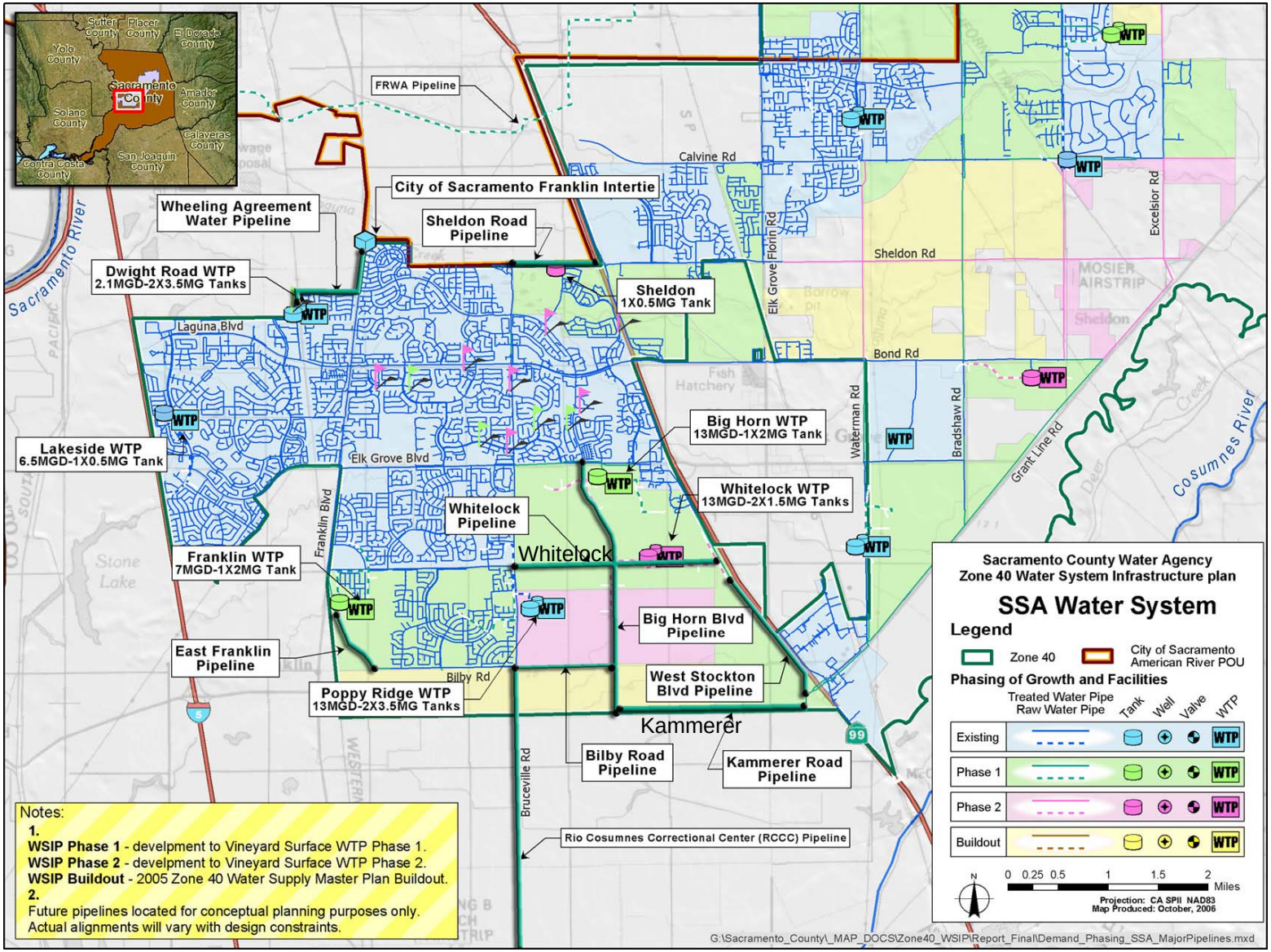
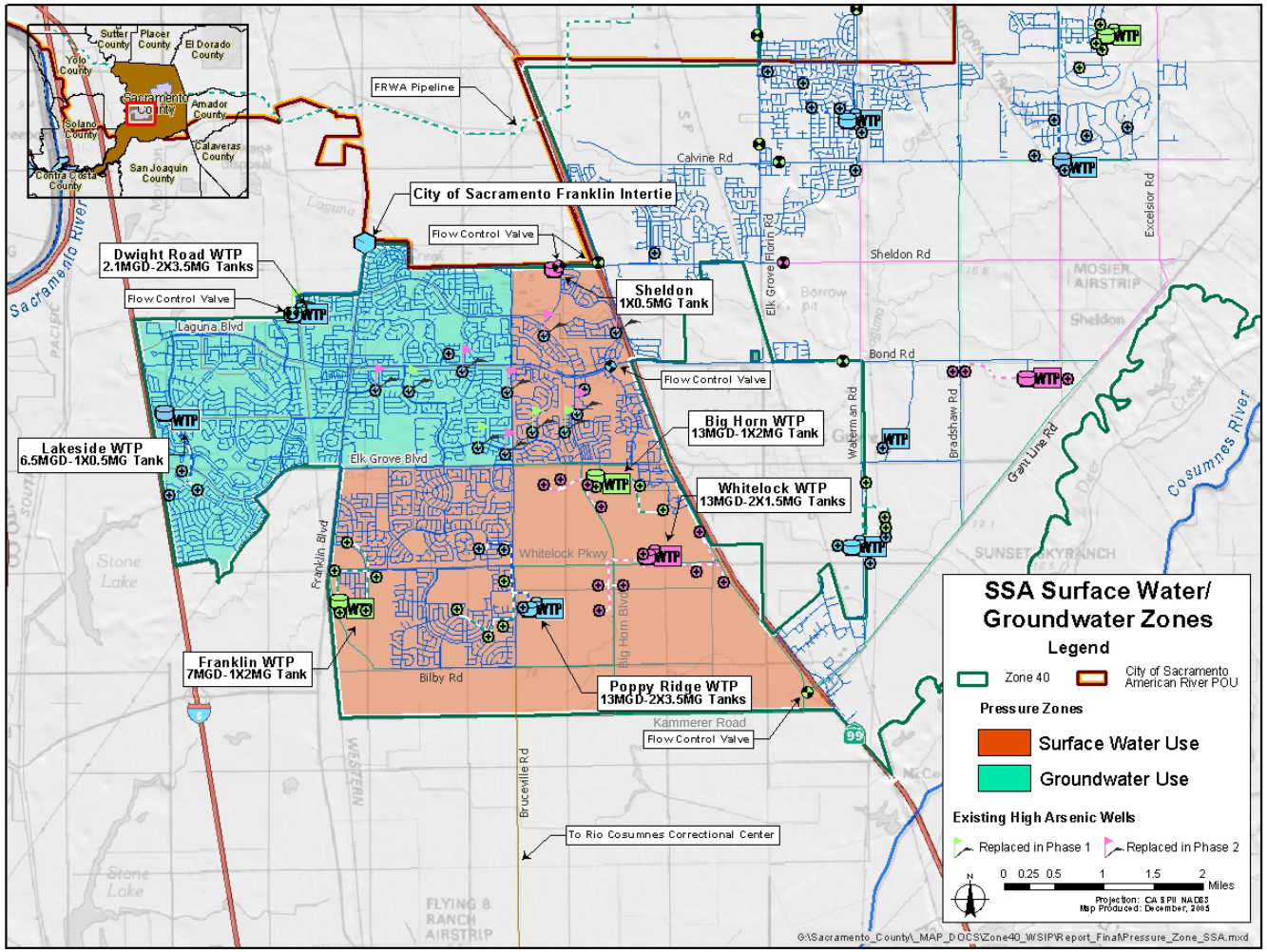


Figure 6-11. Potential Surface Water/Groundwater Use Zones in SSA



6.4.4 Facility Requirements

This section describes facility requirements to treat, store, convey, and distribute water in the SSA water system. The section also discusses the design considerations and phasing of construction for major facilities: water treatment plants, groundwater wells, storage tanks, pipelines, booster pumps, and valves.

6.4.4.1 SSA Water Treatment Plants

Currently, the water supply for the SSA depends mainly on groundwater. Groundwater is either treated in a number of existing groundwater treatment plants or treated at the well site and directly connected to the distribution system. Existing groundwater treatment plants include Lakeside WTP and the first phase of Poppy Ridge WTP. Numerous wells in the Laguna area of SSA are wells that directly tie into the distribution system. Most of these wells are projected to be decommissioned due arsenic concentrations being higher than the recent change in the MCL from 50 ug/l to 10 ug/l.

The proposed groundwater treatment plants include Big Horn, Franklin, and Whitelock WTPs. The capacity, location, number of wells and construction phase of these groundwater treatment plants are summarized in **Table 6-11**. The phasing of decommissioning high arsenic wells is planned so that those with higher concentration are taken offline first followed by those with lower concentration, see **Figure 6-9**.

Table 6-11. Water Treatment Plants in SSA

Water Treatment Plant	Capacity (MGD)	Location	Number of Wells[a]	WSIP Phase
Lakeside WTP	6.5	Maritime Dr near Harbour Point Dr	3	Existing
Dwight Road WTP	2.1	Dwight Road near Western Pacific	1[b]	
Poppy Ridge WTP	13	Near Bruceville Road south of Whitelock Road	7	6.5 MGD + 3 wells (Existing) and 6.5 MGD + 4 wells (Phase 1)
Big Horn WTP	13	Big Horn Road south of Elk Grove Blvd	7[c]	6.5 MGD + 3 wells (Phase 1) and 6.5 MGD + 4 wells (Phase 2)
Franklin WTP	7	Franklin Blvd south of Poppy Ridge Road	5	Phase 1
Whitelock WTP	13	Whitelock Road east of Big Horn Blvd	7	Phase 2
TOTAL	**54.6**		**30**	

Notes:
a. Wells supplying groundwater for treatment at groundwater treatment plants.
b. Only one operational well according to SCWA staff and the production rates are low and not reliable. The Dwight Road Storage Tanks will be essentially converted to surface water storage tanks to receive wheeling agreement water.
c. These wells are considered as replacements wells for those well high in arsenic concentration.

6.4.4.2 SSA Storage Tanks

Table 6-12 summarizes the capacity, location, purpose, and construction phase for all the storage tanks in the SSA. Most of storage tanks are used to provide storage and peaking for the groundwater treated from the respective groundwater treatment plant. The exceptions are the Dwight Road Tanks and Sheldon Tank.

According to SCWA staff, there is currently only one groundwater well left that is operational for the Dwight Road WTP, but the production rate is very low and not reliable. The 7-MG Dwight Road Tanks (2x3.5 MG) are considered to be peaking

facilities that fill with water from the distribution system during off-peak hours and emptied during peak hours. With the construction of the dedicated Franklin Intertie pipeline, the storage tanks will become surface water tanks to make optimum use of surface water year-round. The booster pumps at the storage tanks can operate full-time to push the surface water out to the distribution system.

The Sheldon Tank is proposed in the northeast part of the SSA. As most of the arsenic wells are phased out and most of the groundwater treatment plants are located south of Elk Grove Blvd, this storage tank is proposed as a peaking facility for the north portion of SSA. The source of fill water can come from the SSA and the CSA because of the intertie at Sheldon Road and State Highway 99.

Table 6-12. Storage Tanks in SSA

Storage Tanks	Capacity (MG)	Location	Purpose	WSIP Phase
Lakeside WTP Storage Tank	1x0.5	Same as Lakeside GWTP	Provide peaking for treated water from Lakeside GWTP	Existing
Dwight Road WTP Storage Tanks	2x3.5	Same as Dwight Road GWTP	Convert to surface water storage tanks to store and provide peaking to the wheeling agreement water.	
Poppy Ridge WTP Storage Tanks	2x3.5	Same as Poppy Ridge GWTP	Provide peaking for treated water from Poppy Ridge GWTP	One 3.5-MG Storage Tank (Existing) + One 3.5-MG Storage Tank (Phase 1)
Big Horn WTP Storage Tanks	1x2	Same as Big Horn GWTP	Provide peaking for treated water from Big Horn GWTP	Phase 1
Franklin WTP Storage Tanks	1x2	Same as Franklin GWTP	Provide peaking for treated water from Franklin GWTP	
Whitelock WTP Storage Tanks	2x1.5	Same as Whitelock GWTP	Provide peaking for treated water from Whitelock GWTP	Phase 2
Sheldon Storage Tank	1x0.5	Sheldon Road near Lewis Stein Road	No groundwater well. it fills during off-peak hours and empty during peak hours.	
Total	**22**			

6.4.4.3 SSA Major Pipelines

Figure 6-9 and **Figure 6-10** provides a graphic depiction of the pipeline layout and phasing in the SSA water system. The sizes of the pipelines are shown in the maps included in **Appendix D**. The pipelines follow the alignment of existing and proposed

roads. The pipeline sizes are determined so that the flow velocity in the pipe is less than the maximum flow requirement of 5 ft/sec, and at the same time keeping pressures within a 40 psi to 75 psi range. **Table 6-13** and **Figure 6-10** summarize the major pipelines in the SSA.

6.4.4.4 SSA Booster Pumps

The quantity, major design parameters, and phasing for proposed booster pumps are shown in the detailed AutoCAD drawings in **Appendix D Infrastructure Workbook**.

6.4.4.5 SSA Valves

The SSA water system operates in one single pressure zone. So, no valves in the SSA are used to define the pressure boundaries or other particular water use zones.

Table 6-13. Proposed Major Pipelines in SSA

Pipelines	Alignment	Purpose	Diameter (inch)	Length (feet)	WSIP Phase
Wheeling Agreement Water Pipeline	Franklin Connection →Franklin Blvd →Dwight Road →Western Pacific Railroad →Dwight Road Storage Tanks	Dedicated to conveying the Wheeling Agreement water to fill the Dwight Road Storage Tanks to fully utilize surface water in the SSA	24	7,200	Phase 1
Whitelock Pipeline	Whitelock Road between Bruceville Road and West Stockton Blvd	Major west east direction transmission line for Laguna Ridge area	24	11,000	
Big Horn Blvd Pipeline	Big Horn Blvd from Elk Grove Blvd to Kammerer Road	Major north south direction transmission line for Laguna Ridge and Southeast Study Areas	20	11,100	
West Stockton Blvd Pipeline	West Stockton Blvd from Elk Grove Auto Mall to Promenade	Deliver water to Promenade and Sterling Meadows areas	20	10,000	
Sheldon Road Pipeline	Sheldon Road between HWY 99 and Brunceville Road	Integrate SSA with CSA	24	4,700	
Bilby Road Pipeline	Bilby Road from Bruceville Road to Big Horn Blvd	Transmission line for south Laguna Ridge	20	5,285	
Kammerer Road Pipeline	Kammerer Road from Big Horn Blvd to Promenade	Transmission line for south Southeast Study and Sterling Meadows areas	20	9,500	
East Franklin Pipeline	Future Road along Western Pacific Railroad in East Franklin area	Deliver Franklin GWTP water to south area	24	3,900	
Subtotal				**62,685**	
Rio Cosumnes Correctional Center (RCCC) Pipeline	Bruceville Road from Bilby Road to RCCC	Provide water supply to RCCC in the build out when extra water supply in Zone 40 is available.	20	28,000	Build out
Total				**90,685**	