Appendix I Water Supply Assessment

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DEL ROSA MUTUAL WATER COMPANY
and
WEST TWIN CREEK WATER COMPANY

WATER SUPPLY ASSESSMENT

For

ARROWHEAD SPRINGS DEVELOPMENT

February, 2005
Revised: March, 2005
Revised: 5/13/2005

Prepared By:

DEL ROSA MUTUAL WATER COMPANY
AND
WEST TWIN CREEK WATER COMPANY

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SB 610 PUBLIC WATER SUPPLIER CERTIFICATION

The Del Rosa Mutual Water Company (DRMWC) is the agency responsible for retail domestic water supply and the West Twin Creek Water Company (WTCWC) is the agency responsible for the irrigation water supply to the proposed Arrowhead Springs Development (Project). We have prepared the attached Water Supply Assessment for the subject project as required by Sections 10901 through Section 10915 of the State Water Code.

Based on this assessment, we certify that the information and findings including therein fairly represent the DRMWC's and WTCWC,s ability to meet the long-term water supply requirements of the DRMWC, including build-out of the Project. There is sufficient water available to meet the demands of the DRMWC at build-out, through normal, dry and multiple dry years through the year 2025. The water supply capabilities and enhancements that would apply to the Project are documented for in the "Domestic Water, Irrigation Water, Wastewater and Recycled Water Facility Plan for Arrowhead Springs Property", dated August 2004, and the attached Water Supply Assessment.

This Certification is based upon data maintained by the Del Rosa Mutual Water Company, West Twin Creek Water Company, San Bernardino Valley Municipal Water District, San Bernardino County Flood Control District and California Department of water Resources.

This certification does not guarantee that water will be available on a constant basis as supply is subject to emergencies, natural disasters and other events not under the control of the DRMWC or the WTCWC. Water service is also subject to payment of applicable fees and completion of certain improvements, which may be determined to apply to the Project.

This certification is non-transferable and expires upon termination of the Specific Plan, Parcel Map or Tentative Map. This Certification is non-binding during a declared water shortage or emergency.

_____ _____

Michael Groves, Vice President
Del Rosa Mutual Water Company

Date of Approval

_____ _____

Michael Groves, Vice President
West Twin Creek Water Company

Date of Approval

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SECTION I

INTRODUCTION

1.01 Introduction

The Arrowhead Springs Development (Project) will be planned through a Specific Plan, which will be processed through the City of San Bernardino. The propose Project is located partially within the City of San Bernardino, San Bernardino County. The total project encompasses about 1,916 acres, of which 1,400 acres is devoted to Open Space/Watershed Property. The balance of the property, 506 acres will contain the existing Arrowhead Springs Hotel and proposed development area. The development area will contain a Conference Center, Spa-Health Club and Swimming Pool, Residential areas, 18-hole championship sized golf course, International Hotel, Corporate Office Complex, and a Shopping Complex. The Project is located in the foothills of the San Bernardino Mountains at the mouth of Waterman Canyon.

The City of San Bernardino is responsible for the preparation of the Environmental Impact Report (EIR). The EIR includes an assessment of utilities, including water supply. Recent legislation, Senate Bills 221 and 610, effective January 2002, requires that a Water Supply Assessment be prepared to document the sufficiency of an available water supply for the water supplier and the Project. There exist on the property, the Del Rosa Mutual Water Company (Company), which has the powers to serve domestic water and wastewater services and this Company will be the providing agency. The West Twin Creek Water Company is also existing and on the property and will be providing the irrigation water to the Project. The new law requires that a water provider furnish substantial evidence that water supplies are available to meet the demands of new and existing customers, through normal, single dry and multiple dry years for a 20-year period. There will be a holding Company for the DRMWC and the WTCWC called the Arrowhead Springs Water And Power Company. This holding company will supply the water for heating and related purposes. The holding Company is owned wholly by the Project.

The Del Rosa Mutual Water Company has not prepared and adopted an "Urban Water Management Plan" as required by law since the Company is not providing domestic water at this time. When domestic service commences, an Urban Water Management Plan will be prepared and filed with the State of California.

The Del Rosa Mutual Water Company will provide domestic water service to the Project and no one else except for the City of San Bernardino who currently owns 583 shares. The balance of the shares, are currently owned by the Project and they will be issued to the new customers in the Project as they become active. The Project is in control of and owns all of the shares of stock in the West Twin Creek Water Company and shares will be distributed to irrigation customers.

Contained in this report is a discussion on existing Company water demands, projected Company water demands, entitlements, and existing supplies needed to meet future demands. In addition, the report includes a discussion of the reliability of each water supply. Lastly, the report includes a conclusion of the Water Supply Assessment, a list of reference material and an appendix.

SECTION 2

WATER DEMAND, SUPPLIES AND PROJECT INFRASTRUCTURE

2.01 Population and Water Demand

Currently, the Project area has a skeleton crew to maintain the properties along with offices for the firms who are leading the development process for the property owners. Water is being supplied to the Project area through a Water Permit from the County of San Bernardino, Department of Environmental Health. The growth of the Del Rosa Mutual Water Company and West Twin Creek Water Company will be in direct response to the development area of the project.

The water use at the present time is for three purposes: Domestic use, irrigation and heating from the geo-thermal wells on the property. During the calendar years 2001, 2002 and 2003, the average use, for these three purposes are: Domestic-81.27 acre-feet; Irrigation-1,768.33 acre-feet; Heating from geo-thermal wells-28.57 acre-feet. It is planned that the water currently being utilized for irrigation by the Del Rosa Mutual Water Company will be converted to Domestic use. The geo-thermal wells will be continued to be used for on-site heating of structures as it has been for many years and irrigation water will be developed by the West Twin Creek Water Company from West Twin Creek surface water sources, recycled wastewater and wells on and off the property

The population and water requirements will be in direct response to the development of the Project area. There will be a mixture of land uses where there will be a permanent population and most important, a transient population using the hotels and short term housing. So as to not distort the population demand for water, the projected population will be shown along with equivalent dwelling units (EDU's) will be shown over the 20-year projected water use period. The current projection for build-out of the project is a 10-year period. This is a projection only and is subject to future economic and marketing conditions as the Project goes forward.

Table 2-1 shows the development of the project along with projected population and the EDU's that will be developed over the next 20-year period. The requirements for Domestic and Irrigation water will be shown. The geo-thermal well requirement will remain constant; however, the development of future geo-thermal wells remains a probability to reduce the requirement for other energy requirements for heating and probably for cooling.

TABLE 2-1
POPULATION AND WATER DEMAND

Year	Population	EDU's	Domestic	Irrigation	Heating	Total
2005	25	N/A	82	1,750	29	1,861
2010	1,920	1,280	918	1,000	29	1,947
2015	3,450	2,405	1,724	1,521	29	3,274
2020	3,962	2,781	1,993	2,042	29	4,064
2025	3,962	2,781	1,993	2,042	29	4,064

Note: All quantities of water shown in acre-feet

All of the wastewater generated on the Project will be treated on the Project to meet Title 22 standards, recycled and used for irrigation purposes. The estimated quantity of wastewater at the build out of the project is 977 acre-feet per year. Irrigation water will be provided by the West Twin Creek Water Company, a Mutual Water Company. It will be sourced from recycled water from the wastewater treatment plant, from West Twin Creek, and supplemental wells. There is a warm water well known as the "Steam Cave Well" which will be utilized for irrigating a fuel break area separating the mountain brush area from the Project. Del Rosa Mutual Water Company will provide the wastewater services and after treatment, the recycled water will be transferred to the West Twin Creek Water Company.

The Arrowhead Springs Development water demands are shown in Table 2-2. The average annual domestic demand is 1,779,370 gallons per day or 1,993 acre-feet per year. The maximum day demand is 3.56 mgd and the peak hour demand is 7.17 mgd. The irrigation demand is estimated at 3.308 mgd during the peak month of July and the annual requirement is 2,030 acre-feet.

TABLE 2-2
ARROWHEAD SPRINGS DEVELOPMENT WATER DEMANDS

Annual Demand	
Domestic (DRMWC)	1,993 Acre-Feet
Irrigation (WTCWC)	2,042 Acre Feet
Heating	29 Acre-Feet
Daily Domestic Demands	
Average Daily Demand	1.78 MGD
Maximum Day Demand	3.56 MGD
Peak Hour Demand	7.17 MGD

2.02 Water Rights

The Arrowhead Springs Development project is located just northerly of the northerly line of the adjudication of the San Bernardino Basin through the "Orange County Water District vs. City of Chino, et al. Case No. 117628 Settlement Documents" and the physical solutions to this case are set forth in the "Western Municipal Water District vs.

East San Bernardino County Water District et al. Case No. 78426 of the County of Riverside.

The present owner, Campus Crusade For Christ has acquired the Carpenter Right in East Twin Creek, the majority of shares in the Del Rosa Mutual Water Company and all shares in the West Twin Creek Water Company (Waterman Canyon Creek). The City of San Bernardino has 581 Shares in Del Rosa Mutual Water Company. The two mutual water companies have been diverting water from these sources long before December 19, 1914, when the State Water Commission Act became effective and the appropriators of surface waters were required to use the application, permit and license process. All prior appropriators were not required to use this new process. These are generally known as the pre-1914 rights.

A Special Use Permit was issued by the United States Department of Agriculture, Forest Service, which covers 0.05 acres of land and 0.13 miles of pipeline issued for the purpose of "maintaining a water transmission conduit, intake dam, service trail and other appurtenances to convey water from Coldwater Creek to Permitee's private land". The Special use permit pertains to a portion of the SW1/4 of the SE1/4 of Section 1. T1N, R4W and is dated June 1976. The permit supersedes a Special Use Permit designated: "Campus Crusade for Christ, Water Transmission."

The waters have been significantly utilized by means of a dam located in the Coldwater Creek (a tributary of East Twin Creek), which diverts water from Coldwater Canyon to the Arrowhead Springs property through a pipeline. This source of water served the historic Arrowhead Springs Hotel, outbuildings and grounds for many years prior to 1914 and stopped using domestic water from that source when the State Health Department required treatment. Irrigation water continued to be supplied and continues to be supplied from that source today. This water source, is planned to be diverted to a new water treatment plant.

The Judgment in Case 31798 states that all lands of Arrowhead Springs Corporation, Ltd., "are contiguous and, except such portions thereof as lie outside of the watershed of East Twin Creek, are bordering on and have access to, and are riparian to said East Twin Creek....". East Twin Creek as defined in the Judgment includes such principal tributaries as Strawberry Creek, Coldwater Creek, Hot Springs Creek and other unnamed tributaries and springs.

In accordance with information furnished by Ham Hall (1888, p 317) and Scott 77-398, Del Rosa Mutual Water Company posses a pre-1914 right. The water, by virtue of Judgment 31798, October 19, 1931, also has adjudicated rights. Del Rosa Mutual, in addition to diverting water, extracted from ground water supplies. When Del Rosa Mutual Water Company was transferred to Mr. Warner Hodgden, East San Bernardino kept and maintained the Del Rosa Mutual well, except the well on the water company's property at its intake.

During the period that East San Bernardino County Water District (District) owned shares in both West Twin Creek Water Company and Del Rosa Mutual Water Company, District allowed the surface water not used for irrigation in the two Mutual Water Companies to flow into the East Twin Creek Spreading grounds below 40th Street to recharge the groundwater basin for later recovery. Water not diverted from West and East Twin Creeks was allowed to flow downstream where it was percolated into the San Bernardino or Bunker Hill Basin for later recovery by District, who claimed that portion of the water right through its proportionate share of stock ownership. Today, District owns no stock in either West Twin Creek Water Company or Del Rosa Mutual Water Company.

There are a four decreed water rights in Waterman Canyon, upstream from the Arrowhead Springs Property in the June 14, 1894 Judgment. These rights are:

M.E. Benson, West Twin Creek, 10 inches, 15 acres
G.P. Thomas, Cold Creek, 8 inches, 12 acres
C.L. Embry, Cold Creek, 8 inches, 12 acres
Milton Vale, West Twin Creek, 8 inches, 5 acres

Use of the, above described, water was confined to certain acreages of apple orchards and incidental domestic use by the above users.

Sather Banking Co., West Twin Creek, 4 inches, not restricted was confined to domestic, sanitarium, stock watering, bathing and ornamental uses on the Waterman Ranch, which was and is a part of the Arrowhead Springs Hotel Property. The Judgment also decreed this company with this use of the stream flow for bottled water.

West Twin Creek Water Company., West Twin Creek-Unlimited. This Company was decreed the right to use all of the water of West Twin Creek after the above-mentioned uses were satisfied.

Arrowhead Reservoir and Power Company, West Twin Creek, 1 inch, Water Trough, probably at the old Lower Toll House where Waterman Canyon Road first crossed Waterman Creek.

The rights shown above substantiate that the Arrowhead Springs Development Project controls the water in West Twin Creek (Waterman Canyon) and East twin Creek through the ownership of the Stock in West Twin Creek Water Company, Del Rosa Mutual Water Company and rights obtained through the ownership of the property.

It will be the duty of West Twin Creek to patrol the upper reaches of Waterman Canyon Creek to see that, except by the aforementioned water right holders, no water is taken from the stream

2.03 Existing Water Supply

Currently, the water supply to the Project area is from a private, single owner water system under permit from the County of San Bernardino, Department of Environmental Health. The Domestic Water supply is from wells constructed on the Project property. Irrigation water is from surface water supplies in Coldwater Canyon and East and West Twin Creeks. Water is produced from geo-thermal wells for use in heating the Hotel, supporting structures and swimming pool. A listing of the Domestic, Heating and Irrigation water supplies are shown separately in Tables 2-3 through Table 2-5 below:

TABLE 2-3

EXISTING DOMESTIC WATER SUPPLY
All quantities shown in acre-feet

Well Name	2001	2002	2003
Rods' Well	6.2	5.8	4.9
Football Field	4.5	4.3	4.1
Rowan Well	58.0	55.0	51.0
Strawberry Creek Well	17.6	17.3	17.1
TOTAL	86.3	82.4	77.1

TABLE 2-4

EXISTING GEO-THERMAL WATER SUPPLY
All quantities shown in acre-feet

Well Name	2001	2002	2003
Hot Well	11.3	11.4	11.5
Geo Mud Bath Well	17.4	17.1	17.0
TOTAL	28.7	28.4	28.5

TABLE 2-5

EXISTING IRRIGATION SUPPLY
All quantities shown in acre-feet

Source Name	2001	2002	2003
Del Rosa Mutual	1,735	1,785	1,785

2.04 Groundwater

The domestic water for the Project area is from wells constructed in the boundaries of the site. These wells are relatively shallow and are constructed into the fractured rock underlying the soil mantle. The wells are low producers but are capable of furnishing the needed supply at this time. Domestic water production from these wells for the Project will not meet State Health Department regulations and the supply must be from other sources.

The Del Rosa Mutual Water Company existing service area encompasses parts of the San Bernardino Basin which overlays significant groundwater basins where the mutual has produced water in the past. The East Twin Creek Spreading Grounds lies over the San Bernardino Basin where the water not diverted for either domestic or irrigation uses will percolate into the basin. New wells constructed by Del Rosa Mutual Water Company will recover these percolated flows to provide water to the Project.

2.05 Imported Water

The Del Rosa Mutual Water Company's existing service area is within the San Bernardino Valley Municipal Water District who was formed to be the distributor of State Project Water in the area. The district has contracted with the State of California for 102,600 acre-feet of State Project Water annually.

The San Bernardino Valley Municipal Water District has constructed the "Foothill Feeder" pipeline to provide water to the easterly part of the San Bernardino Valley. The San Gorgonio Pass Water Agency contracted for capacity in this pipeline for the transport of State Project Water to their agency. This pipeline is located southerly of the Project and discussions may be held between the Project owners and the San Bernardino Valley Municipal Water District regarding any future connections, if needed.

2.06 Recycled Water

The Arrowhead Springs Development Project plans to construct a Wastewater Treatment Plant, which will treat all of the wastewater to meet Title 22, California Administrative Code and utilize all of the effluent for irrigation purposes in accordance with the regulations of the State Department of Public Health, Drinking Water Division. The use of the effluent will be in locations where runoff will not reach waterways of the United States, but remain within the project area. It is presently projected that 977 acre-feet per year of recycled water will be available when the Project is completed and occupied.

2.07 Project Demands and Supplies

The Del Rosa Mutual Water Company and West Twin Creek Water Company have rights to develop additional water and will require the developer to pay impact fees and/or construct infrastructure to develop local water to meet the Project demands. To serve the Arrowhead Springs Development, new facilities are required for water service. To serve

the Project, The "Domestic Water, Irrigation Water, Wastewater and Recycled Water Facility Plan for Arrowhead Springs Property, Dated August, 2004" was prepared to determine the water demands and facilities to serve the Project.

Facility improvements required to serve the Arrowhead Springs Development Project are:

Domestic Water

- Two or more vertical wells constructed in the San Bernardino Basin
- 0.5 MGD surface water treatment plant
- 1.0 MGD surface water treatment plant
- Two-0.75 MG reservoirs
- One 3.20 MG reservoir
- One 0.50 MG reservoir
- One 3,800 GPM booster station
- One 3,500 GPM booster station
- One 500 GPM booster station
- One 200 GPM booster station
- Pipelines ranging in size from 18-inch to 8-inch in diameter
- Appurtenances such as pressure regulators, fire hydrants, blow-offs, air & vacuum assemblies and metered water services and other accessories.

Irrigation Water:

- Construction of a new weir in West Twin Creek (now Waterman Canyon Creek) and contract with the USGS to measure the flows passing the weir.
- Re-construct a water intake above the new measuring weir to divert flows during periods when water is flowing in the stream for irrigation use.
- Install a pump in the Steam Cave Well to discharge water to reservoir(s) providing water to the fuel break area.
- Construct a series of reservoirs to receive irrigation water to provide irrigation service to the area.
- Provide a network of pipeline of various sizes to convey the irrigation water to the reservoirs and point of use for the various irrigation water users.
- Construct booster stations at needed locations to move the irrigation water to the reservoirs for use.
- Construct an interconnection with the Del Rosa Mutual Water Company recycled water pipeline to receive and integrate the recycled water into the West Twin Creek Water Company Irrigation System.

The Del Rosa Mutual Water Company and West Twin Creek Water Company will both need to realign the service areas for each company. The final realignment will include the boundary of the lands within the Arrowhead Springs Development, including the watershed lands and offsite facilities. This will be included with the petition to activate any necessary functions such as domestic water and wastewater services on the project.

SECTION 3

RELIABILITY OF WATER SUPPLIES

3.01 General

The Del Rosa Mutual Water Company, the West Twin Creek Water Company and the region are facing increasing challenges and opportunities in its role as stewards of water resources in the region. Each water basin and drainage area from which water is acquired has unique challenges. Each area is described below:

3.01.A San Bernardino Basin

The Del Rosa Mutual Water Company and the West Twin Creek Water Company plans to extract water from the San Bernardino Basin in a quantity matching the amount percolated from waters discharged from West and East Twin Creeks and percolated into the San Bernardino Basin at the East Twin Creek Settling Basins, owned and operated by the San Bernardino County Flood Control District. The Company will be working in cooperation with the water management agencies within the San Bernardino Basin to achieve water supply reliability, water quality and watershed management goals for the Santa Ana River Watershed.

The Southern California region faces a challenge between satisfying its water requirements and securing its firm water supplies. Increased environmental regulations and collaborative competition for water outside the region have resulted in reduced supplies of imported water. Continued population and economic growth increases the water demand within the region, putting even a larger burden on local supplies.

Within the San Bernardino Basin, there are four areas of pollution of the groundwater: (1) Lockheed Perchlorate/VOC Plume; (2) Norton Air Force VOC Plume; (3) Santa Fe RXR VOC Plume; and, (4) the Camp Ono/Newmark Plume. The Santa Ana Regional Water Quality Control Board is working with the polluters to clean up these plumes. The City of San Bernardino is working on a proposed Consent Decree in *City of San Bernardino vs. United States of America,* C.D. Cal. Case No. CV 96-8867 (MRP); *State of California, on behalf of the Department of Toxic Substances Control vs. United States of America,* C.D. Cal. Case No. CV 96-5205 (MRP) (Consolidated), with the Environmental Protection Agency. A Management Zone is proposed in the San Bernardino Basin, which includes areas of controlled water extraction and water spreading. The spreading of the West and East Twin Creeks water in the East Twin Creek Spreading Ponds is within the management zone for water spreading. The construction of proposed wells will be outside the Management Zone. The wells will be across gradient from the Camp Ono/Newmark Plume, which concerns the Management Zone. The Del Rosa Mutual Water Company and West Twin Creek Water Company

The Metropolitan Water District of Southern California (MWD) installed a pipeline across East Twin Creek and constructed a tunnel through Harrison Mountain for delivery of State Water. The tunnel has been constructed with concrete plates and the annulus between the concrete liner and the tunnel wall has been grouted solid. During construction of the tunnel, the water is allowed to be discharged outside the tunnel. At this time, we do not know the effects this may have on any wells or springs. The court in the condemnation of the right-of-way has retained jurisdiction in this matter and a monitoring program has been set up and the results given to the judge in this matter. Until a determination on the effects of the tunnel is made, MWD will remain a defendant and will be required to make good any damages.

Water from the East Twin Creek is not a constant flow but will vary during the year and from year to year. By percolating water into the San Bernardino Basin and pumping out a like amount as needed, a reserve amount will be maintained so the highs and lows of the surface water flow will be evened out over time.

The long-term average (78 years) has averaged 4,262 acre-feet per year. The listing of the recorded flows from 1921 through 1998 is attached in the appendix.

3.01.C West Twin Creek (Waterman Canyon) Drainage

Within the West Twin Creek Drainage, There is human habitation along the stream in Waterman Canyon and wastewater disposal is by septic tanks and underground disposal. Most likely, the effluent from the underground disposal systems, are intruding into the stream flow. This will deter the diversion of this water and treatment for domestic purposes. For this reason, the West Twin Creek flows will be used for irrigation water to supplement the recycled water from the wastewater treatment plant. Excess flows will be allowed to percolate into the East Twin Creek Spreading Basin for future extraction.

The long-term average (79 years) has averaged 2,491 acre-feet per year. The listing of the recorded flows from 1920 through 1998 is attached in the Appendix.

3.02 Santa Ana Regional Water Quality Control Board

The Santa Ana Regional Water Quality Control Board (SARWQCB) is responsible for the development and enforcement of water quality objectives to meet the requirements of the Federal Clean Water Act, California Porter-Cologne Act and the National Pollution Discharge Elimination System (NPDES).

In 1975, the SARWQCB completed the Water Quality Control Plan for the Upper portion of the Santa Ana Watershed (above Prado Dam). The plan outlines specific water quality management actions to address water quality. These actions include the construction of a large well field and desalters in the lower part of the basin to extract and treat poor quality, the construction of a pipeline to export brines from the upper basin to the ocean,

and the use of large volumes of low total dissolved solids water for groundwater recharge. The desalter water projects provide (through treatment) unusable water to be usable for potable water purposes.

The SARWQCB has been monitoring the cleanup of the plumes of contaminates in the San Bernardino Basin. Contaminated water is being pumped from the basin and treated so it can be used for potable purposes. The with-drawl of this water is slowing the migration of the water and reducing the total amount of contaminated water in the basin. In some cases, the original polluter of the water is paying for the cleanup.

Since 1975, a brine line (Santa Ana Interceptor or SARI line) has been constructed and has been in operation to receive brine and conduct it to the ocean. In addition, the Arlington Desalter removes the salts by reverse osmosis and the resulting brine that is removed is placed in the SARI line. The finished water is of potable quality.

3.03 Santa Ana Watershed Authority

The Santa Ana Watershed Authority (SAWPA) was formed in 1972 as a joint powers agency for the purpose of coordinating regional planning within the Santa Ana Watershed to address water quality and supply improvements. SAWPA is made up of five major water supply and wastewater agencies within the Santa Ana Watershed: Eastern Municipal Water District, Inland Empire Utilities District, Orange County Water District, San Bernardino Valley Municipal Water District and Western Municipal Water District. Since the early 1970's SAWPA has held a key role in the development and update of the Regional Basin Plan for the Santa Ana Regional Water Quality Control Board. SAWPA conducts water related investigations and planning studies and builds facilities needed for regional water supply, wastewater treatment and water quality remediation. Current studies include the Chino Basin Water Management Study, The Colton-Riverside Conjunctive Use Project and an investigation of water quality in Lake Elsinore and studies on the nitrogen and organic carbon levels in the Prado Basin.

To facilitate development of improvements to the local water system, SAWPA adopted an Integrated Resource Plan in June 1998. SAWPA conducted a stakeholder process, which resulted in identifying individual potential projects with a total estimated cost of one billion dollars. The State Water Bond Act (Proposition 13), was approved by voters in March 2000. This act included 235 million dollars to the Southern California Integrated Watershed Program (SCIWP). On July 17, 2000, the State Water Resources Control Board (SWRCB) entered into a memorandum of understanding to set forth general procedures and criteria for selecting projects to be funded by SCIWP for the Santa Ana Watershed. On August 01,2000, SAWPA approved an Initial Project Priority List of 44 projects with an estimated cost of 689 million dollars, and adopted a policy to ensure that the list is reviewed periodically to provide for timely and cost effective use of the funds.

3.04 San Bernardino Valley Municipal Water District

The San Bernardino Valley Municipal Water District (SBVMWD) was formed for managing the water resources of the San Bernardino Basin and contracting for State Project Water with the State Water Resources Control Board. SBVMWD has contracted for 102,600 acre-feet of State Project Water annually to supplement the natural water supply of the area. SBVMWD has participated with the San Gorgonio Pass Water Agency for capacity in a portion of the pipeline that delivers water to the pass along with additional pipelines in the area to deliver water to local suppliers and area for groundwater recharge.

The SBVMWD and Western Municipal Water District (WMWD) have submitted an application for storm waters stored behind the new Seven Oaks Dam, located near the mouth of the Santa Ana Canyon, controlling waters in the Santa Ana River during storm flows. If successful, the SBVMWD would use 72 percent of the water with WMWD using the other 28 percent (Percentages derived from the 1969 settlement). WMWD is currently reviewing alternatives for taking delivery of the water from Seven Oaks Dam and State Water stored in the San Bernardino Basin via Metropolitan Water District of Southern California. One alternative involves taking delivery of the water from the Bunker Hill Pressure Zone near I-10/I-215 interchange in exchange for Seven Oaks water, from and/or State Project Water being spread in the San Bernardino Basin Area. This alternative would require construction of a pipeline from WMWD to the pressure zone in the Bunker Hill Basin. WMWD has been reviewing alignment alternatives and has tentatively named the pipeline "The Riverside-Corona Feeder". This pipeline could be used by the City of Riverside to obtain more water from the Pressure Zone. This additional production from the Pressure Zone would help the SBVMWD better manage the San Bernardino Basin area. The SBVMWD may be able to save money by participating in the Riverside-Corona Feeder.

The SBVMWD has facilities in place to transport water to the Mouth of the Santa And Canyon and percolate water into the alluvial area of the streambed and have done so in the past.

SBVMWD has been active in the planning for the future facilities and water supplies in the San Bernardino Basin to ensure that a viable supply of water is available for the local water supply agencies.

3.05 San Bernardino Valley Water Conservation District

The San Bernardino Valley Water Conservation District (SBVWCD) was formed to protect and replenish the San Bernardino Groundwater Basin with rainfall and storm-water from the drainage area to the Santa Ana River and Mill Creek in the areas below the mouth of the Santa Ana Canyon. SBVWCD uses a system of percolation ponds and spreading grounds to augment the natural capacity of the region to capture runoff for the recharge of the groundwater basin. SBVWCD promotes water conservation through public education programs.

3.06 City of San Bernardino

The City of San Bernardino (CSB) with the aid of the United States Environmental Protection Agency (EPA) has taken on the task of removing the polluted water from the Camp Ono/Newmark Plume, treating the water to drinking water standards thus slowing or stopping the migration of the plume. The CSB is in the process of completing the "Agreement to Develop and Adopt an Institutional Controls Groundwater Management program," ("Bunker Hill Purveyors Agreement"). A very general location of the "Management Zone" proposed by the CSB is the City Limits line on the North, Mill Street on the South, San Jacinto Fault on the West and Harrison Avenue on the East.

The "Management Area" encompasses that segment of the Arrowhead Springs Development currently within the City Limits of CSB. The "Bunker Hill Purveyors Agreement" will place controls on the development of wells and extraction of water within the Management Zone along with the spreading of water.

Wells proposed by the Arrowhead Springs Development are planned easterly of Harrison Street and are outside the management zone. The spreading and percolation of waters from East and West Twin Creeks into the East Twin Creek Spreading Basin is within the Management Zone.

SECTION 4

WATER SHORTAGE PLANS

4.01 Del Rosa Mutual Water Company Water Shortage Contingency Plan

The Del Rosa Mutual Water Company has not prepared a "Water Shortage Contingency Plan" since it is not yet providing the service of domestic water. During the planning and implementation of the water system and Water Company, the following items are proposed:

- Create and maintain an "Emergency Fund" within the Water Company so monies are available immediately in times of emergency and respond to the emergency so that a wait for funding is not a deterrent.
- Create and maintain a "Contamination Fund" within the Water Company so monies are available to respond to the possibility of contamination reaching water supply points and maintain a drinking water supply.
- Within the operations of the water system, install a SCADA System that will include notification of water company personnel in case of operations or equipment breakdown 24 hours a day so company response is immediate to maintain a constant supply of water. This will include any unauthorized entry into any pumping plant or storage facility of the Water Company. This is done to prevent many of the water outages. There will be earth movement detectors to shut down water storage facilities in case of major earthquakes, saving water in storage for further use.
- Identify alternate sources of water so if an emergency does arrive, the route to follow for additional supplies is set out. Alternatives sources of water would be from additional wells constructed in the San Bernardino Basin and purchase of State Project Water through the San Bernardino Valley Municipal Water District.

Even though not required, West Twin Creek Water Company will prepare a Water Emergency Plan so the company will have direction where to go to develop additional sources of water. Additional water supply could be from the construction of wells in the San Bernardino Basin and the purchase of State Water from the San Bernardino Valley Municipal Water District.

4.02 Water Conservation as a Reliable Water Source

An active water conservation plan and education must be adopted by the Water Company to reduce the wasting of water. During construction of structures on the Project, water saving devices such as low water use toilets, showerheads and faucets that shut off when no one is using the water are large sources of waste.

On-site landscaping should require draught tolerant plants and drip irrigation should be requested by the water company to create a water-wise irrigation program. The Water Company should prepare a "Water Conservation Hints" booklet that would be given to

developers and new owners of property on the Project. Many of these hints are available through the American Water Works Association and other regional water agencies.

The Water Company needs to initiate a "In-Home-Water-Audit" program to review a customer's in-home and landscape water use and habits. The audit can be performed at either the request of the customer or may be suggested by office personnel if a higher than normal water meter reading has been verified. Once an audit has been performed, the Water Company will follow up and check the results of suggestions and recommendations.

4.03 Unaccounted-For-Water

Upon the start of operations, the Water Company must review unaccounted-for-water in the domestic and irrigation water systems. A continuous accounting of the water source production against the water delivered to customers will indicate many cases of wasted water. A new water system should continuously have an unaccounted-for-water amount less than three percent of the water production. After the system has been in operation, the amount should not be grater than five percent.

4.04 Water System Interconnections

The Del Rosa Mutual Water Company and the CSB may wish to implement a connection between the two water systems. The CSB owns shares in the Water Company and their water in accordance with the share ownership could be transferred to them and in case of an emergency in the water company, water from the CSB could be transferred to the domestic water system. Any connection between the two would require an agreement for water rates of flow, quantities and payment of water.

4.05 Reliability Comparison

There has been insufficient water use during the past to compare with the requirements for the Arrowhead Springs Development Project. The project will require 4,064 acre-feet of water per year with a water source operation time not to exceed 18-hours per day. If the water production is needed to operate 24 hours per day, the production would be 4,436 acre-feet per year. This is of course dependent upon the completion of the required capacities for water production.

Table 4-1 shows the water demand in the Del Rosa Mutual Water Company for an average or "normal" water year, a single dry year and multiple dry years. The Metropolitan Water District of Southern California data shows that the San Bernardino area, being a semi-arid region, that during periods of dry weather, will demand approximately eight (8) percent more urban water use than a "normal" weather year.

TABLE 4-1

WATER SUPPLY ASSESSMENT

DEL ROSA MUTAL WATER COMPANY

PROPOSED WATER DEMAND-WATER SUPPLY RELIABILITY

All quantities shown in acre-feet per year

Source Water Supply	Average-Normal Water Year	Single Dry Year	Multiple Dry Years		
			Year 1	Year 2	Year 3
All Sources #	2660	2,660	2,660	2,660	2,660
Total Demand	1,993	2,152	2,152	2,152	2,152
Surplus Supply	667	508	508	508	508

Total demand single and multiple dry years = 1.08
 # Supply of 3,015 acre-feet of water can be available by pumping wells 24 hours per day

TABLE 4-2

WATER SUPPLY ASSESSMENT

WEST TWIN CREEK WATER COMPANY

PROPOSED WATER DEMAND-WATER SUPPLY RELIABILITY

All Quantities Shown in Acre-Feet per Year

Source Water Supply	Average-Normal Water Year	Single Dry Year	Multiple Dry Years		
			Year 1	Year 2	Year 3
All Sources #	2,240	2,240	2,240	2,240	2,240
Total Demand	2,042	2,205	2,205	2,205	2,025
Surplus Supply	198	35	35	35	35

Total demand single and multiple dry years = 1.08
 # Supply of 2,257 acre-feet of water can be made available by pumping wells 24 hours per day

TABLE 4-3

WATER SUPPLY SOURCES

WEST TWIN CREEK AND DEL ROSA MUTUAL WATER COMPANY

All quantities shown in acre-feet per year

West Twin Creek Water Company

LOCATION	AMOUNT
Steam Cave Well	13
Recycled Water	977
West Twin Creek	600
San Bernardino Basin Wells	650
TOTAL	2,240

Del Rosa Mutual Water Company

LOCATION	AMOUNT
Coldwater Creek Diversion	536
Strawberry Creek Diversion	1,059
San Bernardino Basin Wells	1,065
TOTAL	2,660

Note: Water source supplies will vary due to actual flows in the respective streams and the changes will be made up from wells in the San Bernardino Basin, pumping water percolated under each company's individual rights.

Hot water will continue to be produced from the Geo Mud Bath and Hot wells as in the past. Water production can be increased in the Hot well and there are other unused geo-thermal wells in the area, which could be equipped and operated.

SECTION 5

CONCLUSIONS

5.01 General

The Del Rosa Mutual Water Company (DRMWC) and West Twin Creek Water Company (WTCWC) will optimize their water though an integrated resource approach, utilizing available water programs and projects. The DRMWC and WTCWC will receive their water from surface water and groundwater sources; however, wastewater will be recycled to provide a source in-lieu of surface and/or groundwater for irrigation. Complexities and continuing refinement in groundwater management and rights and challenges of imported water reliability make analysis of water demand and supply complicated. This water supply analysis is considered in a point in time when known future projects in concept are yet to be designed. Therefore, water supply assessment should be a part of the on-going planning efforts of the DRMWC and WTCWC to optimize its' water resources program.

4.02 Water Demand

The DRMWC current average water demand over the past three (3) years has averaged about 1,850 acre-feet per year. At build-out of the Arrowhead Springs Development, the project will increase demand on the DRMWC by approximately 144 acre-feet. The WTCWC has been diverting water for the construction of the MWD tunnel and utilizing some supplies for irrigation. There have been no records maintained of the quantities used during this period.

4.03 Water Supply and Demand Projections

Analysis of water demand and supply projections for the DRMWC, and WTCWC, including the Arrowhead Springs Development, demonstrate that projected water supplies could exceed demands through the year 2025. These projections consider land use, water development, conversion projects and water conservation.

The DRMWC has additional opportunities to increase the water supply through the following measures: (1) utilize imported State Project Water from the San Bernardino Valley Municipal Water District; (2) purchase additional water rights if required; and, (3) Continue to percolate the waters from East and West Twin Creeks in East Twin Creek Spreading Basin and maintain accurate records of the quantities percolated for future with-drawl. Collectively, these additional options will enable the DRMWC to increase water supply to exceed now and into the future.

BIBLIOGRAPHY

The following documents were used in conjunction with the San Bernardino Valley Municipal Water District, in preparation of this water supply assessment:

1. Del Rosa Mutual Water Company water production records
2. West Twin Creek Water Company water production records
3. Domestic Water, Irrigation Water, Wastewater and Recycled Water Facility Plan For Arrowhead Property, dated August, 2004
4. USGS stream flow measurements for East Twin Creek and West Twin Creek
5. Water production records at Arrowhead Springs Hotel
6. Settlement Documents, Orange County Water District vs. City of Chino, et al. Case No. 117628, Superior court of the State of California, for the County of Orange
7. Western-San Bernardino Watermaster Western Municipal Water District et al. vs. East San Bernardino County Water District et al., Case No. 78426, County of Riverside, Volume III, Judgment, Related Documents and Annual reports, 2000/01 to present.
8. Santa Ana Watermaster, Orange County Water District vs. City of Chino et al., Case No. 117628, County of Orange, Volume III, Judgment, Related Documents and Annual Reports, 2000/01-present.
9. Water Quality Control Plan, Santa Ana River Basin (8), California Regional Water Quality Control Board, Santa Ana Region.
10. Development and Use of a Mathematical Model of the San Bernardino Valley Groundwater Basin, USGS Open File report 80-576.