WEST YOST & ASSOCIATES

Consulting Engineers


**FINAL**

**TECHNICAL MEMORANDUM NO. 1**

DATE: October 19, 2005 Project No.: 423-02-03-01

TO: Don Ridenhour, Project Manager CC: WATRTAC Members

FROM: Gerry Nakano, Project Manager
Elizabeth Teien, Project Engineer

SUBJECT: 2050 Napa Valley Water Resources Study
Review of 1991 and 1992 Studies

The purpose of this technical memorandum is to summarize the planning assumptions and criteria utilized to develop the key findings and recommendations in the following previous studies prepared for the Napa County Flood Control and Water Conservation District (County):

- Water Resources Study for the Napa County Region, prepared by James M. Montgomery Consulting Engineers, Inc., January 1991 (1991 Study); and
- Napa River Diversion Feasibility Study, prepared by Kennedy/Jenks Consultants, May 1992 (1992 Study).

This baseline data will then be used by West Yost & Associates in subsequent tasks of the 2050 Napa Valley Water Resources Study to update and reevaluate the applicability and validity of these previous assumptions, findings and recommendations. Also contained in this technical memorandum is a summary of the status of the recommendations made in the 1991 and 1992 studies.

## KEY ASSUMPTIONS AND CRITERIA USED IN 1991 STUDY

### Study Area

The 1991 Study by the County evaluated the entire Napa County, divided into three regions:

- North Napa Valley including Calistoga, St. Helena and Yountville;
- South Napa including the City of Napa and American Canyon; and
- Lake Berryessa.

The 2050 Napa Valley Water Resources Study being conducted for the Flood Control District (District) will evaluate only the North Napa Valley and South Napa areas, and will not include an evaluation of the Lake Berryessa area or the rural Angwin area. Plate 1 (see attached) shows the current study area, compared to the study area used for the 1991 Study.

**Water Demand**

The 1991 Study evaluated three water demand scenarios extending to the year 2020. Key assumptions for each of the scenarios are described in Table 1.

Other key assumptions used to determine the municipal and industrial demands and agricultural demands are discussed in the following sections.

Municipal and Industrial (M&I) Demand

In the 1991 Study, existing (1989/1990) M&I water use was determined from an analysis of water production records and metered water sales data. Average per capita water uses (not including industrial uses) for 1985 through 1989 were calculated for each City, and then used with ABAG and CDOF population projections to develop future M&I water demands as shown in Table 2.

Agricultural Demand

In the 1991 Study, agricultural water use factors were assigned to each subarea for different crop categories. Water use factors for a specific crop were assumed to be the same throughout a given subarea. Existing agricultural acres (1989/1990) were based on a Department of Water Resources Land Use Study conducted in 1987 (DWR Land Use Study #88-62). Future agricultural acres were based on a Napa County 1989-2005 General Plan Land Use Map. Other irrigated agricultural acres (non-vineyard acres) were assumed to remain constant over the study period. The agricultural acres and unit water use factors are shown in Table 3.

Agricultural water consumption (irrigation) was based on 1989 irrigation practices, and was primarily assumed to be sprinkler irrigation. The 1991 Study noted that irrigation methods would be converting to drip irrigation in the future, but that the differences in water use between the two methods would not be significant. The 1991 Study also noted that some vineyards (about 50 percent of those in the North Napa Subarea) would be converting to wind machines for frost and heat protection by the Year 2020, and assumed a vineyard planting density of about 500 to 600 vines per acre. The 2050 Water Resources Study update will review and develop appropriate water demand factors by subarea, and consider that current vineyard planning practices are increasing vine densities to an average of about 900 vines per acre with a maximum of up to 1,500 to 2,000 vines per acre.

Agricultural water demands for vineyards and other irrigated agriculture based on the findings in the 1991 study are shown in Table 2. As shown, the total projected water demand (both M&I and agriculture) for the 1991 Study area, was projected to be 77,407 acre-feet per year (af/yr) by the Year 2020, a 32 percent increase from the 1990 demand. The total demand for the North and South Napa Valley Subareas (being included in the current plan update) was projected to be 68,518 af/yr for the Year 2020.

**Water Supply**

In the 1991 Study, five sources of water supply were evaluated:

- Groundwater;
- River diversion;
- Reservoirs;
- Imported water; and
- Reclamation.

Table 4 presents a summary of the estimated yield from each of these supply sources as presented in the 1991 Study, and the assumptions used to estimate these yields. The 1991 Study also recommends a Water Management Plan based on the water need/supply balance identified in the 1991 Study and provides estimates of the incremental supply potentially available from each supply source if water management measures were implemented. A summary of the incremental supplies potentially available in the future, as identified in the 1991 Study, is provided in Table 5.

## STATUS OF RECOMMENDATIONS MADE IN 1991 AND 1992 STUDIES

Table 6 provides a summary of the recommendations made in the 1991 Study, and description of the current status of each of the recommendations. Table 7 provides a summary of the recommendations made in the 1992 Study and a description of the current status of each of the recommendations.

## KEY ASSUMPTIONS TO BE USED FOR 2050 WATER RESOURCES STUDY

Table 8 provides an overview of the previous study assumptions and a description of the key assumptions that have changed or that will be evaluated in an alternative manner based on current M&I water demand projections, current and projected agricultural trends in the Napa Valley, and current and projected water supply availability and associated environmental and/or regulatory concerns.

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**Table 1. Key Water Demand Assumptions Used in 1991 Study**

| Scenario | Key Assumptions |
|---|---|
| Baseline Projection | • Per capita use for municipal areas based on the average consumption during the 1985-89 period. The per capita factors for this period of predominantly dry years reflects a conservation-oriented attitude deemed to be representative of future use.<br>• Population projections from the Association of Bay Area Governments (ABAG) and California Department of Finance (CDOF).<br>• Irrigated crop acreage from Napa County 1989-2005 General Plan Land Use Map, with area dedicated to Agricultural Resource fully developed as vineyards by the year 2020 for South Napa and North Napa Valley subareas, and 50 percent developed in the Lake Berryessa subarea due to restricted water availability.<br>• Frost and heat protection not required for 50 percent of future vineyard lands in the North Napa Valley and Lake Berryessa subareas due to hillside location. |
| Alternative Scenario 1 | • Reduced M&I water demand by 10 percent to account for water conservation<br>• No additional growth in vineyard acreage in the Lake Berryessa subarea due to limited water availability<br>• Wind machines will replace sprinkler systems for frost and heat protection in 50 percent of the vineyards in the North Napa Valley and Lake Berryessa subareas by the year 2020 |
| Alternative Scenario 2 | • A greater projected population than the ABAG and CDOF estimates based on the 1980-2000 growth rates used in the Napa County General Plan, assuming that the growth rates remain in effect until the year 2020.<br>• Due to potential rapid development of Carneros vineyards, the acreage designated as Agricultural Resource in the South Napa subarea is assumed to be fully developed by the year 2005, instead of the year 2020. |

**Table 2. Summary of Projected Water Demands as Presented in the 1991 Study[a]**

| Area/Water Use | Baseline Projected Water Use, af/yr [b] 1990 | 2000 | 2020 | Per Capita Water Use, gpcd [f] | Comments |
|---|---|---|---|---|---|
| **North Napa Valley Subarea** | | | | | |
| Calistoga | | | | | |
| Municipal | 745 | 930 | 1,240 | 151 | |
| Industrial | 245 | 260 | 275 | | |
| St. Helena | | | | | Current St. Helena per capita use of 228 gpcd for all water users; 209 gpcd without industrial users. |
| Municipal | 1,495 | 1,835 | 2,250 | 233 | |
| Industrial | 440 | 440 | 440 | | |
| Yountville | | | | | Includes Town of Yountville and Veterans Home. |
| Municipal | 900 | 970 | 1,085 | 223 | |
| Industrial | - | - | - | | |
| Rural | 1,358 | 1,443 | 1,756 | | Includes rural population and winery use; does not include Angwin (listed below) |
| | | | | | |
| Vineyard [c] | 22,181 | 24,532 | 29,235 | | |
| Other Irrigated Agriculture [d] | 797 | 797 | 797 | | Assumed to remain constant over the study period |
| **North Napa Subtotals, af/yr** | **28,161** | **31,207** | **37,078** | | |
| | | | | | |
| **South Napa Valley Subarea** | | | | | |
| Napa | | | | | |
| Municipal | 13,135 | 14,540 | 17,285 | 179 | |
| Industrial | 690 | 765 | 910 | | |
| American Canyon | | | | | |
| Municipal | 1,325 | 1,580 | 2,050 | 164 | |
| Industrial | 266 | 266 | 266 | | |
| Rural | 1,705 | 1,811 | 2,207 | | Includes rural population and winery use |
| | | | | | |
| Vineyard [c] | 3,248 | 3,904 | 5,216 | | |
| Other Irrigated Agriculture [d] | 3,506 | 3,506 | 3,506 | | Assumed to remain constant over the study period |
| **South Napa Subtotals, af/yr** | **23,875** | **26,372** | **31,440** | | |
| **NORTH AND SOUTH NAPA VALLEY SUBTOTALS, af/yr** | **52,036** | **57,579** | **68,518** | | **Compares to study area being used for 2050 Napa Valley Water Resources Study** |
| | | | | | |
| **Lake Berryessa Subarea** | | | | | This subarea is not included in 2050 Napa Valley Water Resources Study |
| Rural | 95 | 101 | 123 | | Includes rural population and winery use |
| | | | | | |
| Vineyard [c] | 2,460 | 3,144 | 4,512 | | |
| Other Irrigated Agriculture [d] | 3,359 | 3,359 | 3,359 | | |
| **Angwin** | 630 | 725 | 895 | 135 | This area is not included in 2050 Napa Valley Water Resources Study |
| **Lake Berryessa and Angwin Subtotals, af/yr** | **6,544** | **7,329** | **8,889** | | These subareas are not included in 2050 Napa Valley Water Resources Study |
| | | | | | |
| **TOTAL 1991 STUDY AREA TOTALS, af/yr** | **58,580** | **64,908** | **77,407** | | **As presented in 1991 Study** |
| **Napa County Population [e]** | **108,900** | | **147,500** | | |

(a) Napa County Flood Control and Water Conservation District, Water Resource Study for the Napa County Region, January 1991, James M. Montgomery Consulting Engineers
(b) As presented in Tables 3-4 and 3-5 of the 1991 Study.
(c) See Table 3 for agricultural acres and unit water requirements by crop category.
(d) See Table 3 for other irrigated agricultural acres and unit water requirements by crop category.
(e) As presented in Table 3-3 of the 1991 Study; baseline projection.
(f) As presented in Table 3-1 of the 1991 Study. Based on average per capita use for 1985 through 1989. Does not include industrial water use.

**Table 3. Summary of Agricultural Acres and Unit Agricultural Water Requirements as Presented in the 1991 Study[a]**

| | North Napa Valley Subarea | South Napa Valley Subarea | Lake Berryessa Subarea | |
|---|---|---|---|---|
| **Agricultural Water Use Factors by Crop Category, af/ac/yr[b]** | | | | |
| Vineyard | | | | |
| Irrigation | 0.50 | 0.40 | 0.60 | No evapotranspiration assumed. Irrigation water use was assumed to be constant over a given subregion. Assumed vineyard density of 500 to 600 vines per acre. |
| Frost Protection | 0.33 | 0.00 | 0.33 | Based on 32 hours per year of frost protection. No frost protection for South Napa Valley (1991 Study pg. 3-13). 50 percent of future land developed as vineyards in North Napa and Lake Berryessa will not require frost or heat protection. |
| Heat Protection | 0.17 | 0.00 | 0.17 | No heat protection for South Napa Valley (1991 Study pg. 3-13). 50 percent of future land developed as vineyards in North Napa and Lake Berryessa will not require frost or heat protection. |
| Total Vineyard Water Use | 1.00 | 0.40 | 1.10 | |
| Pasture | | | | |
| Irrigation | 4.00 | 4.00 | 4.00 | Irrigation water use was assumed to be constant over a given subregion. |
| Grain | | | | |
| Irrigation | 1.70 | 1.70 | 1.70 | Irrigation water use was assumed to be constant over a given subregion. |
| Deciduous | | | | |
| Irrigation | 2.00 | 2.00 | 2.00 | Irrigation water use was assumed to be constant over a given subregion. |
| Truck Crops | | | | |
| Irrigation | 1.70 | 1.70 | 1.70 | Irrigation water use was assumed to be constant over a given subregion. |
| | | | | |
| **Agricultural Area, acres** | | | | |
| 1990 [c] | | | | |
| Vineyard Acres | 22,181 | 8,121 | 2,236 | |
| Other Irrigated Agriculture Acres | 320 | 1,010 | 1,115 | Assumed to remain constant over the study period |
| 2020 [d] | | | | |
| Vineyard Acres | 31,586 | 13,041 | 4,650 | |
| Other Irrigated Agriculture Acres | 320 | 1,010 | 1,115 | Assumed to remain constant over the study period |
| | | | | |
| **Agricultural Water Demand, af/yr[e]** | | | | |
| 1990 | | | | |
| Vineyard Water Demand | 22,181 | 3,248 | 2,460 | |
| Average Water Use, af/ac/yr | 1.00 | 0.40 | 1.10 | |
| Other Irrigated Agriculture Water Demand | 797 | 3,506 | 3,359 | Assumed to remain constant over the study period |
| Average Water Use, af/ac/yr | 2.49 | 3.47 | 3.01 | |
| 2020 | | | | |
| Vineyard Water Demand | 29,235 | 5,216 | 4,512 | |
| Average Water Use, af/ac/yr | 0.93 | 0.40 | 0.97 | |
| Other Irrigated Agriculture Water Demand | 797 | 3,506 | 3,359 | Assumed to remain constant over the study period |
| Average Water Use, af/ac/yr | 2.49 | 3.47 | 3.01 | |

(a) Napa County Flood Control and Water Conservation District, Water Resource Study for the Napa County Region, January 1991, James M. Montgomery Consulting Engineers
(b) As presented in Table 3-2 of the 1991 Study; average annual crop water demand was assumed constant for each subarea.
(c) Based on DWR Land Use Study #88-62; as presented in Table 3-3 of the 1991 Study.
(d) Based on Napa County 1989-2005 General Plan Plan Use Map; as presented in Table 3-3 of the 1991 Study.
(e) As presented in Table 3-5 of the 1991 Study.

**Table 4. Yield of Available Water Supplies as Presented in the 1991 Study[a]**

| Water Supply | | Safe or Firm Yield, af/yr [b] | Useable Storage, af [c] | Comments |
|---|---|---|---|---|
| **Groundwater** | | | | |
| North Napa Valley Basin | | 22,500 | 190,000 | Period of record: 1962-1989 |
| Milliken-Sarco-Tulucay Basin | | <5,400 | 20,000 | |
| Lake Berryessa Basin | | <400 | 7,700 | |
| Carneros Area Basin | | <300 | <3,000 | |
| **Total Groundwater (maximum)** | | **28,600** | | |
| **Total Groundwater (without Lake Berryessa Basin)** | | **28,200** | | Compares to study area being used for 2050 Napa Valley Water Resources Study. |
| | | | | |
| **River Diversion** | | | | |
| Napa River above Oak Knoll | | 10,000 | | Based on period of record: 1960-1988 |
| **Total River Diversion** | | **10,000** | | |
| | | | | |
| **Reservoirs (Municipal)** | | | | |
| Municipal [d] | | | | Based on period of record: 1940-1989 |
| Milliken | | 400 | 2,000 | Based on 80 percent frequency yield |
| Rector | | 1,200 | 4,000 | Based on 100 percent frequency yield |
| Lake Hennessey | | 5,000 | 31,000 | Based on 100 percent frequency yield |
| Bell Canyon | | 480 | 2,050 | Based on 80 percent frequency yield |
| Kimball | | 110 | 335 | Based on 80 percent frequency yield |
| **Total Municipal Reservoirs** | | **7,190** | **39,385** | |
| Lake Berryessa | | 1,500 | | Based on 1991 agreement for lakeside use |
| | | | | |
| **Imported Water** | | | | |
| North Bay Aqueduct [e] | | | | |
| 1990 | Minimum | 5,060 | | Assumes delivery of only 75 percent of contract entitlement due to potential cutbacks due to drought conditions. |
| | Maximum | 6,745 | | Assumes 100 percent delivery of contract entitlement in 1990 |
| 2020 | Minimum | 13,695 | | Assumes delivery of only 55 percent of contract entitlement based on capacities of existing State Water Project facilities (assuming no new facilities). |
| | Maximum | 24,900 | | Assumes 100 percent delivery of contract entitlement in 2020 |
| | | | | |
| **Reclamation (Recycled Water)** | | | | |
| | Minimum | 3,103 | | |
| | Maximum | 5,943 | | |

(a) Napa County Flood Control and Water Conservation District, Water Resource Study for the Napa County Region, January 1991, James M. Montgomery Consulting Engineers
(b) As presented in Table S-2 of the 1991 Study.
(c) As presented in Table 5-2 of the 1991 Study.
(d) Storage capacity as presented in Table 5-6 of the 1991 Study.
(e) Contract entitlement culminates in the Year 2021 with a total entitlement of 25,000 af/yr:

| | |
|---|---|
| City of Napa | 18,800 |
| American Canyon | 5,200 |
| Town of Yountville | 500 |
| Calistoga | 500 |
| Total | 25,000 |

**Table 5. Incremental Supply Potentially Available in the Future as Presented in the 1991 Study [a]**

| Water Supply | Incremental Supply Available From Water Management Measures, af/yr [b] 1990 | 2020 | Comments |
|---|---|---|---|
| **Conservation (Drought Period Water Use Cutback of 25%)** | | | |
| Calistoga | 248 | 379 | Maximum future cutbacks assumed to be 25 percent. |
| St. Helena | 484 | 672 | |
| Yountville | 112 | 156 | |
| City of Napa | 3,456 | 4,549 | |
| American Canyon | 398 | 579 | |
| Rural (Total) | 947 | 1,245 | |
| Agricultural (Total) | 8,888 | 11,656 | |
| **Total** | **14,533** | **19,236** | |
| **Groundwater as a Municipal Supply** | 9,776 | 2,048 | Per 1991 Study, no groundwater available in American Canyon. |
| **Maximizing River Diversions** | | 5,000 | |
| **Maximizing Municipal Reservoir Yield** | | | |
| Milliken (20-foot dam height increase) | | 600 | |
| Rector | | Minimal | |
| Lake Hennessey (15-foot dam height increase) | | 1,500 | |
| Bell Canyon (20-foot dam height increase) | | 700 | |
| Kimball (40-foot dam height increase) | | 500 | |
| **Total** | | **3,300** | |
| **Lake Berryessa Supply** | Indeterminate | | |
| **Firming Up North Bay Aqueduct Supply (from 55 percent delivery to 100 percent delivery)** | | | |
| Calistoga | - | 225 | |
| Yountville | - | 225 | |
| City of Napa | - | 8,415 | |
| American Canyon | - | 2,340 | |
| **Total** | **-** | **11,205** | |
| **In-County Water Transfers** | | | |
| American Canyon NBA Entitlement | 610 | 546 | |
| North Napa Valley Groundwater | 9,776 | 2,048 | |
| **Total** | **10,386** | **2,594** | |
| **Additional Wastewater Reclamation** | | | |
| Napa Sanitation District | | 4,321 | |
| Calistoga | | 200 | |
| St. Helena | | 500 | |
| Yountville | | 100 | |
| **Total** | | **5,121** | |
| **New Supplemental Water Supplies** | | | |
| Local Storage Reservoirs | | | |
| Napa River, Off-Stream | | 10,000 | The 2050 Water Resources Study will consider the current listing of steelhead as a threatened species and increased regulatory concerns which may impact the current viability of such diversion projects. |
| Others | | 1,000 | |
| Imported | | | |
| Central Valley Project | | 10,000 | |
| **Total** | | **21,000** | |

(a) Napa County Flood Control and Water Conservation District, Water Resource Study for the Napa County Region, January 1991, James M. Montgomery
(b) As presented in Table S-4 of the 1991 Study.

**Table 6. 1991 Study Recommendations and Status**

| Recommendation | Status |
|---|---|
| Public Information<br>The County should develop, maintain and distribute information to County water users regarding:<br>• County water supply sources;<br>• Current hydrologic conditions in the County and for the State Water Project and how County water users will be impacted;<br>• Status of State's effort to meet its future water contract entitlements<br>• Status of municipal, industrial and agricultural water conservation efforts<br>• Status of wastewater reclamation efforts | The District established a Water Technical Advisory Committee (WATRTAC) with representatives from the County and each of the cities in the County (Calistoga, St. Helena, Yountville, Napa and American Canyon). The mission of the WATRTAC is to provide a venue to openly discuss regional water supply issues and projects, including but not limited to issues such as updates on State Water Project deliveries, contract administration, water purchase opportunities, DWR activities/projects to increase supply and deliveries, NBA studies, and SWP contractor concerns and positions. |
| Water Needs<br>The County should update the County-wide water needs analysis every five years to track the baseline water use and establish revised alternative demand projections, as necessary | No action taken until authorization for the 2050 Study to begin. |
| Water Supply<br>The County should consider the following future activities: | |
| • Encourage or sponsor additional investigation of the smaller groundwater basins to refine safe yield estimates | County has a Groundwater Ordinance which requires a demonstration of available groundwater supply (and associated metering of usage), from wells in the MST area, prior to use approval. County has also required metering on a few wells in the Carneros area. County has entered into a cooperative program with USGS to evaluate the Milliken-Sarco-Tulucay Basin. County also continuing to collect water level data from key wells in the main basin area. |
| • Track exploration for new wells by municipalities and wineries with regard to depth, production and water quality | County does track new wells proposed by municipalities and wells in MST/Carneros areas. |
| • Inventory County storage facilities beyond the five major municipal reservoir, with special focus on facilities that derive water from the Napa River | The 1992 study evaluated the feasibility of diverting Napa River water to off-stream storage. This Study evaluated and provided an inventory of potentially available divertible flows, water rights and an inventory of some 40 potential storage sites. (See Table 7 for 1992 Study recommendations.) However, with the current listing of steelhead as a threatened species (under the Federal Endangered Species Act of 1997) and the increased regulatory concerns with maintaining habitat areas and flushing flows, it is questionable whether the river diversion projects evaluated in the 1992 study are still viable water supply alternatives. |
| • For County development use permits, ensure that drainage is retained on site to encourage groundwater recharge, and the adequacy of water supply is fully demonstrated | County has various regulations that require surface water drainage to be controlled. Although these regulations don't necessarily require that all drainage be retained on-site, any efforts to reduce the rate at which flow leaves the site will further encourage localized groundwater recharge. County has developed and adopted an ordinance requiring the demonstration of adequate groundwater supplies if a new development intends to use groundwater as its source of supply. |
| • Negotiate with Solano County for allocation of the water rights reservation from Lake Berryessa considering the water needs and supplies of the Lake Berryessa Subarea | Adjudication settlement with Solano County has resolved this issue. |
| • Serve as the lead agency in firming up the North Bay Aqueduct supply. Incorporate St. Helena into the contract entitlement. | In January 2000, the City of St. Helena entered into a water supply contract with the District to obtain 1,000 acre-feet per year of State Water Project entitlements. However, to date, St. Helena does not have firm transmission capacity in the NBA. |
| • Encourage the implementation of Napa Sanitation/American Canyon Water District's reclamation plans at the joint Soscol Wastewater Plant. | Both Napa Sanitation District and American Canyon Water District are implementing recycled water plans, however, each entity is doing this independently, not at a joint water reclamation facility. |
| • Investigate the advantages of conversion of the County into a County Water Agency. | On-going transition. County Board has been converted from 5 Supervisors to an 11 member District Board which now includes representatives from each City/Town, and this District Board has now taken a more active role in County-wide water issues. |

**Table 8. Overview of Previous Study Assumptions and Considerations for 2050 Water Resources Study**

| Issue | Key Assumptions in Previous Studies | Considerations for 2050 Water Resources Study |
|---|---|---|
| Study Period | • Projections made to the year 2020 | • Projections will be made to the year 2050 |
| Study Area | • Entire Napa County area, including North Napa Valley Subarea, South Napa Subarea and Lake Berryessa Subarea | • Only North and South Napa Valley areas to be included.<br>• Lake Berryessa area and rural Angwin are not included. |
| M&I Water Demands | • Projected to the year 2020 using average per capita water use for 1985 through 1989 and extrapolated using ABAG and CDOF population projections. | • Updated "high" and "low" projections to be developed approximately every ten years to the year 2050<br>• Projections to be based on recent water use data, current conditions and updated General Plans obtained from each City. Water savings from long-term conservation programs to be factored in (if applicable).<br>• Will consider growth ordinances put in place by several cities and recent growth surge in American Canyon.<br>• Demand management measures which may be implemented in dry years will be considered. |
| Agricultural Water Demands | • Projected based on then existing irrigation methods and 1989-2005 Napa County General Plan Land Use Map.<br>• Assumed vineyard planting at 500 to 600 vines per acre.<br>• Unit water use factors for each subarea were assumed to be constant for the entire subarea, | Updated agricultural water demand projections will be developed based on:<br>• Unit water use factors based on subareas (North Valley, Mid Valley and South Valley) and microclimates (hillside vs. valley).<br>• Potential densification of vineyard plantings from 500 to 600 vines per acre to average of 900 vines per acre, and up to 1,500 to 2,000 vines per acre in some areas.<br>• Conversion to drip irrigation and resulting changes in irrigation water use. |
| Water Supplies | | |
| • Groundwater | Use of groundwater as a municipal supply source was considered limited. | • Groundwater basins in Northern Napa Valley area, Milliken-Sarco-Tulucay area and Carneros area will be further evaluated based on available data. |
| • River Diversion | Maximizing of existing diversions and new off-stream diversions were considered. | • Viability may now be limited due to current listing of steelhead as a threatened species and increased regulatory concerns with maintaining habitat areas and flushing flows. |
| • Municipal Reservoirs | Expansion of municipal reservoirs was recommended by raising of dams (Milliken, Lake Hennessey, Bell Canyon and Kimball). | • Yield curves to be re-evaluated.<br>• Viability of raising dams may be limited due to current environmental concerns and possibly increased stream releases. |
| • Imported Water | Limitations consisted of delivery probabilities (as low as 55 percent of contract entitlements). | • Additional State Water Project entitlements purchased.<br>• Probability of deliveries from the State Water Project will be updated.<br>• The impact of capacity constraints in the NBA on supply deliveries will be evaluated.<br>• Expansion of the NBA will be considered. |
| • Reclamation | Limited expansion of then existing reclamation capabilities was assumed. | • Will evaluate timing and quantities of uncommitted, highly-treated recycled water which might be available for use as a potential non-potable water supply source.<br>• Will consider locally-generated and available recycled water resources as a possible source of water to meet non-potable landscape irrigation and/or agricultural needs.<br>• Will evaluate current NSD expansion of recycled water pipelines in the City of Napa, MST area and Carneros area. |
| • Additional Supplemental Supplies | The following projects were considered:<br>• Water Conservation (25 percent use cutback)<br>• Groundwater as a Municipal Supply<br>• Maximizing River Diversions<br>• Lake Berryessa Supply Increase<br>• Firming up of NBA Supply<br>• In-County Water Transfers<br>• Additional Wastewater Reclamation<br>• New Off-Stream reservoirs<br>• Imported Surface Water from Central Valley Project | The following projects will be considered:<br>• Milliken-Sarco-Tulucay Conjunctive Use Project<br>• Use of Untreated Water from Milliken Reservoir for non-potable landscape and agricultural demands in lieu of pumping groundwater<br>• Multi-Agency water exchange or supplemental water supply projects developed between Calistoga/St. Helena and the City of Napa, Yountville/Veterans Homes and the City of Napa, and possibly the agricultural community, NSD and the City of Napa.<br>• Possible use of groundwater as a municipal supply.<br>• Possible Enlargement of NBA<br>• Increased use of Recycled Water for non-potable irrigation purposes<br>• Possible storage of excess NBA water deliveries.<br>• Acquisition of additional imported supplies.<br>• Acquisition of dry year options.<br>River diversion projects may be less viable due to current listing of steelhead as a threatened species and increased regulatory concerns with maintaining habitat areas and flushing flows. |

Plate 1. Project Area

See data CD for Plate 1.pdf