SURVEY REPORT

ON

GROUNDWATER CONDITIONS

February 2012

ALAMEDA COUNTY WATER DISTRICT

Fremont, California

ALAMEDA COUNTY WATER DISTRICT

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February 9, 2012

Mr. John H. Weed
President
Board of Directors
Alameda County Water District
43885 South Grimmer Boulevard
Fremont, California 94538

Dear Mr. Weed:

Subject: Survey Report on Groundwater Conditions, February 2012

Submitted herewith is the Survey Report on Groundwater Conditions, as requested by the Board on November 10, 2011. The report presents information on groundwater conditions together with estimates of FY 2012/13 costs of importing and recharging supplemental water supplies to the groundwater basin.

This report is a prerequisite to consideration by the Board of the rate of replenishment assessment for FY 2012/13, under provisions of Chapter 1942, Statutes of 1961. It provides all the data required pursuant to Section 7 of this statute. Staff is recommending a 3% increase in the replenishment assessment rate in order to generate sufficient revenue over the next several years in anticipation of groundwater-related projects scheduled in the Capital Improvement Program, as well as expected groundwater expenses.

Sincerely,

Walter L. Wadlow
General Manager

mh/ps
Enclosure

PROFESSIONAL CERTIFICATION

The 2012 Engineering Survey and Report on Groundwater Conditions was prepared by Alameda County Water District staff under the general direction of Robert Shaver, and under the immediate supervision of Steven Inn and Mikel Halliwell. The information and other content in this report, including quantities provided in the tables, text, and figures, were developed with a level of effort and methods considered adequate for the purpose of this report's creation; that is, to provide a reasonable basis for the Board of Directors of Alameda County Water District to determine the need for, and rate of, replenishment assessment for the coming fiscal year, pursuant to the requirements of the Replenishment Assessment Act.

REGISTERED PROFESSIONAL ENGINEER
ROBERT T. SHAVER
No. C49999
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CIVIL
STATE OF CALIFORNIA

Robert Shaver, P.E.
Assistant General Manager - Engineering

Feb 2, 2012
Date

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INTRODUCTION

On November 10, 2011, the Board of Directors (Board) of the Alameda County Water District (District) ordered the preparation of a Survey Report on Groundwater Conditions. The purpose of the report is to provide information on the District's groundwater basin in accordance with Section 7, Chapter 1942, Statutes of 1961, referred to as the Replenishment Assessment Act.

The report contains the results of an annual study which: 1) estimates the total amount of groundwater production for the coming year; 2) estimates the total amount of groundwater recharge required; 3) determines the extent of any salinity intrusion into the groundwater basin; and 4) analyzes the effects of production and recharge on groundwater levels within the basin.

In addition, the report recommends the amount of supplemental water to be purchased in order to maintain basin water levels, and summarizes the cost of the District's groundwater program including the estimated cost of the recommended supplemental supply. The amount of these costs is the basis for the determination by the Board of the need for, and the rate of, a replenishment assessment for FY 2012/13.

The Replenishment Assessment Act requires the Board to perform certain actions prior to specific dates in the process of setting a replenishment assessment rate for the coming fiscal year. In addition, a proposal to increase the replenishment assessment rate is subject to the Proposition 218 notification requirement. Listed below are the required actions for raising funds by replenishment assessment in FY 2012/13:

	REQUIRED ACTIONS	TENTATIVE DATE	LATEST DATE
1.	Order an Engineering Survey and Report.	Completed Nov. 10, 2011	
2.	Declare whether water funds will be raised by (a) a water charge, (b) by a replenishment assessment, or (c) a combination of both.	Feb. 9, 2012	Mar. 13, 2012
3.	To comply with Proposition 218, mail written notices of the proposed increase in the replenishment assessment rate to well owners or operators that would be subject to the new rate.	Feb. 10, 2012	Feb. 22, 2012
4.	Publish a notice of Public Hearing.	Mar. 27, 2012	Mar. 31, 2012
5.	Hold a Public Hearing - required on 2nd Tuesday of April.	Apr. 10, 2012	Apr. 10, 2012
6.	Complete Public Hearing.	Apr. 10, 2012	May 1, 2012
7.	Make formal findings on groundwater conditions and costs, and rate of replenishment assessment.	Apr. 10, 2012	May 8, 2012

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

- o The water level in the Newark Aquifer has remained above sea level. The aquifer was not overdrawn and there is no indication that saltwater entered the basin between Fall of 2010 and Fall of 2011.

- o The estimated volume of supplemental water needed next year for the replenishment of groundwater supplies is 1,500 acre-feet.

- o The estimate of the District's groundwater program costs for FY 2012/13 is summarized below:

Fixed and Capital Costs		$ 5,329,000
Variable and Operating Costs		$ 8,461,000
	TOTAL	$ 13,790,000

Recommendations

1. The District should purchase and/or take delivery of 1,500 acre-feet of water in FY 2012/13 from the State Water Project, Lake Del Valle, or from other sources as they become available.

2. The District should levy a Replenishment Assessment to recover a portion of its groundwater program costs in FY 2012/13.

Category	Existing	Proposed
Agricultural and Municipal Recreation	$ 8/acre-foot	$ 8/acre-foot
All Other Purposes	$ 256/acre-foot	$ 264/acre-foot

GROUNDWATER BASIN CONDITIONS

Background

The District's geographic area, which encompasses about 105 square miles, is shown on Plate 1. Table 1 is a tabulation of 2006 land use. Figure 1A shows the trends of historical land use, and Figure 1B shows the percentages of land use for 2006.

The Niles Cone Groundwater Basin, as delineated by the Department of Water Resources (DWR), exists almost exclusively within the District's boundaries. However, certain aquifer layers of the Niles Cone appear to extend substantially beyond these boundaries. The Newark Aquifer and Centerville-Fremont Aquifers, according to DWR (Plate 2), continue westward all the way to the San Francisco Bay Peninsula. In addition, there is evidence that the Deep Aquifer is in hydraulic communication with the adjacent Southeast Bay Plain Groundwater Basin to the north. The amount of groundwater production from the basin west of San Francisco Bay is quite small and is neglected for the purposes of this report. The portion of the Newark Aquifer under the bay provides the means of transporting saline water to the groundwater basin underlying the District.

TABLE 1

LAND USE IN ALAMEDA COUNTY WATER DISTRICT, 2006

Land Use	**Thousands of Acres**
Municipal (e.g., residential and commercial)	25.2
Industrial	7.0
Irrigated Agricultural and Non-Municipal Recreation	1.3
Non-Developed Land*	8.8
Salt Ponds and Marsh	24.8
TOTAL	67.1

* Includes idle land, Alameda Creek Flood Control Channel, most of the Coyote Hills, and the Quarry Lake areas.

The groundwater basin is divided on the east side of the District by the Hayward Fault. The portion of the basin on the east side of the Hayward Fault is generally referred to as the "Above Hayward Fault Sub-basin." It is not subject to saltwater intrusion because the fault is a relatively impermeable barrier that impedes the flow of water. Twenty-six percent of the groundwater produced by the District in FY 2010/11 was pumped from the sub-basin above the Hayward Fault.

The portion of the groundwater basin on the west side of the Hayward Fault, generally referred to as the "Below Hayward Fault Sub-basin," is composed of a forebay and three primary aquifers as shown on Plate 2. If the water levels in the Newark Aquifer are below sea level, saline water will flow from the bay and salt evaporation ponds into the Newark Aquifer, then easterly toward the forebay area. Then, following the flow of water caused by pumping, the saline water may move down into the lower levels of the forebay and into the Centerville-Fremont and Deep Aquifers. Saline water can also be transmitted from the upper aquifers to the lower aquifers

FIGURE 1A
HISTORICAL LAND USE IN ALAMEDA COUNTY WATER DISTRICT

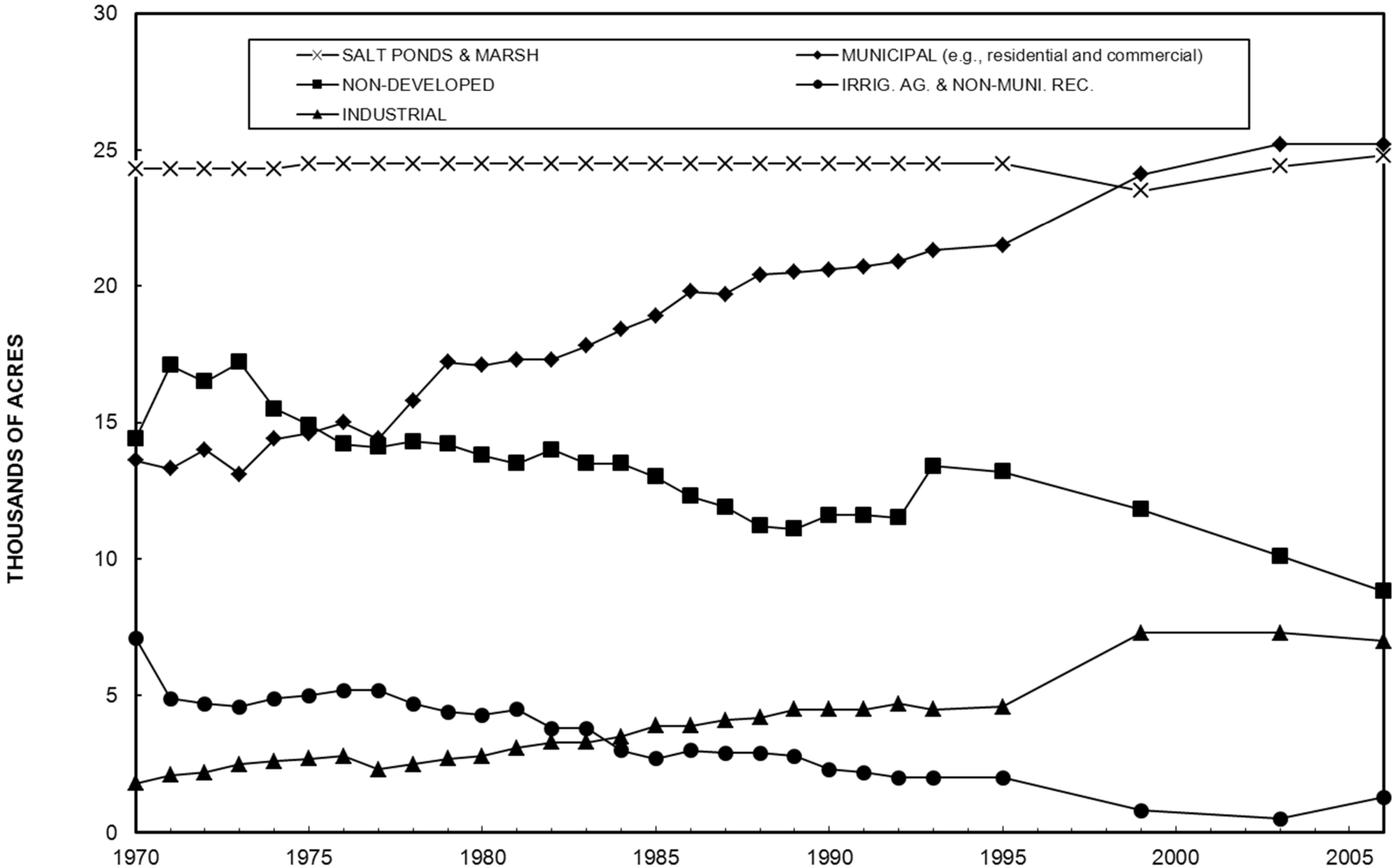
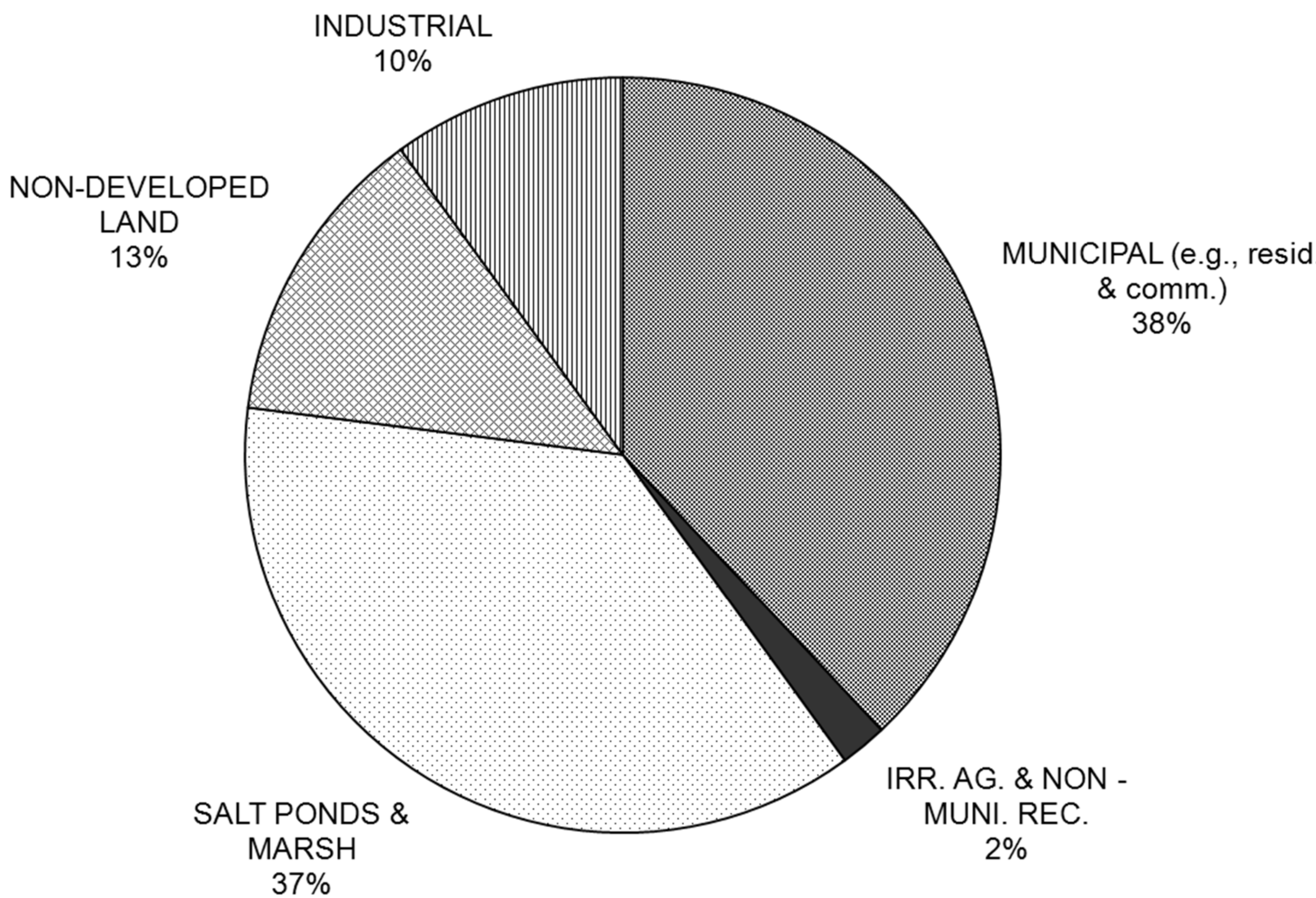


FIGURE 1B
LAND USE IN ALAMEDA COUNTY WATER DISTRICT
2006



through breaks in the aquitards that separate them and through defective wells. The saltwater intrusion results when groundwater levels in the Newark Aquifer are below sea level due to an overdraft of the basin. The Newark Aquifer water levels are presently above sea level and are forecast to remain above sea level through June 2012. A graph of historical groundwater levels in the forebay area of the Newark Aquifer is presented on Plate 3.

Production of Groundwater

The "production" of groundwater is defined in the Replenishment Assessment Act as the extraction of groundwater by pumping or any other method from shafts, tunnels, wells, excavations, or other sources of groundwater for domestic, irrigation, industrial, or other beneficial uses. Most pumping from the basin is classified as production.

Table 2 lists the various components of groundwater pumping for FY 2010/11 (actual), FY 2011/12 (forecast), and FY 2012/13 (forecast). Production is broken down by usage category and by sub-basin (Above Hayward Fault and Below Hayward Fault). Groundwater supplied to ACWD's distribution system comprises the "Municipal" category of production, and includes water pumped from ACWD's two wellfields, and water delivered to the Newark Desalination Facility from certain Aquifer Reclamation Program (ARP) wells. ARP water not diverted to the Newark Desalination Facility (i.e., ARP water discharged to flood control channels) is accounted for in Table 2 under "Aquifer Reclamation," a category of pumping that is not production.

The purpose of ACWD's ARP is to restore water quality in certain sections of the groundwater basin that became brackish due to intrusion of saltwater from San Francisco Bay. This saltwater intrusion occurred as a result of high volume pumping during the 1920's through the early 1960's without adequate recharge for replenishment of the basin. The ARP involves extracting brackish groundwater, with the objective of improving the quality of groundwater in the basin as recharge water replaces the pumped brackish groundwater. ARP pumping also prevents the plume of brackish water in the Centerville-Fremont Aquifer from further migrating toward ACWD's Mowry Wellfield.

Prior to 2003, all pumped ARP water was discharged to San Francisco Bay. Construction of the Phase 1 Newark Desalination Facility subsequently enabled conversion of a portion of this discharge to potable use. The portion for potable use has increased since the Phase 2 expansion of the Newark Desalination Facility in 2010. "Other Reported Pumping," the final category listed in Table 2, is extraction of groundwater quantified and reported to ACWD, but is neither production nor "Aquifer Reclamation." This category may include dewatering of trenches and excavations during construction of subsurface utilities. "Total Reported Pumping" is the sum of "Total Production," "Aquifer Reclamation," and "Other Reported Pumping." A certain amount of groundwater pumped from the basin is not reported to ACWD, and hence, is not included in Table 2. Unreported pumping is of one of several potential loss mechanisms for which the District attempts to estimate through the calculation of "Other Extractions and Outflow" (see "Annual Overdraft").

Figure 2 provides graphs of historical groundwater pumping from FY 1969/70 through FY 2010/11. The terms "AHF Production" and "BHF Production" in the legend correspond to the subtotaled production of the Above Hayward Fault and Below Hayward Fault, respectively, in Table 2. Similarly, "Aquifer Reclamation," "Other Reported Pumping," and "Total Reported Pumping" refer to the same-named categories in Table 2.

As indicated in Figure 3, 40% of ACWD'S distribution system supply in FY 2010/11 was supplied by groundwater, with 26% and 14% supplied by the wellfields and the Newark Desalination Facility, respectively. In FY 2011/12 and FY 2012/13, the groundwater share is expected to be 41%, with 21% from the wellfields and 20% from the Newark Desalination Facility.

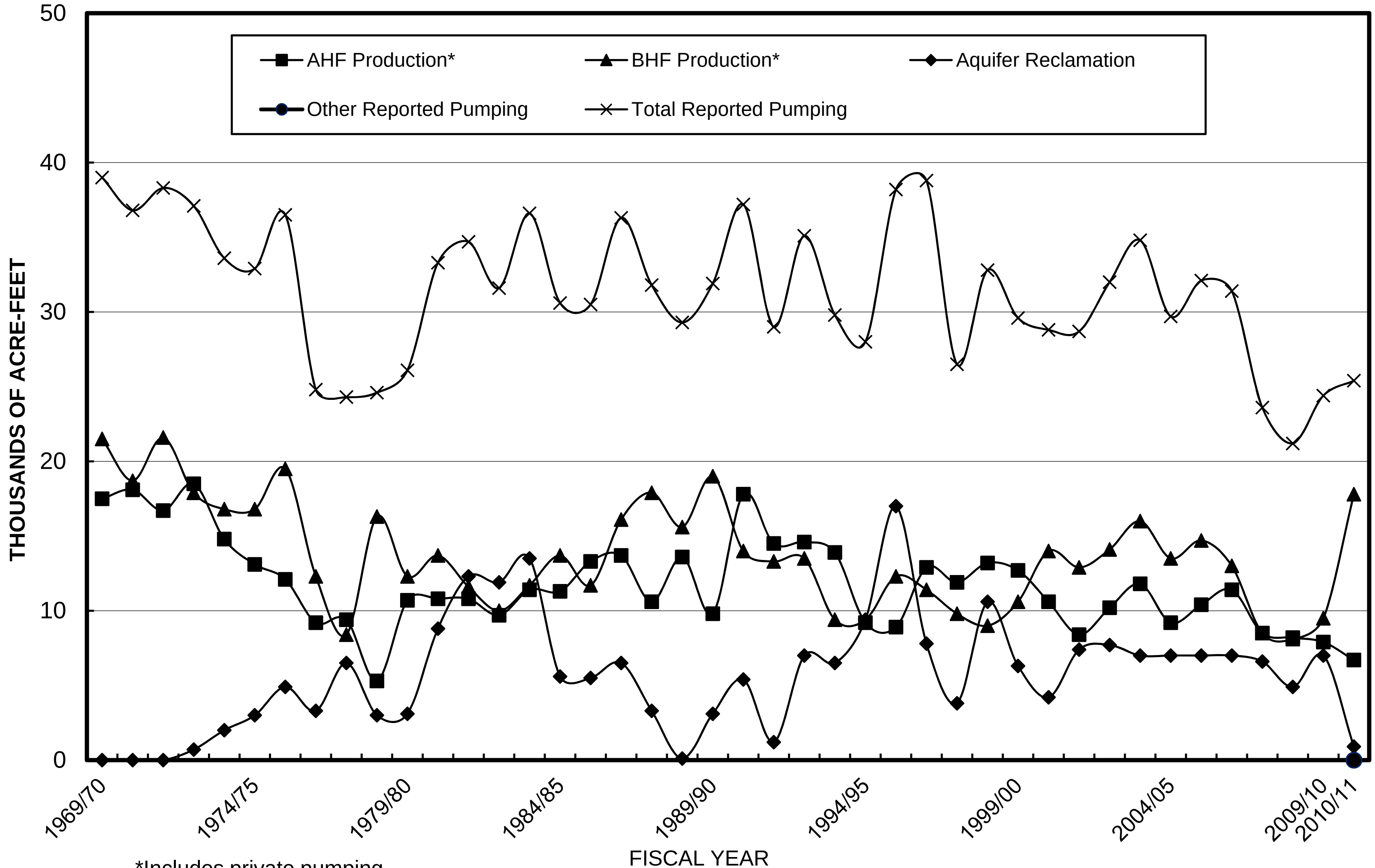
TABLE 2

PRODUCTION OF GROUNDWATER
(in thousands of acre-feet)

USE	FY 2010/11 Actual	FY 2011/12 Forecast	FY 2012/13 Forecast
ABOVE HAYWARD FAULT			
Municipal*	5.8	6.3	6.8
Industrial	0.1	0.1	0.0
Non-Municipal Recreation	0.1	0.1	0.1
Agricultural	0.1	0.1	0.0
Municipal Recreation	0.6	0.5	0.7
Subtotal	6.7	7.1	7.6
BELOW HAYWARD FAULT			
Municipal*	16.7	15.9	16.6
Industrial	0.8	0.8	0.8
Non-Municipal Recreation	0.0	0.0	0.0
Agricultural	0.2	0.2	0.2
Municipal Recreation	0.1	0.1	0.1
Subtotal	17.8	17.0	17.7
TOTAL PRODUCTION BY USE			
Municipal*	22.5	22.2	23.4
Industrial	0.9	0.9	0.8
Non-Municipal Recreation	0.1	0.1	0.1
Agricultural	0.3	0.3	0.2
Municipal Recreation	0.7	0.6	0.8
TOTAL PRODUCTION	24.5	24.1	25.3
Aquifer Reclamation*	0.9	0.0	0.0
Other Reported Pumping	0.0	0.5	0.0
TOTAL REPORTED PUMPING	25.4	24.6	25.3

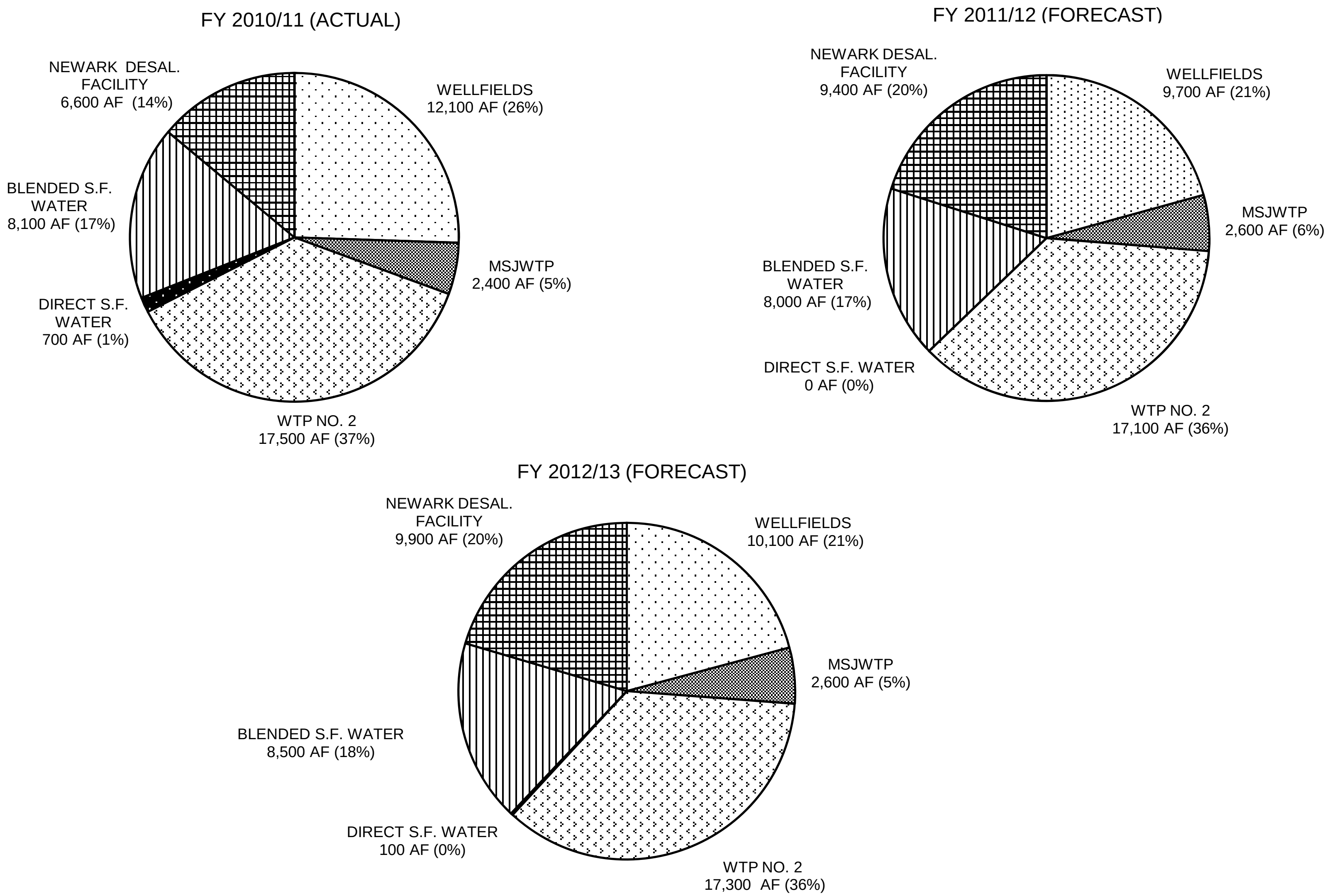
*The discussion on Page 6 describes how the amounts for these categories have been calculated.

FIGURE 2
HISTORICAL GROUNDWATER PUMPING IN ACWD
(ACTUAL THROUGH FY 2010/11)



*Includes private pumping.

FIGURE 3 - ACWD DISTRIBUTION SYSTEM SOURCE OF SUPPLY



Most of the FY 2010/11 groundwater production figures in Table 2 were obtained from well meter readings. A small amount of unmetered groundwater production was estimated. Similarly, production figures for the first five months of FY 2011/12 were obtained mostly from well meter readings. The production of groundwater for the remaining seven months of FY 2011/12 and the entirety of FY 2012/13 were based on an analysis of historical trends.

Replenishment Assessment Meters

The establishment of the replenishment assessment required that meters be installed on all of the active wells in the District. This requirement can, however, be deferred by the Board on a year-to-year basis if it is justified. The Board chose to install the necessary water meters on most wells in FY 1970/71 and FY 1971/72. Additional meters have been installed as necessary for new or reactivated wells.

Of the 76 non-ACWD-owned wells in the replenishment assessment program, 74 are currently equipped with meters, and one is planned for meter installation this year. In addition, all active ACWD production and ARP wells are equipped with meters, except two that are operated infrequently or on a standby basis. The cost of metering the three unequipped wells (the two operated by ACWD and the one private well not planned for metering) would likely not be returned during their remaining active years. Therefore, their assessments are based on estimates of production. To allow for the use of non-metered wells, Section 20 of the Replenishment Assessment Act requires that the Board adopt a resolution extending the date when all water producing facilities are required to be metered. The price of water metering devices or other circumstances can be the basis for the Board's determination. Last year, the Board extended the deadline for metering non-metered wells to March 13, 2012.

Wells with discharge lines not greater than two inches in diameter and providing groundwater for domestic use or for irrigation on less than one acre of land can be excused from the meter requirement, and charged a flat rate established by the Board. The Board would be required to pass a resolution to that effect at the time they fix the general replenishment assessment rate. The Board did not levy a flat rate assessment on these wells for FY 2011/12.

Annual Overdraft

The annual overdraft, as defined in the Replenishment Assessment Act, means the amount, as determined by the Board, by which the quantity of groundwater removed by any natural or artificial means from the groundwater supplies within the District during the water year exceeds the quantity of non-saline water replaced therein by the replenishment of such groundwater supplies in the water year by any natural or artificial means other than replenishment under provisions of the Act. Effectively, the annual overdraft is the difference between the amount of pumping of groundwater from the basin and the amount of water recharged from local water supplies for the fiscal year.

The net local water recharged to the groundwater basin is composed of the portion of precipitation, watershed runoff, and applied agricultural, municipal, and industrial water that percolates into the groundwater basin, less evaporation, saline water outflow, and other outflow. Part of the local recharge from precipitation and applied water percolates into the brackish water in the Newark Aquifer. While part of this water is not usable directly due to degradation from mixing with saline water, it does contribute to the volume of water in the basin.

The amounts of these components of net local recharge for FY 2010/11 (actual), FY 2011/12 (forecast), and FY 2012/13 (forecast) are listed in Table 3. With the exception of the quantity of runoff, they were estimated by the District's groundwater flow model, which was also used to project piezometric heads through the end of FY 2012/13. Some of the water reported in Table 3 as Saline Water Outflow could include non-saline flow across the northern boundary of the Niles Cone to the Southeast Bay Plain Groundwater Basin.

TABLE 3

ANNUAL OVERDRAFT
(In Thousands of Acre-Feet)

	FY 2010/11 Actual	FY 2011/12 Forecast	FY 2012/13 Forecast
TOTAL REPORTED PUMPING (Table 2)	25.4	24.6	25.3
LOCAL RECHARGE			
Precipitation	7.2	5.9	7.0
Applied Water	3.1	3.1	3.1
Runoff	26.3	18.8	21.8
Evaporation	-1.4	-1.4	-1.4
Saline Water Outflow	-6.1	-6.1	-5.9
Other Extractions and Outflow	-1.6	-0.0	0.0
TOTAL NET LOCAL RECHARGE	27.5	20.3	24.6
ANNUAL OVERDRAFT	-2.1	4.3	0.7

When the piezometric head of the Newark Aquifer forebay approaches 20 feet MSL, the rate of rise in piezometric head appears to slow in response to additional recharge. Although the specific cause(s) of this phenomenon is not known precisely, ACWD has mathematically represented it as a discharge, labeled “Other Extractions and Outflow”, in the calculation of annual overdraft (Table 3) and water supply/demand inventory (Plates 11-13). However, the actual causes likely include miscellaneous, unrecorded pumping or other extractions from the basin; and may include possible overestimates of channel percolation, or model limitations that could lead to under-calculated saline outflow or overestimates of rainfall/applied water percolation.

Change in Piezometric Heads

In this report, each piezometric head value is presented as the actual elevation of the water level in the well in which it was measured, and accordingly, is expected to equate (approximately) to the level of the free water surface in the aquifer if the well is not in a pressure aquifer.

Movement of water within an aquifer is in the direction of decreasing piezometric heads (in certain cases, precise calculations of flow direction may require consideration of not only water levels but also water density). Prior to 1972, the Newark Aquifer groundwater levels decreased in the landward direction toward the basin forebay (as shown on Plate 2). This caused landward movement of saline water toward the forebay area. The piezometric heads in the lower aquifers are generally lower than those of the Newark Aquifer, and the aquitards separating the aquifers are thin in the forebay. As a result, saline water in the forebay area migrated downward from the

Newark Aquifer and into the lower aquifers. A combination of recharge and pumping may have caused saline water in these lower aquifers to disperse and spread to areas outside the forebay.

Plate 4 summarizes the groundwater basin water levels in each aquifer from representative monitoring wells during Calendar Years 2010 and 2011. Plates 5 through 7 show water level contours for the Newark, Centerville-Fremont, and Deep Aquifers, respectively, in the Fall of 2011.

During FY 2010/11, the piezometric heads of groundwater contained within the pressure level areas of the Newark Aquifer were above sea level. The water level in the Centerville-Fremont Aquifer indicator well on Plate 4 was above sea level during early July 2010, then below sea level to mid December 2010, then fluctuated above and below sea level to mid February 2011, and then remained above sea level for the rest of the fiscal year. The water level in the Deep Aquifer indicator well on Plate 4 was above sea level in March 2011 through late June 2011, but was below sea level during other times of the fiscal year. The changes in piezometric heads from the beginning to the end of the fiscal year were increases of approximately two feet, three feet, and one foot in the Newark Aquifer, Centerville-Fremont Aquifer, and Deep Aquifer, respectively. The level in the Newark Aquifer forebay indicator well varied between 11.0 and 19.9 feet above sea level during the fiscal year. Since the piezometric heads of the Newark Aquifer remained above sea level, some of the saltwater in the Newark Aquifer should have been repulsed back toward San Francisco Bay.

The Newark Aquifer well levels in the vicinity of the forebay well on Plate 4 are estimated to be approximately 15 feet above sea level in July 2012 and about 15 feet above sea level in July 2013. The well levels in the Centerville-Fremont and Deep Aquifers should be above sea level for most of the remainder of the current water year if projected pumping occurs. These estimates are based on the assumption that the projected recharge shown in Tables 3 and 4 will be realized.

Extent of Salinity Intrusion

As discussed above under the heading of "Change in Piezometric Heads," the overdraft condition that had existed within the groundwater basin prior to 1973 caused saltwater intrusion to occur. The importation of supplemental water supplies has helped to reverse this condition, and in so doing, has improved the quality of groundwater in the basin. The long-term trend of gradual, steady improvement in water quality is expected to continue through FY 2011/12.

Any portion of an aquifer that contains water with a chloride concentration greater than 250 parts per million (ppm) is considered to be degraded by saltwater intrusion. Plates 8 through 10, which were obtained from the District's Groundwater Monitoring Report, 2011, indicate the location of the 250 ppm line (isochlor) in the Newark Aquifer, Centerville-Fremont Aquifer, and Deep Aquifer in the Fall of 2011. Each plate also includes the corresponding 250 ppm isochlor line for 1962 to indicate the net change that has occurred in each aquifer since 1962, when supplemental water from the State Water Project was first purchased.

According to the Groundwater Monitoring Report, all wells monitored above the Hayward Fault had chloride concentrations below 250 ppm in the Fall of 2011. A comparison of Fall 2011 chloride contour maps to those of Fall 2010 indicate no significant change in the Newark Aquifer. However, in the Centerville-Fremont Aquifer, the bulge of brackish water east of Paseo Padre Parkway has receded slightly away from the Mowry Wellfield. Some improvement of water quality in the Deep Aquifer was also observed east of I-880.

Accumulated Overdraft

The accumulated overdraft is defined in the Replenishment Assessment Act as the amount of water necessary to be replaced in the groundwater basin to prevent the landward movement of bay water into the fresh groundwater basin. This applies only to the groundwater basin below the Hayward Fault. Therefore, for this report, the accumulated overdraft is assumed to be the volume of water required to raise the water levels in the Newark Aquifer to mean sea level.

The accumulated overdraft of the basin has been eliminated since early 1972, as indicated on Plate 3. The water levels in the Newark Aquifer have remained above sea level since then, except during a brief period in 1990 when groundwater recharge operations below the fault were temporarily cut back to accommodate construction activity in the Quarry Lakes Recreational Area.

Based upon expected water conditions for the current fiscal year and the projected recharge shown in Tables 3 and 4, the Newark Aquifer levels are expected to be above sea level for the entire FY 2012/13. No accumulated overdraft is expected in June 2012.

AMOUNT AND AVAILABILITY OF SUPPLEMENTAL WATER SUPPLIES

Supplemental Water Supplies Available to the District

Supplemental water for groundwater replenishment is obtained by the District from two sources. They are the California State Water Project (SWP), and ACWD's share of the local conservation storage in Del Valle Reservoir. In wet years when local supplies are abundant, ACWD does not require delivery of all of its state water allocation, and therefore allows some to be diverted to the Semitropic Water Storage District (SWSD) in Kern County through a water banking agreement. This agreement allows ACWD to subsequently recover this water during dry or sub-normal years when it is needed. Recovery is actually accomplished through an exchange, whereby ACWD receives SWP water that would otherwise be allocated to the SWSD, or to other state water contractors that, in turn, can be compensated through deliveries from the SWSD. Following several wet years, ACWD recovered banked water in FY 2007/08 and FY 2008/09, which had sub-average rainfall totals. But subsequent above average rainfall in the winters of 2010 and 2011 enabled ACWD to replenish its banked water storage during FY 2010/11. Table 4 indicates the amounts of supplemental water for groundwater replenishment received from each of the aforementioned sources in FY 2010/11, the amounts that are anticipated to be received in FY 2011/12, and the amounts that will be required in FY 2012/13.

The District’s first water delivery schedule for Calendar Year 2013 must be submitted to the State by October 1, 2012. If the supplemental water is not ordered by October 1, 2012, then it will probably not be available when it is needed.

Two conditions were considered in deriving the amount of supplemental water to be purchased. These conditions are: 1) the need for water to meet estimated production demands; and 2) the replenishment capacity of the District's groundwater facilities. The District replenishment capacity is adequate to replenish the groundwater basin with the amount of supplemental water recommended for FY 2012/13.

TABLE 4

SUPPLEMENTAL WATER SUPPLIES
(In Thousands of Acre-Feet)

Source*	FY 2010/11 Actual	FY 2011/12** Forecast	FY 2012/13 ** Forecast
State Water Project	0.3	0.0	1.5
Banked water (SWSD)	0.0	0.0	0.0
Del Valle Reservoir	0.0	0.0	0.0
TOTAL FOR YEAR	0.3	0.0	1.5

* Values reflect only amounts delivered, or projected to be delivered, to ACWD for groundwater recharge. The supply for Mission San Jose Treatment Plant and Treatment Plant No. 2, as well as diversions of state water to the SWSD for future ACWD use, are not included herein, but do appear on Plates 11 through 13.

** Assuming normal winter runoff in Alameda Creek.

Water Supply/Demand Inventory

The water supply/demand inventory for ACWD in FY 2010/11, FY 2011/12, and FY 2012/13 is provided in Plates 11, 12, and 13, respectively. These plates show the total District water supplies and consumption in flow chart format.

GROUNDWATER COSTS AND FUNDING

Estimated Groundwater Costs

The District's groundwater program activities will require funds to: 1) purchase supplemental water; 2) provide for the capital costs of the District's groundwater recharge facilities; 3) fund the District's operation, maintenance, and engineering activities associated with groundwater replenishment and basin management; and 4) provide for administration of the replenishment assessment program. The estimated cost of the District's groundwater program is shown by major function in Table 5 for FY 2012/13.

Estimated Cost of FY 2012/13 Supplemental Water Supply

The cost of supplemental water for groundwater replenishment in FY 2012/13 is based on the recommended delivery of 1,500 acre-feet (Table 4) and the variable unit costs thereof, plus the share of State Water Project (SWP) fixed costs allocated to the groundwater basin.

The variable cost of SWP water delivered via the South Bay Aqueduct is $54.98 per acre-foot in 2012 and is expected to be $28.69 in 2013. The total annual cost of Lake Del Valle water is a flat amount of $1,800 regardless of the amount of water actually delivered. Application of these unit costs results in a total variable cost of $84,000. In order to reduce actual expenses for groundwater replenishment, any additional available water in Del Valle Reservoir that is not delivered to the treatment plants may be used in lieu of SWP water for groundwater recharge. Fixed SWP costs are anticipated to be $4,048,000. The combined fixed and variable SWP cost total of $4,132,000 will be largely offset by SWP tax revenue, which is projected to be $4,185,000 in FY 2012/13 (see Table 6).

TABLE 5

ESTIMATED GROUNDWATER COSTS*
FY 2012/13

Item			Cost $
FIXED OR CAPITAL COSTS			
State Water Project			4,048,000
Program Planning & Environmental Documentation			6,000
Interfacility Electrical and Control			6,000
Fish Screen & Fish Passage Facilities			341,000
Administrative Capital (Groundwater Portion)			143,000
Shinn Gravity Rediversion 2			200,000
Shinn Pit Rehabilitation			41,000
Pit T-2 Slope Rehabilitation			38,000
Vallecitos Channel Betterments			22,000
Monitoring Wells - Construction			72,000
Rubber Dam 1 - Fabric Replacement (13' High)			101,000
Rubber Dam 1 - Seismic Upgrades (Incl. Kaiser Embankment)			76,000
GW Supply Facilities Improv/ Equip Replacements			110,000
Recharge Facilities Control Electrification			80,000
GW Basin Reclamation and Protection Improvements			45,000
	Subtotal	**$**	**5,329,000**
EXPENSES			
State Water Project and Lake Del Valle			84,000
Supplemental Water Storage			357,000
Pits and Creek Maintenance and Diversion Pumping			318,000
Supervision, Labor and Expense			
1. Management of groundwater basin			819,000
2. Management of watershed and recharge facilities			1,370,000
3. Monitoring and analysis of groundwater			410,000
4. Monitoring and analysis of creek and pit water			232,000
5. Well Ordinance administration**			982,000
6. Water resources planning			172,000
7. Groundwater Protection Program			463,000
8. Local Oversight Program (LUFT/SLIC sites)			833,000
Aquifer Reclamation Program (excluding water supply)**			178,000
Replenishment Assessment and Meter Maintenance			128,000
Administrative and General Expense (Groundwater portion)			2,115,000
	Subtotal	**$**	**8,461,000**
	Total	**$**	**13,790,000**

* Includes only the non-growth component of costs associated with the management and replenishment of the groundwater basin. Growth and distribution system-related costs are not included herein. Capital costs other than State Water Project fixed costs are based on the adopted "ACWD 25-Year Capital Improvement Program, FY 2011/12 to FY 2035/36."

** Reflects net cost after permit and lease revenue considered.

Fixed and variable SWP costs appear in Table 5 as "State Water Project" (under the heading "Fixed or Capital Costs") and "State Water Project and Lake Del Valle" (under the heading "Expenses"), respectively. Water banking costs, including SWSD charges and SWP variable costs to 'deposit' additional water at SWSD, are not included in these SWP cost amounts. Instead, water banking costs appear in Table 5 as "Supplemental Water Storage." The amount of $357,000 is the portion of FY 2012/13 water banking costs allocated to the groundwater basin.

Groundwater Program Funding and Replenishment Assessment

In accordance with Section 7, Paragraph f, of the Replenishment Assessment Act, shown below is the rate of replenishment assessment required to be levied upon the production of groundwater to fund the estimated groundwater costs shown on Table 5 without consideration of other revenue sources.

Water Use	Acre-Feet (from Table 2)	Rate $/AF	Funds $
Agricultural and Municipal Recreation	1,000	8.00 (a)	8,000
Other than Agricultural and Municipal Recreation	24,300	567.16 (b)	13,782,000
		Required Total (from Table 5)	13,790,000

(a) Maximum rate fixed by AB 2052
(b) Computed to nearest 1¢

Historically, the District has used a combination of sources to fund groundwater costs. Table 6 shows the existing and proposed replenishment assessment rates and the corresponding amounts of the other currently utilized sources of groundwater program funds required for the total cost shown on Table 5. The recommended FY 2012/13 replenishment assessment rate (for production other than agricultural and municipal recreation) has been made with consideration that sources of revenue other than replenishment assessment will be available.

A 3% increase in the replenishment assessment rate for production other than agricultural and municipal recreation is recommended to generate sufficient revenue over the next several years in anticipation of groundwater-related projects scheduled in the Capital Improvement Program, as well as expected groundwater expenses. Additional rate increases may be necessary in FY 2013/14 and beyond, depending on revenues and costs actually realized, and updates of future projections. As indicated in Figure 4, the replenishment assessment rates were not increased from FY 1998/99 to FY 2007/08.

TABLE 6

GROUNDWATER PROGRAM FUNDING AND REPLENISHMENT ASSESSMENT
FY 2012/13

	Acre-Feet	Existing Rate $/AF	Revenue Funds $	Proposed Rate $/AF	Revenue/ Funds $
A. Replenishment Assessment Categories					
1. Agricultural and Municipal Recreation	1,000	8	8,000	8	8,000
Municipal, Industrial and Non-Municipal Recreation	24,300	256	6,220,800	264	6,415,200
B. Ad Valorem Taxes					
1. Portion of 1% Tax			3,819,000		3,819,000
2. State Water Project			4,185,000		4,185,000
C. Grants for Groundwater CIP			264,000		264,000
D. Annexation Fees			26,000		26,000
Total Groundwater Revenue			14,522,800		14,717,200
Total Groundwater Costs			13,790,000		13,790,000
Subtotal			732,800		927,200
Intra-Fund Transfer			(732,800)		(927,200)
Total			0		0

FIGURE 4
REPLENISHMENT ASSESSMENT RATES

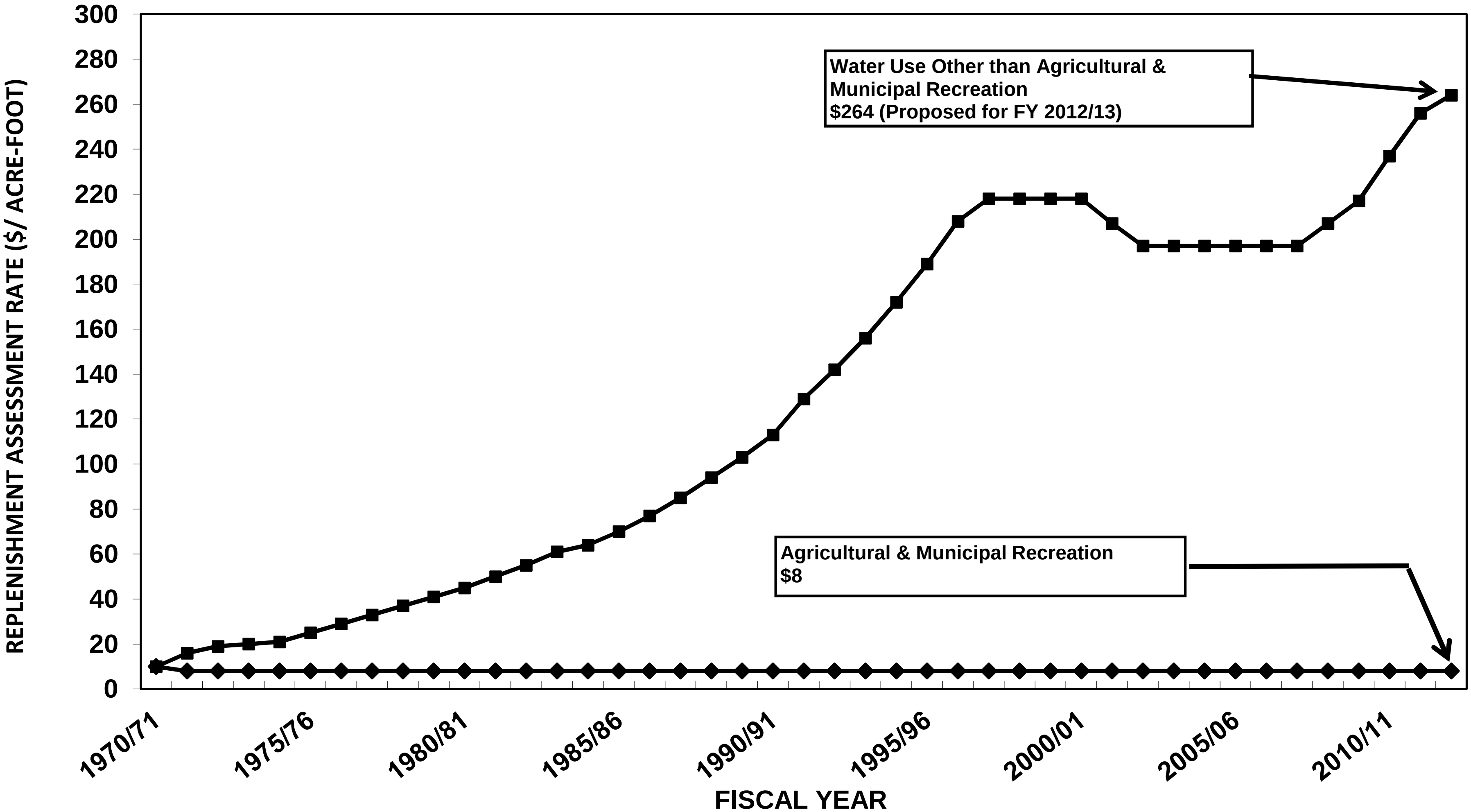
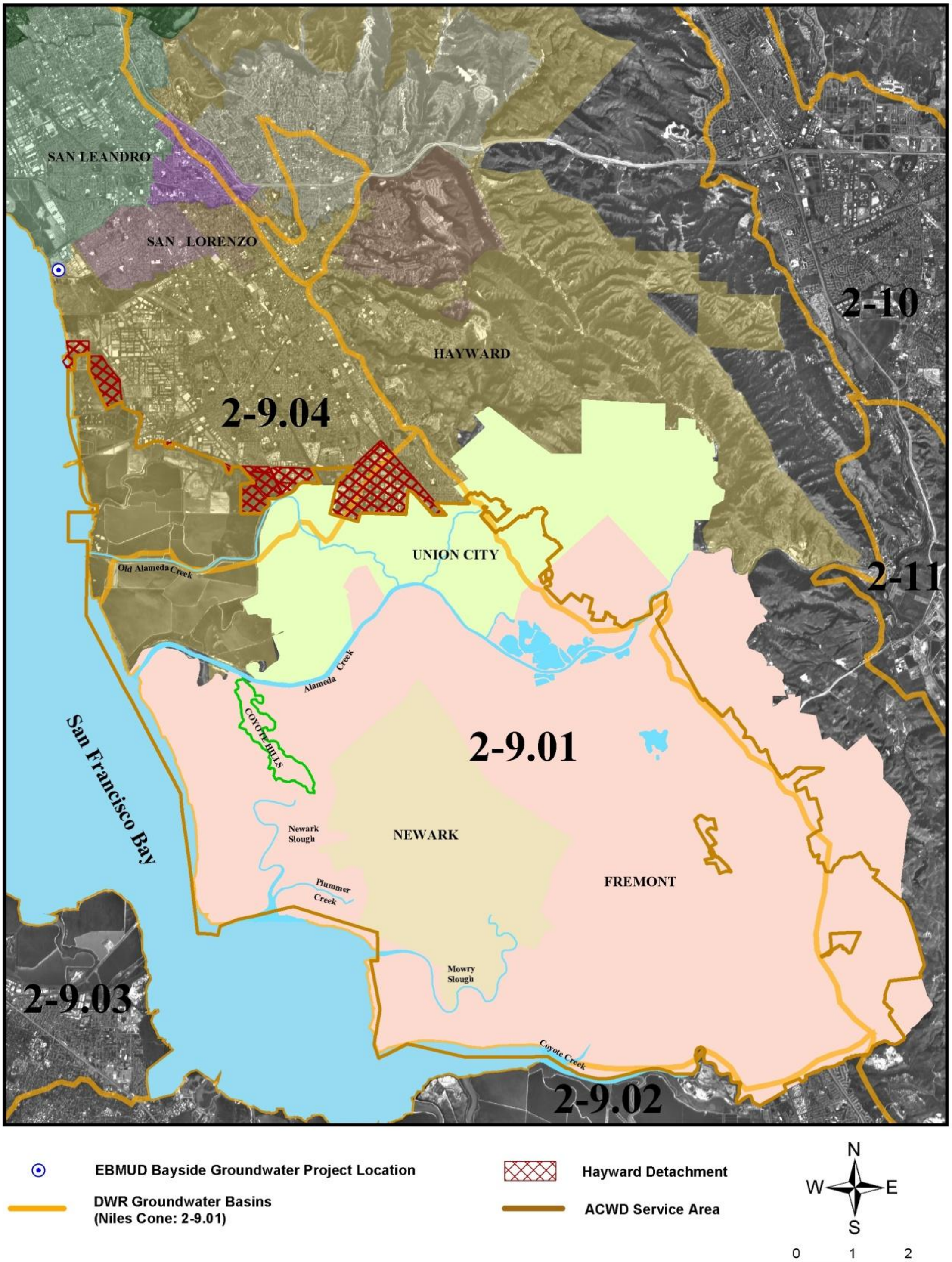
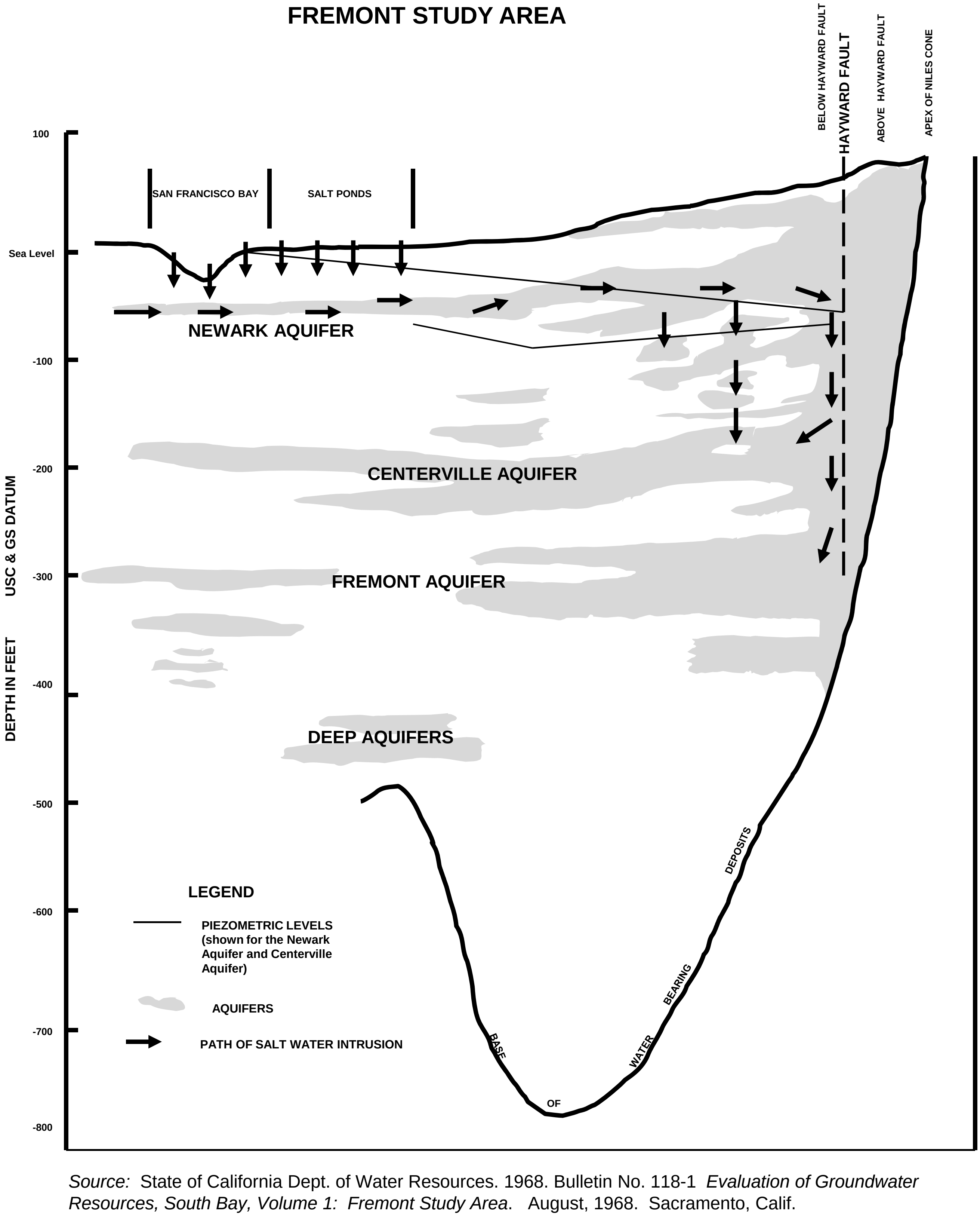


PLATE 1: LOCAL AGENCY BOUNDARIES



INTRUSION OF SALT WATER INTO THE FREMONT STUDY AREA



Source: State of California Dept. of Water Resources. 1968. Bulletin No. 118-1 *Evaluation of Groundwater Resources, South Bay, Volume 1: Fremont Study Area*. August, 1968. Sacramento, Calif.

PLATE 2

HISTORICAL WATER LEVELS IN THE NEWARK AQUIFER
(FOREBAY AREA)

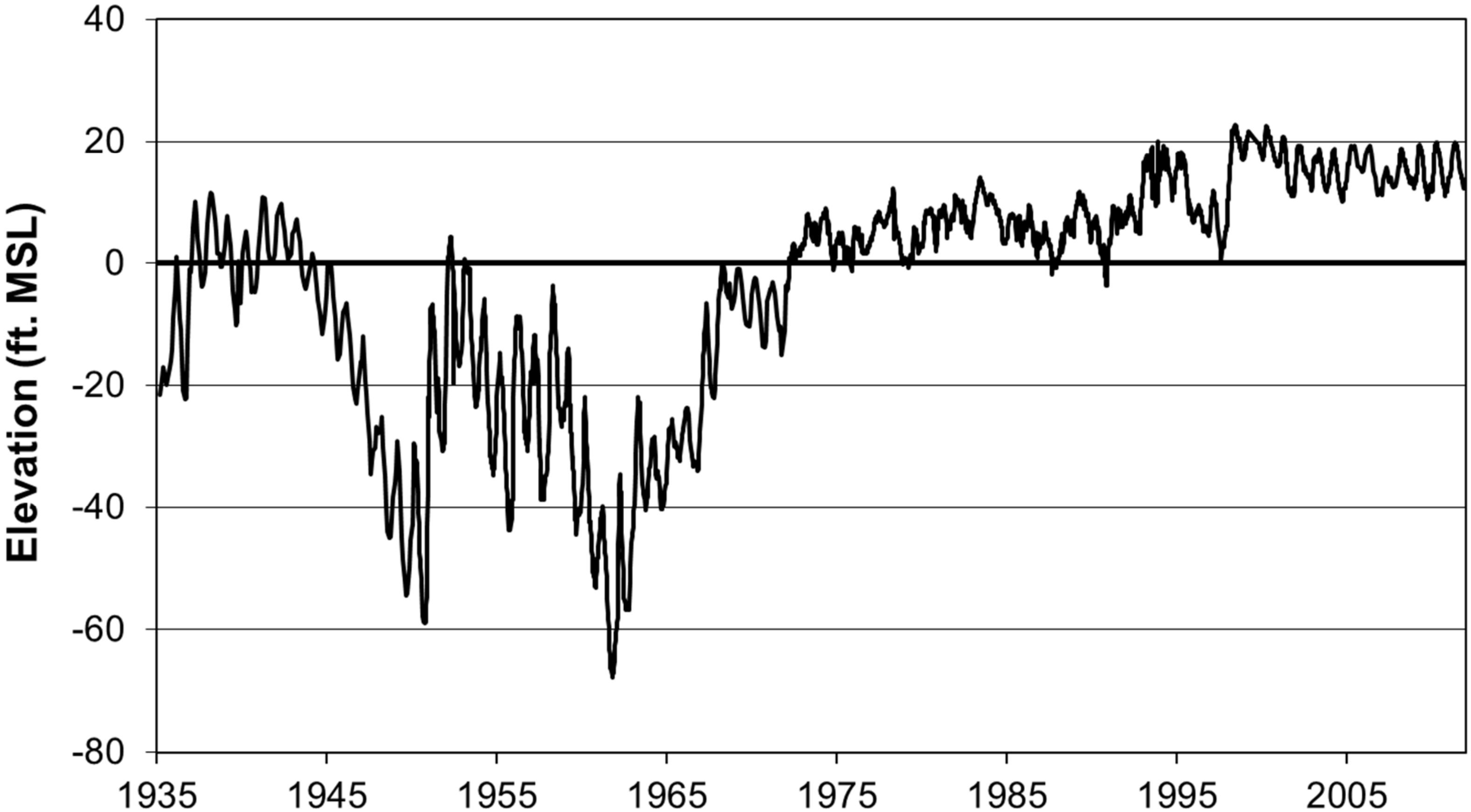
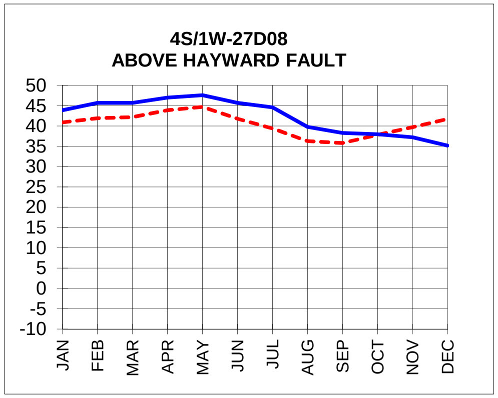
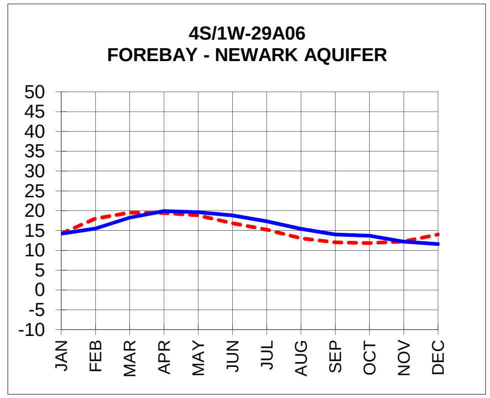
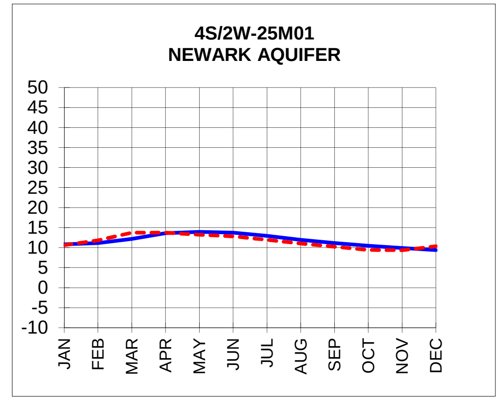
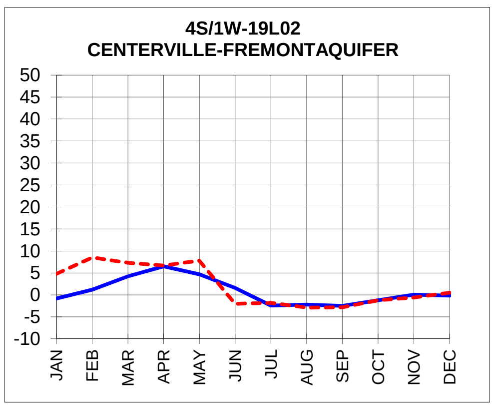


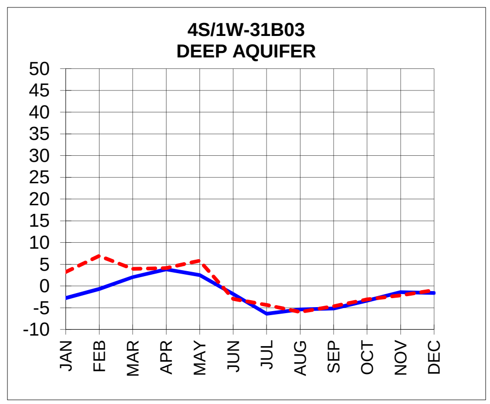
PLATE 3











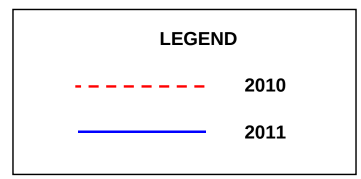
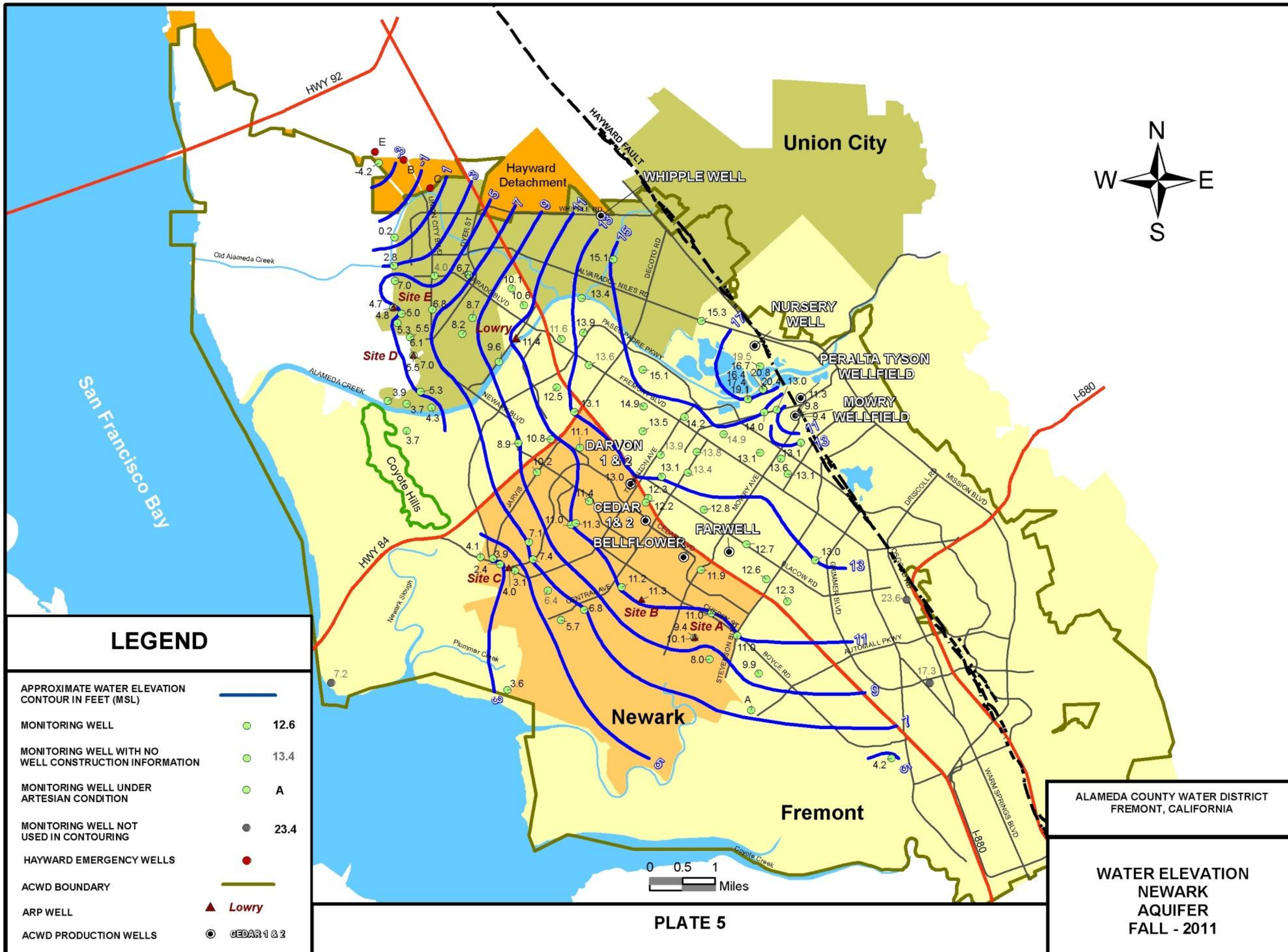


PLATE 4

ALAMEDA COUNTY WATER DISTRICT

GROUNDWATER BASIN MONTHLY ELEVATIONS

NEWARK (UPPER) AQUIFER	0' TO 200'
CENTERVILLE-FREMONT AQUIFERS	200' TO 350'
DEEP AQUIFERS	BELOW 350'



Union City
Hayward Detachment
Newark
Fremont
San Francisco Bay
Coyote Hills
HAYWARD FAULT
HWY 92
HWY 84
I-680
I-880
WHIPPLE WELL
NURSERY WELL
PERALTA TYSON WELLFIELD
MOWRY WELLFIELD
DARVON 1 & 2
CEDAR 1 & 2
FARWELL
BELLFLOWER
Site A
Site B
Site C
Site D
Site E
Lowry
Old Alameda Creek
ALAMEDA CREEK
Coyote Creek
Plummer Creek
Newark Slough
N
S
E
W
0 0.5 1 Miles
LEGEND
APPROXIMATE WATER ELEVATION CONTOUR IN FEET (MSL)
MONITORING WELL 12.6
MONITORING WELL WITH NO WELL CONSTRUCTION INFORMATION 13.4
MONITORING WELL UNDER ARTESIAN CONDITION A
MONITORING WELL NOT USED IN CONTOURING 23.4
HAYWARD EMERGENCY WELLS
ACWD BOUNDARY
ARP WELL Lowry
ACWD PRODUCTION WELLS CEDAR 1 & 2
PLATE 5
ALAMEDA COUNTY WATER DISTRICT
FREMONT, CALIFORNIA
WATER ELEVATION
NEWARK
AQUIFER
FALL - 2011

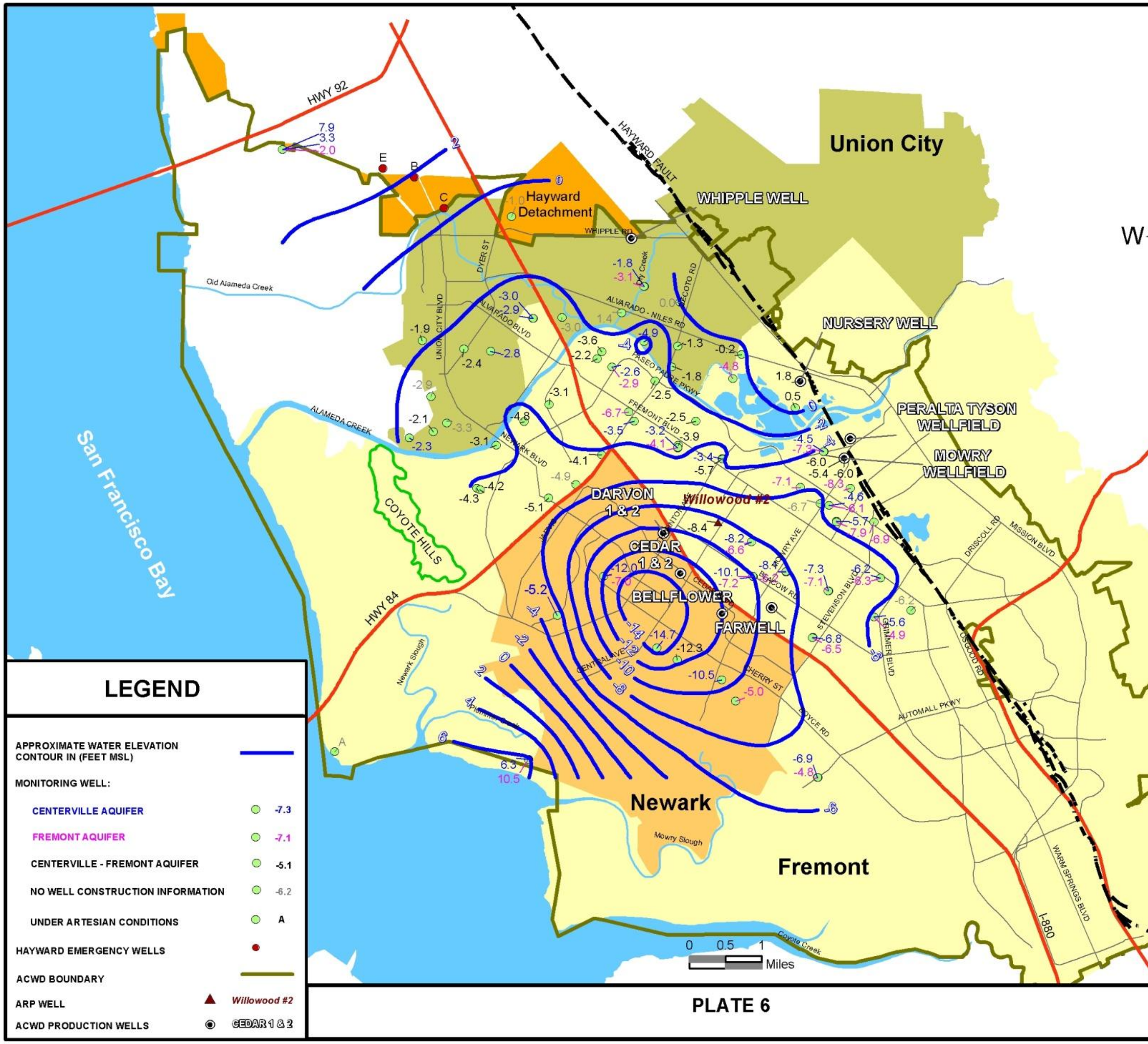
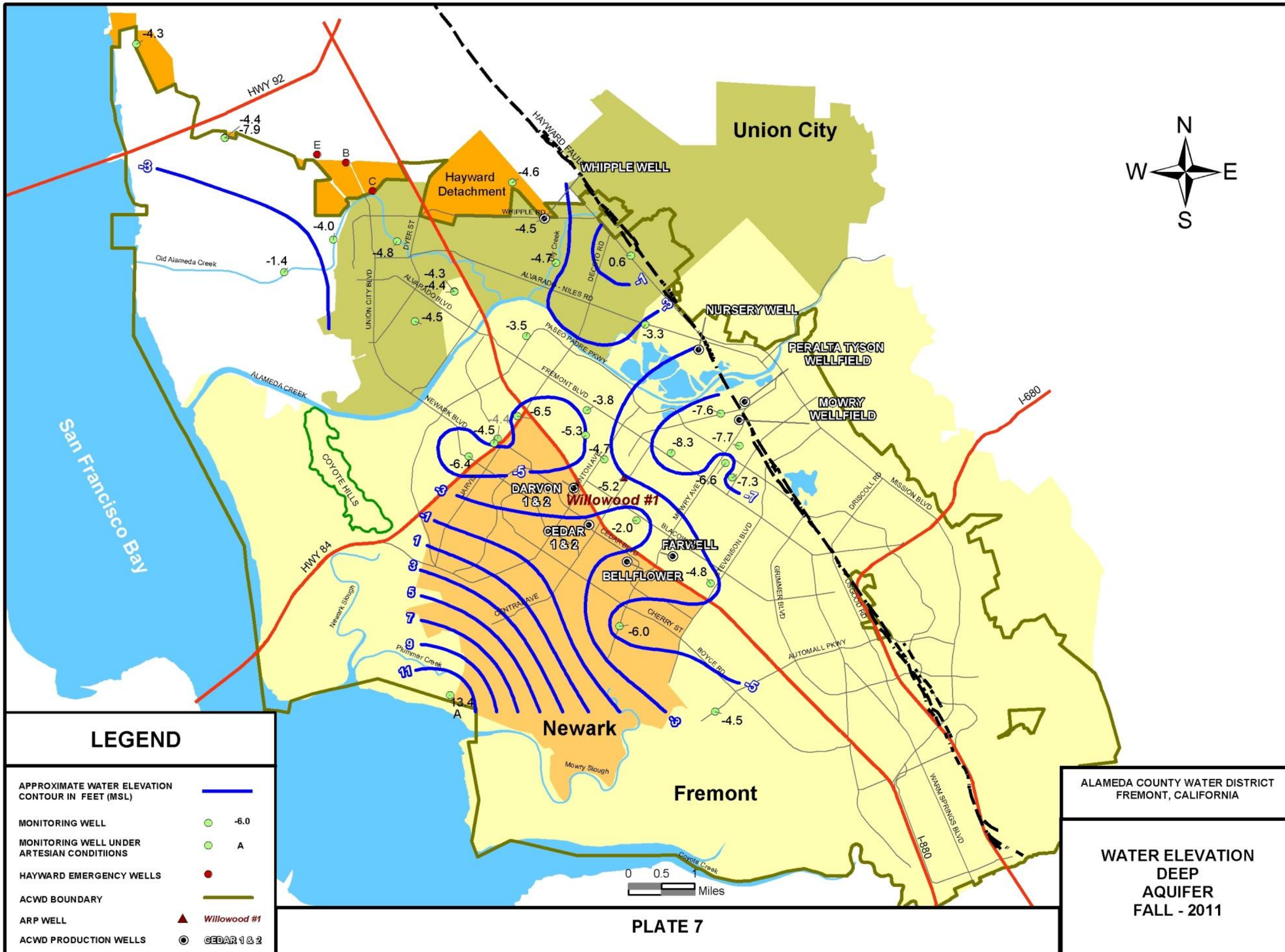
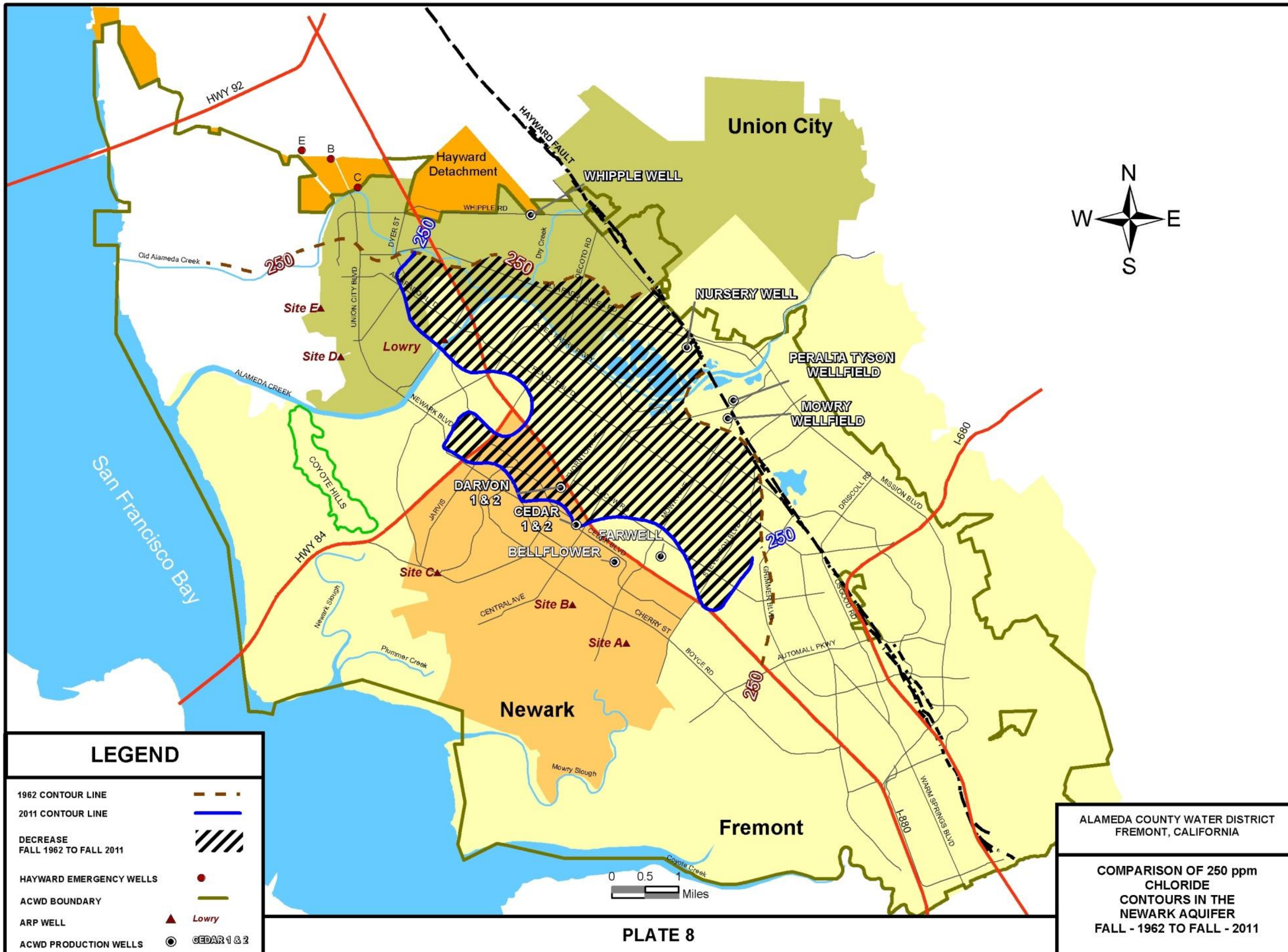


PLATE 6

ALAMEDA COUNTY WATER DISTRICT
FREMONT, CALIFORNIA

WATER ELEVATION CENTERVILLE - FREMONT AQUIFER FALL - 2011


Union City
Hayward Detachment
Newark
Fremont
San Francisco Bay
HWY 92
HWY 84
I-680
I-880
HAYWARD FAULT
WHIPPLE WELL
NURSERY WELL
PERALTA TYSON WELLFIELD
MOWRY WELLFIELD
DARVON 1 & 2
Willowood #1
CEDAR 1 & 2
FARWELL
BELLFLOWER
COYOTE HILLS
Old Alameda Creek
ALAMEDA CREEK
Newark Slough
Plummer Creek
Mowry Slough
Coyote Creek
WHIPPLE RD
DYER ST
UNION CITY BLVD
ALVARADO BLVD
ALVARADO - NILES RD
DECOTO RD
PASEO PADRE PKWY
FREMONT BLVD
NEWARK BLVD
JARVIS
THORNTON AVE
MOWRY AVE
CEDAR BLVD
BLACOW RD
STEVENSON BLVD
CENTRAL AVE
CHERRY ST
BOYCE RD
AUTOMALL PKWY
GRIMMER BLVD
OSGOOD RD
DRISCOLL RD
MISSION BLVD
WARM SPRINGS BLVD
N
W
E
S
0 0.5 1
Miles
LEGEND
APPROXIMATE WATER ELEVATION CONTOUR IN FEET (MSL)
MONITORING WELL -6.0
MONITORING WELL UNDER ARTESIAN CONDITIIONS A
HAYWARD EMERGENCY WELLS
ACWD BOUNDARY
ARP WELL Willowood #1
ACWD PRODUCTION WELLS CEDAR 1 & 2
PLATE 7
ALAMEDA COUNTY WATER DISTRICT
FREMONT, CALIFORNIA
WATER ELEVATION
DEEP
AQUIFER
FALL - 2011



ALAMEDA COUNTY WATER DISTRICT
FREMONT, CALIFORNIA

COMPARISON OF 250 ppm CHLORIDE CONTOURS IN THE NEWARK AQUIFER FALL - 1962 TO FALL - 2011

PLATE 8

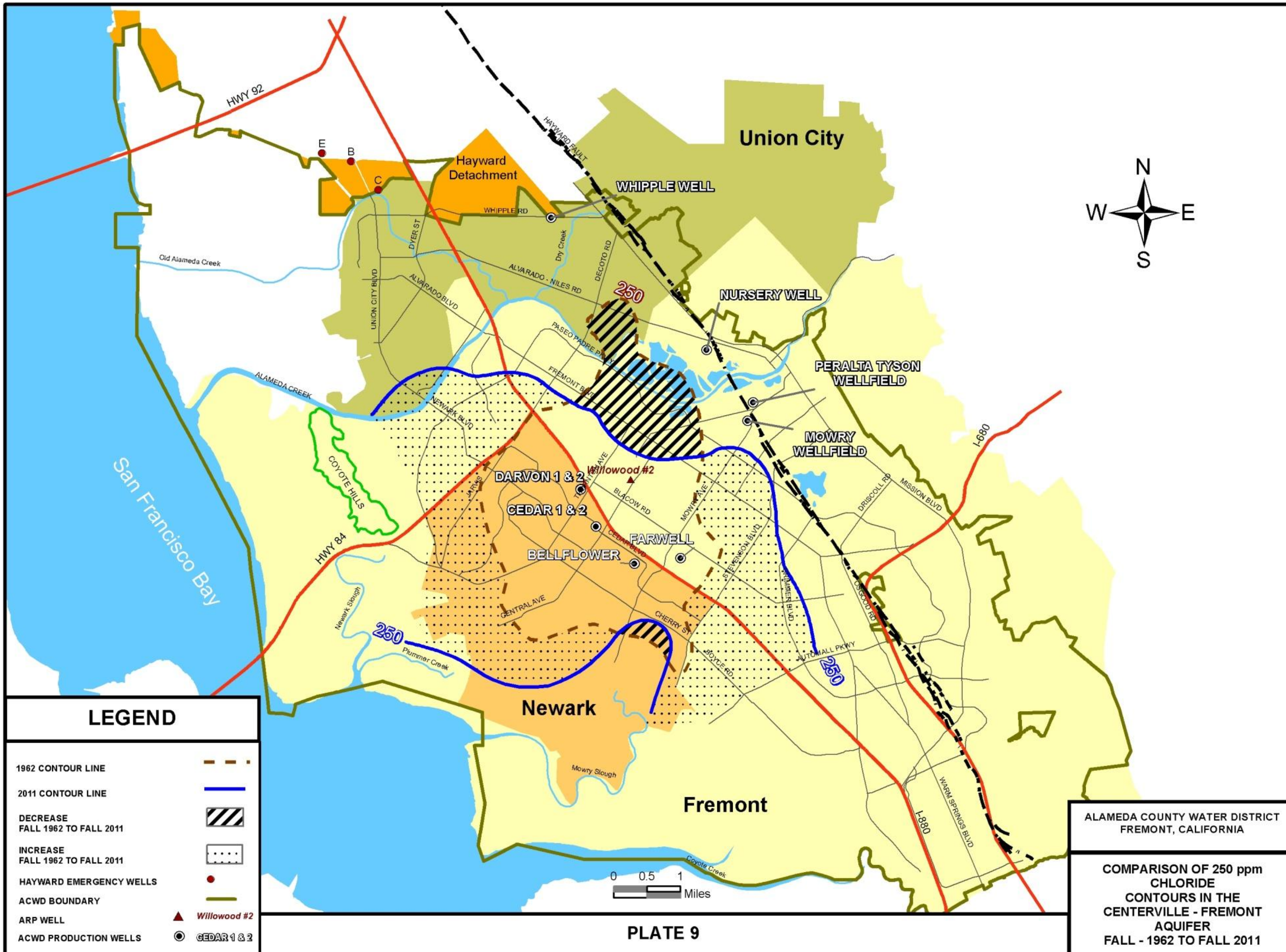


PLATE 9

ALAMEDA COUNTY WATER DISTRICT
FREMONT, CALIFORNIA

COMPARISON OF 250 ppm CHLORIDE CONTOURS IN THE CENTERVILLE - FREMONT AQUIFER FALL - 1962 TO FALL 2011

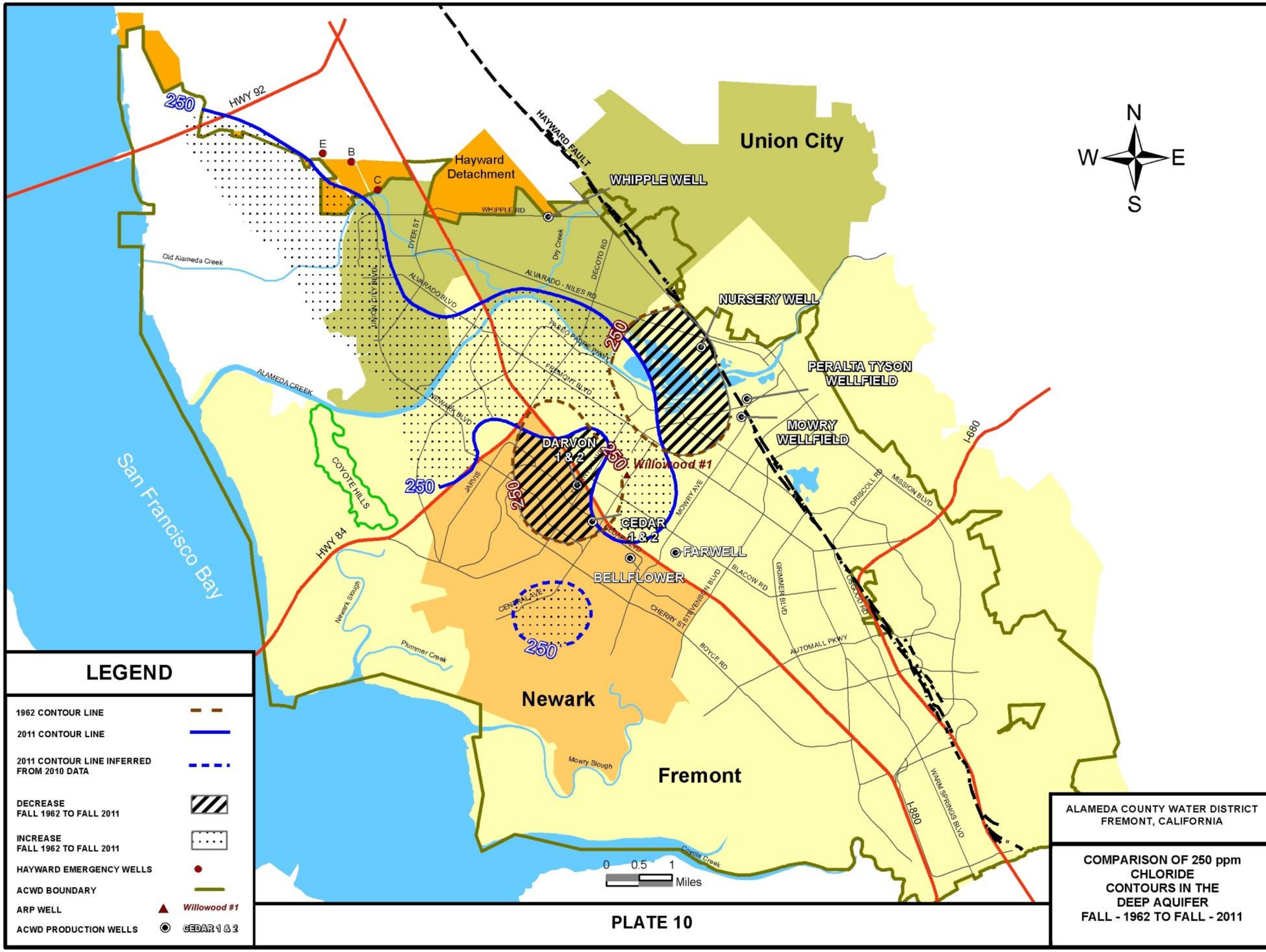


PLATE 10

ALAMEDA COUNTY WATER DISTRICT
FREMONT, CALIFORNIA

COMPARISON OF 250 ppm CHLORIDE CONTOURS IN THE DEEP AQUIFER FALL - 1962 TO FALL - 2011

ALAMEDA COUNTY WATER DISTRICT

WATER SUPPLY/DEMAND INVENTORY FY 2010/11 (ACTUAL)

(1000's OF ACRE-FEET)

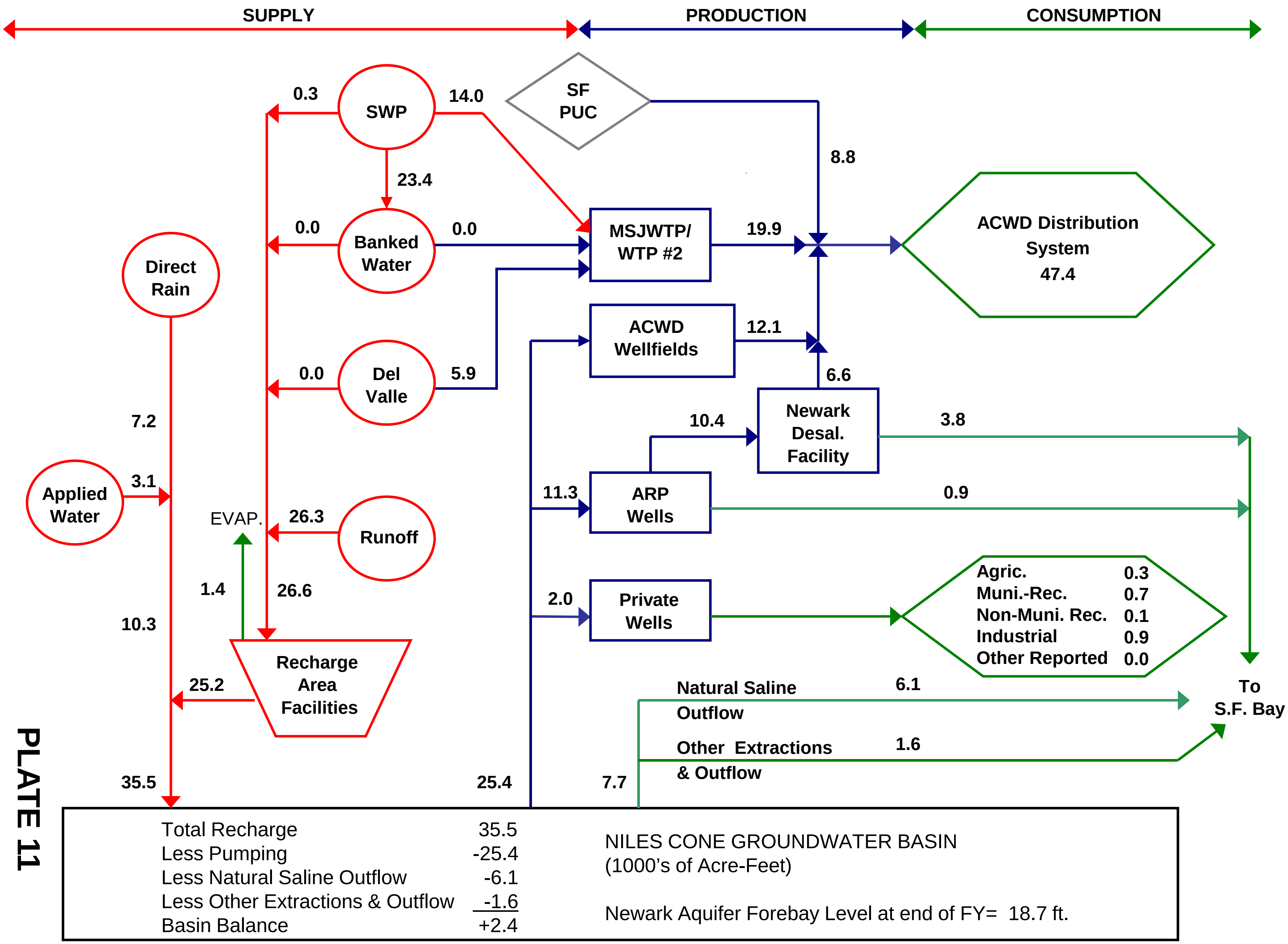


PLATE 11

ALAMEDA COUNTY WATER DISTRICT

WATER SUPPLY/DEMAND INVENTORY FY 2011/12 (FORECAST)

(1000's OF ACRE-FEET)

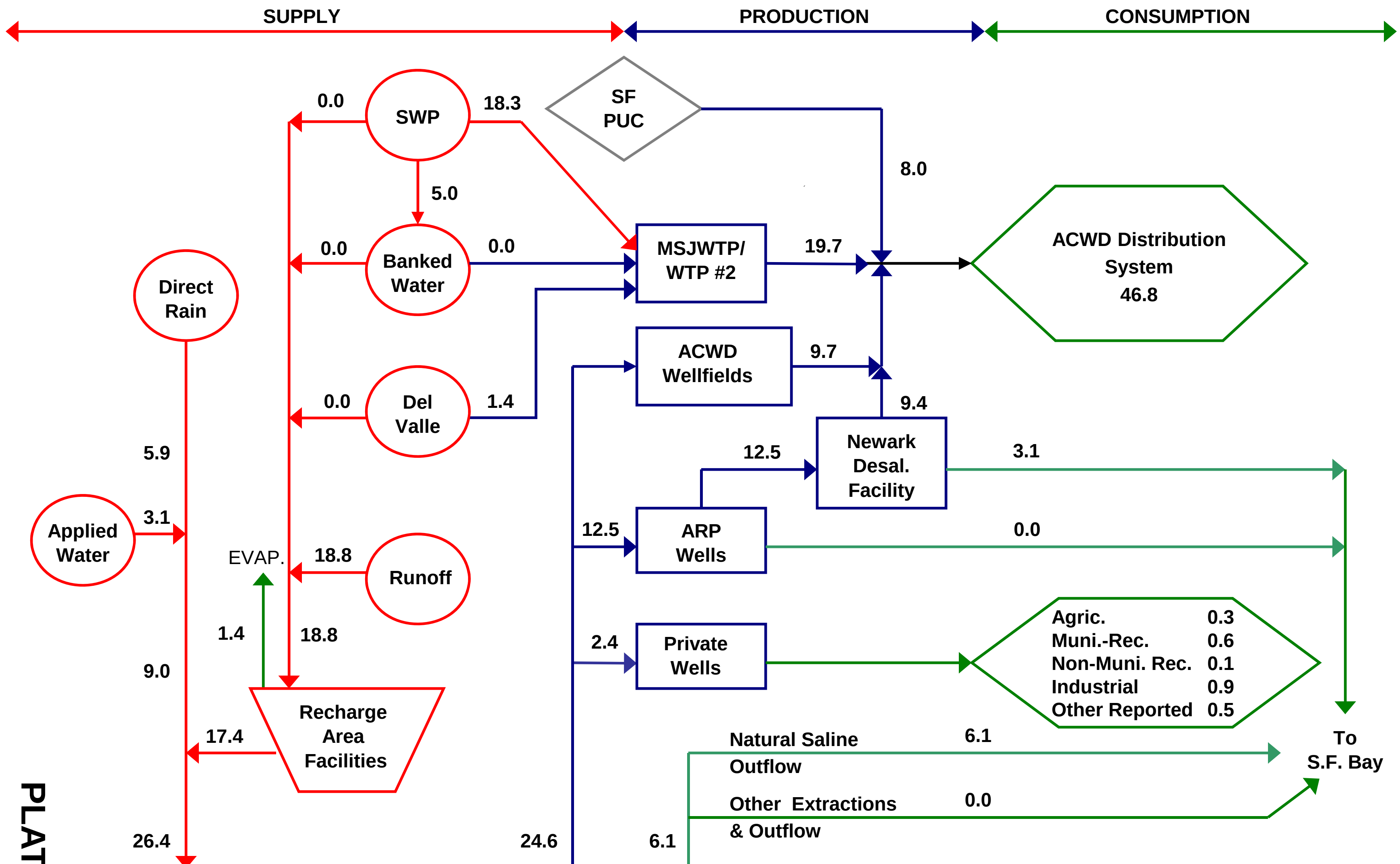


PLATE 12

Total Recharge	26.4
Less Pumping	-24.6
Less Natural Saline Outflow	-6.1
Less Other Extractions & Outflow	-0.0
Basin Balance	-4.3

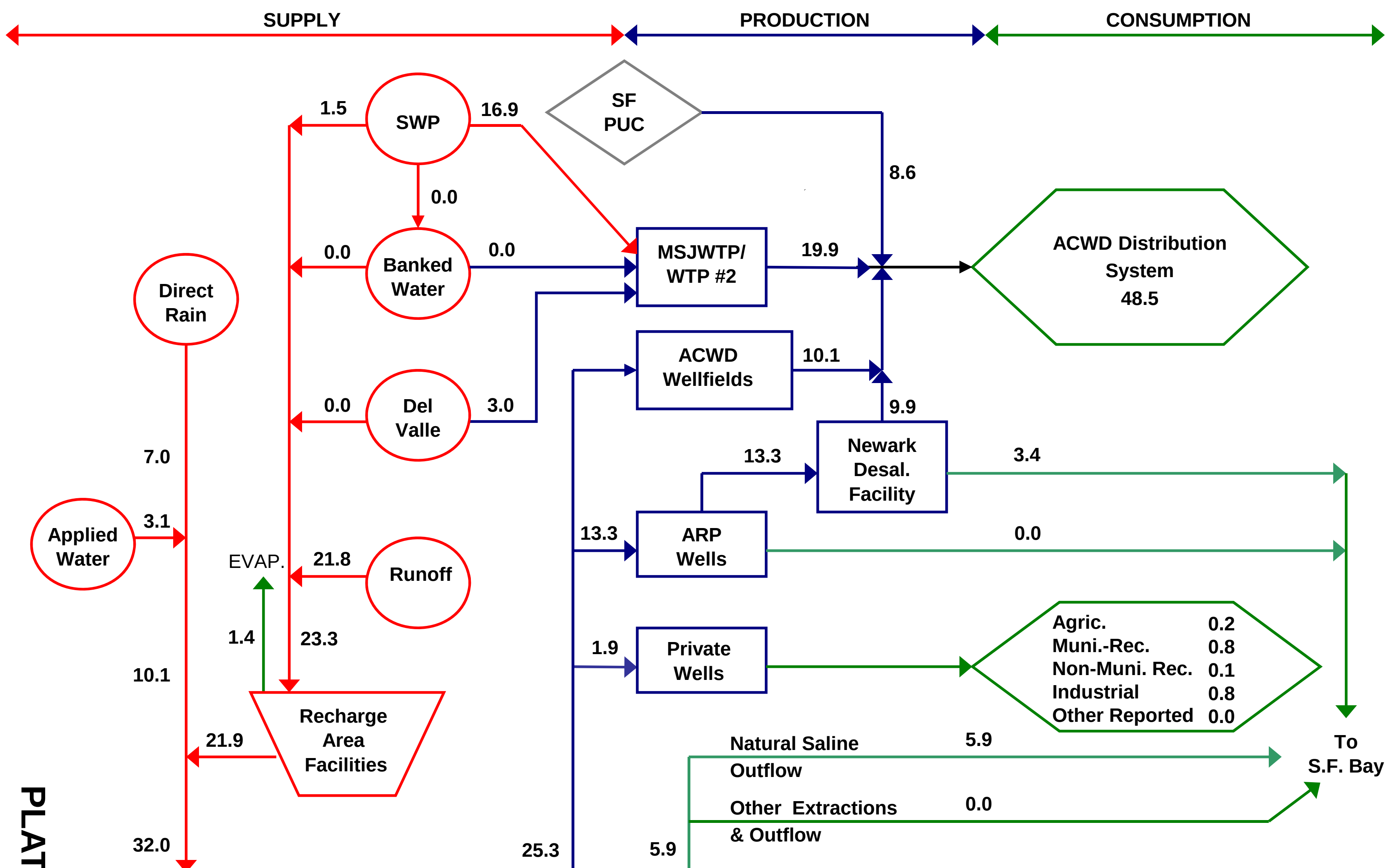
NILES CONE GROUNDWATER BASIN
(1000's of Acre-Feet)

Newark Aquifer Forebay Level at end of FY= 15 ft.

ALAMEDA COUNTY WATER DISTRICT

WATER SUPPLY/DEMAND INVENTORY FY 2012/13 (FORECAST)

(1000's OF ACRE-FEET)



Total Recharge	32.0	NILES CONE GROUNDWATER BASIN
Less Pumping	-25.3	(1000's of Acre-Feet)
Less Natural Saline Outflow	-5.9	
Less Other Extractions & Outflow	-0.0	Newark Aquifer Forebay Level at end of FY= 15 ft.
Basin Balance	+0.8	

PLATE 13