# Section 4. WATER SUPPLY AVAILABILITY

*EXISTING AND FUTURE SOURCES OF WATER FOR SCWA'S ZONE 40 ARE GROUNDWATER, SURFACE WATER, AND RECYCLED WATER. SCWA HAS IMPLEMENTED A CONJUNCTIVE USE PROGRAM WITHIN ZONE 40 THAT OPTIMIZES THE USE OF GROUNDWATER AND SURFACE WATER BASED ON HYDROLOGIC CONDITIONS. IN ACCORDANCE WITH THE WFA, THE CALCULATED MAXIMUM LONG-TERM AVERAGE GROUNDWATER YIELD AVAILABLE TO ZONE 40 IS* ***40,900 AF/YEAR****, AND THE MAXIMUM LONG-TERM AVERAGE SURFACE WATER YIELD AVAILABLE TO ZONE 40 IS* ***78,000 AF/YEAR****.*

*THIS SECTION PROVIDES AN OVERVIEW OF THE RELIABILITY OF WATER SUPPLIES AS THEY RELATE TO THE WSIP AND THE DESIGN AND OPERATION OF WATER FACILITIES. SIMILAR DISCUSSIONS ARE INCLUDED IN BOTH THE WSMP AND THE ZONE 40 GMP BUT DO NOT FOCUS ON THE FACILITY SIDE OF GROUNDWATER EXTRACTIONS AND SURFACE WATER DIVERSIONS, OR CONNECTIONS WITH ADJACENT PURVEYORS.* ***FIGURE 4-1*** *SHOWS THE SURFACE WATER AND GROUNDWATER FACILITIES DISCUSSED IN THIS SECTION. PHASING DIAGRAMS ARE INCLUDED UNDER EACH DISCUSSION OF FUTURE GROUNDWATER SUPPLIES THAT SHOW HOW BOTH GROUNDWATER AND SURFACE WATER CAPACITY WORK TOGETHER TO FULLY IMPLEMENT SCWA'S CONJUNCTIVE USE PROGRAM.*

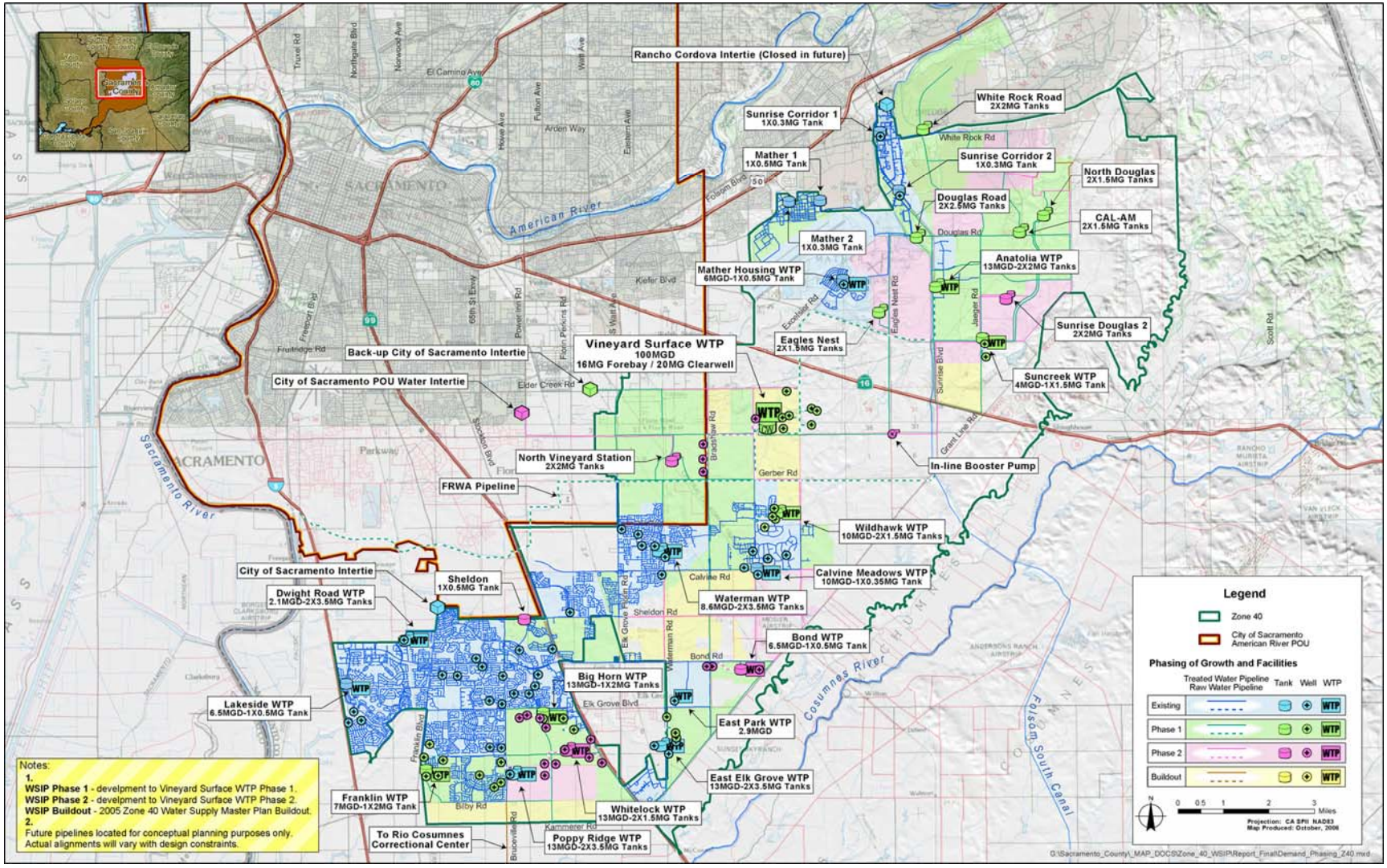
## 4.1 Groundwater Supplies

**Figure 4-2** and **Figure 4-3** (both figures taken from the Central Basin GMP) show groundwater elevations over time in monitoring wells within the Central Basin with **Figure 4-2** showing wells located only in Zone 40. The elevation lines on these figures indicate that, for the most part, the groundwater basin has reached a sustainable equilibrium based on current levels of groundwater extraction. The reliability of these supplies into the future are managed through compliance with the WFA and the timely importation of surface water into Zone 40.

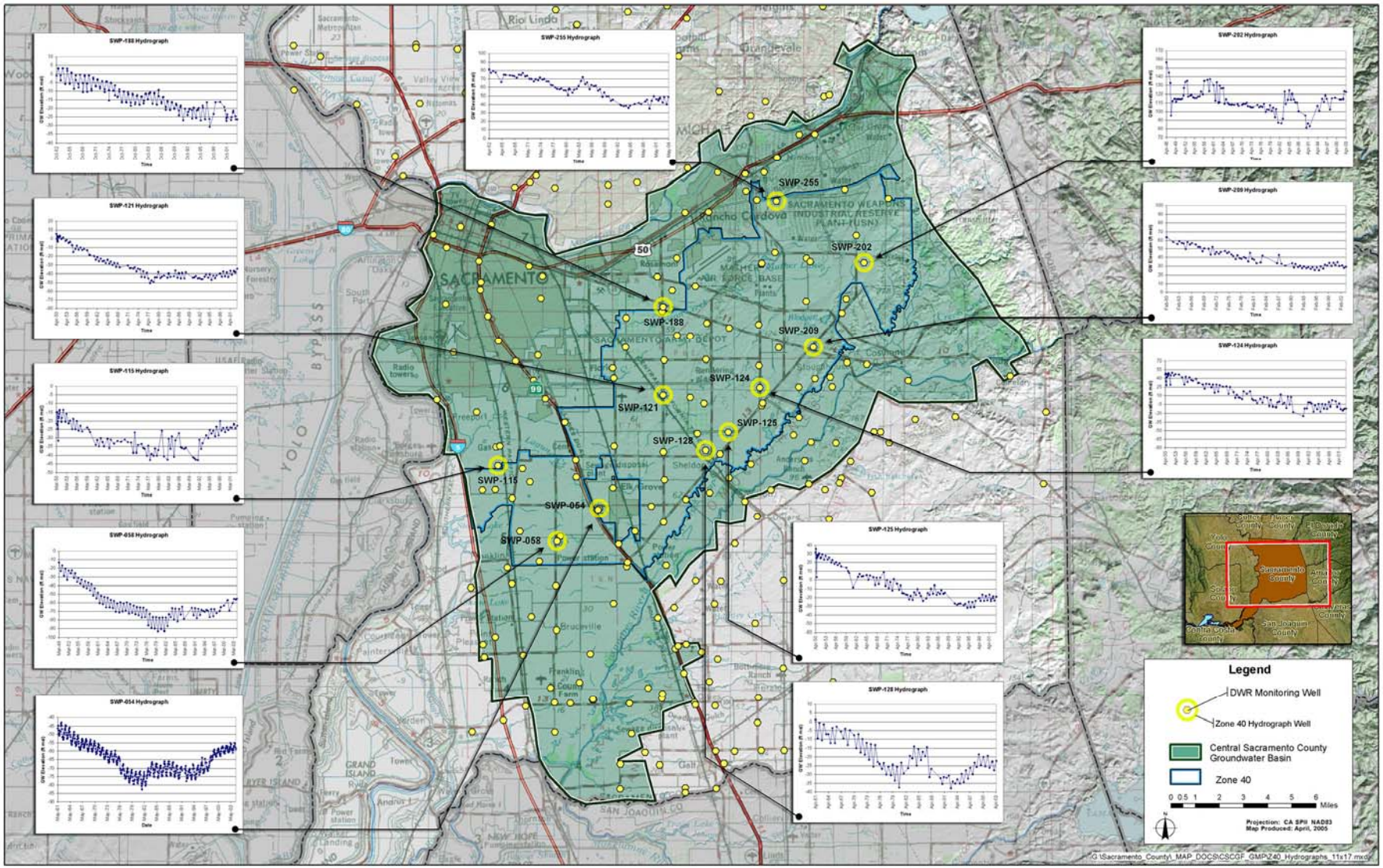
In Sacramento County, the groundwater basin is divided into three subbasins, North, Central, and South (Galt). The groundwater basin in the Central Area of the county, known as the "Central Basin," lies south of the American River, east of Interstate 5 and the Sacramento River, and north of the southern boundary of the Omochumne-Hartnell Water District and the Cosumnes and Mokelumne rivers. The eastern boundary of the

Central Basin is approximately 5 to 6 miles west of the Sacramento County/El Dorado County border where the Sierra Nevada Foothills begin to rise up from the Central Valley floor. Zone 40 lies entirely within the Central Basin.

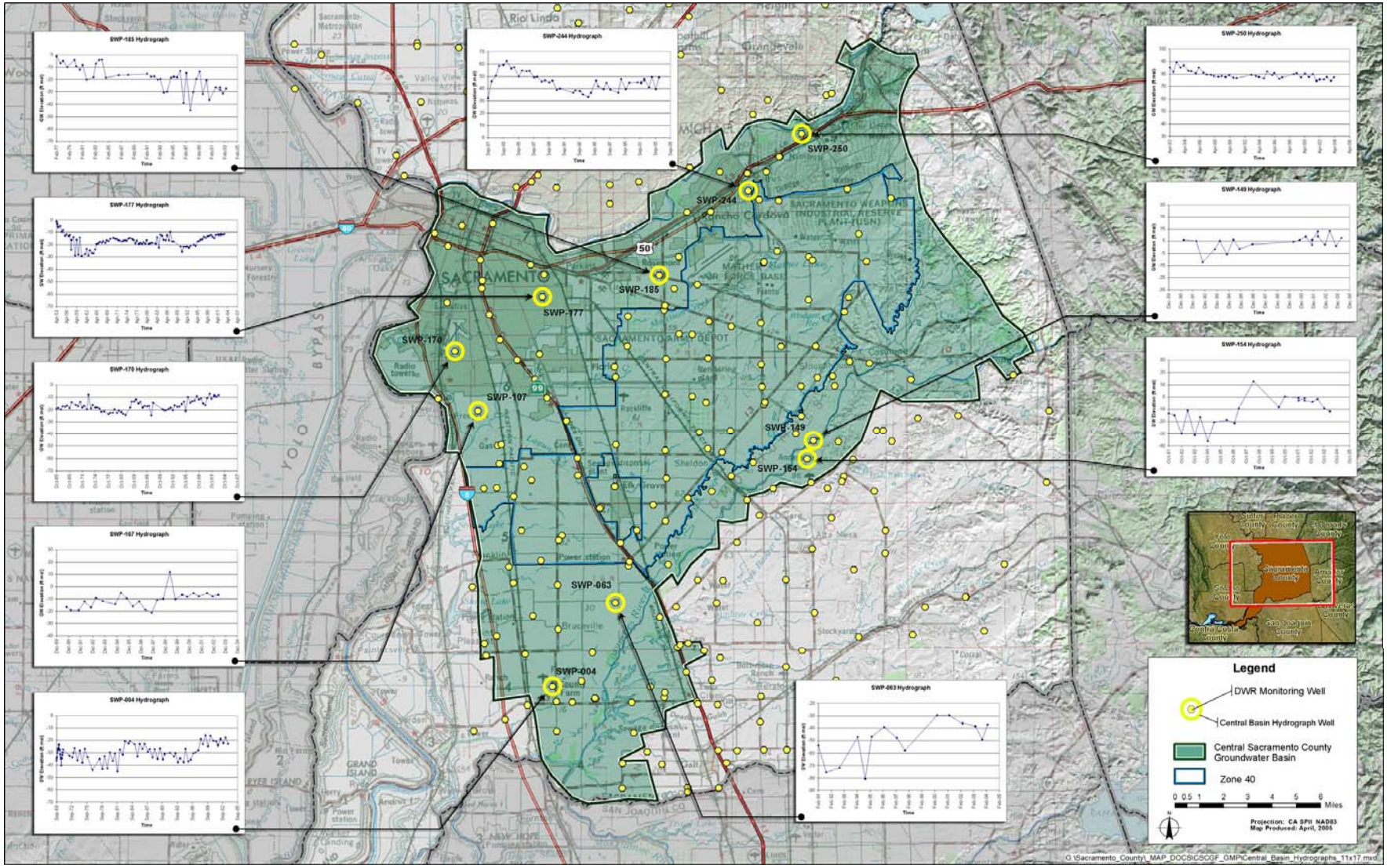
## Figure 4-1. Ultimate Zone 40 Surface Water and Groundwater Facilities



## Figure 4-2. Central Basin Groundwater Elevation Hydrographs Inside Zone 40



## Figure 4-3. Central Basin Groundwater Elevation Hydrographs Outside Zone 40



For each of the three groundwater basins in Sacramento County, the Water Forum Negotiation Committee, using technical data to support on-going discussion, arrived at a long-term average sustainable yield of groundwater that could meet the 2030 land and water use conditions.

The term "long-term average sustainable yield" is used to describe the state of an aquifer where it can be continuously pumped, on average, and not exceed the natural recharge of the basin over a defined period of time. Natural recharge occurs primarily from streams, rainfall, and subsurface inflow. Under sustainable conditions, natural recharge is said to be able to balance the amount of groundwater extracted over the long-term (with consideration given to wet and dry periods over the hydrologic record).

For an in-depth discussion on how the Water Forum determined 273,000 AF/year as long-term average sustainable yield for the Central Basin the reader is referred to the Central Basin GMP. Briefly, the decision was based on an evaluation of future land and water use conditions and assessing the impacts associated with increased water use by municipal and agricultural users. As part of the evaluation it was assumed that water demands would be met solely with groundwater. The results of this analysis were then compared with existing conditions (1990 as the baseline year) to illustrate the level of impact associated with pumping beyond baseline conditions.

Based on the evaluation of the Central Basin, the 2005 level of development was felt to provide an acceptable level of impact to the Basin by the Water Forum. This resulted in a negotiated long-term average sustainable yield of 273,000 AF/year for the Central Basin. After allocating groundwater to agriculture, agriculture/residential, public and private purveyors, and self-supplied industries it was determined that 40,900 AF/year was available for use by SCWA. The 40,900 AF/year is used as a target for operation of SCWA's Zone 40 conjunctive use water facilities. The WSIP focuses on utilizing Zone 40's long-term average sustainable yield through optimal sizing of facilities and operational strategies. This process is described in subsequent sections of the WSIP.

### *4.1.1 Existing Groundwater Supplies*

A discussion on existing groundwater supplies and facilities is necessary in order to determine the extent of facilities needed to optimize groundwater production during the driest years.

#### 4.1.1.1 NSA

Groundwater supplies for the NSA currently come from the Mather Housing WTP and the Anatolia WTP. The Mather Housing system was originally built by the Air Force to provide water service to military personnel living in base housing. When ownership of the Air Force base was turned over to Sacramento County in the late 1990's SCWA began operating the system. Because of the loss of wells in the "main base" portion of Mather Field and in the Sunrise Corridor due to groundwater contamination, the Mather Housing system was interconnected with these two systems and became the primary source of water in the NSA. The total capacity of Mather Housing facility is approximately 4,200 gallons per minute (gpm). The Anatolia WTP came on line in July 2005 and now provides water service to the Sunridge Specific Plan area and the Sunrise Corridor system. Quantities and service level pressures from the Anatolia WTP are sufficient to turn off the intertie between Golden State and Zone 41 located on Sunrise Blvd. The raw groundwater for the Anatolia WTP comes from the Excelsior Well Field (a.k.a. Vineyard Well Field). The current capacity of this facility is approximately 4,500 gpm. Current groundwater capacity in the NSA is approximately 12.5 MGD or 8,700 gpm.

#### 4.1.1.2 CSA

Groundwater supplies in the CSA include developed wells and WTP's in the Country Creek Estates, Vineyard, and East Elk Grove areas. These systems have been reliable and sustainable over the past 15 years and will continue to provide reliable service into the future. Current groundwater capacity in the CSA is approximately 27 MGD or 18,800 gpm.

#### 4.1.1.3 SSA

When groundwater supplies were originally developed in the Laguna area, wells were plumbed directly into the distribution system. Eventually, to meet system peaking requirements, a storage tank was constructed at what is now the Dwight Road WTP. The tank was designed to fill during off-peak periods and release flows during peak periods.

In the early 1990's changes in water quality regulations required the construction of groundwater treatment facilities in order to meet secondary drinking water quality standards for iron and manganese. As demand has increased in the SSA, groundwater treatment facilities were constructed in conjunction with new wells to meet these requirements. These facilities include the Dwight Road WTP, the Lakeside WTP and the Poppy Ridge WTP. Provisions to expand the Dwight Road and Poppy Ridge WTP's have been provided for and are under different stages of completion. Because of the proximity of the Dwight Road WTP to the Franklin Boulevard surface water intertie with the City, expansion of this facility will likely not occur until some time in the future. The Poppy Ridge facility is currently the primary source of supply for the East Franklin Specific Plan area. It is anticipated that this facility will be expanded to its full capacity in late 2006.

Many of the older wells that were plumbed directly in to the distribution system will be phased out due to exceeding the modified MCL for naturally occurring arsenic found in the shallow aquifer zones in the SSA region. The new arsenic standard set by the federal Environmental Protection Agency (EPA) is going to make it necessary to replace many of the older CSA wells that have an arsenic concentration higher than the new MCL of 10 ug/l. The new MCL was effective January 2006 and the California State Department of Health Services (DHS) is working with purveyors to obtain compliance within a reasonable time span. Zone 40 and Zone 41 will replace lost capacity in their system with the construction of the Bighorn WTP. Current groundwater capacity in this service area is approximately 17 MGD in groundwater treatment plant capacity or 11,800 gpm and approximately 16 MGD or 11,200 gpm of direct feed capacity that will ultimately be partially abandoned.

Total existing capacity in the three service areas is estimated to be **60** MGD to **73** MGD or 40,000 gpm to 50,000 gpm. The existing maximum day water demand based on **Table 3-2** is estimated to be **44** MGD or **30,560** gpm. This indicates that sufficient water supplies exist with groundwater to meet current demands even if the largest source is not in service (say a 2,000 gpm well). As demands increase, additional groundwater and surface water supplies become necessary as explained in **Section 4.1.2**.

### *4.1.2 Future Groundwater Water Supplies*

Groundwater serves a vital role in meeting the objectives of SCWA's conjunctive use program. Because of its reliability, groundwater capacity provides the flexibility necessary to meet water supply needs within Zone 40 through all hydrologic year types. For SCWA, groundwater supplies serve two purposes: 1) provide water supply capacity in dry years when surface water supplies are limited, and 2) provide a means to meet the demands of new growth until additional surface water supplies become available through the Vineyard SWTP and the POU Pipeline.

The proceeding discussion identifies needed groundwater production and treatment facilities and provides a schedule of when each facility is needed based on demand or the availability of surface water from the Vineyard SWTP and/or the POU Pipeline.

#### 4.1.2.1 NSA

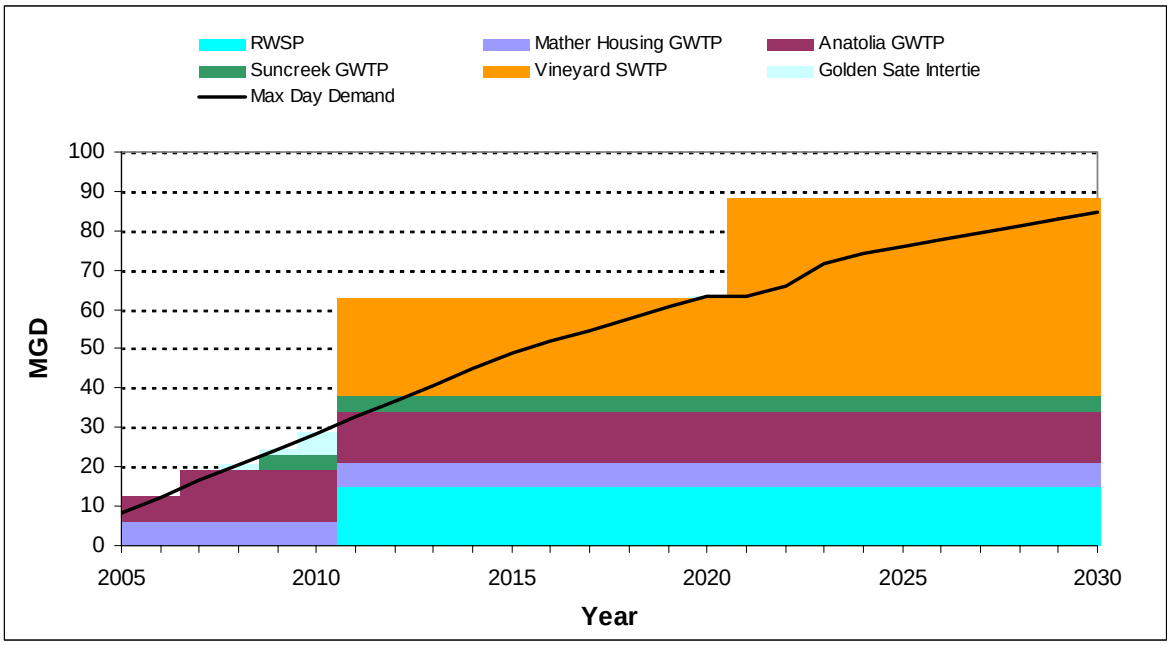
As shown in **Figure 4-4**, there are a number of points in time where available supply just meets demands. Completion of the FRWA project and the first phase of the Vineyard SWTP in the 2010/11 timeframe are critical to insure adequate water supplies in the NSA region. The issues facing the NSA are described in **Table 2-1**.

##### *4.1.2.1.1 Suncreek WTP*

According to probabilistic modeling studies conducted by Boeing, a limited amount of groundwater can be developed in the southern portion of the Sunrise Douglas Community Plan area without being threatened by contamination plume migration from the north. However, because this area is located where the useable aquifer thickness begins to pinch out it is likely that only a small two (2) to three (3) well groundwater treatment plant can

be supported. This facility will likely be capable of delivering up to 4,000 gpm. To increase output capacity, it is possible that raw water supplies from the Excelsior Well Field could be made available to the Suncreek WTP. Appurtenant turnouts in the Excelsior Well Field raw water pipeline were installed at the intersection of Keifer Boulevard and Sunrise Boulevard to provide for this option will be investigated further as the Suncreek development application proceeds.

**Figure 4-4. Phasing of NSA Treatment Facilities**




Note: Graph represents above average to normal hydrologic year conditions. In dry and critical years, surface water curtailments will occur requiring mandatory rationing and possible supplemental groundwater from CSA.

The Keifer Landfill is in close proximity to the proposed well and WTP site. The Sacramento County Solid Waste and Recycling Department has taken measures over the past 15 years to clean up and protect the groundwater underlying the landfill. Federal and state regulatory officials have stated that scientific evidence indicates that clean up operations have controlled migration of the contaminant plume.

#### *4.1.2.1.2 Anatolia WTP and the Excelsior Well Field*

Rezone conditions for the Sunridge Specific Plan area identify the Excelsior Well Field as the source of water supply in the specific plan area until the Vineyard SWTP comes on-line. When surface water becomes available, groundwater from the Excelsior Well Field becomes part of the overall conjunctive use program and will be treated as one of several sources of supply that serve the entire NSA.

Note that the blue band of water at the bottom of **Figure 4-4** represents water from the Replacement Water Supply Project (RWSP) that is being treated through the Vineyard SWTP (i.e., Vineyard SWTP is ultimately a 100 MGD plant with 15 MGD of capacity reserved for the RWSP). The 15 MGD of capacity represents only the quantity under consideration to serve the following: 1) lost SCWA and Golden State supplies, 2) the "lands of Aerojet and Boeing", and 3) additional Zone 40 water demands in the NSA. Groundwater capacity in the NSA will ultimately need to be 23 MGD or 16,000 gpm.

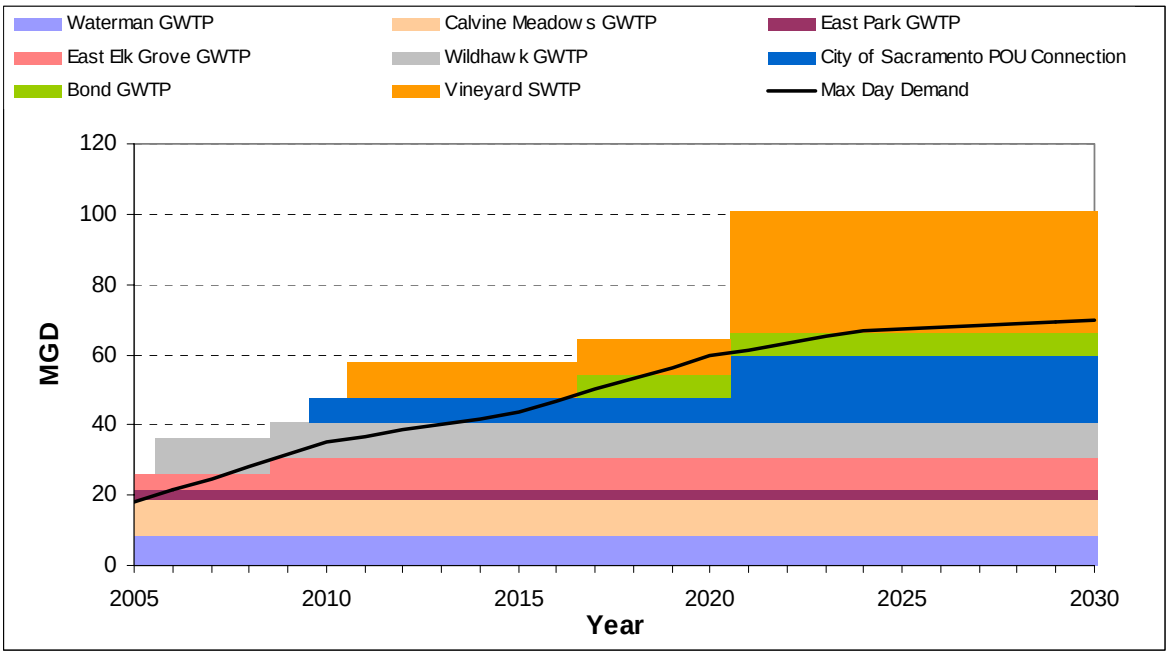
#### *4.1.2.1.3 Special Condition - Excelsior Well Field*

As a rezone condition for the Sunridge Specific Plan developers are required to participate in a Well Protection Program that would provide insurance for participating private well owners potentially affected by pumping from the Excelsior Well Field. The program provides for a payment to participants in the event their well is damaged by pumping from the well field. Because development within the Specific Plan area is funding the insurance program, capacity from the well field is allocated to developers participating in the program. The program is administered by SCWA and requires that private well owners register prior to operation of the well field in order to establish baseline conditions for potentially affected wells. Allocation of water from the well field is done by SCWA's Board of Directors prior to the tentative map of any development using the well field and requires participation in the insurance program and payment of supplemental fees.

#### 4.1.2.2 CSA

As with the NSA, completion of the FRWA project and the Vineyard SWTP are critical in meeting water demands in the CSA region. The FRWA project and the first phase of the Vineyard SWTP are currently in design and development and agreements on use and operation of shared facilities are still under negotiation. The phasing of the various groundwater (and surface water) facilities are shown in **Figure 4-5**. **Figure 4-5** delineates points in time that should be considered targets for completion of various capital facilities in order to meet water supply objectives for this region. Since surface water from the Vineyard SWTP could be curtailed to the point where all remaining capacity is needed for the NSA, the needed groundwater capacity is constrained by the condition of no Vineyard SWTP.

**Figure 4-5. Phasing of CSA Treatment Facilities**




Note: Graph represents above average to normal hydrologic year conditions. In dry and critical years, surface water curtailments will impact the CSA significantly. The impact will come from the operation of the water system to make as much surface water available to the NSA. Mandatory rationing and possible transfer of CSA groundwater to NSA may also have to occur.

##### *4.1.2.2.1 Wildhawk WTP*

The Wildhawk WTP is currently under construction and will have a 6,000 gpm maximum day capacity. Ultimately this facility will serve Country Creek Estates, Vineyard, North

Vineyard Station, and the Florin Vineyard Community Plan. This WTP is critical in meeting interim supply requirements for the CSA until the Vineyard SWTP and POU Pipeline are constructed.

#### *4.1.2.2.2 Bond WTP*

The Bond WTP will be the last groundwater treatment facility constructed in the CSA. Once the Vineyard SWTP is on-line, the need for new groundwater capacity is significantly reduced until sometime in the future. Delaying construction of this facility also aids in the cash flow requirements of the Zone 40 fee program by not having to construct a facility prior to its need. When constructed, this facility will have a 4,500 gpm maximum day capacity and will be used to meet peaking needs in the CSA and potentially help support the NSA in critical year conditions by moving groundwater through the Vineyard SWTP clear well and high lift pumps.

Groundwater capacity in the CSA will ultimately need to be 47 MGD or 32,663 gpm.

### 4.1.2.3 SSA

New production facilities in the SSA will primarily be groundwater facilities located south of Elk Grove Boulevard. Other issues facing the SSA include Phase Two of the recycled water program with SRCSD, the phasing-out of wells with arsenic concentrations above the MCL of 10 ug/l (effective January 2006), and the coordinated operation of groundwater facilities with the operation of the recycled water system and the Vineyard SWTP.

SRCSD has initiated a change to the Phase Two recycled water program that will limit the amount of recycled water that will be available to meet peak irrigation demands. As a result of this change SCWA will need to provide untreated (or treated) groundwater to meet peak demands in the recycled water system. To meet arsenic regulatory requirements, replacement wells will be constructed as part of the overall Big Horn WTP project. The coordinated operation of groundwater facilities south of Elk Grove Boulevard is going to be important in order to maintain a uniform groundwater pumping balance in the area. Over dependency on one facility can contribute to a localized cone

of depression that could impact the wells of existing Ag/res homes that could remain in the area for some time. **Figure 4-6** illustrates the phasing of groundwater treatment facilities for the SSA. The older individual wells are not accounted for due to the possible need to shut down these due to naturally occurring arsenic.

#### *4.1.2.3.1 Poppy Ridge WTP*

Phase One of the Poppy Ridge WTP currently provides water deliveries to the East Franklin Specific Plan area. Phase Two construction is scheduled to begin in early 2006. When completed, this facility will have a 9,000 gpm maximum day capacity and provide water deliveries to both the East Franklin and Laguna Ridge Specific Plan areas.

#### *4.1.2.3.2 Big Horn WTP*

The Big Horn WTP will provide capacity for new development in the Laguna Ridge Specific Plan area and will also be the primary replacement supply source for existing wells in the Laguna portion of the system that have arsenic levels that exceed the new arsenic regulations. These older wells will be decommissioned when the Bighorn WTP comes on line sometime in 2006. When constructed, this facility will have a 9,000 gpm maximum day capacity.

#### *4.1.2.3.3 Franklin WTP*

The Franklin WTP will provide capacity for development in the East Franklin Specific Plan area. This facility (and the Whitelock WTP) is unique in that it will have both potable drinking water and recycled water facilities located on the same site. The on-site standby well will be used by the recycled system during peak irrigation periods to supplement available recycled water to fill the recycled water storage tank to meet system demands. When constructed, this facility will have a 5,000 gpm maximum day potable water capacity.

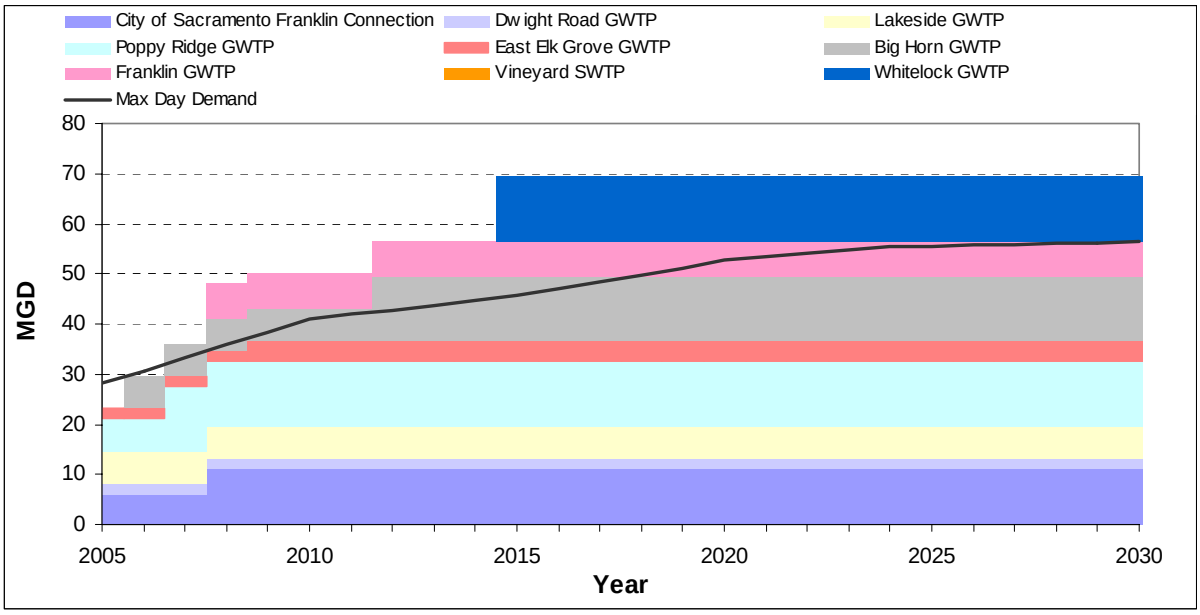
#### *4.1.2.3.4 Whitelock WTP*

The Whitelock WTP will provide capacity for development in the Laguna Ridge Specific Plan area, Elk Grove Promenade, Sterling Meadows, and the Southeast Planning area. This facility will have both potable drinking water and recycled water facilities located on the same site. The on-site standby well will be used by the recycled system during

peak irrigation periods to supplement available recycled water to fill the recycled water storage tank to meet system demands. When constructed, this facility will have a 9,000 gpm maximum day capacity.

Groundwater capacity in the SSA will ultimately need to be 52.5 MGD or 36,500 gpm. The phasing of the various groundwater (and surface water) facilities are shown in **Figure 4-6**.

**Figure 4-6. Phasing of SSA Treatment Facilities**




Note: Graph represents above average to normal hydrologic year conditions. In dry and critical years, surface water curtailments will impact the SSA to some extent and will require water conservation and possible transfer of water from CSA.

## 4.2 Surface Water

The Zone 40 WSMP discusses each of the surface water supply sources in some detail to be able to quantify the water supplies available to Zone 40. The purpose of this section in the WSIP is to begin to look at how the individual surface water contracts and their reliability begin to play a role in how the water system is designed and operated.

### *4.2.1 Existing Surface Water Supplies*

#### 4.2.1.1 City Wheeling Agreement

SCWA started surface water deliveries to Zone 40 in 1995 through a series of year-to-year contracts with Browns Valley Irrigation District to purchase surface water. At the time, an interim wheeling agreement with the City was executed to divert and treat this water at their Sacramento River Water Treatment Plant. Delivery of this water was taken at the existing intertie located in Franklin Boulevard near the City's boundary with Zone 40. With internal improvements to the City's conveyance system completed by SCWA in 1999, SCWA began taking delivery of their CVP contract water (or "Fazio" water) at the Franklin connection through a long-term wheeling agreement with the City. It is expected that this connection will ultimately provide a firm dedicated supply of 11 MGD of water to the system (initial delivery is considered "non-dedicated capacity" it is expected with the negotiation of a Master Wheeling Agreement with the City that deliveries at this connection will be considered "dedicated capacity").

##### *4.2.1.1.1 Arden-Cordova System (Golden State) Agreement*

In the early 1990's an intertie was constructed between Golden State and SCWA as an emergency backup (water can be supplied to either agency in the event of an emergency) connection for the Zone 41 Sunrise Corridor System and Golden State system. Later on, an in-line booster pump was installed to increase pressures going into the Sunrise Corridor system in order to provide peaking capacity within the system because of lack of storage. This storage has yet to be built.

In 1997, perchlorate was detected in the Sunrise Corridor system wells and they were removed from service. With this loss of capacity the Golden State intertie became a critical source of water until new supplies were developed and brought on line through the Anatolia and Excelsior Well Field projects. The intertie may still be necessary in the future and in the peak water demand months. A provision of the agreement stipulates that the connection can be shut off at any time if supplies or pressures within Golden State's system are insufficient to meet their own water demands. To date this has not occurred. When in operation the total capacity of this supply is 1,000 gpm.

SCWA assumes that as new capacity comes on-line within the NSA the intertie between the two systems will again be an emergency connection for both water purveyors. If Golden State were to loose groundwater capacity in the future as a result of contamination from Aerojet, SCWA, under its obligation to replace this capacity in accordance with the Water Supply Delivery Agreement (see **Section 3.4.2**), may use this connection until dedicated long term connections can be constructed at specified locations.

### *4.2.2 Future Surface Water Supplies*

#### 4.2.2.1 City of Sacramento POU Water

The City and SCWA are currently negotiating a Master Wheeling Agreement that will provide surface water from the American River within their POU (see also discussion on City Wheeling Agreement in **Section 4.2.1.1**). The City, as delineated in the WFA, is planning for the wholesale delivery of American River water within the POU including areas outside of the City limits. The WFA recognizes the City's need to make maximum use of their surface water entitlements within their respective place of use. A key factor in the Master Wheeling Agreement is the guarantee that SCWA will receive the same level of service as the City's retail customers. There will be an interim period when the City cannot provide this assurance as they will be constructing appropriate infrastructure to provide this level of reliability.

Approximately 20 MGD is assumed for SCWA's need for POU water. In **Figure 4-5**, the City POU water is shown as a nominal 19 MGD with the understanding that there may be conditions when a 50 percent cutback could occur in dry and critical years until the City infrastructure can provide reliable supplies in all hydrologic year types. An initial connection is assumed to come on-line in 2009/10 to serve as a source of supply for the Florin Vineyard Community Plan area, with the more permanent connection coming on-line after 2020. The figure `illustrates this phasing by showing capacity increasing in two increments, an initial approximately 6.5 MGD (4,500 gpm) increment and then a 19 MGD increment after 2020. Deferment of the larger project is also needed

to stagger the larger projects in a way that does not place financial constraints on Zone 40 reserves.

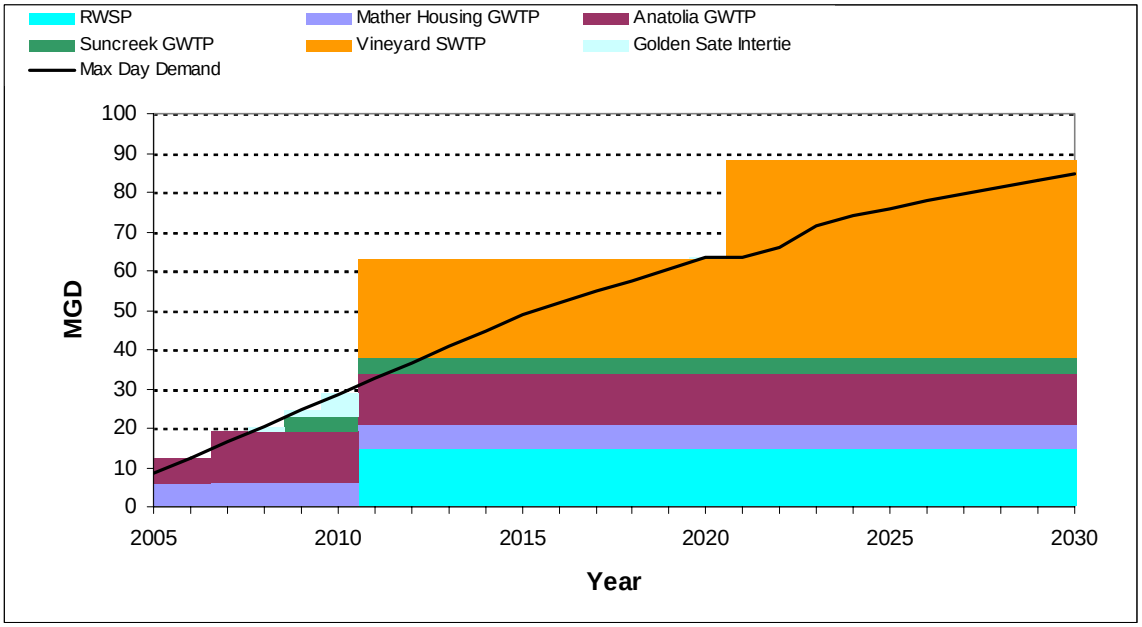
Additional analysis is provided later in this WSIP quantifying the interim reliability of the POU supplies and the infrastructure necessary to convey this water to Zone 40.

#### 4.2.2.2 Central (Surface) Water Treatment Plant

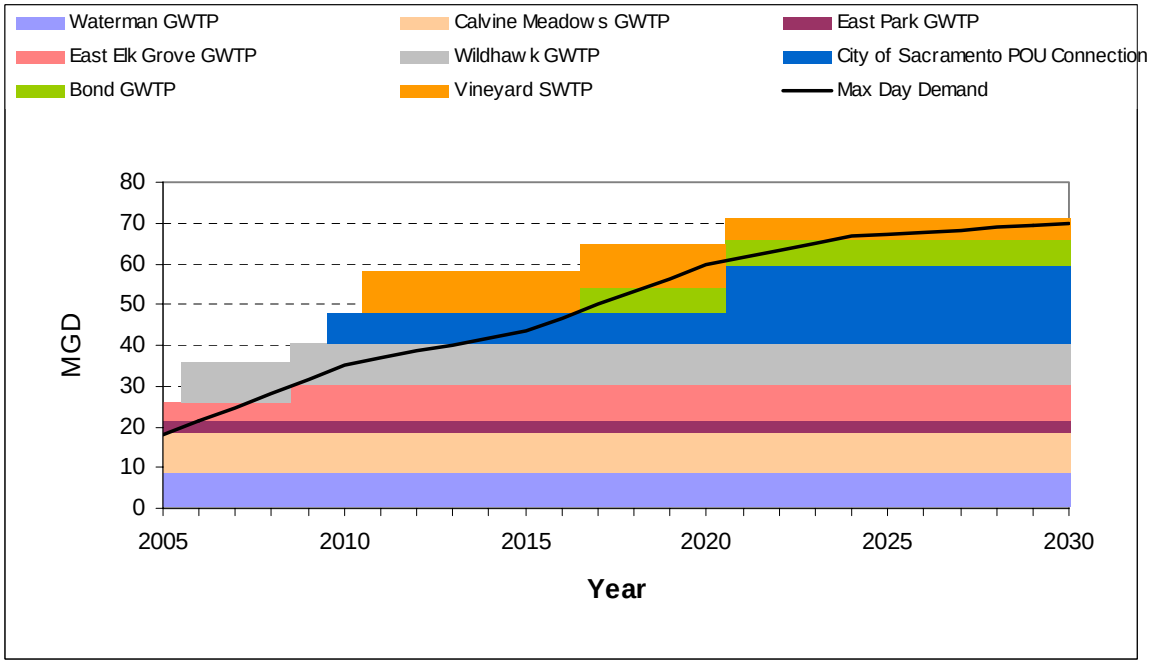
SCWA and EBMUD jointly created FRWA to design and construct a diversion structure on the Sacramento River near the community of Freeport and a raw water conveyance pipeline from the diversion structure to the central portion of Zone 40 (EBMUD's portion of the pipeline continues on to the Folsom South Canal). In conjunction with the FRWA project, SCWA will construct a 100 MGD (ultimate capacity including the Replacement Water Supply Project) surface water treatment facility in the central portion of Zone 40 along with appurtenant treated water conveyance pipelines. The expected maximum day capacity available to Zone 40 is 85 MGD of firm capacity in the joint pipeline and 100 MGD in the SCWA dedicated pipeline. The source of supply for the Vineyard SWTP will come from surface water entitlements (not exceeding 78,000 AF/year on a long-term average) and the Replacement Water Supply Project (estimated at 15 MGD of constant flow being discharged from remediation facilities in Aerojet and Boeing to the American River).

The Vineyard SWTP capacity is shown in both **Figure 4-4** and **Figure 4-5** for the NSA and CSA, respectively. Since both figures represent normal to above average year conditions the total 100 MGD capacity of the Vineyard SWTP is shown. If surface water contracts to the Vineyard SWTP are reduced by 50 percent or, say, the available maximum day capacity is 50 MGD, the figure for NSA looks almost the same as NSA should me met first as shown in **Figure 4-7;** However, the figure for CSA looks different because the water delivery to CSA is significantly reduced (see **Figure 4-8**). SSA does not receive any Vineyard SWTP capacity in critical year conditions and relies solely on groundwater and the Franklin Intertie (shown as the City water in **Figure 4-6**).

## Figure 4-7. NSA Under Dry and Critical Year Conditions




## Figure 4-8. CSA Under Dry and Critical Year Conditions



The above two figures indicate that there is likely going to be a problem in the NSA under extreme drought conditions (e.g., see 2019 in **Figure 4-8** where a water shortage is shown**)**. A combination of water conservation and taking some excess groundwater in CSA and transferring it to NSA will be necessary and should be planned for in the design of the larger water facilities.

In wet years Zone 40 will likely receive full surface water entitlements (described below) and be able to use 15 MGD of EBMUD's portion of the joint pipeline. Under these conditions there is excess system capacity, especially in the low demand season, when the SSA can receive approximately 10 MGD or more of Vineyard SWTP capacity.

#### *4.2.2.2.1 CVP Water*

SCWA has entered into a contract with the U.S. Bureau of Reclamation (Reclamation) for 22,000 AF/year of CVP supplies from the American River pursuant to Public Law (PL) 101-514 (this contract is often referred to as "Fazio Water"). Of this 22,000 AF/year, 7,000 AF/year has been subcontracted to the City of Folsom for diversion from Folsom Lake. The remaining 15,000 AF/year will be diverted by the City or SCWA from the Sacramento River at the City's Sacramento River Diversion Structure or the FRWA Diversion Structure at Freeport, respectively.

SCWA also entered into a three-party agreement with the City and the SMUD for the assignment to SCWA of 15,000 AF/year of SMUD's existing contract with Reclamation. This supply will be diverted by SCWA from the Sacramento River at Freeport (this supply is often referred to as "SMUD I"). SCWA has also acquired a second water contract with SMUD for the assignment of an additional 15,000 AF/year pursuant to SMUD's existing contract with Reclamation. This supply will be diverted by SCWA from the Sacramento River at Freeport (this supply is often referred to as "SMUD II"). All CVP water is subject to dry year cutbacks not exceeding 50 percent.

#### *4.2.2.2.2 Appropriative Water*

SCWA has made application to the State Water Resources Control Board (SWRCB) for appropriated water. Appropriated water is defined as excess flows on the American

River and Sacramento River to be diverted by SCWA from the Sacramento River at the FRWA diversion structure. These flows, which are available on an intermittent basis, could provide a long-term average yield of up to 14,586 AF/year. In wet years, the amount of appropriated water available for use could be significantly higher given the availability of the wet-year water on the river system. Use of this water is crucial to implementation of the conjunctive use program that is described below.

#### *4.2.2.2.3 Replacement Water Supply Project Water*

While the water from the Replacement Water Supply Project (RWSP) is diverted through the FRWA project off of the Sacramento River, it is not part of the surface water tally because this water is remediated groundwater from Aerojet and Boeing's groundwater clean-up operations in the Central Basin. However, for purposes of the WSIP, this water has to be considered as a water source treated by the Vineyard SWTP. Currently, the amount of groundwater that is estimated to be available to SCWA is approximately 17,000 AF/year and by the time it reaches the FRWA diversion location 15 MGD is assumed to be available.

The NOP of an Environmental Document for the Replacement Water Supply Project was issued on April 8, 2005. The Draft EIR is completed and currently out for public review and comment. The Draft EIR provides a full project description and is available through the Sacramento County's Department of Environmental Review and Assessment.

The need for this project is linked to agreements between SCWA, Aerojet, and Boeing to recover lost groundwater supplies due to groundwater contamination (see discussion in **Section 1.2**). Under the terms of these agreements SCWA is obligated to provide a replacement water supply to purveyors in the Rancho Cordova area that lose capacity as a result of groundwater contamination plume migration from either the Aerojet or Boeing properties. Additionally, the agreement provides water for new development and environmental purposes, if available.

A large component of the Replacement Water Supply Project is integrated into FRWA's diversion and pipeline project and the Vineyard SWTP. While additional capacity is not

necessary in the FRWA facilities it is required in SCWA's pipeline that connects to FRWA's pipeline and the Vineyard SWTP. Based on EBMUD's stated need for water from the FRWA project it is unlikely they would utilize their capacity every year unless agreements are made to sell or transfer water through the pipeline and down the FSC. If this is the case, SCWA will have to purchase an additional 15 MGD of capacity from EBMUD in some months out of the year.

NOTE: SCWA will not utilize its full 85 MGD share of the 185 MGD capacity of the FRWA facilities until after completion of the second phase of the Vineyard SWTP. Even then, 85 MGD would only be used during periods of peak demand. Not diverting replacement water should be considered during these conditions to avoid the long-term cost of renting capacity from EBMUD that may not be needed until near 2030.

The timeline for implementation of the Replacement Water Supply Project pushes construction of the Vineyard SWTP. In the interim, SCWA's Board has set aside a portion of the capacity from the Excelsior Well Field to meet replacement water supply needs in the event additional groundwater capacity is lost to contamination. The ability to access this capacity could become challenging depending on the rate of development in the NSA. This can be addressed by constructing the Suncreek WTP in the southern portion of the Sunrise Douglas Community Plan area to support replacement supplies until the Vineyard SWTP is on-line.

The supply of remediated groundwater that makes up the replacement supplies will be available every year without dry year shortages and is delivered on a uniform pattern 24 hours a day 7 days a week. The timing and amount of remediated groundwater available is subject to change as a result of on-going negotiations with water purveyors affected by groundwater contamination and with Aerojet/Boeing as their remediation plans may change as directed by various regulatory agencies. Remediated groundwater from the Replacement Water Supply Project will co-mingle with other surface and groundwater supplies to meet the total Zone 40 demand as well as other water commitments (i.e., wholesale customers outside of Zone 40).

It is evidently clear that the advantage of using remediated groundwater is that it keeps the groundwater in the Central Basin and does not further reduce Zone 40's ability to rely on groundwater in the dry years. However, the drawback of having to convey and treat this water through the FRWA project and the Vineyard SWTP is that there is less capacity to import surface water supplies when they are available. For instance, surface water would be the majority of supply in the wet months absent the Replacement Water

Supply Project. With the project, groundwater is used thereby diminishing the effectiveness of the Zone 40 conjunctive use program over the long term.

##### *4.2.2.2.4 Other Water Supplies*

Other water supplies are water transfers from various upstream water users that hold surface water rights on the Sacramento River and the American River upstream of SCWA's points of diversion. This source is considered to be the most challenging and most expensive of surface water supplies. The timing to lock up this water by agreement will be dependent on the water market; making it necessary to, at a minimum, pay for an option on the water prior to its actual use. The estimated average quantity of Other Water Supplies is estimated at 5,200 AF/year.

### 4.2.2.3 Recycled Water Supplies

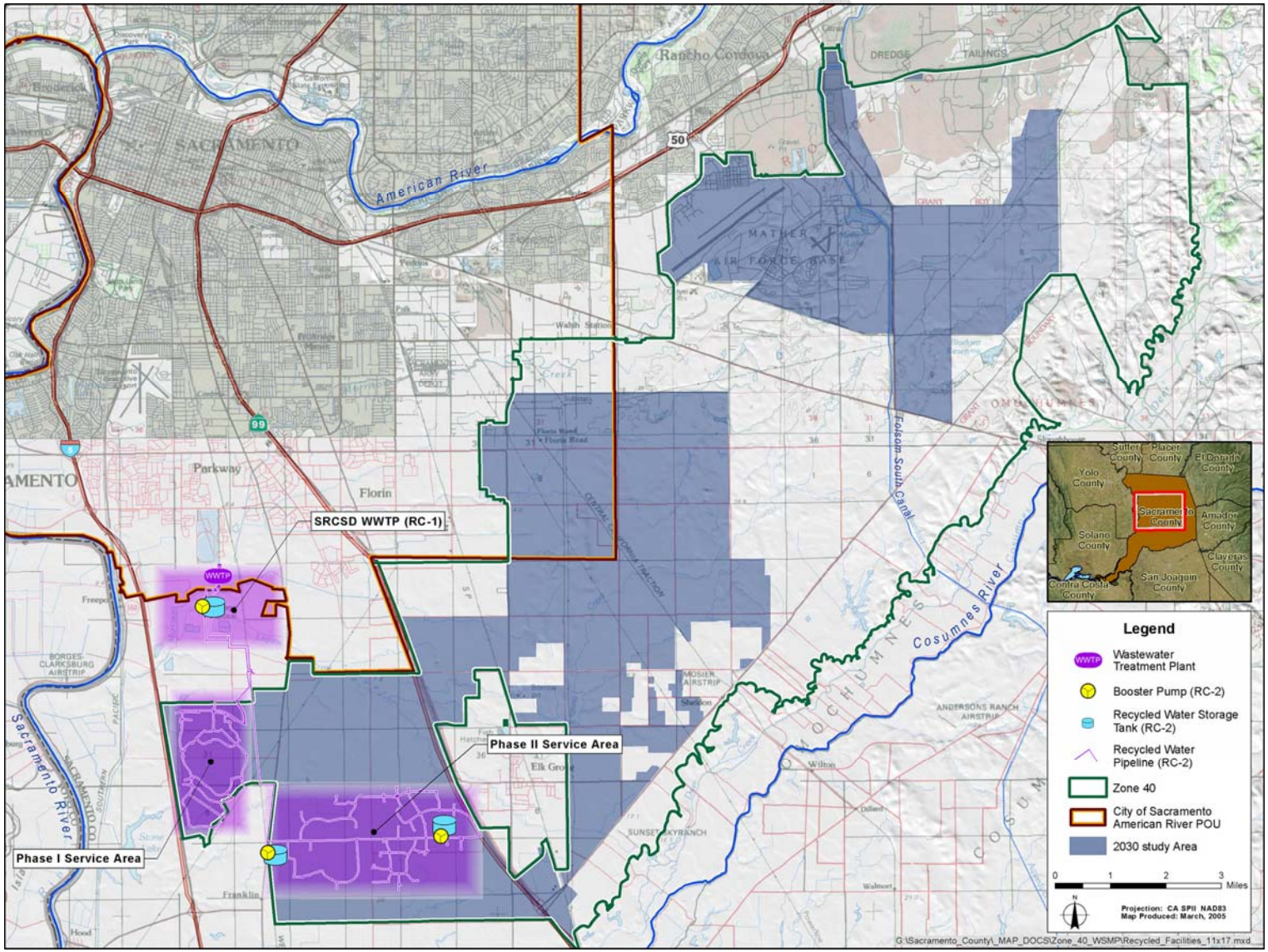
Recycled water is tertiary treated wastewater from SRCSD that is sold to SCWA Zone 41 as a source of non-potable water for irrigation of parks, schools, and rights-of-way (the use of recycled water for residential landscaping has not been evaluated at this time). Currently, SCWA provides recycled water in the SSA in the Laguna West/Lakeside/ Laguna Stonelake service areas (see **Figure 4-9** Phase 1 area) as well as on-site at the SRCSD treatment plant site. The Phase 2 area shown in **Figure 4-9** is currently under construction and will likely be operable by 2008/09.

The design and implementation of recycled water is quite different than potable water and includes a significant amount of regulatory oversight to maintain public health standards. Zone 40's participation in the Phase 1 and Phase 2 areas is based on a pilot scale approach of using up to 10 MGD of recycled water. The information learned through the pilot implementation will be applied to other areas as SRCSD expands their recycled water program.

Recycled water is not currently being used in the NSA or CSA areas; however, SCWA is collaborating with SRCSD in evaluating the feasibility of increasing the use of recycled water within Zone 40 as part of SRCSD's on-going recycled water master planning effort. SCWA has completed two feasibility reports that looked at the possibility of

installing recycled water infrastructure in the North Vineyard Station Specific Plan/Florin Vineyard Community Plan areas and in the Sunrise Douglas Community Plan area. These reports are included in **Appendix A** and are only intended to provide some guidelines on how a recycled water distribution system should be designed. These papers should not be construed as what will be needed for these service areas.

## Figure 4-9. Zone 40 Recycled Water Facilities



## 4.3 Surface Water Supply Availability Analysis

The ability to forecast surface water supply availability is a complicated process that involves assumptions in the amount of rainfall, snow pack, and reservoir operational strategies by state and federal agencies for flood control and water supply. The need to accurately forecast surface water availability in different hydrologic years has resulted in the development of predictive tools that provide a high level of confidence in water supply forecasting but still need to be viewed as simply making use of the best available information and methods to assist in planning for the future.

For the purpose of this WSIP, the latest technology was used to evaluate the reliability of SCWA's surface water supplies. This was done so that facilities can be sized to achieve the optimum use of surface water while balancing feasibility and practicability in their implementation. For purposes of this analysis, modeling information for the FRWA project was used to generate a down-sized version of FRWA's model for the Zone 40 area. This provides the needed higher resolution of how well surface water and groundwater supplies meet water demands under variable hydrologic conditions. The model and analysis are explained below.

### *4.3.1 CALSIM II Model Overview*

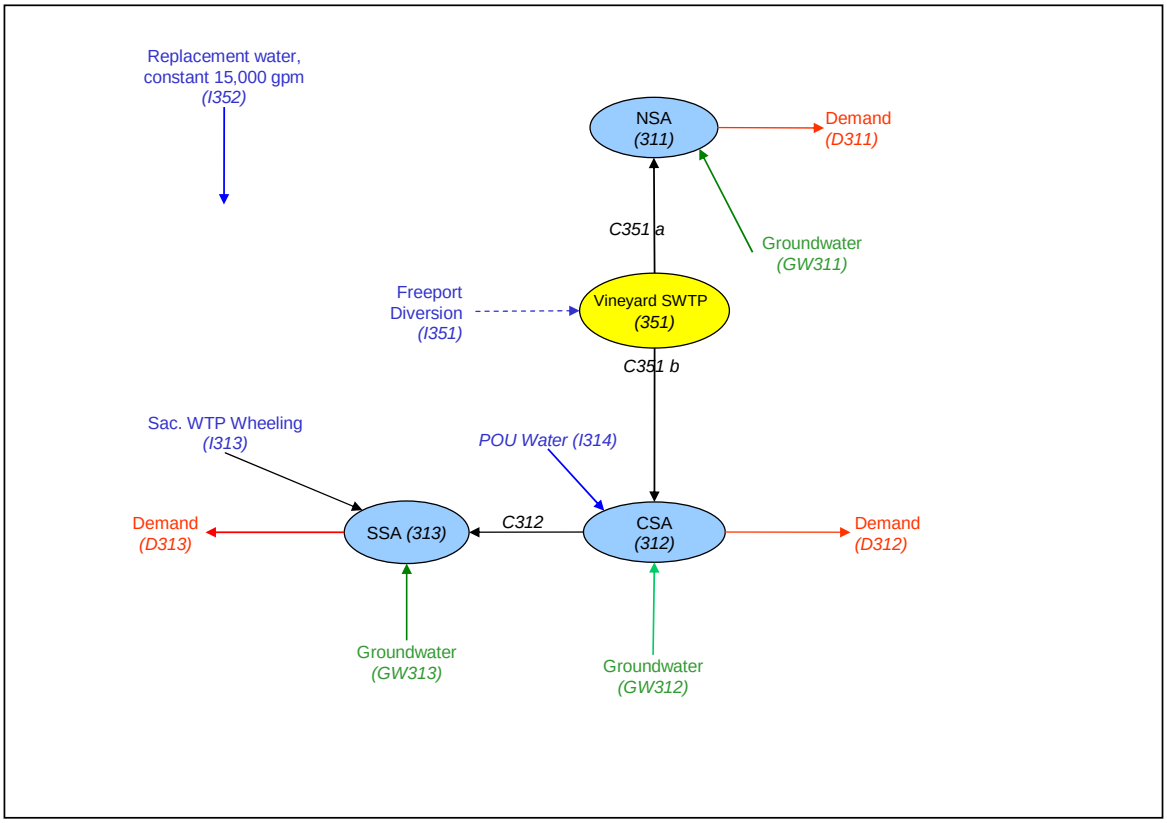
CALSIM II is a generalized water resources simulation model for evaluating operational alternatives of large complex river basins. Developed by DWR, CALSIM II provides a simulation language for flexible operational criteria specification, and a linear programming solver for efficient water allocation decisions. CALSIM II was originally designed to replace existing planning models of the SWP/CVP system, DWR's DWRSIM and Reclamation's PROSIM.

CALSIM II is used to simulate the entire California Central Valley river system taking into account each diversion and inflow point that is documented along the major waterways. CALSIM II results for Zone 40 are in the form of an aggregated amount of water for build-out through the City and the Freeport Diversion Structures, coming either from CVP water contracts, Other Water Supplies, and Appropriative Water. For the

purpose of this WSIP there is a need to disaggregate the water not only by contract (i.e., SMUD I, SMUD II, and Fazio) but also by time. This is done in order to compare facility capacity with the amount of water available. To accomplish this there was a need to create a "mini-CALSIM".

**Figure 4-10** provides a schematic of the Zone 40 system with demands and supplies indicated by notations. Surface water supplies are indicated by blue notations, surface water treatment is indicated by yellow circled notations, demands are red notations, groundwater is green notations, and service areas are indicated by blue circled notations. Each component of the model is given a unique identifier for purposes of output and post processing. **Table 4-1** provides some additional explanation of the schematic.

**Figure 4-10. Zone 40 System Schematic (mini-CALSIM)**



## Table 4-1. Summary of Water Supply Sources in Zone 40 CALSIM

| Water Supply | Features | Region |
|---|---|---|
| **Replacement Water Supply Project** | | |
| From Vineyard SWTP and Groundwater | ▪ The Vineyard SWTP feeds a large storage tank in the NSA to serve as a surrogate WTP.<br>▪ Groundwater from within NSA and from the Excelsior Well Field make up remaining supply. | NSA |
| Replacement Water to Zone-40 | ▪ Constant rate of water enters the Vineyard SWTP, is treated, and then is pumped to the Douglas Storage Tanks.<br>▪ Constant rate of 5,900 gpm goes to Cal-Am and Golden State.<br>▪ The remaining 9,100 gpm goes to environmental purposes, Aerojet Lands (i.e., Rio Del Oro, etc.), then the remaining to Z40-Sunrise Douglas area. | NSA Z40-SD (Sunrise Douglas) |
| **From the City (Sacramento River WTP and Fairbairn WTP)** | | |
| City CVP Wheeling | ▪ Source: modified (Operational Criteria and Plan (OCAP) current Environmental Water Account (EWA) output (D167b).<br>▪ Remaining scenarios: modified OCAP Future EWA output (D167b).<br>▪ This water is diverted at the City's diversion structure, treated, and wheeled to SCWA at the Franklin Boulevard connection to serve the Laguna Franklin Demand. | Z40-LF (Laguna Franklin) |
| City POU | ▪ This is the City's POU water serving the portion of Zone 40 within the POU. | City POU |
| **From Freeport Diversion and Vineyard SWTP** | | |
| CVP | ▪ For each hydrologic year, the maximum annual amount of diversion is equal to the modified OCAP Future EWA output (D168C_FRWP).<br>▪ The monthly pattern is to maximize diversion of available CVP contract waters based on demands and facility capacities. | Z40-SD<br>Z40-E99<br>Z40-LF |
| Appropriative Water | ▪ The maximum monthly amount of diversion is equal to the modified OCAP Future EWA output (D168C_EXCESS).<br>▪ Lower diversion priority than CVP waters. | Z40-SD<br>Z40-E99<br>Z40-LF |
| Other Contracts | ▪ The maximum monthly amount of diversion is equal to the modified OCAP Future EWA output (D168C_OTHER).<br>▪ Lower diversion priority than Appropriative waters. | Z40-SD<br>Z40-E99<br>Z40-LF |
| Environmental Water | ▪ Environmental Water will likely not come through the Zone 40 system but is included as an option. | Z40 -SD |
| Groundwater | ▪ To meet the remaining demand. | Z40-LF<br>Z40-E99<br>Z40-SD |

### *4.3.2 Use of Mini CALSIM for Zone 40*

The purpose of developing the mini CALSIM Zone 40 model is to provide a simplified method of taking what is known about the different water supplies (described above), their availabilities and their constraints, and placing this information in one location that can be used to understand how the Zone 40 water distribution system should be operated. This is the first step in proceeding with the design of the water distribution system and its many components. The need to look at what extreme conditions might the system be exposed to given the portfolio of supplies and the need to comply with existing agreements. The result is a spreadsheet tool that provides the ability to input what is known from external factors such as rainfall, water demands, and contract delivery patterns and distill this information into how each of the groundwater WTPs should be operated in each month of the year to optimize the amount of available surface water. This tool provides the bookends for the design and layout of the water distribution model.

**Figure 4-11** shows the input fields that are used to make a determination of how the system should be operated under any given scenario. **Figure 4-12** and **Figure 4-13** provides the graphical output of how much capacity should be utilized for the given groundwater treatment plants. This information is used in the distribution modeling analysis to evaluate whether the system design can maintain sufficient pressures under any given scenario. **Figure 4-13** represents build-out conditions under a critical year in the month of July. **Figure 4-12** is looking at the same conditions but in a wet year. The goal in looking at the difference in the percentage use of each groundwater treatment facilities is to minimize pressure barriers from the groundwater treatment plants that would impede the ability to move surface water from the Vineyard SWTP. It is from these two scenarios that the water distribution model can be tuned to simulate the extreme conditions and then evaluate the pressures in the system to verify that the design objectives are satisfied. It should be noted that this tool provides a guideline of operation is by no means a replacement for what is occurring in the system at the moment.

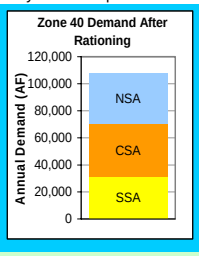
# Figure 4-11. Inputs to Operations Model

Important: White Cells are Points where Data Updates/Entry is Required by Zone 41Operations Staff

**Step1: Esitmate of Annual Water Demand (AF)**

| Service Area | Total w/ Recycled | Recycled Water | After Rationing |
|---|---|---|---|
| North (NSA) | 37,500 | 0 | **37,500** |
| Central (CSA) | 39,000 | 0 | **39,000** |
| South (SSA) | 31,000 | 800 | **31,000** |
| Total Zone 40 | 107,500 | 800 | **107,500** |

TRUE With recycled water supply to Zone 40?




**Step 2:Hydrologic Conditions**

FALSE EBMUD diversion at Freeport

100% CVP M&I Availability

0% Rationing (per CVP M&I delivery rate)

**Step3:SCWA Raw Water Facilities (MGD)**

100 Central WTP Physical Capacity

100 SCWA Freeport Diversion Capacity (when constructed 85 mgd of pipeline capacity is dedicated, 15 mgd is shared)

Conveyance Capacity (MGD)

65.0 Between NSA and CSA

10.0 Between SSA and CSA

10.0 Between City and SSA

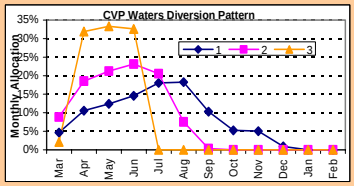
20.0 Between City and POU Area

**Step 4:SCWA Surface Water Supplies (annual contract amount in AF)**

***Supplies from City***

6,500 Fazio Water (CVP Water)

2 Diversion Pattern




TRUE POU Water: up to 10,000 AF

10,644 POU Water

***Supplies at Freeport***

*CVP Waters*

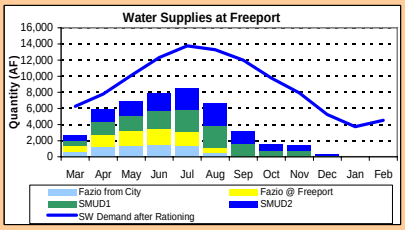
8500 Fazio Water

TRUE SMUD1: up to 15,000 AF

1 Diversion Pattern

TRUE SMUD2: up to 15,000 AF

1 Diversion Pattern




***Non-CVP Waters***

TRUE Replacement Water (15MGD)

TRUE Appropriative Water

| Mar | Apr | May | Jun | Jul | Aug |
|---|---|---|---|---|---|
| TRUE | TRUE | FALSE | FALSE | FALSE | FALSE |
| Sep | Oct | Nov | Dec | Jan | Feb |
| FALSE | FALSE | FALSE | FALSE | TRUE | TRUE |

monthly pattern

FALSE Other Waters

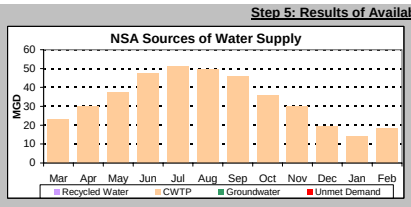
8,000 Annual Quantity (AF)

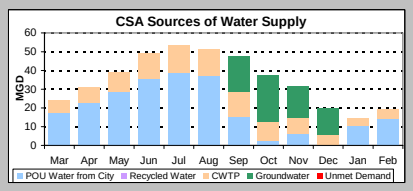
# Figure 4-12. Output of Mini CALSIM for Zone 40 Under Wet Conditions

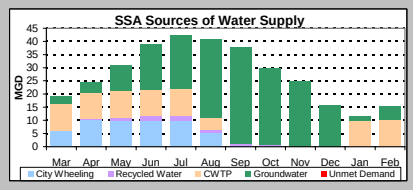
**Step 5: Results of Available Water Supplies and Treatement Plant Operations**

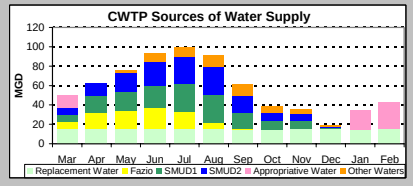
**MGD**
Annual Usage (AF)

| | |
|---|---|
| Fazio | **13,326** |
| SMUD1 | **15,003** |
| SMUD2 | **14,607** |
| Appropriative | **5,387** |
| Other Waters | **5,474** |
| Replacement | **16,754** |
| POU | **10,644** |
| Total GW | **25,504** |
| Unmet Dmd | **0** |
| NSA | |
| Surface Water | **37,500** |
| Groundwater | **0** |
| CSA | |
| Surface Water | **31,997** |
| Groundwater | **7,002** |
| SSA | |
| Surface Water | **11,699** |
| Groundwater | **18,501** |



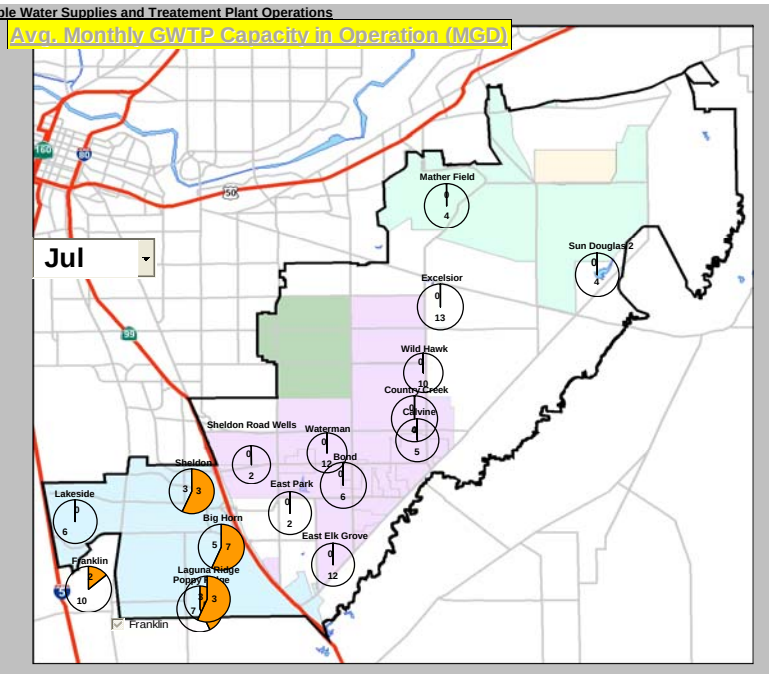
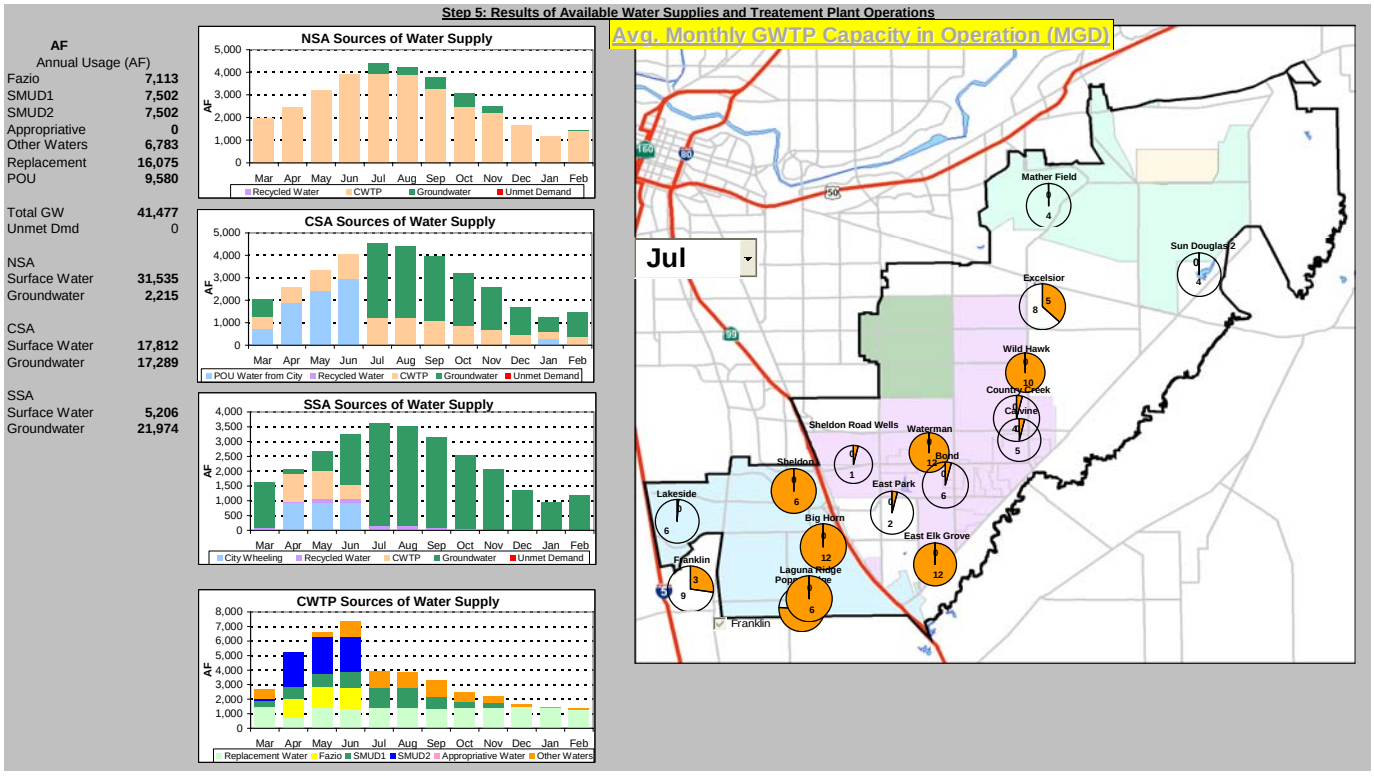



**Figure 4-13. Output of Mini CALSIM for Zone 40 Under Dry Conditions**




In **Figure 4-12** there are many groundwater WTPs that show no operation in hottest month of the driest year. This does not mean that these WTPs are not operating. In fact, every WTP is in operation to meet peak hour demands and every WTP is needed under the various input parameters (e.g., if water supplies from City are cut off).

### *4.3.3 Long-Term Surface Water and Groundwater Use*

**Figure 3-3** presented a curve of the total water demand projected from 2005 to build-out at 2030. At this time it is necessary to define what constitutes build-out in terms of facility planning and financial planning. In most cases the reference to build-out infers the year 2030 as per the Water Forum. However, when reference is made to financial planning, a longer build-out period is recognized, one that assumes that growth does not occur as rapidly as predicted by the Water Forum and/or SACOG. This is done to allow

for conservative financial forecasting by assuming that the cash flow revenue stream is not as strong as it could be under a shorter timeframe.

**Figure 4-14** is a conceptual depiction of a service area build-out timeframe extending out to 2050. The top blue line being the generalized water demand curve, the straight line being the sustainable groundwater yield of 40,900 AF/year, and the orange line being the groundwater usage over time. As mentioned in the groundwater supply availability section, 40,900 AF/year is the target yield for groundwater beyond which surface water is needed. The phasing of the surface water treatment plant (represented by the jagged look of the orange line) is based on the need to meet this objective. Under the 2005 to 2050 time frame, the two 50 MGD phases of the Vineyard SWTP are 2017 and 2026. In reality, phase one will be completed in 2010/11 to meet the needs of the Replacement Water Supply Project, to optimize the use of acquired surface water entitlements, and to continue moving forward on the implementation of the conjunctive use program set forth in the WSMP. The lightly colored vertical bars at each year on **Figure 4-14** represents the maximum and minimum use of groundwater for the given year. In later years there is a greater dependence on Appropriative Water which makes the difference between the high and low use in groundwater much larger because of variations in the availability of Appropriative surface water. The lower value of groundwater use is limited by the capacity of the Vineyard SWTP. Meaning, in the wet years, the maximum Vineyard SWTP output is limited to 100 MGD, the rest of the demand is supplied primarily by groundwater. It is this figure that encapsulates the conjunctive use program showing the phasing of facilities and the needed supply requirements that could occur in any given year throughout the planning period of the WSIP.

## Figure 4-14. Conjunctive Use in Zone 40