WATER SUPPLY ASSESSMENT FOR THE CITY OF VALLEJO

FINAL

Mare Island
Redevelopment Project

June 24, 2005

Provided by

BROWN AND CALDWELL

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SECTION 1

INTRODUCTION

This section discusses the purpose and scope of the water supply assessment for the Mare Island Redevelopment Project (Project) and provides a description of both the proposed redevelopment and the existing City of Vallejo (City or Vallejo) Water Systems.

1.1 Purpose and Scope of Water Supply Assessment

Senate Bill 610, now codified as Water Code sections 10910 and 10911, requires land use planning entities when evaluating certain large development and redevelopment projects to request an assessment of the availability of water supplies from the water supply entity that will provide water to the project. Such a water supply assessment (WSA) is performed in conjunction with the land-use approval process associated with the project and must include an evaluation of the sufficiency of the water supplies available to the water supplier to meet existing and anticipated future demands, including the demand associated with the project over a twenty-year horizon for normal, single-dry, and multiple-dry years.

The WSA must identify any existing water supply entitlements, water rights, or water service contracts held by the water supplier or relevant to the identified water supply for the proposed project, and include a description of the quantities of water received in prior years by the public water system.

1.2 Description of Proposed Redevelopment

The main vision of the Project is to restore Mare Island to the vitality that it brought to Vallejo through its 91 years of recognized significance. This vision includes a vital new place where people live and work within the context of a well-established, highly distinctive and historically significant fabric of buildings and landscape that balances economic development with preservation. The goals set forth for the Project as stated in the 1999 Specific Plan are as follows: 1). Create jobs and other economic development opportunities to sustain and improve the economic conditions in the surrounding areas. 2). Preserve and enhance the history of Mare Island. 3). Create a self-sustaining and multi community. 4). Ensure that the human services needed are easily accessible and available. The proposed Mare Island project consists of commercial, residential, and open space development as well as public improvements related to transportation and access to the island. Neighborhoods will provide a full range of land uses for Mare Island including employment, residential, commercial, recreation, and open space. The new development will preserve and expand the existing open space areas and will provide access to a regional and local populace. Access to Mare Island will be achieved through a balance between automobile, transit, bicycle, and pedestrian modes. Overall, the project will add up to 1,400 residential units and up to 9,047,000 gross square feet of space for commercial, office, education, recreation, and industrial use. Approximately 1,333,938 square feet of vacant storage, garages, bomb shelters, and miscellaneous navy base structures would be removed to

make way for the new Mare Island Redevelopment project. Figure 1-1 shows a map of the regional location of Mare Island and Figure 1-2 shows the general plan for the redevelopment project.

1.3 Description of Existing City of Vallejo Water Systems and Water Supply Facilities

There are currently two separate water systems: the City of Vallejo water system and Vallejo Lakes water system, collectively called the City of Vallejo Water Systems. The City of Vallejo is a public water supplier that purchases, treats, distributes and sells water in the City of Vallejo and unincorporated areas of Solano County. The City also provides potable water to the Vallejo Lakes water system, to the former Mare Island Naval Shipyard, and to Travis Air Force Base. The City of Vallejo distribution system currently serves the area encompassing the proposed Project area.

The City of Vallejo water system serves approximately 36,500 connections in the City of Vallejo and the adjacent western parts of Solano County, as of FY 2002/2003. The terrain in the service area is moderately varied with residential developments in canyon areas.

The Vallejo Water Systems utilize two water treatment plants--the Fleming Hill WTP and the Green Valley WTP. The Fleming Hill WTP will serve the proposed Project area.

The Fleming Hill WTP treats water that is supplied from the Sacramento River Delta and upstream catchment and delivered through the North Bay Aqueduct (NBA), Lake Berryessa (Solano Project), and Lake Curry (under anticipated conditions). The Fleming Hill WTP is the main water treatment facility for the City. The WTP uses preozonation, coagulation, flocculation, sedimentation, intermediate ozonation, filtration, and disinfection. A recent expansion program increased the design flow rate from 27 to 42 million gallons per day (mgd). The Fleming Hill WTP is the only plant which can supply water to customers within the City limits and included unincorporated areas within the City boundaries.

The Green Valley WTP was completed in 1998 with a capacity of 1.0-mgd and serves the Vallejo Lakes System. The Gordon Valley WTP is out of service and not currently operated. The area it once served was temporarily connected to the City of Fairfield's system, but is now served from the new Green Valley WTP. The Green Valley WTP can not be used to serve City of Vallejo residents or the Mare Island Development. It has a separate raw water lake supply and distribution system.

1.4 Description of Location and Climatology

Vallejo is located in the northern part of the San Francisco Bay area. Vallejo's climate is characterized by cool, rainy winters and warm, dry summers. Like the rest of the San Francisco Bay Area, the Vallejo region is classified as a Marine West Coast Climate type with Mediterranean characteristics. Summer maximum temperatures average in the low 80's, with summer minimums in the low 50's. Winter maximums are in the mid-50's, with minimums in the mid-30's (City of Vallejo, 1999). Sunshine is plentiful, and the annual precipitation averages 20 inches, with most of it falling

between November and May (Rains, Melton, and Carella, Inc., July 2001). The moderately hot and dry weather during the summer months results in moderately high water demand.

[Please see Figure 1-1 on the following page, 1-4.]

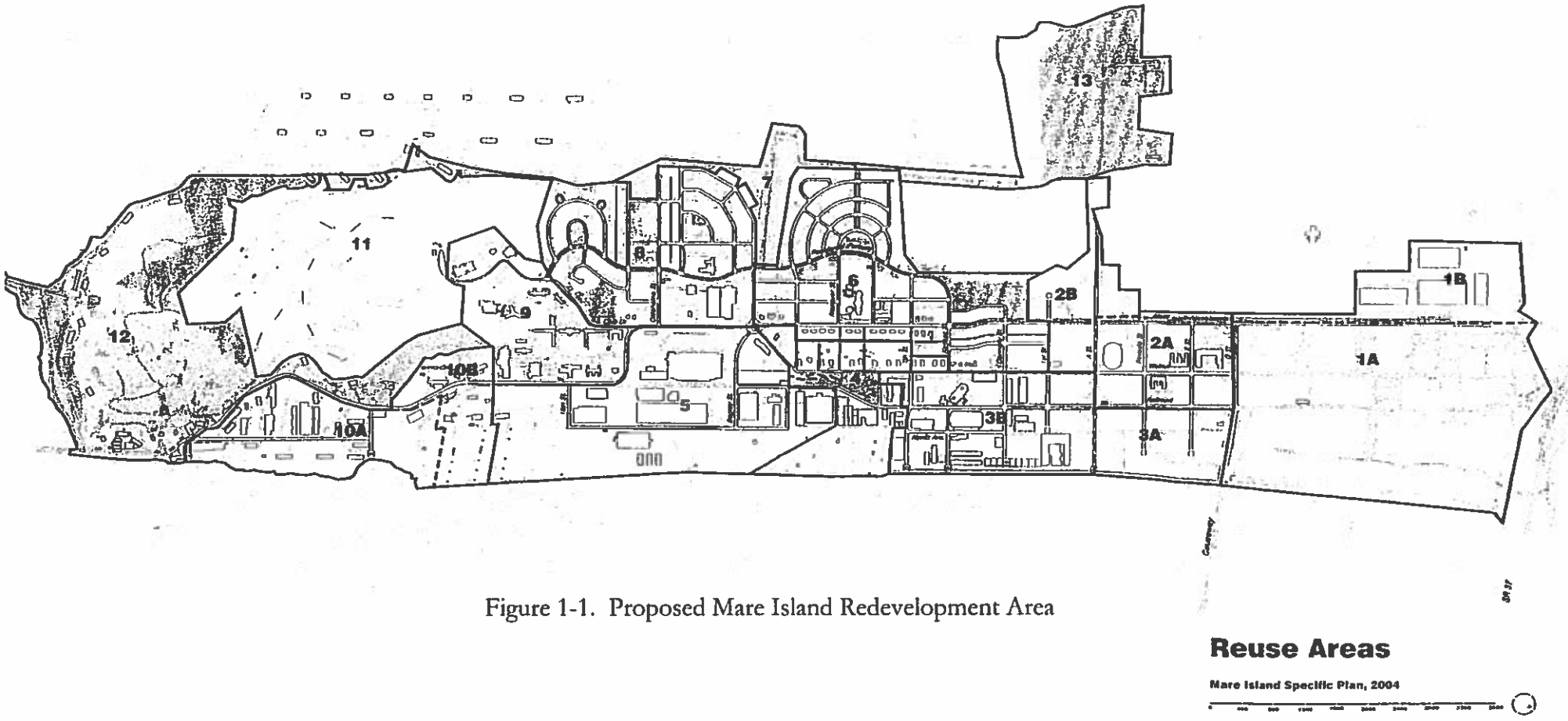


Figure 1-1. Proposed Mare Island Redevelopment Area

SECTION 2

WATER SUPPLIES

The City of Vallejo Water Systems currently uses surface water as their sole source of supply. The City of Vallejo water systems do not use any groundwater sources. The City brings surface water from four different sources into two treatment plants in order to serve customers in two different counties and on an active and former military base. This chapter describes the surface water supplies, as well as the historical, present and projected water supplies.

2.1 Surface Water Supplies

The City has five sources of surface water: Solano Project Water, State Water Project, Vallejo Permit Water, Lakes Frey and Madigan, and Lake Curry. This section describes these sources. Table 2-1 summarizes these surface water supplies including water entitlements of each surface water source in units of acre-feet per year.

Table 2-1. Surface Water Sources

Source	Water Entitlements (ac-ft/yr)	Remarks
State Water Project	5,600	SCWA[c]
Vallejo Permit Water[a]	17,200 (until 2005); 22,800 (2010 and beyond)	Water rights and conveyance control with SCWA
Solano Project Water	14,600	Entitlement from U.S. Bureau of Reclamation through SCWA
Lakes Frey and Madigan	400	City water rights
Lake Curry[b]	3,750 (2010 and beyond)	City water rights
Total	37,800 (until 2005); 47,150 (2010 and beyond)	

[a] Supply should increase from 17,200 ac-ft/yr in 2005 to 22,800 ac-ft/yr in 2010 and beyond, when agreements required to allow Vallejo's full conveyance of the 22,800 ac-ft/yr through the NBA should be in place.

[b] The City currently has a fully entitled water right to 3,750 ac-ft/yr of Lake Curry supplies. Such supplies are anticipated to be available to the City by 2009, when necessary conveyance facilities are intended to be constructed.

[c] SCWA = Solano County Water Agency.

State Water Project (SWP). State Water Project water is delivered from Lake Oroville through the Sacramento River to the North Bay Aqueduct (NBA) pumping facility at Barker Slough where it is pumped to the California Department of Water Resources (DWR) Forebay at Cordelia. SWP water may be diverted to supply Travis Air Force Base before reaching the DWR Forebay. From the DWR Forebay at Cordelia it is pumped by City facilities to the Fleming Hill Water Treatment Plant (WTP).

Vallejo Permit Water. Vallejo Permit Water is delivered from the NBA pumping facility at Barker Slough to the DWR Forebay at Cordelia. Vallejo Permit Water may be diverted to supply Travis Air Force Base before reaching the DWR Forebay. From the DWR Forebay at Cordelia it is pumped by City facilities to the Fleming Hill WTP. The 5,600 acre foot increase shown for 2010 reflects the entitlement of water purchased by City of Vallejo when the state water project was created. The City purchased an additional 17.10 cubic foot per second (cfs) capacity which translates to 22, 800 acre feet per year. Although the relevant contract correctly indicated that the City purchased 17.10 cfs additional capacity, a clerical contract error resulted in an incorrect annual delivery calculation of 17,200 ac-ft/yr, rather than 22,800 ac-ft/yr. This clerical error is recognized by the parties to the contract, who are actively working on a corrective contract amendment expected to be completed within three years.

Solano Project Water (SPW). Solano Project Water is delivered from Lake Berryessa via the Putah South Canal to the U. S. Bureau of Reclamation Terminal Reservoir in Cordelia. From Cordelia it can be pumped to the Fleming Hill WTP or via Solano Irrigation District's distribution facilities to the Green Valley WTP.

Lakes Frey and Madigan Lakes Frey and Madigan are located in northern Solano County. The City owns both lakes and the surrounding land. Water flows from Lake Madigan into Lake Frey and then into the diversion dam, from which the water continues to flow under gravity through a pipe into the Green Valley WTP located at the end of Green Valley Road. The water from these lakes is solely used by the Green Valley Plant, and the water rights are equal to the maximum plant capacity.

Lake Curry. Lake Curry is a future source for the City located in Napa County. The City owns the water rights but currently lacks a method of conveyance to immediately use the raw water impounded behind the dam. The City is actively investigating the most efficient use and in the process of EIR preparation to determine the preferred method of transportation of the water to a point usable by City of Vallejo customers. It is anticipated that this process may take up to five years to be finalized and the City water customers to regain beneficial usage of this water right.

Table 2-2 summarizes the projected annual water supply for normal climate years. The City, in conjunction with the Vallejo Sanitation and Flood Control District, has considered reclaimed water. While reclaimed, secondary-treated water is available, studies have repeatedly shown that its distribution would be cost prohibitive. In addition, no water supply loss due to water quality is anticipated and assumed for water planning purposes. Furthermore, no groundwater sources are or will be available.

Table 2-2. Projected Normal Water Year Water supplies, ac-ft/yr

Water supply	2005	2010	2015	2020	2025
Surface water	37,800	47,150	47,150	47,150	47,150
Groundwater	0	0	0	0	0
Recycled water	0	0	0	0	0
Water supply loss due to water quality	0	0	0	0	0
Total	37,800	47,150	47,150	47,150	47,150

2.2 Transfers and Exchanges

Table 2-3 provides a breakdown of the water transfers that have occurred in prior dry years per existing service agreements that the City maintains with American Canyon, Benicia, and Fairfield. Note that historically, these transfers have only been from the City to other wholesale agencies. Copies of these water transfer agreements will be provided upon request by the City. This section provides a discussion of these agreements.

Table 2-3. Water Transfers

From whom	To whom	1989 (ac-ft)	1991 (ac-ft)	1996 (ac-ft)	2001 (ac-ft)
City of Vallejo	American Canyon	0	0	0	500
City of Vallejo	Benicia	0	5,572	0	3,807
City of Vallejo	Fairfield	0	1,716	0	1,333
TOTAL	--	0	7,288	0	5,640

City of American Canyon. A water service agreement exists between the City of Vallejo and the City of American Canyon, dated May 1, 1996. The agreement gives American Canyon the right to purchase up to 1.0 mgd of potable water from Vallejo with possible additional capacity purchases. If available, American Canyon will supply its excess raw water entitlement to Vallejo at $75/acre-foot, which Vallejo shall treat and transmit to American Canyon. Existing Vallejo transmission facilities in American Canyon's water service area are available to wheel American Canyon raw water with reimbursement of costs.

Per Addendum No. 1 to the Water Service Agreement between the City of Vallejo and the City of American Canyon, dated July 18, 1996, American Canyon wants an alternative source of raw water to supply water for agricultural, golf course, and landscaping purposes. Vallejo agrees to sell raw water to American Canyon during emergencies, if available, such as a reduction in NBA entitlement, in quantities up to 500 acre-feet per year at a cost of 90 percent of what American Canyon charges their customers outside the city limit.

Per Addendum No. 2 to the Water Service Agreement between the City of Vallejo and the City of American Canyon, dated June 4, 1998, Vallejo agrees to sell and transfer 500 acre-feet of water entitlement to American Canyon from Vallejo's permit water for domestic use at a cost of $1,000 per acre-foot. American Canyon will transfer to the City of Calistoga 500 acre-feet of American Canyon's NBA entitlement. American Canyon will reimburse Vallejo for previously incurred capacity investments, and other costs associated with conveyance of the permit water. Restrictions on Vallejo's permit water will be passed along to American Canyon proportionally.

Per Addendum No. 3 to the Water Service Agreement between the City of Vallejo and the City of American Canyon, dated May 4, 2000, Vallejo agreed to provide and American Canyon purchased fire supply storage and fire supply flow to the Montevino Subdivision.

Per Addendum No. 4 to the Water Service Agreement between the City of Vallejo and the City of American Canyon, dated December 7, 2000, Vallejo will sell up to 250 acre-feet of Vallejo Permit water to American Canyon thereby allowing American Canyon to sell an equivalent amount of their water to Yountville. There are a number of agreements which must be reached before the sale can take place. The addendum can be voided if all conditions are not fulfilled by December 31, 2005.

City of Benicia. An agreement exists between the City of Vallejo and the City of Benicia relating to the limited term (18-year) purchase of water, dated March 5, 1992. Vallejo will make available to Benicia, before any other agency, up to 4,400 acre-feet on an annual basis at a cost of $220,000 firm and $75 (initially) per acre-foot usage. Notification to Vallejo is required by February 1 or Vallejo is free to sell or use the water as it chooses. This agreement was terminated by Benicia Council action in February 2004, thereby reverting the 4,400 ac-ft/yr entitlement to Vallejo control.

Per Amendment No. 2 to the 1962 Vallejo / Benicia Water Agreement, dated April 28, 1989, Vallejo is to deliver 1,100 acre feet per year. A service charge applies for usage exceeding 50 days per year. Treated water is sold to Benicia at Vallejo's outside-the-City-limit rate. Raw water from the Terminal Reservoir sells at a calculated charge of $37.53/ac-ft.

City of Fairfield. An agreement exists for temporary potable water service between the City of Fairfield and the City of Vallejo, dated March 20, 1992. Fairfield is to serve potable water to Vallejo's Lake System. Vallejo provides the raw water supply and pays for the cost of service (lease payment and user charge). Demand is not to exceed 1,120 acre-feet in 12 months.

Per an agreement for mutual water exchange or sale and temporary standby water service between the City of Fairfield and the City of Vallejo, dated May 4, 1993, Vallejo will provide surplus permit water to Fairfield at either an exchange rate of 2:1 for Solano Project water or at a price of $50/ac-ft

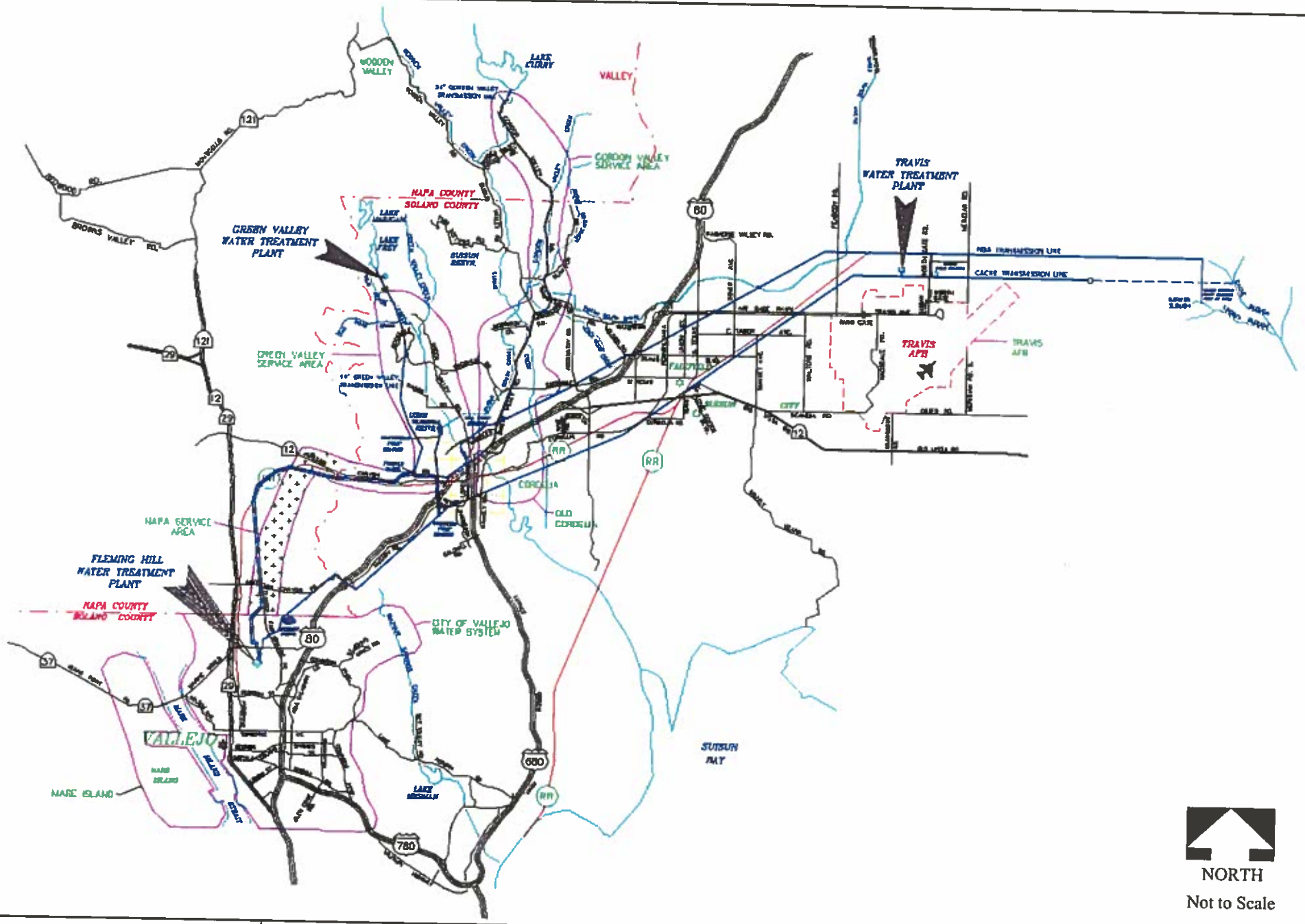
(initially). Fairfield will serve potable water into the Vallejo system. Raw water used will be added to Vallejo's Solano Project use. Vallejo will be charged for water service at Fairfield's in-city general service rate.

Per Amendment No. 1 to provide for mutual water exchange or sale and temporary standby water service between the City of Fairfield and the City of Vallejo, dated August 4, 1993, a second connection will be added through which Fairfield will serve potable water into the Vallejo system. Vallejo pays Fairfield a user charge if the connections are activated.

Figure 2-1 presents a map depicting the areas served by the water systems.

[Please see Figure 2-1 on the following page, 2-6]

P:\24000\24580 - Vallejo WSA\Graphics



NORTH

Not to Scale

B R O W N AND C A L D W E L L	DATE 7-18-03	SITE Water Supply Assessment, City of Vallejo, California	Figure 2-1
	PROJECT 24580-001	TITLE Water System Map	

SECTION 3

EXISTING AND PROJECTED WATER DEMANDS

This section describes the existing and projected housing and employment figures as well as historical and projected water demand.

3.1 Existing and Projected Demographics

This section describes the existing and projected housing and employment for the existing City of Vallejo Systems. These figures are based on information from the draft Environmental Impact Report (EIP Associates, 2004), the Vallejo Water Utility Financing Plan and Rate Study, and the City of Vallejo Buildout Estimates (Miering Contracting and Consulting, 2003). In addition, this section describes the projected housing and employment for the proposed Project.

3.1.1 City of Vallejo System Demographics

Housing and employment data were obtained from the City of Vallejo Buildout Estimates, which is presented by traffic zone. Figures 3-1 and 3-2 show the traffic zones that cover the City of Vallejo water system service area. Historical and projected housing and employment data are presented in Table 3-1.

Table 3-1. Housing and Employment Projections, Vallejo Water Systems

Customer category	2000	2005	2010	2015	2020 (buildout)	2025 (buildout)
City of Vallejo Water System[a]						
Single Family Residential, units	30,445[H]	31,540[EE]	32,634[EE]	33,729[EE]	34,823[BE]	34,823[BE]
Multi-Family Residential, units	12,629[H]	13,770[EE]	14,911[EE]	16,053[EE]	17,194[BE]	17,194[BE]
Residential, Total, units	43,074[H]	45,310[EE]	47,545[EE]	49,782[EE]	52,017[BE]	52,017[BE]
CIILGR, employees[b]	35,550[IE]	41,357[EE]	47,164[EE]	52,972[EE]	58,779[BE]	58,779[BE]
Vallejo Lakes System						
Single Family Residential, units[c]	778	803	828	853	878	900

[a] Miering Contracting and Consulting, 2003. Figures based on historical data, and the City of Vallejo Buildout Estimates for base year (1999) and 2020 (buildout); intermediate figures were linearly extrapolated. Figures for 2025 are assumed to be the same as for 2020 due to anticipated buildout by 2020. H = historical; IE = initial City of Vallejo Buildout Estimates; EE = extrapolated City of Vallejo Buildout Estimates; BE = buildout City of Vallejo Buildout Estimates.

[b] CIILGR = Commercial, industrial, institutional, landscaping, governmental, and recreational.

[c] Housing projections for the Vallejo Lakes service area is calculated based on 778 residential connections, at a growth rate of 5 connections/year up to a capacity of 900 connections, per the City of Vallejo Water Utility Financing Plan and Rate Study, Table 2.11, and the City of Vallejo, Utilities Division, Water Department.

3.1.2 Proposed Project Demographics

Housing and land use data developed in the Mare Island Specific Plan were used to develop estimates for this study of the future Project water use. The build out demographics for the redevelopment are shown in Table 3-2.

Table 3-2. Proposed Mare Island Redevelopment

	Single family units	Mult-family units	Office/R& D (kgsf)	Light Industrial (kgsf)	Retail (kgsf)	Ware-house (kgsf)	Heavy Industrial (kgsf)	Educational/ Civic (kgsf)
Buildout	870	530	1,618	2,225	508	1,400	2,050	1,226
Demolition	0	0	0	0	0	0	0	0
Net	870	530	1,618	2,225	508	1,400	2,050	1,226

Source: Tables 3-2 and 5-1, Mare Island Specific Plan, Administrative Draft, May 2004.
kgsf = thousand gross square feet.

3.2 Historical Water Use and Demands

Records of historical annual water production were obtained from the City. Water production is the volume of water measured at the source, which includes all water delivered to residential, commercial, and public authority connections, as well as unaccounted-for water. For the purposes of this Plan, four categories of water users have been identified: (1) single family residential; (2) multi-family residential; (3) commercial, industrial, institutional, landscaping, governmental, and recreational (CIILGR); and (4) other. Note that the City supports minimal agricultural or manufacturing uses. This section discusses how the unit water use factor method was used to estimate demand for the CIILGR category. In addition, this section will also explain why the City believes that the use of previously-established, more conservative unit water use factors, in lieu of using gross average historical unit water use factors, is appropriate for single family and multi-family units in determining the residential demand projections. This section will also elaborate on the definition of "other users," which consists of unbilled metered use and unaccounted-for water use, and miscellaneous water use.

3.2.1 Annual Water Production

Table 3-4 presents historical annual and maximum day water use from 1985 to 2004 for the Fleming Hill (e.g., City of Vallejo) water system. Historical annual and maximum-day water use records for the remainder of the City of Vallejo water systems were not available. Due to known inaccuracies of State Water Project meters and billings, the City does not have an accurate method of determining the amount of water actually received from its water supplies. However, such information can be determined by reference to the annual water production at the City's Fleming Hill WTP, which is accurately recorded. These annual production figures are particularly representative of the amount of water received by the City from its wholesale water suppliers because of the lack of significant

raw water users of City's untreated supplies. Furthermore, the City is reluctant to rely on the incomplete water records of its wholesale water suppliers because such reliance may under-represent actual historical water usage.

Table 3-3. Historical Water Production
Fleming Hill Water System

	Annual average		Maximum day	
Year[a]	ac-ft/yr	mgd	mgd	Peaking factor[b]
1985	19,291	17.23	29.2	1.69
1986	20,467	18.28	29.1	1.59
1987	21,127	18.87	30.9	1.64
1988	22,146	19.78	29.3	1.48
1989	22,617	20.20	33.4	1.65
1990	21,732	19.41	27.9	1.44
1991	21,990	19.64	28.4	1.45
1992	21,183	18.92	29.5	1.56
1993	19,851	17.73	29.6	1.67
1994	17,981	16.06	24.8	1.54
1995	19,437	17.36	28.0	1.61
1996	18,709	16.71	26.0	1.56
1997	20,254	18.09	28.0	1.55
1998	19,090	17.05	29.0	1.70
1999	20,433	18.25	31.0	1.70
2000	20,814	18.59	28.0	1.51
2001	20,377	18.20	28.0	1.54
2002	20,736	18.52	29.4	1.59
2003	20,242	18.51	30.1	1.63
2004	20,545 (est.)	18.10 (est.)	28.8	1.59

[a] Water Year March through February

[b] Maximum day peaking factor = maximum-day demand/annual average day demand.

3.2.2 Unit Water Use

Current water demand, housing and employment data are used by this assessment to derive the unit water use factors for the following types of water use categories: (1) single-family residential; (2) multi-family residential; and (3) CIILGR. Future single-family and multi-family residential water needs have been determined using the projections for single-family or multi-family residential dwelling units, as appropriate, within the City's service area, coupled with a unit water use factor per single-family or multi-family dwelling unit, respectively. Since the City does not have specific geographical data and building size records to correlate with gross calculated historical per unit usage rates, a conservative factor of safety of 33 percent has been added to historical averages to adequately account for the future water needs of SFR and MFR units (although this factor of safety likely over-estimates actual future demand). CIILGR future water needs have been determined using projections for employees within the City area, coupled with a unit water use factor per

employee. Studies show that a good correlation exists between the projected number of employees and the CIILGR water demand (California Urban Water Agencies, 1992). In the Solano Transportation Authority Travel Model, a conversion factor from non-residential floor space to employee counts is provided for each CIILGR category (see Appendix C). Note that, due to the lack of production data for the entire Vallejo Water Systems, this assessment relies on the production data for the City of Vallejo system (i.e. Fleming Hill water system alone) as a surrogate for calculating estimated unit water use factors. By eliminating the Lakes System, which is geographically isolated and primarily serves only residential uses, a more accurate data set was developed for use in this assessment.

The historical billing data for FY 2000-2001 are used by this assessment to derive estimates for unit water use factors for the CIILGR category. Per unit multi-family residential MFR water use is projected to be 89 percent of the calculated gross historical single family residential SFR water use average. This differential is consistent with that calculated within the most recent Water Master Plan hydraulic design calculations. A summary of the unit water use factors used are presented in Table 3-4. Detailed calculations may be found in the Draft 2005 UWMP (Brown and Caldwell, 2005).

3.2.3 Non-billed Metered Water Use

In addition to usage recorded in the billings data, there exists some non-billed metered water use at select City locations which are not recorded in the usage database. Non-billed metered use has been determined to comprise of approximately 12 percent of the total water are not in 2000 (or 2.2 mgd). Ongoing conversion of non-billed accounts to metered, billed accounts will create incentives for best management water use practices to be implemented. These changes are expected to reduce non-billed, non-collected metered usage figures to about 7 percent of total metered usage, or 1.7 mgd, by 2025.

3.2.4 Unaccounted-for Water

Unaccounted-for water use is unmetered water use such as from fire protection and training, system and hydrant flushing, sewer cleaning, construction, system leaks and breaks, and unauthorized connections. Unaccounted-for water can also result from meter inaccuracies. As estimated by the City Utilities Department, Water Division, approximately 10 percent of total water use consists of unaccounted-for water. However, enhanced metering programs at City connections and water auditing programs are underway, in addition to a large meter replacement project to assure greater accuracy for major users. By 2025, it is anticipated that unaccounted-for water will gradually drop to about 6 percent of total metered use, or 1.4 mgd.

3.2.5 Miscellaneous Water Use

Miscellaneous water use consists of raw water use at golf courses. Historically, the Hiddenbrooke Golf Course and the Blue Rock Springs East and West Golf Course use 270 million gallons (826 ac-ft) per year. It is anticipated that this demand for raw will remain constant through 2025.

3.2.6 Proposed Project Unit Water Use

The unit water use factors and conversion factors used to estimate project demands are presented in Table 3-4. The residential unit water use factors (single-family and multi-family dwelling unit) are obtained from historical billing data for FY 2000-2001 from the Vallejo Water Utility Financing Plan and Rate Study (Rate Study) using the methodology outlined in Section 3.2.2. Employee unit water use factors were calculated based on actual non-residential usage per the Rate Study and employee counts per the City of Vallejo Buildout Estimates. The Solano Transportation Authority Travel Model also provided conversion factors to convert square footage by land use category to employee counts.

Table 3-4. Conversion[a] and Unit Water Use Factors for the City of Vallejo Water Systems and Proposed Project [b]

Classification	Conversion or unit water use factor[c]
Single-Family Dwelling Unit[d]	387 gpd/unit
Multi-family Dwelling Unit[e]	345 gpd/unit
Employees	102 gpd/employee
Office/R&D	3.32 employees/kgsf
Light Industrial	2.31 employees/kgsf
Retail	2.85 employees/kgsf
Warehouse	1.28 employees/kgsf
Heavy Industrial	2.31 employees/kgsf
Educational/Civic	3.32 employees/kgsf

a Conversion factors to employee counts were obtained from the Solano Transportation Authority Travel Model..
b Unit water use factors were obtained from the Water Master Plan (Kennedy Jenks, 1985),and developed in the Draft 2000 Urban Water Management Plan (Brown and Caldwell, February 2005).
c gpd = gallons per day; kgsf = thousand gross square feet
d Single-Family unit water use factor derived as follows: Safety factor of 1.33 x [2000-2001 single-family usage of 4,188,303 ccf x (2.05 gpd/ccf)] / 29,486 single-family connections = 387 gpd/unit.
e Multi-Family unit water use factor derived as follows: 89% x [Single-Family unit water use factor] = 345 gpd/unit. The 89% differential between multi-family and single-family unit water use factors is consistent with that calculated within the most recent Water Master Plan design usage calculations.

3.3 Projected Water Demands

This section describes the projected water demands for the Vallejo Systems. In addition, this section describes the projected water demands for the proposed redevelopment.

3.3.1 City of Vallejo Water Systems Projected Water Demands

Water demands through the year 2025 were estimated based on the unit water use factors presented in Table 3-4, the housing and employment projections presented in Table 3-2, a sliding percentage of total metered usage as unaccounted-for water, and a decreasing percentage of total metered usage as non-billed metered water use. Detailed calculations for the derivation of these demand figures are presented in Appendix B. These demand projections are shown in Table 3-5 and Table 3-6. For the purposes of this WSA, it is assumed that these demand projections include the demands due to the proposed project.

Table 3-5. City of Vallejo Water Systems Projected Annual Water Demands, mgd[a]

	2000	2005	2010	2015	2020	2025
Fleming Hill system	19.38	20.45	21.65	21.60	24.37	24.37
Vallejo Lakes system	0.28	0.29	0.30	0.31	0.32	0.33
Total	19.65	20.74	21.96	21.91	24.69	24.70

[a] These figures include "unaccounted-for" water as described in Section 3.2.3.

[b] The Vallejo Lakes system uses the full 400 ac-ft/yr of the supply from Lakes Madigan and Curry with no surplus.

Table 3-6. City of Vallejo Systems Total Projected Water Demands

	Annual average		Maximum day[a]
Year	ac-ft/yr	mgd	mgd
2000	22,240	19.65	31.45
2005	23,470	20.74	33.18
2010	24,840	21.96	35.13
2015	24,790	21.91	35.06
2020	27,930	24.69	39.50
2025	27,940	24.70	39.51

[a] Assuming Peaking Factor = 1.6

3.3.2 Proposed Projected Water Demands for the Project

Water demands through the year 2025 were estimated based on the unit water use factors (see Table 3-5) and the demographic estimates for the redevelopment (see Table 3-3). For a detailed analysis of the conversion from land use (in terms of gross square feet) by land use category to

employee counts, upon which the CIILGR unit water use factor is based, refer to Appendix C. These projections are shown in Table 3-8 and Table 3-9. The projected annual water demands are based on the assumption that the redevelopment will be completed by 2005. The actual completion date is planned for mid 2005 (Lennar Mare Island Website). The assumption of a slightly premature build out date ensures a conservative (high) annual water demand estimate in each year prior to the actual build-out date.

Table 3-7. Proposed Mare Island Redevelopment Projected Annual Water Demands by User Type, mgd[a]

Category	2005[c]	2010	2015	2020	2025
Single Family Dwelling Unit	387 gpd/unit x 870 units x 1 million/10^6 = 0.34				
Multi-family Dwelling Unit	345 gpd/unit x 530 units x 1 million/10^6 = 0.18				
CIILGR[b]	102 gpd/employee x 22,557 employees x 1 million/10^6 = 2.30				
Total	0.34 + 0.18 + 2.30 = 2.82				

[a] For the sake of simplifying this calculation, a premature build-out date of 2005 is assumed to ensure a conservative (high) estimate of the water demand estimate in each year prior to the actual build-out date.

[b] CIILGR = Commercial, industrial, institutional, landscaping, governmental, and recreational. See Appendix C for a full derivation of this figure.

Table 3-8. Proposed Mare Island Redevelopment Total Projected Water Demands

	Annual average		Maximum day[a]
Year	ac-ft/yr	mgd	mgd
2005	3190	2.82	4.51
2010	3190	2.82	4.51
2015	3190	2.82	4.51
2020	3190	2.82	4.51
2025	3190	2.82	4.51

[a] Assuming Peaking Factor = 1.6

3.3.3 Proposed Projected Water Demands for Projects to Date

The projected demands of all redevelopment projects to date, including this Project and the Vallejo Station and Downtown Redevelopment Project, are shown in Table 3-9. The combination of

pending redevelopment demands and existing base year 2000 demands exceeds that shown in Table 3-6 until 2015 due to variable nature of development timing. Table 3-6 is calculated as a linear extrapolation of total possible build out 2020 development (Meiring Contracting and Consulting) which appears to underestimate the speed at which pending development is anticipated. Given the uncertain nature of development timing, the intermediate 5-year demands are estimates only with the total City-wide demand due to full build out at 2020 being the restricting factor to new development.

Table 3-9. Total Projected Water Demands Attributable to Redevelopment Projects To Date

	Annual average		Maximum day[a]
Year	ac-ft/yr	mgd	mgd
2005	3,730	3.30	5.28
2010	3,930	3.48	5.56
2015	4,870	4.31	6.89
2020	4,870	4.31	6.89
2025	4,870	4.31	6.89

Source: Table 3-8 (above), Table 3-8, Vallejo Station and Waterfront Water Supply Assessment, and Table 3-8, Downtown Water Supply Assessment, Brown and Caldwell, 2005.

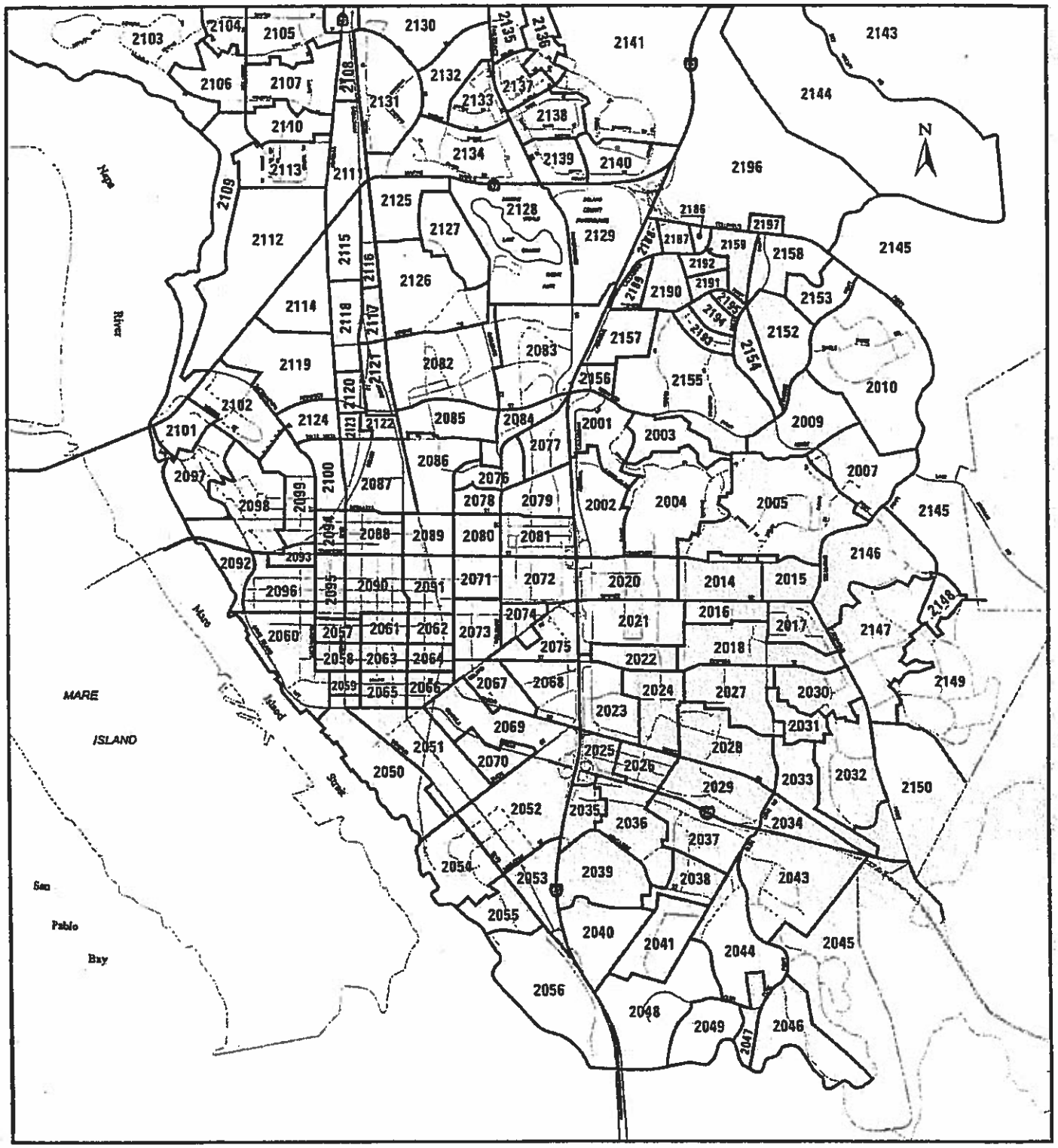
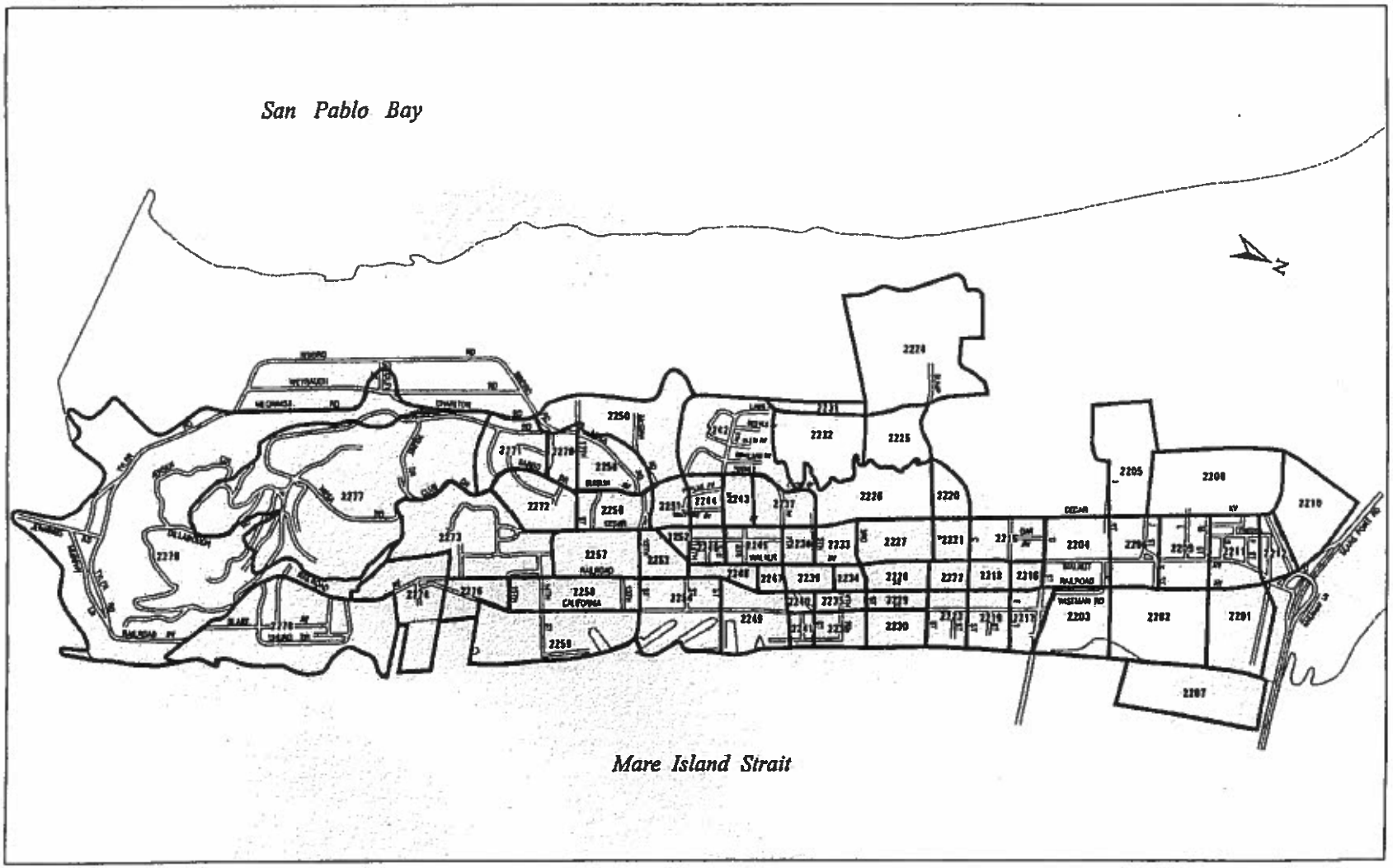


Figure 3-1. Vallejo Traffic Zones



MARE ISLAND TRAFFIC ZONES

Figure 3-2. Mare Island Traffic Zones

SECTION 4

SUPPLY/DEMAND COMPARISON, SHORTAGE, AND SUPPLY PROJECTS

This chapter provides a comparison of projected water supplies and demand and water shortage expectations.

4.1 Water Supplies and Demand Comparison

The projected annual existing available water supply and demand from existing, approved, and pending projects for the City of Vallejo water systems is compared and summarized in Table 4-1. Recycled water supply is not currently available, and is assumed to not become available in the future. Groundwater is also not available. The estimated demands also include the demands for the adjacent cities that are supplied water by Vallejo. Although the 400 acre-feet/year entitlement to Lakes Frey and Madigan supplies is included in this document's total estimated supplies, the annual demand for this water, which is equal to 400 acre-feet/year, is also included in this document's total estimated demands. Accordingly, the Lakes Frey and Madigan supply is not relied on by this document as being available to the project or other users within the City of Vallejo. The existing available water supply does not include the planned availability of Lake Curry. This assumption about water supply serves to examine conservatively the City's ability to sustain all known water use accounted for to date. As shown in Table 4-1, the surface water supplies are sufficient to serve existing, approved, and pending development.

[Please see Table 4-1 on the following page, 4-2.]

Table 4-1. Comparison of Existing Supply and Demand from Existing, Approved, and Pending Projects, ac-ft/yr

	2005	2010	2015	2020	2025
Water supply					
Surface water	37,800	43,400	43,400	43,400	43,400
Groundwater	0	0	0	0	0
Recycled water	0	0	0	0	0
Water loss due to water quality	0	0	0	0	0
Total Supply	37,800	43,400	43,400	43,400	43,400
Estimated demand					
Vallejo Water Systems[a]	25,970	26,170	27,110	27,110	27,110
Travis AFB deliveries[b]	3,400	3,860	4,330	4,790	5,250
City of Benicia	1,100	1,100	1,100	1,100	1,100
City of American Canyon	750	750	750	750	750
Other	0	0	0	0	0
Total Demand	31,220	31,880	33,290	33,750	34,210
Surplus or (Deficit)	6,580	11,520	10,110	9,650	9,190

Units of measure: ac-ft/yr

[a] Vallejo Water Systems demand estimates include those from all existing, approved, and pending development (i.e. this Project, the Mare Island Redevelopment Project, and the Vallejo Downtown Redevelopment Project). The estimated demand does not include General Plan buildout over and above demand associated with existing, approved and pending development.

[b] Travis AFB demand in 2005 of 3,400 ac-ft/yr is based on the maximum demand out of three recent years of historical water production data. Demands in subsequent years are assumed to increase in equal steps to the maximum potential demand of 5,250 ac-ft/yr by 2025.

Water supply and demand reliability comparisons are provided in Tables 4-2 through 4-5 for the year 2025, assuming various conditions regarding the future availability of Lake Curry and the adoption of water demand management measures. All tables consider three water supply scenarios: average/normal water year; single dry-water year; and multiple dry-water years. The possible future reduction in water supply to the City of Vallejo water systems due to drought conditions cannot be precisely predicted. However, estimates are made for this WSA. It is assumed that a single dry-water year would result in a reduction in normal year supply. The surface water supplies to the City of Vallejo water systems could be further reduced during a multiple-dry-year scenario. For the third year of the multiple-dry-year scenarios, it is assumed that an overall reduction to 74 percent of normal year supply would occur. The footnotes in each of Tables 4-2 through 4-5 describe the supply reduction assumptions for each water supply source. The SCWA Agreement requires specific drought measures by all Participating Agencies (including the City of Vallejo) when the water level in Lake Berryessa drops below half full. A copy of the agreement will be made available upon request to the City of Vallejo.

Table 4-2 gives the water supply reliability for the year 2025, assuming existing supply and existing, approved, and pending development (i.e. this Project, the Mare Island Project, and the Vallejo Downtown Project). This scenario does not consider that portion of the demand from City-wide buildout (as estimated by the City of Vallejo Buildout Estimates) over and above the demand associated with existing, approved and pending development. There are insufficient water supplies to serve the demand analyzed in this table in the third of consecutive dry years.

Table 4-2. Water Supply Reliability, 2025, ac-ft/yr, Assuming Existing, Plus Approved, Plus Pending Development

	Average/normal water year	Single dry water year[a]	Multiple dry water years		
			Year 1[a]	Year 2[b]	Year 3[c]
Water supply					
Surface water	43,400	37,720	37,720	35,250	32,050
Groundwater	0	0	0	0	0
Recycled water	0	0	0	0	0
Total Supply	43,400	37,720	37,720	35,250	32,050
Total Demand	34,210	34,210	34,210	34,210	34,210
Surplus or (Deficit)	9,190	3,510	3,510	1,040	(2,160)

Units of measure : ac-ft/yr

[a] Assumes 3,400 AF State Water Project Water from DWR, (40 percent cutback on 5,600 AF entitlement), 19,400 AF Permit Water (15 percent cutback on 22,800 AF entitlement), 320 AF for Lake System Suppliers (20 percent reduction of 400 AF) and 14,600 AF Solano County Water Agency Agreement (0 percent cutback on Lake Berryessa supplies).

[b] Assumes 2,800 AF State Water Project Water from DWR, (50 percent cutback on 5,600 AF entitlement), 18,250 AF Permit Water (20 percent cutback on 22,800 AF entitlement), 300 AF for Lake System Suppliers (25 percent reduction of 400 AF) and 13,900 AF Solano County Water Agency Agreement (5 percent cutback on Lake Berryessa supplies).

[c] Assumes 2,250 AF State Water Project Water from DWR, (60 percent cutback on 5,600 AF entitlement), 17,100 AF Permit Water (25 percent cutback on 22,800 AF entitlement), 300 AF for Lake System Suppliers (25 percent reduction of 400 AF) and 12,400 AF Solano County Water Agency Agreement (15 percent cutback on Lake Berryessa supplies).

Table 4-3 gives the water supply reliability for the year 2025, assuming existing supply and existing, approved, pending, and planned development. That is, this scenario assumes full City-wide buildout as estimated by the City of Vallejo Buildout Estimates. There are insufficient water supplies to serve the demand analyzed in this table in the third of consecutive dry years.

Table 4-3. Water Supply Reliability, 2025, ac-ft/yr, Assuming Existing, Plus Approved, Plus Pending, Plus Planned Development

	Average/normal water year	Single dry water year[a]	Multiple dry water years		
			Year 1[a]	Year 2[b]	Year 3[c]
Water supply					
Surface water	43,400	37,720	37,720	35,250	32,050
Groundwater	0	0	0	0	0
Recycled water	0	0	0	0	0
Total Supply	43,400	37,720	37,720	35,250	32,050
2025 Demand	34,610	34,610	34,610	34,610	34,610
Surplus or (Deficit)	8,790	3,110	3,110	640	(2,560)

Units of measure : ac-ft/yr

[a] Assumes 3,400 AF State Water Project Water from DWR, (40 percent cutback on 5,600 AF entitlement), 19,400 AF Permit Water (15 percent cutback on 22,800 AF entitlement), 320 AF for Lake System Suppliers (20 percent reduction of 400 AF) and 14,600 AF Solano County Water Agency Agreement (0 percent cutback on Lake Berryessa supplies).

[b] Assumes 2,800 AF State Water Project Water from DWR, (50 percent cutback on 5,600 AF entitlement), 18,250 AF Permit Water (20 percent cutback on 22,800 AF entitlement), 300 AF for Lake System Suppliers (25 percent reduction of 400 AF) and 13,900 AF Solano County Water Agency Agreement (5 percent cutback on Lake Berryessa supplies).

[c] Assumes 2,250 AF State Water Project Water from DWR, (60 percent cutback on 5,600 AF entitlement), 17,100 AF Permit Water (25 percent cutback on 22,800 AF entitlement), 300 AF for Lake System Suppliers (25 percent reduction of 400 AF) and 12,400 AF Solano County Water Agency Agreement (15 percent cutback on Lake Berryessa supplies).

Table 4-4 gives the water supply reliability for the year 2025, assuming existing supply and existing, approved, pending, and planned development, and assuming the implementation of water demand management measures. That is, this scenario assumes full City-wide buildout as estimated by the City of Vallejo Buildout Estimates. This scenario also factors in water savings achieved through the implementation of certain anticipated water demand management measures during drought years. A draft Water Shortage Contingency Plan (WSCP) is currently in place. The City intends to adopt this WSCP and implement Stage 1 demand management measures during drought years.
Implementation of such measures is expected to offset the 8 percent in water deficit in the third of consecutive dry years.

Table 4-4. Water Supply Reliability, 2025, ac-ft/yr, Assuming Existing, Plus Approved, Plus Pending, Plus Planned Development, and Assuming the Implementation of Water Demand Management Measures

	Average/normal water year	Single dry water year[a]	Multiple dry water years		
			Year 1[a]	Year 2[b]	Year 3[c]
Water supply					
Surface water	43,400	37,720	37,720	35,250	32,050
Groundwater	0	0	0	0	0
Recycled water	0	0	0	0	0
Total Supply	43,400	37,720	37,720	35,250	32,050
2025 Demand	34,610	34,610	34,610	34,610	34,610
Implementation of Demand Management Measures					2,560
Surplus or (Deficit)	8,790	3,110	3,110	640	0

Units of measure : ac-ft/yr

[a] Assumes 3,400 AF State Water Project Water from DWR, (40 percent cutback on 5,600 AF entitlement), 19,400 AF Permit Water (15 percent cutback on 22,800 AF entitlement), 320 AF for Lake System Suppliers (20 percent reduction of 400 AF) and 14,600 AF Solano County Water Agency Agreement (0 percent cutback on Lake Berryessa supplies).

[b] Assumes 2,800 AF State Water Project Water from DWR, (50 percent cutback on 5,600 AF entitlement), 18,250 AF Permit Water (20 percent cutback on 22,800 AF entitlement), 300 AF for Lake System Suppliers (25 percent reduction of 400 AF) and 13,900 AF Solano County Water Agency Agreement (5 percent cutback on Lake Berryessa supplies).

[c] Assumes 2,250 AF State Water Project Water from DWR, (60 percent cutback on 5,600 AF entitlement), 17,100 AF Permit Water (25 percent cutback on 22,800 AF entitlement), 300 AF for Lake System Suppliers (25 percent reduction of 400 AF) and 12,400 AF Solano County Water Agency Agreement (15 percent cutback on Lake Berryessa supplies).

[d] Assumes that Water Shortage Contingency Plan Stage 1 measures will be implemented to achieve an 8 percent reduction in demand during Year 3 of consecutive dry water years to offset deficit. Measures within Stage 1 implementation include prohibitions to street washing for other than public health goals and uncontrolled water usage such as car washing with a constantly running hose.

Table 4-5 gives the water supply reliability for the year 2025, assuming the following: (1) existing supply and existing, approved, pending, and planned development, and (2) the availability of future water supplies. As was noted previously in Section 2, the City owns water rights to Lake Curry but presently lacks the physical means to convey that water for use. A description of the two alternatives proposed to bring Lake Curry online by 2009 is located in Section 4.3. In the scenario analyzed in this table, a slight surplus is observed in the third of consecutive dry years. Thus, in this case, the City is expected to have adequate supply to meet City-wide buildout demands.

Table 4-5. Water Supply Reliability, 2025, ac-ft/yr, Assuming Existing, Plus Approved, Plus Pending, Plus Planned Development, and Assuming the Availability of Future Water Supplies

	Average/normal water year	Single dry water year[a]	Multiple dry water years		
			Year 1[a]	Year 2[b]	Year 3[c]
Water supply					
Surface water	47,150	40,700	40,700	38,050	34,850
Groundwater	0	0	0	0	0
Recycled water	0	0	0	0	0
Total Supply	47,150	40,700	40,700	38,050	34,850
2025 Demand	34,610	34,610	34,610	34,610	34,610
Surplus or (Deficit)	12,540	6,090	6,090	3,440	240

Units of measure : ac-ft/yr

[a] Assumes 3,400 AF State Water Project Water from DWR, (40 percent cutback on 5,600 AF entitlement), 19,400 AF Permit Water (15 percent cutback on 22,800 AF entitlement), 3,300 AF for Lake System Suppliers (20 percent reduction of 4,150 AF) and 14,600 AF Solano County Water Agency Agreement (0 percent cutback on Lake Berryessa supplies).

[b] Assumes 2,800 AF State Water Project Water from DWR, (50 percent cutback on 5,600 AF entitlement), 18,250 AF Permit Water (20 percent cutback on 22,800 AF entitlement), 3,100 AF for Lake System Suppliers (25 percent reduction of 4,150 AF) and 13,900 AF Solano County Water Agency Agreement (5 percent cutback on Lake Berryessa supplies).

[c] Assumes 2,250 AF State Water Project Water from DWR, (60 percent cutback on 5,600 AF entitlement), 17,100 AF Permit Water (25 percent cutback on 22,800 AF entitlement), 3,100 AF for Lake System Suppliers (25 percent reduction of 4,150 AF) and 12,400 AF Solano County Water Agency Agreement (15 percent cutback on Lake Berryessa supplies).

4.2 Water Shortage Expectations

No unusual short-term water shortages are anticipated. Short-term surface water supply shortages lasting from several hours to several days are accounted for in supply planning. At key locations, the City's pumps are fitted with emergency diesel-powered generators for use during power outages, which increases the reliability of supply. The City's Draft Water Shortage Contingency Plan is included in the Draft 2000 Vallejo Urban Water Management Plan (Brown and Caldwell, 2005).

4.3 Water Supply Projects

The City owns water rights to Lake Curry but presently lacks the physical means to convey the 3750 Ac-Ft of yearly safe yield water for use. One conveyance option contemplates the release of water from Lake Curry dam to flow into Suisun Creek. This would require the construction of a diversion structure and pumping station approximately 5 miles downstream, where Suisun Creek crosses the Putah South Canal. This water would then be usable by the City at the terminal reservoir in the identical manner in which Lake Berryessa is currently used. A second conveyance option requires

the construction of a 5-mile-long raw water pipe along the existing Gordon Valley Road from the Lake Curry dam outlet to the point of intersection of Gordon Valley Road and the Putah South Canal. The water would then be directed into the Putah South Canal and would be usable by the City in the same manner as is currently employed for Solano Project, Lake Berryessa water. The capital outlay program for financing this conveyance project has not been drafted as the options vary greatly in cost, with estimates ranging from 0.5 to 5 million dollars, depending on which alternative is implemented. Regardless of which option is ultimately implemented, the City has informed the State Water Resources Control Board that the conveyance structures are intended to be completed by approximately 2010.

SECTION 5

CONCLUSIONS

This Water Supply Assessment has been prepared in accordance with the requirements of Senate Bill 610, now Water Code Sections 10910 and 10911. The total available supplies for the Vallejo Water Systems in 2025 in a normal climate year is 43,400 acre-feet per year (ac-ft/yr), excluding Lake Curry supplies, or 47,150 ac-ft/yr if Lake Curry supplies (to which the City owns the water rights but has no conveyance facilities in place at present) are included. The total projected demand from existing, approved, and pending development (including this proposed Project, as well as the Mare Island and Vallejo Downtown Projects) is 34,210 ac-ft/yr. The total demand from existing, approved, pending, plus planned development (i.e., the projected City of Vallejo 2025 Buildout Estimates) is 34,610 ac-ft/yr. Thus, it has been determined that, during normal climate years, adequate water supplies are available, during a 20-year projection, to serve the projected demand of the proposed Project, in addition to existing and planned future uses.

This WSA has also examined the reliability of the City's water supply assuming various below-average precipitation scenarios, the future availability of Lake Curry, and the potential implementation of water shortage response measures. This WSA demonstrated that the City has insufficient available supplies to serve existing, approved, pending, and buildout development in the event of a three-year drought without the re-introduction of Lake Curry supplies if per dwelling unit demands are not reduced. The renewed use of Lake Curry would remove this deficit and result in a slight surplus even after the third year of below average rainfall. If Lake Curry supplies are unavailable in the future, the projected maximum deficit in the third dry year is less than 9 percent. It should be noted that the probability of attaining this marginal deficit is remote when considering the enhanced conservation efforts being imposed by the State and the use of residential water usage unit demand figures which incorporate a 33 percent factor of safety above gross historical average use. Nevertheless, if in the event of a multi-year drought, the City implements water shortage response measures substantially similar to those in the attached draft Water Shortage Contingency Plan, then projected water supplies are sufficient to serve the projected demand of the Project, in addition to existing and planned future uses (as such future uses are projected by the City of Vallejo Buildout Estimates) even if Lake Curry supplies are not ultimately brought on-line.

BROWN AND CALDWELL

APPENDIX A

REFERENCES

Brown and Caldwell. *Draft City of Vallejo Water Shortage Contingency Plan.* Rancho Cordova, California. January 2003.

Brown and Caldwell. *Draft City of Vallejo 2000 Urban Water Management Plan.* Rancho Cordova, California. February 2005.

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Miering Contracting and Consulting and updated by City of Vallejo Planning Division. *City of Vallejo Buildout Estimates.* Spreadsheets sent via email as an attachment, December 2004.

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BROWN AND CALDWELL

APPENDIX B

Detailed Calculations for Vallejo Water Systems Housing and Employment Projections; Total Water Demand Projections By Customer Category; and Demand vs. Supply Comparisons

City of Vallejo Urban Water Management Plan – Calculations for Demand Projections within Vallejo Water Systems
By Lisa Maddaus and Wynn Yin, Brown and Caldwell
Last Modified: June 10, 2005

Unit Water Use Factors

Single Family (gpd/unit)	387
Multi-family (gpd/unit)	345
Employees (gpd/employee)	102

TYPE OF UNITS AND BUILDING PROJECTION

City of Vallejo Water System

	2000	2005	2010	2015	2020	2025
Single Family, units						
City of Vallejo Buildout Estimates[a]	30445H	31,540EE	32,634EE	33,729EE	34823BE	34823BE
ABAG						
EIR						
Multi-family, units						
City of Vallejo Buildout Estimates[a]	12629H	13,770EE	14,911EE	16,053EE	17194BE	17194BE
ABAG						
EIR						
Total Residential, units						
City of Vallejo Buildout Estimates[a]	43074H	45,310EE	47,545EE	49,781EE	52017BE	52017BE
ABAG[b]	35,844	40,784	42,588	44,614	46,511	48,100
EIR[c]	40,608	42,814	45,020	47,045	49,070	49,070+
CIILGR[d], employees						
City of Vallejo Buildout Estimates[a]	35,550IE	41,357EE	47,164EE	52,972EE	58779BE	58779BE
ABAG[b]	25,113	28,660	31,685	34,391	37,203	39,849
EIR[c]	32,210	35,695	39,180	42,370	45,560	45,560+

Vallejo Lakes System

	2000	2005	2010	2015	2020	2025
Single Family, units						
Vallejo Utilities Division, Water Dept.[e]	778	803	828	853	878	900

Notes:

[a]Miering Contracting and Consulting, 2003. Figures based on historical data, and the City of Vallejo Buildout Estimates for base year (1999) and 2020 (buildout); intermediate figures were linearly extrapolated. Figures for 2025 are assumed to be the same as for 2020. H = historical; IE = initial City of Vallejo Buildout Estimates; EE = extrapolated City of Vallejo Buildout Estimates; BE = buildout City of Vallejo Buildout Estimates.

[b]ABAG data by census tract, sent to Brown and Caldwell on 9/17/02. City of Vallejo service area only.

[c]EIP Associates, Vallejo Waterfront/Downtown Project, Draft EIR, 12/02. Only figures for even years listed were available; other figures were linearly extrapolated when necessary.

[d]CIILGR = Commerical, industrial, institutional, landscaping, governmental, and recreational use.

[e]Vallejo Lakes System service area assumes 778 residential connections per Vallejo Water Utility Financing Plan and Rate Study, at a growth rate of 5 connections/year up to a capacity of 900 connections, per the City of Vallejo, Utilities Division, Water Department. All residential units are conservatively assumed to be single-family.

DEMAND ESTIMATES

City of Vallejo Water System	2000	2005	2010	2015	2020	2025
Single Family Units, mgd						
City of Vallejo Buildout Estimates	8.6	9.0	9.4	9.9	10.3	10.3
ABAG						
EIR						
Multi-Family Units, mgd						
City of Vallejo Buildout Estimates	2.3	2.7	3.1	3.5	3.9	3.9
ABAG						
EIR						
Total Residential, mgd						
City of Vallejo Buildout Estimates	10.9	11.7	12.5	13.3	14.1	14.1
ABAG						
EIR						
Total Commerical, mgd						
City of Vallejo Buildout Estimates	3.6	4.2	4.8	5.4	6.0	6.0
ABAG	2.6	2.9	3.2	3.5	3.8	4.1
EIR	3.3	3.7	4.0	4.3	4.7	4.7+
Total Other Demand, mgd (water losses, etc.)						
Non-billed metered use[f]	2.2	2.0	1.8	1.7	1.7	1.7
Unaccounted for water[g]	1.9	1.7	1.6	0.1	1.4	1.4
Golf course irrigation	0.7	0.7	0.7	0.7	0.7	0.7

Vallejo Lakes System	2000	2005	2010	2015	2020	2025
Single Family Units, mgd						
Vallejo Utilities Division, Water Dept.	0.3	0.3	0.3	0.3	0.3	0.3

Notes:

[f]E-mail from E. Nutgeren, City of Vallejo, received 1/3/05. Non-billed metered use, which accounts for approx. 13% of total metered use in the base year (2000), is expected to decrease linearly to due to changes in non-billing practices which will create incenvitve for best management water use practices.

[g]E-mail from E. Nutgeren, City of Vallejo, received 1/3/05. Unaccounted-for water, which includes meter losses and inaccuracies, pipeline leaks, etc., is assumed to be 11% of total metered use for calibration purposes for the base year. This value is expected to drop due to enforcement of illegal conneciton removal, enhanced flushing and maintenance practices, and greater meter accuracy due to large meter replacement projects which will accurately gauge true cost of service and create incentives for best management practices and reductions in use.

[h]E-mail from E. Nutgeren, City of Vallejo, received 4/14/05. Irrigation of Hiddenbrooke Golf Course and Blue Rock Springs East and West Golf Courses comprise of 270 million gallons per year, or 0.7 mgd.

Total Demand Projection for Vallejo Water System (based on City of Vallejo Buildout Estimates sent 12/20/04), mgd, unless otherwise speci

	2000	2005	2010	2015	2020	2025
Single Family	8.6	9.0	9.4	9.9	10.3	10.3
Multi-family	2.3	2.7	3.1	3.5	3.9	3.9
Commerical	3.6	4.2	4.8	5.4	6.0	6.0
Other	4.9	4.4	4.1	2.6	3.8	3.8
Total, mgd	19.4	20.4	21.5	21.3	24.0	24.0
Total, AF/yr	21,920	23,030	24,290	24,120	27,140	27,140

Total Demand Projection for Vallejo Lakes System

	2000	2005	2010	2015	2020	2025
Single Family, mgd	0.3	0.3	0.3	0.3	0.3	0.3
Single Family, AF/yr	320	330	340	350	360	370

Demand Projections for Other Wholesale Customers, ac-ft/yr, unless otherwise specified

	2000	2005	2010	2015	2020	2025
Travis AFB deliveries[1]	3,200	3,400	3,860	4,330	4,790	5,250
City of Benecia	1,100	1,100	1,100	1,100	1,100	1,100
City of American Canyon	750	750	750	750	750	750
Total, AF/yr	5,050	5,250	5,710	6,180	6,640	7,100

Notes:

[1]Travis AFB demand in 2005 of 3,400 ac-ft/yr is based on the maximum demand out of three recent years of historical water production data. Demands in subsequent years are assumed to increase in equal steps to the maximum potential demand of 5,250 ac-ft/yr by 2025.

Total Supply

	2000	2005	2010	2015	2020	2025
State Water Project	5,600	5,600	5,600	5,600	5,600	5,600
Vallejo Permit Water	17,200	17,200	22,800	22,800	22,800	22,800
Solano Project Water	14,600	14,600	14,600	14,600	14,600	14,600
Lakes Frey, Madigan	400	400	400	400	400	400
Lake Curry	-	-	3,750	3,750	3,750	3,750
Total Supply Excluding Lake Curry, AF/yr	37,800	37,800	43,400	43,400	43,400	43,400
Total Supply Including Lake Curry, AF/yr	37,800	37,800	47,150	47,150	47,150	47,150

Total Demand

	2000	2005	2010	2015	2020	2025
Total Demand, All Sources	27,290	28,610	30,340	30,650	34,140	34,610

Supply vs. Demand Comparison	2000	2005	2010	2015	2020	2025
Surplus, AF/yr	10,510	9,190	16,810	16,500	13,010	12,540

BROWN AND CALDWELL

APPENDIX C

Detailed Calculations for the Conversion of Land Use by Category to Employment Projections, Mare Island Project

Mare Island Water Supply Assessment – Conversion of Land Use by Category to Employment Projections
By: Wynn Yin, Brown and Caldwell
Last Modified: June 22, 2005

Vallejo Land Use	Units	Build Out	Conversion Factor	Units		Units
Office/R&D	KSF	1,618	3.320	Emp/KSF	5,372	Emp
Light Industrial	KSF	2,225	2.310	Emp/KSF	5,140	Emp
Retail	KSF	508	2.850	Emp/KSF	1,448	Emp
Warehouse	KSF	1,400	1.280	Emp/KSF	1,792	Emp
Heavy Industrial	KSF	2,050	2.310	Emp/KSF	4,736	Emp
Educational/Civic	KSF	1,226	3.320	Emp/KSF	4,070	Emp
				TOTAL:	22,557	Emp

Source: Tables 3-2 and 5-1, Mare Island Specific Plan, Administrative Draft, May 2004.
*Conversion factor obtained from the Solano Transportation Authority Travel Model.