DESERT WATER

DESERT WATER AGENCY

WATER SUPPLY ASSESSMENT

FOR THE

MUSEUM MARKET PLAZA SPECIFIC PLAN

Prepared For

THE DESERT WATER AGENCY
1200 Gene Autry Trail
Palm Springs, CA 92264

and

THE CITY OF PALM SPRINGS
3200 East Tahquitz Canyon Way
Palm Springs, CA 92262

Prepared By

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400 South Farrell Drive, B-205
October 8, 2008

Adopted: October 13, 2008

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RESOLUTION NO. 984

RESOLUTION OF THE BOARD OF DIRECTORS OF DESERT WATER AGENCY REGARDING THE ADOPTION OF A WATER SUPPLY ASSESSMENT FOR THE MUSEUM MARKET PLAZA SPECIFIC PLAN

WHEREAS, Desert Water Agency owns and operates a public water system as defined by Water Code section 10912 and, accordingly, may receive requests from time to time to prepare a water supply assessment (WSA) pursuant to California Water Code sections 10910 *et. seq.*, commonly referred to as California Senate Bill 610 (SB 610); and

WHEREAS, the City of Palm Springs recently submitted a request to Desert Water Agency to prepare a WSA for the proposed Museum Market Plaza Specific Plan located in the City of Palm Springs, described as a project consisting of 955 residential units, 620 hotel rooms, 275,000 square feet of commercial area, 100,000 square feet of office area, 25,000 square feet of restaurant area, and 18,000 square feet of open space land uses in the downtown area; and

WHEREAS, Desert Water Agency has prepared a WSA for the proposed Museum Market Plaza Specific Plan pursuant to applicable Water Code provisions, including Water Code sections 10910 *et. seq.*; and

WHEREAS, the Board of Directors of Desert Water Agency desires to adopt this Resolution in order to approve the WSA for the proposed Museum Market Plaza Specific Plan;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of Desert Water Agency as follows:

Section 1. All of the foregoing Recitals are true and correct and the Board so finds and determines. The Recitals set forth above are incorporated herein and made an operative part of this Resolution.

Section 2. Pursuant to the requirements of Water Code sections 10910 *et. seq.*, the Board hereby approves the WSA prepared for the proposed Museum Market Plaza Specific Plan, a copy of which WSA is attached hereto as Exhibit "A" and incorporated herein by reference.

Section 3. The WSA shall not create a water right and shall not constitute a guarantee that water will be available on a constant basis, as supply is subject to emergencies, natural disasters or other events not subject to the control of Desert Water Agency. Water service shall also be subject to applicable fees and charges as they become due, completion of such improvements as may be needed to provide service, and compliance with such water conservation requirements and conditions of service which may apply to the project.

ADOPTED this 13th day of October, 2008.

F. T. Kieley, III
President of the Board of Directors

ATTEST:

F. Gillar Boyd, Jr.
Secretary/Treasurer

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J/JLT/ORD-RES/RES 984

MUSEUM MARKET PLAZA

WATER SUPPLY ASSESSMENT

I. EXECUTIVE SUMMARY

This Water Supply Assessment (WSA) was prepared in conjunction with the preparation of the Environmental Impact Report for the Museum Market Plaza Specific Plan located in the City of Palm Springs, Riverside County, California. The WSA addresses the water supply issues associated with buildout of the Specific Plan. In addition to evaluating existing and future water demand for the project, the WSA also evaluates the available existing and future water resources that the local water purveyor, Desert Water Agency (DWA), will use to meet future demand throughout its service area. The analysis focuses on the Palm Springs Subarea of the Upper Whitewater Subbasin, but it also describes future water supply conditions for both the Subarea and the Subbasin.

The Museum Market Plaza project is located within the service area of DWA and will rely primarily upon the underlying Palm Springs Subarea aquifer to meet project demand. In 1964 the California Department of Water Resources estimated that the Palm Springs Subarea underlying the DWA service area had approximately 4.6 million acre-feet of water in storage. Since the Department of Water Resources' 1964 analysis, demand has exceeded the recharged supply in the Palm Springs Subarea, which has resulted in a cumulative reduction in water storage of approximately 250,000 acre-feet, leaving a current estimate of approximately 4.35 million acre-feet of water in the Palm Springs Subarea.

Water Supply Assessment

The Water Supply Assessment provides a conservative supply/demand analysis for the Desert Water Agency's service area and models the Agency's future water supplies over the next 20 years with and without the development of the proposed project. The analysis is primarily based on information provided in the Desert Water Agency's 2005 Urban Water Management Plan. In addition, the WSA utilizes the most recent projections (2007 Draft Reliability Report) from the Department of Water Resources (DWR) of future water availability from the State Water Project (SWP) Exchange water, which is the primary source of water recharge in the Palm Springs Subarea and the Upper Whitewater Subbasin. The WSA finds that projected supplies from the above mentioned sources, in addition to locally available groundwater in storage, are sufficient to meet the demand of the proposed Specific Plan without adversely impacting other water users for at least the next 20 years.

The proposed project will contain 955 high density residential units, 620 hotel rooms, 275,000 square feet of commercial, 100,000 square feet of office, 25,000 square feet of restaurant, and 18,000 square feet of open space land uses, all of which will generate water demand for potable and landscaping purposes. Based on calculation of the water demand for the Museum Market Plaza Specific Plan, at buildout the projected water demand is estimated to be approximately 262 acre-feet per year without considering return flows. The primary component of water consumption is potable water demand, at 254 acre-feet per year. Landscaping demand is projected to be 8.1 acre-feet per year before return flows are factored in and 5.2 acre-feet per year once a 35 percent return flows factor is considered. At this rate of demand, the Water Supply Assessment under normal water year conditions projects a net benefit to the Palm Springs Subarea through 2019. Beginning in 2020 demand is greater than supply and previously banked water will be extracted from the aquifer to meet demand. Due to the net increase of water in storage from 2005 through 2019, groundwater extraction from 2020 through 2030 will not contribute to the current overdraft conditions.

Normal, single, and multiple dry water year scenarios are analyzed for a 20 year period and confirm that sufficient water supplies are available to meet demand. The normal year scenario results in a cumulative balance of 64,298 acre-feet in 2030. Five single dry year scenarios were analyzed at each five-year increment between 2010 and 2030, and result in a cumulative positive balance of 26,386 acre-feet in 2030 regardless of when the dry year occurs. Under the worst case drought scenario of four consecutive multiple dry years, the 20-year model projects a negative cumulative balance of approximately 63,350 acre-feet in 2030. In the event that a multiple drought scenario were to occur, DWA would extract needed water supplies from the Palms Spring Subarea. Therefore, the amount of water that would remain in storage in the Subarea at the end of the 20-year period, would range from 4.44 to 4.32 million acre-feet depending on the model scenario.

Desert Water Agency's Urban Water Management Plan

The Water Supply Assessment compares the water demand estimated for the Museum Market Plaza project with existing and anticipated supplies identified in the Desert Water Agency's Urban Water Management Plan; this assure that sufficient water supplies are and will be available to serve the Museum Market Plaza Specific Plan during normal, single and multiple dry year scenarios. Net project water demand would represent approximately 0.3% of the Desert Water Agency's annual estimated demand in 2030.

State Water Project Delivery Projections

Replenishment of Desert Water Agency water supplies are primarily dependent upon deliveries of State Water Project water (Table A allocation). Recent court cases have affected the deliveries of State Water Project water to its contractors, including the Desert Water Agency. In December 2007, the State Department of Water Resources completed its State Water Project delivery reliability analysis, which indicated that State Water Project contractors can assume delivery of at least 66% of their maximum Table A allocations in 2027.

The DWA's 2008 Engineer's Report, which assumes deliveries of 65% (36,012 acre-feet) of annual maximum Table A allocations (55,750 acre-feet) for years 2010 through 2035, was used to estimate projected deliveries from the State Water Project from 2010 through 2030.

Conclusion

Based upon analysis set forth in this WSA, buildout of the Specific Plan will not have a significant direct, indirect, or cumulative impact on local water supplies or the Desert Water Agency's ability to provide domestic water to its service area including agricultural, industrial, and manufacturing users. The various supply/demand analyses indicate that a sufficient and reliable range of resources for domestic and non-domestic water uses will be available for the 20 year period between 2010 and 2030.

MUSEUM MARKET PLAZA

WATER SUPPLY ASSESSMENT

SECTION II. INTRODUCTION & PROJECT DESCRIPTION

A. Introduction

Purpose

The City of Palm Springs has requested that a Water Supply Assessment be conducted for the proposed Museum Market Plaza Specific Plan. The purpose of this assessment is to evaluate the existing and future water resources in relation to the project, identify water demands associated with proposed land uses, and provide mitigation measures that will limit impacts to water resources and promote water conservation for the life of the project. Reference documents used as a basis for this WSA and WSV include the Desert Water Agency's Domestic Water System General Plan[1]; the DWA 2005 Urban Water Management Plan[2]; the DWA 2008/2009 Ground Water Replenishment and Assessment Program for the Whitewater Subbasin[3]; and Department of Water Resources (DWR) 2007 SWP Reliability Report.[4]

Background

Buildout of the Museum Market Plaza Specific Plan will result in approximately 955 high density residential units, 620 hotel rooms (498,430 square feet), 275,000 square feet of commercial development, 100,000 square feet of office space, 25,000 square feet of restaurant, and 18,000 square feet of open space land uses, which will generate a total daily demand of 0.23 million gallons or 262.1 acre-feet per year not including return flows for potable or landscaping uses.

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1 "Desert Water Agency Domestic Water System General Plan 1998," prepared by Krieger & Stewart, Inc., January 5, 1999.

2 "Desert Water Agency 2005 Urban Water Management Plan," prepared by Krieger & Stewart, Inc., December 2005.

3 "Desert Water Agency Engineers Report, Ground Water Replenishment and Assessment Program for the Whitewater River Subbasin, Desert Water Agency, 2008/2009," prepared by Krieger & Stewart, Inc., April 2008.

4 "The State Water Project Delivery Reliability Report," prepared by the State of California Department of Water Resources, August 2008.

It should be noted that the proposed project contains approximately 380,977 square feet of gross leasable space that currently receive water services, and water demand from these land uses is included in the UWMP. Utilizing similar methodology as applied to projecting demand for buildout of the Specific Plan, it is estimated that current demand onsite is approximately 65.9 acre-feet per year or 0.06 million gallons per day not including return flows for potable or landscaping uses. This existing demand is contained within the estimated water demand for DWA service area and is accounted for in the 2005 UWMP.

At buildout, the Museum Market Plaza Specific Plan project is expected to generate a total net water demand of 259.3 acre-feet per year after considering 35% return flows to the Subarea for landscaping. The existing water demand onsite is estimated to be 64.9 acre-feet annually after accounting for 35% return flows associated with the landscaping component of the demand. Therefore, the net water demand (proposed minus existing) that will be generated at buildout of the Specific Plan after factoring in 35% return flows for landscaping is 194.3 acre-feet per year or 0.17 million gallons per day (see Appendix A).

B. Regulatory Requirements of WSA

Water Supply Assessment: Senate Bill 610

Senate Bill 610 requires a city or county that determines a project is subject to the California Environmental Quality Act to identify any public water system that may supply water for the project and to request those public water systems to prepare a water supply assessment. The bill requires the assessment to include an identification of existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and water received in prior years pursuant to those entitlements, rights, and contracts.

The law requires the city or county to include the water supply assessment and certain other information in any environmental document prepared for the project pursuant to the act.

The Desert Water Agency (DWA or Agency) produced this Water Supply Assessment to meet the requirements of Senate Bill 610 in support of the Museum Market Plaza Project and the California Environmental Quality Act (CEQA) review process.

Under the State Water Code Section 10912, a "Project" is defined as any of the following:

> (1) A proposed residential development of more than 500 dwelling units.
> (2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
> (3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
> (4) A proposed hotel or motel, or both, having more than 500 rooms.
> (5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
> (6) A mixed-use project that includes one or more of the projects specified in this subdivision.
> (7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

SB 610 applies to the project because the proposed number of residential units, hotel rooms, and the commercial square footage proposed meet the criteria set forth in §10912.(a)(1), (3), and (4).

In accordance with Section 21080.1 of the Public Resources Code, the City of Palm Springs sent a WSA request letter, dated July 7, 2008, to DWA, thereby identifying the Agency as the supplier of the public water system for the proposed project. DWA operates the public water system and will supply water to the project.

Section 10910 (g) of California's Water Code requires that the Agency submit the assessment no later than 90 from the day the request was received or request an extension which shall not exceed 30 day. DWA has been granted an extension and therefore must submit the assessment to the City of Palm Springs no later than November 4, 2008.

Although the existing water users onsite are considered in the UWMP, the Specific Plan calls for an intensification of land uses, which would result in increased water demand, some of which may not be accounted for in the UWMP. Therefore, in accordance with Water Code Section §10910 (c)(3) an analysis of the 20 year period from 2010 through 2030 was preformed in order to determine projected water supply and the Agency's ability to meet demands during normal, single, and multiple dry year conditions for all users including agricultural and manufacturing (See Appendix C).

In support of Water Code Section §10910 (d)(1), Section III of this WSA identifies each water supply source held by DWA, past quantities delivered, and future quantities expected from each water source. Since groundwater is identified as a supply source, pursuant to Section §10910 (f) of the Water Code additional information regarding the groundwater supply is provided in Section III-B of this WSA.

C. Project Description

The project site is located in the center of the Business District in downtown Palm Springs, within and contiguous to an urbanized area that has a combined population of more than 100,000 persons when considering the cities of Cathedral City and Rancho Mirage. A Specific Plan and an Environmental Impact Report have been prepared and do not include a tentative tract map, parcel map, or a development agreement. The project site is irregular in shape, but generally encompasses lands on the east side of North Palm Canyon to Indian Canyon; lands to the south of Tahquitz Canyon, on the east side of South Belardo Road, to Arenas Road; and the central area of the project, which is bounded by the Hyatt Regency Suites on the north, Tahquitz Canyon Way on the south, Museum Drive on the west, and North Palm Canyon Drive on the east (see Exhibit II-2).

The existing land uses within the 20.6 acre site include a mix of hotel, retail, office space, and restaurants. Lands to the north include hotel and retail commercial development along North Palm Canyon, North Indian Canyon and Baristo. Lands to the east include retail commercial development on North Palm Canyon and Indian Canyon, and the Spa Hotel beyond. Lands to the south include hotel and retail commercial development, the Wellwood Murray Library and single-family residential neighborhoods. Lands to the west include the Palm Springs Art Museum and the O'Donnell Golf Course.

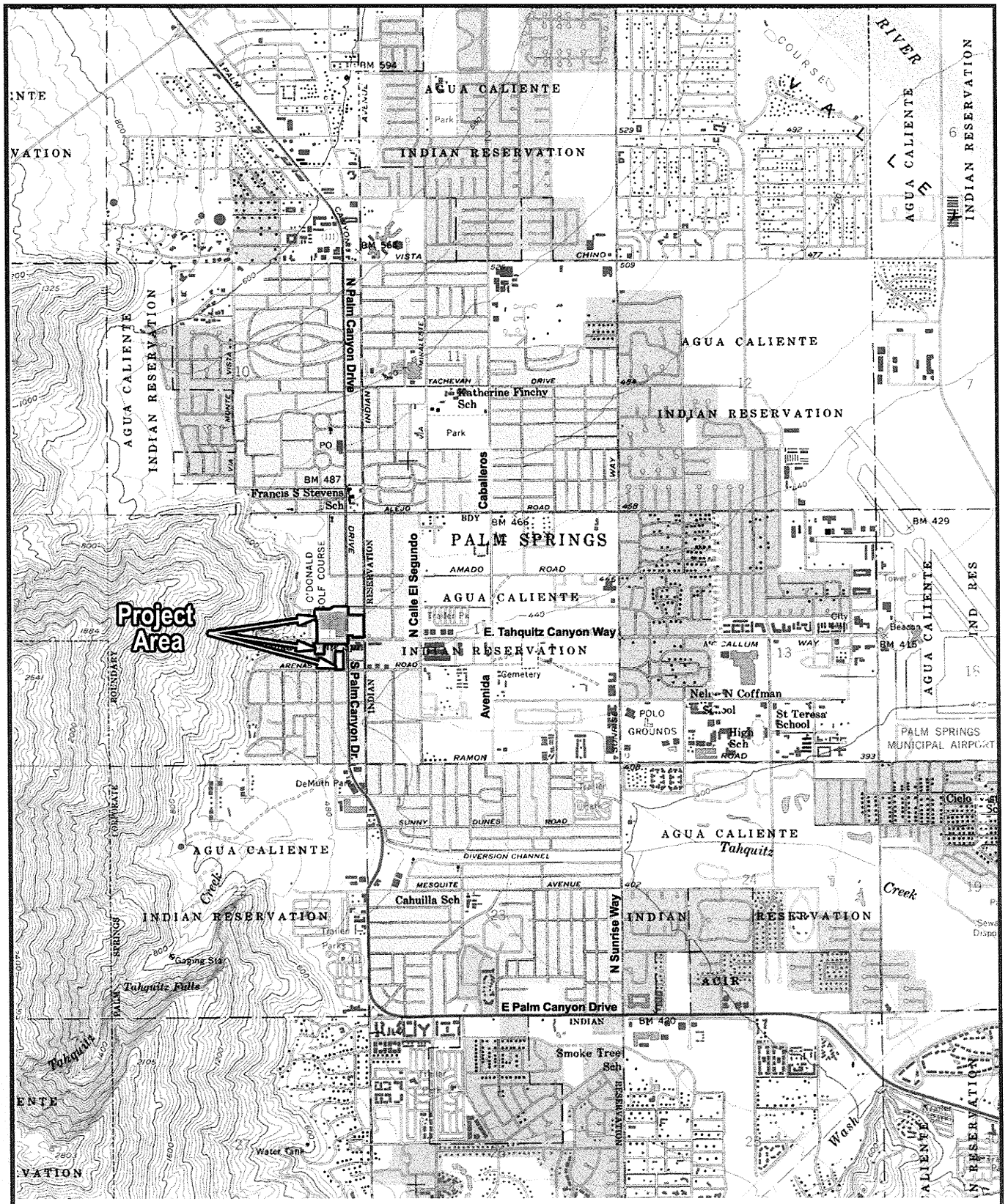
The proposed Museum Market Plaza (MMP) Specific Plan encompasses a total of 20.6 acres, and will provide commercial/retail, public plazas, professional office space, hotels, residential development, restaurants, and parking. Retail commercial will be developed on the ground floor on Palm Canyon Drive, with some exceptions (please see Section III, Development Standards of the Specific Plan). A mix of hotel, professional office and/or retail development is planned on the ground floor on all other project roadways. Development above ground floor level will be high density residential units (condominiums) and may include timeshares.

Table II-1
Museum Market Plaza Specific Plan
Land Use[1]

Land Use Designation	Acres	Percent	Units	Square Feet
High Density Residential	6.9	33%	955	1,146,000
Hotel	2.7	13%	620	498,430
Commercial	3.3	16%		275,000
Office	1.2	6%		100,000
Restaurant	0.3	1%		25,000
Streets, Sidewalks, and Parking Lots	6.2	30%		
Project Total	**20.6**	100%		**2,044,430**

[1]Source: Modified from Museum Market Plaza Specific Plan, Terra Nova Planning & Research, April 2008.
Note: Retail is 67%, Office is 25%, and Restaurant land use is 6.25% of Office and Retail acreage identified in Specific Plan.

As noted above in Table II-1, the 20.6 acre site will contain 955 residential dwelling units, 620 hotel rooms, 275,000 square feet of retail, 100,000 square feet of office, 25,000 square feet of restaurant space, and 30% of the site (6.2 acres) will consist of roads, sidewalks, parking areas, and open space.



Source: USGS Quad 7.5 Minute Map
Palm Springs, CA 1957, Photorevised 1988

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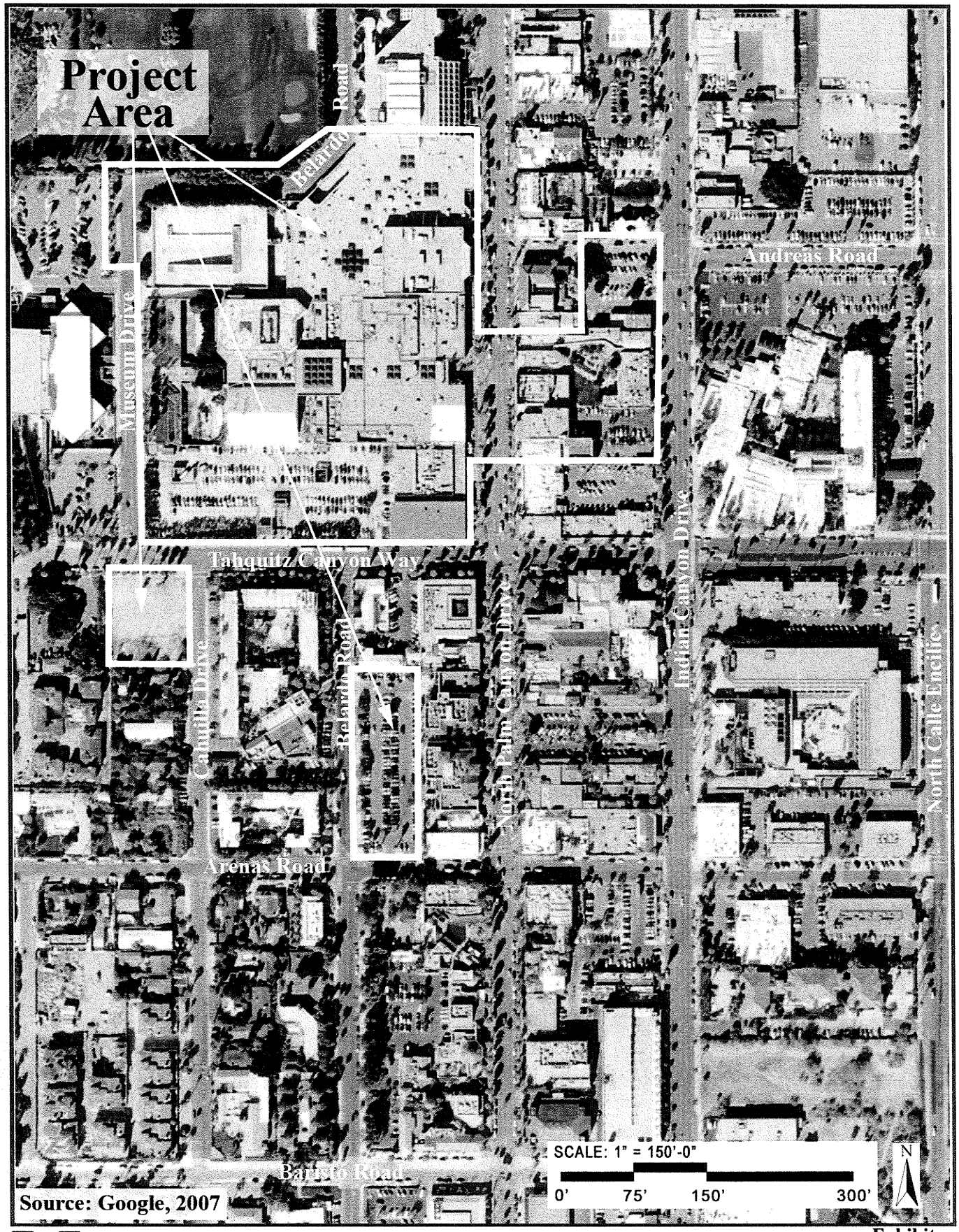
Museum Market Plaza WSA
Vicinity Map
Palm Springs, California

Exhibit

II-1



Source: Google, 2007

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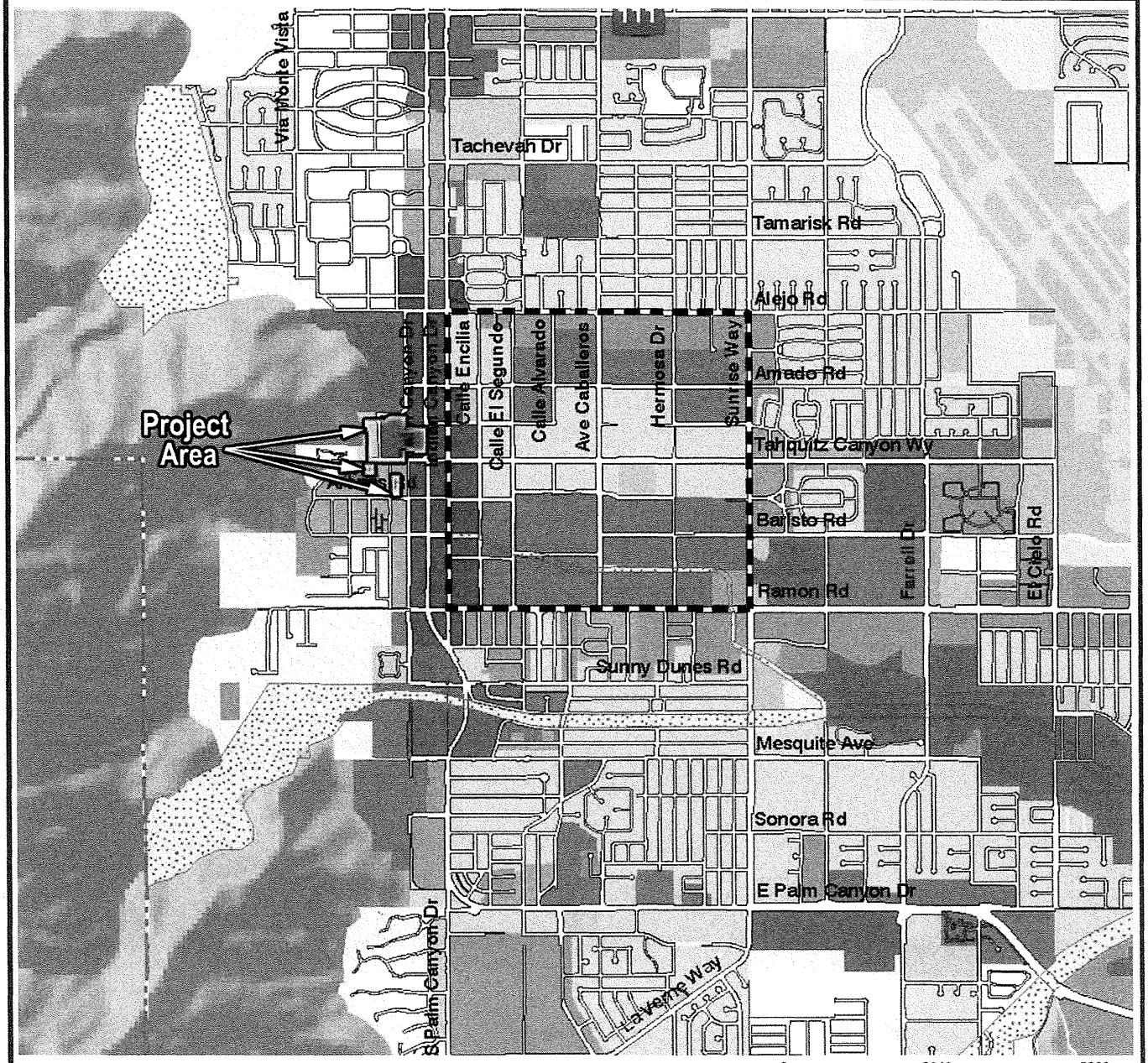
Museum Market Plaza WSA
Aerial View
Palm Springs, California

Exhibit
II-2



- Estate Residential (0 - 2.0 du/ac)
- Very Low Density Residential (2.1 - 4.0 du/ac)
- Low Density Residential (4.1 - 6.0 du/ac)
- Medium Density Residential (6.1 - 15.0 du/ac)
- High Density Residential (15.0 - 30.0 du/ac)
- Small Hotel
- Tourist Resort Commercial
- Neighborhood/Community Commercial
- Central Business District
- Regional Commercial
- Mixed Use/Multi-Use
- Office
- Industrial
- Regional Business Center
- Public/Quasi-Public
- School
- Public/Utilites
- Airport
- Open Space - Mountain (1 du/40 ac)
- Open Space - Conservation (1 du/20 ac)
- Open Space - Parks/Recreation
- Open Space - Water
- Desert (1 du/10 ac)
- Special Policy Area
- Watercourse Zone
- Wind Energy Overlay
- City Boundary
- Sphere of Influence
- Potential Future Sphere of Influence Expansion Area
- Section 14 Specific Plan

Source: City of Palm Springs General Plan 10.24.2007

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Museum Market Plaza WSA
General Plan Land Use Designations
Palm Springs, California

Exhibit
II-3

MUSEUM MARKET PLAZA

WATER SUPPLY ASSESSMENT

SECTION III. EXISTING CONDITIONS

The Museum Market Plaza site, the City of Palm Springs and the Coachella Valley are located within the West Basin of the Colorado River Watershed, which drains into the Salton Trough and the terminal lake, the Salton Sea. As is typical in desert environments, the region is very dry, receiving less than 6 inches of water annually. Water, especially in the desert, is a limited and valuable resource. Demand for water in the Coachella Valley comes from both urban and agricultural needs, and cannot be satisfied through local groundwater supplies alone. Therefore, in order to prevent adverse impacts from the depletion of groundwater reserves throughout the Coachella Valley, a groundwater replenishment program has been implemented. Through this program the Coachella Valley receives water from northern California, the Colorado River, and limited surface flows.

Water from northern California is transported via the California aqueduct to Southern California where it provides drinking water to over 23 million Californians and irrigation water for about 755,000 acres.[5] The amount of water that is transferred to southern California varies with the amount of available precipitation, such that in wet years additional water is available, but in dry years the amount of water delivered declines.

Based on the Arizona verses California US Supreme Court ruling in 1964, California is entitled to 4.4 million acre-feet of Colorado River water per year. Water from the Colorado River is the main source of imported water for the Coachella Valley. Colorado River water is high in total dissolved solids and is considered of poorer quality. Additionally, water from the Colorado River is contributing to increased levels of salinity in the Coachella Valley. Additional information regarding deliveries of Colorado River water to the Coachella Valley is discussed in below.

Artificial groundwater replenishment began in the Upper Whitewater River Subbasin in 1973. DWA and the Coachella Valley Water District (CVWD) jointly manage this allocation of SWP Exchange water. State Water Project water is not received by direct deliveries, rather through an exchange agreement with Metropolitan Water District (MWD). This agreement allows MWD to retain the Valley's SWP allocations in exchange for like quantities of Colorado River Water.

[5] "Department of Water Resources News / People", Summer 2007 edition, prepared by the California Department of Water Resources and Public Affairs, July 2007.

(This exchange agreement is further discussed below under Section III-C, Imported Water.) Replenishment continues today and is accomplished by importing Colorado River water via the Colorado River Aqueduct, which is owned and operated by MWD. Limited additional artificial recharge is from the release of treated wastewater to spreading ponds and non-consumptive return of irrigation water.

The Coachella Valley, although located in one of the driest regions of the country, has a substantial subsurface groundwater basin. The accumulation of groundwater has occurred over millions of years as a result of water runoff from surrounding mountains and the geology of the Valley. The groundwater basin in the Coachella Valley is a northwest-southeast trending sub-surface aquifer, which generally extends from the Whitewater River in the northwest to the Salton Sea in the southeast. The groundwater basin is divided into four distinct Subbasins, including the Mission Creek Subbasin, the Garnet Hill Subbasin, the Desert Hot Springs Subbasin, and the Whitewater River Subbasin.

The Whitewater River Subbasin provides the most significant groundwater resources and production (extraction) in the Coachella Valley. The Subbasin covers approximately 400 square miles and is bounded on the north by the Garnet Hill Fault, on the east by the San Andreas Fault, and on the south and west by the San Jacinto and Santa Rosa Mountains. The Subbasin is estimated to contain about 28.8 million acre-feet of groundwater within the first 1,000 feet below the ground surface.[6]

The Whitewater River Subbasin is divided into the Upper Subbasin and the Lower Subbasin near Point Happy (approximately Washington Street). DWA's service area is located within the Upper Whitewater River Subbasin, and is estimated to contain about 14.2 million acre-feet of groundwater within the first 1,000 feet below the ground surface as shown in Table III-1 below (Section III-B).

The Museum Market Plaza Specific Plan is located in the Palm Springs Subarea of the Upper Whitewater River Subbasin. In this Subarea, the top of the water table ranges from 300 to 400 feet below the ground surface, and the aquifer is believed to be at least 1,000 feet thick; however, the thickness of these water bearing materials is not definitively known.[7]

In 1964 the California Department of Water Resources estimated that the Palm Springs Subarea had approximately 4.6 million acre-feet of water in storage. Since the Department of Water Resources' 1964 analysis, demand has exceeded the recharged supply to the Palm Springs Subarea and has resulted in a cumulative reduction in water storage of approximately 250,000 acre-feet, leaving a current estimate of approximately 4.35 million acre-feet of water in storage in the Palm Springs Subarea. Despite this vast water supply, water table levels fluctuate over time depending on supply and demand, as discussed below.

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6 "Coachella Valley Water District Engineers Report on Water Supply and Replenishment Assessment for the Upper Whitewater River Subbasin Area of Benefit," prepared by Water Resources Branch, Engineering Department, Coachella Valley Water District, April 2008.

7 *Ibid.*

A. Water Resource Management and Regulation

Desert Water Agency

The Desert Water Agency (DWA) was formed in 1961 to assure that an adequate water supply would be available for the northwesterly portion of the upper Coachella Valley. DWA entered into a water supply contract with the State of California the following year. In 1968, DWA purchased the Palm Springs Water Company and the Cathedral City Water Company. The existing population within DWA's service area is approximately 70,000, and is projected to reach 100,000 by 2030.[8]

Exhibit II-1 illustrates DWA's Retail Service Area and Institutional Boundary. The Retail Service Area (60 square miles) is the area to which DWA currently provides water service. The area within the Institutional Boundary (325 square miles) encompasses the Retail Service Area as well as a larger planning area. The Retail Service Area includes most of City of Palm Springs, the southwest portion of Cathedral City, and some unincorporated areas of Riverside County. The Institutional Boundary encompasses the City of Palm Springs, the southwest portion of the cities of Cathedral City and Desert Hot Springs, and unincorporated areas of Riverside County.

DWA provides potable and recycled water services through two separate systems within its service area. The service system includes a series of wells and storage facilities located in the Upper Whitewater River Basin, as well as surface water diversions, and recycled water for irrigation. Groundwater makes up approximately 90% of the supply for DWA's service area, with local surface water making up approximately 4% and recycled water about 6% of the total supply. Water use in 2007 totaled 58,533 acre-feet[9]; annual use is projected to reach 74,300 acre-feet by 2030, an increase of 16,800 acre-feet in annual demand or a 21% increase in 24 years.

DWA is organized and operates pursuant to Desert Water Agency Law, Water Code Appendix, Section 100-1 et seq. Pursuant to DWA Law, the agency is vested with broad statutory powers with respect to matters including, without limitation, water supply, such as local groundwater resources, water rights, water supply infrastructure, and water supply planning and management for the use and benefit of the agency, its inhabitants, right holders, and lands within the agency.

<u>Desert Water Agency Domestic Water System General Plan</u>[10]

The DWA Domestic Water System General Plan is updated approximately every 10 years and was last revised and adopted in 1998. Accordingly, the next update is due in 2008 and preparations of the General Plan update is currently underway. The General Plan is intended to serve as a guide for system improvements for the next ten to twenty years. The document also outlines projected water requirements and recommendations for system improvements based on historical, existing and future trends. The General Plan identifies specific water system improvement projects, their locations and schedules for completion. However, the plan serves as a guide and projects may be altered or relocated during final project design.

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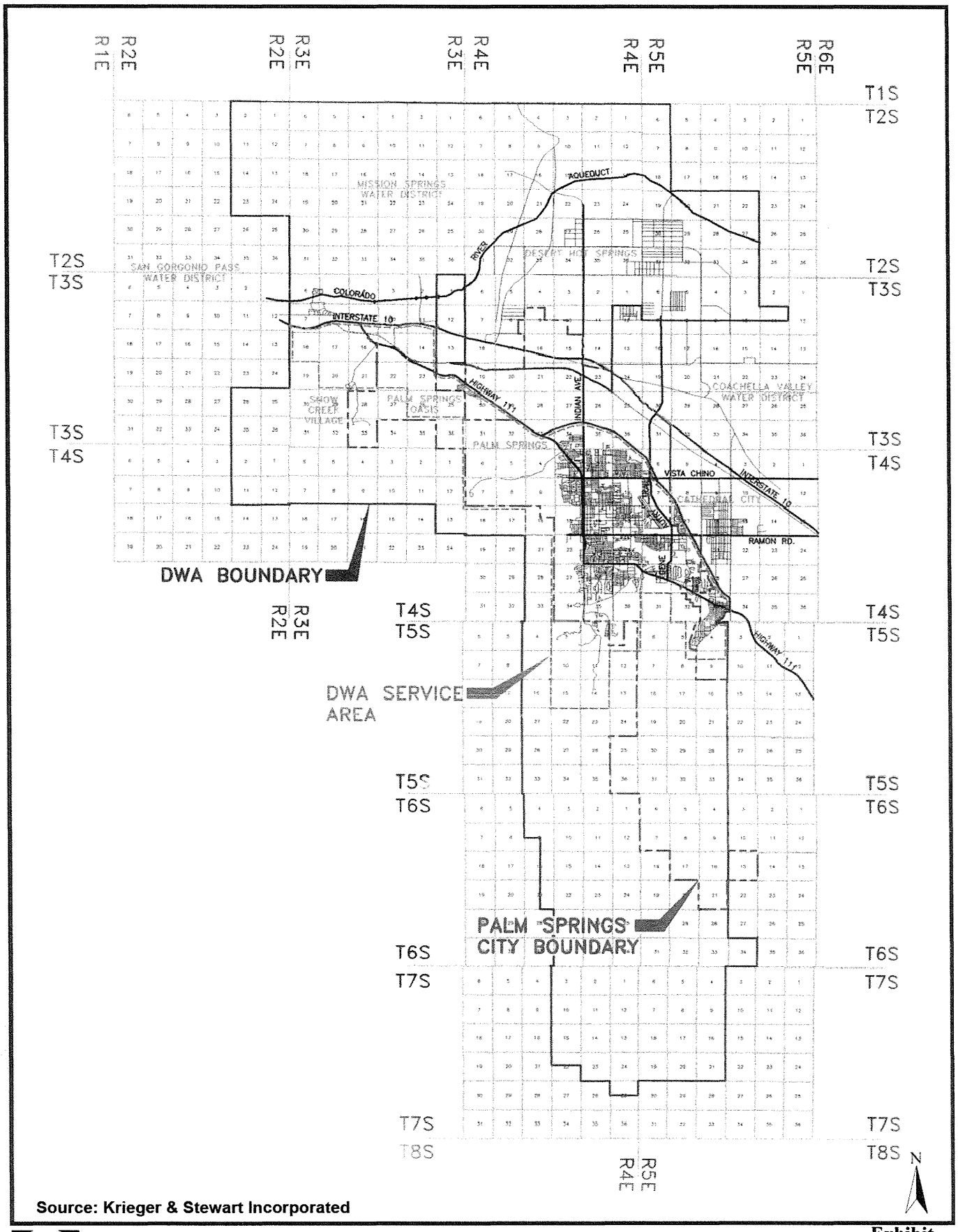
8 "Desert Water Agency 2005 Urban Water Management Plan," prepared by Krieger and Stewart Engineering, Inc., December 2005

9 "Desert Water Agency Engineers Report on Ground Water Replenishment and Assessment Program for the Whitewater River Subbasin 2007-2008," prepared by Krieger and Stewart Engineering, Inc., April 2008.

10 "Desert Water Agency Domestic Water System General Plan," prepared by Krieger and Stewart Engineering, Inc., 1998.



Source: Krieger & Stewart Incorporated

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Museum Market Plaza WSA
Desert Water Agency Water Service Area
Palm Springs, California

Exhibit
III-1

Desert Water Agency 2005 Urban Water Management Plan[11]

Urban water suppliers are required by the California Urban Water Management Planning Act (Water Code Sections 10610 – 10656) to make every effort to ensure that the level of reliability in its water Service Area boundary is sufficient to meet the needs of its customers during normal, single dry and multiple dry years. This is to be demonstrated through the publication of an Urban Water Management Plan required of all water suppliers, either publicly or privately owned, that are providing water for potable purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually.

The DWA Board of Directors adopted its Urban Water Management Plan (UWMP) on December 6, 2005, which was subsequently submitted to the California Department of Water Resources within 30 days of approval. The UWMP contains all of the information necessary to meet the requirements of California Water Code Division 6 part 2.6, which includes an analysis of existing and future land uses within the DWA Retail Service Area.

Desert Water Agency Yearly Engineer's Report[12]

DWA is required to file an Engineer's Report on a yearly basis for its Ground Water Replenishment and Assessment Program for the Whitewater River Subbasin. The Engineer's Report must be filed before the District can levy and collect groundwater replenishment assessments. The report addresses the existing condition of groundwater supplies, the need for groundwater replenishment, the area of benefit, water production in the area of benefit, and the amount of replenishment assessments to be levied in accordance with water production.

In addition, the Engineer's Report sets forth expected Table A SWP water deliveries for future years and accounts for any changes or updates to expected deliveries. In the 2008 Report the Agency projects that Table A allocations will be 65% (36,012 acre-feet) of maximum Table A deliveries (55,750 acre-feet) from 2010 through 2035.

Coachella Valley Water District

CVWD and DWA work together to manage the groundwater stored in the Upper Whitewater River Subbasin. As noted above, CVWD and DWA are the SWP contractors for the region. CVWD and DWA became participants in the SWP program in the early 1960s and currently work together to import SWP exchange water and recharge groundwater in the Upper Whitewater River Subbasin through the use of spreading ponds and through natural percolation of recycled wastewater used for irrigation. As previously discussed, the delivery facilities necessary for CVWD and DWA to directly receive SWP water have not been constructed. Therefore, these agencies have mutually entered into an exchange agreement with MWD that allows MWD to take the CVWD and DWA SWP Table A Amounts in exchange for an equal amount of Colorado River water that MWD transports through its Colorado River Aqueduct and delivers to a turn-out located in Whitewater Canyon.

[11] "Desert Water Agency 2005 Urban Water Management Plan," prepared by Krieger and Stewart Engineering, Inc., December 2005.

[12] "Desert Water Agency Engineer's Report on Ground Water Replenishment and Assessment Program for the Whitewater River Subbasin 2008/2009," prepared by Krieger and Stewart Engineering, Inc., April 2008.

California Water Resource Regulation

California Department of Water Resources

The California Department of Water Resources operates and maintains the State Water Project (SWP), including the California Aqueduct. The department also provides dam safety and flood control services, assists local water districts in water management activities, promotes recreational opportunities, and develops plans to address California's future water needs.

The State's effort to acquire the water rights that the SWP now manages, began in 1927 when the California Legislature gave the State Department of Finance the authority to file application to reserve unappropriated water for future development projects. Federal, state, and other agencies filed applications for this water. Water rights permits were then issued on many of these applications for water projects, including the State Water Project, and to other agencies for state and local projects.

The SWP includes 660 miles of aqueduct and conveyance facilities extending from Lake Oroville in the north to Lake Perris in the south. The SWP has contracts to deliver to 29 contracting agencies. The Desert Water Agency and the Coachella Valley Water District are the primary SWP contractors in the Coachella Valley. As previously mentioned, the conveyance system for SWP water does not extend to the Coachella Valley. Therefore the Coachella Valley receives SWP exchange water via an arrangement with MWD by exchanging like quantities of SWP water for Colorado River water.

B. Description of the Groundwater Aquifer

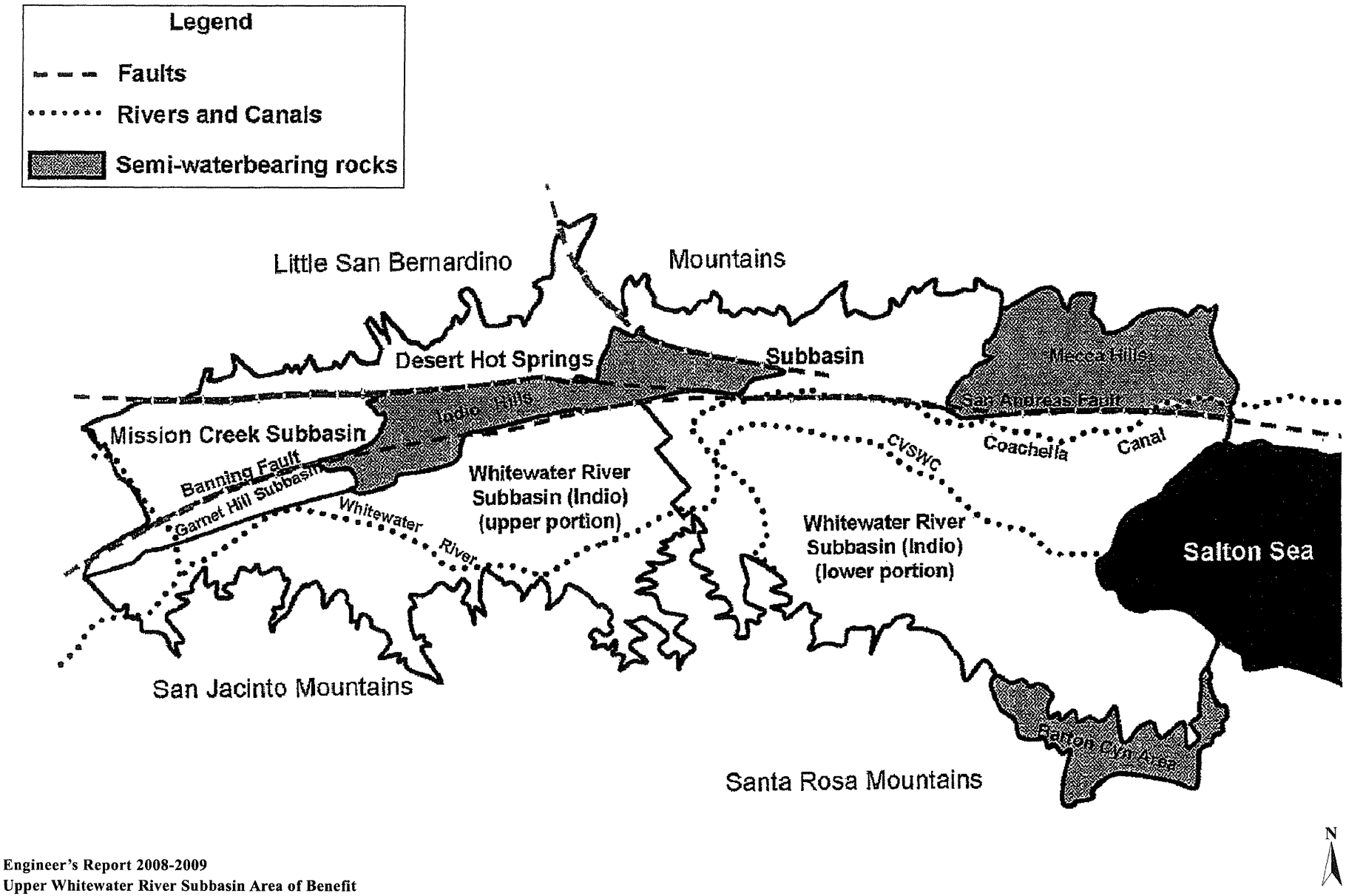
In accordance with Water Code Section §10910 (f) the following discussion describes the groundwater aquifer underling the Coachella Valley and the Subarea that will serve the site.

Introduction

The Coachella Valley groundwater basin is a northwest-southeast trending sub-surface aquifer, which generally extends from the community of Whitewater in the northwest to the Salton Sea to the southeast. It is bounded by the non-waterbearing rocks of the San Bernardino and Little San Bernardino Mountains on the north and northeast, and the San Jacinto and Santa Rosa Mountains on the south and southwest. The Valley's subsurface aquifer system largely consists of relatively young alluvial deposits underlain by older basement rocks. Although the sediment fill is estimated to be approximately 20,000 feet thick, the water-yielding section extends only to depths of a few thousand feet.[13]

Interflow of groundwater between Subbasins occurs throughout the Coachella Valley groundwater basin but is limited in some areas by fault barriers, constrictions in the basin profile, and areas of low permeability. Based on these observations, the U.S. Geological Survey and the California Department of Water Resources have divided the groundwater basin into four distinct Subbasins. Subbasin boundaries are generally based upon faults that restrict the lateral movement of groundwater, including the Mission Creek and Banning strands of the San Andreas Fault Zone. The Subbasins in the Coachella Valley include: Mission Creek, Garnet Hill, Whitewater River, and Desert Hot Springs (see exhibit III-2).

[13] "Hydrologic Investigations Atlas 730-B: Ground Water Atlas of the United States, Segment 1: California/Nevada," prepared by the United States Geological Survey, Michael Planert and John Williams, 1989.

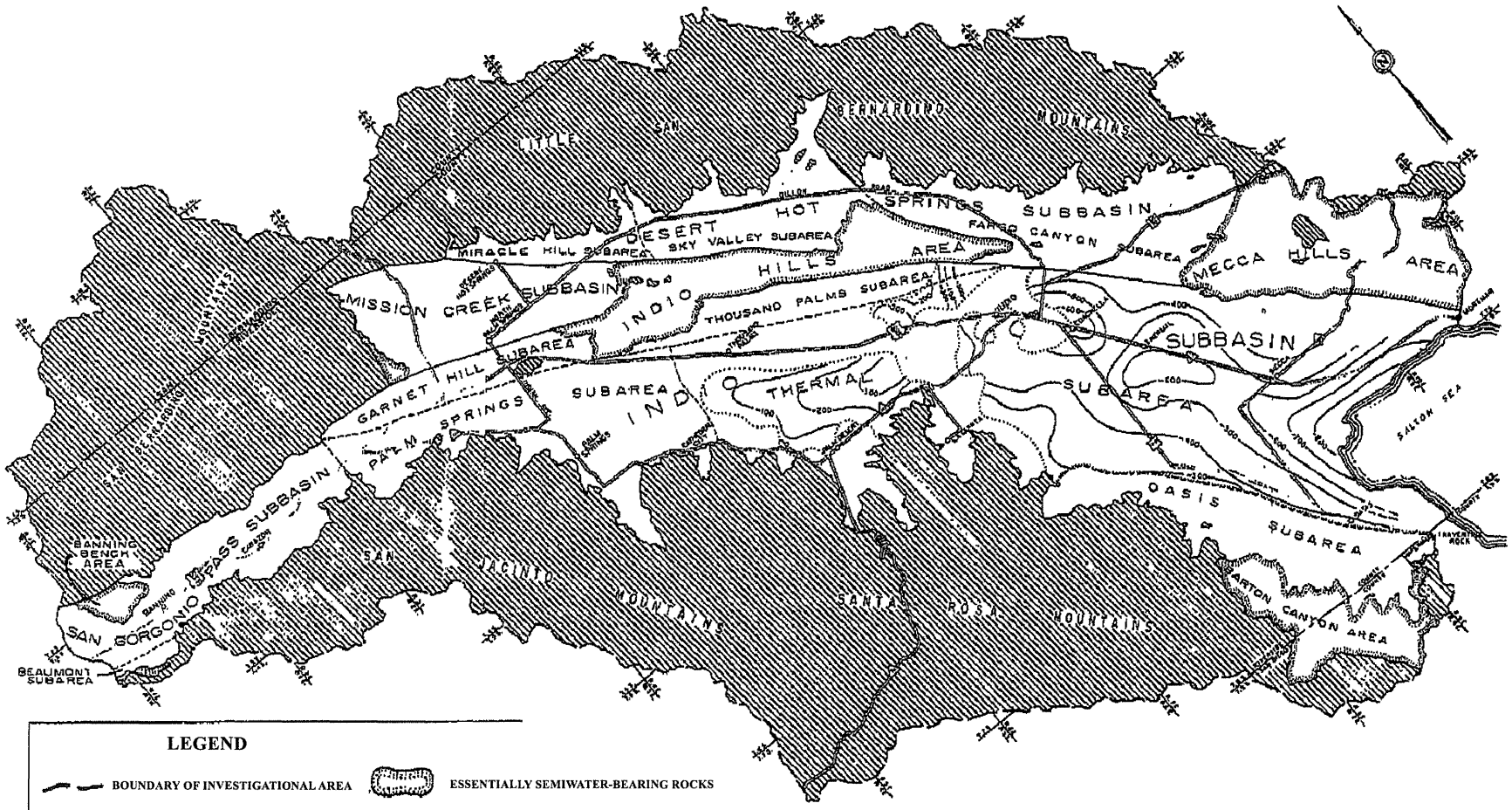


Engineer's Report 2008-2009
Upper Whitewater River Subbasin Area of Benefit

TERRA NOVA®
Planning & Research, Inc.

Museum Market Plaza WSA
Coachella Valley Groundwater Subdivision
Palm Springs, California

Exhibit
III-2



LEGEND

- BOUNDARY OF INVESTIGATIONAL AREA
- GROUND WATER BASIN BOUNDARY
- GROUND WATER SUBBASIN BOUNDARY, DASHED WHERE APPROXIMATE
- GROUND WATER SUBAREA BOUNDARY
- ESSENTIALLY NONWATER-BEARING ROCKS
- ESSENTIALLY SEMIWATER-BEARING ROCKS
- APPROXIMATE EXTENT OF THE SHALLOW SEMIPERCHED GROUND WATER BODY
- BOUNDARY OF AREAS IN WHICH UPPER AND LOWER AQUIFER ZONES ARE DEFINABLE
- -500- CONTOURS OF ELEVATION ON THE TOP OF THE LOWER AQUIFER ZONE

NOTE: ELEVATION DATUM IS U.S.G.S. MEAN SEA LEVEL

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

COACHELLA VALLEY INVESTIGATION

COACHELLA VALLEY
GROUND WATER BASIN

SCALE OF MILES

Bulletin No. 108, July 1964

Engineer's Report 2008-2009
Upper Whitewater River Subbasin Area of Benefit

TERRA NOVA®
Planning & Research, Inc.

Museum Market Plaza WSA
Coachella Valley Groundwater Subbasins and Subareas
Palm Springs, California

Exhibit
III-3

The Whitewater River Subbasin provides the most significant groundwater production (extraction) in the Coachella Valley. Smaller quantities of groundwater are produced from the Mission Creek Subbasin for use in the Desert Hot Springs area and unincorporated communities of Sky Valley and Indio Hills.

Due to its large size, the Whitewater River Subbasin is separated into "upper" and "lower" Subbasins in the vicinity of Washington Street. The Upper Whitewater Subbasin is located west of Washington Street and supplies water for urban uses. The Lower Whitewater River Subbasin is located east of Washington Street and supplies the needs of urban development as well as limited agriculture users. The project is located in the Upper Whitewater Subbasin, which is further discussed below (See Exhibits III-2 and III-3 above).

Upper Whitewater River Subbasin[14]

DWA's Retail Service Area is located in the Upper Whitewater River Subbasin. The Subbasin consists of water-bearing strata underlying the Palm Springs Subarea, the Thousand Palms Subarea, and the Upper Thermal Subarea, which make up the Subbasin. The Palm Springs Subarea generally underlies the communities of Palm Springs and Cathedral City. The Thousand Palms Subarea is generally located along the southwest toe of the Indio Hills north of Interstate-10. The Upper Thermal Subarea is generally located within the communities of Rancho Mirage, Indian Wells, and Palm Desert.

As shown in Table III-1 below, the total storage capacity in the Upper Whitewater River Subbasin is estimated to be 14.2 million acre-feet within the first 1,000 feet below the ground surface.[15]

Table III-1
Upper Whitewater Subbasin Groundwater Storage Capacity (acre-feet)*

Subarea	Storage
Palm Springs Subarea	4,600,000
Thousand Palms Subarea	1,800,000
Upper Thermal Subarea	7,800,000
Total Storage:	**14,200,000**

* In the first 1,000 feet below the ground surface; assumes a 40/60 split in groundwater resources in the Upper and Lower Thermal Subarea.

Source: "Coachella Valley Water District Engineer's Report on Water Supply and Replenishment Assessment, Upper Whitewater River Subbasin Area of Benefit 2007/2008," prepared by Water Resources Branch, Engineering Department, Coachella Valley Water District, April 2007.

[14] "Coachella Valley Water District Engineer's Report on Water Supply and Replenishment Assessment, Upper Whitewater River Subbasin Area of Benefit 2007/2008," prepared by Water Resources Branch, Engineering Department, Coachella Valley Water District, April 2007.

[15] *Ibid.*

DWA's service area is located primarily within the Palm Springs Subarea. The Palm Springs Subarea is an unconfined aquifer comprised of a triangular area between the Garnet Hill Fault on the northwest and the east slope of the San Jacinto Mountains southeast to Cathedral City. The fill materials within this Subarea are made up of heterogeneous alluvial fan deposits with little sorting and fine grained material content. The total groundwater storage capacity in this Subarea is estimated to be approximately 4.6 million acre-feet.

Groundwater Production

DWA and CVWD work together to manage the groundwater stored in the Upper Whitewater River Subbasin, of which the aforementioned Palm Springs Subarea is a part. DWA and CVWD both extract naturally and artificially replenished groundwater from the Upper Whitewater River Subbasin. DWA extracts water from the northerly portion of the Subbasin and CVWD extracts water from the middle and southerly portions of the Subbasin. Based on past groundwater extractions, approximately 25% of annual water production within the Subbasin can be attributed to DWA and the remaining 75% to CVWD.

Combined DWA and CVWD groundwater extractions and surface water diversions within the Upper Whitewater River Subbasin increased from approximately 93,000 acre-feet per year in 1966 to over 187,000 acre-feet per year in 1990; production reached 208,000 acre-feet per year in 2000. Since 2000, the annual production has averaged 210,000 acre-feet per year.[16] In 2007, total water production in the Upper Whitewater River Subbasin was 209,503 acre-feet (157,487 ac-ft/yr by CVWD and 49,837 ac-ft/yr by DWA), which represents approximately 1.5% of the groundwater in the Subbasin. [17]

Groundwater Condition

The California Department of Water Resources (DWR) Bulletin 108, Coachella Valley Investigation, published in 1964 is the most current bulletin published by the DWR that characterizes the condition of the groundwater basin as a whole. In Bulletin 108, DWR notes that the groundwater basin in the Coachella Valley is in a state of overdraft, [18] and in bulletin 160-93 DWR defines overdraft as the condition where groundwater extraction is in excess of inflow.[19]

Groundwater overdraft occurs when water extraction exceeds replenishment, causing reduced water levels in storage, decreased well yields, and increased pumping costs. Overdraft can also affect water quality, and in extreme cases can cause ground subsidence. Historical water level declines in the Upper Whitewater River Subbasin have been well documented by the US Geological Survey, the California Department of Water Resources, DWA, and CVWD.

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16 "Desert Water Agency 2005 Urban Water Management Plan," prepared by Krieger and Stewart Engineering, Inc., December 2005.

17 "Coachella Valley Water District Engineer's Report on Water Supply and Replenishment Assessment, Upper Whitewater River Subbasin Area of Benefit 2008/2009," prepared by Water Resources Branch, Engineering Department, Coachella Valley Water District, April 2008. Note that DWA's "Engineer's Report Ground Water Replenishment and Assessment Program for the Whitewater River Subbasin," prepared by Krieger and Stewart Engineering, Inc., in April of 2008 reports a rounded production amount of 209,000 acre-feet for the year 2007 and estimates that of this CVWD produced 156,750 acre-feet and DWA produced 52,250 acre-feet.

18 "Coachella Valley Investigation: Bulletin 108," prepared by the California Department of Water Resources, 1964.

19 "Coachella Valley Final Water Management Plan," prepared by MWH, September 2002.

As previously mentioned, production in the Upper Whitewater River Subbasin in 2007 totaled 209,503 acre-feet, with net withdrawal estimated at 96,168 acre-feet. This figure is based on a 35 percent return flows factor (73,326 acre-feet), natural recharge of 49,000 acre-feet per year, natural outflow of 25,000 acre-feet per year, and artificial groundwater replenishment of 16,009 acre-feet, which includes Table A water, additional water purchased from the State Water Project, and groundwater for storage. It should be noted that without artificial replenishment from SWP exchange water the net withdrawal from the Subbasin for 2007 would be 112,177 acre-feet. [20]

Based on an estimated total groundwater storage capacity for the Upper Whitewater River Subbasin of 14,200,000 acre-feet, and a cumulative overdraft of 775,884 acre-feet,[21] approximately 13,424,116 acre-feet of water remains in storage in the Upper Whitewater River Subbasin. The following table summarizes the cumulative balance in the Subbasin from 1973 through 2007.

Table III-2
Water Balance
Upper Whitewater River Subbasin 2007

Item	Acre-Feet
Production (2007)*	- 209,503
Non-consumptive Return (35%)	73,326
Natural Recharge	49,000
Natural Outflow	- 25,000
Artificial Recharge	16,009
Net Balance 2007	**- 96,168**
Subbasin Balance (through 2006)	**-679,716**
Cumulative Balance (through 2007)	**-775,884**

Source: "Engineer's Report on Water Supply and Replenishment and Assessment for the Upper Whitewater River Subbasin 2008-2009," prepared by CVWD, April 2008.
*Note that production includes 157,487 acre-feet extracted by CVWD and 49,837 acre-feet extracted by DWA, for a total production of 209,503 acre-feet in 2007.
** Negative numbers represent cumulative overdraft conditions in the Subbasin.

As shown in Table III-1, the Palm Springs Subarea represents 32.4% (4,600,000 acre-feet) of the Upper Whitewater River Subbasin's total storage capacity (14,200,000 acre-feet). Assuming an even distribution throughout the Upper Whitewater River Subbasin and a cumulative overdraft (1978 through 2007) of 775,884 acre-feet,[22] approximately 4,348,614 acre-feet[23] of water remains in storage in the Palm Springs Subarea.

[20] "Coachella Valley Water District Engineer's Report on Water Supply and Replenishment Assessment, Upper Whitewater River Subbasin Area of Benefit 2008/2009," prepared by Water Resources Branch, Engineering Department, Coachella Valley Water District, April 2008.

[21] *Ibid.*

[22] Represents 32.4% of total estimated cumulative overdraft in the Upper Whitewater River Subbasin 1973 through the end of 2006.

[23] Assumes that 251,386 acre-feet (32.4%) of the total estimated overdraft in the Upper Whitewater River Subbasin has occurred in the Palm Springs Subarea.

Ground subsidence caused by groundwater extraction has been documented in portions of the Coachella Valley since 1945. In 2007, the average decline observed in the monitoring wells located in the Upper Whitewater River Subbasin was 0.7 feet.[24] Although CVWD released a ground subsidence report in early 2008 indicating that measurable subsidence has occurred in the eastern portion of the Whitewater River Subbasin, similar investigations conducted by DWA in 2008, the finding of which were presented to DWA's Board of Directors on July 1, 2008, conclude that no substantial decline in ground surface elevations has occurred within the study area.[25] The study confirms that no significant ground subsidence has occurred within the western portion of the Whitewater River Subbasin to date.

Groundwater Recharge

DWA and CVWD jointly replenish the Subbasin. Imported water from the Colorado River is used to recharge and replenish natural groundwater in the Upper Whitewater River Subbasin. Since 1973, natural groundwater replenishment has been supplemented with Colorado River water imported through the Colorado River Aqueduct. The imported water is infiltrated in the Whitewater River spreading facilities (recharge basins) northwest of Palm Springs near Windy Point. The details of groundwater recharge are further discussed below. As further discussed below the programmatic recharge activities carried out in the basin by means of imported water, recycled water, return flows, and other local supplies are jointly managed by DWA and CVWD pursuant to, among other mechanisms, the Groundwater Management Agreement in an effort to eliminate long-term overdraft conditions that have existed in the basin.[26]

C. Water Supply Sources

The DWA sources for water supply include locally diverted surface water, natural groundwater, and imported water that is artificially recharged to augment natural groundwater replenishment. Other sources include water from exchanges/transfers as well as recycled wastewater. Table III-3 summarizes DWA's water supply sources through 2030. The projections in this table are from DWA's 2005 UWMP and do not reflect the revised projections for future imported water deliveries set forth in the DWA's 2008 Engineer's Report, which are expected to average 36,012 acre-feet per year beginning in 2010.

[24] "Coachella Valley Water District Engineer's Report on Water Supply and Replenishment Assessment, Upper Whitewater River Subbasin Area of Benefit 2008/2009," prepared by Water Resources Branch, Engineering Department, Coachella Valley Water District, April 2008.

[25] "Desert Water Agency Domestic Water System Subsidence Study," prepared by Krieger and Stewart Engineering, Inc., April 2008.

[26] "Groundwater Management Agreement," prepared by CVWD and DWA, adopted in the 1970's and amended in 1992.

Table III-3
Desert Water Agency Water Supply Sources
(Acre-Feet/Year)

Individual Sources	2005	2010	2015	2020	2025	2030
Surface Water (1)	2,500	2,800	2,800	2,800	2,800	2,800
Groundwater (2)	7,250	7,250	7,250	7,250	7,250	7,250
Imported Water (3)	35,800	37,800	36,400	35,000	33,650	33,650
Recycled Water	2,850	6,000	6,000	8,000	8,000	8,000
Total	**48,400**	**53,850**	**52,450**	**53,050**	**51,700**	**51,700**

Source: "Desert Water Agency 2005 Urban Water Management Plan," prepared by Krieger and Stewart Engineering, Inc., December 2005.
1) DWA Surface diversions include diversions from Snow Creek, Chino Creek North, and Chino Creek West, which are all tributary to the Whitewater River.
2) Long term natural recharge within the Upper Whitewater River Subbasin.
3) State Water Project water via the Colorado River water exchange per DWA's 2005 UWMP.

Surface Water
The sources of surface water used to supplement the Upper Whitewater River Subbasin include locally diverted surface water from streams in the San Jacinto Mountains. The Snow Creek, Falls Creek, and Chino Creek North and West systems constitute the diverted surface water supply system for DWA. The quantities of various surface water supplies are limited and constitute a total (maximum) annual yield of about 3,300 acre-feet per year and an average of approximately 2,800 acre-feet per year.[27]

DWA has licenses to divert 2,475 gallon per minute from Snow Creek and 675 gallons per minute from Falls Creek. Thus, the total licensed surface water diversion from both stream is 3,150 gallons per minute. In addition, DWA has an adjudicated right to deliver 900 gallons per minute from both Chino Creek North and Chino Creek West. The total surface water diversion of 2,800 acre-feet per year is based on average diversions from 1977 through 2004.

Groundwater
Based on long-term conditions, natural inflow into the Upper Whitewater River Subbasin averages 36,000 acre-feet per year and natural outflow to the Lower Whitewater River Subbasin averages 7,000 acre-feet per year, for a total net groundwater recharge of approximately 29,000 acre-feet per year.[28] Assuming even distribution throughout the Upper Whitewater River Subbasin and DWA's share of approximately 25%, total natural groundwater recharge is expected to be 7,250 acre-feet annually within DWA's service area.[29]

[27] "Desert Water Agency Domestic Water System General Plan," prepared by Krieger and Stewart Engineering, Inc., 1998.
[28] "Evaluation of a ground-water flow and transport model of the upper Coachella Valley, California," Water Resource Investigation 91-4142, prepared by the US Geological Survey, January 1992.
[29] "Desert Water Agency 2005 Urban Water Management Plan," prepared by Krieger and Stewart Engineering, Inc., December 2005.

As discussed herein, the Desert Water Agency also extracts groundwater from the Palm Springs Subarea, which is estimated to have 4.35 million acre-feet of groundwater in storage, pursuant to a managed program of groundwater replenishment and production that is carried out by DWA and CVWD to ensure the long-term reliability and sustainability of the basin.

Imported Water

In addition to the natural groundwater recharge, DWA and CVWD jointly replenish the Subbasin with imported water. Since 1973, natural groundwater replenishment has been supplemented with Colorado River water imported through the MWD Colorado River Aqueduct. DWA and CVWD are "participating public agencies" and are entitled to water originating in northern California through contracts with the State Water Project (SWP).[30] The SWP has contracts to deliver to 29 contracting agencies.

In 2003 CVWD's SWP water allotment was 23,100 acre-feet per year and DWA's SWP allotment was 38,100 acre-feet per year, for a combined allotment of 61,200 acre-feet annually. In 2004, CVWD purchased an additional 9,900 acre-feet per year of SWP water from the Tulare Lake Basin Water Storage District, which brought CVWD's total SWP allotment to 33,000 ac-ft/yr. Therefore, the total annual SWP allotment for CVWD and DWA is currently 71,100 ac-ft.

In addition, CVWD and DWA have negotiated an exchange agreement for the purchase of 100,000 acre-feet per year of SWP water from MWD. Through this purchase agreement MWD has permanently transferred 88,100 acre-feet per year to CVWD of its SWP allotment, and 11,900 acre-feet per year to DWA. Thus, the total current (2007) SWP allotment for CVWD and DWA is now 171,100, with DWA's portion equal to 50,000 acre-feet per year.

CVWD and DWA have also negotiated the transfer of 12,000 acre-feet per year and 4,000 acre-feet per year, respectively, from the Kern County Water Agency for a total amount of 16,000 acre-feet per year from this source. This transfer agreement was executed in May 2007 and deliveries will begin in 2010. In addition, CVWD and DWA have negotiated the transfer of 5,250 acre-feet per year and 1,750 acre-feet per year, respectively, from the Tulare Lake Water Storage District for a total amount of 7,000 acre-feet per year. This transfer was executed in December of 2007. Water deliveries from the Kern County Water Agency and the Tulare Lake Water Storage District will start in 2010.

Thus, the total SWP allocations for CVWD and DWA are expected to reach 194,100 acre-feet per year by 2010, with DWA's portion equal to 55,750 acre-feet per year. These allocations are contracted to run through 2035.[31] Total SWP Table A allotments for DWA and CVWD are summarized in Table III-4 below.

[30] "Water Supply Contract Between the State of California Department of Water Resources and Desert Water Agency," prepared by the Resources Agency of California Department of Water Resources, October 17, 1962.

[31] "Desert Water Agency Engineers Report on Ground Water Replenishment and Assessment Program for the Whitewater River Subbasin 2008-2009," prepared by Krieger and Stewart Engineering, Inc., April 2008.

Table III-4
State Water Project Table A Allocations

Water Transfers	CVWD Table A	DWA Table A	Total
Existing Allotment (2007)	121,100	50,000	171,100
Tulare Lake Water Storage District (2010)	5,250	1,750	7,000
Kern County Water Agency (2010)	12,000	4,000	16,000
Total	**138,350**	**55,750**	**194,100**

Source: "Engineer's Report Groundwater Replenishment and Assessment Program for the Whitewater River Subbasin," prepared by Krieger & Stewart Inc., April 2008.

Although there is no direct SWP delivery pipeline to the Coachella Valley, DWA and CVWD, through a joint agreement, exchange their State Water Project allotment with the Metropolitan Water District's (MWD) Colorado River water allotment. MWD maintains a turn-out facility that delivers Colorado River water to the Coachella Valley in Whitewater Canyon. Continued artificial recharge is necessary to reduce or eliminate the effects of over extraction.

It should be noted that the exchange contract between DWA, CVWD and MWD permits MWD to recall 100,000 acre-feet of exchange water a maximum number of times given a period of years during 50 and 75 percent of the driest years. The 100,000 acre-feet was divided into two 50,000 acre-feet blocks, the first of which can be called back after 2015 under the conditions stipulated above. The agreement also gives CVWD and DWA the opportunity to secure increased quantities of surplus water in addition to increased quantities of SWP water during normal or high water supply conditions.

In order to supplement water supplies, CVWD and DWA also purchase additional water from the SWP when available. Acquiring additional SWP water involves purchases of water on the spot market (surplus water) from various contractors as water occasionally becomes available, as opposed to the purchase of ongoing water supplies based upon DWA's and CVWD's SWP allocations. In the past, the availability to DWA and CVWD of these spot market waters has ranged from about 200 acre-feet (during a dry year) up to about 4,000 acre-feet (during a wet year). In addition, CVWD and DWA are exploring the possibility of constructing an aqueduct that would connect directly to the California Aqueduct.

As previously mentioned, imported water brought into the Coachella Valley is recharged to the groundwater basin and extracted for consumption. Based on the most recent data available including litigation discussed in Appendix B, reductions in accordance with the SWP 2007 Reliability Report, and projections in the 2008 Engineer's Report it was assumed that 65% of maximum Table A allocations would be delivered each year from 2010 through 2030.

Recycled Water

Recycled water is currently being used to augment DWA's water supply and is used instead of groundwater for irrigation. Therefore, recycled water reduces total demand for groundwater and surface water. Recycled water used for irrigation was 4,915 acre-feet per year, or approximately 8.4% of DWA's total water supply in 2007 (See Table III-5). The average annual amount of recycled water available is projected to grow over time to 8,000 acre-feet per year by 2020.[32]

[32] "Desert Water Agency 2005 Urban Water Management Plan," prepared by Krieger and Stewart Engineering, Inc., December 2005.

DWA and the City of Palm Springs have two agreements for recycled water services: 1) Water Conservation and Reclamation Agreement signed on December 7, 1997; and 2) Water Reclamation Agreement signed on February 19, 1985. These agreements are available for review at the Agency.

D. Historical and Projected Water Use[33]

Single-family residential customers constitute the majority of DWA's customers, with the 2005 population in the DWA service area estimated at approximately 70,000. Over the past 10 years total water production in the DWA service area has increased approximately 8%. Table III-5 sets forth the total water production for the past 10 years in the DWA Service Area. Notably, the primary source of consumption in the DWA Service area is outdoor water use, which accounts for an estimated 60% to 80% of residential and commercial water use.

Table III-5
DWA Water Production Acre-Feet
1997 to 2007

Year	Ground Water	Surface Water	Recycled Water	Total
1997	43,658	5,626	3,090	52,374
1998	41,385	7,545	2,524	51,454
1999	44,350	6,941	2,905	54,196
2000	44,458	6,297	2,947	53,702
2001	44,112	4,928	3,018	52,058
2002	46,004	4,221	2,875	53,100
2003	43,463	4,627	2,787	50,877
2004	48,093	4,758	2,948	55,799
2005	46,080	4,799	2,616	53,495
2006	48,967	4,644	3,665	57,276
2007	50,128	3,490	4,915	58,533

Source: "Desert Water Agency Engineers Report on Ground Water Replenishment and Assessment Program for the Whitewater River Subbasin 2008-2009," prepared by Krieger and Stewart Engineering, Inc., April 2008.

Population in the DWA service area is estimated to reach 100,000 by 2030, with total water demand estimated to reach over 74,000 acre-feet per year in 2030.[34] Table III-6 shows the total estimated water demand and projected groundwater extractions from 2010 through 2030. Based on these projections, total annual water use will increase by approximately 34%, or 25,000 acre-feet, over the next 24 years; total groundwater extractions are projected to increase by almost 25% over that same period of time.

[33] *Ibid.*
[34] *Ibid.*

Table III-6
Projected DWA Groundwater Extractions

Year	Total Water Use	Estimated Loss	Surface Water	Recycled Water	Total Ground-water Extractions	Ground Water Non-Consumptive Return[1]	Net Ground-water Extractions
2010	56,650	1,250	-2,800	-6,000	49,100	-17,185	31,915
2015	60,550	1,350	-2,800	-6,000	53,100	-18,585	34,515
2020	66,500	1,450	-2,800	-8,000	57,150	-20,003	37,148
2025	70,400	1,550	-2,800	-8,000	61,150	-21,403	39,748
2030	74,300	1,600	-2,800	-8,000	65,100	-22,785	42,315

Source: Modified from the "Desert Water Agency 2005 Urban Water Management Plan," prepared by Krieger and Stewart Engineering, Inc., December 2005.
1) Non-consumptive return is approximately 35% of consumptive use (USGS Water Resource Investigation 91-4142). Note that estimates are considered conservative (35%) and may actually be upwards of 45%.

Table III-6 estimates the projected net groundwater extractions that would be needed in the 2010 through 2030 period to meet demand. Total water use and estimated losses are summed and discounted by the amount of surface and recycled water, which yield the estimated total groundwater extractions. The table assumes that 35% of the total groundwater extracted is returned to the basin (non-consumptive return), and offers the estimated net groundwater extraction expected to occur including return flows. It should be noted that imported water is not included in this table. Therefore, the actual water extracted from the Palm Springs Subarea will be tempered by imported water. Detailed supply and demand projections are further discussed in Section V and presented in Appendix C.

E. Water Resource Planning and Supply Reliability

Water Planning

Due to DWA's ability to secure imported water and store it within the Upper Whitewater River Subbasin, historically short-term drought situations have had a negligible effect on DWA's ability to supply water to its customers.

As with most water systems in southern California and their water sources, reliability can be affected by earthquakes, power outages, floods and other natural events. Emergency preparedness planning is therefore a key part of DWA's operations. DWA has coordinated with local entities to formulate an Emergency Preparedness Plan. The plan outlines specific courses of action that DWA personnel will follow in the event of a natural disaster or breach in system security. As part of this process, DWA is installing earthquake safety valves on all above ground steel reservoirs, and aging pipelines are being upgraded as part of an ongoing mainline replacement program to further enhance the reliability of the water system.

In addition, DWA has also adopted an ordinance (No. 45) that details how the use of water supplies can be restricted during emergencies. This ordinance provides a water supply plan with four stages of emergency, ranging from normal conditions to mandatory compliance with severe water use restrictions during water shortage emergencies. Additional information on Ordinance Number 45 is provided in Section IV below.

Water Reliability

Water purveyors make annual requests to the Department of Water Resources (DWR) for water allocations and DWR makes an initial SWP Water allocation for planning purposes, typically in the last month before the next water delivery year. As additional information regarding water availability becomes available to DWR throughout the year, DWR updates its estimates.

The following table outlines the historic reliability of SWP deliveries, including their initial and final allocations for years 1987 through 2006. Over the past 20 years SWP Water deliveries have averaged 87% of the water purveyors allocations. DWR's 2007 State Water Project Delivery Reliability Report estimates that average reliability of future State Water Project Table A deliveries through 2027 will range from 66% to 69%.[35] However, DWA used a conservative estimate in the 2008 Engineer's Report and assumed that they would receive on average 65% (36,012 acre-feet per year) of their State Water Project allocations (55,750 acre-feet per year) through 2030.

Table III-7
Department of Water Resources Table A Water Allocations
1987 - 2007

Year	Initial Allocation	Final Allocation
1987	100%	100%
1988	100%	100%
1989	100%	100%
1990	100%	100%
1991	85%	30%
1992	20%	45%
1993	10%	100%
1994	50%	50%
1995	40%	100%
1996	40%	100%
1997	70%	100%
1998	40%	100%
1999	55%	100%
2000	50%	90%
2001	40%	39%
2002	20%	70%
2003	20%	90%
2004	35%	65%
2005	40%	90%
2006	55%	100%
2007	60%	60%
Average	**54%**	**83%**

Source: State of California Department of Water Resources, Water Contract Branch within the State Water Project Analysis Office, Notices to State Water Contractors, 1987 – 2007.

[35] "The State Water Project Delivery Reliability Report," prepared by the State of California Department of Water Resources, August 2008.

F. Water Resources and Effects of Climate Change

Increased levels of carbon dioxide and other green house gases in the atmosphere have the potential to cause global warming and result in climatic changes. The primary concern in dealing with climate change is adequately predicting future hydrological cycles and water resource conditions so that appropriate management techniques can be established and implemented.

In order to account for potential changes in water supplies associated with changing climatic conditions, the Department of Water Resources considered potential fluctuations in water supplies in their 2007 Reliability Report. These potential reductions are accounted for in DWA's Engineer's Report upon which the analysis conducted herein is based. Therefore, potential reductions to SWP deliveries associated with climate change are accounted for in the supply/demand model presented in Appendix C.

Colorado River water supplies may also be subject to reduced deliveries as a result of changing climatic conditions. However, since DWA receives SWP exchange water in the form of Colorado River water potential reductions in deliveries to Colorado River water are anticipated and accounted for in the reduced reliability figure of 65% of maximum Table A allocations. Also see Appendix B and C.

Despite the debate surrounding the effects of global warming and climate change, it is apparent that proactive measures should be taken to limit the adverse effects of and prepare for potential outcomes associated with changing climatic conditions. DWA has the ability to utilize the groundwater basin for water storage and extraction during periods of low precipitation. This reserve will serve as a reliable water source in times of extreme water shortages and will provide sufficient water supplies even in the event that external sources are interrupted.

MUSEUM MARKET PLAZA

WATER SUPPLY ASSESSMENT

SECTION IV. WATER CONSERVATION EFFORTS

A. Water Resource Management

Introduction
Over the past several years, DWA and CVWD have made significant efforts to provide private and public consumers of local water resources with a variety of technological and management approached that promote conservation of water resources. These include extensive and detailed information on the use of drought-tolerant desert plants in landscaping, water efficient irrigation, and the use of reclaimed wastewater and non-potable water sources for irrigation. In addition, the City of Palm Springs requires that developers implement water-efficient landscaping in developments within its jurisdiction.

Desert Water Agency
In order to promote water conservation and encourage water efficient use especially during drought conditions and when imported water supplies are reduced, the Desert Water Agency's Board of Directors adopted Ordinance 31 and Ordinance 45.

Ordinance Number 31 was adopted in February of 1982 and prohibits the waste of water including but not limited to excessive use as evidenced by the runoff of water onto streets or gutters. This ordinance is enforced by DWA, the cities of Palm Springs and Cathedral City, and the County of Riverside. A first time violation results in a warning, and subsequent violations initiate a surcharge to the users water bill up to 50%. Multiple violations can result in the discontinuation of water services.

Ordinance Number 45 sets forth a water supply plan for the conservation of water during an water shortage emergency. The plan established four stages of severity depending on the water supply reduction and proposes specific conservation targets including water use restrictions and penalties for violations.

DWA's UWMP includes a description of the Water Contingency Plan that identifies the four aforementioned water supply shortage stages. The first stage is under Normal Conditions, where there is a 25% to 40% shortage in supplies. Water rationing includes voluntary conservation measures with a reduction goal of 15% where customers are encouraged to use water wisely. The second stage occurs when there is a 40% to 50% shortage in supplies and is called the Water Supply Shortage Alert, with mandatory conservation measures including use restrictions. The consumer reduction goal under this stage is 25%. The third stage is a Water Shortage Warning, which occurs when supplies are reduced by 50% to 60%. This stage includes stronger mandatory conservation measures and no issuing of new construction meters, with a consumer reduction goal of 30%. The final stage is a Water Shortage Emergency. This stage is implemented when there is a shortage in supplies exceeding 60% and includes severe water use prohibitions such as no water for construction use or pools and fountains. At this stage the customer reduction goal is 50%.

The Desert Water Agency also actively promotes water conservation through the Agency's Water Conservation Program, which was initiated in 1977. The primary focus has been on large water users and outdoor irrigation. In addition, the Agency recognizes the effectiveness of water conservation education, especially at the grade school level and established a number of special programs for use in the local school system.

Also, DWA has instituted a groundwater replenishment fee to cover the costs associated with recharging the Upper Whitewater Subbasin and managing its finite resources and capacity. A stronger nexus between resource use and cost will also encourage efficiency and conservation.

To further reduce the impacts of development on groundwater supplies, DWA has implemented the use of tertiary (third stage) treated wastewater for golf course, landscape and other irrigation purposes. DWA operates a 10.0 million gallon per day wastewater treatment facility in Palm Springs, with plans to expand the facility to 15.0 million gallons per day. This reclamation plant is expected to ultimately provide 17,000 acre-feet per year of recycled water within DWA's Service Area. Use of recycled water helps to relieve demand for potable groundwater, thereby freeing up groundwater in the Palm Springs Subarea and the Whitewater River Subbasin.

Coachella Valley Water District

To manage water resources in the Coachella Valley, CVWD follows their UWMP, the requirements in their landscape ordinance and their Lush and Efficient Landscape Guide. In addition, CVWD imports Colorado River water for use and groundwater replenishment, and operates wastewater treatment facilities throughout the Whitewater River Subbasin in order to provide recycled water to consumers and reduce demand on groundwater.

City of Palm Springs

The City has adopted a Water-Efficient Landscape Ordinance (Municipal Code Title 8 Chapter 8.6), which establishes the minimum water efficient landscape requirements for all new and rehabilitated landscape projects to meet the minimum requirements of the State of California Water Conservation in Landscaping Act (Government Code Section 65591, et seq). The following are excerpts from the City's Landscape Ordinance and shall be applied to the Museum Market Plaza Specific Plan:

- City Landscaping requirements shall apply to all new and rehabilitated landscaping for private development projects such as common area landscaping, private schools, businesses, and for multifamily housing that have a landscaped area of two thousand five hundred square feet or more.

- All landscape design plans shall be designed and constructed to the highest level of aesthetic values and water efficiency, and to make wise water management viable and easy.

- For all private development projects, a licensed landscape architect, installing licensed contractor, or other qualified professional in a related field shall conduct a final field observation and shall provide a certificate of completion. The certificate shall specifically indicate that plants were installed as specified. The installing contractor shall certify that the irrigation system was installed as designed.

- Water waste from inefficient landscape irrigation allowing runoff, low head drainage, overspray or other conditions where water flows onto roadways, adjacent property or non-irrigated property is prohibited.

- Landscape and irrigation system shall be maintained to ensure water efficiency. A regular maintenance schedule shall include, but not be limited to, checking, adjusting and repairing irrigation equipment, resetting the time clocks monthly, aerating and dethatching turf areas, replenishing mulch, fertilizing, pruning, and weeding all planted areas.

- Programmed irrigation should only occur from 9:00 PM to 9:00 AM during the summer months (May 1st through September 30th).

Museum Market Plaza Specific Plan

The project promotes the use of drought tolerant and native plant materials species. Landscape designs that specify the use of low-water or drought-tolerant vegetation is known as "xeriscape landscaping." Using xeriscape landscape design and maintenance practices promotes water efficiency, which is optimal for the Palms Springs area. Plant selection will be consistent with the existing landscape established in the project vicinity.

In accordance with the Specific Plan, all landscape areas shall be irrigated using an automatic climate-based irrigation system that relies primarily on point application or bubblers/drip irrigation to minimize water loss and maximize water application directly to the root zone. The regular irrigation of native plants should be viewed as temporary for the initial period of plant growth establishment. Once native plant materials have rooted and are surviving on their own, supplemental water should be minimized. Turf and shrub irrigation will utilize independent delivery systems for optimum water efficiency.

Landscaping within the proposed Specific Plan will be limited to approximately 10% (2.06 acres) of the site (20.6 acres). Limited landscaping is appropriate due to the downtown setting in the urban core, and has the added benefit of reducing water demand for irrigation purposed. Provision is made for plaza and roof-top landscaping as well.

Water Conservation

With increasing demands on limited water supplies in southern California and the project area, efforts to reduce water consumption are a priority. The Palm Springs landscape ordinance establishes minimum water-efficient landscape requirements for all new and rehabilitated public and private landscape projects. The ordinance also requires development projects to submit landscape construction plans, grading plans, irrigation design plans, and landscape maintenance schedules for review and approval by the Palm Springs Public Works Department. In some cases, landscape irrigation audits and soil analyses are required. In addition, projects are required to comply with State law, which, since 1992, has mandated the installation of low-flush toilets and low-flow showerheads and faucets in new construction.

Landscape Design

It is anticipated that the proposed Museum Market Plaza project will be required to follow the Palm Springs Landscape Ordinance (8.60). The purpose and intent of the City's Landscape Ordinance is to establish minimum water efficient landscape requirements for all new and rehabilitated landscape projects to meet the minimum requirements of the State of California Water Conservation in Landscaping Act, Government Code Section 65591, et seq. In doing so, the City's staff shall consider the State Model Water Efficient Landscape Ordinance and determine the provisions of this ordinance in order to more appropriately address the specific needs of the City. Under the Palm Springs Ordinance, water waste from inefficient landscape irrigation allowing runoff, low head drainage, overspray or other conditions where water flows onto roadways, adjacent property or non-irrigated property is prohibited.

In order to further reduce outdoor water use, climate-based irrigation controllers (evapotranspiration controllers or ET controllers) should be utilized. ET controllers apply water based on measured evapotranspiration rates. The ET rate provides a measurement of the amount of water required to replace evaporation and transpiration for optimum plant growth. ET controllers may be installed in common irrigated areas and throughout the landscaped areas of the proposed development. The controllers are connected (via cable or satellite) to a weather station, which monitors evapotranspiration rates and adjusts irrigation control systems accordingly. The controller can develop an irrigation schedule on a real-time basis, allowing adjustment to watering systems to reduce peak demands.

B. General Control and Conservation Measures

In addition to conservation actions required by the City, and DWA the following measures shall be imposed to ensure water use efficiency and conservation within the proposed project:

1. To the greatest extent practicable, drought tolerant and native desert landscaping shall be used in all non-turf areas of project landscaping. Boulders, cobble, gravels and crushed granitic materials, shall be used throughout landscaped areas to naturalize the design, provide additional structure and pattern, and eliminate or reduce the need for water in these areas.

2. Turf areas shall be limited to areas of maximum human contact, such as recreation and sports areas or areas with heavy foot traffic or activity. Large, non-functional turf areas, such as those fronting roadways, shall be prohibited.

3. Landscaped areas shall utilize efficient irrigation systems that minimize runoff and evaporation, and maximize effective watering of plant roots. Landscape areas shall be outfitted with moisture detectors and ET controllers to maximize irrigation efficiency. Landscape plans shall be approved by the City and DWA prior to installation.

4. The use of low-flush toilets and water-conserving shower heads and faucets shall be required in conformance with Section 17921.3 of the Health and Safety Code, Title 20, California Code of Regulations Section 1601(b), and applicable sections of Title 24 of the State Code.

C. Monitoring and Reporting

1. Prior to the issuance of building permits, applicants shall submit a landscape plan for review and approval by the City and DWA to assure the maximum possible use of water efficient, drought tolerant landscaping, irrigation and maintenance practices.
   Responsible Parties: Developers, project landscape architects. To be submitted concurrently to the City Planning Department and DWA for review and approval.

2. Project design and plans shall reflect the use of efficient irrigation systems and moisture detectors, low flush toilets and water-conserving shower heads and faucets.
   Responsible Parties: Developers, project architects, project landscape architects. To be submitted to the City Building Development Departments, DWA for review and approval.

3. Installation of efficient irrigation systems and low moisture detectors.
   Responsible Parties: Project developers, general contractors, and landscape architects. To be inspection by Palm Springs Building and Safety, as required.

MUSEUM MARKET PLAZA

WATER SUPPLY ASSESSMENT

SECTION V. WATER SUPPLY ASSESSMENT

A. Existing Demand verses Project- Specific Water Demand Estimates

The project site encompasses a total of approximately 20.6 acres located in downtown Palm Springs. The existing land uses within the project boundary include a mix of retail, office, and restaurant uses. The Specific Plan project proposes increased intensity of the project site, which would result in residential, hotel, commercial, office, restaurant, and open space land uses. Development will increase demand for water resources compared to the existing less intense water demand.

Existing and projected water demand for the proposed project site was estimated using the methodology described in Appendix A. The existing water demand comes from approximately 380,977 square feet of commercial, office, and restaurant land uses. Using the same methodology applied to the projected water demand, the existing water demand is estimated at 64.9 acre-feet per year or 0.06 mgd. The existing water demand is contained and accounted for within the estimated water demand for DWA service area as presented in the 2005 UWMP. The estimated water demand at buildout of the Specific Plan will require 0.23 million gallons per day, or 259.3 acre-feet per year.[36] In order to quantify the additional demand that will be generated at buildout of the Specific Plan, the aforementioned analysis was conducted (see Appendix A Water Supply Assessment). Therefore, at buildout of the Specific Plan, the net water demand increase is estimated to be 194.3 acre-feet per year or 0.17 million gallons per day after accounting for the existing water demand (see Table V-1).

Table V-1
Museum Market Plaza Specific Plan
Net Annual & Daily Water Demand

Water Demand	Total Annual Demand (ac-ft/yr)	Total Daily Demand (mgd)
Project Water Demand	259.3	0.23
Existing Water Demand	64.9	0.06
Net Water Demand	**194.3**	**0.17**

Source: "Museum Market Plaza Water Supply Assessment," prepared by Terra Nova Planning & Research, September 3, 2008.

[36] "Appendix A Water Demand Estimated for the Museum Market Plaza Specific Plan," prepared by Terra Nova Planning & Research, September 2008.

It should be mentioned that DWA's infrastructure including pumping facilities, water conveyance lines, and storage facilities are adequate to meet the net increase in water demand that will be generated as result of the proposed project. Excluding return flows at buildout the project will generate a cumulative daily water demand of 0.72 acre-feet or an annual demand of 262.14 acre-feet, and a net demand of 0.54 acre-feet per day or an annual demand of 196.27 acre-feet (Also see Appendix A). Further, development and increased water demand will occur incremental as the project builds out, which will allow DWA to expand facilities as needed.

B. Water Supply and Demand Projections

In accordance with SB 610 and to assess a range of future water supply and demand conditions, three water supply scenarios have been analyzed, and include normal, single, and multiple dry years occurring over the 20 year model period between 2010 and 2030. Appendix C describes the methodology utilized to construct the model and perform the analysis. Summary tables based on Appendix C are presented below and detail the results of the analysis.

Demand estimates from the Desert Water Agency's 2005 Urban Water Management Plan and Appendix A, and supply estimates from the 2005 UWMP and the 2008 Engineer's Report, account for changes in State Water Project deliveries in accordance with the 2007 California Department of Water Resources State Water Project Reliability Report and recent federal litigation (Appendix B). The 2007 SWP Reliability Report accounts for constraints to water delivery reliability associated with climate change and recent federal litigation (Judge Wanger's ruling presented in Appendix B). Based on information from the Report, average reliability of future SWP Table A deliveries through 2027 will range from 66% to 69%.[37] DWA's 2008 Engineer's Report offers revised Table A water delivery figures based on the aforementioned litigation and potential reductions to SWP deliveries, and assumes 65% (36,012 acre-feet per year) of the maximum Table A allocation for DWA (55,750 acre-feet per year).

The following discussion of water supply and demand projections include the three water reliability scenarios outlined above. The results are presented below under a normal water year scenario, single dry water year scenarios, and multiple dry water year scenarios. The single dry year is analyzed in the event that a single dry year occurs that is similar to the drought that occurred during 1988. The multiple dry year projections are analyzed in the event that a four (4) year drought were to occur that would be comparable to the drought that occurred from 1989 through 1992.

Under each of the three scenarios DWA's total water demand, including that associated with the proposed project ranges from 56,682 acre-feet in 2010 up to 74,494 acre-feet per year in 2030. The tabulations of these three scenarios are illustrated in Appendix C.

In order to calculate the percentage impact to the Subarea and Subbasin as a ratio of the estimated groundwater in storage in 2007, it was assumed that the Palm Springs Subarea contains 4,348,614 acre-feet and the Upper Whitewater River Subbasin contains 13,675,502 acre-feet.

[37] "The State Water Project Delivery Reliability Report," prepared by the State of California Department of Water Resources, August 2008.

1. Normal Water Year

Under the normal water year scenario 2010 through 2030, DWA would maintain a positive cumulative balance through 2030, which would result in a surplus of 64,298 acre-feet in that year. For the 20 year model period, the net project demand represents no more than 0.32% of DWA's total projected demand. Supplies will exceed demand through 2019, which will allow DWA to bank surplus water in the groundwater basin. Under the normal water year scenario, in year 2020 water demands will exceed supplies. It should be mentioned that without the inclusion of the proposed project, DWA's 2005 UWMP estimates that in year 2020 demands would also exceed supplies. Therefore, development of the Museum Market Plaza Specific Plan will not result in a significant impact to the water supplies or interfere with DWA's ability to meet water demands for any users including agricultural, industrial, and manufacturing.

Banking water supplies during years 2010 through 2019, when supplies exceed demands, will allow DWA to withdraw water as needed from 2020 through 2030 without contributing to overdraft conditions. Thus, sufficient water supplies are available to meet demand during the normal water year scenario without impacting the groundwater basin.

The cumulative water balance in 2030 would represent a surplus of 1.48% of the estimated groundwater in storage in the Palm Springs Subarea in 2007, and 0.47% of the Upper Whitewater River Subbasin. As a result, the amount of water that would remain in storage in the Subarea at the end of the modeled period is approximately 4.41 million acre-feet.

Table V-2
Normal Water Years 2010 – 2030
(acre-feet/year)

Supply Sources	**2010**	**2015**	**2020**	**2025**	**2030**
Surface Water	2,800	2,800	2,800	2,800	2,800
Natural Groundwater	7,250	7,250	7,250	7,250	7,250
Table A Water[1]	36,012	36,012	36,012	36,012	36,012
Groundwater Recharge[2]	11,739	13,160	12,543	13,908	15,273
Recycled Water	6,000	6,000	8,000	8,000	8,000
Total Supply	**63,801**	**65,222**	**66,605**	**67,970**	**69,335**
Demand					
Recycled Water	6,000	6,000	8,000	8,000	8,000
Water Production	50,650	54,550	58,500	62,400	66,300
Net Project Demand[3]	32	194	194	194	194
Total Demand with Project	**56,682**	**60,744**	**66,694**	**70,594**	**74,494**
Annual Balance[4]	**7,119**	**4,478**	**-89**	**-2,624**	**-5,159**
Cumulative Balance[5]	**52,519**	**80,190**	**92,945**	**84,959**	**64,298**
Net Project Demand as a % of Total Demand	0.06%	0.32%	0.29%	0.27%	0.26%
Net Project Demand as a % of Cumulative Balance	0.06%	0.24%	0.21%	0.23%	0.30%

Source: "Desert Water Agency 2005 Urban Water Management Plan Final Report," Table 15, prepared by Krieger & Stewart Inc., December 2005.
1) Modified in accordance with " Engineer's Report Groundwater Replenishment and Assessment for the Whitewater River Subbasin," Table 2, prepared by Krieger & Stewart Inc., April 2008, which is based on DWR SWP 2007 Reliability Report and assumes 65% of maximum Table A deliveries.
2) Groundwater recharge accounts for 35% return flows as a result of natural percolation associated with irrigation and non-consumptive use of water.
3) Net Project Demand is the difference between existing demand onsite (64.9 ac-ft/yr) and projected demand (259.3 ac-ft/yr) at buildout of the Museum Market Plaza Specific Plan. Note that the project will initiate in 2010 and buildout in 2015, in the interim years an annual additional water demand of 32.4 ac-ft/yr are assumed.
4) The annual difference between total supply and total demand.
5) The cumulative difference in the input/output model assuming a starting balance of 45,400 acre-feet in storage in accordance with DWA 2005 UWMP year 2009.

2. Single Dry Water Year

In order to determine the impact to the water supply from a single dry year occurring in different years throughout the 20 year period, the model analyzes the occurrence of a single dry year in 2010, 2015, 2020, 2025, and 2030 (See Appendix C Tables 2C through 6C). In all single dry year scenarios, water demands exceed supplies during the year that the dry event occurs and annually beginning in year 2020. Although the last 10 years of the model (2020 through 2030) result in demands exceeding supplies, the cumulative balance in year 2030 remains positive. Regardless of the year in which the single dry year occurs, the cumulative balance in 2030 is projected to be 26,386 acre-feet. The cumulative balance in year 2030 would represent a surplus of 0.61% of the estimated groundwater in storage in the Palm Springs Subarea in 2007, and 0.19% of the estimated storage in the Upper Whitewater River Subbasin. As a result, the amount of water that would remain in storage in the Subarea at the end of the modeled period would be approximately 4.38 million acre-feet. Therefore, development of the project and increased water demand generated will not significantly impact water supplies or interfere with DWA's ability to meet water demands for any existing or future users including agricultural, industrials, and manufacturing for the 20 year period from 2010 through 2030.

Charts 1 through 5 below show the supply (blue) and demand (red) trend line from 2010 through 2030, as well as the cumulative balance (yellow) for each of the single dry year scenarios.

As shown in Chart 1 and seen in Appendix C Table 2C, the single dry year would occur in 2010 and would result in an annual deficit of 30,793 acre-feet for that year. However, subsequent years 2011 through 2019 would result in surplus water that would recharge the basin. Nonetheless, by 2020 water demands exceed supplies and the cumulative balance begins to decline. As projected, this scenario would result in a positive cumulative surplus in 2030 of 26,386 acre-feet and would not require significant drawdown from the groundwater basin. Therefore, in the event that a single dry year were to occur in 2010 there would be sufficient supplies to meet demands without impacting the groundwater basin.

Similarly, as shown in Chart 2, a single dry year occurring in 2015 would not impact groundwater in storage since sufficient water supplies are available to meet demand as a result of the surplus water that would be banked in years preceding the dry year and from 2016 through 2019. Therefore, the occurrence of a single dry year in 2015 would not adversely impact the water supply or the ability of DWA to meet demands, including demands generated by the proposed project.

Chart 3 shows the supply and demand projection and impacts to the cumulative balance in the event that a single dry year were to occur in 2020. From 2010 through 2019 supplies are greater than demand and the cumulative balance increases. In 2020, during the single dry year event, and subsequent years through 2030 water demands exceed supplies, and the cumulative balance declines. Nonetheless, in 2030 the cumulative balance remains positive at 26,386 acre-feet. Therefore, under this scenario sufficient water supplies are available to meet demand without adversely impacting the groundwater basin.

In the event that a single dry year were to occur in 2025, as shown in Chart 4, sufficient water supplies would be available to meet demand without adversely impacting groundwater. Chart 4 shows that water supplies are greater than demand through 2019, with the cumulative balance increasing. In 2020 the cumulative balance begins to decline and is greatly reduced in year 2025 when the single dry year occurs. Due to the banked water during the normal year period from 2010 through 2019 the cumulative balance remains positive through 2030.

Chart 5 shows the impacts to the water demand, supplies and the cumulative balance in the event of a single dry year occurring in 2030. For years 2010 through 2019 supplies exceed demand and the cumulative balance increases. Beginning in year 2020 demands exceed supplies and the cumulative balance begins to decline. In 2030 the cumulative balance is greatly reduced as a result of the single dry year event, but remains positive at 26,386 acre-feet. Therefore, impacts to the groundwater basin would be less than significant in the event that a single dry year were to occur in 2030.

Although the occurrence of a single dry year at any time within the 20 year period would not result in adverse impacts to groundwater in storage, the overall trend indicates that after 2019 demands exceed supplies. The banking of surplus water during the first few years of the model allows for groundwater extraction while retaining a positive cumulative balance. However, the trend indicates that without the implementation of conservation efforts and/or acquisition of additional water supplies the cumulative balance will diminish and groundwater will have to be extracted to meet demands.

Please note that for easy reference these charts are included on the subsequent page, however larger charts are available in Appendix C, Charts 2C through 6C.

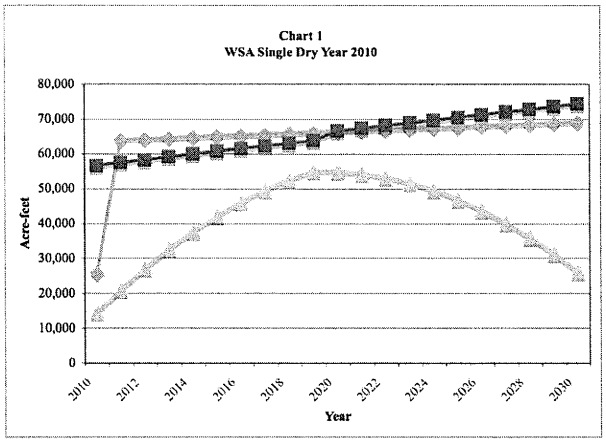


Chart 1
WSA Single Dry Year 2010
Acre-feet
Year

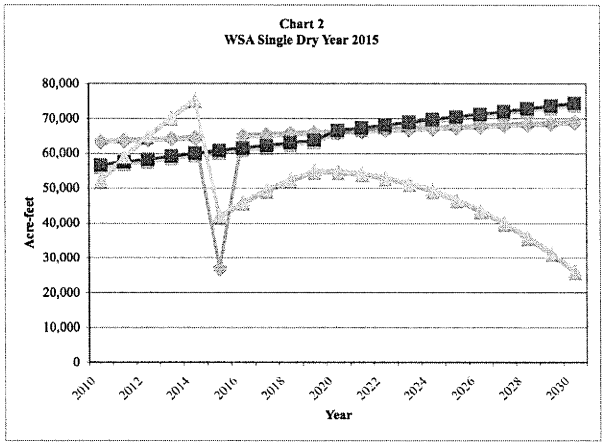


Chart 2
WSA Single Dry Year 2015
Acre-feet
Year

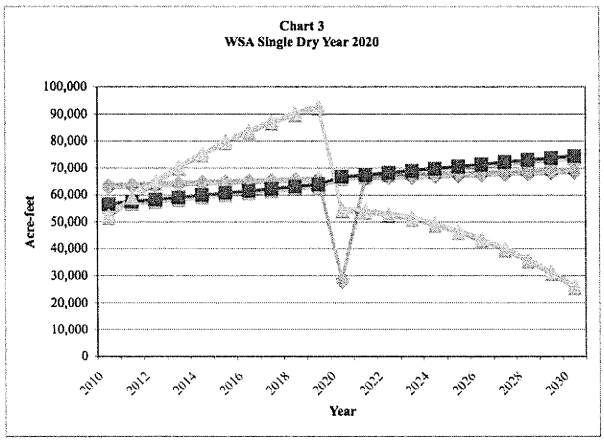


Chart 3
WSA Single Dry Year 2020
Acre-feet
Year

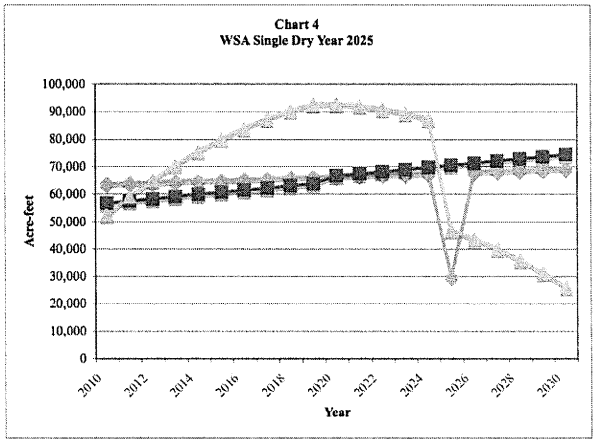


Chart 4
WSA Single Dry Year 2025
Acre-feet
Year

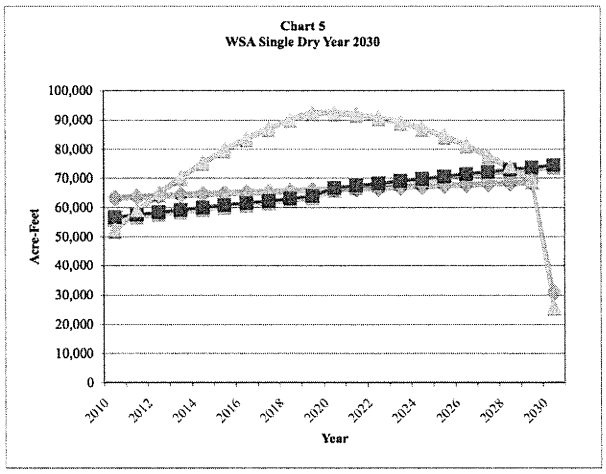
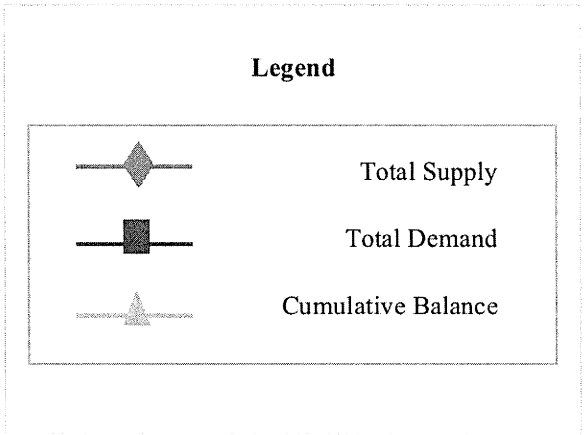


Chart 5
WSA Single Dry Year 2030
Acre-Feet
Year


Legend
Total Supply
Total Demand
Cumulative Balance

3. Multiple Dry Water Years

Under the multiple dry year scenario, DWA's cumulative balance would be depleted, and an overdraft in the amount of an estimated 63,350 acre-feet would result in 2030 (See Appendix C, Tables 7C through 10C). The projected shortfall in 2030 represents a deficit of 1.46% of the estimated groundwater in storage in the Palm Springs Subarea in 2007 and 0.46% of the Upper Whitewater River Subbasin in 2007. This scenario and the resulting overdraft would not have a significant impact on the amount of water in storage in the groundwater basin or interfere with DWA's ability to meet water demands for any users including agricultural, industrials, and manufacturing. The amount of water that would remain in storage in the Subarea at the end of the modeled period would be approximately 4.29 million acre-feet.

In the model period 2010 through 2014, the net project demand represents no more than 0.27% of DWA's total projected demand. In year 2014, due to the deficit of 51,936 acre-feet, the groundwater basin would contain an estimated 4.30 million acre-feet. See Table V-3 below.

Table V-3
Multiple Dry Water Years 2010 – 2014
(acre-feet/year)

Supply Sources	**2010**	**2011**	**2012**	**2013**	**2014**
Surface Water	1,500	1,500	1,500	1,500	2,800
Natural Groundwater	6,000	5,500	5,000	4,500	7,250
Table A Water[1]	8,100	8,100	6,700	6,700	36,012
Groundwater Recharge	11,739	12,030	12,286	12,596	12,887
Recycled Water	6,000	6,000	6,000	6,000	6,000
Total Supply	**33,339**	**33,130**	**31,486**	**31,296**	**64,949**
Demand					
Recycled Water	6,000	6,000	6,000	6,000	6,000
Water Production	50,650	51,450	52,150	53,000	53,800
Net Project Demand[2]	32	65	97	130	162
Total Demand with Project	**56,682**	**57,515**	**58,247**	**59,130**	**59,962**
Annual Balance[3]	**-23,343**	**-24,385**	**-26,761**	**-27,834**	**4,987**
Cumulative Balance[4]	**22,057**	**-2,328**	**-29,089**	**-56,923**	**-51,936**
Net Project Demand as a % of Total Demand	0.06%	0.11%	0.17%	0.22%	0.27%
Net Project Demand as a % of Cumulative Balance	0.15%	-2.79%	-0.33%	-0.23%	-0.31%

Source: "Desert Water Agency 2005 Urban Water Management Plan Final Report," Tables 17A-17C, prepared by Krieger & Stewart Inc., December 2005. Assumes that the first 4 years are drought years and the fifth year is a normal year.
1) Modified in accordance with " Engineer's Report Groundwater Replenishment and Assessment for the Whitewater River Subbasin," Table 2, prepared by Krieger & Stewart Inc., April 2008, which is based on DWR SWP 2007 Reliability Report.
2) Net Project Demand is the difference between existing demand onsite (64.9 ac-ft/yr) and projected demand (259.3 ac-ft/yr) at buildout of the Museum Market Plaza Specific Plan. Note that the project will initiate in 2010 and buildout in 2015, in the interim years an annual additional water demand of 32.4 ac-ft/yr are assumed.
3) The annual difference between total supply and total demand.
4) The cumulative difference in the input/output model assuming a starting balance of 45,400 acre-feet in storage in accordance with DWA 2005 UWMP year 2009.

Table V-4 shows the affects of a multiple dry year drought from 2015 through 2018 and normal water year conditions in 2019. The net project demand represents no more than 0.32% of DWA's total projected demand. In year 2019, due to the deficit of 34,614 acre-feet, the groundwater basin underlying the site (Palms Springs Subarea) would contain an estimated 4.31 million acre-feet. Under this scenario the cumulative balance in 2030 is an estimated deficit of 63,350 acre-feet (See Table 8C Appendix C). This projected overdraft would constitute approximately 1.46% of the total water in the Palm Springs Subarea, 0.46% in the Subbasin, and does not result in significant impacts to the groundwater supply or interfere with DWA's ability to meet water demands for any users including agricultural, industrials, and manufacturing. As previously mentioned, the large volume of groundwater in the Subarea has sufficient water supplies to meet projected demand for the 20-year model period and beyond.

Table V-4
Multiple Dry Water Years 2015 – 2019
(acre-feet/year)

Supply Sources	**2015**	**2016**	**2017**	**2018**	**2019**
Surface Water	1,500	1,500	1,500	1,500	2,800
Natural Groundwater	6,000	5,500	5,000	4,500	7,250
Table A Water[1]	8,100	8,100	6,700	6,700	36,012
Groundwater Recharge	13,160	13,440	13,685	13,983	14,263
Recycled Water	6,000	6,000	6,000	6,000	6,000
Total Supply	**34,760**	**34,540**	**32,885**	**32,683**	**66,325**
Demand					
Recycled Water	6,000	6,000	6,000	6,000	6,000
Water Production	54,550	55,350	56,050	56,900	57,700
Net Project Demand[2]	194	194	194	194	194
Total Demand with Project	**60,744**	**61,544**	**62,244**	**63,094**	**63,894**
Annual Balance[3]	**-25,984**	**-27,004**	**-29,359**	**-30,411**	**2,431**
Cumulative Balance[4]	**49,728**	**22,724**	**-6,634**	**-37,045**	**-34,614**
Net Project Demand as a % of Total Demand	0.32%	0.32%	0.31%	0.31%	0.30%
Net Project Demand as a % of Cumulative Balance	0.39%	0.85%	-2.92%	-0.52%	-0.56%

Source: "Desert Water Agency 2005 Urban Water Management Plan Final Report," Tables 17A-17C, prepared by Krieger & Stewart Inc., December 2005. Assumes that the first 4 years are drought years and the fifth year is a normal year.
1) Modified in accordance with " Engineer's Report Groundwater Replenishment and Assessment for the Whitewater River Subbasin," Table 2, prepared by Krieger & Stewart Inc., April 2008, which is based on DWR SWP 2007 Reliability Report.
2) Net Project Demand is the difference between existing demand onsite (64.9 ac-ft/yr) and projected demand (259.3 ac-ft/yr) at buildout of the Museum Market Plaza Specific Plan. Note that the project will initiate in 2010 and buildout in 2015, in the interim years an annual additional water demand of 32.4 ac-ft/yr are assumed.
3) The annual difference between total supply and total demand.
4) The cumulative difference in the input/output model assuming a starting balance of 45,400 acre-feet in storage in accordance with DWA 2005 UWMP year 2009.

Table V-5 shows the affects of a multiple dry year drought from 2020 through 2023 and includes year 2024 as a normal water year. The net project demand represents no more than 0.29% of DWA's total projected demand in this five year period. In year 2024, due to the deficit and resulting overdraft of 40,065 acre-feet, the groundwater basin underlying the site (Palms Springs Subarea) would contain an estimated 4.31 million acre-feet. Under this scenario the cumulative balance in 2030 is an estimated deficit of 63,350 acre-feet (See Table 9C Appendix C), and represents 1.46% of the Subarea and 0.46% of the Subbasin, which does not constitute a significant impact to the groundwater basin or interfere with DWA's ability to meet water demands for any users including agricultural, industrials, and manufacturing. Sufficient water supplies are currently available within the groundwater Subarea to meet demand during multiple dry year events.

Table V-5
Multiple Dry Water Years 2020 – 2024
(acre-feet/year)

Supply Sources	**2020**	**2021**	**2022**	**2023**	**2024**
Surface Water	1,500	1,500	1,500	1,500	2,800
Natural Groundwater	6,000	5,500	5,000	4,500	7,250
Table A Water[1]	8,100	8,100	6,700	6,700	36,012
Groundwater Recharge	12,543	12,805	13,085	13,348	13,628
Recycled Water	8,000	8,000	8,000	8,000	8,000
Total Supply	**36,143**	**35,905**	**34,285**	**34,048**	**67,690**
Demand					
Recycled Water	8,000	8,000	8,000	8,000	8,000
Water Production	58,500	59,250	60,050	60,800	61,600
Net Project Demand[2]	194	194	194	194	194
Total Demand with Project	**66,694**	**67,444**	**68,244**	**68,994**	**69,794**
Annual Balance[3]	**-30,551**	**-31,539**	**-33,959**	**-34,946**	**-2,104**
Cumulative Balance[4]	**62,483**	**30,944**	**-3,015**	**-37,961**	**-40,065**
Net Project Demand as a % of Total Demand	0.29%	0.29%	0.28%	0.28%	0.28%
Net Project Demand as a % of Cumulative Balance	0.31%	0.63%	-6.43%	-0.51%	-0.48%

Source: "Desert Water Agency 2005 Urban Water Management Plan Final Report," Tables 17A-17C, prepared by Krieger & Stewart Inc., December 2005. Assumes that the first 4 years are drought years and the fifth year is a normal year.
1) Modified in accordance with " Engineer's Report Groundwater Replenishment and Assessment for the Whitewater River Subbasin," Table 2, prepared by Krieger & Stewart Inc., April 2008, which is based on DWR SWP 2007 Reliability Report.
2) Net Project Demand is the difference between existing demand onsite (64.9 ac-ft/yr) and projected demand (259.3 ac-ft/yr) at buildout of the Museum Market Plaza Specific Plan. Note that the project will initiate in 2010 and buildout in 2015, in the interim years an annual additional water demand of 32.4 ac-ft/yr are assumed.
3) The annual difference between total supply and total demand.
4) The cumulative difference in the input/output model assuming a starting balance of 45,400 acre-feet in storage in accordance with DWA 2005 UWMP year 2009.

Table V-6 shows the affects of a multiple dry year drought from 2025 through 2028 and includes years 2029 and 2030 as normal water years. The net project demand represents no more than 0.27% of DWA's total projected demand. In year 2030, due to the deficit of 63,350 acre-feet, the groundwater basin underlying the site (Palms Springs Subarea) would contain an estimated 4.29 million acre-feet, or 1.46% of the Subarea and 0.46% of the Subbasin, which does not constitute a significant impact to water supplies or interfere with DWA's ability to meet water demands for any users including agricultural, industrials, and manufacturing. Therefore, sufficient water supplies are available to meet demands due to the large volume of groundwater contain in the Subarea.

Table V-6
Multiple Dry Water Year 2025 – 2030
(acre-feet/year)

Supply Sources	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Surface Water	1,500	1,500	1,500	1,500	2,800	2,800
Natural Groundwater	6,000	5,500	5,000	4,500	7,250	7,250
Table A Water[1]	8,100	8,100	6,700	6,700	36,012	36,012
Groundwater Recharge	13,908	14,170	14,450	14,713	14,993	15,273
Recycled Water	8,000	8,000	8,000	8,000	8,000	8,000
Total Supply	**37,508**	**37,270**	**35,650**	**35,413**	**69,055**	**69,335**
Demand						
Recycled Water	8,000	8,000	8,000	8,000	8,000	8,000
Water Production	62,400	63,150	63,950	64,700	65,500	66,300
Net Project Demand[2]	194	194	194	194	194	194
Total Demand with Project	**70,594**	**71,344**	**72,144**	**72,894**	**73,694**	**74,494**
Annual Balance[3]	**-33,086**	**-34,074**	**-36,494**	**-37,481**	**-4,639**	**-5,159**
Cumulative Balance[4]	**54,497**	**20,423**	**-16,070**	**-53,551**	**-58,190**	**-63,350**
Net Project Demand as a % of Total Demand	0.27%	0.27%	0.27%	0.27%	0.26%	0.26%
Net Project Demand as a % of Cumulative Balance	0.36%	0.95%	-1.21%	-0.36%	-0.33%	-0.31%

Source: "Desert Water Agency 2005 Urban Water Management Plan Final Report," Tables 17A-17C, prepared by Krieger & Stewart Inc., December 2005. Assumes that the first 4 years are drought years and the fifth year is a normal year.

1) Modified in accordance with " Engineer's Report Groundwater Replenishment and Assessment for the Whitewater River Subbasin," Table 2, prepared by Krieger & Stewart Inc., April 2008, which is based on DWR SWP 2007 Reliability Report.

2) Net Project Demand is the difference between existing demand onsite (64.9 ac-ft/yr) and projected demand (259.3 ac-ft/yr) at buildout of the Museum Market Plaza Specific Plan. Note that the project will initiate in 2010 and buildout in 2015, in the interim years an annual additional water demand of 32.4 ac-ft/yr are assumed.

3) The annual difference between total supply and total demand.

4) The cumulative difference in the input/output model assuming a starting balance of 45,400 acre-feet in storage in accordance with DWA 2005 UWMP year 2009.

C. Summary and Conclusions

Water Demand

In DWA's UWMP it was assumed that growth and new development would occur within its service boundaries. The existing water demand onsite is estimated at 64.9 acre-feet per year, which has been accounted for in DWA's UWMP demand projections. The proposed development will generate a net additional demand of 194.3 acre-feet per year after accounting for return flows of 35%. The estimated net water demand at buildout of the Museum Market Plaza Specific Plan represents about 0.26% of DWA's total projected demand in 2030.

According to the 2005 UWMP, under the normal water year projections there would be a cumulative surplus of 58,950 acre-feet of DWA water delivered into the Upper Whitewater River Subbasin by 2030. Under the single dry water year scenario, there would be a cumulative surplus in 2030 ranging from 19,250 acre-feet to 23,150 acre-feet. Under the multiple dry year scenario, there would be a cumulative shortfall in 2030 ranging from 59,500 acre-feet to 74,100 acre-feet. Under the worst-case scenario, the amount of water that would remain in storage in the Subarea in 2030 is approximately 4.27 million acre-feet.

Comparatively, Appendix C and Section V-B (above) shows the cumulative balance for the normal, single, and multiple dry year scenarios utilizing the most recent Table A water deliveries expected and includes the demand associated with buildout of the proposed project. Using this methodology the cumulative balance in 2030 during normal year conditions would be approximately 64,298 acre-feet, 26,386 acre-feet during a single dry year event, and an estimated deficit of 63,350 acre-feet during a multiple dry year event. These figures are comparable and within the range presented in the 2005 UWMP.

Based on the information and findings documented above, there will be sufficient water supplies to meet the demands of the project during normal years, single dry years, and multiple dry years though at least 2030 without adversely impacting the groundwater basin or interfering with DWA's ability to provide services to existing and planned future water users including agricultural, manufacturing, and industrial users. During years of supply shortfall (dry years) DWA would extract additional needed supplies from groundwater in storage to meet demand. It is expected that post-2030 this temporary over extraction from groundwater reserves (overdraft) would be replenished in the future during wet years through recharge and or conservation.

As previously mentioned, the Palm Springs Subarea contains approximately 4.35 million acre-feet of water, which can be pumped to meet demands as needed. The Subarea, based on existing management practices provides a reliable long term water source that will continue to supply water to DWA's service area including existing and future water users and agricultural, industrial, and manufacturing users. Nevertheless, it is critical that water conservation be implemented, water efficiency be advocated and incorporated into existing and new development, and the Agency continue to secure addition water sources.

Water Supply

DWA has existing water entitlements, rights and contracts to meet future demand as needed over time, and has committed sufficient capital resources and planned investments in various water programs and facilities to serve all of its existing and planned customers. Under the UWMP multiple dry water year scenarios, drawdown of the groundwater would be required to meet demand.

Supply has been historically available within the Upper Whitewater River Subbasin and Palm Springs Subarea due to the large size of the aquifer. During historic water shortages of imported water, DWA's customers were not affected by the dry conditions because the existing Palm Springs Subarea, which has an existing groundwater supply of approximately 4.35 million acre-feet of water, provided adequate supply. In a multiple year drought, the groundwater basin would be pumped to meet demands. It is expected that after a multiple year drought scenario, the Palm Springs Subarea would be replenished with imported and other water sources, conservation measures would be implementing conservation measures, and additional surplus waters would be purchased when available.

SWP surplus water is occasionally available to water contractors for purchase. Therefore, in order to supplement artificial recharge of the Upper Whitewater River Subbasin, DWA and CVWD have regularly requested surplus water in addition to their yearly allocations of SWP water. In the past, the availability to DWA and CVWD of these spot market waters has ranged from about 200 acre-feet (during a dry year) up to about 4,000 acre-feet (during a wet year). DWA will continue to purchase additional surplus water as available, which will be used to recharge the aquifer and bank water reserves for use during dry years.

The Museum Market Plaza Specific Plan is designed to help DWA accomplish water efficiency and conservation by adhering to existing and future conservation measures, and by incorporating the latest water conservation technology to keep water use to the minimum. All development will be sewered and wastewater will be collected and used for recharge and/or recycled water, as available. This recycled effluent could be used to replace groundwater currently being pumped for irrigation purposes, thereby reducing the demand on groundwater elsewhere in DWA's service area. The project will also be required to pay fees to DWA for the purpose of buying additional supplies of water for importation into the basin. These combined actions will assure that any impacts of the project on the groundwater basin will be less than significant.

It should be mentioned that this project is extremely water efficient on a per capita level (0.13 acre-feet per person per year), since it allows for high density residential uses, includes water efficient appliances indoors, and limits outdoor irrigation.

Based on the entire record, total projected water supplies available to DWA during normal, single dry, and multiple dry years are and will be sufficient to satisfy the estimated demand generated the Specific Plan project in addition to existing and planned future uses within DWA's service without impacting existing and future water users through 2030 including agricultural, manufacturing, and industrial water users.

MUSEUM MARKET PLAZA

WATER SUPPLY ASSESSMENT

SECTION VI. ORGANIZATIONS, PERSONS, AND DOCUMENTS CONSULTED

1. "Museum Market Plaza Specific Plan," prepared by Terra Nova Planning & Research, April 2008.

2. "Desert Water Agency Domestic Water System General Plan 1998," prepared by Krieger & Stewart, Inc., January 5, 1999.

3. "Desert Water Agency 2005 Urban Water Management Plan," prepared by Krieger & Stewart, Inc., December 2005.

4. "Desert Water Agency Engineers Report, Ground Water Replenishment and Assessment Program for the Whitewater River Subbasin, Desert Water Agency, 2007/2008," prepared by Krieger & Stewart, Inc., April 2007.

5. "The State Water Project Delivery Reliability Report," prepared by the State of California Department of Water Resources, August 2008.

6. "Department of Water Resources News / People", Summer 2007 edition, prepared by the California Department of Water Resources and Public Affairs, July 2007.

7. "Coachella Valley Water District Engineers Report on Water Supply and Replenishment Assessment for the Upper Whitewater River Subbasin Area of Benefit," prepared by Water Resources Branch, Engineering Department, Coachella Valley Water District, April 2007.

8. "Desert Water Agency Engineers Report on Ground Water Replenishment and Assessment Program for the Whitewater River Subbasin 2007-2008," prepared by Krieger and Stewart Engineering, Inc., April 2007.

9. "Hydrologic Investigations Atlas 730-B: Ground Water Atlas of the United States, Segment 1: California/Nevada," prepared by the United States Geological Survey, Michael Planert and John Williams, 1989.

10. "Coachella Valley Investigation: Bulletin 108," prepared by the California Department of Water Resources, 1964.

11. "Coachella Valley Final Water Management Plan," prepared by MWH, September 2002.

12. "Coachella Valley Water District Engineer's Report on Water Supply and Replenishment Assessment, Upper Whitewater River Subbasin Area of Benefit 2008/2009," prepared by Water Resources Branch, Engineering Department, Coachella Valley Water District, April 2008.

13. "Desert Water Agency Domestic Water System Subsidence Study," prepared by Krieger and Stewart Engineering, Inc., April 2008.

14. "Groundwater Management Agreement," prepared by CVWD and DWA, adopted in the 1970's and amended in 1992.

15. "Evaluation of a ground-water flow and transport model of the upper Coachella Valley, California," Water Resource Investigation 91-4142, prepared by the US Geological Survey, January 1992.

16. "Water Supply Contract Between the State of California Department of Water Resources and Desert Water Agency," prepared by the Resources Agency of California Department of Water Resources, October 17, 1962.

17. "Appendix A Water Demand Projections for the Museum Market Plaza Specific Plan," prepared by Terra Nova Planning & Research, October 8, 2008.

18. "Appendix B Water Resource Litigation and Other Actions," prepared by Terra Nova Planning & Research, October 8, 2008.

19. "Appendix C Technical Analysis of Water Supply and Demand for the Museum Market Plaza Specific Plan," prepared by Terra Nova Planning & Research, October 8, 2008.

APPENDIX A

Water Demand Projections for the Museum Market Plaza Specific Plan

Prepared in Support of the
Museum Market Plaza Specific Plan
Water Supply Assessment

Prepared by

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October 8, 2008

Estimated Water Demand Methodology

The following describes the methodology, techniques, and assumptions that were utilized in quantifying water demand estimates for all proposed land uses described in the Museum Market Plaza Specific Plan. As proposed, the project will substantially increase water demand compared to the existing water demand onsite, which comes from an estimated 380,977 square feet of commercial, office, and restaurant uses, all of which are accounted for in Desert Water Agency's 2005 Urban Water Management Plan. In order to quantify the difference between projected demand at buildout of the Specific Plan and the existing demand onsite, Tables A1 through A7 were prepared. The analysis considers landscape and potable water demand for all land uses and includes a 35% return flow factor to the landscaping water demand only. A 35% return flow factor is also expected from the potable demand component and is accounted for in the Supply and Demand Model (Appendix C), as an element of ground water recharge. As described in Appendix C, groundwater recharge, in combination with recycled water, represents 35% of total demand for the project. To be conservative, the water demand model assumes that buildout of the Specific Plan will occur in 2015.

Proposed Project Water Demand

Water demand at buildout of the Specific Plan will come from irrigation of outdoor landscaped areas and indoor water use. Methodologies used to estimate water demand for the proposed land uses described in the Specific Plan are set forth below. The Specific Plan proposes 400,000 square feet of commercial/retail land use. In order to more precisely estimate water demand associated with buildout of this land use designation, it was assumes that 68.75% would be commercial, 25% office, and 6.25% would be restaurant land uses.

Landscape Water Demand Methodology

Landscape water demand was calculated using an estimated 10% landscape coverage area for residential, hotel, commercial, office, restaurant, and streetscape land uses. The open space-plaza assumes 100% of the area will be landscaped. To be conservative, it was assumes that the entire 18,000 square feet of the plaza would be turf; although this area may include paved areas and drought-tolerant plantings. Applying an estimated landscape area percentage factor to the total acres designated for each land use provided the average landscape area, which excludes impervious surfaces for each land use component. The total estimated acreage that will require irrigation (2.4 acres or 10% of the project site) for landscaping purposes was then multiplied by the estimated landscaping demand factor in order to estimate the total water demand that will be generated at buildout of the Museum Market Plaza Specific Plan.

The water demand factors for project landscaping are based on the Maximum Water Allowance (MWA) for Zone 3A as defined in the Coachella Valley Water District's (CVWD) Landscape Ordinance 1302.1. Several evapotranspiration (ET) zones, including Zone 3A, are defined for the Coachella Valley and account for differences in transpiration rates for plants, which vary depending on the location within the Valley floor. For example, transpiration rates in coves adjacent to hillsides along the Valley's margins have a lower ET compared to transpiration rates on the valley floor, since the former tend to be better shaded and protected from high winds.

The total water demand associated with landscaping is calculated using the appropriate MWA factor for moderate desert landscaping or turf. The MWA for moderate desert landscaping in Zone 3A is 1,354 CCF or 3.108 acre feet per acre annually. The MWA for turf in Zone 3A is 1,896 CCF or 4.352 acre feet per acre annually. Landscaping onsite will be predominantly moderate desert landscaping with very limited turf. See Table A-1 for projected landscape water demand associated with moderate desert landscaping and turf.

To account for infiltration and percolation that will occur onsite as a result of outdoor irrigation, a 35% return flows factor was applied to the total landscaping demand. This factor assumes that 35% of the water used for irrigation onsite will be returned to the underlying aquifer via natural percolation.

Based on these estimates without the consideration of the return flows, a total of 8.1 acre-feet per year would be required for landscaping throughout the Project. With the consideration of a 35% return flows component, at buildout, the water demand for landscaping is estimated at 5.2 acre-feet per year.

It should be noted that according to estimates provided by TKD Inc. project landscaping would only occur on 1.47 acres of the site, which would generate a total landscape water demand of 5.1 acre-feet annually, or 3.3 acre-feet annually including 35% return flows. In order to be conservative and allow for additional landscaping as needed, the aforementioned methodology was utilized for the landscaping component of this analysis.

Potable Water Demand Methodology

Potable water demand was calculated for all indoor uses based on estimates from the American Water Works Association Research Foundation (AWWARF). For residential land uses, the number of planned dwelling units was multiplied by the expected household population size of 2.10 persons. The total population was then multiplied by the AWWARF per capita factor for indoor use: 69.3 gallons per day per person.[1]

Indoor potable demand for non-residential land uses was multiplied by the appropriate AWWARF water demand factor. For hotel, commercial, and office land uses the AWWARF figures offer a low and high estimate for each projected demand. In order to be consistent the low and high estimates were averaged and the resultant values were used. The average potable water demand factor for hotel uses is 87.5 gallons per day per occupied room, 30.5 gallons per year per square foot for commercial and office land uses, and 230.5 gallons per year per square foot of restaurant use. The total water demand estimates assume 75% occupancy of the hotel year round. Square footages for commercial, office, and restaurant land uses were extracted from the Specific Plan and assume 275,000 square feet of commercial space, 100,000 square feet of office space, and 25,000 square feet of restaurant space at buildout. Square footages were then multiplied by the appropriate average per square foot AWWARF water demand factor in order to quantify the total potable annual water demand expected to be generated by buildout of the Museum Market Plaza Specific Plan.[2]

1 Project #241A, Residential End Uses of Water, AWWARF, Winter 1999/2000
2 Project #241B, Commercial and Industrial End Uses of Water, AWWARF, Summer 2000.

As seen in table A-2, a total of 254.04 acre-feet per year would be required to meet potable water demands throughout the project site. As previously mentioned a return flows factor was not applied to the potable water demand figures in Appendix A, but are accounted for as an element of ground water recharge in Appendix C. Therefore, net project demand for potable water equals 254.04 acre-feet, less the 35% return flows, or 165.1 acre-feet per year.

Total Projected Water Demand

Overall water demand for the Museum Market Plaza Specific Plan considers the use of water for outdoor irrigation of landscaped areas and domestic or indoor water use. Table A-3 summarizes the estimated water demand for the Specific Plan. Based on the methodology described above, at buildout the project will require approximately 259.3 acre-feet of water per year or 0.23 million gallons per day. Note that actual projected water consumption will total approximately 170.4 acre-feet once non-consumptive return flow is considered.

Existing Water Demand Onsite

As previously mentioned, the project site contains 380,977 square feet of existing development that generates water demand. To be consistent with the assumptions made for the projected water demand at buildout of the Specific Plan, it was assumes that 68.75% would be commercial, 25% office, and 6.25% would be restaurant land uses. In order to quantify the net water demand that will be generated at buildout of the Specific Plan, the existing water demand was estimated using the methodology described below.

Landscape Water Demand Methodology

Similar methodologies to those described above were used to estimate the existing landscaping water demand onsite. As shown in Table A-4, all landscaped areas are assumes to be moderate desert landscaping with an estimated water demand of 3.108 acre feet per acre per year. Ten percent (0.87 acre) of the total existing area to be landscaped (8.75 acres) onsite was used to calculate landscaping demand, which yields a total demand of 2.7 acre-feet per year. After applying the 35% return flows factor, the existing water demand for landscaping onsite is estimated to be 1.8 acre-feet per year.

Potable Water Demand Methodology

Table A-5 shows the estimated potable water demand for the existing development onsite. As described above, AWWARF factors for commercial, office, and restaurant were assumed to be 30.5 gallons per year per square foot for commercial and office, and 230.5 gallons per year per square foot of restaurant use. Using these factors, an existing potable water demand onsite was calculated to be 63.17 acre-feet per year.

Total Existing Water Demand

Overall water demand for the existing development onsite considers the use of water for outdoor irrigation of landscaped areas and indoor water use. Table A-6 summarizes the estimated water demand for the existing land uses. Based on the methodology described above, the project site has an existing total water demand of 64.9 acre-feet per year or 0.06 million gallons per day.

Net Water Demand

As mentioned above, a portion of the proposed Museum Market Plaza Specific Plan site contains existing development that generates water demand. This water demand is factored and accounted for in DWA's 2005 UWMP. In order to quantify the additional water demand that will be generated onsite, the aforementioned methodology was utilized to calculate both proposed and existing water demands.

Total Net Water Demand

As shown in Table A-7, the net water demand, which can be defined as the difference between the projected water demand and the existing waster demand, is estimated to be 194.3 acre-feet per year or 0.17 million gallons per day. It should be mentioned that this figures accounts for 35% return flows of the landscaping demand, but does not account for return flows associated with potable demand. However, potable water or indoor water demand also generate return flows at an estimated rate of 35% of demand. Appendix C accounts for the projects potable demand return flows as an element of the ground water recharge supply component (See Appendix C).

Museum Market Plaza - Landscape Water Demand

Table A-1 **Landscape Water Demand**	Total Acres	Number of Units	Landscaped Acres[1]	Estimated Landscaping Demand (AC-FT/AC//Y)[2]	Total Demand (AF/Y)	Total Demand Less 35% Return Flows
High Density Residential	6.9	955	0.7	3.108	2.1	1.4
Hotel	2.7	620	0.3	3.108	0.8	0.5
Commercial	3.3		0.3	3.108	1.0	0.7
Office	1.2		0.1	3.108	0.4	0.2
Restaurant	0.3		0.0	3.108	0.1	0.1
Open Space- Plaza	0.4		0.4	4.352	1.8	1.2
Streetscape	5.79		0.6	3.108	1.8	1.2
				Landscape Water Demand Total	8.1	**5.2**

1 Assumes 10% landscaping for all component, expect Open Space (Plaza), which assumes 100% turf.

2 Maximum Water Allowance (MWA) per CVWD's Landscape Ordinance No 1302.1.

Moderate Desert Landscaping	Zone 3A	3.108	ac-ft/ac/yr	1,353.97 CCF
Turf Landscaping	Zone 3A	4.352	ac-ft/ac/yr	1,895.56 CCF

Museum Market Plaza - Potable Water Demand

Table A-2 **Potable Water Demand**	Total Units	Population /Unit	Square Feet	Gallons	Total AF/Y
High Density Residential	955	2.10		69.3	155.68
Hotel*	620			87.5	45.58
Commercial			275,000	30.5	25.74
Office			100,000	30.5	9.36
Restaurant			25,000	230.5	17.68
				Potable Water Demand Total	**254.04**

* Hotel assumes 75% occupancy year round

Museum Market Plaza- Summary Table

Table A-3 Museum Market Plaza Specific Plan WSA Project Specific Estimate of Water Service Demands				
SP Land Use Designation	**Landscaping* (ac-ft/yr)**	**Potable** (ac-ft/yr)**	**Total Annual Demand (ac-ft/yr)**	**Daily Demand (mgd)**
High Density Residential	1.4	155.7	157.1	0.14
Hotel	0.5	45.6	46.1	0.04
Commercial	0.7	25.7	26.4	0.02
Office	0.2	9.4	9.6	0.01
Restaurants	0.1	17.7	17.7	0.02
Open Space-Plaza	1.2	0.0	1.2	0.00
Streetscape	1.2	0.0	1.2	0.00
Total	**5.2**	**254.0**	**259.3**	**0.23**

*Accounts for 35% non-consumptive return flows in the Palm Sprins Subarea.

**Does not account for any return flows.

Existing - Landscape Water Demand

Table A-4 **Landscape Water Demand (all Desert Landscaping)**	Total Square Feet	Total Acres	Landscaped Acres[1]	Estimated Landscaping Demand (AC-FT/AC/Y)[2]	Total Demand (AF/Y)	Total Demand Less 35% Return Flows
Commercial	299,729	6.88	0.69	3.108	2.1	1.4
Office	36,434	0.84	0.08	3.108	0.3	0.2
Restaurant	44,814	1.03	0.10	3.108	0.3	0.2
				Landscape Water Demand Total	2.7	**1.8**

1Assumes 10% landscaping for commercial, office, and restaurant.

2 Maximum Water Allowance (MWA) based on Zone 3A calculated per CVWD's Landscape Ordinance No 1302.1.

Moderate Desert Landscaping	Zone 3A	3.108	ac-ft/ac/yr

Existing - Potable Water Demand

Table A-5 **Potable Water Demand**	Square Feet	Gallons	Total AF/Y
Commercial	299,729	30.5	28.05
Office	36,434	30.5	3.41
Restaurant	44,814	230.5	31.70
		Potable Water Demand Total	**63.17**

Water Demand- Exisitng

Table A-6 Estimate of Existing Water Demands Onsite				
SP Land Use Designation	**Landscaping* (ac-ft/yr)**	**Potable** (ac-ft/yr)**	**Total Annual Demand (ac-ft/yr)**	**Daily Demand (mgd)**
Commercial	1.4	28.1	29.4	0.03
Office	0.2	3.4	3.6	0.00
Restaurant	0.2	31.7	31.9	0.03
Total	**1.8**	**63.2**	**64.9**	**0.06**

*Accounts for 35% non-consumptive return flows in the Palm Springs Subarea.

**Does not account for any return flows.

Net Water Demand

Table A-7 Museum Market Plaza Specific Plan WSA Net Water Demand Projections				
SP Land Use Designation	**Projected Demand (ac-ft/yr)**	**Existing Demand (ac-ft/yr)**	**Net Water Demand (ac-ft/yr)**	**Net Daily Demand (mgd)**
High Density Residential	157.1	0.0	157.1	0.14
Hotel	46.1	0.0	46.1	0.04
Commercial	26.4	29.4	-3.0	-0.003
Office	9.6	3.6	6.0	0.01
Restaurants	17.7	31.9	-14.2	-0.01
Open Space-Plaza	1.2	0.0	1.2	0.00
Streetscape	1.2	0.0	1.2	0.00
Total	**259.3**	**64.9**	**194.3**	0.17

APPENDIX B

Water Resource Litigation and Other Actions

Prepared in Support of the
Museum Market Plaza Specific Plan
Water Supply Assessment

Prepared by

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October 8, 2008

Water Resource Litigation and Other Actions

The following is a summary of background information that is to support the Water Supply Assessment for the Museum Market Plaza Specific Plan. This information includes pertinent legal actions and other actions that may impact the reliability of water resources in Southern California and the Coachella Valley.

Protection of the Delta Smelt and the Longfin Smelt

The delta smelt is a small fish with a typical adult size of 2-3 inches that is found only in the Sacramento-San Joaquin Estuary. The delta smelt was listed as a threatened species by the U.S. Fish and Wildlife Service and by CDFG in 1993. The delta smelt population is affected by the amount of outflow from the estuary. Biological studies suggest that the decline of the delta smelt may be the result of toxins, exotic species, and/or freshwater exports out of the delta by the state and federally operated water projects since 2001.[1] On August 31, 2007, U.S. District Court Judge Wanger ruled in the case of NRDC vs. Kempthorne that the 2005 delta smelt biological opinion was invalid and that the US Fish and Wildlife Service shall prepare a new opinion (expected in late 2008).

As a result, the judge issued an order to the US Bureau of Reclamation (USBR) and DWR to operate the SWP/Central Valley Project in the interim, and any operations must be consistent with the suite of actions the judge ordered based upon proposals submitted by the parties. Those actions include enhanced surveys and monitoring, as well as operational constraints from late December 2007 through June 2008. Actual water supply reductions will depend on fish, weather, and flow conditions in the Delta and how reductions are divided between the state and federal projects.

The operational constraints of the judge's decision include a series of restrictions on state and federal water project operations in the Sacramento-San Joaquin Delta selected from remedies submitted by environmental groups as well as state and federal resource agencies. Based on initial estimates supplied by the state, the Metropolitan Water District of Southern California and water purveyors supplying southern California stand to lose as much as 30 percent of their supplies during a normal water year (with smaller cuts during dry years) from northern California next year, and possibly longer, under the preliminary ruling.[2] This ruling will reduce Table A allocations in 2008, and, depending on the biological opinion due in Summer/Fall 2008 water restrictions could continue beyond 2008.

However, the judge reserved to DWR and USBR "the right [of] reasonable notice to deviate from the prescriptive remedies, if necessary to protect public health, safety and the human environment." During the hearing, the judge had indicated that public health, safety and human environment concerns were not necessarily limited to the maintenance of emergency water supplies for schools, hospitals or fire departments, but could include, depending upon the circumstances, significant effects related to agricultural land fallowing and/or subsidence from increased groundwater pumping necessitated by the absence of project water.

1 "Judge Throws Out Biological Opinion for Delta Smelt," Press Release, Natural Resources Defense Council, May 2007.

2 "Metropolitan Water District of Southern California News Release," prepared by the Metropolitan Water District of Southern California, August 31, 2007.

In December 2008 the judge issued a temporary remedial ruling that the interim restrictions will stay in place until the new Biological Opinion is completed. The ruling stipulated that the new OCAP shall be completed by September 15, 2008.

As a result of the judge's decision, SWP deliveries have the potential to be substantially cut for this year and possibly longer. The percentage of SWP Table A water to be delivered in future years is currently unclear until the new OCAP process in completed. However, DWR 2007 SWP Delivery Reliability Report conservatively assumes that the operating restriction ordered pursuant to federal court ruling in Kempthorne case will remain in place throughout the 20 year model period and further reduction beyond those initially established are not anticipated. As previously noted, this reduction in SWP Table A water is expected to have a limited direct effect on the Lower Valley Aquifer and any potential reductions are expected to be accounted for in the model via the application of the 65% delivery reliability figure estimated for Table A allocations.

The longfin smelt is a close relative to the delta smelt that lives in the San Francisco Bay-Delta and is believed to be impacted by water exports from the San Joaquin River Delta.[3] In February 2008, the California Fish and Game Commission accepted the longfin smelt as a candidate species for listing under the California Endangered Species Act (ESA). Under the California ESA, when a species is accepted as a candidate species it has the same level of protection as if it were a listed threatened or endangered species. Therefore, the Commission adopted regulations to protect this species.

Pacific Coast Federation of Fishermen's Association (PCFFA) vs. Gutierrez

On October 3, 2007, Judge Wanger reviewed the merits of a companion lawsuit to the NRDC vs. Kempthorne, in which the Pacific Coast Federation of Fishermen's Association (PCFFA) vs. Gutierrez challenged the winter and spring-run salmon and steelhead trout biological opinion determination of "no jeopardy" that was issued by the National Marine Fisheries Service (NMFS) in 2004. The plaintiffs allege similar types of deficiencies with this biological opinion as with the Kempthorne case above, including current and future Delta pumping operations under the Operations and Criteria Plan (OCAP), and emphasized the potential adverse impacts to species and habitats caused by changes to cold-water temperatures due to the reduction in water levels in the Sacramento River, and related changes in the methodology of species management.

On July 18, 2008, Judge Wanger issued Findings of Fact and Conclusions of Law, which determined, among other things, that additional water supply restrictions beyond those required in Kempthorne case are not required at this time.

[3] "Petition to List the San Francisco Bay-Delta Population of longfin smelt as Endangered Under the Endangered Species Act," prepared by The Bay Institute, Center for Biological Diversity, and the Natural Resources Defense Council, August 8, 2007.

Watershed Enforcers v. California Department of Water Resources, et al

In this case, a plaintiffs group filed suit against DWR alleging that the SWP is being operated without "take authorization" as defined under the California Endangered Species Act. The case was heard on November 17, 2006 and, on April 18, 2007, the Alameda County Superior Court issued a judgment granting a peremptory writ of mandate ordering DWR to cease and desist further operations of the Harvey O. Banks pumping plant facilities of the SWP unless DWR obtained proper authorization from the California Department of Fish and Game for the take of threatened and endangered salmon species and delta smelt. The trial court decision was appealed by DWR and several water agency parties and the case was stayed pending the appeal. Due to the stay, the judgment is currently not in effect and DWR has not been required to cease operations of the Banks pumping plant facilities.

The parties have extended the allotted time for the appeal process and, therefore, a final decision is not expected in the near future. For these reasons, and because the effects of SWP operations on protected fish species in the Delta are already being addressed in the Kempthorne and Gutierrez cases as discussed above, the Watershed Enforcers case is not expected to result in additional reductions to SWP supplies.

The Bay-Delta Conservation Plan

As identified in this plan, near and intermediate-term actions are intended to reduce fishery and earthquake related risks, and include elements such as real-time monitoring of fishery resources, ecosystem restoration, physical modifications to Delta channels, local water supply projects, and emergency preparedness and response plans.

The Bay-Delta Conservation Plan process involves several state and federal resource agencies, along with various environmental and water user entities, who are currently engaged in developing a plan to address ecosystem needs and secure long-term operating permits for the SWP. The process is scheduled for completion during the third quarter of 2009 and includes acquisition of appropriate permits and completion of necessary environmental review.

The Delta Vision process established by Governor Schwarzenegger is also aimed at identifying long-term solutions for the Delta. On December 17, 2007, the Delta Vision Blue Ribbon Task Force released its Final Report entitled Our Vision for the California Delta, containing findings and recommendations for sustaining the Delta as a healthy ecosystem and critical water supply resource for California, including the need for a comprehensive solution to stabilize the ecosystem of the estuary and to provide for a reliable long-term water supply such as a dual-conveyance system in the Delta and enhanced water use efficiency and conservation. The Task Force is scheduled to present its Strategic Plan to implement Delta solutions by October 31, 2008. Similar analyses are contained in a July 2008 report issued by the Public Policy Institute of California entitled Comparing Futures for the Sacramento-San Joaquin Delta.

The Delta Vision Task Force is a seven-member independent panel whose recommendations are non-binding but could be used by the Governor in crafting a new policy for the delta. The Task Force is currently drafting a report due out in 2008 that identifies $5.9 billion for a comprehensive water plan, which includes $1 billion for delta restoration, a new system for diverting water around the San Joaquin Delta, and considers the construction of new reservoirs and rock dams to further protect sensitive species as well as provide reliable water supplies to southern California.[4]

[4] "Preliminary Visions Recommendations Report," prepared by the Delta Vision Stakeholder Coordination Group, August 2007.

Coordinated QSA Cases

Several cases are being litigated in regard to the historic, negotiated agreement that determined how California's annual share of Colorado River water was allocated among certain water supply agencies. In 2003, those water supply agencies executed several agreements know as the Quantification Settlement Agreements (QSA) that involved significant long-term water conservation measures. Within the Imperial Irrigation District (IID), up to 200,000 acre-feet per year of conserved Colorado River water is transferred from IID to the San Diego County Water Authority, and 100,000 acre-feet per year is made available for acquisition by MWD and/or the Coachella Valley Water District.

Several legal actions were filed after the QSA was adopted and those cases were coordinated and stayed for over two years beginning in 2004, while a procedural issue in two of the cases was determined by the California Court of Appeal. The cases became active again in late 2007 and are currently being litigated in the Sacramento County Superior Court. A principal contested issue in the Coordinated QSA Cases is whether the environmental review documents prepared for the QSA approvals comply with CEQA. Deliveries of Colorado River water are determined by the U.S. Department of the Interior, Bureau of Reclamation, who is not a party to the Coordinated QSA Cases, and it is therefore not certain that the cases will affect the amount of Colorado River water delivered by the Bureau.

An agreement entered into between the states of Wyoming, Utah, Colorado, Nevada, New Mexico, Arizona, and California regarding how shortages in Colorado River water will be administered over the next 19 years sets forth three major elements: (1) it establishes particular water level elevations at Lake Mead that trigger water cutbacks among the states, which will total less than 10 percent of the Lower Basin's allocation, with Arizona's agriculture and Nevada bearing the brunt of any such cutback and California's allocation not being impacted; (2) Lake Powell and Lake Mead will be operated as one reservoir system, which is expected to facilitate control of water levels in Lake Mead, thereby helping control conditions that trigger a shortage; and (3) the states will be allowed to hold conserved water in Lake Mead from year to year, which changes the current use-or-lose allocation system and allows agencies to store conserved water for later use.

It should be noted that DWA does not receive allocations of Colorado River water directly, rather through an exchange agreement with MWD for SWP Table A allocations. Reductions associated with the aforementioned cases are accounted for in the model found in Appendix C.

APPENDIX C

Technical Analysis of Water Supply and Demand

Prepared in Support of the
Museum Market Plaza Specific Plan
Water Supply Assessment

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Technical Analysis of Water Supply and Demand

Introduction

This Appendix has been prepared to provide updated supply and demand projections based on the Desert Water Agency's (DWA) 2005 Urban Water Management Plan (UWMP). This was necessary due to recent (since 2005) regulatory changes as described in Appendix B, and the increased intensity proposed in the Museum Market Plaza Specific Plan, which was not accounted for in the UWMP. Supply projections are modified from the UWMP to reflect expected changes in deliveries of State Water Project water in accordance with DWA's 2008/2009 Engineer's Report (Ground Water Replenishment and Assessment Program for the Whitewater River Subbasin), which considers the 2007 State Water Project Reliability Report and recent legislation (Appendix B). Demand projections show the unmodified demand figures from the UWMP based on expected water production and the Project Specific demand estimates based on Appendix A and discounted by 64.9 acre-feet to account for existing demand contained within the 2005 UWMP. Net water demand for the Museum Market Plaza project is added to the projected water demand in the 2005 UWMP to determine impacts to the annual and cumulative balance. Details on the normal, single, and multiple-dry years scenarios that are analyzed in this document are also discussed. Finally, a summary of findings of the analysis are included. All of the tables referenced in the text below can be found at the end of this Appendix.

1. Supply

Supply conditions have been updated from the 2005 UWMP per DWA's 2008/2009 Engineer's Report, which considers the 2007 SWP Reliability Report and recent litigation. The following discussion describes the current and future water supply conditions for the aquifer serving the Specific Plan site. The supply analysis describes surface water, groundwater, and other sources of supply available to DWA, and discusses how they are used in preparing the WSA. It should be noted that all of the supply sources except for Table A Water and Ground Water Recharge are unchanged from the 2005 UWMP.

a. Surface Water: DWA has licenses to divert 2,475 gallon per minute from Snow Creek and 675 gallons per minute from Falls Creek. Thus, the total licensed surface water diversion from both stream is 3,150 gallons per minute. In addition, DWA has an adjudicated right to deliver 900 gallons per minute from both Chino Creek North and Chino Creek West. The total surface water diversion of 2,800 acre-feet per year is based on average diversions from 1977 through 2004.

b. Natural Ground Water: Natural Ground Water is from long term recharge within the Upper Whitewater River Subbasin that occurs naturally, approximately 29,000 acre-feet per year (36,000 ac-ft/yr total natural inflow less 7,000 ac-ft/yr natural outflows) as estimated by USGS Water Resources Investigation 91-4142. Of this total amount (29,000 ac-ft/yr), DWA's share is approximately 25% (7,250 ac-ft/yr). Groundwater supplies utilized in Appendix C are taken directly from the 2005 UWMP.

c. Table A Water: Table A Water figures are extracted from Table 2 of the April 2008 version of DWA's Engineer's Report "Groundwater Report and Replenishment Program for the Whitewater River Subbasin," and represent 65 percent of the maximum Table A Water Allocation. This figure accounts for a potential reduction (of 35%) in deliveries of Table A water as a result of recent litigation (Appendix B), and "The State Water Project Delivery Reliability Report 2007," prepared by the California Department of Water Resources, December 2007.

Several changes to the quantity and reliability of Table A Water have occurred since the 2005 UWMP was prepared. These are discussed below.

(1) Additional Table A Amounts: Desert Water Agency (DWA) and Coachella Valley Water District (CVWD) have purchased additional Table A amount water from Berrenda Mesa and Tulare Lake. The Berrenda Mesa Transfer consists of 16,000 acre-feet per year to CVWD and DWA. The Tulare Lake Transfer accounts for an additional supply of 7,000 acre-feet per year. Combined, these purchases result in an increase in the Maximum Table A amount of the two agencies by 23,000 acre-feet per year starting in 2010. DWA will receive 4,000 acre-feet per year from the Berrenda Mesa Transfer and 1,750 acre-feet per year from the Tulare Lake Transfer for an additional Table A amount of 5,750 acre-feet per, which brings DWA's total maximum Table A amount to 55,750 acre feet per year beginning in 2010.

(2) The Department of Water Resources (DWR) 2007 State Water Project (SWP) Reliability Report: DWR has issued a draft 2007 SWP Reliability Report that includes provisions for changes in the hydrologic cycle due to potential future climatic changes and restrictions on future deliveries from the SWP and the Federal Central Valley Project resulting from interim operating rules from a December 2007 Federal Court order. Long-term average deliveries are estimated at 66%-69% of maximum Table A allocations, single dry year deliveries are estimated at 7% of maximum, and the multiple year dry period deliveries range from 26% to 37% depending on the length of the drought.[1]

(3) Longfin smelt and Other SWP Restrictions (Appendix B): In February 2008, the California Fish and Game Commission accepted the longfin smelt as a candidate species for listing under the state Endangered Species Act (ESA). Under the California ESA, when a species is accepted as a candidate species it has the same level of protection as if it were a listed threatened or endangered species. Therefore, the Commission adopted regulations meant to protect this species that may incidentally impact SWP deliveries. In addition to the longfin smelt, there may be other restrictions on deliveries from the SWP.

(4) MWD Callback: In 1984, Metropolitan Water District (MWD), DWA, and CVWD entered into an advanced delivery agreement which allowed MWD to store water from its Colorado River Aqueduct in the Whitewater River Subbasin. Prior to this agreement, DWA and CVWD were exchanging their annual SWP Table A Amount with MWD for the same amount of water from MWD's Colorado River Aqueduct. This was done because the SWP does not extend into the Coachella Valley. This agreement allows MWD to deliver more water into the Coachella Valley during wet periods when it has excess water and to build a credit that it can use to provide the water to exchange for DWA and CVWD's Table A Amounts during dry periods. This creates a conjunctive use program among the three agencies.

In 2003, MWD, DWA and CVWD entered into an exchange agreement whereby MWD transferred title of 100,000 acre-feet of its SWP Maximum Table A Amount to DWA and CVWD. Under the agreement, MWD obtained the right to callback the exchange water for its use for a maximum number of times in a given period of years. The 100,000 acre-feet was divided into two 50,000 acre-feet blocks. The 100,000 acre-feet transfer with MWD provides that after 2015, MWD can recall the first 50,000 acre-feet in 50 percent of the driest years and the second 50,000 acre-feet in 75 percent of the driest years.

[1] "The State Water Project Delivery Reliability Report 2007 (Table 6-5 and 6-14)," State of California The Resources Agency Department of Water Resources, prepared December 2007.

d. Ground Water Recharge: Ground Water Recharge is the amount of artificially recharged water that is returned to the aquifer after use, and accounts for non-consumptive return flows of 35%. Irrigation water percolating into the ground and treated wastewater discharged to percolation ponds are examples of this water source. As described in Appendix A, the Net Project Demand does not account for return flows associated with potable water demand. However, the Supply and Demand Projections model presented in Appendix C includes an overall return flow of 35% of the total demand with project. Therefore, the model accounts for return flows of 35% associated with the potable demand component of the project.

The 35% return flows factor is based on USGS Water Investigation 91-4142. However, current ground water conditions and operation indicate that non-consumptive return flows may actually be closer to 45%. Nonetheless, to be conservative and consistent with the UWMP the return flows factor of 35% was used. Note that non-consumptive return flows of 35% of water production are the combination of ground water recharge and recycled water.

e. Recycled Water: Figures used to project the recycled water supply are unmodified from the 2005 UWMP. Recycled water is captured and treated effluent that can be used safely for irrigation. The use of recycled water reduces demand for groundwater by providing an alternative water source for non-potable uses.

2. Demand

Demand figures utilized in the model are consistent with the 2005 UWMP (Table 15) and are combined with the net project demand estimate of 194 acre-feet per year at buildout.

a. Recycled Water: Figures used for the recycled water demand are unmodified from the 2005 UWMP. Recycled Water is used for irrigation and non-potable water demands within the DWA service area. As seen in Appendix C Tables, 100% of the recycled water supply is utilized.

b. Water Production: Water production is based on DWA's projected demands, as cited in Table 15 of the 2005 UWMP, and represents the estimated quantity of water to be extracted from the Subbasin.

c. Project Demand: As described in Appendix A, demand estimates for the proposed Museum Market Plaza Specific Plan indicate that at buildout the project will use 259.3 acre-feet per year. Since there are existing water users onsite and have been since development of the 2005 UWMP, a portion of projected demand for the proposed Specific Plan are assumed to be contained within the UWMP water production figures. To quantify the existing demand contained within the UWMP 299,729 square feet of commercial, 36,434 square feet of office, and 44,814 square feet of restaurant land uses were assumed. These uses generate an estimated existing water demand of 64.9 acre feet per year, all of which is accounted for within the 2005 UWMP. The difference between the existing (64.9 acre-feet) and proposed (259.3 acre-feet) water demand estimates, yield a net project demand of 194.3 acre-feet per year at buildout of additional demand beyond that assumed in the 2005 UWMP. Therefore, a net project demand of 194.3 acre-feet per year or 0.17 million gallons per day is added to DWA's demand subtotal to obtain the total demand, including the net project demand, within DWA's service area.

It should be noted that, to be conservative, the project demand assumed a buildout year of 2015 and a start year of 2010. In the interim years (2011-2014) a linear growth in water demand of 32.39 acre-feet per year was assumed.

3. Balance

As quantities of supply fluctuate, the balance of water varies to make up the difference between the demand and the supply.

a. Annual Balance: Figures show the difference between supply and demand on a yearly basis. Negative numbers indicate a water deficit when demand is greater than supply and imply the use of groundwater to make up the difference. Positive numbers show excess water to be stored in the basin for future use or to make up for past overdraft.

b. Cumulative Balance: Cumulative balance is the annual difference between supply and demand in addition to water stored or extracted in previous years. Year 2010 assumes a cumulative balance of 45,400 from year 2009 based on the UWMP Table 15.

4. Normal Year Scenario

Table C-1 present the normal year scenario, which assume that each year of the 20-year model represents normal water year conditions. According to the normal water year scenario, the cumulative balance in 2030 is projected to be 64,298 acre-feet. In year 2020 water demand is greater than supply and cumulative water stored from the first 10 years of the model are used to meet this demand. Thus, sufficient supplies are available to meet demand without causing overdraft.

5. Single Dry Year Scenario

For the single dry year scenarios supply sources, expect for non-consumptive sources (ground water recharge and recycled water), are reduced compared to the normal year scenario and demand estimates are unchanged.

The single dry year scenarios (Tables 2C through 6C) analyze a single dry year occurring in 2010, 2015, 2020, 2025, and 2030, all other years are considered to be normal years. The dry year scenarios assume a reduction in all supply sources per the 2005 UWMP, save ground water recharge and recycled water. Due to decreased precipitation in single dry years compared to normal years, surface water is reduced to 48% (1,350 acre-feet), natural ground water is reduced to 83% (6,000 acre-feet), and Table A water is reduced to 2.2% (800 acre-feet).

As previously mentioned, the 2007 SWP Reliability Report indicated that expected deliveries during a single dry year may be reduced to 7% of maximum Table A allocations. Using this methodology Table A Water would be reduced to 3,902.5 acre-feet per dry year, which is substantially greater (20.5%) than the reductions assumed in this WSA. Nonetheless, to be conservative and consistent with the methodology utilized in the 2005 UWMP, the lower Table A Water amount of 800 acre-feet per year during a single dry year was used in this analysis. It should be mentioned that the delivery amount is so low (1.43% of maximum Table A allocations) that any additional restrictions for the longfin smelt and other potential SWP issues per recent litigation (Appendix B) would be inherent in this figure.

The 2030 cumulative balance for all single dry model year scenarios is projected to be 26,386 acre-feet. Thus, regardless of the occurrence of a single dry year event at any time in the 20 year model, sufficient water supplies would be available to meet demand without contributing to overdraft since a positive cumulative balance is maintained.

6. Multiple Dry Year Scenario

For the multiple dry year scenarios supply sources, expect non-consumptive sources (ground water recharge and recycled water), are reduced compared to the normal year scenario and demand estimates are unchanged. Reductions in supply sources are consistent with the 2005 UWMP.

As was done in the 2005 UWMP, a four-year drought was used to analyze the effects of a multiple year drought. Tables 7C through 10C analyze a four year drought occurring at various times within the projected 20 year model.

Due to decreased precipitation in multiple dry years compared to normal years, surface water is reduced to 54% (1,500 acre-feet) for all drought years, natural ground water is reduced to 83% (6,000 acre-feet) for the first drought year and is reduced by 500 acre-feet per year through year 4 (4,500 acre-feet), and Table A water is reduced to 22.5% (8,100 acre-feet) for the first 2 drought years and to 18.6% (6,700 acre-feet) for the second 2 drought years.

The 2007 SWP Reliability Report indicated that expected deliveries during multiple dry years may be reduced to 32%-37% of maximum Table A allocations. Using the average of the expected range, Table A Water would be reduced to 34.5% of maximum Table A allocations or 19,233.75 acre-feet per dry year, which is substantially greater (35%-42%) than the reductions assumed in this WSA. Nonetheless, to be conservative and consistent with the methodology utilized in the 2005 UWMP, the lower Table A Water amounts of 8,100 acre-feet for the first 2 years and 6,700 acre-feet for the final 2 years of a four year drought period were used.

Although the annual balance varies depending on the multiple dry year scenario analyzed, the 2030 cumulative balance for all multiple dry model year scenarios projects an accrued deficit of 63,350 acre-feet of groundwater. This amount will have a negligible contribution to the existing overdraft conditions in the Subbasin, since it represents only 0.5% of the total supply in the Subbasin, and only 1.5% of the total supply in the Palms Springs Subarea. Furthermore, this water deficit can be fulfilled by the existing groundwater in storage without having a substantial impact on water supplies.

7. Summary

Data from the 2005 UWMP and the 2008/2009 Engineer's Report were utilized to construct the supply and demand model. Estimated Table A (State Water Project) deliveries are taken from the 2008/2009 Engineer's Report for normal water year deliveries and estimated Table A deliveries are taken from the 2005 UWMP for single and multiple dry year deliveries. Figures in the Engineer's Report base projected deliveries on the Department of Water Resources Bulletin 132-07 prepared in February of 2008 and on the 2007 Reliability Report. Projected deliveries from the 2007 Reliability Report consider changes in the hydrologic cycle due to potential future climatic changes, existing storage in SWP conservation reservoirs, operational constraints, federal court order 2008 Delta export restrictions to protect Delta smelt, and 2008 contractor demands.

Normal, single, and multiple dry year scenarios will not result in substantial impacts to the water supply or interfere with the ability of DWA to produce water to meet demand. During the 20-year normal and single dry year scenarios cumulative supply is greater than demand. Under the normal year scenario approximately 64,298 acre-feet of excess water would be banked in the aquifer and made available for future use. The single dry year scenario would result in storage of approximately 26,386 acre-feet over the 20-year period analyzed. Under the multiple dry year scenario demand would exceed supply, which would result in an overall deficit of 63,350 acre-feet by year 2030. Due to the volume of the Subarea, estimated to contain 4.3 million acre feet, extraction of 63,350 acre feet would represent only 1.5% of the Palm Springs Subarea. This modest reduction in groundwater storage in the event of a 4 year drought will be addressed through additional water supply purchases, water conservation, and source substitution.

The large volume of water contained in the Subarea assures that a sufficient and reliable water source is and will be available for the duration of the 20 year model and beyond including sufficient supplies during multiple dry year conditions.

As previously mentioned, the model is conservative in that a non-consumptive return flows of 35% is assumed when in fact it may be as high as 45%. In the event that a 45% return flows factor was used, the cumulative water balance in 2030 during normal and single dry year scenarios would be increased by approximately 187,500 and 149,500 acre-feet respectively, and the multiple dry year scenario would result in a cumulative storage of 59,800 acre-feet at the end of the 20 year period.

Although the proposed project in and of itself will not have a significant impact on water supplies, the cumulative impact will contribute to the overall water demand in the Valley, which is in a state of overdraft. DWA is actively combating the overdraft condition by encouraging water conservation, acquiring additional water supplies, and purchasing excess water as available. Project developers will contribute funds for the purpose of purchasing additional water to be imported into the Basin.

Table 1C
WSA Normal Water Year
Supply and Demand Projections

	Supply						Demand					Balance	
Year	Surface Water[1]	Natural Ground Water[2]	Table A Water[3]	Ground Water Recharge[4]	Recycled Water[5]	Total Supply	Recycled Water	Water Production[6]	Demand Subtotal	Net Project Demand[7]	Total Demand with Project	Annual	Cumulative[8]
2010	**2,800**	7,250	**36,012**	**11,739**	**6,000**	**63,801**	**6,000**	**50,650**	**56,650**	**32**	56,682	**7,119**	52,519
2011	2,800	7,250	36,012	12,030	6,000	64,092	6,000	51,450	57,450	**65**	57,515	**6,577**	59,096
2012	2,800	7,250	36,012	12,286	6,000	64,348	6,000	52,150	58,150	**97**	58,247	**6,101**	65,197
2013	2,800	7,250	36,012	12,596	6,000	64,658	6,000	53,000	59,000	**130**	59,130	**5,528**	70,725
2014	2,800	7,250	36,012	12,887	6,000	64,949	6,000	53,800	59,800	**162**	59,962	**4,987**	75,712
2015	**2,800**	**7,250**	**36,012**	**13,160**	**6,000**	**65,222**	**6,000**	**54,550**	**60,550**	**194**	60,744	**4,478**	80,190
2016	2,800	7,250	36,012	13,440	6,000	65,502	6,000	55,350	61,350	**194**	61,544	**3,958**	84,148
2017	2,800	7,250	36,012	13,685	6,000	65,747	6,000	56,050	62,050	**194**	62,244	**3,503**	87,652
2018	2,800	7,250	36,012	13,983	6,000	66,045	6,000	56,900	62,900	**194**	63,094	**2,951**	90,603
2019	2,800	7,250	36,012	14,263	6,000	66,325	6,000	57,700	63,700	**194**	63,894	**2,431**	93,034
2020	**2,800**	**7,250**	**36,012**	**12,543**	**8,000**	**66,605**	**8,000**	**58,500**	**66,500**	**194**	66,694	**-89**	92,945
2021	2,800	7,250	36,012	12,805	8,000	66,867	8,000	59,250	67,250	**194**	67,444	**-577**	92,368
2022	2,800	7,250	36,012	13,085	8,000	67,147	8,000	60,050	68,050	**194**	68,244	**-1,097**	91,271
2023	2,800	7,250	36,012	13,348	8,000	67,410	8,000	60,800	68,800	**194**	68,994	**-1,584**	89,687
2024	2,800	7,250	36,012	13,628	8,000	67,690	8,000	61,600	69,600	**194**	69,794	**-2,104**	87,583
2025	**2,800**	**7,250**	**36,012**	**13,908**	**8,000**	**67,970**	**8,000**	**62,400**	**70,400**	**194**	70,594	**-2,624**	84,959
2026	2,800	7,250	36,012	14,170	8,000	68,232	8,000	63,150	71,150	**194**	71,344	**-3,112**	81,847
2027	2,800	7,250	36,012	14,450	8,000	68,512	8,000	63,950	71,950	**194**	72,144	**-3,632**	78,216
2028	2,800	7,250	36,012	14,713	8,000	68,775	8,000	64,700	72,700	**194**	72,894	**-4,119**	74,097
2029	2,800	7,250	36,012	14,993	8,000	69,055	8,000	65,500	73,500	**194**	73,694	**-4,639**	69,458
2030	**2,800**	**7,250**	**36,012**	**15,273**	**8,000**	**69,335**	**8,000**	**66,300**	**74,300**	**194**	74,494	**-5,159**	64,298

See final sheet of Appendix C for footnotes.

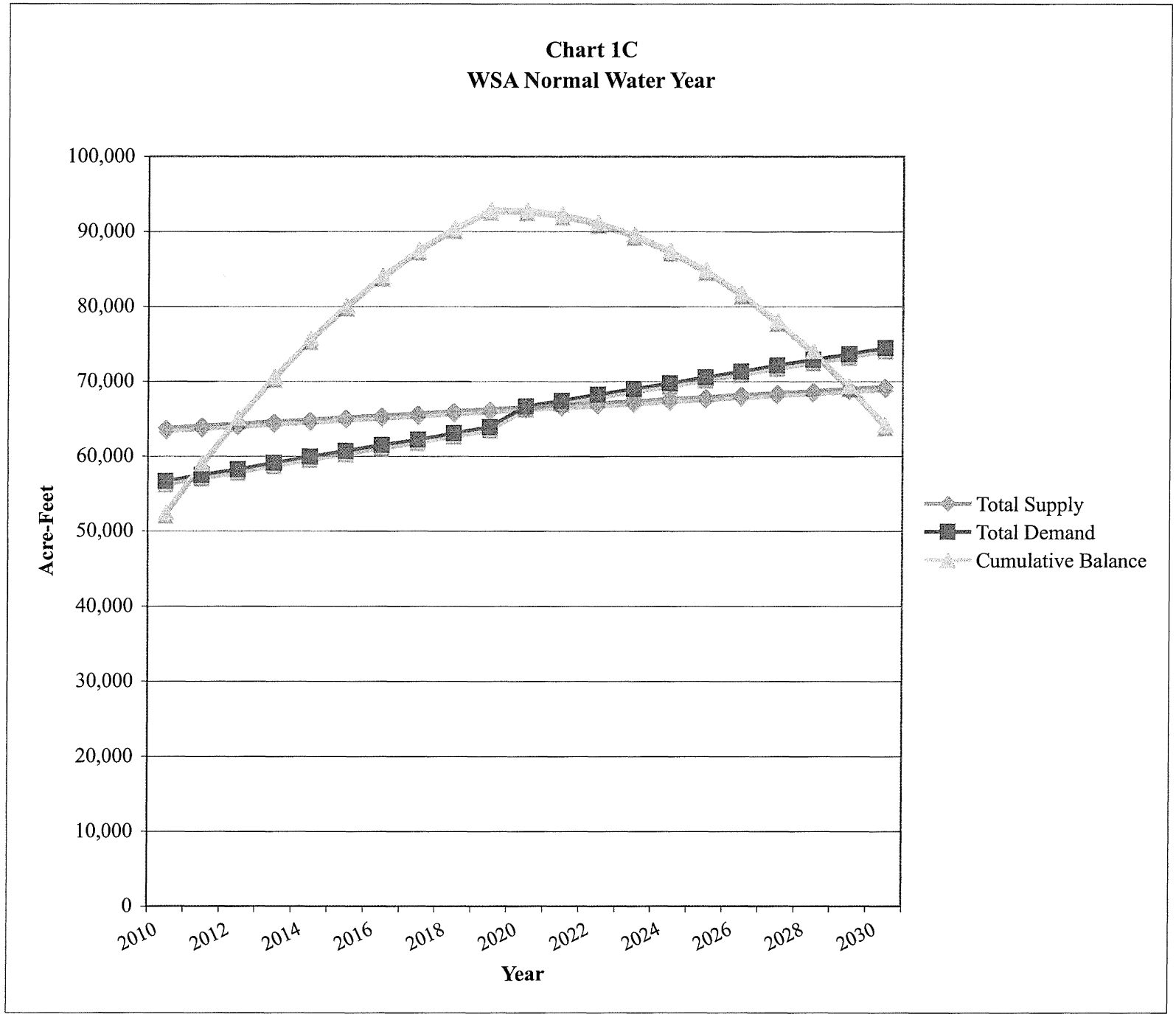
Chart 1C
WSA Normal Water Year
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Acre-Feet
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Year
Total Supply
Total Demand
Cumulative Balance

Table 2C
WSA Single Dry Year
Supply and Demand Projections

	Supply						Demand					Balance	
Year	Surface Water[1]	Natural Ground Water[2]	Table A Water[3]	Ground Water Recharge[4]	Recycled Water[5]	Total Supply	Recycled Water	Water Production[6]	Demand Subtotal	Net Project Demand[7]	Total Demand with Project	Annual	Cumulative[8]
2010	**1,350**	**6,000**	**800**	**11,739**	**6,000**	**25,889**	**6,000**	**50,650**	**56,650**	**32**	56,682	**-30,793**	14,607
2011	2,800	7,250	36,012	12,030	6,000	64,092	6,000	51,450	57,450	**65**	57,515	**6,577**	21,184
2012	2,800	7,250	36,012	12,286	6,000	64,348	6,000	52,150	58,150	**97**	58,247	**6,101**	27,285
2013	2,800	7,250	36,012	12,596	6,000	64,658	6,000	53,000	59,000	**130**	59,130	**5,528**	32,813
2014	2,800	7,250	36,012	12,887	6,000	64,949	6,000	53,800	59,800	**162**	59,962	**4,987**	37,800
2015	**2,800**	**7,250**	**36,012**	**13,160**	**6,000**	**65,222**	**6,000**	**54,550**	**60,550**	**194**	60,744	**4,478**	42,278
2016	2,800	7,250	36,012	13,440	6,000	65,502	6,000	55,350	61,350	**194**	61,544	**3,958**	46,236
2017	2,800	7,250	36,012	13,685	6,000	65,747	6,000	56,050	62,050	**194**	62,244	**3,503**	49,740
2018	2,800	7,250	36,012	13,983	6,000	66,045	6,000	56,900	62,900	**194**	63,094	**2,951**	52,691
2019	2,800	7,250	36,012	14,263	6,000	66,325	6,000	57,700	63,700	**194**	63,894	**2,431**	55,122
2020	**2,800**	**7,250**	**36,012**	**12,543**	**8,000**	**66,605**	**8,000**	**58,500**	**66,500**	**194**	66,694	**-89**	55,033
2021	2,800	7,250	36,012	12,805	8,000	66,867	8,000	59,250	67,250	**194**	67,444	**-577**	54,456
2022	2,800	7,250	36,012	13,085	8,000	67,147	8,000	60,050	68,050	**194**	68,244	**-1,097**	53,359
2023	2,800	7,250	36,012	13,348	8,000	67,410	8,000	60,800	68,800	**194**	68,994	**-1,584**	51,775
2024	2,800	7,250	36,012	13,628	8,000	67,690	8,000	61,600	69,600	**194**	69,794	**-2,104**	49,671
2025	**2,800**	**7,250**	**36,012**	**13,908**	**8,000**	**67,970**	**8,000**	**62,400**	**70,400**	**194**	70,594	**-2,624**	47,047
2026	2,800	7,250	36,012	14,170	8,000	68,232	8,000	63,150	71,150	**194**	71,344	**-3,112**	43,935
2027	2,800	7,250	36,012	14,450	8,000	68,512	8,000	63,950	71,950	**194**	72,144	**-3,632**	40,304
2028	2,800	7,250	36,012	14,713	8,000	68,775	8,000	64,700	72,700	**194**	72,894	**-4,119**	36,185
2029	2,800	7,250	36,012	14,993	8,000	69,055	8,000	65,500	73,500	**194**	73,694	**-4,639**	31,546
2030	**2,800**	**7,250**	**36,012**	**15,273**	**8,000**	**69,335**	**8,000**	**66,300**	**74,300**	**194**	74,494	**-5,159**	26,386

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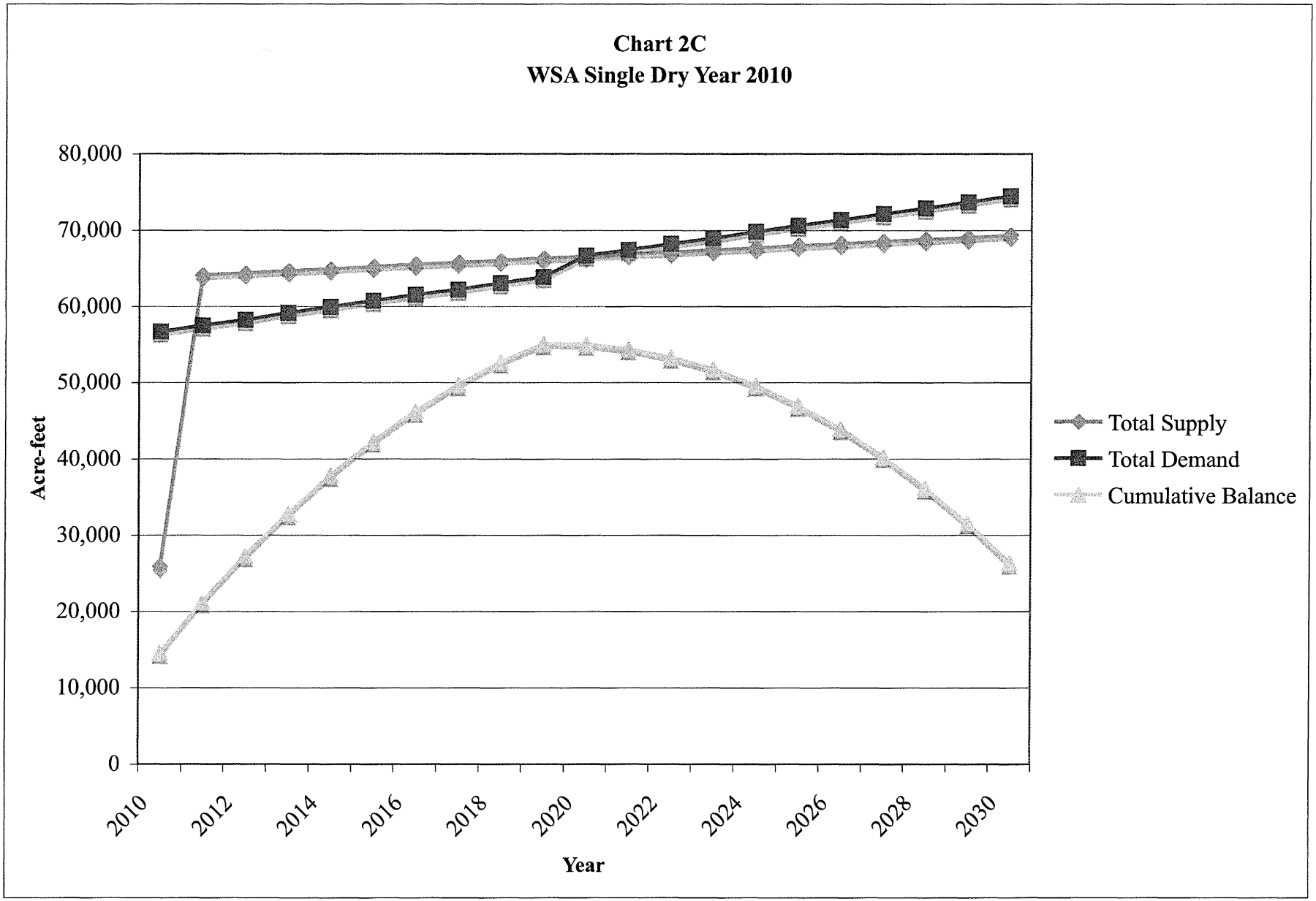
Chart 2C
WSA Single Dry Year 2010
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Acre-feet
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Year
Total Supply
Total Demand
Cumulative Balance

Table 3C
WSA Single Dry Year 2015
Supply and Demand Projections

	Supply						Demand					Balance	
Year	Surface Water[1]	Natural Ground Water[2]	Table A Water[3]	Ground Water Recharge[4]	Recycled Water[5]	Total Supply	Recycled Water	Water Production[6]	Demand Subtotal	Net Project Demand[7]	Total Demand with Project	Annual	Cumulative[8]
2010	**2,800**	**7,250**	**36,012**	**11,739**	**6,000**	**63,801**	**6,000**	**50,650**	**56,650**	**32**	**56,682**	**7,119**	52,519
2011	2,800	7,250	36,012	12,030	6,000	64,092	6,000	51,450	57,450	**65**	57,515	**6,577**	59,096
2012	2,800	7,250	36,012	12,286	6,000	64,348	6,000	52,150	58,150	**97**	58,247	**6,101**	65,197
2013	2,800	7,250	36,012	12,596	6,000	64,658	6,000	53,000	59,000	**130**	59,130	**5,528**	70,725
2014	2,800	7,250	36,012	12,887	6,000	64,949	6,000	53,800	59,800	**162**	59,962	**4,987**	75,712
2015	**1,350**	**6,000**	**800**	**13,160**	**6,000**	**27,310**	**6,000**	54,550	**60,550**	**194**	60,744	**-33,434**	42,278
2016	2,800	7,250	36,012	13,440	6,000	65,502	6,000	55,350	61,350	**194**	61,544	**3,958**	46,236
2017	2,800	7,250	36,012	13,685	6,000	65,747	6,000	56,050	62,050	**194**	62,244	**3,503**	49,740
2018	2,800	7,250	36,012	13,983	6,000	66,045	6,000	56,900	62,900	**194**	63,094	**2,951**	52,691
2019	2,800	7,250	36,012	14,263	6,000	66,325	6,000	57,700	63,700	**194**	63,894	**2,431**	55,122
2020	**2,800**	**7,250**	**36,012**	**12,543**	**8,000**	**66,605**	**8,000**	**58,500**	**66,500**	**194**	66,694	**-89**	55,033
2021	2,800	7,250	36,012	12,805	8,000	66,867	8,000	59,250	67,250	**194**	67,444	**-577**	54,456
2022	2,800	7,250	36,012	13,085	8,000	67,147	8,000	60,050	68,050	**194**	68,244	**-1,097**	53,359
2023	2,800	7,250	36,012	13,348	8,000	67,410	8,000	60,800	68,800	**194**	68,994	**-1,584**	51,775
2024	2,800	7,250	36,012	13,628	8,000	67,690	8,000	61,600	69,600	**194**	69,794	**-2,104**	49,671
2025	**2,800**	**7,250**	**36,012**	**13,908**	**8,000**	**67,970**	**8,000**	**62,400**	**70,400**	**194**	70,594	**-2,624**	47,047
2026	2,800	7,250	36,012	14,170	8,000	68,232	8,000	63,150	71,150	**194**	71,344	**-3,112**	43,935
2027	2,800	7,250	36,012	14,450	8,000	68,512	8,000	63,950	71,950	**194**	72,144	**-3,632**	40,304
2028	2,800	7,250	36,012	14,713	8,000	68,775	8,000	64,700	72,700	**194**	72,894	**-4,119**	36,185
2029	2,800	7,250	36,012	14,993	8,000	69,055	8,000	65,500	73,500	**194**	73,694	**-4,639**	31,546
2030	**2,800**	**7,250**	**36,012**	**15,273**	**8,000**	**69,335**	**8,000**	**66,300**	**74,300**	**194**	74,494	**-5,159**	26,386

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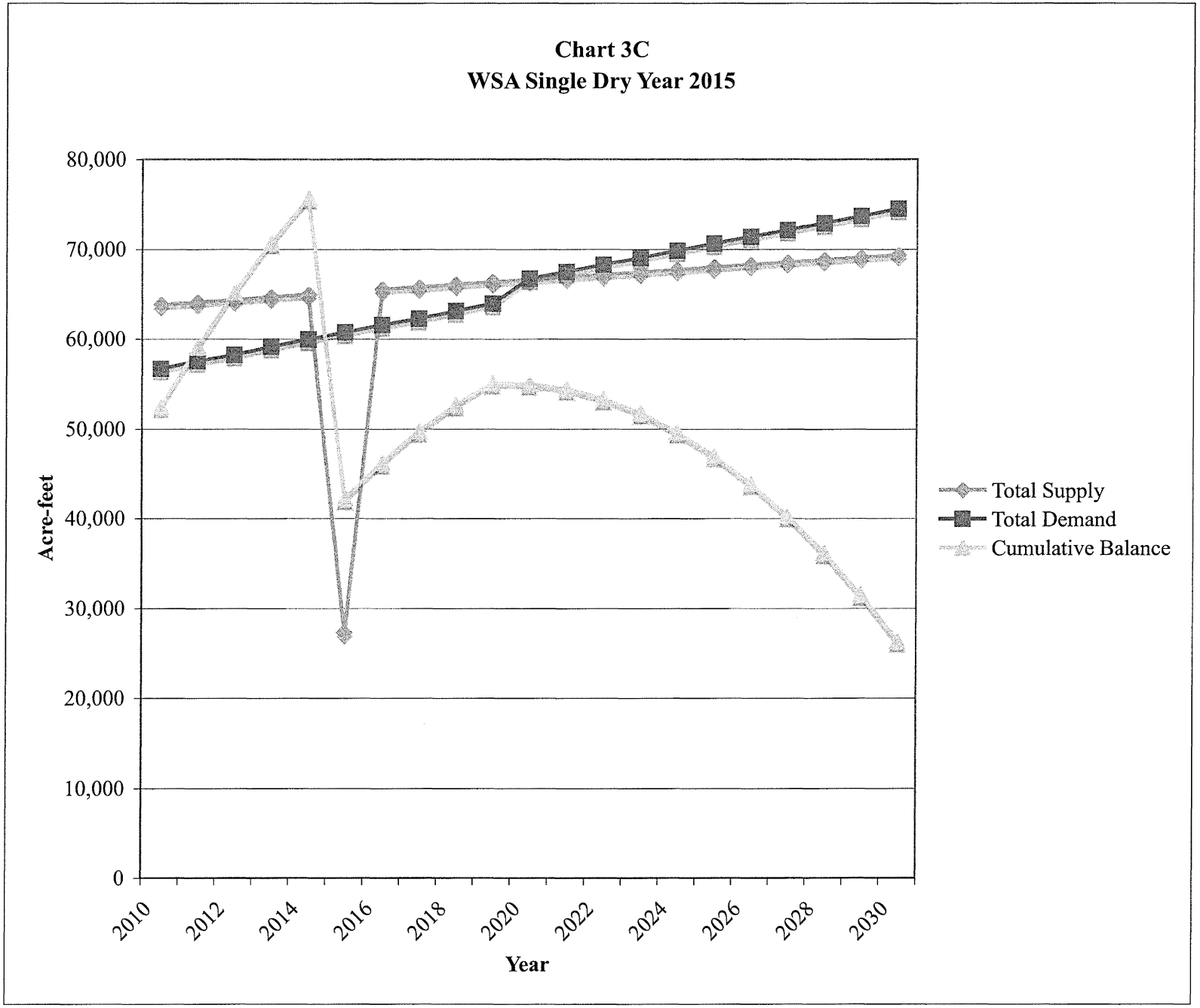
Chart 3C
WSA Single Dry Year 2015
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Acre-feet
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Year
Total Supply
Total Demand
Cumulative Balance

Table 4C
Single Dry Year 2020
Supply and Demand Projections

	Supply						Demand					Balance	
Year	Surface Water[1]	Natural Ground Water[2]	Table A Water[3]	Ground Water Recharge[4]	Recycled Water[5]	Total Supply	Recycled Water	Water Production[6]	Demand Subtotal	Net Project Demand[7]	Total Demand with Project	Annual	Cumulative[8]
2010	**2,800**	7,250	**36,012**	**11,739**	**6,000**	**63,801**	**6,000**	**50,650**	**56,650**	**32**	56,682	**7,119**	52,519
2011	2,800	7,250	36,012	12,030	6,000	64,092	6,000	51,450	57,450	**65**	57,515	**6,577**	59,096
2012	2,800	7,250	36,012	12,286	6,000	64,348	6,000	52,150	58,150	**97**	58,247	**6,101**	65,197
2013	2,800	7,250	36,012	12,596	6,000	64,658	6,000	53,000	59,000	**130**	59,130	**5,528**	70,725
2014	2,800	7,250	36,012	12,887	6,000	64,949	6,000	53,800	59,800	**162**	59,962	**4,987**	75,712
2015	**2,800**	**7,250**	**36,012**	**13,160**	**6,000**	**65,222**	**6,000**	**54,550**	**60,550**	**194**	60,744	**4,478**	80,190
2016	2,800	7,250	36,012	13,440	6,000	65,502	6,000	55,350	61,350	**194**	61,544	**3,958**	84,148
2017	2,800	7,250	36,012	13,685	6,000	65,747	6,000	56,050	62,050	**194**	62,244	**3,503**	87,652
2018	2,800	7,250	36,012	13,983	6,000	66,045	6,000	56,900	62,900	**194**	63,094	**2,951**	90,603
2019	2,800	7,250	36,012	14,263	6,000	66,325	6,000	57,700	63,700	**194**	63,894	**2,431**	93,034
2020	**1,350**	**6,000**	**800**	**12,543**	**8,000**	**28,693**	**8,000**	**58,500**	**66,500**	**194**	66,694	**-38,001**	55,033
2021	2,800	7,250	36,012	12,805	8,000	66,867	8,000	59,250	67,250	**194**	67,444	**-577**	54,456
2022	2,800	7,250	36,012	13,085	8,000	67,147	8,000	60,050	68,050	**194**	68,244	**-1,097**	53,359
2023	2,800	7,250	36,012	13,348	8,000	67,410	8,000	60,800	68,800	**194**	68,994	**-1,584**	51,775
2024	2,800	7,250	36,012	13,628	8,000	67,690	8,000	61,600	69,600	**194**	69,794	**-2,104**	49,671
2025	**2,800**	**7,250**	**36,012**	**13,908**	**8,000**	**67,970**	**8,000**	**62,400**	**70,400**	**194**	70,594	**-2,624**	47,047
2026	2,800	7,250	36,012	14,170	8,000	68,232	8,000	63,150	71,150	**194**	71,344	**-3,112**	43,935
2027	2,800	7,250	36,012	14,450	8,000	68,512	8,000	63,950	71,950	**194**	72,144	**-3,632**	40,304
2028	2,800	7,250	36,012	14,713	8,000	68,775	8,000	64,700	72,700	**194**	72,894	**-4,119**	36,185
2029	2,800	7,250	36,012	14,993	8,000	69,055	8,000	65,500	73,500	**194**	73,694	**-4,639**	31,546
2030	**2,800**	**7,250**	**36,012**	**15,273**	**8,000**	**69,335**	**8,000**	**66,300**	**74,300**	**194**	74,494	**-5,159**	26,386

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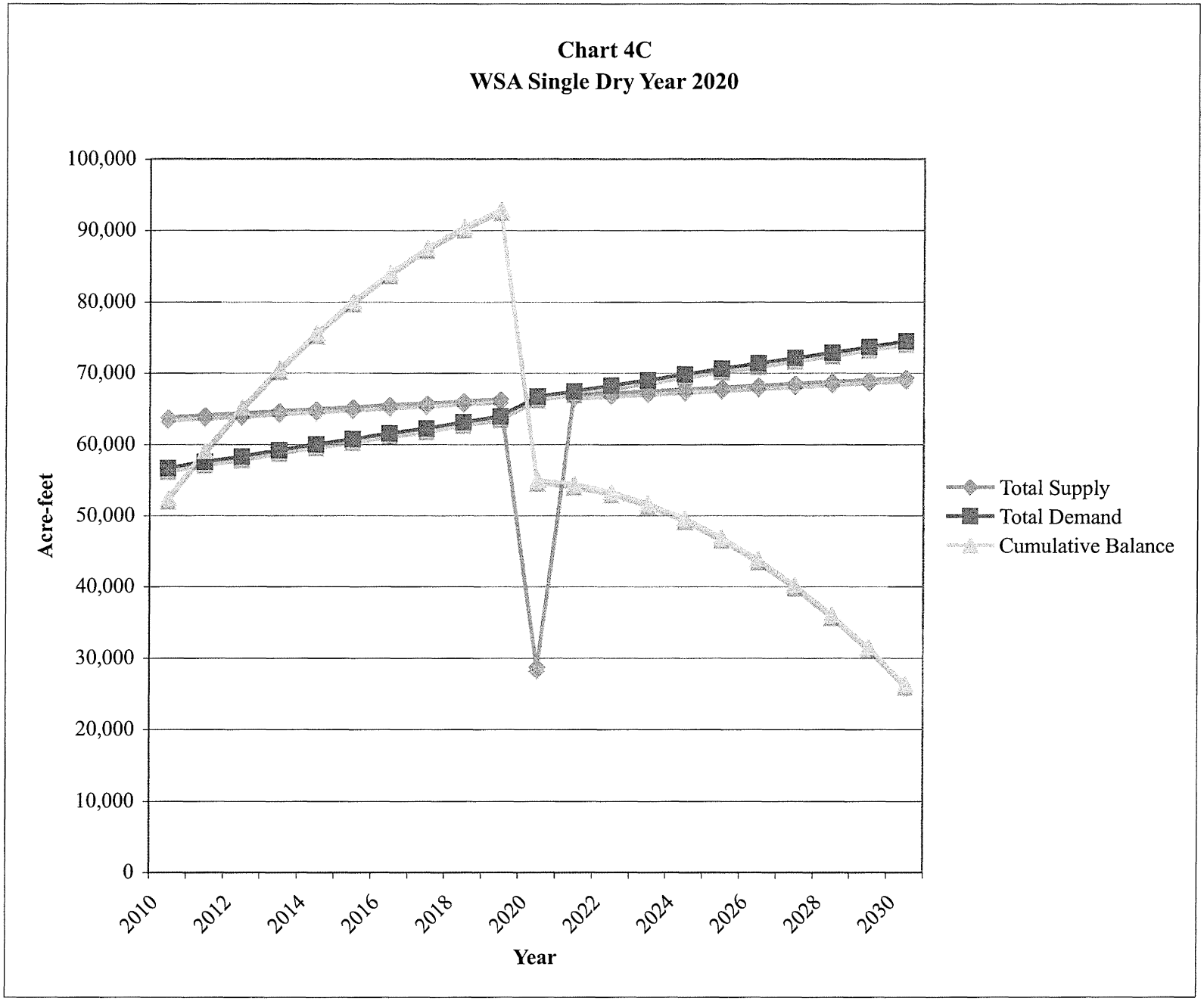
Chart 4C
WSA Single Dry Year 2020
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Acre-feet
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Year
Total Supply
Total Demand
Cumulative Balance

Table 5C
Single Dry Year 2020
Supply and Demand Projections

	Supply						Demand					Balance	
Year	Surface Water[1]	Natural Ground Water[2]	Table A Water[3]	Ground Water Recharge[4]	Recycled Water[5]	Total Supply	Recycled Water	Water Production[6]	Demand Subtotal	Net Project Demand[7]	Total Demand with Project	Annual	Cumulative[8]
2010	**2,800**	7,250	**36,012**	**11,739**	**6,000**	**63,801**	**6,000**	**50,650**	**56,650**	**32**	56,682	**7,119**	52,519
2011	2,800	7,250	36,012	12,030	6,000	64,092	6,000	51,450	57,450	**65**	57,515	**6,577**	59,096
2012	2,800	7,250	36,012	12,286	6,000	64,348	6,000	52,150	58,150	**97**	58,247	**6,101**	65,197
2013	2,800	7,250	36,012	12,596	6,000	64,658	6,000	53,000	59,000	**130**	59,130	**5,528**	70,725
2014	2,800	7,250	36,012	12,887	6,000	64,949	6,000	53,800	59,800	**162**	59,962	**4,987**	75,712
2015	**2,800**	**7,250**	**36,012**	**13,160**	**6,000**	**65,222**	**6,000**	**54,550**	**60,550**	**194**	60,744	**4,478**	80,190
2016	2,800	7,250	36,012	13,440	6,000	65,502	6,000	55,350	61,350	**194**	61,544	**3,958**	84,148
2017	2,800	7,250	36,012	13,685	6,000	65,747	6,000	56,050	62,050	**194**	62,244	**3,503**	87,652
2018	2,800	7,250	36,012	13,983	6,000	66,045	6,000	56,900	62,900	**194**	63,094	**2,951**	90,603
2019	2,800	7,250	36,012	14,263	6,000	66,325	6,000	57,700	63,700	**194**	63,894	**2,431**	93,034
2020	**2,800**	**7,250**	**36,012**	**12,543**	**8,000**	**66,605**	**8,000**	**58,500**	**66,500**	**194**	66,694	**-89**	92,945
2021	2,800	7,250	36,012	12,805	8,000	66,867	8,000	59,250	67,250	**194**	67,444	**-577**	92,368
2022	2,800	7,250	36,012	13,085	8,000	67,147	8,000	60,050	68,050	**194**	68,244	**-1,097**	91,271
2023	2,800	7,250	36,012	13,348	8,000	67,410	8,000	60,800	68,800	**194**	68,994	**-1,584**	89,687
2024	2,800	7,250	36,012	13,628	8,000	67,690	8,000	61,600	69,600	**194**	69,794	**-2,104**	87,583
2025	**1,350**	**6,000**	**800**	**13,908**	**8,000**	**30,058**	**8,000**	**62,400**	**70,400**	**194**	70,594	**-40,536**	47,047
2026	2,800	7,250	36,012	14,170	8,000	68,232	8,000	63,150	71,150	**194**	71,344	**-3,112**	43,935
2027	2,800	7,250	36,012	14,450	8,000	68,512	8,000	63,950	71,950	**194**	72,144	**-3,632**	40,304
2028	2,800	7,250	36,012	14,713	8,000	68,775	8,000	64,700	72,700	**194**	72,894	**-4,119**	36,185
2029	2,800	7,250	36,012	14,993	8,000	69,055	8,000	65,500	73,500	**194**	73,694	**-4,639**	31,546
2030	**2,800**	**7,250**	**36,012**	**15,273**	**8,000**	**69,335**	**8,000**	**66,300**	**74,300**	**194**	74,494	**-5,159**	26,386

See final sheet of Appendix C for footnotes.

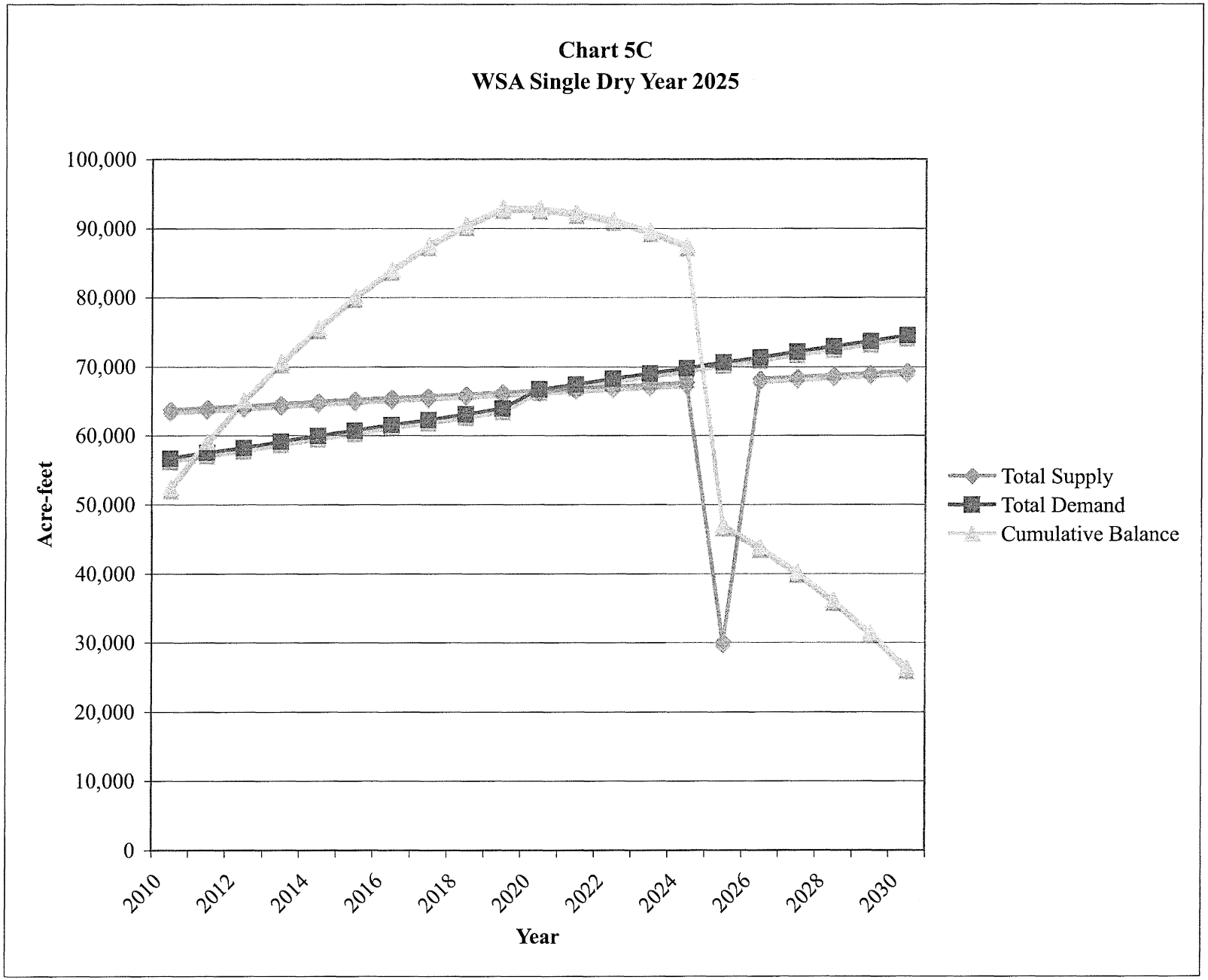
Chart 5C
WSA Single Dry Year 2025
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Acre-feet
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Year
Total Supply
Total Demand
Cumulative Balance

Table 6C
Single Dry Year 2030
Supply and Demand Projections

	Supply						Demand					Balance	
Year	Surface Water[1]	Natural Ground Water[2]	Table A Water[3]	Ground Water Recharge[4]	Recycled Water[5]	Total Supply	Recycled Water	Water Production[6]	Demand Subtotal	Net Project Demand[7]	Total Demand with Project	Annual	Cumulative[8]
2010	**2,800**	7,250	**36,012**	**11,739**	**6,000**	**63,801**	**6,000**	**50,650**	**56,650**	**32**	56,682	**7,119**	52,519
2011	2,800	7,250	36,012	12,030	6,000	64,092	6,000	51,450	57,450	**65**	57,515	**6,577**	59,096
2012	2,800	7,250	36,012	12,286	6,000	64,348	6,000	52,150	58,150	**97**	58,247	**6,101**	65,197
2013	2,800	7,250	36,012	12,596	6,000	64,658	6,000	53,000	59,000	**130**	59,130	**5,528**	70,725
2014	2,800	7,250	36,012	12,887	6,000	64,949	6,000	53,800	59,800	**162**	59,962	**4,987**	75,712
2015	**2,800**	**7,250**	**36,012**	**13,160**	**6,000**	**65,222**	**6,000**	**54,550**	**60,550**	**194**	60,744	**4,478**	80,190
2016	2,800	7,250	36,012	13,440	6,000	65,502	6,000	55,350	61,350	**194**	61,544	**3,958**	84,148
2017	2,800	7,250	36,012	13,685	6,000	65,747	6,000	56,050	62,050	**194**	62,244	**3,503**	87,652
2018	2,800	7,250	36,012	13,983	6,000	66,045	6,000	56,900	62,900	**194**	63,094	**2,951**	90,603
2019	2,800	7,250	36,012	14,263	6,000	66,325	6,000	57,700	63,700	**194**	63,894	**2,431**	93,034
2020	**2,800**	**7,250**	**36,012**	**12,543**	**8,000**	**66,605**	**8,000**	**58,500**	**66,500**	**194**	66,694	**-89**	92,945
2021	2,800	7,250	36,012	12,805	8,000	66,867	8,000	59,250	67,250	**194**	67,444	**-577**	92,368
2022	2,800	7,250	36,012	13,085	8,000	67,147	8,000	60,050	68,050	**194**	68,244	**-1,097**	91,271
2023	2,800	7,250	36,012	13,348	8,000	67,410	8,000	60,800	68,800	**194**	68,994	**-1,584**	89,687
2024	2,800	7,250	36,012	13,628	8,000	67,690	8,000	61,600	69,600	**194**	69,794	**-2,104**	87,583
2025	**2,800**	**7,250**	**36,012**	**13,908**	**8,000**	**67,970**	**8,000**	**62,400**	**70,400**	**194**	70,594	**-2,624**	84,959
2026	2,800	7,250	36,012	14,170	8,000	68,232	8,000	63,150	71,150	**194**	71,344	**-3,112**	81,847
2027	2,800	7,250	36,012	14,450	8,000	68,512	8,000	63,950	71,950	**194**	72,144	**-3,632**	78,216
2028	2,800	7,250	36,012	14,713	8,000	68,775	8,000	64,700	72,700	**194**	72,894	**-4,119**	74,097
2029	2,800	7,250	36,012	14,993	8,000	69,055	8,000	65,500	73,500	**194**	73,694	**-4,639**	69,458
2030	**1,350**	**6,000**	**800**	**15,273**	**8,000**	**31,423**	**8,000**	**66,300**	**74,300**	**194**	74,494	**-43,071**	26,386

See final sheet of Appendix C for footnotes.

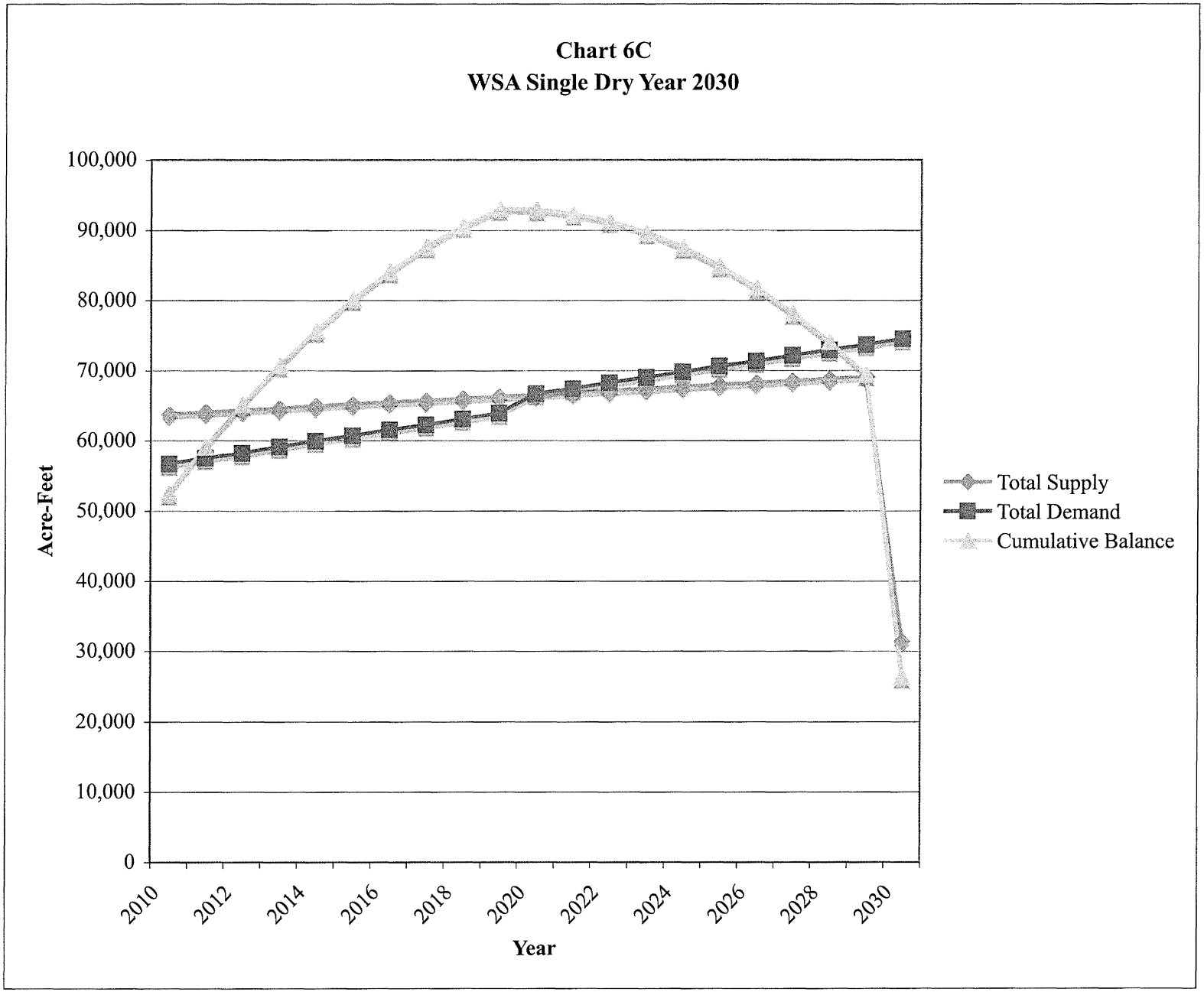
Chart 6C
WSA Single Dry Year 2030
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Acre-Feet
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Year
Total Supply
Total Demand
Cumulative Balance

Table 7C
WSA Multiple Dry Years 2010-2013
Supply and Demand Projections

	Supply						Demand					Balance	
Year	Surface Water[1]	Natural Ground Water[2]	Table A Water[3]	Ground Water Recharge[4]	Recycled Water[5]	Total Supply	Recycled Water	Water Production[6]	Demand Subtotal	Net Project Demand[7]	Total Demand with Project	Annual	Cumulative[8]
2010	**1,500**	6,000	**8,100**	**11,739**	**6,000**	**33,339**	**6,000**	**50,650**	**56,650**	**32**	56,682	**-23,343**	22,057
2011	1,500	5,500	8,100	12,030	6,000	33,130	6,000	51,450	57,450	**65**	57,515	**-24,385**	-2,328
2012	1,500	5,000	6,700	12,286	6,000	31,486	6,000	52,150	58,150	**97**	58,247	**-26,761**	-29,089
2013	1,500	4,500	6,700	12,596	6,000	31,296	6,000	53,000	59,000	**130**	59,130	**-27,835**	-56,923
2014	2,800	7,250	36,012	12,887	6,000	64,949	6,000	53,800	59,800	**162**	59,962	**4,987**	-51,936
2015	**2,800**	**7,250**	**36,012**	**13,160**	**6,000**	**65,222**	**6,000**	**54,550**	**60,550**	**194**	60,744	**4,478**	-47,458
2016	2,800	7,250	36,012	13,440	6,000	65,502	6,000	55,350	61,350	**194**	61,544	**3,958**	-43,500
2017	2,800	7,250	36,012	13,685	6,000	65,747	6,000	56,050	62,050	**194**	62,244	**3,503**	-39,996
2018	2,800	7,250	36,012	13,983	6,000	66,045	6,000	56,900	62,900	**194**	63,094	**2,951**	-37,045
2019	2,800	7,250	36,012	14,263	6,000	66,325	6,000	57,700	63,700	**194**	63,894	**2,431**	-34,614
2020	**2,800**	**7,250**	**36,012**	**12,543**	**8,000**	**66,605**	**8,000**	**58,500**	**66,500**	**194**	66,694	**-89**	-34,704
2021	2,800	7,250	36,012	12,805	8,000	66,867	8,000	59,250	67,250	**194**	67,444	**-577**	-35,280
2022	2,800	7,250	36,012	13,085	8,000	67,147	8,000	60,050	68,050	**194**	68,244	**-1,097**	-36,377
2023	2,800	7,250	36,012	13,348	8,000	67,410	8,000	60,800	68,800	**194**	68,994	**-1,584**	-37,961
2024	2,800	7,250	36,012	13,628	8,000	67,690	8,000	61,600	69,600	**194**	69,794	**-2,104**	-40,065
2025	**2,800**	**7,250**	**36,012**	**13,908**	**8,000**	**67,970**	**8,000**	**62,400**	**70,400**	**194**	70,594	**-2,624**	-42,689
2026	2,800	7,250	36,012	14,170	8,000	68,232	8,000	63,150	71,150	**194**	71,344	**-3,112**	-45,801
2027	2,800	7,250	36,012	14,450	8,000	68,512	8,000	63,950	71,950	**194**	72,144	**-3,632**	-49,432
2028	2,800	7,250	36,012	14,713	8,000	68,775	8,000	64,700	72,700	**194**	72,894	**-4,119**	-53,551
2029	2,800	7,250	36,012	14,993	8,000	69,055	8,000	65,500	73,500	**194**	73,694	**-4,639**	-58,190
2030	**2,800**	**7,250**	**36,012**	**15,273**	**8,000**	**69,335**	**8,000**	**66,300**	**74,300**	**194**	74,494	**-5,159**	-63,350

See final sheet of Appendix C for footnotes.

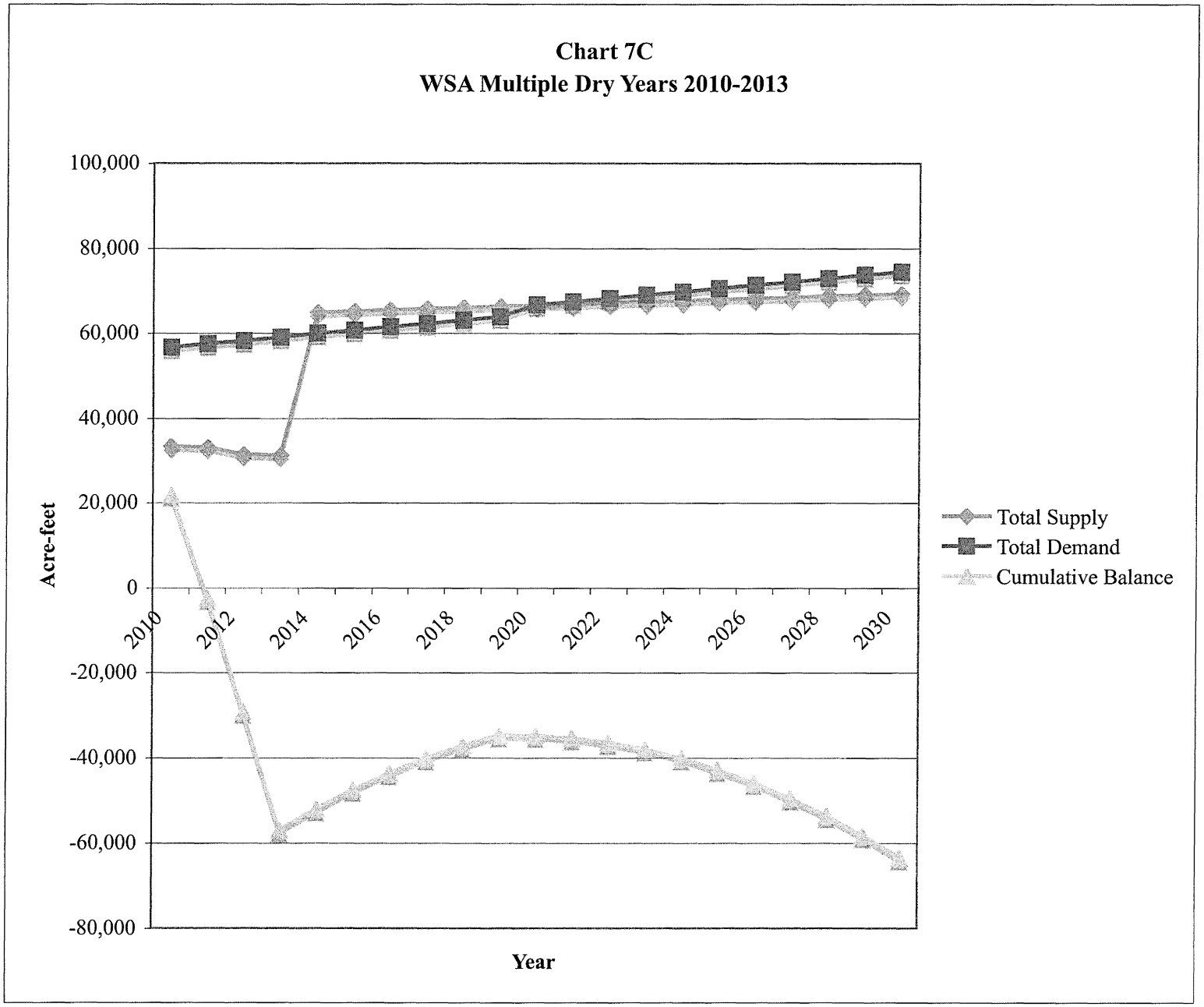
Chart 7C
WSA Multiple Dry Years 2010-2013
100,000
80,000
60,000
40,000
20,000
0
-20,000
-40,000
-60,000
-80,000
Acre-feet
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Year
Total Supply
Total Demand
Cumulative Balance

Table 8C
WSA Multiple Dry Years 2015-2018
Supply and Demand Projections

	Supply						Demand					Balance	
Year	Surface Water[1]	Natural Ground Water[2]	Table A Water[3]	Ground Water Recharge[4]	Recycled Water[5]	Total Supply	Recycled Water	Water Production[6]	Demand Subtotal	Net Project Demand[7]	Total Demand with Project	Annual	Cumulative[8]
2010	**2,800**	7,250	**36,012**	**11,739**	**6,000**	**63,801**	**6,000**	**50,650**	**56,650**	**32**	56,682	**7,119**	52,519
2011	2,800	7,250	36,012	12,030	6,000	64,092	6,000	51,450	57,450	**65**	57,515	**6,577**	59,096
2012	2,800	7,250	36,012	12,286	6,000	64,348	6,000	52,150	58,150	**97**	58,247	**6,101**	65,197
2013	2,800	7,250	36,012	12,596	6,000	64,658	6,000	53,000	59,000	**130**	59,130	**5,528**	70,725
2014	2,800	7,250	36,012	12,887	6,000	64,949	6,000	53,800	59,800	**162**	59,962	**4,987**	75,712
2015	**1,500**	**6,000**	**8,100**	**13,160**	**6,000**	**34,760**	**6,000**	**54,550**	**60,550**	**194**	60,744	**-25,984**	49,728
2016	1,500	5,500	8,100	13,440	6,000	34,540	6,000	55,350	61,350	**194**	61,544	**-27,004**	22,724
2017	1,500	5,000	6,700	13,685	6,000	32,885	6,000	56,050	62,050	**194**	62,244	**-29,359**	-6,634
2018	1,500	4,500	6,700	13,983	6,000	32,683	6,000	56,900	62,900	**194**	63,094	**-30,411**	-37,045
2019	2,800	7,250	36,012	14,263	6,000	66,325	6,000	57,700	63,700	**194**	63,894	**2,431**	-34,614
2020	**2,800**	**7,250**	**36,012**	**12,543**	**8,000**	**66,605**	**8,000**	**58,500**	**66,500**	**194**	66,694	**-89**	-34,704
2021	2,800	7,250	36,012	12,805	8,000	66,867	8,000	59,250	67,250	**194**	67,444	**-577**	-35,280
2022	2,800	7,250	36,012	13,085	8,000	67,147	8,000	60,050	68,050	**194**	68,244	**-1,097**	-36,377
2023	2,800	7,250	36,012	13,348	8,000	67,410	8,000	60,800	68,800	**194**	68,994	**-1,584**	-37,961
2024	2,800	7,250	36,012	13,628	8,000	67,690	8,000	61,600	69,600	**194**	69,794	**-2,104**	-40,065
2025	**2,800**	**7,250**	**36,012**	**13,908**	**8,000**	**67,970**	**8,000**	**62,400**	**70,400**	**194**	70,594	**-2,624**	-42,689
2026	2,800	7,250	36,012	14,170	8,000	68,232	8,000	63,150	71,150	**194**	71,344	**-3,112**	-45,801
2027	2,800	7,250	36,012	14,450	8,000	68,512	8,000	63,950	71,950	**194**	72,144	**-3,632**	-49,432
2028	2,800	7,250	36,012	14,713	8,000	68,775	8,000	64,700	72,700	**194**	72,894	**-4,119**	-53,551
2029	2,800	7,250	36,012	14,993	8,000	69,055	8,000	65,500	73,500	**194**	73,694	**-4,639**	-58,190
2030	**2,800**	**7,250**	**36,012**	**15,273**	**8,000**	**69,335**	**8,000**	**66,300**	**74,300**	**194**	74,494	**-5,159**	-63,350

See final sheet of Appendix C for footnotes.

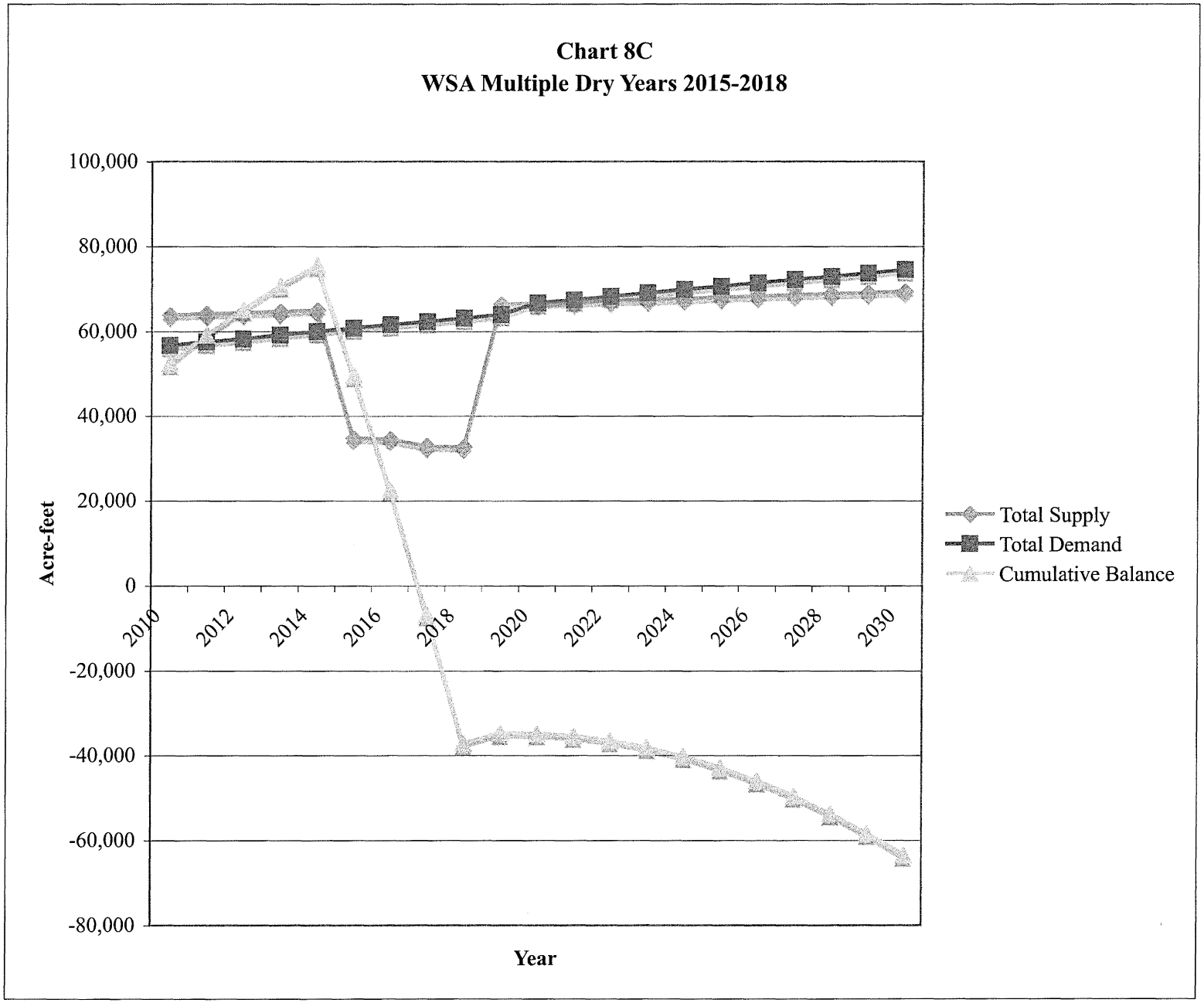
Chart 8C
WSA Multiple Dry Years 2015-2018
100,000
80,000
60,000
40,000
20,000
0
-20,000
-40,000
-60,000
-80,000
Acre-feet
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Year
Total Supply
Total Demand
Cumulative Balance

Table 9C
WSA Multiple Dry Years 2020-2023
Supply and Demand Projections

	Supply						Demand					Balance	
Year	Surface Water[1]	Natural Ground Water[2]	Table A Water[3]	Ground Water Recharge[4]	Recycled Water[5]	Total Supply	Recycled Water	Water Production[6]	Demand Subtotal	Net Project Demand[7]	Total Demand with Project	Annual	Cumulative[8]
2010	**2,800**	7,250	**36,012**	**11,739**	**6,000**	**63,801**	**6,000**	**50,650**	**56,650**	**32**	56,682	**7,119**	52,519
2011	2,800	7,250	36,012	12,030	6,000	64,092	6,000	51,450	57,450	**65**	57,515	**6,577**	59,096
2012	2,800	7,250	36,012	12,286	6,000	64,348	6,000	52,150	58,150	**97**	58,247	**6,101**	65,197
2013	2,800	7,250	36,012	12,596	6,000	64,658	6,000	53,000	59,000	**130**	59,130	**5,528**	70,725
2014	2,800	7,250	36,012	12,887	6,000	64,949	6,000	53,800	59,800	**162**	59,962	**4,987**	75,712
2015	**2,800**	**7,250**	**36,012**	**13,160**	**6,000**	**65,222**	**6,000**	**54,550**	**60,550**	**194**	60,744	**4,478**	80,190
2016	2,800	7,250	36,012	13,440	6,000	65,502	6,000	55,350	61,350	**194**	61,544	**3,958**	84,148
2017	2,800	7,250	36,012	13,685	6,000	65,747	6,000	56,050	62,050	**194**	62,244	**3,503**	87,652
2018	2,800	7,250	36,012	13,983	6,000	66,045	6,000	56,900	62,900	**194**	63,094	**2,951**	90,603
2019	2,800	7,250	36,012	14,263	6,000	66,325	6,000	57,700	63,700	**194**	63,894	**2,431**	93,034
2020	**1,500**	**6,000**	**8,100**	**12,543**	**8,000**	**36,143**	**8,000**	**58,500**	**66,500**	**194**	66,694	**-30,551**	62,483
2021	1,500	5,500	8,100	12,805	8,000	35,905	8,000	59,250	67,250	**194**	67,444	**-31,539**	30,944
2022	1,500	5,000	6,700	13,085	8,000	34,285	8,000	60,050	68,050	**194**	68,244	**-33,959**	-3,015
2023	1,500	4,500	6,700	13,348	8,000	34,048	8,000	60,800	68,800	**194**	68,994	**-34,946**	-37,961
2024	2,800	7,250	36,012	13,628	8,000	67,690	8,000	61,600	69,600	**194**	69,794	**-2,104**	-40,065
2025	**2,800**	**7,250**	**36,012**	**13,908**	**8,000**	**67,970**	**8,000**	**62,400**	**70,400**	**194**	70,594	**-2,624**	-42,689
2026	2,800	7,250	36,012	14,170	8,000	68,232	8,000	63,150	71,150	**194**	71,344	**-3,112**	-45,801
2027	2,800	7,250	36,012	14,450	8,000	68,512	8,000	63,950	71,950	**194**	72,144	**-3,632**	-49,432
2028	2,800	7,250	36,012	14,713	8,000	68,775	8,000	64,700	72,700	**194**	72,894	**-4,119**	-53,551
2029	2,800	7,250	36,012	14,993	8,000	69,055	8,000	65,500	73,500	**194**	73,694	**-4,639**	-58,190
2030	**2,800**	**7,250**	**36,012**	**15,273**	**8,000**	**69,335**	**8,000**	**66,300**	**74,300**	**194**	74,494	**-5,159**	-63,350

See final sheet of Appendix C for footnotes.

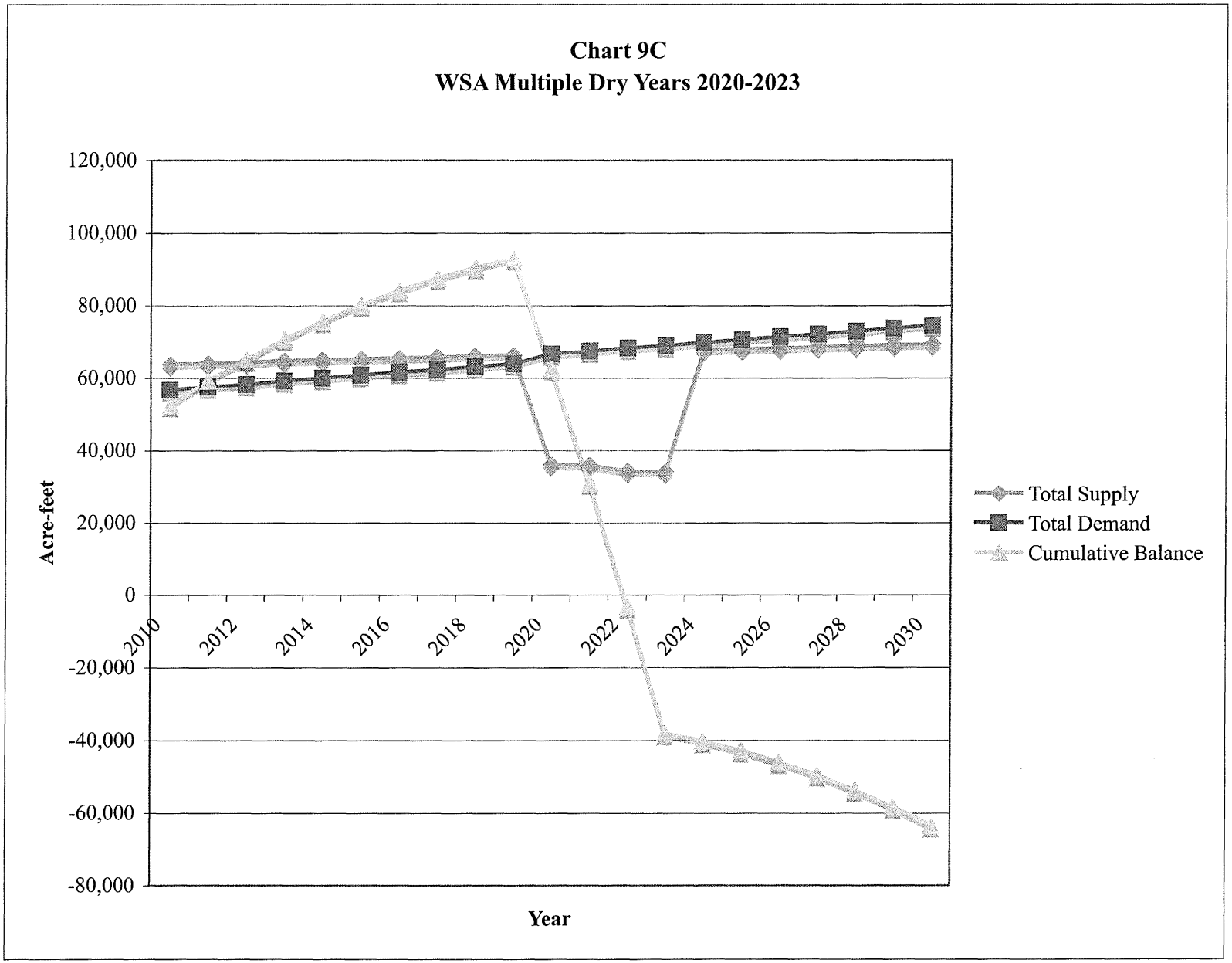
Chart 9C
WSA Multiple Dry Years 2020-2023
120,000
100,000
80,000
60,000
40,000
20,000
0
-20,000
-40,000
-60,000
-80,000
Acre-feet
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Year
Total Supply
Total Demand
Cumulative Balance

Table 10C
WSA Multiple Dry Years 2025-2028
Supply and Demand Projections

	Supply						Demand					Balance	
Year	Surface Water[1]	Natural Ground Water[2]	Table A Water[3]	Ground Water Recharge[4]	Recycled Water[5]	Total Supply	Recycled Water	Water Production[6]	Demand Subtotal	Net Project Demand[7]	Total Demand with Project	Annual	Cumulative[8]
2010	**2,800**	7,250	**36,012**	**11,739**	**6,000**	**63,801**	**6,000**	**50,650**	**56,650**	**32**	56,682	**7,119**	52,519
2011	2,800	7,250	36,012	12,030	6,000	64,092	6,000	51,450	57,450	**65**	57,515	**6,577**	59,096
2012	2,800	7,250	36,012	12,286	6,000	64,348	6,000	52,150	58,150	**97**	58,247	**6,101**	65,197
2013	2,800	7,250	36,012	12,596	6,000	64,658	6,000	53,000	59,000	**130**	59,130	**5,528**	70,725
2014	2,800	7,250	36,012	12,887	6,000	64,949	6,000	53,800	59,800	**162**	59,962	**4,987**	75,712
2015	**2,800**	**7,250**	**36,012**	**13,160**	**6,000**	**65,222**	**6,000**	**54,550**	**60,550**	**194**	60,744	**4,478**	80,190
2016	2,800	7,250	36,012	13,440	6,000	65,502	6,000	55,350	61,350	**194**	61,544	**3,958**	84,148
2017	2,800	7,250	36,012	13,685	6,000	65,747	6,000	56,050	62,050	**194**	62,244	**3,503**	87,652
2018	2,800	7,250	36,012	13,983	6,000	66,045	6,000	56,900	62,900	**194**	63,094	**2,951**	90,603
2019	2,800	7,250	36,012	14,263	6,000	66,325	6,000	57,700	63,700	**194**	63,894	**2,431**	93,034
2020	**2,800**	**7,250**	**36,012**	**12,543**	**8,000**	**66,605**	**8,000**	**58,500**	**66,500**	**194**	66,694	**-89**	92,945
2021	2,800	7,250	36,012	12,805	8,000	66,867	8,000	59,250	67,250	**194**	67,444	**-577**	92,368
2022	2,800	7,250	36,012	13,085	8,000	67,147	8,000	60,050	68,050	**194**	68,244	**-1,097**	91,271
2023	2,800	7,250	36,012	13,348	8,000	67,410	8,000	60,800	68,800	**194**	68,994	**-1,584**	89,687
2024	2,800	7,250	36,012	13,628	8,000	67,690	8,000	61,600	69,600	**194**	69,794	**-2,104**	87,583
2025	**1,500**	**6,000**	**8,100**	**13,908**	**8,000**	**37,508**	**8,000**	**62,400**	**70,400**	**194**	70,594	**-33,086**	54,497
2026	1,500	5,500	8,100	14,170	8,000	37,270	8,000	63,150	71,150	**194**	71,344	**-34,074**	20,423
2027	1,500	5,000	6,700	14,450	8,000	35,650	8,000	63,950	71,950	**194**	72,144	**-36,494**	-16,070
2028	1,500	4,500	6,700	14,713	8,000	35,413	8,000	64,700	72,700	**194**	72,894	**-37,481**	-53,551
2029	2,800	7,250	36,012	14,993	8,000	69,055	8,000	65,500	73,500	**194**	73,694	**-4,639**	-58,190
2030	**2,800**	**7,250**	**36,012**	**15,273**	**8,000**	**69,335**	**8,000**	**66,300**	**74,300**	**194**	74,494	**-5,159**	-63,350

See final sheet of Appendix C for footnotes.

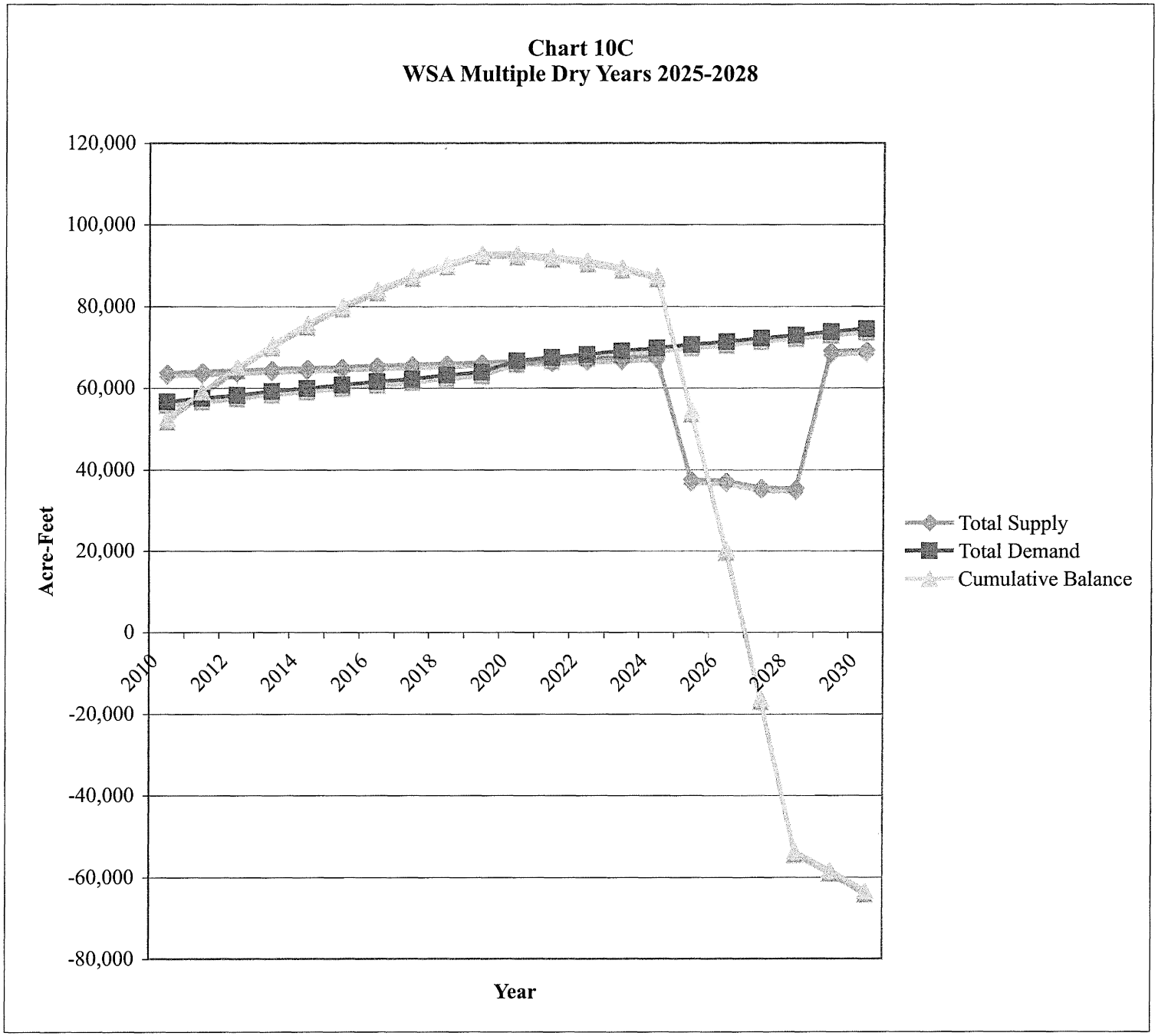
Chart 10C
WSA Multiple Dry Years 2025-2028
120,000
100,000
80,000
60,000
40,000
20,000
0
-20,000
-40,000
-60,000
-80,000
Acre-Feet
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Year
Total Supply
Total Demand
Cumulative Balance

Appendix C Footnotes

1 Surface water includes water diverted from surface flows at Snow Creek (2,475 gpm), Falls Creek (675 gpm), Chino Creek North (900 gpm), and Chino Creek West (900 gpm), which are all tributaries to the Whitewater River. The total surface water diversion of 2,800 acre-feet per year is based on average diversions from 1977 through 2004.

2 Natural groundwater is from long term recharge within the Upper Whitewater River Subbasin that occurs naturally, approximately 29,000 acre-feet per year (36,000 ac-ft/yr total natural inflow less 7,000 ac-ft/yr natural outflows) as estimated by USGS Water Resources Investigation 91-4142. Of this total amount (29,000 ac-ft/yr), DWA's share is approximately 25% (7,250 ac-ft/yr).

3 Table A Water figures are extracted from Table 2 of the April 2008 version of DWA's Engineer's Report "Groundwater Report and Replenishment Program for the Whitewater River Subbasin," and represent 65 percent of the maximum Table A Water Allocation. This figure accounts for a potential reduction (of 35%) in deliveries of Table A water as a result of recent litigation (Appendix B), and "The State Water Project Delivery Reliability Report 2007, Draft", prepared by the California Department of Water Resources, December 2007.

4 Ground Water Recharge is the amount of total water demand including demand from the project that recharges via percolation back into the Subbasin, and accounts for non-consumptive return flows of 35% in addition to recycled water.

5 Recycled Water is captured and treated effluent that can be used safely for irrigation. The use of recycled water reduces demand for groundwater by providing an alternative water source for non-potable uses.

6 Water production is based on DWA's projected demands, as cited in Table 15 of the 2005 UWMP, and represents the estimated quantity of water to be extracted from the basin.

7 Net Project Demand is based on the Water Supply Assessment Appendix A: Water Demand Projections, which is discounted by 64.9 acre-feet to reflect existing demand contained within the UWMP.

8 Cumulative balance is the annual amount of supply greater than demand in addition to water stored in previous years. Year 2010 assumes a Cumulative balance of 45,400 from year 2009 based on the UWMP Table 15.